
NSW Child Death Review Team

Annual Report

2012



October 2013

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

General enquiries: (02) 9286 1000
Toll free (outside Sydney Metro Area, NSW only): 1800 451 524
Facsimile: (02) 9283 2911
Telephone typewriter: (02) 9264 8050
Website: www.ombo.nsw.gov.au
Email: nswombo@ombo.nsw.gov.au

ISSN 1329-640X

ISBN 978-1-925061-15-4

NSW Government Publication

© NSW Ombudsman, October 2013

This work is copyright, however material from this publication may be copied and published by State or Federal Government Agencies without permission of the Ombudsman on the condition that the meaning of the material is not altered and the NSW Ombudsman is acknowledged as the source of the material. Any other persons or bodies wishing to use material must seek permission.

Foreword

On behalf of the NSW Child Death Review Team, I extend my sincere sympathies to the family and friends of children who have died and whose deaths are considered in this report. The death of any child is an immense loss – for their family and friends, and for our broader community. It is critical that every effort is made to prevent and reduce the likelihood of these deaths.

This report is about the 493 children whose deaths were registered in NSW in 2012. The number of deaths, and the mortality rate of 29.10 per 100,000 children, is the lowest since the Team began in 1996.

This is positive, and the Team welcomes important actions that have been taken in the past year to increase awareness and reduce deaths associated with swimming pools, low speed vehicle run-over incidents, and accidental poisoning. However, the report also demonstrates the need for further and concerted efforts to reduce child deaths.

Of current concern to the Team are the deaths of children associated with off-road vehicles. Over the 10 year period to 2012, 25 children died in off-road vehicle fatalities, involving vehicles such as quad bikes. The Team's review found that the risk of death or serious injury to children associated with the use of off-road vehicles is substantial, and the measures to prevent or mitigate the risk are insufficient.

Importantly, the report provides a sobering reminder that preventing child deaths is a whole-of-community responsibility. In 2012, the deaths of 20 children were intentional, including 16 deaths due to suicide. The report also underscores the importance of promoting key messages to parents and other carers about reducing the risk of sudden and unexpected death in infancy, particularly in relation to safe sleeping practices; and the risk of children drowning in bathtubs.

The work of the Team is focused on preventing child deaths, and ensuring that the knowledge gained from our reviews of these deaths assists in sustaining and improving the lives of others. To that end, the Team has made 12 recommendations, and will closely monitor their implementation.



Bruce Barbour

Convenor, Child Death Review Team
NSW Ombudsman

NSW Child Death Review Team

Team members in 2012 - 2013 were:

Statutory members

Mr Bruce Barbour

Convenor
NSW Ombudsman

Ms Megan Mitchell (until March 2013)

Commissioner for Children and Young People

Ms Kerryn Boland (from March 2013)

Commissioner for Children and Young People
Children's Guardian

Mr Steve Kinmond

Community and Disability Services Commissioner
Deputy Ombudsman

Agency representatives

Ms Robyn Bale (Education and Communities)

Director, Student Engagement and Interagency Partnerships
Department of Education and Communities

Detective Superintendent Michael Willing (from July 2012) (NSW Police Force)

Commander Homicide, NSW Police Force

Ms Anne Marie Dwyer (until December 2012) (Ageing, Disability and Home Care)

Executive Director, Prevention and Pathways, Ageing,
Disability and Home Care

Ms Christine Callaghan (from July 2013) (Ageing, Disability and Home Care)

A/Executive Director, Home Care and Operational Policy,
Ageing, Disability and Home Care

Ms Helen Freeland (until January 2013) (Community Services)

A/Deputy Chief Executive, Operations, Community Services

Ms Kate Alexander (from July 2013) (Community Services)

Establishment Senior Practitioner, 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 (NSW Health)

NSW Chief Paediatrician, Ministry of Health

Aboriginal representatives

Professor Ngiare Brown

Executive Manager Research, National Aboriginal
Community Controlled Health Organisation

Professor Megan Davis

Director, Indigenous Law Centre, University of NSW

Independent members

Dr Susan Adams

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

Dr Luciano Dalla-Pozza

Head of Department and Senior Staff Specialist (Oncology),
Children's Hospital at Westmead

Dr Jonathan Gillis

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

Dr Bronwyn Gould

General Practitioner

Dr John Howard

Senior Lecturer, National Drug and Alcohol Research Centre,
University of NSW

Professor Heather Jeffery

International Maternal and Child Health, University of Sydney/
Royal Prince Alfred Hospital

Professor Ilan Katz

Director, Social Policy Research Centre, University of NSW

Dr Helen Somerville

Visiting Medical Officer, Department of Gastroenterology,
Children's Hospital at Westmead

Dr Ella Sugo

Paediatric Pathologist, Sydney Children's Hospital

Acknowledgements

The Child Death Review Team would like to thank NSW state government and other agencies that provided data and other information for this report, including the NSW Registry of Births, Deaths and Marriages; the State Coroner's Office; the Victorian Institute of Forensic Medicine and Victorian Department of Justice (National Coronial Information System); the Department of Family and Community Services, in particular Community Services and the Child Death and Critical Reports Unit; NSW Health; and the NSW Police Force.

The Team would also like to acknowledge Sue Walker from the National Centre for Health Information Research and Kelly Savage for providing cause of death coding; and Fadwa Al-Yaman, Deanna Pagnini and Bernice Cropper from the Australian Institute of Health and Welfare for their work on two projects for the Team.

Thanks to Dr Jonathan Gillis, Dr Bronwyn Gould, Dr Michael Fairley and Dr Julie Brown for their review of matters and provision of expert advice.

The Team is also grateful for the input and advice of the members of the CDRT sub-committees. In this regard, we thank Professor Les White, Professor Heather Jeffery, Dr Bronwyn Gould, Dr Ella Sugo and Maurice Taylor for their work on Sudden Unexpected Death in Infancy; and thank Professor Ilan Katz, Helen Freeland, Steve Kinmond, Dr Jonathan Gillis, Kate Alexander, Kerry Boland, and Christine Callaghan for their advice on the Team's research project into causes of death of 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

Foreword.....	i
NSW Child Death Review Team.....	ii
Acknowledgements.....	iii
Executive summary.....	1
List of recommendations.....	8
Chapter 1. Introduction.....	10
Chapter 2. All child deaths in 2012	14
Chapter 3. Leading causes of death of children in NSW in 2012.....	19
Chapter 4. Children who died outside of NSW	24
Chapter 5. Deaths due to natural causes	25
Chapter 6. Deaths from conditions arising in the perinatal period	29
Chapter 7. Deaths from congenital and chromosomal causes	32
Chapter 8. Deaths from neoplasms	35
Chapter 9. Deaths from diseases of the nervous system	38
Chapter 10. Deaths from diseases of the respiratory system.....	40
Chapter 11. Deaths from endocrine, nutritional or metabolic diseases	42
Chapter 12. Deaths from diseases of the circulatory system	44
Chapter 13. Deaths from infectious and parasitic diseases	46
Chapter 14. Deaths of infants and Sudden Unexpected Death in Infancy	49
Chapter 15. Sudden Unexpected Death in Infancy (SUDI)	52
Chapter 16. Deaths from all external causes	67
Chapter 17. Transport fatalities	69
Chapter 18. Off-road vehicle fatalities 2003-2012	80
Chapter 19. Drowning	89
Chapter 20. Deaths from other unintentional external causes	97
Chapter 21. Suicide.....	102
Chapter 22. Fatal assault	112
Chapter 23. Monitoring recommendations.....	114
Appendix 1: Methods	123
Appendix 2: Definitions	126
Appendix 3: Definitional approach to Sudden Infant Death	129



Executive summary

The purpose of the NSW Child Death Review Team is to prevent or reduce the likelihood of child deaths. The Team reports annually on its work, including data, trends and patterns relating to child deaths, and its recommendations to reduce such deaths. This is the Team's seventeenth annual report, and the third since the NSW Ombudsman became Convenor.

The report provides information on 493 children whose deaths were registered in NSW in 2012.

The children who died in 2012

Consistent with previous years:

- most of the children who died (303; 61%) were infants under one year of age
- more males (293; 59%) than females (200; 41%) died, and
- Aboriginal and Torres Strait Islander children were over-represented in child deaths, with 52 children (11%) identified as Indigenous.

While most of the children who died (63%) lived in major cities, the mortality rate was highest in remote areas of NSW. The mortality rate was also highest amongst children who lived in the least socioeconomically advantaged areas.

The families of 88 children (18%) had a child protection history.

Leading causes of death in 2012

As the final cause of death of 35 children was unavailable at the time of writing, information and analysis relating to causes of death in the report focuses on 458 children.

Overall, the leading causes of death for children in NSW in 2012 were consistent with previous years. The majority of deaths (357 children; 78%) were due to natural causes, over half of which were due to certain conditions arising in the perinatal period (32%), and congenital/chromosomal causes (22%). External (unnatural) causes comprised the third leading cause of the deaths of children in 2012 (18%).

While the leading cause of death of infants was perinatal conditions, the leading cause for children over one year of age was transport fatalities, followed by neoplasms (cancers and tumours).

Male children outnumbered female children in the majority of the leading causes of death. The largest gender imbalance was in deaths from external causes. Almost twice as many males died from unnatural causes than did females.

Natural causes of death

Natural causes accounted for most of the deaths of infants aged less than one year (92%), and children aged 1-4 years (67%), 5-9 years (70%), and 10-14 years (54%). The lowest proportion of deaths from natural causes was amongst children aged 15-17 years (38%).

Conditions arising in the perinatal period

148 children died as a result of conditions arising in the perinatal period, such as complications of pregnancy, labour and delivery, and disorders related to length of gestation and foetal growth, such as prematurity. The rate of perinatal deaths in 2012 was 1.49 per 1,000 live births. Most perinatal deaths occur in the first day of life: in 2012, just over half of the children who died from these conditions were less than one day old.

Congenital malformations and chromosomal abnormalities

102 children died from congenital (88) and chromosomal (14) causes. The leading causes were congenital malformations of the circulatory system (31%), and congenital malformations of the nervous system (23%). The vast majority of the children who died from congenital and chromosomal causes (82%) were less than one year of age; almost half of these children died in the first day of life. The rate of death from these causes in 2012 was 6.21 per 100,000 children.

Neoplasms

29 children died as a result of neoplasms (cancers and tumours). In 2012, cancers and tumours were the leading natural cause of death of children aged one year and over. The rate of death was 1.77 per 100,000 children, which was lower than previous years. The most common causes of death from cancers and tumours were leukaemias (10 children) and malignant brain tumours (7 children).

Diseases of the nervous system

25 children died as a result of diseases of the nervous system, mainly cerebral palsy, epilepsy, and spinal muscular dystrophy. The rate of death from this cause was 1.52 per 100,000 children. There has been a decline in these deaths in NSW over the past 15 years.

Diseases of the respiratory system

14 children died from diseases of the respiratory system. Half of these deaths were due to asthma, and four deaths were attributed to pneumonia. The rate of death from respiratory diseases in 2012 was 0.85 per 100,000 children.

Endocrine, nutritional or metabolic diseases

11 children died as a result of metabolic diseases, including Batten disease, glycoprotein disorders and cystic fibrosis. There were no deaths due to endocrine or nutritional diseases in 2012. The rate of death from metabolic diseases was 0.67 per 100,000 children.

Diseases of the circulatory system

10 children died from circulatory system diseases, including myocarditis, cardiomyopathy, and heart disease. Four of the 10 deaths were considered to be sudden cardiac deaths. The rate of death from circulatory system diseases was 0.61 per 100,000 children.

Infectious or parasitic diseases

Seven children died from infectious diseases, including sepsis, viral carditis, pertussis and meningococcal infection. There were no deaths due to parasitic diseases in 2012. The rate of death from infectious diseases was 0.43 per 100,000 children.

Sudden and Unexpected Deaths in Infancy (SUDI)

Of the 303 infants whose deaths were registered in 2012, 50 (17%) 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 healthy babies who die suddenly and unexpectedly. It includes Sudden Infant Death Syndrome (SIDS).

Of the 50 SUDI:

- Most (32) of the infants died in the first three months of life. Thirteen infants were less than 28 days old (neonates).
- Over half (28) of the infants were male.
- Nine of the infants were Aboriginal. Aboriginal infants were overrepresented in SUDI, comprising 18 per cent of these deaths in 2012.
- Over one-third (19) of the infants had a parent(s) who was born overseas in a country where the main language is not English.
- Infants from families with a child protection history were overrepresented in SUDI. Of the 50 families, over one-third (17) had a child protection history. The vast majority (16) of the 17 infants with a child protection history who died suddenly and unexpectedly were in unsafe sleep environments when they died.

Cause of death

At the time of writing, information on cause of death was available for 29 of the 50 infants:

- The cause of death of 13 infants was identified after investigation. The majority of explained SUDI (9) were due to diseases and conditions that were not recognised as life threatening prior to death, including cardiac conditions and respiratory infections.
- The cause of death of 16 infants remained unexplained after investigation. The deaths of these infants were generally classified as consistent with SIDS, or due to ill-defined or unspecified causes of mortality.

Modifiable risk factors

Modifiable risk factors for SUDI include exposure to tobacco smoke; infants sharing a sleep surface with another person; not placing infants on their back to sleep; infants placed to sleep with loose bedding or other items; and infants placed to sleep in bedding that is not infant-specific.

In 2012, more than three-quarters (39) of the 50 infants had at least one modifiable risk factor present. Almost all of these infants (37) died while they were in a sleep environment, and most (22) had three or more risk factors present. Only three infants who died in a sleep environment were placed to sleep alone in fixed infant-specific bedding.

Prevention messages

Key prevention messages to reduce the risk of SUDI are: to sleep babies on their back in a safe sleeping environment, on their own, with their head and face uncovered, without loose bedding or objects, and in the same room as an adult caregiver; to keep babies smoke free before and after birth; and to breastfeed.

The Team's recommendations are aimed at achieving a comprehensive response to SUDI, including a multi-disciplinary case review approach to the SUDI investigation process; an increased proportion of SUDI that are explained; and greater timeliness of forensic pathology results. The Team is also focused on attaining consistent promotion of safe sleeping messages in maternity facilities and the broader community, including education targeted at high-risk groups; and reducing the risk of SUDI in families with a child protection history.

External causes of death

The deaths of 83 children were due to external (unnatural) causes. The majority (63) were due to unintentional or accidental causes, mainly related to transport fatalities (39) and drowning (11). The deaths of 20 children were intentional, due to suicide (16) or fatal assault (4).

Transport fatalities

The deaths of 39 children in 38 transport incidents were registered in 2012. Consistent with previous years, transport fatalities were the leading external cause of death of children in NSW. The rate of death was 2.37 per 100,000 children, which was slightly higher than the previous two years.

Of the 39 children who died in transport fatalities:

- Over half (20) were teenagers. Most of the teenagers (13) were 17 years of age, including seven who were driving a vehicle at the time of their death.
- The majority (26) were male. In 2012, the rate of death from transport incidents of boys was almost twice that of girls.
- Four children (10%) were Aboriginal

Motor vehicle fatalities

The majority (28) of the children died in motor vehicle incidents: almost half of the children (19) were passengers, and nine were drivers. Most (18) of the motor vehicle fatalities were single vehicle incidents, involving collision with stationary objects, such as trees.

Most (16) of the 19 passenger deaths of children involved vehicles with adult drivers. Thirteen of these children who died as passengers were using some form of child safety restraint at the time of the fatality. For most (9) of the 13 children, the restraints were incorrectly or inappropriately used, such as straps being twisted or not fitted to the vehicle's anchor point, and children being below the recommended height for the use of an adult seatbelt.

There was a range of contributing factors to the motor vehicle fatalities that were largely preventable. These included speed (15), drug or alcohol use (5), fatigue (5), and worn tyres (2). Environmental factors, such as heavy rain, poor street lighting, and a slippery road surface were present in eight of the fatalities.

Pedestrian deaths

Six children who died were pedestrians. The vast majority (5) were male. Half of the pedestrian deaths involved a vehicle travelling forward at low speed, including travelling across a pedestrian crossing, manoeuvring in a cul-de-sac, and exiting a car park.

Contributory factors to the pedestrian deaths of children included limited visibility (2), negligent or reckless driving (2), alcohol (1), and speed (1).

Other transport fatalities

Five children died in other transport fatalities, mainly involving incidents in which they were travelling or riding outside the vehicle in a position not intended for passengers. This included standing in the tray of a utility vehicle, holding onto a vehicle while riding a skateboard, and leaning out of a train. All of the children were male and aged 11-17 years.

Prevention measures

Key factors in the deaths of children in transport incidents in 2012 included speed; young drivers and risk-taking behaviour; and failure to use, or incorrect/inappropriate use of, child safety restraints. In the main, these factors have been identified in targeted prevention measures and behaviour modification strategies by NSW Government agencies and injury prevention organisations.

Off-road vehicle fatalities 2003-2012

This year, the Team undertook a 10-year review of the deaths of children in off-road vehicle incidents. Between 2003 and 2012, 25 children died in off-road vehicle fatalities in NSW. The incidents mainly involved off-road motorcycles (13) and 'all-terrain' and other motor vehicles designed primarily for off-road use (11), such as quad bikes.

Off-road motorcycle fatalities

Thirteen children died in off-road motorcycle (or 'dirt bike') fatalities. All of the children were male, and their average age at death was 14.2 years.

The vast majority of the fatalities (11) occurred off-road, mainly on state forests or fire trails (4), racetracks (3), and tracks/jumps on private property (2). Most (10) of the children were riding for recreation.

The majority of the fatalities (10) were single vehicle incidents, where the child hit a stationary object such as a tree, or came off the bike during jumps or other activities. Three fatalities resulted from collision with another motorcycle.

Most (82%) of the children were wearing a helmet at the time of the fatality. Less than half of the children who died in off-road motorcycle fatalities had adult supervision at the time of the incident.

Quad bike and side-by-side vehicle fatalities

Quad bikes are four-wheeled motorcycles that are frequently used for both recreation and agricultural work. They are considered to be inherently unstable on anything other than flat terrain, and are not designed to carry passengers. Side-by-side vehicles are designed for off-road use and can transport at least two people on a bench-type seat.

Ten children died in incidents involving quad bikes (6) and side-by-side vehicles (4) in NSW. The children were aged between one and 16 years. The average age at death of children in quad bike fatalities was nine years; the average age of the children who died in side-by-side vehicle fatalities was slightly older, at 11.75 years. The vast majority (9) were riding for recreation.

Most (6) of the children were passengers, including three children who were being driven by other children (aged two to 12 years). Four of the children (aged 9-16 years) were driving the vehicle at the time of the fatality, and one of the children driving a quad bike was carrying multiple passengers.

The majority (7) of the fatalities resulted from the vehicle tipping or rolling over. In four of these incidents, the roll-over occurred while the vehicle was going up a steep incline. The injuries sustained in the incidents were primarily severe head injuries and crush injuries. Two children were wearing a helmet at the time of the fatality.

Most (7) of the children were with, or watched by, adults. All of the peer drivers had been given permission by adult supervisors to control the vehicle.

Prevention measures

Key areas that have been identified as necessary to prevent death and serious injury of children relating to the use of off-road vehicles include:

- greater public awareness of the dangers of off-road vehicles

-
- introduction of engineering controls – including fitment of roll over protective structures to quad bikes; and measures to prevent operation of the vehicles by children, and
 - introduction of administrative controls – such as vehicle registration; rider training and licensing; and requirements relating to a minimum age of 16 years, no passengers, and mandatory use of personal protection, such as helmets.

The Team believes that a coordinated approach is required to prevent the deaths of children in relation to off-road vehicles, including consideration by government and injury prevention groups of the need for specific strategies to reduce the risks.

Drowning

In 2012, the drowning deaths of 11 children were registered in NSW. This is the lowest number of deaths due to drowning since 2005, and represents a mortality rate of 0.67 deaths per 100,000 children.

Drowning was the second most common unnatural unintentional cause of death of children in NSW, and was the leading external cause of death for children aged 1-4 years. As in previous years, the majority of the children who drowned were very young: almost two-thirds (7) were four years of age or younger.

Consistent with deaths over the past 15 years, the majority (9) of the children who drowned were male. In 2012, the rate of death of males from drowning was four times that of females.

One of the children who drowned was of Torres Strait Islander descent. This was a notable decrease from 2011, when seven Indigenous children drowned.

Circumstances of drowning

Of the 11 children who drowned in NSW:

- Four children drowned in private swimming pools, all of which were permanent in-ground pools. The children were aged one to eight years. All were out of sight of adults for periods ranging from five minutes to over an hour.
- Four children drowned in natural bodies of water, including oceans, a lake and a river. Two of the deaths occurred in boating incidents, and two occurred during recreational swimming. Environmental conditions contributed to each of the deaths, including strong tides and rips, low visibility, strong winds, and turbulent water.
- Two children drowned in bathtubs. Both were very young and were not directly supervised by an adult at the time of the fatality.
- One child drowned in an irrigation channel on a rural property.

Drowning deaths of children in bathtubs 2003-2012

Between 2003 and 2012, 21 children in NSW drowned in bathtubs. The majority (15) of the children were under two years of age.

Of the 15 children under two years of age:

- The vast majority (13) had been placed in the bath by their carer/ adult supervisor, and were unsupervised at the time of the fatality. The other two children accessed bathtubs that contained water, without the carer's knowledge.
- Information relating to the length of time children were unsupervised was available for eight children. Most (5) were unsupervised for less than five minutes.
- Relevant factors in the deaths included that the children were left with young siblings (aged 2-5 years), or had been left in a bath that was not completely drained of water. In three incidents, the carer fell asleep while in the bathroom with the child; alcohol was a factor in two of the three incidents.

Prevention measures

Prevention messages in relation to bathtub drowning deaths focus on ensuring constant and arms-length adult supervision of young children in the bath, and restricting access to bathtubs without supervision.

In relation to swimming pools, the NSW Government has amended legislation to increase safety around backyard swimming pools and reduce drowning and near-drowning incidents by including requirements that owners register their pools, and that councils develop a pool inspection program. The Team's recommendations are aimed at ensuring that properties with swimming pools where young children reside or regularly visit are prioritised for inspection, and that the legislative amendments are accompanied by a comprehensive education and awareness campaign.

Other deaths due to unnatural unintentional causes

Excluding SUDI, 13 children whose deaths were registered in 2012 died from other unintentional external causes.

Four of the 13 children died from complications of surgery or underlying medical conditions, including two children whose deaths were associated with organ transplants. Three children died as a result of unintentional poisoning.

The deaths of two children resulted from accidental threats to breathing, including accidental asphyxiation and choking on food. Two children died during play, including a fall from a tree-house and being hit by a projectile. One child died after being crushed by machinery at a workplace, and one child died in a household fire.

Deaths from unintentional poisoning

The deaths of three young people, aged 15-17 years, were due to unintentional poisoning. Each of the deaths was associated with drug use.

Two of the young people died from mixed drug toxicity associated with the use of narcotics and various psychoactive drugs. Both had taken multiple drugs, and had a background of substance use. The other young person died after ingesting a fatal level of a substance thought not to be toxic. While the young person believed that the substance was a hallucinogenic drug, it turned out to be a synthetic drug, '251-NBOMe'.

The deaths of young people from unintentional poisoning in 2012 reflect broader trends relating to deaths from this cause over the past 15 years. During that time, 67 children or young people died as a result of unintentional poisoning; most (51) were 15-17 years of age. Key factors in these deaths related to adolescent risk-taking and experimentation, poly drug use, and vulnerable adolescents with a child protection history.

Of the 51 adolescents who died from unintentional poisoning in 1998-2012:

- Most (38) died as a result of toxic levels of narcotics and/or psychoactive drugs. Almost two-thirds (31) of the deaths involved illicit drugs, including heroin, methamphetamine, amphetamines, cocaine, MDMA (ecstasy), and cannabis.
- Almost two-thirds (31) of the adolescents had engaged in poly drug use (involving the use of two to five drugs). The combination of drugs typically involved both illicit and prescription drugs, such as heroin or amphetamines and benzodiazepines; or methadone, antidepressants and alcohol. Just over half of the deaths involved the use of multiple depressants, including two of the young people who died in 2012.
- Over half (30) of the adolescents had complex and multiple needs, and had experienced substantial childhood trauma, neglect and/or abuse, and contact with the criminal justice system. Almost all were well known by agencies for their drug use, and many had a history of involvement in detoxification and rehabilitation programs. Over half (29) had a child protection history.

Prevention measures

Substance use is determined by numerous inter-related individual, family, social, environmental and other risk factors. There is a range of drug and alcohol and youth focused organisations that currently provide useful information and resources on individual drugs, their effects, and treatment of substance abuse. There are also numerous strategies and activities that target adolescent and young adult drug use.

The Team considers that two areas that may warrant attention in future preventative campaigns are the use of pharmaceuticals (such as opioids and benzodiazepines) by young people, and the risks associated with mixing drugs.

The NSW Government is currently undertaking work aimed at developing and improving services to vulnerable teens. Ongoing reform in this area will be closely monitored by the NSW Ombudsman.

Suicide

The deaths of 16 young people registered in NSW in 2012 were suicides. After transport fatalities, suicide was the second leading cause of death of young people aged 15-17 years. This was also the case in the previous two years. Since 1998, there has been no significant change in the suicide mortality rate, with an average of 16 deaths per year.

The age of the young people ranged from 13 to 17 years. The majority (14) were 15 years and older. While nine of the 16 young people who died from suicide were male, there were more female deaths attributed to suicide in 2012 than there had been since 2004.

In 2012, the deaths of four Indigenous young people were due to suicide, double the number that occurred the previous year. Of the 16 young people who died as a result of suicide in 2012, most lived at home with at least one parent (10), and were attending school (11). Half died at their family home or other usual place of residence.

Intent and precipitating factors

Just over half (9) of the young people documented their intent to suicide, via a note or letter, social networking website, text messages, and/or video diary. Another six young people had previously raised the subject of suicide, made suicide threats or attempts, experienced suicidal ideation, and/or engaged in self-harming behaviour.

For half of the young people who died from suicide in 2012, records indicated possible precipitating events that included a relationship breakdown with a boy/girlfriend, an argument with a close friend or family member, and problems with schooling and future education opportunities.

Risk factors associated with suicide

There are a range of interrelated biological, social and psychological risk factors associated with suicidal behaviour. These include: mental health conditions such as depression, anxiety disorders, personality disorders and behavioural disorders; previous suicidal 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 2012:

- All of the young people experienced at least one risk factor associated with suicide. The majority (14) experienced multiple risk factors.
- Interpersonal or personal stressors were present for the vast majority (15) of the young people, with most experiencing a combination of stressors including educational, social, peer, family, personal or other relationship difficulties.
- The majority (13) had experienced mental health issues, either a diagnosed mental illness or undiagnosed mental health problems.
- Most (12) exhibited prior suicidal or self-harming behaviours, or prior suicidal thoughts and/or discussions.

Prevention measures

The *NSW Suicide Prevention Strategy 2010-2015* is a whole-of-government strategy that includes specific actions targeted to children and young people. The Team's recommendations have been aimed at ensuring that the Strategy includes a focus on making use of new media to deliver prevention services to young people, developing resources to educate young people on the importance of passing on suicide risk concerns about peers, and increasing collaboration between schools and youth mental health services.

Fatal assault

The deaths of four children registered in NSW in 2012 were due to fatal assault. All fatal assault deaths of children and young people are subject to separate review by the NSW Ombudsman, as 'reviewable deaths'.

All of the children were male and aged between two and 17 years. One child was Aboriginal. The families of two of the children who died as a result of fatal assault had a child protection history.

Most fatal assault deaths of children in Australia are familial homicides. Three of the four deaths in 2012 occurred within a familial context, allegedly involving biological parents and a step-parent. One teenager was allegedly killed by a peer.

In the past 15 years, more than two-thirds (69%) of child homicides were committed by family members, primarily parents. The remaining assaults were perpetrated by peers (16%) or other unrelated persons (15%).

List of recommendations

Sudden Unexpected Death in Infancy (SUDI)

NSW Kids and Families (page 73)

1. In relation to NSW Kids and Families' file audits to assess compliance with the *Death – Management of Sudden Unexpected Death in Infancy* policy directive, the agency should provide detailed advice to the Team on:
 - (a) the scope and method of the audits
 - (b) the findings of the audits, and
 - (c) any action NSW Kids and Families intends to take in response to the findings.
2. In relation to the review of the *Death – Management of Sudden Unexpected Death in Infancy* policy directive and model of response to SUDI, NSW Kids and Families should:
 - (a) provide advice to the Team on the terms of reference and timeframes of the review, and
 - (b) include consideration of 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.
3. In relation to the promotion of safe sleeping practices, NSW Kids and Families should provide detailed advice to the Team on:
 - (a) the outcome of the audits conducted by Local Health Districts to assess compliance with the *Maternity – Safer Sleeping Practices for Babies in NSW Public Health Organisations* policy directive. The advice should include Kids and Families' assessment of:
 - (i) the adequacy of the audits, including the scope and method (such as the use of spot-checks)
 - (ii) the findings of the audits regarding compliance with the policy requirements, and
 - (iii) whether there are any systemic issues arising from the audits and, if so, the actions NSW Kids and Families will take in response.
 - (b) the outcome of NSW Kids and Families' consultation with SIDS and Kids and Community Services regarding the available education resources and online packages for staff.

Ministry of Health (page 73)

4. In relation to post mortem examinations following unexpected deaths of infants, the Ministry of Health should provide advice to the Team on current or planned initiatives to:
 - (a) reduce forensic pathology delays, and
 - (b) increase the proportion of SUDI that are explained.

Department of Family and Community Services, Community Services (page 73)

5. In relation to Community Services' cohort review of SUDI where the infant's family had a child protection history, the agency should provide detailed advice to the Team on:
 - (a) the findings of the review
 - (b) the strategies and training resources that Community Services will develop to assist caseworkers to assess risk for infants and provide casework services and targeted education to at-risk families, and
 - (c) how the agency will audit or otherwise measure practice and related outcomes.

Off-road fatalities

The Centre for Road Safety (page 87)

6. In the context of the Centre for Road Safety's (CRS) analysis of data relating to low speed vehicle run-over incidents and its plans to convene key injury prevention agencies to determine further countermeasures to address such incidents, CRS should provide advice to the Team on:
 - (a) key findings or results from the data analysis, and
 - (b) the outcomes of the consultations/ forum with relevant agencies, including any areas of further work to prevent low speed vehicle run-over fatalities.

Department of Premier and Cabinet (page 97)

7. The Department of Premier and Cabinet (DPC) should bring together key injury prevention and regulatory agencies to consider the findings of this report to identify whether specific strategies are needed in NSW to reduce the risk of death and injury of children in relation to off-road vehicle incidents. In particular, DPC, with agencies, should consider:
 - (a) existing or planned initiatives within NSW and at the national level
 - (b) the need for targeted research, including environmental and vehicle design elements of prevention and attitudinal research relating to parent and carer perceptions of risk
 - (c) the need for public awareness strategies, including print and electronic media resources that recognise the behavioural, environmental and vehicle design elements of prevention, and
 - (d) the need for regulation of the recreational use of such vehicles on private property, including licensing, registration, and requirements relating to safety equipment such as helmets.
8. DPC should provide detailed advice to the Team on the outcomes of this work, including identified strategies and how they will be progressed.

Private swimming pools

Department of Premier and Cabinet, Division of Local Government (page 103)

9. In relation to targeting swimming pool inspection programs to pools at premises where children, particularly those under five years of age, reside or regularly visit, the Division of Local Government should:
 - (a) provide detailed advice to the Team as to the demographic information available to Councils that will enable them to identify and prioritise the inspection of the pools of these premises, and how the Division encourages Councils to target resources towards swimming pools used by young children, and
 - (b) provide a copy of the Division's guidelines to assist Councils to develop their pool inspection programs.
10. The Division of Local Government should advise the Team of the timeframe for issuing the Swimming Pools Regulations.
11. In relation to the development of targeted educational resources on the Swimming Pools Act amendments and safety requirements, the Division of Local Government should provide detailed advice to the Team on progress with:
 - (a) the education and awareness campaign it is conducting with Royal Life Saving Australia (NSW) and other stakeholder agencies, and
 - (b) the development of specific resources for lessees of rental properties on the legal and safety requirements for installing an above-ground or inflatable pool at rented premises.

Suicide

Ministry of Health (page 122)

12. The Ministry of Health should provide detailed advice to the Team on the progress of the project to develop resources to support safe and effective discussion of suicide, *Conversations Matter*. The advice should include information about the intended approach of the project in relation to children and young people, and timeframes for completion.

Chapter 1. Introduction

Since 1996, the NSW Child Death Review Team (the Team) has been responsible for reviewing and reporting on child deaths in NSW. This is the Team's seventeenth report, and the third since the NSW Ombudsman became Convenor of the Team and responsibility for support and assistance for the Team transferred to his office.¹

This report provides information on 493 children and young people whose deaths were registered in NSW in 2012.

1.1 The purpose of the Team

The Team is established under Part 5A of the *Community Services (Complaints, Reviews and Monitoring) Act 1993*, for the purpose of preventing and reducing the deaths of children in NSW.

The legislation requires the Team to comprise the NSW Ombudsman (Convenor); the Commissioner for Children and Young People; the Community and Disability Services Commissioner; representatives of certain 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 work of the Team; and two members who are Aboriginal. Members of the Team in 2012 are outlined on page ii.

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 relating to those deaths
- undertake research that aims to help prevent or reduce the likelihood of child deaths, and to identify areas requiring further research, and
- make recommendations as to legislation, policies, practices and services for implementation by government and non-government agencies and the community to prevent or reduce the likelihood of child deaths.

1.2 This report

1.2.1 Methodology

The methodology used in this report is detailed in Appendix 1, and definitions are provided in 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.

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 Organization (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 Organization as the 'disease or injury that initiated the train of events leading directly to death, or the circumstances of the accident or violence which

1 In late February 2011, responsibility for support and assistance for the Team transferred to the NSW Ombudsman from the NSW Commission for Children and Young People.

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

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

In addition, cause of death coding identifies:

- direct cause of death – the final condition or event that actually caused death (for example, cardiac arrest or respiratory failure)
- intervening causes of death – other conditions that may have given rise to the immediate cause of death, and
- contributory causes of death – conditions or events that were present in 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

1.2.2 Identifying and reporting 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.⁵ This has been an ongoing concern for the Team.⁶

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.⁷

As was the case in 2010 and 2011, 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 their NSW Births, Deaths and Marriages birth certificate.
- Agency records identify the child as Aboriginal or Torres Strait Islander through a number of records, which were corroborative. Records used to do this include the NSW Police Computer Operated Policing System and Community Services KIDS 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.⁸

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

1.2.3 The child death register and data issues

2012 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 an extent, 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.

In some areas, there have also been additional issues that have impacted on data reliability. As noted in last year's report, the Team has adopted different practices over time that can affect trend reporting and the comparison of current trend data to

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

4 *Ibid.*

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

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

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

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

previously published work. Examples include the identification of Aboriginal and Torres Strait Islander status and the definition of Sudden Unexpected Death in Infancy. In the main, differences arising from changed practices affect the comparison of data on a year by year basis, but not overall trends.

In addition, in 2007-2009, the Team used an 'all cause' approach to reporting that allowed for multiple counts of cause of death. As a result, previous reports have reported deaths against a number of causes, rather than identifying one underlying cause. Again, this tends to affect comparison of data on a year by year basis, but not overall trends.

The child death register

Last year's report outlined the considerable challenges faced by the Team in relation to the child death register, and the pressing need for a new data system. In summary, the register has outgrown its original platform and the data capture has become inconsistent over time, which has adversely affected the Team's ability to reliably and consistently extract and analyse information.

A key priority for the Team has been the development of an integrated, reliable and sustainable death register that provides for efficient extraction of meaningful data for prevention purposes. Earlier this year, NSW Treasury approved a business case for a new register, enabling the Team to commence the necessary major re-build. This critical work will be the key focus of the Team over the next year.

Aboriginal and Torres Strait Islander status

As was the case last year, this report does not provide trend information for Indigenous children, due to problems with data consistency and comparability.

Over time, the Team has used different approaches to identify Aboriginal and Torres Strait Islander status and the base population of Indigenous children in NSW that enables the calculation of mortality rates. As a result, 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.

The approach taken by the Team in 2011 and 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. Consequently, while the number of children identified each year may be more accurate, the mortality rate is likely to be over-estimated.

To improve the accuracy of data and the capacity to report on trends, this year the Team has contracted the Australian Institute of Health and Welfare (AIHW) to provide expert advice on how the Team should best collect and report on Aboriginal and Torres Strait Islander status of children who die in NSW.

Following provision of the expert advice, the Team will commence work to bring its approach in line with best practice and consider options for further work in relation to the deaths of Indigenous children.

1.2.4 Structure of the report

Chapter 2 provides demographic and other information about the children who died in 2012, and trend analysis.

Chapter 3 presents an analysis of leading causes of death for children in 2012 by key demographic variables.

Chapter 4 of the report provides information about the deaths of children who were usually resident in NSW but died outside of the state.

Chapters 5 to 13 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.

Chapters 14 and 15 detail information about the deaths of infants, and Sudden Unexpected Deaths in Infancy.

Chapters 16 to 22 focus on external (unnatural) cause 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 fatalities (including a 10-year review of off-road vehicle fatalities)
- drowning
- other unintentional external causes
- suicide, and
- fatal assault.

Chapters 23 reports on progress in relation to the implementation of previous recommendations made by the Team.

1.3 Work of the Team and future plans

1.3.1 Key work of the Team

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 2011 report, the work of the Team has included:

- Analytic process improvements to the CDRT register, including actions to increase the stability of the system and to support data quality and analysis.
- Release of an issues paper on low speed vehicle run-over fatalities of young children in 2002-2011.
- Completion of a research project to analyse causes of death of children with a child protection history over a 10-year period.
- Contracting expert advice on identifying and reporting Aboriginal and Torres Strait Islander status.
- Holding a Team Planning meeting in March 2013, to identify opportunities and priorities for the Team's work.

Following the planning meeting, the Team developed a high-level strategic plan for its work over the next three years. In the coming year, priorities include establishing an integrated death review data system, obtaining the aforementioned expert advice on identifying and reporting Aboriginal and Torres Strait Islander status, and strengthening the Team's links to injury prevention and child safety agencies and researchers.

Reporting on the Team's research

Under CS CRAMA, the Team may, at any time (and at least every three years), report to Parliament on the results of research undertaken in the exercise of its functions. The Team's last research report – *A preliminary investigation of neonatal SUDI in NSW 1996-2008: opportunities for prevention* – was released in October 2010. In the intervening period, the Team has transitioned to the Ombudsman's office, and work has focused on integrating and improving systems and processes, producing detailed annual reports and issues papers, and strengthening the membership and effective operation of the Team.

In 2013, the Team completed a research project analysing the causes of death of children with a child protection history in the 10 year-period 2002-2011. The Australian Institute for Health and Welfare (AIHW) conducted the project, using data provided by the Team.

Amongst other things, the research found that children with a child protection history have a higher mortality rate than children without a child protection history. Given the complexities involved, it is important that the Team's research is supplemented by broader consideration and analysis of the child protection system. In this regard, in early 2014, the Ombudsman will table a special report in Parliament on progress towards strengthening the child protection system and responding to capacity challenges and other issues. The Team will release its special report on the causes of death of children with a child protection history at the same time as the Ombudsman's report.

1.3.2 Disclosure of information authorised by the Convenor

CS CRAMA contains strict confidentiality conditions that prevent the disclosure of CDRT information except in specific circumstances. Section 34L(1)(b) of the legislation provides for the Convenor to authorise the disclosure of information in connection with research that is undertaken for the purpose of helping to prevent or reduce the likelihood of deaths of children in NSW.

Since the last report, the Convenor authorised the disclosure of information pursuant to s34L(1)(b) on five occasions. Two requests, from a government agency and infant mortality researchers, related to the provision of data to inform research and reviews of the sudden and unexpected deaths of infants. Two requests were received from child death review teams in other Australian jurisdictions for de-identified data, and one request was made by a health organisation for de-identified data relating to the deaths of children in above-ground swimming pools.

Chapter 2. All child deaths in 2012

The deaths of 493 children were registered in NSW in 2012.

As shown in table 1, the number of deaths and the Directly Standardised Mortality Rate (DSMR)⁹ of 29.10 per 100,000 children aged 0-17 years are the lowest since the CDRT began in 1996.

Table 1: Deaths of children from all causes – deaths registered, 1998-2012

Year	Population	Deaths	Crude Mortality Rate	Directly Standardised Mortality Rate	95% Lower Confidence Limit	95% Upper Confidence Limit
1998	1582970	720	45.48	45.66	42.38	49.12
1999	1590912	813	51.10	51.24	47.78	54.89
2000	1600335	753	47.05	47.12	43.81	50.61
2001	1612999	715	44.33	44.33	41.14	47.70
2002	1610765	636	39.48	40.39	37.31	43.66
2003	1605241	645	40.18	40.96	37.86	44.25
2004	1599934	617	38.56	39.35	36.31	42.59
2005	1601597	668	41.71	41.98	38.86	45.29
2006	1610112	630	39.13	38.15	35.23	41.25
2007	1608544	597	37.11	36.53	33.66	39.59
2008	1610679	608	37.75	36.38	33.55	39.40
2009	1616319	580	35.88	34.11	31.38	37.01
2010	1624687	590	36.31	34.70	31.96	37.63
2011	1634606	582	35.60	33.81	31.12	36.69
2012	1642401	493	30.02	29.10	26.59	31.80

⁹ 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 2012.

Table 2: Key demographic and individual characteristics – deaths, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval ¹⁰	Incident Rate Ratio ¹¹	p ¹²
Total	493	100	30.02	27.37 - 32.67		
Gender						
Female	200	41	25.05	21.58 - 28.53		
Male	293	59	34.71	30.74 - 38.68	1.39	0.0002
Age						
Under 1 year	303	61	325.41 (3.06)†	288.77 - 362.05		
1-4 years	49	10	12.83	9.49 - 16.96	0.04	
5-9 years	44	9	9.76	7.09 - 13.10	0.03	
10-14 years	35	7	7.92	5.52 - 11.01	0.02	
15-17 years	62	13	22.59	17.32 - 28.96	0.07	
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	441	89	28.07	25.45 - 30.69		
Aboriginal or Torres Strait Islander	52	11	73.04	54.55 - 95.78	2.60	0
Remoteness*						
Major cities	303	63	25.71	22.81 - 28.60		
Inner regional areas	110	23	32.40	26.35 - 38.46	1.26	
Outer regional areas	55	12	51.43	38.75 - 66.95	2.00	
Remote areas	9	2	107.87	49.33 - 204.78	4.20	
Very remote areas	1	0	-	-	-	
Socioeconomic status**						
Quintile 5 (highest)	102	22	25.18	20.29 - 30.06		
Quintile 4	105	22	36.04	29.14 - 42.93	1.43	
Quintile 3	84	18	30.24	24.12 - 37.43	1.20	
Quintile 2	64	14	18.46	14.22 - 23.57	0.73	
Quintile 1 (lowest)	115	24	41.39	33.83 - 48.96	1.64	

*Remoteness was not calculated in 15 cases.

**Socioeconomic status was not calculated for 23 cases.

† Infant Mortality Rate.

2.1.1 Age and gender

As has consistently been the case, infants accounted for almost two-thirds of all child deaths in NSW (303). The mortality rate decreased to a minimum in the 10-14 year age group, then rose again in the 15-17 year age group.

The mortality rate was lower than previous years for all age groups, except for children aged 5-9 years. Compared with 2011, the crude mortality rate for 5-9 year olds in 2012 increased approximately two per 100,000 population. However, this falls within the range estimated by the 2011 confidence intervals and therefore may not be significant.

10 The confidence interval estimates the range in which some proportion (95%) of the statistics from all samples will fall (see Appendix 1 for more information).

11 The Incident Rate Ratio is the ratio of the mortality rates for two exclusive classes of people, such as male and female (see Appendix 1).

12 The p-value is a quantitative measurement of the likelihood that a statistic occurred by chance. All p-values noted in this report are statistically significant (see Appendix 1).

As shown in tables 3 and 4, and consistent with previous years, more males (293) than females (200) died. The directly standardised mortality rate for males (33.86 per 100,000 children) and females (24.15 per 100,000 children) in 2012 represented the lowest rates to date.

Table 3: Deaths of male children from all causes – deaths registered, 1998-2012

Year	Population	Deaths	Crude Mortality Rate	Directly Standardised Mortality Rate	95% Lower Confidence Limit	95% Upper Confidence Limit
1998	811151	439	54.12	54.53	49.55	59.89
1999	814983	463	56.81	57.29	52.19	62.76
2000	819929	446	54.39	54.69	49.73	60.01
2001	827100	410	49.57	49.57	44.89	54.61
2002	825622	372	45.06	46.17	41.59	51.11
2003	822802	362	44.00	44.93	40.42	49.81
2004	820172	343	41.82	42.71	38.31	47.49
2005	821481	390	47.48	47.79	43.16	52.78
2006	825664	385	46.63	45.73	41.27	50.54
2007	825397	333	40.34	39.79	35.63	44.31
2008	826739	364	44.03	42.83	38.54	47.48
2009	830207	339	40.83	39.10	35.04	43.51
2010	834620	362	43.37	41.70	37.51	46.24
2011	840269	327	38.92	37.22	33.29	41.50
2012	844144	293	34.71	33.86	30.09	37.98

Table 4: Deaths of female children from all causes – deaths registered, 1998-2012

Year	Population	Deaths	Crude Mortality Rate	Directly Standardised Mortality Rate	95% Lower Confidence Limit	95% Upper Confidence Limit
1998	771819	281	36.41	36.35	32.22	40.86
1999	775929	350	45.11	44.93	40.35	49.90
2000	780406	307	39.34	39.23	34.97	43.88
2001	785899	305	38.81	38.81	34.58	43.42
2002	785143	264	33.62	34.33	30.31	38.73
2003	782439	283	36.17	36.79	32.63	41.34
2004	779762	274	35.14	35.82	31.71	40.33
2005	780116	278	35.64	35.87	31.78	40.35
2006	784448	245	31.23	30.26	26.59	34.31
2007	783147	264	33.71	33.09	29.22	37.34
2008	783940	243	31.00	29.53	25.93	33.50
2009	786112	241	30.66	28.90	25.36	32.80
2010	790067	228	28.86	27.38	23.94	31.20
2011	794337	255	32.10	30.24	26.64	34.21
2012	798257	200	25.05	24.15	20.91	27.76

* In 2008, the gender of one child was not recorded.

2.1.2 Child protection history

As described in table 5, the families of 88 children (18%) had a child protection history.

Fifty-nine of the children who died (12%) had been the subject of a report of risk of harm or significant risk of harm to Community Services in the three years prior to their death. Five of these children were in care at the time of their death.

One child 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 28 children (6%) 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, 2012

Age range	No known history		Child subject of a report(s) to Community Services or Child Wellbeing Unit		Sibling only subject of a report(s)	
	Number	Percent	Number	Percent	Number	Percent
Infants (<1 year)	261	86.3	20	6.6	22	7.3
1-4 years	42	85.7	6	12.2	1	2
5-9 years	39	88.6	5	11.3	0	0
10-14 years	23	65.7	10	28.6	2	5.7
15-17 years	40	64.5	19	30.6	3	4.8
Total	405	82.2	60	12.2	28	5.7

In 2013, the Team completed a research project analysing the causes of death of children with a child protection history¹³ in the 10 year-period 2002-2011. The AIHW conducted the project, using data provided by the Team.

The AIHW's findings included that the overall mortality rate for children with a child protection history was 1.4 times the rate for those without a child protection history; and the children with a child protection history who died were more likely than those without a child protection history to be Indigenous, older, from regional or remote areas, and to have lived in lower socioeconomic areas.¹⁴

The report from the project includes trend analyses for the five leading causes of death where the likelihood of death was found to be higher for children with a child protection history (deaths due to external causes, SIDS and other undetermined causes, SUDI, suicide, and diseases of the nervous system); and analysis of the impact of key variables on cause of death distributions for children with a child protection history and those without.

The Team's report from the research project will be tabled in Parliament early next year.

2.1.3 Aboriginal and Torres Strait Islander status

In 2012, 52 children were identified as Indigenous. Forty-six children were Aboriginal, four children were of Torres Strait Islander descent, and two children were Aboriginal and Torres Strait Islander.

The mortality rate for Indigenous children in 2012 of 73.04 per 100,000 children was more than 2.5 times that of non-Indigenous children.

2.1.4 Remoteness¹⁵

Relative to the area population, deaths in remote areas in 2012 were about twice as prevalent as in outer regional areas, around three times as prevalent as in inner regional areas, and four times the mortality rate in major cities.

One child in a very remote area died in 2012. While this equates to a relatively high mortality rate based on the numbers of children living in those areas, the small numbers both for deaths and populations in more remote areas means that these patterns should be interpreted with caution.

¹³ 'Children with a child protection history' comprised children (or their siblings), who were the subject of a report of risk of harm to Community Services within three years prior to their death (2002-2009). For 2010-2011, this included children (or their siblings) who were the subject of a report of risk of harm/significant harm to Community Services and/or a Child Wellbeing Unit in the three years before their death.

¹⁴ AIHW (2013) *Analysis of Causes of Death – Children with a Child Protection History 2002-2011* – report prepared for the CDRT (unpublished).

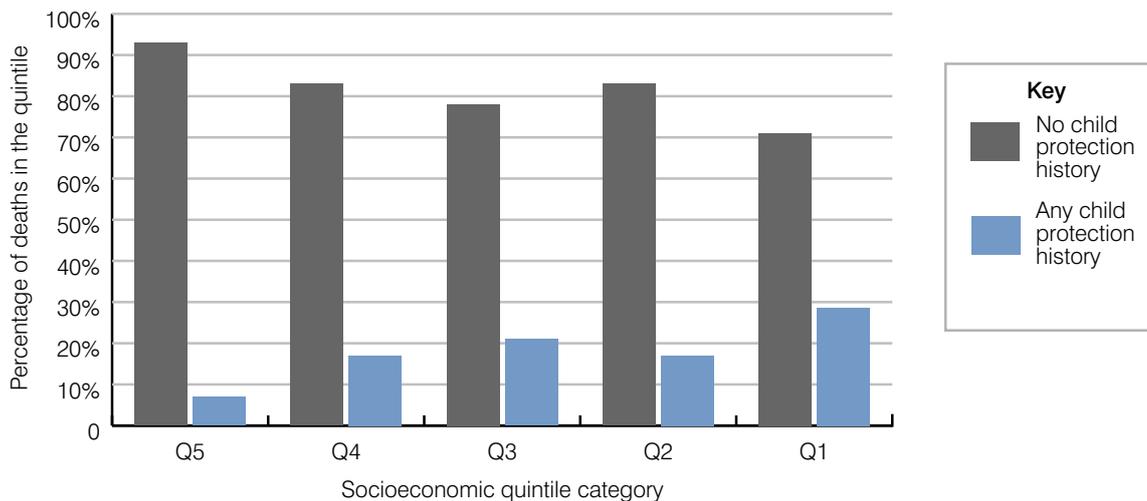
¹⁵ Remoteness is measured using the Aria-Plus index. Further details are provided in Appendix 2.

2.1.5 Socioeconomic status¹⁶

The number of deaths in the higher socioeconomic categories (quintiles 4 and 5) decreased in 2012 (207) compared with 2011 (280). The individual category with the largest number of deaths in 2012 was quintile 1, representing the least socioeconomically advantaged areas, where the number of deaths was the same in 2011 and 2012 (115).

As shown in figure 1, child protection history interacts with socioeconomic status, with children residing in areas of relatively low socioeconomic status (quintile 1) being over four times as likely to have a child protection history as those residing in areas of the highest socioeconomic status (quintile 5).

Figure 1: Child protection history by socioeconomic status (IRSD quintiles), 2012



¹⁶ 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 the child normally resided. Quintile 1 represents the relatively most disadvantaged 20 per cent, and quintile 5 the relatively least disadvantaged 20 per cent. Further information is provided in Appendix 2.

Chapter 3. Leading causes of death of children in NSW in 2012

At the time of writing, information about cause of death was available for 458 children (93%). Where underlying cause of death is the base for analysis below, it relates to 458 children.

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 (unnatural) causes of death.

As has consistently been the case, the leading cause of death of infants in 2012 was certain conditions arising in the perinatal period ('perinatal conditions') – conditions that arise during pregnancy or up to 28 days after birth.

For children over one year of age, transport incidents were the leading cause of death, followed by neoplasms (cancers and tumours). However the number of deaths due to neoplasms for children over one year of age decreased markedly in 2012 (29) compared with 2011 (44).

While drowning has continued to be the leading external cause of death for children aged 1-4 years, the mortality rate in 2012 (1.57 per 100,000) was slightly less than 2011 (2.44 per 100,000).

In the 15-17 year age group, the second leading cause of death was suicide. In both 2011 and 2012, there were 14 suicide deaths of 15-17 year olds.

Table 6: Frequency, rates and leading natural and external causes of death, 2012

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	303	61%	Perinatal conditions (158 per 100,000)	Threats to breathing (4.30 per 100,000)
1-4 years	49	10%	Congenital and chromosomal conditions (2.62 per 100,000)	Drowning (1.57 per 100,000)
5-9 years	44	9%	Neoplasms (2.24 per 100,000)	Transport (1.77 per 100,000)
10-14 years	35	7%	Respiratory diseases (1.13 per 100,000)	Transport (2.04 per 100,000)
15-17 years	62	13%	Neoplasm (2.91 per 100,000)	Transport (6.19 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 2012 by chapters of the International Statistical Classification of Diseases and Related Health Problems (ICD) system.¹⁷

¹⁷ Nationally and internationally, morbidity and mortality data are coded according to the ICD system. The ICD is the international standard health classification published by the World Health Organization (WHO) for coding diseases for statistical aggregation and reporting purposes. The ICD provides structured rules guiding how the underlying cause of death is determined. Use of these rules assists with standardisation of coded data and facilitates comparability with other collections of mortality data.

The underlying cause of death is most frequently used for analysis of mortality statistics and reporting. It refers to 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'.¹⁸

Overall, the leading underlying causes of death of children in NSW in 2012 were consistent with previous years. The most common causes were perinatal conditions (148) and congenital/chromosomal causes (102), which together accounted for over half of all child deaths in that period. External causes (injury-related causes) continued to be the third most common cause of death.

Crude mortality rates for the vast majority of the causes of death were lower in 2012, particularly for deaths from perinatal conditions, circulatory system diseases, neoplasms and external causes. The mortality rate for respiratory diseases in 2012 (0.85 per 100,000) was marginally higher than 2011 (0.49 per 100,000).

Table 7: Leading underlying causes of death by Indigenous identification, 2012

ICD chapter	Number of deaths (Crude Mortality Rate)		
	All children	Not Aboriginal or Torres Strait Islander	Aboriginal or Torres Strait Islander
Certain conditions arising in the perinatal period	148 (9.01)	130 (8.27)	18 (25.28)
Congenital malformations, deformations and chromosomal abnormalities	102 (6.21)	97 (6.17)	5 (7.02)
External causes of morbidity and mortality	80 (4.87)	69 (4.39)	11(15.45)
Neoplasms	29 (1.77)	28 (1.78)	1 -
Diseases of the nervous system	25 (1.52)	22 (1.4)	3 -
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	18 (1.1)	13 (0.83)	5 (7)
Diseases of the respiratory system	14 (0.85)	12 (0.76)	2 -
Endocrine, nutritional and metabolic disorders	11 (0.67)	11 (0.7)	0 -
Diseases of the circulatory system	10 (0.61)	9 (0.57)	1 -
Certain infectious and parasitic diseases	7 (0.43)	6 (0.38)	1 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	4 (0.24)	4 (0.25)	0 -
Diseases of the digestive system	4 (0.24)	4 (0.25)	0 -
Injury, poisoning and certain other consequences of external causes	3 -	3 -	0 -
Diseases of the musculoskeletal system and connective tissue	2 -	2 -	0 -
Mental and behavioural disorders	1 -	1 -	0 -
Total	458	411	47

3.2.1 Age and gender

Tables 8 and 9 describe the leading underlying causes of death by age group and gender.

For children under one year of age, perinatal conditions and congenital and chromosomal causes were the most common causes of death, accounting for 82 per cent of infant deaths in NSW.

External causes were the leading cause of the deaths of children across all other age groups, including over half of the deaths of children aged 15-17 years (33), and almost half of the deaths of children aged 10-14 years (16).

Male children outnumbered female children in the majority of the leading causes of death. Consistent with last year, the largest gender imbalance was in deaths from external causes. Almost twice as many male children died from injury-related causes than did female children.

Slightly more girls than boys died from respiratory and metabolic diseases.

¹⁸ World Health Organization 2012, *International Statistical Classification of Diseases and Related Health Problems*, 10th revision (ICD-10), Geneva: WHO.

Table 8: Leading underlying causes of death by age, 2012

ICD chapter	Number of deaths (Crude Mortality Rate)					
	All children	Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Certain conditions arising in the perinatal period	148 (9.01)	147 (157.87)	0 -	1 -	0 -	0 -
Congenital malformations, deformations and chromosomal abnormalities	102 (6.21)	84 (90.21)	10 (2.62)	3 -	2 -	3 -
External causes of morbidity and mortality	80 (4.87)	6 (6.44)	12 (3.14)	13 (2.88)	16 (3.62)	33 (12.02)
Neoplasms	29 (1.77)	0 -	7 (1.83)	11 (2.44)	3 -	8 (2.91)
Diseases of the nervous system	25 (1.52)	7 (7.52)	3 -	5 (1.11)	4 (0.9)	6 (2.19)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	18 (1.1)	16 (17.18)	2 -	0 -	0 -	0 -
Diseases of the respiratory system	14 (0.85)	4 (4.3)	2 -	2 -	5 (1.13)	1 -
Endocrine, nutritional and metabolic disorders	11 (0.67)	3 -	3 -	2 -	2 -	1 -
Diseases of the circulatory system	10 (0.61)	3 -	2 -	1 -	2 -	2 -
Certain infectious and parasitic diseases	7 (0.43)	5 (5.37)	0 -	2 -	0 -	0 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	4 (0.24)	1 -	1 -	1 -	0 -	1 -
Diseases of the digestive system	4 (0.24)	2 -	1 -	1 -	0 -	0 -
Injury, poisoning and certain other consequences of external causes	3 -	0 -	0 -	0 -	0 -	3 -
Diseases of the musculoskeletal system and connective tissue	2 -	1 -	0 -	0 -	1 -	0 -
Mental and behavioural disorders	1 -	0 -	0 -	1 -	0 -	0 -
Total	458	279	43	43	35	58

Table 9: Leading underlying causes of death by gender, 2012

ICD chapter	Number of deaths (Crude Mortality Rate)		
	All children	Female	Male
Certain conditions arising in the perinatal period	148 (9.01)	57 (7.14)	91 (10.78)
Congenital malformations, deformations and chromosomal abnormalities	102 (6.21)	42 (5.26)	60 (7.11)
External causes of morbidity and mortality	80 (4.87)	27 (3.38)	53 (6.28)
Neoplasms	29 (1.77)	13 (1.63)	16 (1.9)
Diseases of the nervous system	25 (1.52)	10 (1.25)	15 (1.78)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	18 (1.1)	7 (0.88)	11 (1.3)
Diseases of the respiratory system	14 (0.85)	8 (1)	6 (0.71)
Endocrine, nutritional and metabolic disorders	11 (0.67)	7 (0.88)	4 (0.47)
Diseases of the circulatory system	10 (0.61)	5 (0.63)	5 (0.59)
Certain infectious and parasitic diseases	7 (0.43)	2 -	5 (0.59)
Diseases of the blood, blood-forming organs and certain disorders of the immune system	4 (0.24)	2 -	2 -
Diseases of the digestive system	4 (0.24)	2 -	2 -
Injury, poisoning and certain other consequences of external causes	3 -	0 -	3 -
Diseases of the musculoskeletal system and connective tissue	2 -	1 -	1 -
Mental and behavioural disorders	1 -	1 -	0 -
Total	458	184	274

3.2.2 Remoteness and socioeconomic status

In 2012, there was a considerable decrease (18%) in the number of deaths from perinatal conditions in major cities. There was a slight increase in the number of deaths from perinatal conditions in inner regional areas, resulting in these areas having the highest rate of deaths from this cause (10.9 per 100,000 children).

The highest mortality rate was associated with external cause deaths in outer regional areas of NSW (19.64 per 100,000 children). This is an increase of over five deaths per 100,000 compared with 2011.

Despite the large numbers of deaths from perinatal conditions, there was no apparent pattern with socioeconomic status. Mortality rates ranged from 5.8 per 100,000 in quintile 4 to 10.3 per 100,000 in quintile 2.

Table 10: Underlying cause of death by remoteness

ICD chapter	Number of deaths (Crude Mortality Rate)					
	All children*	Major Cities	Inner Regional	Outer Regional	Remote	Very Remote
Certain conditions arising in the perinatal period	148 (9.05)	97 (8.23)	37 (10.9)	6 (5.61)	2 -	0 -
Congenital malformations, deformations and chromosomal abnormalities	102 (6.24)	72 (6.11)	18 (5.3)	6 (5.61)	0 -	0 -
External causes of morbidity and mortality	80 (4.89)	35 (2.97)	20 (5.89)	21 (19.64)	3 -	0 -
Neoplasms	29 (1.77)	16 (1.36)	10 (2.95)	2 -	0 -	0 -
Diseases of the nervous system	25 (1.53)	13 (1.1)	6 (1.77)	5 (4.68)	0 -	0 -
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	18 (1.1)	8 (0.68)	6 (1.77)	3 -	1 -	0 -
Diseases of the respiratory system	14 (0.86)	5 (0.42)	4 (1.18)	3 -	2 -	0 -
Endocrine, nutritional and metabolic disorders	11 (0.67)	8 (0.68)	2 -	1 -	0 -	0 -
Diseases of the circulatory system	10 (0.61)	9 (0.76)	0 -	0 -	0 -	1 -
Certain infectious and parasitic diseases	7 (0.43)	5 (0.42)	1 -	1 -	0 -	0 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	4 (0.24)	4 (0.34)	0 -	0 -	0 -	0 -
Diseases of the digestive system	4 (0.24)	1 -	1 -	2 -	0 -	0 -
Injury, poisoning and certain other consequences of external causes	3 -	0 -	2 -	1 -	0 -	0 -
Diseases of the musculoskeletal system and connective tissue	2 -	2 -	0 -	0 -	0 -	0 -
Mental and behavioural disorders	1 -	1 -	0 -	0 -	0 -	0 -
Total	458	276	107	51	8	1

*Remoteness was not calculated in 15 cases.

Table 11: Underlying cause of death by Index of Relative Social Disadvantage quintile (Crude Mortality Rate)

ICD chapter	Number of deaths (Crude Mortality Rate)					
	All children*	Quintile5	Quintile4	Quintile3	Quintile2	Quintile1
Certain conditions arising in the perinatal period	148 (9.08)	29 (8.36)	18 (5.84)	28 (10.08)	30 (10.3)	36 (8.89)
Congenital malformations, deformations and chromosomal abnormalities	102 (6.26)	24 (6.92)	16 (5.19)	12 (4.32)	23 (7.89)	19 (4.69)
External causes of morbidity and mortality	80 (4.91)	15 (4.33)	12 (3.89)	17 (6.12)	19 (6.52)	13 (3.21)
Neoplasms	29 (1.78)	3 -	3 -	1 -	11 (3.78)	9 (2.22)
Diseases of the nervous system	25 (1.53)	5 (1.44)	2 -	4 (1.44)	7 (2.4)	5 (1.23)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	18 (1.1)	7 (2.02)	1 -	2 -	2 -	6 (1.48)
Diseases of the respiratory system	14 (0.86)	7 (2.02)	0 -	4 (1.44)	3 -	0 -
Endocrine, nutritional and metabolic disorders	11 (0.68)	2 -	1 -	1 -	4 (1.37)	3 -
Diseases of the circulatory system	10 (0.61)	4 (1.15)	3 -	1 -	0 -	2 -
Certain infectious and parasitic diseases	7 (0.43)	3 -	2 -	2 -	0 -	0 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	4 (0.25)	1 -	0 -	2 -	0 -	1 -
Diseases of the digestive system	4 (0.25)	1 -	1 -	2 -	0 -	0 -
Injury, poisoning and certain other consequences of external causes	3 -	1 -	0 -	1 -	1 -	0 -
Diseases of the musculoskeletal system and connective tissue	2 -	1 -	0 -	0 -	0 -	1 -
Mental and behavioural disorders	1 -	0 -	0 -	0 -	0 -	1 -
Total	458	103	59	77	100	96

*Socioeconomic status was not calculated in 23 cases.

Chapter 4. Children who died outside of NSW

Each year, a number of children normally resident in NSW die in another state or territory. In 2011, 14 children from NSW died outside of the state. As shown in table 12, this is lower than the average number of such deaths (23) over the 15 years to 2011.

Generally, if a person dies in a particular state, their death is registered in that state.¹⁹ This is required by legislation in NSW.

The 493 children whose deaths were registered in NSW in 2012 include seven children who were normally resident in another state or territory, and four children who were normally resident in another country.

Table 12: Deaths of children resident in NSW registered in another state or territory, 1997 - 2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
ACT	11	6	10	7	12	13	7	5	6	11	7	7	9	11	5	127
NT	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
QLD	5	7	14	8	8	13	12	5	8	9	14	5	10	14	5	137
SA	3	0	2	1	2	1	2	1	1	1	2	4	1	0	0	21
VIC	0	0	1	3	4	3	1	5	3	2	2	8	9	5	3	49
WA	0	1	0	0	0	1	0	0	0	0	0	1	0	1	0	4
TAS	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	4
Total	19	15	28	19	26	31	22	16	19	24	25	25	29	32	14	344

4.1 CDRT reviews and children who die outside of NSW

The jurisdiction of the Team 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 typically limited to age or age grouping, gender, cause of death, and residential postcode. No state or territory provides identifying data, which means that no further information can be sought by the Team from agencies or service providers within NSW.

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

In 2007, the *Commission for Children and Young People Act 1998* 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) bodies.

At this time, the Team has no formal arrangements in place with other states or territories, and such an arrangement would be dependent on similar provisions for exchange of information being available in the relevant legislation for other state and territory review bodies.

4.2 Children who died outside of NSW in 2011

From the information provided by the other states and territories, the vast majority of the 14 children (13) died from natural causes. Consistent with deaths that occurred in NSW, most were due to perinatal conditions (8) and congenital and chromosomal causes (2).

One child who was normally resident in NSW died from whooping cough while interstate. One child was a passenger in a motor vehicle accident.

The majority (12) were younger than one year of age when they died, including eight children who died on the day they were born.

¹⁹ Information about deaths registered interstate is not generally available for the current reporting year. The latest available information relates to deaths registered in other states or territories in 2011.

Chapter 5. Deaths due to natural causes

Over three-quarters (357)²⁰ of the children whose deaths were registered in NSW in 2012 died as a result of natural causes. This has consistently been the case.

This chapter provides information about all of the deaths due to natural causes. More detailed analyses on specific natural causes are presented in the following chapters.

The deaths of five of the 357 children reported here are also reviewable deaths, subject to separate review by the Ombudsman.²¹

5.1 Demographic and individual characteristics

The table below outlines the demographic characteristics of all children who died from natural causes in 2012.

Table 13: Key demographic and individual characteristics – deaths due to natural causes, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	357	100	21.74	19.48 - 23.99		
Gender						
Female	150	42	18.79	15.78 - 21.80		
Male	207	58	24.52	21.18 - 27.86	1.30	0.0064
Age						
Under 1 year	257	72	276.01 (2.59)†	242.26 - 309.75		
1-4 years	29	8	7.59	5.08 - 10.90		
5-9 years	30	8	6.65	4.49 - 9.50		
10-14 years	19	5	4.30	2.59 - 6.71		
15-17 years	22	6	8.02	5.02 - 12.14		
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	326	91	20.75	18.50 - 23.00		
Aboriginal or Torres Strait Islander	31	9	43.54	29.59 - 61.81	2.10	0
Remoteness*						
Major cities	233	68	19.77	17.23 - 22.30		
Inner regional areas	79	23	23.27	18.42 - 29.00		
Outer regional areas	26	8	24.31	15.88 - 35.63		
Remote areas	4	1	47.94	13.06 - 122.76		
Very remote areas	1	0	-	-		
Socioeconomic status**						
Quintile 5 (highest)	77	23	19.01	15.00 - 23.76		
Quintile 4	78	23	26.77	21.16 - 33.41		
Quintile 3	57	17	20.52	15.54 - 26.58		
Quintile 2	46	14	13.27	10.92 - 19.89		
Quintile 1 (lowest)	80	24	28.80	18.30 - 28.72		

*Remoteness was not calculated in 14 cases.

**Socioeconomic status was not calculated in 19 cases.

† Infant Mortality Rate.

20 Based on the 458 deaths where cause of death was known.

21 Under Part 6 of the *Community Services (Complaints, Reviews and Monitoring) Act 1993*, the Ombudsman is required to review the deaths of children and adults with disabilities in care; the deaths of children who died as a result of abuse, neglect, or in suspicious circumstances; and the deaths of children in detention.

5.1.1 Age and gender

Figure 2 illustrates the age and gender of children who died in 2012.

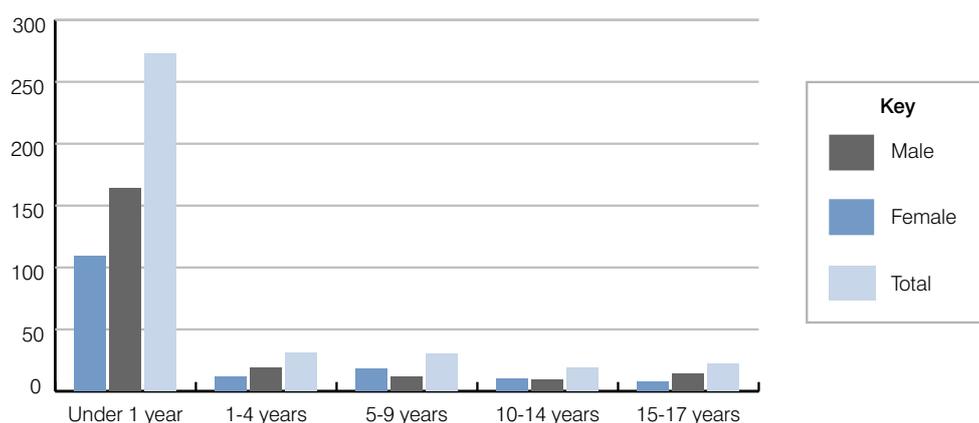
Almost three-quarters (257) of the children who died from natural causes were infants aged less than one year. Overall, natural causes accounted for the vast majority of the deaths of infants (92%).

Natural causes also accounted for most of the deaths of children aged 1-4 years (67%), 5-9 years (70%), and 10-14 years (54%). The lowest proportion of deaths from natural causes was amongst children aged 15-17 years (38%).

The mortality rate for natural causes in 2012 was lower across all age groups, except for children aged 5-9 years where there was a slight increase (6.65 per 100,000, from 5.83 per 100,000).

Consistent with previous years, males had a higher mortality rate for natural causes than females. The proportion of deaths from natural causes for males (76%) and females (82%) was also consistent.

Figure 2: Deaths due to natural causes by age and gender, 2012



5.1.2 Aboriginal and Torres Strait Islander status

Thirty-one children who died from natural causes were Aboriginal (27) or Torres Strait Islander (4). The rate of death of Aboriginal and Torres Strait Islander children from natural causes (43.54 per 100,000) was more than twice that of non-Indigenous children.

5.1.3 Remoteness and socioeconomic status

Over two-thirds of the deaths of children from natural causes occurred in major cities. However, the mortality rate was higher in regional and remote areas. Four deaths occurred in remote areas, and one child died from natural causes in a very remote area of NSW.

Consistent with 2011, 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 quintiles. The rate of death from natural causes of children living in the lowest quintile of socioeconomic status was 1.5 times that of children in the highest quintile.

5.1.4 Child protection history

Of the 357 children who died as a result of natural causes, the families of 42 (12%) had a child protection history.

Within the three years before their death, 25 of the 42 children had been the subject of a report of risk of harm or risk of significant harm to Community Services. One child was in care at the time of their death.

Seventeen of the 42 children had not been the subject of a child protection report, but had a sibling who had been.

5.2 Leading natural causes of death

Table 14 outlines the top five leading natural causes of death of children in 2012.

The first four leading natural causes of death in 2012 – perinatal conditions, congenital and chromosomal causes, neoplasms and diseases of the nervous system – are consistent with previous years.

In 2012, the fifth leading natural cause of death was respiratory diseases, mainly chronic lower respiratory diseases such as asthma. The fifth leading natural cause of death in 2010 and 2011 was diseases of the circulatory system, which, in 2012, was the seventh leading cause.

Table 14: Top five leading natural causes of death, 2012

Natural cause of death	Count	Percent	Crude Mortality Rate	95% Confidence interval
Certain conditions originating in the perinatal period (P00-P96)	148	41.5	9.01 (1.49)†	7.56 - 10.46
Foetus and newborn affected by maternal factors/ complications of pregnancy (P00-P04)	68	19	4.14 (0.69)	3.22 - 5.25
Disorders related to length of gestation/ foetal growth (P05-P08)	30	8.4	1.83 (0.30)	1.23 - 2.61
Perinatal respiratory and cardiovascular disorders (P20-P29)	18	5	1.10 (0.18)	0.65 - 1.73
Other perinatal disorders (P90-P96)	10	2.8	0.61 (0.10)	0.29 - 1.12
Haemorrhagic/haematological disorders of foetus/newborn (P50-P61)	9	2.5	0.55 (0.09)	0.25 - 1.04
Digestive system disorders of foetus/newborn (P75-P78)	5	1.4	0.30 (0.05)	0.10 - 0.71
Perinatal infections (P35-P39)	4	1.1	0.24 (0.04)	0.07 - 0.62
Transitory endocrine and metabolic disorders specific to foetus/newborn (P70-P74)	2	0.6	-	-
Integument and thermoregulation conditions of foetus/newborn (P80-P83)	2	0.6	-	-
Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	102	28.6	6.21	5.01 - 7.42
Malformations of the circulatory system (Q20-Q28)	32	9	1.95	1.33 - 2.75
Malformations of the nervous system (Q00-Q07)	23	6.4	1.40	0.89 - 2.10
Chromosomal abnormalities, not elsewhere classified (Q90-Q99)	14	3.9	0.85	0.47 - 1.43
Malformations/ deformations of the musculoskeletal system (Q65-Q79)	12	3.4	0.73	0.38 - 1.28
Other congenital malformations (Q80-Q89)	10	2.8	0.61	0.29 - 1.12
Malformations of the urinary system (Q60-Q64)	7	2	0.43	0.17 - 0.88
Malformations of the respiratory system (Q30-Q34)	2	0.6	-	-
Malformations of the digestive system (Q38-Q45)	2	0.6	-	-
Neoplasms (C00-D48)	29	8.1	1.77	1.18 - 2.54
Malignant neoplasms of lymphoid/haematopoietic tissue (C81-C96)	11	3.1	0.6	0.33 - 1.20
Malignant neoplasms of eye/brain/other parts of central nervous system (C69-C72)	8	2.2	0.49	0.21 - 0.96
Malignant neoplasms of bone/cartilage (C40-C41)	5	1.4	0.30	0.10 - 0.71
Malignant neoplasms of urinary tract (C64-C68)	2	0.6	-	-
Malignant neoplasms of digestive organs (C15-C26)	1	0.3	-	-
Malignant neoplasms of ill-defined/secondary/unspecified sites (C76-C80)	1	0.3	-	-
Malignant neoplasms of male genital organs (C60-C63)	1	0.3	-	-
Diseases of the nervous system (G00-G99)	25	7	1.52	0.99 - 2.25
Cerebral palsy/ other paralytic syndromes (G80-G83)	7	2	0.43	0.17 - 0.88
Episodic/paroxysmal disorders (G40-G47)	6	1.7	0.37	0.13 - 0.80
Systemic atrophies primarily affecting central nervous system (G10-G13)	4	1.1	0.24	0.07 - 0.62
Inflammatory diseases of central nervous system (G00-G09)	3	0.8	-	-
Diseases of myoneural junction/muscle (G70-G73)	3	0.8	-	-
Other disorders of the nervous system (G90-G99)	2	0.6	-	-
Diseases of the respiratory system (J00-J99)	14	3.9	0.85	0.47 - 1.43
Chronic lower respiratory diseases (J40-J47)	7	2	0.43	0.17 - 0.88
Influenza/Pneumonia	5	1.4	0.3	0.10 - 0.71
Other acute lower respiratory infections (J20-J22)	1	0.3	-	-
Other diseases of upper respiratory tract (J30-J39)	1	0.3	-	-

† Infant Mortality Rate.

5.3 Trends in deaths of children in NSW from natural causes, 1998-2012

As indicated in table 15, there has been a decline in the rate of deaths from natural causes over time. In 2012, the mortality rate for natural causes (21.7 per 100,000) was the lowest rate for 15 years.

The rate of death from natural causes notably declined for both males and females. In 2012, the mortality rates for both genders were the lowest rates for 15 years.

Table 15: Trends in deaths of children due to natural causes by gender, 1998-2012, number and (crude mortality rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	203 (26.3)	253 (32.6)	225 (28.8)	230 (29.3)	201 (25.6)	206 (26.3)	209 (26.8)	207 (26.5)	199 (25.4)	194 (24.8)	197 (25.1)	192 (24.4)	187 (23.7)	198 (24.9)	150 (18.8)
Male	291 (35.9)	323 (39.6)	289 (35.2)	288 (34.8)	234 (28.3)	246 (29.9)	247 (30.1)	285 (34.7)	257 (31.1)	235 (28.5)	269 (32.5)	249 (30.0)	261 (31.3)	247 (29.4)	207 (24.5)
Both	494 (31.2)	576 (36.2)	514 (32.1)	518 (32.1)	435 (27.0)	452 (28.2)	456 (28.5)	492 (30.7)	456 (28.3)	429 (26.7)	466 (28.9)	441 (27.3)	448 (27.6)	445 (27.2)	357 (21.7)

Chapter 6. Deaths from conditions arising in the perinatal period

In 2012, 148 children whose deaths were registered in NSW died as a result of conditions arising in the perinatal period. The rate of perinatal deaths in 2012 (1.49 per 1,000 live births) was lower than 2010 and 2011 (2 per 1,000 live births).

Perinatal conditions are those that arise during pregnancy, or up to 28 days post-partum. It includes conditions such as prematurity; respiratory and cardiovascular disorders, such as intrauterine hypoxia; maternal factors such as hypertensive disorders; and complications of pregnancy, labour and delivery.

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.

6.1 Demographic and individual characteristics

Table 16 outlines the key demographic characteristics of the 148 children who died from perinatal conditions in 2012. In this table, mortality rates are Infant Mortality Rates (per 1,000 live births).

Table 16: Key demographic and individual characteristics – deaths due to perinatal conditions, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	148	100	1.49	1.25 - 1.73		
Gender						
Female	57	39	1.19	0.90 - 1.54	-	-
Male	91	61	1.78	1.44 - 2.19	1.51	0.0071
Age						
Under 1 day	83	56.1	0.84	0.67 - 1.04	-	-
Under 1 week	33	22.3	0.33	0.23 - 0.47	-	-
Under 28 days	18	12.2	0.18	0.11 - 0.29	-	-
Under 1 year	13	8.8	0.13	0.07 - 0.22	-	-
1 year and over	1	0.7	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	130	88	1.39	1.15 - 1.63	-	-
Aboriginal or Torres Strait Islander	18	12	3.21	1.90 - 5.07	2.30	0
Remoteness*						
Major cities	97	68	1.29	1.04 - 1.57	-	-
Inner regional areas	37	26	2.14	1.51 - 2.95	-	-
Outer regional areas	6	4	1.12	0.41 - 2.45	-	-
Remote areas	2	1	-	-	-	-
Very remote areas	0	0	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	36	26	2.02	1.42 - 2.80	-	-
Quintile 4	30	21	1.86	1.26 - 2.66	-	-
Quintile 3	28	20	1.41	0.94 - 2.05	-	-
Quintile 2	18	13	0.77	0.46 - 1.22	-	-
Quintile 1 (lowest)	29	21	1.62	1.09 - 2.33	-	-

*Remoteness was not calculated in six cases.

**Socioeconomic status was not calculated in seven cases.

6.1.1 Age, gender and Aboriginal and Torres Strait Islander status

The majority of perinatal deaths occur in the first day of life. In 2012, just over half of children were less than one day old and 80 per cent were less than one week old when they died from perinatal conditions. This is largely consistent with previous years.

As shown in table 17, males have typically had a higher rate of death from perinatal conditions than females over the past 15 years. In 2012, the mortality rate for both genders was notably lower than previous years.

Eighteen children identified as Aboriginal (16) or Torres Strait Islander (2) died from perinatal conditions in 2012. The mortality rate of Indigenous children from this cause was more than double that of non-Indigenous children.

Table 17: Trends in deaths of children due to perinatal conditions by gender, 1998-2012, number and (Infant Mortality Rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	83 (2.0)	102 (2.4)	107 (2.5)	108 (2.6)	85 (2.0)	99 (2.4)	82 (2.0)	108 (2.6)	94 (2.2)	88 (2.0)	88 (1.9)	84 (1.9)	71 (1.5)	86 (1.8)	57 (1.2)
Male	105 (2.4)	149 (3.4)	139 (3.1)	136 (3.1)	102 (2.3)	100 (2.2)	101 (2.3)	148 (3.3)	144 (3.2)	110 (2.4)	125 (2.6)	116 (2.4)	114 (2.3)	110 (2.2)	91 (1.8)
Both	188 (2.2)	251 (2.9)	246 (2.8)	244 (2.9)	187 (2.2)	199 (2.3)	183 (2.1)	256 (3.0)	238 (2.7)	198 (2.2)	213 (2.2)	200 (2.2)	185 (1.9)	196 (2.0)	148 (1.5)

6.1.2 Remoteness and socioeconomic status

The highest rate of death from perinatal conditions in 2012 was recorded among infants who resided in inner regional areas. One-quarter of the infants who died resided in areas of the highest socioeconomic status.

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

In 2012, and as shown in table 18, maternal factors and complications of pregnancy, labour and delivery were the leading cause of death from perinatal conditions, accounting for almost half of all perinatal deaths (68). Of the 68 deaths of children from this cause:

- half (35) were due to maternal complications of pregnancy, mainly related to premature rupture of membranes (11), multiple pregnancy (9), or incompetent cervix (7)
- over one-quarter (23) were due to placenta, cord and membrane complications, mainly related to chorioamnionitis²² (12), or placental separation and haemorrhage (6), and
- eight were as a result of maternal conditions, mainly maternal hypertensive disorders (5).

Disorders related to the length of gestation and foetal growth accounted for one-fifth of deaths from perinatal conditions (30). The vast majority of these deaths (29) were due to extreme immaturity and extremely low birth weight.

Twelve per cent of perinatal deaths (18) were due to respiratory and cardiovascular disorders, mainly intrauterine hypoxia²³ (5) and primary atelectasis²⁴ of the newborn (4).

²² Bacterial infection of the foetal membranes.

²³ Inadequate oxygen availability during the gestation period.

²⁴ Failure of the lungs to expand fully at birth.

Table 18: Leading causes of death from perinatal conditions, 2012

Type	Female	Male	Total	Crude Mortality Rate	95% Confidence Interval
Maternal/obstetric factors	21	47	68	0.73	0.53 - 0.87
Length of gestation (prematurity)	13	17	30	0.32	0.20 - 0.43
Respiratory/cardiovascular disorders	6	12	18	0.19	0.04 - 0.17
Other perinatal conditions	2	8	10	0.11	0.01 - 0.10
Haemorrhagic/haematological disorders	6	3	9	0.10	0.11 - 0.29
Infections	4	0	4	0.04	0.05 - 0.19
Endocrine/metabolic disorders	4	3	7	0.08	0.00 - 0.07
Disorders of thermoregulation	1	1	2	-	-
Total	57	91	148		

Chapter 7. Deaths from congenital and chromosomal causes

In 2012, 102 children whose deaths were registered in NSW died as a result of congenital malformations and chromosomal abnormalities ('congenital and chromosomal causes'). Consistent with previous years, congenital and chromosomal conditions were the overall second leading cause of death of children in NSW.

The majority of the deaths (88) were due to congenital factors. The deaths of 14 children were due to chromosomal causes.

7.1 Demographic and individual characteristics

Table 19 provides an overview of the key demographic characteristics of the 102 children whose underlying cause of death was congenital and chromosomal conditions.

Table 19: Key demographic and individual characteristics – deaths due to congenital and chromosomal causes, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	102	100	6.21	5.01 - 7.42		
Gender						
Female	42	41	5.26	3.79 - 7.11		
Male	60	59	7.11	5.42 - 9.15	1.35	0.0668
Age						
Under 1 year	84	82	90.21 (0.85)†	71.96 - 111.69		
1-4 years	10	10	2.62	1.26 - 4.81		
5-9 years	3	3	-	-		
10-14 years	2	2	-	-		
15-17 years	3	3	-	-		
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	97	95	6.17	5.01 - 7.53		
Aboriginal or Torres Strait Islander	5	5	7.02	2.28 - 16.39	1.14	0.3897
Remoteness*						
Major cities	72	75	6.11	4.78 - 7.69		
Inner regional areas	18	19	5.30	3.14 - 8.38		
Outer regional areas	6	6	5.61	2.06 - 12.21		
Remote areas	0	0	-	-		
Very remote areas	0	0	-	-		
Socioeconomic status**						
Quintile 5 (highest)	19	20	4.69	2.82 - 7.32		
Quintile 4	23	24	7.89	5.00 - 11.84		
Quintile 3	12	13	4.32	2.23 - 7.55		
Quintile 2	16	17	4.61	2.97 - 8.42		
Quintile 1 (lowest)	24	26	8.64	4.44 - 10.30		

* Remoteness was not calculated in six cases.

** Socioeconomic status was not calculated in eight cases.

† Infant Mortality Rate.

7.1.1 Age, gender and Aboriginal and Torres Strait Islander status

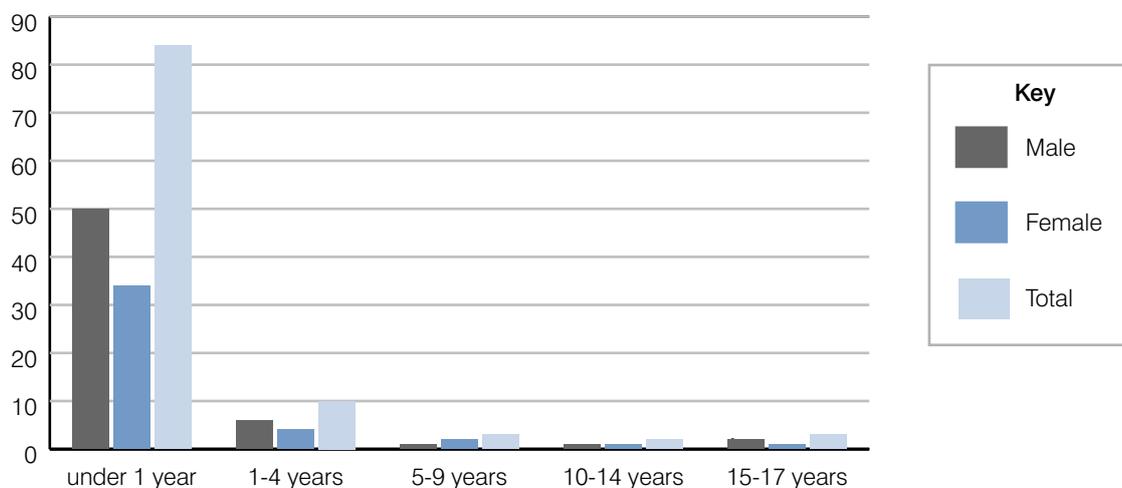
As shown in figure 3, the vast majority (84; 82%) of the children who died from congenital and chromosomal conditions were aged less than one year of age. Almost half of these children (35) died in the first day of life. Overall, congenital and chromosomal causes accounted for 30 per cent of all infant deaths in NSW in 2012. This is largely consistent with the proportion of infant deaths from this cause across Australia.²⁵

In 2012, congenital and chromosomal conditions were the leading cause of the deaths of children aged 1-4 years. This was the only age group in which the rate of death from this cause increased.

More males than females died from congenital and chromosomal conditions in 2012. This has generally been the case over the past 15 years.

Five of the children who died from congenital and chromosomal conditions were Aboriginal. The rate of death of Indigenous children from this cause in 2012 (7 per 100,000) was slightly higher than that of non-Indigenous children (6.1 per 100,000).

Figure 3: Deaths due to congenital and chromosomal causes by age and gender, 2012



7.2 Leading causes of death due to congenital and chromosomal causes

In 2012, the leading causes of death of children from congenital and chromosomal causes were:

- 1. Congenital malformations of the circulatory system** (32; 31%) – mainly congenital malformations of the aortic and mitral valves (9), heart (8), and great arteries (7).
- 2. Congenital malformations of the nervous system** (23; 23%) – primarily congenital malformations of the brain (10), and spina bifida (6).
- 3. Chromosomal abnormalities, not elsewhere classified** (14; 14%) – mainly Edwards and Patau's syndromes (7).
- 4. Congenital malformations and abnormalities of the musculoskeletal system** (12; 12%), such as congenital diaphragmatic hernia.
- 5. Other congenital malformations** (10; 10%), such as Cornelia de Lange syndrome and unspecified congenital malformations.

Congenital malformations of the circulatory system are the most commonly reported congenital conditions in NSW,²⁶ and have consistently been a leading congenital cause of death of children. In the 15 years to 2012, 483 children died as a result of congenital circulatory system conditions, the vast majority of whom (375; 78%) were infants. The 32 deaths from this cause in 2012 are consistent with the average over that period.

²⁵ Across Australia in 2008-2010, congenital anomalies accounted for around one-quarter (26%) of all infant deaths. Australian Institute of Health and Welfare 2012, *A picture of Australia's children 2012*. Cat. no. PHE167. Canberra: AIHW, p. 13.

²⁶ Centre for Epidemiology and Evidence 2013, *NSW Mothers and Babies 2010*. Sydney: NSW Ministry of Health, p. 92.

As indicated in table 20, infants were prevalent in all of the leading causes of death from congenital conditions, including those related to the circulatory system (27; 84%), nervous system (22; 96%), and musculoskeletal system (11; 92%).

Table 20: Leading causes of deaths due to congenital and chromosomal causes by age, 2012

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Circulatory system 27	Circulatory system 3	Circulatory system 1	Other congenital 1	Circulatory system 1
Nervous system 22	Other congenital 3	Respiratory system 1	Chromosomal 1	Urinary system 1
Musculoskeletal 11	Chromosomal 2	Chromosomal 1		Musculoskeletal 1
Chromosomal 10	Nervous system 1			
Urinary system 6	Digestive system 1			
Other congenital 6				
Respiratory system 1				
Digestive system 1				

Chapter 8. Deaths from neoplasms (cancers and tumours)

In 2012, 29 children whose deaths were registered in NSW died as a result of neoplasms (cancers and tumours).

In NSW in 2012, cancers and tumours were the leading natural cause of death of children aged one year and over. Australia-wide, cancers and tumours are the second most common cause of death among children over one year of age.²⁷

The rate of death of children from cancers and tumours in 2012 was notably lower than in 2011. As shown in table 22, there has been a decline in these deaths in NSW over the past 15 years.

8.1 Demographic and individual characteristics

Table 21 provides an overview of the main demographic characteristics of children who died as a result of cancers and tumours.

Table 21: Key demographic and individual characteristics – deaths due to cancers and tumours, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	29	100	1.77	1.18 - 2.54		
Gender						
Female	13	45	1.63	0.87 - 2.78		
Male	16	55	1.90	1.08 - 3.08	1.16	0.3446
Age						
Under 1 year	0	0	-			
1-4 years	7	24	1.83	0.74 - 3.78		
5-9 years	11	38	2.44	1.22 - 4.37		
10-14 years	3	10	-	-		
15-17 years	8	28	2.91	1.26 - 5.74		
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	28	97	1.78	1.18 - 2.58		
Aboriginal or Torres Strait Islander	1	3	-	-		
Remoteness*						
Major cities	16	57	1.36	0.78 - 2.20		
Inner regional areas	10	36	2.95	1.41 - 5.42		
Outer regional areas	2	7	-	-		
Remote areas	0	0	-	-		
Very remote areas	0	0	-	-		
Socioeconomic status**						
Quintile 5 (highest)	9	33	2.22	1.02 - 4.22		
Quintile 4	11	41	3.78	1.88 - 6.75		
Quintile 3	1	4	-	-		
Quintile 2	3	11	-	-		
Quintile 1 (lowest)	3	11	-	-		

* Remoteness was not calculated in one case.

** Socioeconomic status was not calculated in two cases.

27 Australian Institute of Health and Welfare 2011, *Australia's Health 2010*. Canberra: AIHW.

8.1.1 Age and gender and Aboriginal and Torres Strait Islander status

In 2012, cancers and tumours were the overall leading cause of death of children aged 5-9 years, and the leading natural cause of death of children aged 15-17 years.

The age of children who died due to cancers and tumours ranged from one year to 17 years of age. There were no deaths of children under the age of one year.

Overall, the rate of death from cancers and tumours in 2012 (1.77 per 100,000) was lower than previous years (such as 2.99 per 100,000 in 2011). The mortality rate declined for children aged less than one year, and for those aged 1-4 and 10-14 years. The rate of death from cancers and tumours increased marginally for children aged 5-9 and 15-17 years.

In 2012, slightly more males (16) than females (13) died from cancers and tumours. There was little gender difference in the mortality rate from this cause. As shown in table 22, the mortality rate for males has generally, but not always, been higher than for females over the past 15 years.

One of the 29 children who died due to cancers and tumours was Aboriginal.

Table 22: Trends in deaths of children due to cancers and tumours by gender, 1998-2012, number and (crude mortality rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	24 (3.1)	23 (3.0)	26 (3.3)	26 (3.3)	18 (2.3)	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)	13 (1.6)
Male	42 (5.2)	41 (5.0)	26 (3.2)	33 (4.0)	29 (3.5)	34 (4.1)	25 (3.0)	21 (2.6)	13 (1.6)	24 (2.9)	18 (2.2)	21 (2.5)	22 (2.6)	26 (3.1)	16 (1.9)
Both	66 (4.2)	64 (4.0)	52 (3.2)	59 (3.7)	47 (2.9)	53 (3.3)	54 (3.4)	39 (2.4)	31 (1.9)	47 (2.9)	33 (2.0)	32 (2.0)	44 (2.7)	49 (3.0)	29 (1.8)

8.2 Leading causes of death due to cancers and tumours

Table 23 shows the leading types of cancers and tumours for children whose deaths were registered in 2012, by age.

Cancers of lymphoid and haematopoietic tissue (affecting the blood and bone marrow) were the most common cause, accounting for the deaths of 11 children. The vast majority (10) were due to leukaemias.

Leukaemias are the most common cancers in children. Acute lymphoblastic leukaemia is the most common type of leukaemia in children, and the most common type of childhood cancer.²⁸ Of the 10 children who died from leukaemias in 2012, most (6) died from acute lymphoblastic leukaemia. Four children died from myeloid leukaemia, mainly acute myeloid leukaemia (3).

In 1998-2012, 182 children died from leukaemias in NSW, including lymphoid leukaemia (103) and myeloid leukaemia (79). The number of deaths in 2012 is consistent with the average for each type of leukaemia over the 15-year period.

Malignant brain tumours were the second leading cause of death of children in NSW from cancers and tumours, accounting for the deaths of seven children. Approximately 100 children in Australia are diagnosed with malignant brain tumours each year. While they are rare, brain tumours are the second most common cancer in children.²⁹ The causes of most brain and spinal cord tumours are unknown.³⁰

The seven deaths from malignant brain tumours in 2012 was less than half of the deaths from this cause in 2010 (16) and 2011 (15), and lower than the average over the past 15 years (13.4 deaths per year). Of the 201 children who died from malignant brain tumours in 1998-2012, most were aged 1-4 years (56; 28%) and 5-9 years (64; 32%).

Cancers of bone or cartilage were the third most common cause of death of children from cancers and tumours (5).

²⁸ Leukaemia Foundation 2011, *Blood cancers in children factsheet*. Windsor, QLD: Leukaemia Foundation.

²⁹ Cancer Council NSW 2011, *Understanding Brain Tumours: A guide for people with brain or spinal cord tumours, and their families and friends*, Sydney: Cancer Council NSW, p. 13.

³⁰ *Ibid.*, p. 10.

Table 23: Leading causes of deaths due to cancers and tumours by age, 2012

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Nil	Leukaemia 5	Brain/spinal cord 5	Bone 1	Bone 3
	Brain 1	Kidney 2	Brain 1	Leukaemia 2
	Liver 1	Leukaemia 2	Leukaemia 1	Testis 1
		Bone 1		Brain 1
		Primary site unspecified 1		Lymphoma 1

Chapter 9. Deaths from diseases of the nervous system

In 2012, 25 children whose deaths were registered in NSW died as a result of diseases of the nervous system.

Diseases of the nervous system relate to a broad range of conditions that include epilepsy, cerebral palsy, muscular dystrophy, inflammatory diseases such as meningitis, and other nervous system disorders such as hydrocephalus.

Consistent with 2010 and 2011, diseases of the nervous system were the fourth leading natural cause of death of children in 2012. The number of deaths from nervous system diseases has declined over the past 15 years. The 25 deaths in 2012 was much lower than the average since 1998 of 34 deaths per year.

9.1 Demographic and individual characteristics

Table 24 provides an overview of the key demographic characteristics of the 25 children whose deaths were due to nervous system diseases.

Table 24: Key demographic and individual characteristics – deaths due to diseases of the nervous system, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	25	100	1.52	0.99 - 2.25		
Gender						
Female	10	40	1.25	0.60 - 2.30	-	-
Male	15	60	1.78	0.99 - 2.93	1.42	0.1949
Age						
under 1 year	7	28	(0.07)†	3.02 - 15.49	-	-
1-4 years	3	12	-	-	-	-
5-9 years	5	20	1.11	0.36 - 2.59	-	-
10-14 years	4	16	0.90	0.25 - 2.32	-	-
15-17 years	6	24	2.19	0.80 - 2.12	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	22	88	1.40	0.88 - 2.12	-	-
Aboriginal or Torres Strait Islander	3	12	-	-	-	-
Remoteness*						
Major cities	13	54	1.10	0.59 - 1.89	-	-
Inner regional areas	6	25	1.77	0.65 - 3.85	-	-
Outer regional areas	5	21	4.68	1.52 - 10.91	-	-
Remote areas	0	0	-	-	-	-
Very remote areas	0	0	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	5	22	1.23	0.40 - 2.88	-	-
Quintile 4	7	30	2.40	0.97 - 4.95	-	-
Quintile 3	4	17	1.44	0.39 - 3.69	-	-
Quintile 2	2	-	-	-	-	-
Quintile 1 (lowest)	5	22	1.80	0.47 - 3.37	-	-

*Remoteness was not calculated in one case.

**Socioeconomic status was not calculated in two cases.

† Infant Mortality Rate.

9.1.1 Age, gender and Aboriginal and Torres Strait Islander status

Deaths of children from nervous system diseases in 2012 occurred in all age groups. Over one-quarter (7) of the deaths were infants, and they had the highest mortality rate amongst the age groups.

As indicated in table 25, most (15) of the children were male, but this has not been a consistent trend.

Two of the children were identified as Aboriginal, and one child was identified as both Aboriginal and Torres Strait Islander.

Table 25: Trends in deaths of children due to diseases of the nervous system by gender, 1998-2012, number and (crude mortality rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	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)	14 (1.8)	10 (1.3)
Male	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 (1.0)	12 (1.5)	17 (2.0)	19 (2.3)	13 (1.5)	15 (1.8)
Both	45 (2.8)	34 (2.1)	39 (2.4)	36 (2.2)	44 (2.7)	47 (2.9)	48 (3.0)	30 (1.9)	39 (2.4)	17 (1.1)	27 (1.7)	31 (1.9)	28 (1.7)	27 (1.7)	25 (1.5)

9.2 Leading causes of death due to diseases of the nervous system

As shown in table 26, the leading causes of death from nervous system diseases in 2012 were cerebral palsy (7), epilepsy (6), and spinal muscular atrophy (4). The leading causes are largely consistent with deaths in previous years.

Many of the children whose underlying cause of death was nervous system disease had considerable chronic health concerns, including respiratory conditions (14) such as aspiration and lung disease; and relied on enteral nutrition via a gastrostomy or nasogastric tube (11). Ten children were receiving palliative care at the time of their death.

Table 26: Leading causes of deaths due to diseases of the nervous system by age, 2012

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Spinal muscular atrophy/ motor neuron disease 3	Spinal muscular atrophy 1	Cerebral palsy 4	Epilepsy 3	Epilepsy 2
Meningitis 2	Epilepsy 1	Intracranial abscess/ granuloma 1	Cerebral palsy 1	Muscular dystrophy 1
Myoneural disorder 1	Cerebral palsy 1			Cerebral palsy 1
Myopathy 1				Hydrocephalus 1
				Other disorders of the nervous system 1

Chapter 10. Deaths from diseases of the respiratory system

In 2012, 14 children whose deaths were registered in NSW died from diseases of the respiratory system.³¹ Respiratory diseases include conditions such as pneumonia and asthma.

The rate of death of children from respiratory diseases has not changed significantly over the past 15 years.

10.1 Demographic and individual characteristics

The following table provides an overview of the key demographic characteristics of the 14 children who died from respiratory diseases.

Table 27: Key demographic and individual characteristics – deaths due to respiratory diseases, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
All	14	100	0.85	0.47 - 1.43		
Gender						
Female	8	57	1.00	0.43 - 1.97		
Male	6	43	0.71	0.26 - 1.55	0.71	0.2643
Age						
under 1 year	4	29	4.30 (0.04)†	1.17 - 11.00		
1-4 years	2	14	-	-		
5-9 years	2	14	-	-		
10-14 years	5	36	1.13	0.37 - 2.64		
15-17 years	1	7	-	-		
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	12	86	0.76	0.39 - 1.33		
Aboriginal or Torres Strait Islander	2	14	-	-		
Remoteness						
Major cities	5	36	0.42	0.14 - 0.99		
Inner regional areas	4	29	1.18	0.32 - 3.02		
Outer regional areas	3	21	-	-		
Remote areas	2	14	-	-		
Very remote areas	0	0	-	-		
Socioeconomic status						
Quintile 5 (highest)	0	0	-	-		
Quintile 4	3	21	-	-		
Quintile 3	4	29	1.44	0.39 - 3.69		
Quintile 2	0	0	-	-		
Quintile 1 (lowest)	7	50	2.52	0.81 - 4.16		

† Infant Mortality Rate.

³¹ The deaths of two of these children are included in Chapter 15 on Sudden Unexpected Deaths in Infancy.

10.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2012, respiratory diseases were the leading natural cause of death of children aged 10-14 years, primarily due to deaths from asthma. Six of the 14 children who died due to respiratory diseases were younger than five years of age, with four children under one year. The oldest child was 15 years of age.

Of the 14 children who died from respiratory diseases in 2012, most (8) were female. This is inconsistent with deaths since 1998, where the mortality rate for males due to respiratory diseases has been consistently higher than that of females.

In 2012, two of the 14 children who died from respiratory diseases were identified as Aboriginal.

Table 28: Trends in deaths of children due to respiratory diseases by gender, 1998-2012, number and (crude mortality rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	8 (1.0)	9 (1.2)	5 (0.6)	5 (0.6)	5 (0.6)	7 (0.9)	7 (0.9)	2 -	3 -	5 (0.6)	9 (1.1)	4 (0.5)	7 (0.9)	4 (0.5)	8 (1.0)
Male	17 (2.1)	14 (1.7)	9 (1.1)	9 (1.1)	11 (1.3)	8 (1.0)	9 (1.1)	5 (0.6)	8 (1.0)	11 (1.3)	10 (1.2)	5 (0.6)	10 (1.2)	5 (0.6)	6 (0.7)
Both	25 (1.6)	23 (1.4)	14 (0.9)	14 (0.9)	16 (1.0)	15 (0.9)	16 (1.0)	7 (0.4)	11 (0.7)	16 (1.0)	19 (1.2)	9 (0.6)	17 (1.0)	9 (0.6)	14 (0.9)

10.1.2 Remoteness and socioeconomic status

Half of the children who died from respiratory diseases resided in the lowest areas of socioeconomic status. Two children resided in remote areas of NSW.

10.2 Leading causes of death due to respiratory diseases

As shown in table 29, the most common respiratory disease that caused the deaths of children in NSW in 2012 was asthma. Asthma accounted for half (7) of the deaths of children from respiratory diseases in that period.

Four deaths were attributed to pneumonia – one was due to viral pneumonia, one was bacterial, and in two deaths the pathogen was not specified. Three of the four children who died from pneumonia were under 12 months of age.

One child's underlying cause of death was acute bronchitis with the pathogen not specified. One death was due to chronic frontal sinusitis and another child died as a result of the avian influenza virus.

Of the seven asthma-related deaths that occurred in 2012, the youngest child who died was seven years of age, and the eldest was 15 years. Most (5) of the children whose deaths were related to asthma were in middle childhood, aged nine to 14 years.

Over the next year, the Team will undertake a cohort review of asthma-related deaths. The review will examine the deaths of children due to asthma that occurred in the 10 years between 2004 and 2013.

Table 29: Leading causes of deaths due to respiratory diseases by age, 2012

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Viral pneumonia 1	Avian influenza 1	Asthma 2	Asthma 4	Asthma 1
Pneumonia unspecified 2	Bronchopneumonia 1		Chronic sinusitis 1	
Acute bronchitis 1				

Chapter 11. Deaths from endocrine, nutritional or metabolic diseases

In 2012, 11 children whose deaths were registered in NSW died as a result of metabolic diseases. There were no deaths in 2012 attributed to nutritional or endocrine diseases (such as diabetes). Metabolic diseases include Batten disease and cystic fibrosis. The number of deaths from endocrine, nutritional or metabolic diseases in 2012 was slightly lower than the average over the past 15 years (15 deaths per year).

11.1 Demographic and individual characteristics

Table 30 provides an overview of the key demographic characteristics of the 11 children who died due to metabolic diseases.

Table 30: Key demographic and individual characteristics – deaths due to metabolic diseases, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	11	100	0.67	0.33 - 1.20		
Gender						
Female	7	64	0.88	0.35 - 1.81	-	-
Male	4	36	0.47	0.13 - 1.21	0.54	0.1611
Age						
Under 1 year	3	27	-	-	-	-
1-4 years	3	27	-	-	-	-
5-9 years	2	18	-	-	-	-
10-14 years	2	18	-	-	-	-
15-17 years	1	9	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	11	100	0.70	0.35 - 1.25	-	-
Aboriginal or Torres Strait Islander	0	0	-	-	-	-
Remoteness						
Major cities	8	73	0.68	0.29 - 1.34	-	-
Inner regional areas	2	18	-	-	-	-
Outer regional areas	1	9	-	-	-	-
Remote areas	0	0	-	-	-	-
Very remote areas	0	0	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	3	27	-	-	-	-
Quintile 4	4	36	1.37	0.37 - 3.51	-	-
Quintile 3	1	9	-	-	-	-
Quintile 2	1	9	-	-	-	-
Quintile 1 (lowest)	2	18	-	-	-	-

11.1.1 Age, gender and Aboriginal and Torres Strait Islander status

Deaths of children due to metabolic diseases occurred across all age groups.

As indicated in table 31, of the 11 children who died from metabolic diseases in 2012, most (7) were female. In the 15 years since 1998, just over half of the children who died from endocrine, nutritional or metabolic diseases were male (56%).

No Aboriginal or Torres Strait Islander children died from endocrine, nutritional or metabolic diseases in 2012.

Table 31: Trends in deaths of children due to endocrine, nutritional and metabolic diseases by gender, 1998-2012, number and (Crude Mortality Rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	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 -	7 (0.9)
Male	10 91.2)	13 (1.6)	4 (0.5)	6 (0.7)	11 (1.3)	9 (1.1)	3 -	8 (1.0)	4 (0.5)	8 (1.0)	16 (1.9)	9 (1.1)	9 (1.1)	8 (1.0)	4 (0.5)
Both	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)	11 (0.7)

11.1.2 Remoteness and socioeconomic status

The majority of children lived in major cities (8 of 11), but the rate relative to the population in major cities is not particularly high. The majority of children were from the two most advantaged socioeconomic categories, but no particular pattern is apparent.

11.2 Leading causes of death from metabolic diseases

The leading causes of death due to metabolic diseases in 2012 varied, as shown in table 32.

Two children died as a result of Batten disease, a fatal neurodegenerative disorder that typically begins in childhood.³² Two deaths were attributed to 'other metabolic disorders', both of which were identified as mitochondrial. The deaths of two children were due to glycoprotein metabolism disorders; both were younger than one year of age.

All of the remaining metabolic diseases were single cases. One child aged 15-17 years died from cystic fibrosis.

Table 32: Leading causes of death from metabolic diseases, 2012

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Disorders of fatty acid metabolism 1	Other disorders of glycoprotein metabolism 1	Batten disease 2	Mucopolysaccharidosis 1	Cystic fibrosis 1
Disorders of glycine metabolism 1	Disorders of iron metabolism 1		Other metabolic disorders 1	
Defects in glycoprotein degradation 1	Other metabolic disorders 1			

32 National Institute of Neurological Disorders and Stroke (USA) 2011, 'Batten Disease Fact Sheet' Bethesda, MD: NINDS http://www.ninds.nih.gov/disorders/batten/detail_batten.htm, accessed 16 July 2013.

Chapter 12. Deaths from diseases of the circulatory system

In 2012, 10 children whose deaths were registered in NSW died as a result of diseases of the circulatory system. Diseases of the circulatory system relate to a broad range of conditions such as heart diseases, heart failure and cerebrovascular diseases.

The number and rate of deaths from diseases of the circulatory system in 2012 (0.6 per 100,000), represent the lowest number and rate of deaths from this cause since 2003. Deaths in 2012 were considerably lower than the 15-year average of 19 deaths per year.

12.1 Demographic and individual characteristics

Table 33 provides an overview of the key demographic characteristics of the 10 children who died from circulatory diseases.

Table 33: Key demographic and individual characteristics – deaths due to diseases of the circulatory system, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	10	100	0.61	0.29 - 1.12		
Gender						
Female	5	50	0.63	0.20 - 1.46	-	-
Male	5	50	0.59	0.19 - 1.38	0.95	0.4681
Age						
Under 1 year	3	30	-	-	-	-
1-4 years	2	20	-	-	-	-
5-9 years	1	10	-	-	-	-
10-14 years	2	20	-	-	-	-
15-17 years	2	20	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	9	90	0.57	0.26 - 1.09	-	-
Aboriginal or Torres Strait Islander	1	10	-	-	-	-
Remoteness*						
Major cities	9	90	0.76	0.35 - 1.45	-	-
Inner regional areas	0	0	-	-	-	-
Outer regional areas	0	0	-	-	-	-
Remote areas	0	0	-	-	-	-
Very remote areas	1	10	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	2	20	-	-	-	-
Quintile 4	0	0	-	-	-	-
Quintile 3	1	10	-	-	-	-
Quintile 2	3	30	-	-	-	-
Quintile 1 (lowest)	4	40	1.44	0.31 - 2.95	-	-

12.1.1 Age, gender and Aboriginal and Torres Strait Islander status

Deaths due to diseases of the circulatory system occurred across all age groups. In 2012, half of the children who died from circulatory diseases were younger than five years of age; three were under one year. The oldest child was 17 years of age.

The rate of death from circulatory system diseases was slightly lower in 2012 for infants and children aged 10-14 years.

As illustrated in table 34, there was no difference in the number of deaths for females and males. Overall, just over half of the children who have died from circulatory system diseases since 1998 have been male (56%).

One of the children who died from circulatory system disease was Aboriginal.

Table 34: Trends in deaths of children due to diseases of the circulatory system by gender, 1998-2012, number and (crude mortality rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	8 (1.0)	11 (1.4)	8 (1.0)	8 (1.0)	11 (1.4)	4 (0.5)	9 (1.2)	8 (1.0)	11 (1.4)	10 (1.3)	8 (1.0)	7 (0.9)	8 (1.0)	8 (1.0)	5 (0.6)
Male	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 (1.0)	11 (1.3)	9 (1.1)	7 (0.8)	11 (1.3)	10 (1.2)	5 (0.6)
Both	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 (1.1)	14 (0.9)	19 (1.2)	18 (1.1)	10 (0.6)

12.2 Leading causes of death due to diseases of the circulatory system

Table 35 shows the leading causes of death due to diseases of the circulatory system in 2012, by age.

In 2012, 'other heart diseases' comprised the largest cause of the death of children from circulatory system diseases, accounting for the deaths of six children. Half of these deaths were due to myocarditis. Myocarditis is inflammation of the heart muscle, usually caused by viral, bacterial or fungal infections that reach the heart. Two of the three children were under 12 months of age.

The other four deaths caused by 'other heart diseases' were attributed to cardiomyopathy, a conduction disorder, and cardiac arrest (2).

The remaining three deaths from circulatory disease in 2012 were due to acute rheumatic heart disease, pulmonary heart disease (primary pulmonary hypertension), and cerebrovascular disease (subarachnoid haemorrhage).

Table 35: Leading causes of deaths due to diseases of the circulatory system by age, 2012

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Myocarditis 2	Acute rheumatic heart disease 1	Cardiac arrest 1	Pulmonary heart disease 1	Cardiac arrest 1
Other conduction disorder 1	Cerebrovascular disease 1		Myocarditis 1	Cardiomyopathy 1

12.2.1 Sudden cardiac deaths

The deaths of four of the 10 children who died from diseases of the circulatory system in 2012 were considered to be sudden cardiac deaths. 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'.³³ Sudden cardiac death is rare and often occurs in seemingly healthy young people.

The four sudden cardiac deaths were attributed to cardiomyopathy, septic myocarditis, and cardiac arrest (2).

³³ Commission for Children and Young People and Child Guardian 2012, *Trends and Issues paper: Child deaths – sudden cardiac deaths* Number 7 March 2012. Brisbane: CCYPCG.

Chapter 13. Deaths from infectious or parasitic diseases

In 2012, seven children whose deaths were registered in NSW died as a result of infectious diseases.³⁴ No deaths from parasitic diseases were registered in 2012.

Infectious diseases are caused by organisms such as bacteria, viruses, parasites or fungi and can be passed directly or indirectly from person to person. Examples include septicaemia, gastroenteritis and meningococcal disease.

In Australia, there has been a decrease in deaths from infectious diseases over the past 30 years. This decrease is largely attributed to the vaccination program and advances in public health.³⁵

13.1 Demographic and individual characteristics

Table 36 provides an overview of the key demographic characteristics of the seven children who died from infectious diseases and whose deaths were registered in 2012.

Table 36: Key demographic and individual characteristics – deaths due to infectious diseases, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	7	100	0.43	0.17 - 0.88		
Gender						
Female	2	29	-	-	-	-
Male	5	71	0.59	0.19 - 1.38	2.36	0.1446
Age						
Under 1 year	5	71	5.37 (0.05)†	1.74 - 12.53	-	-
1-4 years	0	0	-	-	-	-
5-9 years	2	29	-	-	-	-
10-14 years	0	0	-	-	-	-
15-17 years	0	0	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	6	86	0.38	0.14 - 0.83	-	-
Aboriginal or Torres Strait Islander	1	14	-	-	-	-
Remoteness						
Major cities	5	71	0.42	0.14 - 0.99	-	-
Inner regional areas	1	14	-	-	-	-
Outer regional areas	1	14	-	-	-	-
Remote areas	0	0	-	-	-	-
Very remote areas	0	0	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	0	0	-	-	-	-
Quintile 4	0	0	-	-	-	-
Quintile 3	2	29	-	-	-	-
Quintile 2	2	29	-	-	-	-
Quintile 1 (lowest)	3	43	1.08	0.18 - 2.53	-	-

† Infant Mortality Rate.

34 The death of one of these children is also included in the SUDI chapter.

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

13.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2012, most (5) of the seven children who died as a result of infectious diseases were younger than 12 months of age. The other children were six and eight years of age.

Males were slightly more likely to die from infectious diseases than females, but not significantly so. Five of the seven children who died in 2012 were male. This is generally consistent with previous years (other than 2011), in which males have had a higher mortality rate, as shown in table 37.

One of the children who died from an infectious disease in 2012 was identified as Aboriginal and Torres Strait Islander.

Table 37: Trends in deaths of children who died from infectious and parasitic diseases by gender, 1998-2012, number and (Crude Mortality Rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	4 (0.5)	3 -	7 (0.9)	2 -	5 (0.6)	6 (0.8)	2 -	1 -	7 (0.9)	6 (0.8)	2 -	1 -	2 -	7 (0.9)	2 -
Male	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)	7 (0.8)	7 (0.8)	6 (0.7)	5 (0.6)
Both	16 (1.0)	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)	8 (0.5)	9 (0.6)	13 (0.8)	7 (0.4)

13.1.2 Remoteness and socioeconomic status

The majority of children who died from infectious diseases in 2012 lived in major cities, and tended to reside in areas of lower socioeconomic status.

13.2 Leading causes of death due to infectious diseases

As noted in table 38, the underlying cause of death for two children from infectious disease was sepsis. One death was due to viral carditis; one death was a result of congenital syphilis and one death was due to conditions arising from the human immunodeficiency virus (HIV).

Two deaths in 2012 were due to vaccine preventable diseases. The underlying cause of death for one child was pertussis (whooping cough). One death was due to meningococcal septicaemia. In this case, the serogroup type of meningococcal disease was not identified. Both of these deaths were of children under the age of 12 months, both of whom were younger than the recommended minimum age for receiving the respective vaccinations.³⁶

Table 38: Leading causes of deaths due to infectious diseases by age, 2012

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Pertussis 1		Streptococcal sepsis 1		
Meningococcal infection 1		Other sepsis 1		
Congenital syphilis 1				
HIV disease resulting in other conditions 1				
Viral carditis 1				

36 The National Immunisation Program (NIP) recommends three doses of vaccination for pertussis in infants at two, four and six months of age. The NIP recommends a meningococcal C conjugate vaccine be given to all children at 12 months of age. <http://www.health.gov.au/internet/immunise/publishing.nsf/Content/nips-ctn>, accessed 16 July 2013.

Notifiable and vaccine-preventable diseases

Diseases that are defined as communicable (including vaccine-preventable and certain infectious and parasitic diseases) are required to be notified to NSW Health under the *Public Health Act 2010*. 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 2012, six children died as a result of a notifiable disease. The notifiable diseases included four deaths that have been reported in this chapter. These deaths have been attributed to syphilis and HIV, and the vaccine-preventable diseases of pertussis and meningococcal septicaemia. Two additional deaths attributed to a notifiable disease include one child who died from haemolytic-uraemic syndrome and one child who died from influenza due to the avian influenza virus.^{37, 38}

Table 39: Notifiable conditions by gender, 2012

Cause of death	Female	Male	Total
Pertussis		1	1
Meningococcal infection		1	1
Congenital syphilis		1	1
Human immunodeficiency virus (HIV) infection	2		2
Haemolytic Uraemic Syndrome	1		1
Avian influenza virus	1		1
Total	4	3	7

37 The current seasonal influenza vaccine does not protect humans against the avian influenza virus.
<http://www.health.gov.au/internet/immunise/publishing.nsf/Content/handbook10-4-7>, accessed 16 July 2013,
http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Bird_flu, accessed 16 July 2013.

38 The two deaths are captured in the data relating to ICD chapters: Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50-D89), and Diseases of the respiratory system (J00-J99).

Chapter 14. Deaths of infants and Sudden Unexpected Death in infancy (SUDI)

In 2012, the deaths of 303 infants younger than one year of age were registered in NSW. This represents the majority (61%) of all child deaths in 2012, which is consistent with previous years. Fifty (17%) of the infant deaths were Sudden Unexpected Death in Infancy (SUDI). This was a slight increase from the proportion of infant deaths that were SUDI in 2011 (13%), but was not a statistically significant difference.

SUDI is not a cause of death, but a classification to enable the consideration of deaths of otherwise healthy babies who die suddenly and unexpectedly. In some cases, a cause of death may be identified through 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 five of the 50 infants who died suddenly and unexpectedly are also 'reviewable' and will be reviewed separately by the Ombudsman.

14.1 Demographic and individual characteristics

Table 40 provides an overview of the key demographic characteristics of all infant deaths registered in 2012.

Table 40: Key demographic and individual characteristics – deaths of infants from all causes in NSW, 2012

	Number	Percent	Infant Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	303	100	3.06	2.71 - 3.40		
Gender						
Female	120	40	2.50	2.05 - 2.94	-	-
Male	183	60	3.59	3.07 - 4.11	1.44	0.0009
Age						
Under 1 day	123	41	1.24	1.02 - 1.46	-	-
under 1 week	50	17	0.50	0.37 - 0.67	-	-
under 28 days	49	16	0.49	0.37 - 0.65	-	-
under 1 year	81	27	0.82	0.65 - 1.02	-	-
1 year and over	0	0	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	270	89	2.89	2.54 - 3.23		
Aboriginal or Torres Strait Islander	33	11	5.88	4.05 - 8.26	2.03	0
Remoteness*						
Major cities	200	68	2.65	2.28 - 3.02	-	-
Inner regional areas	65	22	3.76	2.90 - 4.80	-	-
Outer regional areas	21	7	3.93	2.43 - 6.01	-	-
Remote areas	6	2	11.98	0.10 - 0.58	-	-
Socioeconomic status**						
Quintile 5 (highest)	69	24	3.87	3.01 - 4.90		
Quintile 4	53	18	3.29	2.46 - 4.30	-	-
Quintile 3	50	17	2.53	1.88 - 3.33	-	-
Quintile 2	41	14	1.76	1.26 - 2.38	-	-
Quintile 1 (lowest)	76	26	4.25	3.35 - 5.32	-	-

*Remoteness was not calculated in 11 cases.

**Socioeconomic status was not calculated in 14 cases.

14.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2012, almost three-quarters of the infants (222; 73%) died during the neonatal period (the period from birth to less than 28 days), which is consistent with previous years. More male infant deaths (183; 60%) were registered than female infant deaths (120; 40%). Males have been consistently overrepresented in infant deaths in NSW over the past 15 years.

Thirty-three infants (11%) were Aboriginal. The rate of Indigenous infant deaths in 2012 remained significantly higher than that of non-Indigenous children (incident rate ratio: 2.03, $p < 0.001$).

14.1.2 Remoteness and socioeconomic status

The majority of infants whose deaths were registered in 2012 were from major cities (200), and the numbers of deaths decreased as remoteness increased. This is consistent with 2011.

There was no clear pattern in socioeconomic status, with large numbers in all categories in 2012 and 2011.

14.2 Trends in infant deaths

Table 41 shows that there has been a steady decline in the Infant Mortality Rate since 1998. The rate in 2012 was 1.1 per cent lower than in 1998. The rates of both male and female infant deaths have declined, with the female rate declining slightly more (-1.4) than the rate for males (-1.0).

The national Infant Mortality Rate has more than halved over recent decades. Across Australia in 2010, there were 1229 deaths of infants aged less than one year – a rate of 4.1 per 1000 live births.³⁹

Table 41: Infant deaths and mortality rates by gender 1998-2012

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Female	165 (4.0)	216 (5.2)	181 (4.3)	183 (4.3)	159 (3.9)	175 (4.3)	162 (4.0)	187 (4.5)	160 (3.6)	168 (3.9)	167 (3.7)	155 (3.4)	147 (3.2)	162 (3.5)	120 (2.6)
Male	209 (4.8)	262 (6.0)	252 (5.7)	239 (5.3)	184 (4.3)	194 (4.5)	203 (4.7)	248 (5.6)	242 (5.2)	199 (4.4)	223 (4.7)	213 (4.4)	217 (4.5)	203 (4.1)	183 (3.8)
Both	374 (4.4)	478 (5.6)	433 (5.0)	422 (4.8)	343 (4.1)	369 (4.4)	365 (4.4)	435 (5.1)	402 (4.4)	367 (4.1)	390 (4.2)	368 (3.9)	364 (3.9)	365 (3.8)	303 (3.3)

14.3 Leading causes of infant death

As shown in table 42 below, conditions arising in the perinatal period accounted for almost half (49%) of all infant deaths and was the leading cause of death for this age group in 2012. This is consistent with previous years. Almost all (134) of the infants who died from perinatal conditions were neonates.

The second leading cause of death for infants was congenital and chromosomal conditions (28%). Over eighty percent (69) of the infants who died due to this cause were neonates.

For 24 infants, the cause of death had not been classified at the time of reporting. An additional 16 infant deaths were due to causes that were undetermined or ill-defined, including SIDS. The large majority of these deaths (37) were SUDI.

³⁹ Australian Institute of Health and Welfare 2012, *A picture of Australia's children 2012*. Cat. no. PHE 167. Canberra: AIHW.

Table 42: All causes of infant deaths, 2012

Type	Female	Male	Total	Crude Mortality Rate	95% Confidence Interval
Certain conditions arising in the perinatal period	56	91	147	1.48	1.24 - 1.72
Congenital malformations, deformations and chromosomal abnormalities	34	50	84	0.85	0.68 - 1.05
Cause of death not classified (not finalised)	10	14	24	0.24	0.16 - 0.36
Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified	7	9	16	0.16	0.09 - 0.26
Diseases of the nervous system	4	3	7	0.07	0.03 - 0.15
External causes of morbidity and mortality	1	5	6	0.06	0.02 - 0.13
Certain infectious and parasitic diseases	1	4	5	0.05	0.02 - 0.12
Diseases of the respiratory system	3	1	4	0.04	0.01 - 0.10
Diseases of the circulatory system	1	2	3		
Endocrine, nutritional and metabolic diseases	2	1	3		
Diseases of the digestive system	1	1	2		
Diseases of the blood, blood-forming organs and certain disorders involving the immune system	0	1	1		
Diseases of the musculoskeletal system and connective tissue	0	1	1		

14.3.1 Leading causes of neonatal and post neonatal death

While the leading cause of death for all infants is perinatal conditions, when neonatal and post neonatal deaths are considered separately, the leading causes differ. This is illustrated in table 43 below. The leading category of cause of death for infants aged 28 days and older is SIDS and other unexplained causes. External causes are among the top five causes of death for post neonatal infants, but not for neonates.

Table 43: Top 5 causes of neonatal and post neonatal deaths, 1998-2012

Deaths of neonates (birth to <28 days) N = 4084	Deaths of post neonates (28 days to 365 days) N = 1693
Certain conditions originating in the perinatal period (71.4%)	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (32.1%)
Congenital malformations, deformations and chromosomal abnormalities (31.6%)	Congenital malformations, deformations and chromosomal abnormalities (21.1%)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (2.4%)	Certain conditions originating in the perinatal period (11.5%)
Endocrine, nutritional and metabolic diseases (0.8%)	Diseases of the nervous system (7.6%)
Diseases of the nervous system (0.7%)	External causes of mortality and morbidity (7.3%)

Chapter 15. Sudden Unexpected Death in Infancy

15.1 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.⁴⁰ SIDS is a category of SUDI and is a diagnosis of exclusion. The broadly accepted national definition of SIDS is:

*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 clinical history.*⁴¹

There are a number of sub-classifications of SIDS (see Appendix 2). Since 2009, the Team has used the following definition of SUDI.⁴²

“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.”*

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

Along with the decreasing trend in infant deaths overall in NSW, the rate of SUDI has declined, albeit slowly, since 1998.

However, there has been considerable variation in the numbers and rates of SUDI over the past 15 years. Table 44 shows that, since 2003, there has been an average of 54 sudden and unexpected deaths of infants in NSW each year.

Table 44: Infant Mortality Rate of SUDI neonatal status, 1998-2012

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Neonates	9	9	9	12	7	12	4	7	7	12	8	5	11	10	13
Non-neonates	49	64	63	54	54	49	47	47	51	51	45	40	42	38	37
Total	58	73	72	66	61	61	51	54	58	63	53	45	53	48	50
IMRs	0.68	0.85	0.83	0.76	0.73	0.73	0.61	0.63	0.64	0.71	0.58	0.48	0.57	0.50	0.50

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 1986 and 2003, the SIDS death rate decreased by 86 per cent, but has remained comparatively stable to 2010.⁴³ In 2011, 61 infant deaths in Australia were attributed to SIDS.⁴⁴

40 Krous H. F. 2010, *Sudden unexpected death in infancy and the dilemma of defining the sudden infant death syndrome*, Current Pediatric Reviews 6(1): 5-12.

41 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 deaths*, Canberra: SIDS and Kids.

42 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 varying number of SUDI each year occur outside of sleep.

43 Australian Institute of Health and Welfare 2012, *A picture of Australia's children 2012*. Cat. no. PHE 167. Canberra: AIHW, p. 14.

44 Australian Bureau of Statistics 2013, *3303.0 - Causes of Death, Australia, 2011*. Canberra: ABS.

15.2 Demographic and individual characteristics

The table below provides an overview of the main demographic characteristics of the 50 infants whose sudden and unexpected deaths were registered in 2012.

Table 45: Key demographic and individual characteristics of deaths due to SUDI, 2012

	Number	Percent	Infant Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	50	100	0.50	0.37 - 0.67		
Gender						
Female	22	44	0.46	0.29 - 0.69	-	-
Male	28	56	0.55	0.36 - 0.79	1.20	0.2578
Age						
Under 1 day	3	6	0.03	0.01 - 0.09	-	-
under 1 week	2	4	0.02	0.00 - 0.07	-	-
under 28 days	8	16	0.08	0.03 - 0.16	-	-
under 1 year	37	74	0.37	0.26 - 0.51	-	-
1 year and over	0	0	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	41	82	0.44	0.31 - 0.60	-	-
Aboriginal or Torres Strait Islander	9	18	1.60	0.73 - 3.04	3.65	0
Remoteness*						
Major cities	27	54	0.36	0.24 - 0.52	-	-
Inner regional areas	14	28	0.81	0.44 - 1.36	-	-
Outer regional areas	5	10	0.94	0.30 - 2.18	-	-
Remote areas	3	6	-	-	-	-
Very remote areas	0	0	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	9	18	0.20	0.23 - 0.96	-	-
Quintile 4	5	10	0.15	0.10 - 0.72	-	-
Quintile 3	7	14	0.22	0.14 - 0.73	-	-
Quintile 2	8	16	0.20	0.15 - 0.68	-	-
Quintile 1 (lowest)	20	41	0.62	0.68 - 1.73	-	-

*Remoteness was not calculated in one case.

**Socioeconomic status was not calculated in one case.

15.2.1 Age and gender

The 50 infants ranged in age from less than one day to just under one year. Most (32) died during the first three months of life:

- Thirteen infants died in the neonatal period (less than 28 days after birth); five of these infants were aged less than one week.
- Nineteen infants were aged 1-3 months.
- Eleven infants were aged 4-6 months.
- Seven infants were older than six months: six were aged 7-10 months, and one was aged 11 months.

Over half (28) of the infants were male. This is a slightly higher number than 2011 (25); however, the number of male infant SUDI appears to have declined slowly over the past 10 years. For the three year period 2000-2002, there was an average of 39 male SUDI per year.

15.2.2 Aboriginal and Torres Strait Islander status and cultural background

Nine of the infants (18%) were Aboriginal.

More than one-third (19) of the infants had a parent, or both parents, who were born overseas in a country where the main language is not English. Six families were of Middle Eastern backgrounds, five families were of Pacific Island background, four families were of a South East Asian background and two families were of an East Asian background. One family was of a South Asian background and one family was of a European background.

15.2.3 Remoteness and socioeconomic status

The majority (41; 82%) of SUDI in 2012 were in major cities or inner regional areas. This is a more extreme result than was seen in 2011 when 34 infants (70%) were from these less remote, more urbanised categories, but seems to be a relatively consistent pattern through time.

Socioeconomic status showed a less consistent pattern through time, with the majority (20) in the lowest quintile in 2012 and 2010 but not in 2011, when the majority of SUDI was in the two highest quintiles.

15.2.4 Gestational age and birth weight

Prematurity (infants born at less than 37 weeks gestation) and low birth weight (less than 2500 grams) are recognised SIDS risk factors.⁴⁵

Information on gestational age was available for 48 of the 50 infants who died suddenly and unexpectedly and whose deaths were registered in 2012. The majority (41) were full term infants. Seven infants were born prematurely between 32 and 36 weeks gestation. Five of the premature infants and one additional infant had low birth weight, ranging from 1592g to 2335g.

The proportion of SUDI in 2012 who were infants born prematurely (15%) is lower than in 2011 (17%) and in 2010 (40%); however the proportion in all three years is higher than the NSW rate. Over the 10-year period to 2010, the rate of premature birth in NSW was between 7.0 and 7.5 per cent of all births.⁴⁶

15.2.5 Maternal age

Young maternal age has been found to be one of the characteristics associated with SIDS.⁴⁷ Four (8%) mothers of the infants who died suddenly and unexpectedly in 2012 were teenagers aged between 14 and 19 years. This is an over-representation of mothers in this age group. In NSW, 3.3 per cent of mothers who gave birth in 2011 were less than 20 years of age.⁴⁸

15.2.6 Child protection history

Consistent with 2010 and 2011, infants with a child protection history were overrepresented in SUDI in 2012. Of the 50 families, over one-third (17) had a child protection history.

Ten infants had been the subject of a report of risk of harm or report of risk of significant harm to Community Services; most of whom (8) 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.

One additional infant was the subject of a report to a Child Wellbeing Unit. Six infants had not been the subject of a child protection report, but had a sibling who had been.

45 Kinney, H. C. & Thach B. T. 2009, *The sudden infant death syndrome*. New England Journal of Medicine 361(8): 795-805.

46 Centre for Epidemiology and Research 2012, *Health Statistics New South Wales*, Sydney: NSW Ministry of Health <http://www.healthstats.nsw.gov.au>, accessed 16 July 2013.

47 Moon R. Y. & Fu L. 2012, *Sudden Infant Death Syndrome: An Update*, Pediatrics in Review 33(7): 314-320.

48 Australian Bureau of Statistics 2012, *3301.0 - Births, Australia, 2011*. Canberra: ABS.

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

- exposure to domestic violence (11 families)
- inadequate shelter, homelessness or overcrowding (9 families)
- parent/carer mental health and emotional state (7 families), and
- parent/carer drug and alcohol use (7 families).

Eleven families had two or more risk factors present.

Sixteen of the 17 infants who had a child protection history were in unsafe sleep environments when they died. This includes 14 infants who were sharing a sleep surface with one or more family members and two infants who were sleeping alone in non-infant specific sleep environments. Of the 14 infants who were sharing a sleep surface, three infants were with a parent who had consumed alcohol and one infant was with a parent who was prescribed methadone.⁴⁹

15.3 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.⁵⁰ Unexplained SUDI includes deaths that are classified as SIDS and other ill-defined or undetermined causes.

Around three-quarters of SUDI in NSW remain unexplained after autopsy and comprehensive investigation. Table 46 shows that this has consistently been the case since 1998, with no substantial change in the proportion of explained SUDI.

At the time of writing, information regarding cause of death was available for 29 of the 50 infants (58%) who died suddenly and unexpectedly in 2012.

Table 46: Number and rate of explained and unexplained SUDI, 1998-2012

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total (%)
Explained	11	10	19	20	9	15	17	11	14	15	13	9	22	13	13	211 (24)
Unexplained	47	63	53	46	52	46	34	43	44	48	40	36	30	27	16	623 (72)
Not finalised	0	0	0	0	0	0	0	0	0	0	0	0	2	8	21	33 (4)
Total	58	73	72	66	61	61	51	54	58	63	53	45	54	48	50	867 (100)

15.3.1 Explained SUDI

The cause of death for 13 infants who died suddenly and unexpectedly in 2012 was identified after a comprehensive autopsy and examination of the circumstances of the death. Table 47 below shows that the majority of explained SUDI in NSW over the past 15 years was due to diseases and morbid conditions that were not recognised as life threatening prior to death.

⁴⁹ Methadone is a synthetic opioid used in the treatment of people dependent on heroin and other opioids. Australian Drug Foundation, Methadone Facts, Melbourne. <http://www.druginfo.adf.org.au/drug-facts/methadone>, accessed 16 July 2013.

⁵⁰ NSW Child Death Review Team 2005, *Sudden Unexpected Deaths in Infancy: the New South Wales experience*, Sydney: Commission for Children and Young People, p. 7.

Table 47: Total number of explained causes of SUDI, 1998-2012

Cause of death	Number	Percent
Diseases and morbid conditions		
Diseases of the respiratory system	44	21
Congenital chromosomal conditions	33	16
Other diseases and morbid conditions	61	29
Subtotal:	138	65
Accidental threats to breathing		
Accidental suffocation and strangulation	37	18
Other accidental threats to breathing	12	6
Subtotal:	49	23
Other external causes		
Assault	18	9
Other injury, poisoning or external cause	6	3
Subtotal:	24	11
Total	205	100.0

Diseases and morbid conditions

Consistent with previous years, the majority (9) of explained SUDI in 2012 were due to diseases and morbid conditions, including:

- cardiac conditions (5)
- respiratory infections (2)
- acute chorioamnionitis, and
- congenital diaphragmatic hernia.

Eight of the nine infants had been examined by a medical professional in the two weeks before their death; none had been identified as having a life threatening condition. Of the eight infants:

- four had been examined due to minor illness (2) or for a routine health check (2)
- two infants who died as a result of congenital heart malformations had previously identified heart murmurs that were pending further investigation, and
- two infants aged less than one week were still in hospital following their birth.

Two-thirds (6) of the infants who died as a result of diseases and morbid conditions were neonates.

External causes

The cause of death for four infants was accidental threats to breathing. As shown in table 47, this is the most common external cause of explained SUDI in NSW over the past 15 years.

Three of the four infants died while sharing a sleep surface with a parent and/or sibling. One infant had been placed to sleep in a portable travel cot and was found in the prone (face down) position.

15.3.2 Unexplained SUDI

The cause of death of 16 infants who died suddenly and unexpectedly in 2012 remained unexplained after a comprehensive autopsy and examination of the circumstances of the death. Four of the infants were aged less than 28 days.

The cause of death of the 16 infants has been classified as:

- other ill-defined and unspecified causes of mortality (10)
- consistent with Sudden Infant Death Syndrome (5), and
- unattended death.

Table 48 shows the classification of unexplained SUDI since 1998. There has been a slight increase in the number of deaths classified as other ill-defined cause. The table does not include the 31 matters that were not yet finalised at the time of writing this report.⁵¹

⁵¹ As indicated in table 46, the 'not finalised' matters include two deaths from 2010, eight from 2011, and 21 in 2012.

Table 48: Unexplained SUDI by year, 1998-2012

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
SIDS	36	52	44	31	39	23	15	17	0	1	7	5	12	17	5	304
SIDS Unclassified	1	1	0	0	0	1	0	1	8	5	2	0	0	1	0	20
SIDS Category II	0	0	0	0	0	3	6	13	21	22	18	18	6	4	0	111
SIDS Category IB	0	0	0	0	0	0	0	2	4	9	3	2	0	0	0	20
SIDS Category IA	0	0	0	0	0	0	0	6	4	3	3	4	1	0	0	21
Other ill-defined and unspecified causes of mortality	0	2	1	8	2	1	2	1	0	4	5	4	9	5	10	54
Death occurring less than 24 hrs from onset of symptoms, not otherwise explained	10	8	8	7	11	18	8	3	7	3	1	3	1	0	0	88
Other	0	0	0	0	0	0	3	0	0	1	1	0	0	0	1	6
Total	47	63	53	46	52	46	34	43	44	48	40	36	29	27	16	624

15.4 Circumstances of death

15.4.1 Seasonal factors

For deaths registered in 2012, SUDI occurred throughout the calendar year. This distribution varies from deaths in previous years, when SUDI was most common in the winter months of June, July and August.

Table 49: SUDI categorised by month, 2012

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
No. of SUDI	5	4	5	1	8	4	5	4	4	4	2	4

15.4.2 Where the incident occurred

Almost three-quarters (36) of SUDI occurred in the infant's usual home, which is consistent with previous years.

For 13 infants, the incident leading to death occurred in other places, including:

- the home of a relative or friend while the infant's family was visiting (5)
- in hospital (4)
- while travelling in a car (3), and
- a motel.

For one infant, the place of the incident leading to death is unknown.

15.4.3 Carer at the time of the incident

The vast majority of infants (45) were being cared for by their mother and/or father in the period immediately preceding their death, including three infants who were in hospital.

Grandparents were caring for three infants and one infant was being cared for by hospital staff. The carer of one infant whose death was unattended is unknown.

15.4.4 Recent infant illness

The Team continues to monitor SUDI to identify recent illness and medication use.

In 2012, 15 infants (30%) who died suddenly and unexpectedly had displayed signs of an illness in the two weeks prior to their death. Three of the infants were neonates.

The infants displayed symptoms of upper respiratory tract infections (9), difficulties breathing (2), or generalised symptoms of being unwell, such as diarrhoea, recurrent fevers and coughing (4).

Ten of the 15 infants saw a medical practitioner in relation to their symptoms in the two weeks prior to their death. Two other infants who had been unwell were seen by medical practitioners for a routine health check in the two weeks prior to their death.

Eleven of the 15 infants had been treated in the two weeks prior to their death with prescribed or over-the-counter medications, including paracetamol (6), ibuprofen (1), antibiotics (1) colic medication (1) cough medication (1) and complementary herbal medication (1). Another infant was hospitalised at the time of their death and was being treated with a range of medications.

15.4.5 Other infant illness

One infant had a developmental delay with accompanying clinical symptoms that were the subject of extensive investigations prior to the infant's death. One infant had been diagnosed with an inguinal hernia and another infant was diagnosed with neonatal abstinence syndrome at birth.

15.4.6 Hospital deaths

Four infants died in hospital. All were neonates. Three of the infants were still in hospital following their birth and one infant had been admitted to hospital due to symptoms of an illness.

One of the four infants was bed sharing with their mother on a hospital ward at the time of the incident. The infant had been taken to bed for the purpose of breastfeeding and settling and the infant's mother subsequently fell asleep.

All four deaths were the subject of a Root Cause Analysis (RCA) by the health service.⁵² The RCA in each case identified causes or contributing factors to the death and identified opportunities for systemic improvements at the Local Health District level. Broadly, recommendations from the RCAs related to the need for neonatal and maternity policy updates, practice development and staff education on maternity policies; and improved communication and handover of maternity, obstetric and paediatric patients between clinicians.

15.4.7 Toxicology

At the time of reporting, post mortem toxicology results were available for 32 infants. For 28 of the 32 infants, toxicology results did not detect any drugs (excluding drugs used for resuscitation).

For two infants, paracetamol was detected. For an additional infant both paracetamol and ibuprofen were detected. One infant had metoclopramide detected in their toxicology, an antiemetic drug (to prevent nausea and vomiting) that was prescribed to the infant's mother.

15.5 Modifiable risk factors associated with SUDI

In NSW, modifiable risk factors remain evident in a large proportion of SUDI. There is evidence to suggest that over 90 per cent of sudden and unexpected deaths in infancy are associated with preventable risk factors.⁵³

Modifiable risk factors for SUDI include 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.

Information on modifiable risk factors present in the infant's environment is obtained by reviewing police, health and coronial records 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 interviews with the infant's parents/carers.

In 2012, more than three-quarters (39) of the 50 infants who died suddenly and unexpectedly had at least one modifiable risk factor present in their environment. Almost all of these infants (37) died while they were in a sleep environment and the majority (22) had three or more risk factors present. Only three infants who died in a sleep environment were placed to sleep alone in fixed infant specific bedding; either a bassinette (2) or a cot.

52 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 steps to minimise risk of recurrence. Mental Health and Drug & Alcohol Office 2013, *Clinical risk management*, Sydney: NSW Health, http://www0.health.nsw.gov.au/mhdao/clinical_risk_management.asp, accessed 16 July 2013.

53 Mitchell E. A. Freemantle J. Young J. & Byard R. W. 2012, *Scientific consensus forum to review the evidence underpinning the recommendations of the Australian SIDS and Kids Safe Sleeping Health Promotion Programme – October 2010*. *Journal of Paediatrics and Child Health*, 48: 626-633.

Table 50: Presence and frequency of modifiable risk factors for SUDI in a sleep environment, 2012

	Cause of death	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	Explained: External		✓		✓	✓	✓	4
2*	Explained: External	✓		✓	✓	✓		4
3	Explained: Natural	✓		✓		✓	✓	4
4	Explained: Natural	✓		✓		✓	✓	4
5	Unexplained	✓		✓		✓	✓	4
6	Unexplained	✓			✓	✓	✓	4
7	Not finalised	✓		✓		✓	✓	4
8*	Not finalised	✓			✓	✓	✓	4
9*	Not finalised	✓			✓	✓	✓	4
10*	Not finalised	✓		✓	✓	Missing	✓	4
11	Explained: External		✓			✓	✓	3
12	Unexplained	✓				✓	✓	3
13	Unexplained		✓		✓	✓		3
14	Unexplained	✓				✓	✓	3
15	Not finalised	✓				✓	✓	3
16	Not finalised	✓				✓	✓	3
17	Not finalised	✓				✓	✓	3
18	Not finalised	✓			✓	✓		3
19	Not finalised	✓			✓		✓	3
20	Not finalised	✓				✓	✓	3
21	Not finalised	✓			✓	✓		3
22	Not finalised	✓				✓	✓	3
23	Explained: External	✓				Missing	✓	2
24	Explained: Natural		✓			Missing	✓	2
25	Unexplained				✓	✓		2
26	Unexplained					✓	✓	2
27	Unexplained		✓			✓		2
28*	Unexplained	✓			✓	Missing		2
29	Unexplained	✓			✓	Missing		2
30	Unexplained	✓				✓		2
31	Not finalised					✓	✓	2
32	Not finalised		✓			✓		2
33*	Not finalised	✓			✓			2
34	Not finalised		✓			✓		2
35	Not finalised		✓		✓			2
36	Not finalised	✓					✓	2
37	Unexplained		✓					1
Total		25	9	6	15	27	23	

*Six infants were brought to bed for feeding and settling purposes and the mother unintentionally fell asleep. For the purpose of this table, these infants have been included as 'not placed to sleep on their back'.

15.5.1 Shared sleep surfaces

Half (25) of the infants who died suddenly and unexpectedly in 2012 were sharing a sleep surface when they died.⁵⁴

In most cases (22), the shared sleep surface was an adult mattress or bed:

- twelve infants were sharing a sleep surface with one person, either a parent (11) or sibling (1), and
- ten infants were sharing a sleep surface with two or more people, either two adults (5) or adults and children (5).

Five of the infants were sharing a sleep surface with an adult who had consumed either alcohol or other drugs. An additional infant was co-sleeping with an adult prescribed methadone. Carers who consume drugs, alcohol or sedating medication prior to sharing a sleep surface with a child can create hazardous sleep environments that increase the risk of sudden infant deaths and fatal sleep accidents.⁵⁵

Records show that in 16 cases, the adult(s) intended to sleep with the infant; and in six cases the mother brought the infant to bed for the purpose of feeding or settling the infant, and unintentionally fell asleep.

Three of the 25 infants were sharing a cot with their twin (2) or triplets (1) when they died. The practice of placing twins to sleep together is referred to as 'co-bedding'.⁵⁶ Current evidence indicates that the safest way to sleep twins at home is to place each twin separately in their own cot.⁵⁷ In the event that this is not possible, and in order to minimise the risks for twins sharing the same cot, it is recommended to:

- place the babies head to head, at opposite ends of the cot
- not use bedding – safe alternatives include wrapping babies in accordance with SIDS and Kids guidelines and sleeping infants in separate safe infant sleeping bags (for babies weighing 3.2kg and over)
- sleep the twins in separate, safe infant sleeping bags (for babies weighing 3.2kg and over), and
- place them in separate cots once they have reached an age that they can freely move around the cot.⁵⁸

The Team has been collecting information on modifiable risk factors for SUDI since 2003. The sharing of sleep surfaces has been a consistently identified factor. Table 51 shows that just under half (44%) of SUDI since 2003 were infants who were sharing a sleep surface with another person or persons.

Table 51: SUDI and shared sleep surface, 2003-2012*

Shared sleep surface	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total (%)
No	31	25	24	24	37	23	23	27	24	12	250 (52)
Yes	20	20	18	27	25	16	16	20	22	25	209 (44)
Other/not known	0	0	0	0	0	0	0	6	2	13**	21 (4)
Total	51	45	42	51	62	39	39	51	48	50	480 (100)

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

** These 13 infants were not placed in a sleep environment when the incident occurred.

15.5.2 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 2012, nine infants were placed to sleep on surfaces that were not infant-specific. This included adult beds or mattresses (6), and portable bedding such as portable cots (2) and a baby capsule (1).

Police recorded that loose bedding was present in the sleep environment of 27 infants.

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 accidentally fell asleep.

55 SIDS and Kids. National Scientific Advisory Group (NSAG). 2007 *Information Statement: Sleeping with a baby*. Melbourne: National SIDS Council of Australia.

56 SIDS and Kids. National Scientific Advisory Group (NSAG). 2010. *Information Statement: Co-bedding twins*. Melbourne: National SIDS Council of Australia.

57 *Ibid.*

58 *Ibid.*

Sixteen infants had multiple loose objects present in their sleeping environment. These included more than one pillow, blanket, or other items, such as toys. Five infants had adult pillows in their sleep environment. Five infants were sleeping with a loose blanket or doona/quilt and one infant was sleeping with a baby pillow.

15.5.3 Sleep position

The majority (22) of the 37 infants who were in a sleep environment when they died were reportedly placed for sleep on their back. Over two-thirds (15) of these infants were found on their back, four were found on their front, two were found on their side and for one infant, this information was not available.

Eight infants were placed to sleep on their side. Of these eight infants, half were found on their front, three on their side and for one infant, this information was not available.

One infant was placed to sleep on their front.

Six infants were brought into their mother's bed for feeding and/or settling. For all six infants, it is uncertain from the available records how the infant was placed. Three of the infants were found on their back and three were found at the mother's breast.

As table 52 shows, between 2003 and 2012, just under one-third of SUDI were infants not placed for sleep on their back. In 2012 the proportion was slightly lower than average (30%).

Table 52: SUDI and position placed to sleep 2003-2011*

Position placed to sleep	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total (%)
On back	23	28	24	36	33	25	22	28	22	22	263 (55)
On side	15	9	7	8	14	7	10	14	8	8	100 (21)
On front	5	1	1	4	5	2	3	2	3	1	27 (5)
At breast	0	0	0	1	0	0	1	0	1	0	3 (1)
Information not available	8	7	10	2	10	5	3	4	9	6**	64 (13)
Infant not in a sleep environment	0	0	0	0	0	0	0	5	5	13	23 (5)
Total	51	45	42	51	62	39	39	53	48	50	480 (100)

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

** Six infants were brought into their mother's bed for feeding and/or settling. For all six infants, it is uncertain from the available records how the infant was placed.

15.5.4 Infants not in a sleep environment

Thirteen of the 50 infants who died suddenly and unexpectedly in 2012 were not in a sleep environment when they died. This is more than three times the number of infants who died while not in a sleep environment in 2010 (3) and 2011 (4). The circumstances for the 13 infants prior to the incident included the following:

- five infants were being fed or had just finished feeding
- two infants were being held by a parent or carer
- two infants were travelling in cars and placed in an infant restraint
- two infants had developed problems within hours of their birth and were in hospital under medical observation, and
- the circumstances of death are uncertain for two infants who died following unattended births.

Records show that seven of the infants were awake when the incident leading to their death occurred. Some were observed by their carers to choke, some appeared to have trouble breathing, and some appeared to change colour or simply became unresponsive.

The cause of death for six of the 13 infants was ascertained after investigation. All were found to have died due to a disease or morbid condition that had not been detected prior to their death. The cause of death could not be found for four infants; and investigations are not finalised for another three infants.

15.5.5 Exposure to tobacco smoke

Exposure to tobacco smoke continues to be a consistent factor in SUDI deaths. Half (25) of the infants who died suddenly and unexpectedly in 2012 were exposed to tobacco smoke, during and/or after pregnancy.⁵⁹ Smoking is one of the most important modifiable risk factors in reducing the risks of sudden infant death with international agreement that the evidence demonstrates a causal association.⁶⁰

Table 53 shows a slight decrease from 2011 in the proportion of infants exposed to tobacco smoke. Since 2003, where information is available, more than half of all SUDI were infants who had been exposed to tobacco smoke.

Table 53: SUDI and exposure to tobacco smoke 2003-2012

Exposure to tobacco smoke	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total (%)
No	4	7	10	7	12	14	14	17	15	24	124 (23)
Yes	32	32	26	39	38	27	25	29	31	25	304 (57)
Information not available	25	12	16	12	13	12	6	7	2	1	108 (20)
Total	61	51	54	58	63	53	45	53	48	50	536 (100)

15.6 Protective factors

15.6.1 Breastfeeding

Research has shown that breastfeeding reduces the risk of SIDS.⁶¹

Information on breastfeeding was available for 48 of the 50 infants who died suddenly and unexpectedly in 2012. More than half (28) of the infants were being breastfed.⁶² Two of the infants were breastfed after their mother had consumed alcohol.

Eighteen infants were being formula fed, including seven infants who had been exclusively formula fed from birth.

Two infants died in hospital shortly after their birth and prior to feeding.

15.6.2 Room sharing

Room sharing – the practice of sleeping an infant in a safe cot next to the parents' bed – has been found to reduce the risk of sudden unexpected infant death.

The National SIDS Council of Australia has reported that '[s]everal studies have shown that when a committed caregiver sleeps in the same room, but not the same bed with their baby, the chance of the baby dying from Sudden Infant Death Syndrome (SIDS) is reduced by 50 per cent when compared to babies sleeping in a separate bedroom (solitary sleeping)'.⁶³

This year, the Team examined available records for information on room sharing. While information on room sharing is not routinely collected by police or health, information about the location of an infant's cot or bassinette was available for seven of the eight infants who were placed for sleep in an infant-specific sleep environment.

Four of the seven infants were placed for sleep in their parents' bedroom. In each case, modifiable risk factors for SUDI were also present in the infant's sleep environment, including loose bedding (2), the use of a portable cot (1), and sharing a cot with a twin (1).

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: National SIDS Council of Australia. http://www.sidsandkids.org/wp-content/uploads/Smoking-2009_Cit-sugg1.pdf, accessed 16 July 2013.

60 Queensland Health 2008 *Safe infant care to reduce the risk of Sudden Unexpected Deaths in Infancy: Policy statement and Guidelines*. Brisbane: Queensland Health. www.health.qld.gov.au/ph/documents/childhealth/29567.pdf, accessed 16 July 2013.

61 SIDS and Kids. National Scientific Advisory Group (NSAG) 2012, *Information Statement: Breastfeeding*. Melbourne: National SIDS Council of Australia.

62 The NSW Health *Breastfeeding in NSW: Promotion, Protection and Support* policy directive reports information from 2007-08 that indicates that, while 91.1% of children aged 0-23 months across NSW were breastfed at birth, the rate decreases for each month of age. The rate of breastfeeding at six months was 54.8%, while the rate at 12 months was 28.3%.

63 SIDS and Kids. National Scientific Advisory Group (NSAG) 2008, *Information Statement: Room sharing with a baby*. Melbourne: National SIDS Council of Australia.

15.7 Prevention measures

In Australia and internationally, education campaigns have played a significant role in reducing the number of deaths that are attributed to SIDS. Despite this reduction, the leading category of infant death in the post neonatal period (between 28 and 365 days after birth) remains SIDS and other unexplained causes.

SIDS and Kids promotes six key messages to reduce the risk of sudden unexpected death in infancy, including SIDS and fatal sleep accidents:⁶⁴

- 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 birth and after
- provide a safe sleeping environment day and night
- sleep baby in their own safe sleeping place in the same room as an adult caregiver for the first six to 12 months, and
- breastfeed baby.

In December 2012, the NSW Ministry of Health issued the second edition of *Having a Baby*, which contains clear messages about the important steps that parents and carers can take to reduce the risk of SUDI. The publication aligns with the key messages from SIDS and Kids and NSW Health policy and emphasises that the safest place to sleep babies in the first six to 12 months is in their own cot next to the carers' bed.

15.8 The Team's recommendations

15.8.1 A comprehensive response to SUDI

In 2005, the Team recommended that the NSW Government adopt a multi-agency integrated system of response to SUDI. In response, Health issued a policy directive, *Death – Management of Sudden Unexpected Deaths in Infancy (2008)*, aimed at delivering a coordinated response to SUDI by health professionals, police, ambulance, forensic pathologists and coroners.

The policy has two main aspects: the diagnosis of the cause of the infant's death and the support of the surviving family members. An important component is the requirement for health staff to take a comprehensive medical history to assist the forensic pathologist to establish, as far as possible, the cause of death.

Since 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 implemented. Overall compliance with the policy has been found to be low, particularly in relation to the requirements to interview parents and take a medical history, to provide follow-up care to the family, and to provide information to the Department of Forensic Medicine.

For SUDI in 2012, 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, and whether the family was provided with psychosocial support. While there was a small improvement on previous years, the results indicate that compliance in key areas remains relatively low:

- Thirty-five infants were transferred to a NSW hospital via ambulance as required (83% compliance).⁶⁵
- Health staff conducted interviews with parents/carers and recorded the medical history for just over half (20) of the infants transported to hospital by ambulance (57% compliance), and for one additional infant who was in hospital when the incident occurred. While there was a slight increase in the number of interviews conducted in 2012 compared to 2011 (17 families; 43%), the details obtained from some families were limited.
- There was evidence that psychosocial support was provided to the families of 28 infants (80% compliance).
- Seven infants were transported directly from their place of death to the morgue by state contractors. Under these circumstances, there was no opportunity for hospital staff to gather a medical history to inform the post-mortem assessment or to provide psychological support to the family.

64 SIDS and Kids. National Scientific Advisory Group (NSAG) 2007, *Information Statement: Sleeping with a baby*. Melbourne: National SIDS Council of Australia.

65 This calculation excludes infants who were in hospital when they died (4) or were taken directly to hospital by a caregiver (3) or died in unknown circumstances.

A thorough and complete investigation of the circumstances surrounding SUDI is critical to establishing, wherever possible, the cause of death. The low compliance with the policy directive for delivering a multi-agency response to SUDI is one impediment to this. The Team has previously identified issues with the consistency of the response which could be improved through a more centralised response, potentially through a small expert team. In 2012, the Ministry of Health advised that the NSW Sudden Infant Death Advisory Committee would be the appropriate body to consider this suggestion.

In last year's report, the Team recommended that the Ministry of Health should review the purpose, terms of reference and membership of the Sudden Infant Death Advisory Committee. The Team recommended that the scope of 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.

In September 2013, NSW Kids and Families advised that the review of the Committee had been completed. The agency indicated that it would progress implementation of the review recommendations, including reviewing the Health policy directive *Death – Management of Sudden Unexpected Death in Infancy*, and the service model underpinning the policy.

NSW Kids and Families also advised that file audits to assess compliance with the policy directive *Death – Management of Sudden Unexpected Death in Infancy* had been delayed, but had now recommenced.

15.8.2 Post mortem examinations following unexpected deaths of infants

The Health policy, *Death – Management of Sudden Unexpected Deaths in Infancy*, indicates that, because the cause of death can be difficult to establish, it is very important that the post mortem examination be done by a pathologist with extensive experience in infant post mortems at a centre with appropriate facilities for special tests. All post mortems following unexpected deaths of infants are currently required to be carried out at the Department of Forensic Medicine.

In 2011, the Convenor and Ombudsman wrote to the Minister for Health outlining his and the Team's concerns in regard to forensic pathology delays at the Department of Forensic Medicine, particularly in paediatric cases. In December 2011, the Minister advised 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 appoint a new paediatric anatomical pathology registrar training position, funded by Health. The Ministry noted that the appointment would assist with workload management and future workforce shortages.

The Team continues to have concerns about the post mortem examinations of infants who have died suddenly and unexpectedly. In this regard, the Team notes that, at the time of writing this report, information regarding cause of death was outstanding for just under half of the infants who died suddenly and unexpectedly in 2012, and 10 infants who died in 2010-2011. The Team also notes that around three-quarters of SUDI remain unexplained after autopsy and investigation, and there has been no substantial change in the proportion of explained SUDI since at least 1998.

15.8.3 Safe sleeping on maternity wards

In 2010, the Team recommended that the Ministry of Health should assess compliance with the *Babies Safe Sleeping in NSW Health Maternity Facilities* policy. As a result of the subsequent audit findings, the audit team recommended the development of a state-wide education strategy. The Ministry advised in 2012 that an education strategy would be developed following release of the revised policy and that the policy and its key messages would be promoted at a state-wide level through forums such as the Clinical Midwifery Consultants meeting.

The revised policy, *Maternity – Safer Sleeping Practices for Babies in NSW Public Health Organisations*, was published in November 2012. The policy provides direction to staff on how to reduce the risk of SIDS and SUDI in settings where mothers and babies are accommodated together, and provides consistent, evidence-based information to caregivers on safe infant sleep practices. It directs all staff to follow safe sleeping practices, to advise all mothers that sleeping with their babies is strongly discouraged, and to remind all new mothers, parents and caregivers that babies should be returned to their own safe cot after feeding and settling.⁶⁶

⁶⁶ NSW Ministry of Health 2012, *Maternity - Safer Sleeping Practices for Babies in NSW Public Health Organisations*. Document No. PD2012_062. Sydney: NSW Health http://www0.health.nsw.gov.au/policies/pd/2012/PD2012_062.html, accessed 16 July 2013.

The policy requires Local Health Districts to conduct an annual audit of safer sleeping practices to ensure compliance with the policy, and indicates that relevant health professionals are responsible for maintaining their clinical skills and knowledge of evidence-based parenting advice on safer infant sleeping best practice.

Last year, the Team recommended that, as part of the review of the NSW Sudden Infant Death Advisory Committee, the Ministry of Health should consider the Committee's role in promoting safe sleep practices in maternity facilities, including educational strategies for midwives and maternity staff. In September 2013, NSW Kids and Families advised that the review of the Committee had been completed, and it was considered that, while the role of the Committee would include providing advice on key messages, it would not play a direct role in promoting safe sleeping practices to health service staff.

NSW Kids and Families advised the Team that it is promoting SIDS and Kids prevention resources to Local Health Districts to be used in implementing the policy, and is consulting with both SIDS and Kids and Community Services about the available education resources and online packages for staff.

15.8.4 Public education – the importance of clear safe sleeping messages

In last year's report, the Team noted the findings from a Victorian Coronial inquiry into the deaths of four infants who died while they were sharing a sleep surface. The Coroner concluded that sharing a sleep surface was inherently dangerous, and observed that the various terms used to define shared sleep surfaces – including co-sleeping, room-sharing and bed-sharing – are confusing and could potentially impact on caregivers' uptake of safe sleeping advice.

Noting the importance of considering this issue in the NSW context, where almost half (44%) of SUDI since 2003 have been infants who were sharing a sleep surface, the Team recommended that the Ministry of Health should consider the role of the NSW Sudden Infant Death Advisory Committee in providing a point of co-ordination for public education strategies using best-evidence educational methods, including targeted strategies to high-risk groups. NSW Kids and Families has since advised that the review of the Committee identified that, while the role of the Committee would include providing advice on key messages, it would not coordinate public education strategies. The Committee considered that this was a major role for groups such as SIDS and Kids.

15.8.5 Reducing risk for children with a child protection history

Noting that almost half of all SUDI in 2011 and 2010 were from families with a child protection history, last year the Team recommended that Child Deaths and Critical Reports (Community Services) should conduct a cohort review of SUDI where the infant's family had a child protection history, for the purpose of developing targeted strategies and training resources to assist caseworkers to assess risk for infants and provide casework services to at-risk families.

Community Services accepted the recommendation, and in May 2013 advised the Team that work on the review was progressing. At that time, the agency had completed a survey of current staff knowledge, finalised data for the sample group, and undertaken a review of relevant literature. The agency had also met with staff from NSW Kids and Families to discuss opportunities to strengthen the interagency response to SUDI.

Community Services gave support for the Team's recommendation that the NSW Ministry of Health should review the membership of the NSW Sudden Infant Death Advisory Committee, and advised that it would welcome an invitation to participate on the Committee. NSW Kids and Families has advised that, following a review of the Committee, revised membership would include nominees from agencies involved in SUDI, including the Department of Family and Community Services.

Recommendations

NSW Kids and Families

1. In relation to NSW Kids and Families' file audits to assess compliance with the *Death – Management of Sudden Unexpected Death in Infancy* policy directive, the agency should provide detailed advice to the Team on:
 - (a) the scope and method of the audits
 - (b) the findings of the audits, and
 - (c) any action NSW Kids and Families intends to take in response to the findings.
2. In relation to the review of the *Death – Management of Sudden Unexpected Death in Infancy* policy directive and model of response to SUDI, NSW Kids and Families should:
 - (a) provide advice to the Team on the terms of reference and timeframes of the review, and
 - (b) include consideration of 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.
3. In relation to the promotion of safe sleeping practices, NSW Kids and Families should provide detailed advice to the Team on:
 - (a) the outcome of the audits conducted by Local Health Districts to assess compliance with the *Maternity – Safer Sleeping Practices for Babies in NSW Public Health Organisations* policy directive. The advice should include Kids and Families' assessment of:
 - (i) the adequacy of the audits, including the scope and method (such as the use of spot-checks)
 - (ii) the findings of the audits regarding compliance with the policy requirements, and
 - (iii) whether there are any systemic issues arising from the audits and, if so, the actions NSW Kids and Families will take in response.
 - (b) the outcome of NSW Kids and Families' consultation with SIDS and Kids and Community Services regarding the available education resources and online packages for staff.

Ministry of Health

4. In relation to post mortem examinations following unexpected deaths of infants, the Ministry of Health should provide advice to the Team on current or planned initiatives to:
 - (a) reduce forensic pathology delays, and
 - (b) increase the proportion of SUDI that are explained.

Department of Family and Community Services, Community Services

5. In relation to Community Services' cohort review of SUDI where the infant's family had a child protection history, the agency should provide detailed advice to the Team on:
 - (a) the findings of the review,
 - (b) the strategies and training resources that Community Services will develop to assist caseworkers to assess risk for infants and provide casework services and targeted education to at-risk families, and
 - (c) how the agency will audit or otherwise measure practice and related outcomes.

Chapter 16. Deaths from all external causes

In 2012, 83 children (18%) whose deaths were registered in NSW died from external (unnatural) causes. Three-quarters (63) of these deaths were due to unintentional or accidental causes, mainly related to transport fatalities (39) and drowning (11). The deaths of 20 children were intentional, due to suicide (16) and fatal assault (4).

The mortality rate for external causes (5.05 deaths per 100,000) was slightly lower than previous years.

This section summarises the major features of all deaths from external causes. Subsequent chapters provide more detailed analysis of specific external causes.

16.1 Key demographic and individual characteristics

Table 54: Key demographic and individual characteristics – deaths from all external causes, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	83	100	5.05	4.03 - 6.26		
Gender						
Female	27	33	3.38	2.23 - 4.92	-	-
Male	56	67	6.63	5.01 - 8.61	1.96	0.0018
Age						
Under 1 year	6	7	6.44 (0.06)†	2.36 - 14.03	-	-
1-4 years	12	14	3.14	1.62 - 5.49	0.49	-
5-9 years	13	16	2.88	1.54 - 4.93	0.45	-
10-14 years	16	19	3.62	2.07 - 5.88	0.56	-
15-17 years	36	43	13.12	9.19 - 18.16	2.04	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	72	87	4.58	3.59 - 5.77	-	-
Aboriginal or Torres Strait Islander	11	13	15.45	7.71 - 27.65	3.37	0
Remoteness*						
Major cities	35	43	2.97	2.07 - 4.13	-	-
Inner regional areas	22	27	6.48	4.06 - 9.81	2.18	-
Outer regional areas	22	27	20.57	12.89 - 31.15	6.93	-
Remote areas	3	-	-	-	-	-
Very remote areas	0	0	0.00	-	0.00	-
Socioeconomic status**						
Quintile 5 (highest)	13	16	3.21	1.71 - 5.49	-	-
Quintile 4	20	25	6.86	4.19 - 10.60	2.14	-
Quintile 3	18	23	6.48	3.84 - 10.24	2.02	-
Quintile 2	12	15	3.46	2.01 - 6.80	1.08	-
Quintile 1 (lowest)	16	20	5.76	2.64 - 7.49	1.79	-

* Remoteness was not calculated in one case.

**Socioeconomic status was not calculated in four cases.

† Infant Mortality Rate.

16.1.1 Age, gender and Aboriginal and Torres Strait Islander status

Consistent with previous years, more males than females died as a result of external causes; particularly in transport and drowning fatalities. There was a slight reduction in the mortality rates of both genders in 2012.

External causes were the leading cause of death for children aged 1-17 years. External causes accounted for the deaths of over half of the children aged 15-17 years, and almost half of those aged 10-14 years. Compared with previous years, the rate of death from external causes in 2012 declined for children aged 15-17 years, but increased for children aged 5-9 and 10-14 years.

Eleven children who died from external causes in 2012 were identified as Aboriginal (9) or Torres Strait Islander (2). The rate of death of Indigenous children from external causes was more than three times that of non-Indigenous children.

16.1.2 Remoteness and socioeconomic status

As has consistently been the case, the rate of death from external causes increased with remoteness.

The highest rate of death from unnatural causes was amongst children in the second highest area of socioeconomic advantage.

16.1.3 Child protection history

Consistent with 2011, the families of over one-third (31) of the children who died from external causes in 2012 had a child protection history.

Within the three years before their death, the majority (25) of these children had been the subject of a report of risk of harm or risk of significant harm to Community Services. Three children had not been the subject of a report themselves, but had a sibling who had been.

One child had been the subject of a report to a Child Wellbeing Unit. Four children were in care at the time of their death.

Chapter 17. Transport fatalities

The deaths of 39 children in 38 transport incidents were registered in 2012. Consistent with previous years, transport fatalities were the overall leading external cause of death of children in NSW. The rate of death from transport incidents (2.37 per 100,000) was slightly higher than the previous two years.

As shown in table 55, almost three-quarters (28) of the children died in motor vehicle incidents:

- Consistent with previous years, almost half of the children who died in motor vehicle incidents (19) were passengers.
- Nine children were riding or controlling a vehicle at the time of the fatality. Most (7) were vehicles driven on public roads; two deaths occurred in off-road incidents.

Five of the children who died were pedestrians. Over the past 15 years, there has been an overall decline in the number and rate of pedestrian deaths of children in NSW.

In 2012, four children died while travelling or riding outside of a moving vehicle. One child died when a vehicle collided with a building in which they were an occupant, and one child was riding a bicycle at the time of the fatality.

Table 55: Trends in deaths of children due to transport incidents by user type – 1998 – 2012, number and (Crude Mortality Rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Pedestrian	23 (1.5)	24 (1.5)	24 (1.5)	21 (1.3)	13 (0.8)	12 (0.7)	12 (0.8)	8 (0.5)	11 (0.7)	7 (0.4)	6 (0.4)	6 (0.4)	7 (0.4)	8 (0.5)	5 (0.3)	187
Driver (all vehicles)	18 (1.1)	9 (0.6)	12 (0.7)	9 (0.6)	8 (0.5)	10 (0.6)	5 (0.3)	11 (0.7)	11 (0.7)	11 (0.7)	9 (0.6)	9 (0.6)	7 (0.4)	8 (0.5)	9 (0.5)	146
Passenger (all vehicles)	25 (1.6)	33 (2.1)	37 (2.3)	28 (1.7)	33 (2.0)	32 (2.0)	28 (1.8)	23 (1.4)	32 (2.0)	17 (1.1)	12 (0.7)	23 (1.4)	18 (1.1)	13 (0.8)	19 (1.2)	373
Rider (pedal)	3 -	2 -	2 -	4 (0.2)	4 (0.2)	1 -	5 (0.3)	3 -	2 -	6 (0.4)	2 -	2 -	1 -	0 -	1 -	38
Other	2 -	2 -	3 -	4 -	4 -	2 -	4 (0.3)	2 -	9 (0.6)	5 (0.3)	3 -	2 -	2 -	1 -	5 (0.3)	50
Total	71	70	78	66	62	57	54	47	65	46	32	42	35	30	39	794

Five of the 39 transport-related deaths in 2012 are 'reviewable deaths' and will be reviewed separately by the Ombudsman.

17.1 Demographic and individual characteristics

Table 56 provides an overview of the main demographic characteristics of children who died in transport fatalities in 2012.

Table 56: Key demographic and individual characteristics – deaths due to transport fatalities, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	39	100	2.37	1.69 - 3.25		
Gender						
Female	13	33	1.63	0.87 - 2.78	-	-
Male	26	67	3.08	2.01 - 4.51	1.89	0.0287
Age						
Under 1 year	1	3	-	-	-	-
1-4 years	4	10	1.05	0.29 - 2.68	-	-
5-9 years	8	21	1.77	0.77 - 3.50	-	-
10-14 years	9	23	2.04	0.93 - 3.86	-	-
15-17 years	17	44	6.19	3.61 - 9.92	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	35	90	2.23	1.55 - 3.10	-	-
Aboriginal or Torres Strait Islander	4	10	5.62	1.53 - 14.39	2.52	0.0351
Remoteness						
Major Cities	14	36	1.19	0.65 - 1.99	-	-
Inner Regional areas	9	23	2.65	1.21 - 5.03	-	-
Outer Regional areas	16	41	14.96	8.55 - 24.30	-	-
Remote areas	-	-	-	-	-	-
Socioeconomic status*						
Quintile 5 (highest)	4	11	0.99	0.27 - 2.53	-	-
Quintile 4	13	35	4.46	2.38 - 7.63	-	-
Quintile 3	12	32	4.32	2.23 - 7.55	-	-
Quintile 2	4	11	1.15	0.35 - 3.32	-	-
Quintile 1 (lowest)	4	11	1.44	0.31 - 2.95	-	-

* Socioeconomic status was not calculated in two cases

17.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2012, transport fatalities were the leading external cause of death of children aged 5-17 years. Over half (20) of the children who died in transport fatalities were teenagers. Most of the teenagers (13) were 17 years of age, including seven who were driving a vehicle at the time of their death.

As shown in table 57, and consistent with the Team's previous findings, the majority (26) were male. Males were represented in two-thirds of the deaths of drivers, four of the five pedestrian deaths, and all four of the fatalities in which children travelled or rode outside of moving vehicles. In 2012, the rate of death from transport fatalities of boys was almost twice that of girls.

Four children and young people were Aboriginal.

Figure 4: Transport deaths of children registered in 2012, by age and gender

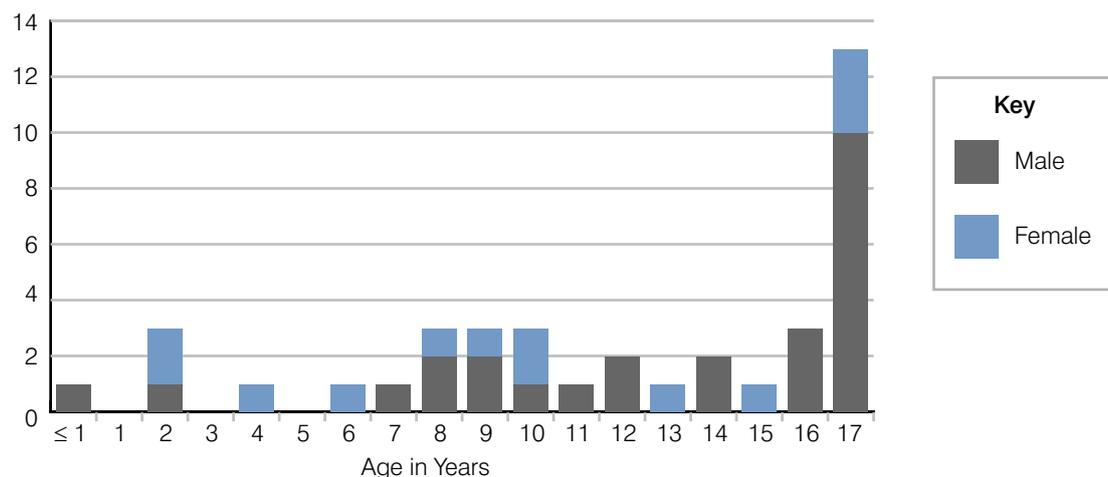


Table 57: Trends in deaths of children due to transport fatalities by gender, 1998-2012, number and (Crude Mortality Rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Female	20 (2.6)	28 (3.6)	28 (3.6)	18 (2.3)	17 (2.2)	21 (2.7)	23 (2.9)	17 (2.2)	15 (1.9)	19 (2.4)	7 (0.9)	17 (2.2)	14 (1.8)	11 (1.4)	13 (1.6)	268
Male	51 (6.3)	42 (5.2)	50 (6.1)	48 (5.8)	45 (5.5)	36 (4.4)	31 (3.8)	30 (3.7)	50 (6.1)	27 (3.3)	25 (3.0)	25 (3.0)	21 (2.5)	19 (2.3)	26 (3.1)	526
Both	71 (4.5)	70 (4.4)	78 (94.9)	66 (4.1)	62 (3.8)	57 (3.6)	54 (3.4)	47 (2.9)	65 (4.0)	46 (2.9)	32 (2.0)	42 (2.6)	35 (2.2)	30 (1.8)	39 (2.4)	794

Table 58: User type and age of children – transport fatalities, 2012

	Under 1	1-4 years	5-9 years	10-14 years	15-17 years	Total
Driver/Rider	0	0	1	1	7	9
Passenger	1	3	6	4	5	19
Pedestrian	0	1	1	1	2	5
Pedal cyclist	0	0	0	1	0	1
Other transport	0	0	0	2	3	5
Total	1	4	8	9	17	39

17.1.2 Remoteness and socioeconomic status

The majority (25) of the children who died lived in a regional area: 16 children lived in an outer regional area, and nine lived in an inner regional area. Most of the children (25) resided in the third and fourth quintiles of socioeconomic status.

17.1.3 Child protection history

The families of one-third (13) of the 39 children who died in transport fatalities had a child protection history. Within the three years before their death, six of the children who died had been the subject of a report of risk of harm or risk of significant harm to Community Services. The reported risk issues were not related to the circumstances of death.

17.2 Motor vehicle fatalities

The majority (28) of the children died in 27 motor vehicle incidents: 19 were passengers and nine were drivers. One of the incidents resulted in the passenger deaths of two children.

Of the 27 incidents:

- Two-thirds (18) were single vehicle incidents, most of which (14) involved collision with stationary objects, such as trees. Nine incidents involved collision with other vehicles.
- In the vast majority of cases (24), the child was travelling in a light vehicle (sedan, station wagon, 4WD, utility or light van). A small number of incidents involved off-road vehicles (2) or a motorcycle (1).
- Two-thirds (18) of the incidents occurred in daylight hours, five occurred between 11pm and 7am, and four took place between 6pm and 11pm.

17.2.1 Passenger fatalities

Nineteen children who died in motor vehicle incidents were passengers in the vehicle. In the majority of cases (16), an adult was driving the vehicle. The other three vehicles were driven by teenagers.

Passengers in vehicles with an adult driver

Of the 16 children who died as passengers in a vehicle with an adult driver, the vast majority (14) were related to the driver. The other two children were driven by a professional driver and an adult peer. One incident resulted in two child deaths.

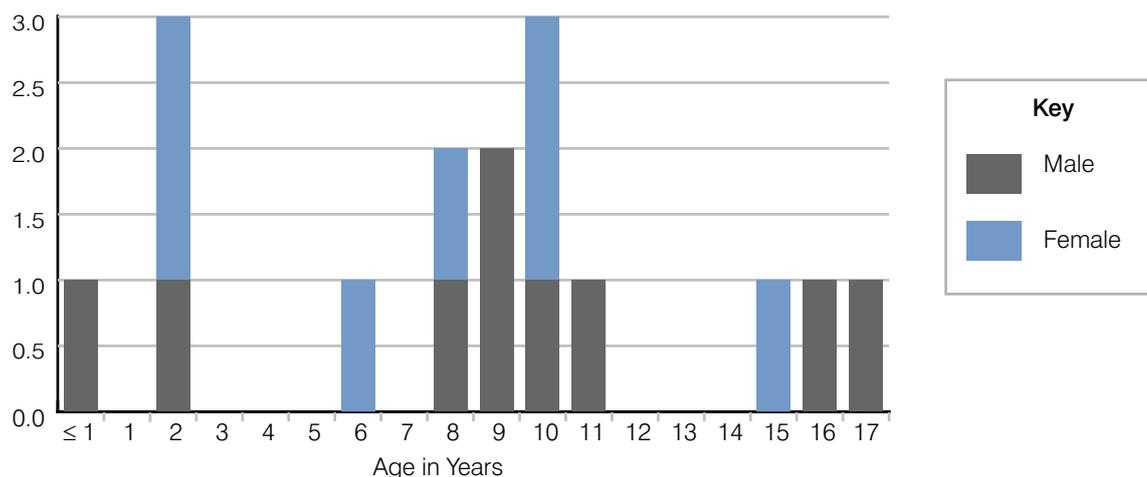
Use of safety restraints in the vehicle

Changes to legislation relating to child restraints in March 2010 introduced an age-graduated system.⁶⁷ Children aged seven years and younger are required to be seated in child safety restraints appropriate for their age, and children under seven years must not travel in the front seat of a vehicle unless all of the rear seats are occupied by younger children.

The majority (13) of the 16 children who were passengers in vehicles with an adult driver were using some form of child safety restraint at the time of the incident. Of the other children, one (aged 16 years) was unrestrained, and one was an occupant of a bus that was not required to have seatbelts. Information regarding restraint use was unavailable for one child (aged 17 years).

As seen in figure 5, the majority (13) of children being driven by adults were younger than 11 years of age, including five children who were younger than seven years, and eight children aged 7-10 years.

Figure 5: Deaths of children as passengers in vehicles with adult drivers by age of child, 2012



⁶⁷ Road Rules 2008 and Road Amendment (Isabelle Broadhead Child Restraint Measures) Rules 2010, under the *Road Transport (Safety and Traffic Management) Act 1999*.

Table 59 outlines child safety restraint information relating to the 13 children who were passengers in vehicles with adult drivers, and who wore a restraint.

Table 59: Deaths of children as passengers in vehicles with adult drivers by age, position in vehicle, restraint type and use, 2012

Age	Location in vehicle	Restraint type	Restraint use issue
Under 7 years	Rear – drivers side	Forward facing child seat	Multiple incorrect uses of restraint, including: <ul style="list-style-type: none"> • Top-tether straps twisted and not firmly fitted to the vehicle's anchor point. • In-built harness straps twisted and uneven in length when buckle engaged. • Shoulder slot chosen for the in-built harness likely to have been too high for the child.
Under 7 years	Rear – drivers side	Forward facing child seat	Multiple incorrect uses of restraint, including: <ul style="list-style-type: none"> • Child's shoulders not secured in the in-built harness (straps positioned against child's back). • In-built harness positioned across child's waist was twisted. • Top-tether straps not attached to the vehicle's anchor point.
Under 7 years	Rear – drivers side	Forward facing child seat	Incorrect use of restraint – top-tether straps not attached to vehicle's anchor point. ⁶⁸
Under 7 years	Rear – centre seat	Forward facing child seat	Multiple incorrect uses of restraint, including: <ul style="list-style-type: none"> • Straps of inbuilt harness were unevenly thread through restraint's shoulder slots in the plastic mould. Straps were different heights and lengths. • Restraint not firmly fitted to seat. • Restraint positioned on a narrow rear-centre seat. Top tether straps positioned between gaps in adjoining seats instead of over back of seat.
Under 7 years	Rear – passenger side	Forward facing booster seat, accessory H-harness, and adult lap-sash seatbelt	Incorrect use of restraint – injuries consistent with a poorly-fitted accessory harness.
7-12 years	Rear – passenger side	Booster cushion and adult lap-sash seat belt	No issues identified with restraint fit.
7-12 years	Rear – passenger side	Adult lap-sash seatbelt	Inappropriate use of restraint – child was 20cm shorter than the recommended height for use of an adult seatbelt. ⁶⁹
7-12 years	Rear – centre seat	Adult lap-sash seatbelt	Insufficient information to ascertain appropriateness of restraint (height of child not reported).
7-12 years	Front passenger	Adult lap sash seat belt	Inappropriate use of restraint – child was 20cm shorter than the recommended height for use of an adult seatbelt.
7-12 years	Front passenger	Adult lap-sash seatbelt	Inappropriate use of restraint – child was 10cm shorter than the recommended height for use of an adult seatbelt.
7-12 years	Rear – centre seat	Adult lap-only seatbelt	Incorrect use of restraint – likely that lap portion of seatbelt was too loose for child. ⁷⁰
7-12 years	Rear – passenger side	Adult lap-sash seatbelt	No issues identified with restraint.
Over 12 years	Rear – passenger side	Adult lap-sash seatbelt	No issues identified with restraint.

68 Research has found high rates of accessory child safety harness system misuse, resulting in serious degradation of the level of protection they provide. Recent research suggests that the risks of injury outweigh any perceived benefit of a child safety harness system over a lap-shoulder system. (Brown J. Wainohu D. Aquilina P. Suranto B. Kelly P. & Bilston L.E. 2010, 'Accessory child safety harnesses: Do the risks outweigh the benefits?' in *Accident Analysis and Prevention* 42: 112 – 121.)

69 Roads and Maritime Services advises that adult lap-sash seatbelts have been designed for people with a minimum height of 145cm. http://www.rta.nsw.gov.au/roadsafety/downloads/choose_right_buckle_right.pdf, accessed 16 July 2013.

70 Roads and Maritime Services recommends that centre lap-only seat belts are replaced by lap-sash seat belts in that position. If a child is too small for a restraint specified for their age, they should be kept in a previous level of restraint for as long as possible.

The available information indicates that the child safety restraints were incorrectly used⁷¹ or inappropriately used⁷² in relation to two-thirds (9) of the 13 children.

The restraints of six children were incorrectly used, including all of the children under seven years of age (5). In relation to three of the five children, multiple errors in the restraint fitting process were evident. Research has shown that multiple minor misuses of the restraint have a cumulative effect, and can have the same effect as major forms of restraint misuse.⁷³

Three of the 11 children who were positioned in the rear of the vehicle were in the centre seat in a split-seat configuration:

- Expert review of the death of one child identified that the restraint was anchored to a narrow vehicle seat that had insufficient strength to withstand forces during the collision (whilst a restraint was anchored to it). The restraint was attached to the anchor point installed by the manufacturer.
- One child used a lap-only seat belt. Research has shown that, when fitted correctly, lap-sash seatbelts offer greater protection to passengers than lap-only seatbelts.⁷⁴
- One child was positioned on a seat of an early-model vehicle with a seat design that provided limited restraint of the child.

Contributing factors in fatalities involving children as passengers with an adult driver

The majority (11) of the 15 incidents occurred on roadways with a sign-posted speed limit of 80-100km/h.

Seven children were travelling in light vehicles that were manufactured prior to 2002, which were not fitted with many of the vehicle safety systems available in more recently manufactured vehicles.

Police identified a number of contributing factors to the incidents, some of which were largely preventable. Some of the incidents involved multiple contributory factors.

- Speed was identified as a factor in almost half (7) of the fatalities. This included drivers exceeding the sign-posted speed limit by five to 100km/h (5), and driving too fast for the prevailing conditions (2).
- Drug use was relevant to three deaths. Two drivers returned positive results for cannabis at levels that were deemed by a police expert to have impaired their driving ability. The driver of a vehicle that collided with a vehicle in which a child was a passenger returned a positive result for amphetamines.
- Fatigue was a factor in three fatalities. Two drivers reported falling asleep whilst driving. Neither incident occurred in the context of long-distance driving.
- Three incidents involved the driver being distracted – by children or animals in the vehicle, or something outside of the vehicle.
- Road and environmental conditions contributed to two of the 15 fatalities, and were possible factors in another three incidents. The conditions included heavy rain and slippery roadways (3), inadequate warning signs about the risk of wildlife entering the path of a vehicle (1), and limited visibility due to poor or absent street lighting (1).
- In two incidents, the vehicle tyres were deemed to be worn and devoid of tread.
- A pre-existing medical condition of the driver was found to have significantly contributed to two fatalities.

Other contributory factors included alcohol use (1) and mobile phone use (1).

Police charged six people in relation to the deaths of six children. The charges included negligent driving occasioning death, dangerous driving, driving under the influence and inappropriate restraint of a child.

Passengers in vehicles with a teenage driver

Three of the passenger deaths of children occurred in vehicles driven by teenagers. The passengers were aged 14 years (1) and 17 years (2). Two were male.

71 'Incorrect use of restraint occurs when the user does not use the restraint as it was designed to be used, either in installing the restraint in the vehicle or securing the child in the restraint', from Brown J. Hatfield J. Du W. Finch C.F. & Bilston L.E. 2010, 'Population-level estimates of child restraint practices among children aged 0-12 years in NSW, Australia', in *Accident Analysis and Prevention* 42: 2144 – 2148.

72 Inappropriate restraint use 'occurs when the child uses a restraint type that is not the most size appropriate. This commonly arises when small children prematurely graduate into restraints designed for older children and adults', in Brown J. et al. 2010, op. cit.

73 Tai A. Bilston L. Brown J. 2011, 'The cumulative effect of multiple forms of minor incorrect use in forward facing child restraints on head injury risk', Enhanced Safety of Vehicles Conference, Washington DC.

74 Henderson M. Brown J. & Griffiths M. 1997, *Children in Adult Seat Belts and Child Harnesses: Crash Sled Comparisons of Dummy Responses*, SAE Technical Paper 973308, doi:10.4271/973308.

In two fatalities, the passengers were positioned in the front passenger seat and wore a seatbelt. They were the only passengers. In the other fatality, the child was positioned in the rear passenger-side seat and the vehicle was full with passengers aged 17-19 years. It is not known if the child who died wore a seatbelt.

The drivers were aged 17-18 years, and tended to be male (2) and unrelated to the child who died (2). Consistent with their age, the drivers did not have extensive driving experience: two had a provisional (P1) driver licence, and one held an international driver licence with no more than 12 months driving experience.

Of the three fatalities, two occurred in the evening between 9pm and 1am, and one occurred in daylight hours. The vehicles were travelling along roadways with speed limits of 60-100km/h.

Contributing factors in fatalities involving children as passengers with a teenage driver

Police identified a number of factors that contributed to the three incidents:

- use of early model vehicles (2) – both vehicles had been manufactured in 1994-1999 and had less sophisticated vehicle safety systems than current models
- speed (2) – in one case, the driver exceeded the speed limit by approximately 40km/h
- driver inexperience (2), and
- environmental conditions (heavy rain).

Police charged two drivers in relation to the death of two children. The charges included dangerous driving occasioning death and negligent driving occasioning death.

17.2.2 Driver fatalities

Nine of the children who died in motor vehicle fatalities in 2012 were driving the vehicle at the time of the incident. The majority (7) occurred on public roads and two occurred in off-road circumstances. Most of the drivers (6) were male.

The number of driver deaths of children has consistently ranged between seven and nine for the past five years.

Fatalities involving children as drivers on public roads

The vast majority (6) of the seven children who died while driving on a public road were 17 years of age. One child was aged 16 years.

Five of the children held a provisional (P1) licence. One driver had a learner licence, but was unsupervised by a fully licensed driver at the time of the fatality. One child did not have a licence. One child was not wearing a seatbelt.

Six children were drivers of light vehicles (utility, light van, and sedan). In five of the incidents, the driver was the sole occupant of the vehicle. One vehicle was carrying one peer passenger. Another child was riding a motorcycle and was carrying a peer pillion passenger.

Most (5) were single vehicle incidents, which involved collision with stationary objects such as trees (4) and a telegraph pole (1). Three of the incidents occurred on a Friday or Saturday night, two of which occurred between 11pm and 6am. The driver was the only vehicle occupant in these two incidents.

All of the fatalities occurred in regional areas of NSW.

Contributing factors in fatalities involving children as drivers on public roads

Records indicate that:

- Excess speed was relevant to the vast majority (6) of the incidents. This included the driver exceeding the sign-posted speed limit and/or the speed limit permitted by their licence.⁷⁵
- In two fatalities, road conditions were contributory, including poor street lighting, no edge lines and a slippery road surface.
- Fatigue was a possible factor in two fatalities. The incidents occurred between 5am and 7am, and did not involve long distances.

Other contributory factors included inexperience with the presenting road conditions, and reckless driving. In one fatality, the driver was impaired due to alcohol use.

⁷⁵ Learner drivers cannot exceed 80km/h and Provisional (P1) drivers cannot exceed 90km/h. http://www.rta.nsw.gov.au/licensing/gettingallicence/200707_restrictions.html, accessed 16 July 2013.

Fatalities involving children as drivers of off-road vehicles

Two children died while driving off-road vehicles on private property. The children were aged nine and 13 years, and were riding a quad bike and a side-by-side vehicle.⁷⁶ Both were single vehicle incidents that included ejection from the vehicle. Neither child wore a helmet.

These deaths are considered in more detail in Chapter 18.

17.3 Pedestrians

In 2012, six children died as pedestrians.⁷⁷ The number of pedestrian deaths of children has remained relatively constant for the past five years, averaging 6.4 per year.

The six children ranged in age from four to 17 years. The vast majority (5) were male.

Two young people were struck by a vehicle while walking along a roadway. One was walking dangerously in the middle of the roadway and one was on the road shoulder. The speed limit for both roads was above 90km/h. Neither of the roadways had designated footpaths for pedestrians.

One child was on a footpath and was struck by a vehicle that had left the roadway whilst being driven recklessly.

Three fatalities involved a vehicle travelling in a forward direction at low speed:⁷⁸

- One child was walking across a designated pedestrian crossing with signals. The child was in a group of adults and other children crossing and had stopped while the others continued.
- One child had left the footpath and entered the path of a vehicle manoeuvring in a cul-de-sac. The driver had limited visibility due to other parked vehicles.
- One child was riding a bicycle and had entered the path of a vehicle exiting a public car-park driveway. This driver also had limited visibility.

The fatalities involving vehicles travelling at low speed were not typical of the 'low speed vehicle run-over' incidents that the Team has previously reported on.⁷⁹ Only one fatality involved a child under five years of age, and none of the incidents involved non-traffic areas or circumstances in which the driver believed that the child was in a safe location.

17.3.1 The driver and vehicle

In the majority (5) of the fatalities where the driver could be identified, two drivers were aged 17 years and three drivers were aged between 37 and 58 years. Most (5) were male. None of the identified drivers were related to the children.

Five fatalities involved light vehicles (4WD, light van, sedan). In one incident the vehicle was unable to be identified.

Contributing factors in pedestrian deaths

Contributory factors in the pedestrian deaths of children in 2012 included:

- Two drivers had limited visibility prior to colliding with the child. Both drivers were noted to have been manoeuvring their vehicles with caution.
- One driver had a poor driving history and had been granted a good behaviour period due to excessive demerit point accumulation. The driver had been suspended from driving on four previous occasions, and had previously been awarded demerit points for failing to give way, which was a relevant factor in the fatality.
- One driver was a learner licence holder and was not accompanied by a supervising driver. The driver was observed to be driving recklessly prior to losing control of the vehicle.
- One driver returned a blood alcohol limit above the legal limit.
- One driver was reported to have been travelling at the sign-posted speed limit, but at an excessive speed for the environmental/road conditions at the time of the incident.

76 A side-by-side vehicle (also known as an ultra light utility vehicle) is a small vehicle that typically has a bench-type seat and a steering wheel.

77 Transport for NSW notes a pedestrian includes 'a person in or on a wheeled recreational device or wheeled toy', <http://roadsafety.transport.nsw.gov.au/stayingsafe/pedestrians/skateboardsfootscootersandrollerblades/index.html>, accessed 16 July 2013.

78 Vehicles travelling less than 10km/h. NSW Child Death Review Team 2012, *NSW Child Death Review Team annual report 2011*, Sydney: NSW Ombudsman, p81.

79 *Ibid.*, pp. 81-85.

Police charged three drivers. The charges included negligent driving occasioning death, dangerous driving occasioning death and driving under the influence.

17.4 Other transport fatalities

Five children died in transport fatalities in which they were not a passenger, driver or pedestrian. All were male and aged 11-17 years. Most (4) of the fatalities involved the child travelling or riding outside the vehicle in a position not intended for passengers. This included standing in the tray of a utility vehicle, standing on the front tip of a powered water vessel, holding onto a vehicle whilst riding a skateboard, and leaning out of a train.

In three of these fatalities, the vehicle or vessel was driven by a peer aged 13-17 years. Three of the incidents occurred in daylight hours and one occurred between midnight and 7am.

One child died when a vehicle collided with the building they were occupying.

Contributing factors

Most (4) of the children were engaged in risk-taking behaviour at the time of the fatality. Other relevant factors included:

- speed (4) – included a moving vessel that was operated at an excessive speed for the waterway
- lack of safety equipment (2) – included not wearing a helmet while travelling on a skateboard at speed, and not wearing a personal flotation device on a boat, and
- impaired judgement of the driver – including one driver who was seriously impaired by alcohol and using a communication device prior to the collision.

One vehicle that collided with a child was not fitted with a front under run protection system,⁸⁰ which is required for vehicles over 25 metres in length.

Police charged one peer driver with dangerous driving occasioning death.

17.5 Prevention measures

Key factors in the deaths of children in transport fatalities in 2012 included speed; young drivers and risk-taking behaviour; and failure to use, or incorrect/inappropriate use of, child safety restraints.

In the main, these factors have been identified in targeted prevention measures and behaviour modification strategies by NSW Government agencies and injury prevention organisations. Transport for NSW's *NSW Road Safety Strategy 2012-2021* includes strategies to address speeding behaviour and improve the safety of children and young people.

17.5.1 Speeding

Speeding is the biggest single road safety issue on NSW roads, and is a contributing factor in 40 per cent of fatal crashes involving P-plate drivers.⁸¹ Speed was a contributing factor in almost half (18) of the transport incidents that caused the deaths of children in 2012.

'Safer speeds' is a key area of focus in the *NSW Road Safety Strategy*, with a multi-faceted 'safe system approach' that includes appropriate speed limits and zoning, engineering controls and enforcement. Speeding behaviour is consistently the focus of road safety campaigns, targeting young drivers, young men and the broader community, such as the recent 'Don't rush' and 'P-plate speeding' campaigns.

17.5.2 Young, inexperienced drivers

Young drivers are over-represented in all transport fatalities.⁸² Over one-third (15) of all transport incidents that resulted in the death of a child in 2012 involved young drivers.

80 A 'front under-run protection system' is a barrier integrated onto the front of a truck that can prevent a colliding car damaging the truck's steering, aids the deployment of air bags and crumple zones in the colliding vehicle, and distributes crash forces more evenly.

81 NSW Centre for Road Safety 2013, *Speed threat information*, Sydney: TfNSW, <http://roadsafety.transport.nsw.gov.au/campaigns/speeding/index.html>, accessed 10 July 2013.

82 NSW Centre for Road Safety 2013, *Crashes involving young drivers*, Sydney: TfNSW, <http://roadsafety.transport.nsw.gov.au/aboutthecentre/statistics/crashesinvolvingyoungdrivers.html>, accessed 16 July 2013.

However, Transport for NSW reports that the number of fatal crashes involving young drivers (aged less than 26 years) fell by 47 per cent in 2000-2010. This was nearly twice the decrease for fatal crashes not involving a young driver.⁸³ The *NSW Road Safety Strategy* includes strategies targeted at reducing risks related to novice young drivers, such as reviewing the licensing arrangements of learner drivers. Changes to learner licences were introduced in July 2013, including:

- learner licence holders can be credited 20 hours of logbook driving hours if they participate in a *Safer Drivers Course*⁸⁴ and professional lessons, and
- the speed limit for learner licence holders has been raised from 80km/h to 90km/h, to enable increased driving experience on higher speed roads before graduating to a provisional licence.

The P Drivers Project aims to develop a driver education model (behaviour change program) for inclusion in the graduated licensing scheme. The large-scale road safety research project in NSW and Victoria recruits newly licensed drivers to participate in program sessions that educate them on common behaviours that lead to serious injury and fatalities.

Information and resources for young drivers are promoted by YouthSafe⁸⁵ and the Roads and Maritime Services' youth website: geared.com.au.

17.5.3 Child restraint systems

While restraint use among children travelling in cars in NSW is high, the quality of restraint use is often poor.⁸⁶ Inappropriate and/or incorrect restraint use reduces the effectiveness of the restraint in preventing injury. Recent research has found that, while there has been an increase in best practice child car restraint use for children aged 2-5 years in low socioeconomic areas after the introduction of mandatory child restraint laws in NSW, further efforts are required to increase optimal child car restraint use.⁸⁷

Initiatives to prevent sub-optimal restraint use typically involve education of the adults fitting the restraints, and improvements to restraint design to enable appropriate use.

Roads and Maritime Services encourages caregivers to use authorised restraint fitting stations to install child restraints.

The caregiver pays a fee for this service of \$15-75. Local councils and Kidsafe NSW offer some fee-free restraint fitting days throughout the state.

Recent NSW and national initiatives to improve the design and use of child restraint systems include:

- Kidsafe NSW's *Seat Me Safely* program provides practical information on the selection and use of child restraints, safety tips to consider when using child restraints, and information on how to correctly install and fit the restraint to the vehicle and child.
- Neuroscience Research Australia and Kidsafe Australia released *Best Practice guidelines for the safe restraint of children travelling in motor vehicles* in May 2013. The guidelines provide evidence-based recommendations on how best to safely restrain children up to 12 years of age. The guidelines will be supported through the development of targeted documents for consumers and restraint fitters.
- The Child Restraint Evaluation Program (CREP) is a collaboration of government and non-government organisations that provides car restraint buyers with information on the levels of protection from injury a restraint can provide, and the ease with which the restraint can be used correctly.
- Revised Australian standards on child restraints were released in June 2013, which provide for the development of a booster seat with an in-built harness for children up to eight years of age. The first booster seats designed for children up to 145cm (marketed for children up to 10 years of age) became commercially available in Australia in February 2013.

83 Transport for NSW, *NSW Road Safety Strategy 2012-2021*. Sydney: TfNSW, http://roadsafety.transport.nsw.gov.au/downloads/road_safety_strategy.pdf, accessed 16 July 2013.

84 A course offering theoretical and practical coaching to learner licence holders. The course deals with different road conditions, understanding factors beyond a driver's control and also helps identify risks on the road. NSW Centre for Road Safety 2013, *Safer drivers course*, Sydney: TfNSW, <http://roadsafety.transport.nsw.gov.au/stayingsafe/drivers/youngdrivers/youngerdriverscourse.html>, accessed 16 July 2013.

85 Not for profit organisation and the peak body in NSW for youth injury prevention.

86 Brown J. Hatfield J. Du W. Finch C.F. & Bilston L.E. 2010, *Population-level estimates of child restraint practices among children aged 0-12 years in NSW, Australia*, *Accident Analysis and Prevention*, 42: 2144 – 2148.

87 Brown J. Keay L. Hunter K. Bilston L.E. Simpson J.M. & Ivers R. 2013, 'Increase in best practice child car restraint use for children aged 2-5 years in low socioeconomic areas after introduction of mandatory child restraint laws', in *Australian and New Zealand Journal of Public Health*, 37: 272 – 277.

-
- Since July 2013, manufacturers of new vehicles have been required to install adult lap-sash seat belts in the rear centre seat of vehicles transporting less than nine occupants. Lap-only seat belts are no longer permitted for installation in these seats. The Australian standard on child restraint systems for use in motor vehicles also indicates that all manufacturers are required to warn consumers that the restraint should not be used on a seat position where the top tether strap may fall into a split in the seat back.
 - A DVD was produced in 2012 to increase awareness amongst Aboriginal communities about the benefits of seatbelts, child restraints and the issues to consider before purchasing a vehicle.

17.6 The Team's recommendations

Last year, the Team took a close look at the deaths of 24 children over a 10-year period from low speed vehicle run-over fatalities. In the context of the need to better understand and monitor the circumstances and scope of such incidents, the Team directed two recommendations to the Centre for Road Safety (CRS).

The recommendations were aimed at improving the collection, analysis and publication of data about low speed vehicle run-over fatalities; and enabling the development of strategies to reduce the risk of death and injury of children from these incidents.

In response to the Team's recommendations, CRS detailed a range of activities in 2012 that were aimed at raising public awareness of the risks to children from these incidents, including a media campaign, workshops and a driveway safety resource for families and carers. The agency also indicated that the Commonwealth Government has initiated an international study of the road safety benefits of reversing technology, in response to the issue being raised by the NSW Government.

The Team was advised that CRS' new database system and recent data linkage activities would enable the recording and reporting of off-road incidents, including low speed run-over incidents. CRS indicated that, once analysis of the data is completed, it would convene key injury prevention agencies to determine further countermeasures to address low speed vehicle run-overs. The Team will monitor CRS' continuing and important work in relation to low speed vehicle run-over fatalities.

Recommendations

The Centre for Road Safety

6. **In the context of the Centre for Road Safety's (CRS) analysis of data relating to low speed vehicle run-over incidents and its plans to convene key injury prevention agencies to determine further countermeasures to address such incidents, CRS should provide advice to the Team on:**
 - (a) **key findings or results from the data analysis, and**
the outcomes of the consultations/forum with relevant agencies, including any areas of further work to prevent low speed vehicle run-over fatalities.

Chapter 18. Off-road vehicle fatalities 2003-2012

In the 10 years between 2003 and 2012, 25 children died in off-road vehicle⁸⁸ incidents in NSW.⁸⁹ The fatalities mainly involved off-road motorcycles (13) and 'all-terrain' and other motor vehicles designed primarily for off-road use (11), such as quad bikes.

Table 60 provides an overview of the main demographic characteristics of children who died in off-road vehicle fatalities in 2003-2012.

Table 60: Key demographic and individual characteristics – off-road vehicle fatalities, 2003-2012

	Number	Percent
Total	25	100
Gender		
Female	6	24
Male	19	76
Age		
Under 1 year	0	0
1-4 years	2	8
5-9 years	3	12
10-14 years	12	48
15-17 years	8	32
Aboriginal and Torres Strait Islander status		
Not Aboriginal or Torres Strait Islander	23	92
Aboriginal or Torres Strait Islander	2	8
Remoteness		
Major cities	6	24
Inner regional areas	11	44
Outer regional areas	7	28
Remote areas	1	4
Socioeconomic status		
Quintile 5 (highest)	4	16
Quintile 4	5	20
Quintile 3	5	20
Quintile 2	7	28
Quintile 1 (lowest)	4	16

In Australia and internationally, increasing attention is being paid to the high incidence of deaths and serious injuries from incidents involving quad bikes and related off-road vehicles. Across Australia in 2012, 19 quad bike deaths were reported, including the deaths of five children (26%), all aged between five and 13 years.⁹⁰

In NSW in the five years to 2010/11, there were 2,036 hospitalisations of children involving off-road vehicles.⁹¹ Over three-quarters

88 An off-road vehicle is designed primarily for use on unsealed surfaces and most are unable to be registered.

89 We defined off-road incidents as instances in which a child was riding a vehicle that was primarily designed for off-road use in an off-road area or temporarily on a public road (such as crossing a road to travel from one off-road area to another).

90 Safe Work Australia Quad Watch 2013, *2012 quad bike fatalities*, Canberra: Safe Work Australia, <http://www.safeworkaustralia.gov.au/sites/swa/whs-information/agriculture/quad-watch/pages/quad-bike-fatalities>, accessed 5 July 2013.

91 The data relates to primarily unregistered off-road vehicles, including motor-scooter, moped or motorised bicycles; motorcycles designed primarily for off-road use; and all-terrain or other motor vehicle designed primarily for off-road use. The information pertains to children aged 0-17 years.

(1,604) involved off-road motorcycles, followed by 'all-terrain' off-road vehicles, such as quad bikes (351). Almost two-thirds of the hospitalisations (1,234) involved children aged 1-14 years.⁹²

The CDRT's previous work relating to recreational transport incidents⁹³ and recent state and national attention to quad bike incidents involving children have prompted the Team to examine off-road vehicle incidents in more detail.

18.1 The children

18.1.1 Age, gender and Aboriginal and Torres Strait Islander status

Of the 25 children who died, three-quarters (19) were male. The prevalence of males was particularly acute in fatalities involving off-road motorcycles, where all of the children who died (13) were male.

Consistent with data on hospitalisations related to off-road vehicle incidents, just over two-thirds (17) of the children who died in the 10-year period were aged 1-14 years.

Two of the children were Aboriginal.

18.1.2 Remoteness and socioeconomic status

Three-quarters (19) of the off-road vehicle incidents that resulted in the deaths of children in NSW occurred outside of the major cities. The majority (18) occurred in regional areas.

There were differences in the location of fatalities involving off-road motorcycles and those involving 'all-terrain' vehicles. While the greatest proportion of fatalities involving quad bikes and other 'all-terrain' vehicles occurred in major cities (40%), the vast majority (85%) of the off-road motorcycle fatalities occurred outside of those centres. Over half (7) of the off-road motorcycle fatalities occurred in inner regional areas.

18.2 The vehicles

As shown in table 61, just over half of the fatalities (13) involved off-road motorcycles. Eleven children died in incidents involving 'all-terrain' or other off-road vehicles, most of whom (6) were using a quad bike.

Table 61: Types of vehicles in off-road vehicle fatalities of children, 2003-2012

Type of vehicle	Number
Motorcycle designed primarily for off-road use	13
All-terrain or other motor vehicle designed primarily for off-road use	11
Quad bike	6
Side-by-side vehicle	4
Go kart	1
Tractor	1
Total	25

18.3 The incidents

All of the off-road vehicle incidents involved single fatalities.

⁹² NSW Commission for Children and Young People 2013, *Submission to the NSW Parliament Inquiry into non-registered motorised vehicles*, Submission No 42, Sydney: NSW Parliament, accessed 6 June 2013, [https://www.parliament.nsw.gov.au/Prod/Parliament/committee.nsf/0/48704f21b1e20f16ca257b74001feeac/\\$FILE/Submission%2042.pdf](https://www.parliament.nsw.gov.au/Prod/Parliament/committee.nsf/0/48704f21b1e20f16ca257b74001feeac/$FILE/Submission%2042.pdf).

⁹³ NSW Child Death Review Team 2008, *Trends in child deaths in New South Wales 1996-2005*, Sydney: NSW Commission for Children and Young People. The Team noted that 17 of 103 driver deaths occurred during recreational activities: seven of the children were driving in off-road areas; six were racing motorbikes or go carts in organised motocross events; and four were driving on rural properties.

18.3.1 Off-road motorcycle fatalities

Motorcycles designed primarily for off-road use are also known as 'dirt bikes'. They are used for recreation, transport and agricultural activities. The use of dirt bikes has a number of inherent risks: the roads tend to be uneven or in poor condition, the activities are frequently risky (such as going over jumps or racing), and the activities often happen in isolated areas where emergency service access may be delayed (such as rural properties or state forests).⁹⁴ Australian and international research has found increasing presentations of motorcycle injuries in children and adolescents.⁹⁵

Thirteen children died in off-road motorcycle fatalities in NSW in 2003-2012; all of whom were male. The dominance of boys in this cohort is consistent with Queensland research, which found that between 2007 and 2009 there were 10 fatal motorcycle child fatalities, all of which involved boys.⁹⁶

The 13 children were aged between nine and 17 years. The average age was 14.2 years.

Location

The vast majority of the fatalities involving off-road motorcycles (11) occurred off-road, on:

- state forests or fire trails (4)
- racetracks (3)
- tracks or jumps on private property (2)
- a driveway, and
- a paddock.

Two fatalities occurred on a road, either while crossing to get from one off-road area to another, or riding on an unsealed local rural road.

Of the 13 fatalities, almost half (6) occurred in settings that required a licence and bike registration (state forests and on roads). None of the six children had a licence or a registered bike.

Activity and injury

Most (10) of the children were riding for recreation. Three children were riding for transport purposes.

All of the children were sole riders of the bike at the time of the fatality; none had passengers.

The majority of the fatalities (10) were single vehicle incidents, where the child hit a stationary object (such as a tree) or came off the bike during jumps or other activities. Three incidents involved a collision with another vehicle (all motorcycles).

The injuries sustained by the 13 children in the fatalities included multiple injuries (4), typically head, neck and chest fractures, lacerations and other injuries; severe head injury (3); chest/ abdominal injury (3); injury to the neck and spinal cord (2); and accidental strangulation (1).

Safety considerations

Information about helmet use was available for 11 of the 13 children. Nine of the 11 children (82%) were wearing a helmet at the time of the fatality.

The level of supervision of the child was able to be ascertained in 12 cases. No adult supervision was provided in relation to seven of the 12 children (58%) who died in off-road motorcycle incidents.

Three children were actively supervised by adults during an organised racing event. For two children, an adult was aware of the child getting on the bike or aware of the time it would take the child to complete a circuit, but they did not have direct adult supervision.

Of the eight children whose blood alcohol level was recorded, one was heavily intoxicated.

94 Ramakrishnaiah R. Chetan Shah C. Parnell-Beasley D & Greenberg B. 2012, *Motorized dirt bike injuries in children*, Journal of Emergency Medicine, 44(4): 806-810.

95 Bevan C. Babl F. Bolt P. & Sharwood L. 2008, *The increasing problem of motorcycle injuries in children and adolescents*, Medical Journal of Australia, 189(1): 17-20; Cassell E. Clapperton A. O'Hare M & Congiu M. 2006, *On- and off-road motorcycling injury in Victoria*, Hazard 64: 1-27; Centers for Disease Control and Prevention 2006, *Nonfatal injuries from off-road motorcycle riding among children and teens — United States, 2001–2004*, Morbidity and Mortality Weekly Report, 55(22): 621-624. The research includes on-road and off-road motorcycles.

96 Pym A. Wallis B. Franklin R. & Kimble R. 2013, *Unregulated and unsafe: the impact of motorcycle trauma on Queensland children*, Journal of Paediatrics and Child Health, 49(6): 493-497.

18.3.2 Quad bike fatalities

Quad bikes are four-wheeled motorcycles that are frequently used for both recreation and agricultural work.⁹⁷ They have a saddle-type seat that is designed for a single operator, and handlebars for steering control.

Quad bikes are considered to be inherently unstable on anything other than flat terrain due to a high centre of gravity.⁹⁸ They have both pitch instability (risk of tipping over when going up or down steep hills) and lateral instability (tipping risk from one side of the bike being lower than the other).⁹⁹ New Zealand researchers have noted that '[a]lthough they appear easy to ride and handle, riding [a quad bike] requires the same or greater skill judgement and experience as for driving a car. [Quad bikes] are heavy, powerful machines.'¹⁰⁰ Quad bikes are currently the leading cause of death and serious injury on Australian farms.¹⁰¹

In the 10 years to 2012, six children died in incidents involving quad bikes in NSW. The vast majority (5) were female.

The children were aged between one and 16 years, with four children aged 11 years or younger. The average age was nine years.

Two of the children were driving the quad bike at the time of the fatality; they were 13 and 16 years old. One of the children was carrying multiple passengers.

Quad bikes are not designed to carry passengers. The addition of passengers is dangerous as they 'restrict the driver's mobility and add weight to an ATV, raising the centre of gravity, making it harder to control and more prone to tipping over.'¹⁰²

Most of the children who died in incidents involving quad bikes were passengers (4). Three of the four passengers were being driven by other children (aged two to 12 years) at the time of the fatality. All of the peer drivers had been given permission by adult supervisors to control the vehicle. One child was driven by a parent.

Location

All of the quad bike deaths occurred on or around rural properties, mostly (5) in paddocks.

One fatality occurred on a road, with the bike hit by a car as it was crossing the road. It is illegal to move a quad bike over a road while it is under power.¹⁰³

Activity and injury

The majority of the children (5) were riding the quad bike for recreation. One child was travelling to a location to herd stock at the time of the fatality.

Half (3) of the incidents were 'rollovers', involving the vehicle tipping or rolling over when the driver attempted to go up a steep incline. In each of the three rollover incidents, the child who died was a passenger on the quad bike.

Quad bikes are noted to be 'prone to tipping and rolling over when moving at moderate speeds and on slopes'.¹⁰⁴ A review of 127 quad bike deaths in Australia in 2001-2010 found that just under half of the incidents (55) were rollovers. New Zealand research has indicated that 70 per cent of paediatric all-terrain vehicle fatalities involve rollovers, tipping or flipping.¹⁰⁵

For the three non-rollover fatalities, two were single vehicle incidents (such as hitting a fence), and one involved collision with a car.

The injuries sustained in the incidents that resulted in death included multiple injuries (2), severe head injury (2), lung laceration (1), and crushed larynx/ trachea (1). These injuries are consistent with those reported in other research relating to quad bike incidents.¹⁰⁶

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

98 *Ibid.*; and WA Department of Health, unknown publication year, *Literature Review – Quad Bike Related Injuries and Deaths*, http://www.healthnetworks.health.wa.gov.au/docs/injury_quad_bike.pdf, accessed July 2013.

99 Safe Work Australia 2012, *Design and engineering controls for improving quad bike safety: key findings from the discussion paper and forum*, Canberra: Safe Work Australia.

100 Anson K. Segedin E. & Jones P. 2009, *ATV (quad bike) injuries in New Zealand children: their extent and severity*, *New Zealand Medical Journal*, 122(1302): 122.

101 Lower T. Pollock K. & Herde E. 2013, *Australian quad bike fatalities: what is the economic cost?*, *Australian and New Zealand Journal of Public Health*, 37(2): 173-178.

102 Anson K. *et al.* 2009, *op cit*, p. 123.

103 Motorcycle Council of New South Wales Incorporated 2012, *Where can you ride?*, Sydney: MCCofNSW <http://dirtbike.mccofnsw.org.au/a/16.html>, accessed 4 July 2013.

104 WA Department of Health, unknown publication year, *Literature Review – Quad Bike Related Injuries and Deaths*, http://www.healthnetworks.health.wa.gov.au/docs/injury_quad_bike.pdf, accessed July 2013.

105 Anson K. Segedin E. & Jones P. 2009, *ATV (quad bike) injuries in New Zealand children: their extent and severity*, *New Zealand Medical Journal*, 122(1302): 127.

106 For example, the Australian Centre for Agricultural Health and Safety's review of the deaths of 127 people from quad bike incidents in Australia in 2001-2010 found that deaths were predominantly associated with multiple injuries and head injuries. Lower T. Herde E. and Fragar L. 2012, *Australian Quad Bike Deaths (2001-2010)*, Conference Presentation: 2012 "Are You Remotely Interested?" Mt Isa, QLD. <http://www.micrrh.jcu.edu.au/conferences-workshops/2012-remotely-interested/Program/S1/tony-lower.pdf>, accessed 5 July 2013

Safety considerations

Research suggests that helmet use with all-terrain vehicles reduces the risk of death by 42 per cent.¹⁰⁷ Helmet use was able to be ascertained for four of the six children: two children were wearing a helmet at the time of the fatality.

The majority (5) of the children who died in quad bike incidents were with, or watched by, adults. Three children were travelling with adults, and two were riding by themselves but with adults nearby. One child had no adult supervision.

18.3.3 Side-by-side vehicle fatalities

Side-by-side vehicles are other small vehicles designed for off-road use. They are called side-by-side vehicles because they are designed to transport at least two people who sit 'side-by-side'.¹⁰⁸

They have four tyres, tend to have a bench-type seat and a steering wheel, and generally have a small tray. Many have a roll cage and seat belts.¹⁰⁹ The Centre for Agricultural Health and Safety has noted that, while side-by-side vehicles are not as common as quad bikes on Australian farms, they are increasingly being used as 'a safer option'.¹¹⁰

In 2003-2012, four children in NSW died in side-by-side vehicle incidents. The vehicles included two 'traditional' side-by-side vehicles, a dune buggy and an ex-army vehicle. Three of the four fatalities occurred in the last two years (2011 and 2012).

The children were aged between nine and 16 years, with an average age of 11.75 years. All were male.

Two children (aged nine and 11 years) were driving the vehicle at the time of the fatality. The other two children were passengers in side-by-side vehicles; one in a seat, and one in the vehicle tray. Both were driven by adults.

All of the side-by-side fatalities occurred on rural properties.

Activity and injury

In all four fatalities, the vehicle rolled over or tipped.

Two of the children died in separate incidents involving a homemade 'race-track'. In both cases, the vehicle made contact with the edge of the track and tipped over. One child was a passenger and the other was a driver.

One child was on the vehicle with several other young people and was going up a steep incline. The other fatality occurred in a paddock/yard – the area was relatively flat and it is unclear how the vehicle came to tip over.

The injuries sustained in the incidents that resulted in the children's deaths were primarily severe head injuries (3), and crush injuries to the child's chest (1).

Safety considerations

None of the children were wearing a helmet at the time of the fatality. While three of the side-by-side vehicles had seatbelts, they were not used by the children who died.

Two fatalities occurred while the vehicle was being driven by an adult. The other two children (aged nine and 11 years) did not have adult supervision at the time of the incident.

18.3.4 Other off-road vehicle fatalities

Over the 10 years, two young people died while using less common off-road vehicles: a go kart and a tractor. Both were driving the vehicle at the time of the fatality.

The go kart rider was wearing full protective equipment, including a helmet.

18.4 Factors associated with off-road vehicle fatalities

Research has identified a number of risk factors that are associated with an increased likelihood of off-road vehicle fatalities:

¹⁰⁷ Rodgers G. 1990, *The effectiveness of helmets in reducing all-terrain vehicle injuries and deaths*, *Accident Analysis and Prevention*, 22: 47–58.

¹⁰⁸ Roads and Maritime Services 2012, *Conditional registration guide (vehicle sheet):ultra-light vehicle*, Sydney: RMS http://www.rta.nsw.gov.au/registration/downloads/vehiclesheet/ultra_light_utility_vehicle_sheet.pdf, accessed 5 June 2013.

¹⁰⁹ Australian Centre for Agricultural Health and Safety 2011, *Safety of quad bikes and Side-by-Side Vehicles on Australian Farms – A practical management guide*, Moree, NSW: University of Sydney.

¹¹⁰ Australian Centre for Agricultural Health and Safety 2011, *Safety of quad bikes and Side-by-Side Vehicles on Australian Farms – A practical management guide*, Moree, NSW: University of Sydney.

- uneven or bumpy ground¹¹¹
- slopes and steep inclines¹¹²
- low skill/experience of driver¹¹³
- being under 16 years of age¹¹⁴
- having a passenger¹¹⁵
- overloading the vehicle¹¹⁶
- not wearing a helmet¹¹⁷
- riding without other people nearby and/or having a delay in accessing emergency services¹¹⁸
- excessive speed,¹¹⁹ and
- alcohol or drug consumption.¹²⁰

The above factors were common in the off-road vehicle incidents that resulted in the deaths of children in 2003-2012, and the vast majority (22) involved two or more risk factors.

Some of the risk factors are particularly acute for children riding off-road motorcycles – the terrain is invariably bumpy, the activity typically involves high speed, and there are considerable practical challenges in supervising the activity and facilitating access to emergency services.

However, the risks are also serious for quad bikes and side-by-side vehicles. While these vehicles have been called ‘all-terrain’ machines, this is not the case. The NSW Government has indicated that the term ‘is now discouraged as it gives a false impression of the performance capabilities of these vehicles.’¹²¹ A 2009 Victorian Coroner’s inquest into eight quad bike fatalities recommended that quad bikes not be described as all terrain vehicles, as ‘[s]o described, a false impression is created, which warnings are unable to erase.’¹²² Many terrains pose a rollover risk for quad bikes and side-by-side vehicles, including slopes, rough and rocky ground, tussocky vegetation, contour banks and dam banks.¹²³

There is wide acknowledgement that off-road vehicles require skill to operate safely,¹²⁴ and that children are at increased risk of serious injury and death from off-road vehicle incidents. In terms of risks, age has been identified as more important than size and weight,¹²⁵ with the operation of many off-road vehicles noted to be beyond the physical capabilities of children.¹²⁶ Two-thirds of the off-road vehicle fatalities in NSW in 2003-2012 involved children aged 14 years and younger.

While the amount of adult supervision was low in relation to the children who died in off-road motorcycle fatalities, this was not the case for children involved in quad bike and side-by-side vehicle fatalities. Most of the children who died in these incidents

-
- 111 Fragar L. & Pollock K. 2007, *All-terrain Vehicle (Quad bike) Safety on Australian Farms Briefing Paper*, Moree, NSW: Farmsafe Australia Reference Group on Quad bike Safety; Milosavljevic S. McBride D. Bagheri N. Vasiljev R. Carman A. Rehn B. & Moore D. 2011, *Factors associated with quad bike loss of control events in agriculture*, International Journal of Industrial Ergonomics 41(3): 317-321.
- 112 Fragar L. & Pollock K. 2007 *op. cit.*; Milosavljevic S. *et al.* 2011, *op. cit.*; and WA Department of Health, *op cit.*
- 113 Bevan C. Babl F. Bolt P. & Sharwood L. 2008, *The increasing problem of motorcycle injuries in children and adolescents*, Medical Journal of Australia 189(1): 17-20; and O’Connor T. Hanks H. & Steinhardt D. 2009, *All-terrain vehicle crashes and associated injuries in North Queensland: findings from the Rural and Remote Road Safety Study*, Australian Journal of Rural Health 17(5): 251-256.
- 114 Queensland Commission for Children and Young People and Child Guardian 2012, *Issues paper number 9: child deaths - quad bike deaths in Queensland*, Brisbane: CCYPCG, <http://www.ccypcg.qld.gov.au/pdf/publications/papers/trends-and-issues/Issues-Paper-no-9-Quad-bikes.pdf>, accessed 4 June 2013.
- 115 Curran J. & O’Leary C. 2012, *Paediatric Trauma Associated with All-Terrain Vehicles*, Irish Medical Journal, 105(7): 55-57; O’Connor *et al.* 2009, *op cit.*
- 116 Fragar, L. & Pollock, K. 2007, *op cit.*
- 117 Rodgers G. 1990, *The effectiveness of helmets in reducing all-terrain vehicle injuries and deaths*, Accident Analysis and Prevention 22: 47–58; and Keenan H. & Bratton S. 2004, *All-terrain vehicle legislation for children: a comparison of a state with and a state without a helmet laws*, Paediatrics 113: e330-e333.
- 118 WorkSafe Victoria 2011, *Quad bikes on farms*, Melbourne: WorkSafe Victoria, <http://www.worksafe.vic.gov.au/forms-and-publications/forms-and-publications/quad-bikes-on-farms>, accessed 6 June 2013.
- 119 Milosavljevic S. *et al.* 2011, *op. cit.*
- 120 Hall A. Bixler D. Helmkamp J. Kraner J. & Kaplan J. 2009, *Fatal all-terrain vehicle crashes: injury types and alcohol use*, American Journal of Preventive Medicine, 36(4): 311–316; and Curran J. & O’Leary C. 2012, *op cit.*
- 121 NSW Department of Premier and Cabinet 2013, *Submission by NSW Government in response to The Parliamentary Joint Standing Committee on Road Safety (Staysafe) Inquiry into Non-Registered Motorised Vehicles*, Submission No 66, p. 17.
- 122 Australian Centre for Agricultural Health and Safety 2011, *Safety of quad bikes and Side-by-Side Vehicles on Australian Farms – A practical management guide*, Moree, NSW: University of Sydney, p. 12.
- 123 Australian Centre for Agricultural Health and Safety 2011, *op. cit.*
- 124 Coroners Court of Victoria 2011, *Finding into death without inquest, Coroners Case 958/2011, Angus William Wilson*
- 125 Australian Centre for Agricultural Health and Safety 2011, *op. cit.*
- 126 Safe Work Australia 2012, *Design and engineering controls for improving quad bike safety: key findings from the discussion paper and forum*, Canberra: Safe Work Australia.

had adults with them or nearby, but this did not mitigate the significant risks involved. Very young children, including toddlers, were drivers and passengers of these vehicles; the use of helmets and other safety equipment was low; and most of the quad bikes carried loads, including child passengers.

18.5 Prevention measures

18.5.1 Countermeasures

Quad bike manufacturers provide labels or decals on quad bikes warning of the dangers to child operators,¹²⁷ including that children under the age of 16 must 'never operate' the vehicle, and that use by such children increases their chance of severe injury or death.¹²⁸ Manufacturers also recommend that passengers not be carried on quad bikes.¹²⁹

However, information relating to the deaths of children in off-road vehicle incidents over the past 10 years indicates that additional strategies are required. The key areas that have been identified as necessary to prevent death and serious injury of children relating to the use of off-road vehicles include:

- greater public awareness of the dangers of off-road vehicles – including the use of quad bikes by children, inclusion of passengers, and instability of the vehicles
- introduction of engineering controls – including fitment of crush protection devices/ roll over protective structures to quad bikes; and measures to prevent operation of the vehicles by children, such as weight sensors on seats, and coded starting systems, and
- introduction of administrative controls – such as vehicle registration; rider training and licensing; and requirements relating to a minimum age of 16 years, no passengers, and mandatory use of personal protection, such as helmets.

While the use of off-road vehicles on roads and road related areas¹³⁰ requires licensing and vehicle registration, there is no regulation of the recreational use of off-road vehicles on private property. For example, there are no legislative requirements for recreational riders of off-road vehicles on private properties, including quad bikes and motorcycles, to wear a helmet or be of a minimum age.

Riders of motorcycles on NSW roads are required to obtain a licence by completing various stages of training and testing, and to have at least three years of experience before graduating to a full rider licence. To obtain a learner rider licence, a person must be at least 16 years and nine months of age, complete a pre-learner training course, and pass a rider knowledge test. In contrast, there are no licensing or training requirements or tests for children to be able to ride motorcycles off-road on private property, and no minimum age requirements for riders.

In recent public appeals for greater protection of children in relation to off-road vehicle incidents, doctors and other emergency medical staff have emphasised that adults should not allow unlicensed or inappropriate use of motorised vehicles and, when used by children of an appropriate age, they should ensure that safety precautions used on roads – helmets and protective clothing – are also observed off-road.¹³¹

In February 2013, the NSW Parliament Staysafe (Road Safety) Committee commenced an inquiry to review and report on the increasing use of non-registered motorised vehicles on public roads and footpaths and their impact on road safety. Amongst other things, the inquiry includes consideration of:

- the adequacy of data collection for injury and fatality rates arising from the use of non-registered motorised vehicles
- the extent and effectiveness of education and the necessity for skills and competency training for users of these vehicles, and
- initiatives taken by local Councils and other jurisdictions to certify, register and regulate the use of currently non-registered motorised vehicles.
- Actions have been taken in recent years to improve the collection and analysis of information about off-road vehicle incidents. QuadWatch, managed by Safe Work Australia, collects and reports on quad bike fatalities in Australia, and the quad bike Product Stewardship Program enables users of quad bikes to report safety incidents and near-misses.¹³²

127 Australian Centre for Agricultural Health and Safety (2011) *op. cit.*

128 Coroners Court of Victoria 2011, *op. cit.*

129 Mount Isa Centre for Rural & Remote Health 2012, *Mount Isa Statement on Quad Bike Safety – 2012* media release 3 August 2012.

130 Roads and road related areas mean any area that is publicly accessible to vehicles, including roads, the road shoulder, car parks, fire trails, state forests, and recreation areas. http://www.rta.nsw.gov.au/licensing/downloads/motorcycle_riders_handbook.pdf, accessed 11 July 2013.

131 Duke T. 2013, *Farm bike rules must change to protect children*, Herald Sun, 20 May 2013.

132 Safe Work Australia 2013, *Quad bike stewardship program*, Canberra: Safe Work Australia, <http://www.safeworkaustralia.gov.au/sites/swa/whs-information/agriculture/quad-watch/quad-stewardship-program/pages/quad-bike-stewardship-program>

The Centre for Road Safety (CRS) has indicated that its new database system, CrashLink 2, will enable recording and reporting of off-road incidents that are reported to police, including provision of an off-road crash data summary on its new website. Quad bikes will be reported as a separate category of road users.¹³³ CRS has advised the Team that, in 2012, the UNSW Transport and Road Safety Research group completed a data linkage of the NSW crash database to health and emergency data and Births, Deaths and Marriages data in 2001-09, and that analysis of this linked data would include off-road incidents that are not reported to police.¹³⁴

The Quad Bike Performance Project (run by UNSW Transport and Road Safety on behalf of WorkCover NSW and the Heads of Workplace Safety Authorities) is undertaking crash performance testing and research on quad bikes and side-by-side vehicles to develop a testing and rating system for rollover stability, handling and crashworthiness. The project is also collecting injury and fatality data, and preliminary analysis of the data has raised concerns that 'the significant portion of riders killed and injured are children under the age of 16.'¹³⁵ The first stage of testing commenced in March 2013.

18.5.2 Current prevention measures

Current prevention measures associated with off-road vehicles are primarily focused on the use of quad bikes.

While there is consensus amongst stakeholders that operation of adult-sized quad bikes is beyond the physical capabilities of children, and children should be prevented from using adult quad bikes, there is no consensus on the use of small size quad bikes.¹³⁶ Manufacturers support children using quad bikes of an 'appropriate size',¹³⁷ while researchers, health and safety experts and other stakeholders consider that there is no place for children under the age of 16 years on quad bikes.¹³⁸

The Commonwealth Government has indicated that the responsibilities of quad bike users are to 'wear a helmet, not to carry passengers and not to let children ride quad bikes', and has indicated that Safe Work Australia will work with state and territory regulators to institute a ban on children under 16 years operating a quad bike of full size in a workplace.¹³⁹ At present, there is no agreement about how to prevent children from using quad bikes for recreational purposes, other than ongoing education of parents to control child access to the vehicles.¹⁴⁰

A range of organisations are involved in promoting quad bike safety, including FarmSafe and the Australian Centre for Agricultural Health and Safety. Guidelines and recommendations for safe quad bike use have been issued by agencies such as the Royal Australasian College of Surgeons, WorkCover NSW, the Australian Competition and Consumer Commission, the Queensland Commission for Children and Young People and Comcare.

There does not seem to be a current focus on measures to prevent deaths of children in off-road motorcycle incidents.

While there is considerable work underway to reduce fatalities and serious injuries associated with quad bike use on farms in a work setting, the Team's review of off-road vehicle fatalities of children has identified that the vast majority of these deaths occurred in a recreational context and were not limited to farms.

The review highlights the need for a specific focus on measures to prevent the deaths of children associated with the use of off-road vehicles, beyond the bounds of work safety. The Team notes that there is currently no one agency in NSW that has responsibility for matters relating to the recreational use of off-road vehicles in an off-road setting (including private property), which presents a significant challenge in seeking to address these issues.

133 NSW Department of Premier and Cabinet 2013, *Submission by NSW Government in response to The Parliamentary Joint Standing Committee on Road Safety (Staysafe) Inquiry into Non-Registered Motorised Vehicles*, Submission No 66, p. 17. Sydney: DPC.

134 Centre for Road Safety advice to the CDRT, 28 May 2013.

135 Transport and Road Safety (TARS) Research UNSW 2013, *Submission to the Staysafe Committee Inquiry into Non-Registered Motor Vehicles*, Submission No 60, p. 5. Sydney: UNSW.

136 Safe Work Australia 2012, *Design and engineering controls for improving quad bike safety: key findings from the discussion paper and forum*, Canberra: Safe Work Australia.

137 *Ibid.*

138 *Ibid.*; Australian Council of Trade Unions 2013, *No more excuses: Quad Bikes without Crush Protection Devices should not be operated media release*, 2 May 2013, Melbourne: ACTU; Farmsafe Australia 2013, *Quadbike and Vehicle Safety*, Moree, NSW: ACAHS, <http://www.farmsafe.org.au/index.php?article=content/for-farmers/quadbike-and-vehicle-safety>, accessed 6 July 2013; and Royal Australasian College of Surgeons 2013, *Position Paper, submission to NSW Parliament Inquiry into non-registered motor vehicles*, Submission No 73, Melbourne: RACS.

139 Minister for Employment and Workplace Relations, Financial Services and Superannuation, Bill Shorten 2012, *Quad bike safety media release*, 19 December 2012.

140 Safe Work Australia 2012, *op. cit.*

Recommendations

Department of Premier and Cabinet

7. The Department of Premier and Cabinet (DPC) should bring together key injury prevention and regulatory agencies to consider the findings of this report to identify whether specific strategies are needed in NSW to reduce the risk of death and injury of children in relation to off-road vehicle incidents. In particular, DPC, with agencies, should consider:
 - (a) existing or planned initiatives within NSW and at the national level
 - (b) the need for targeted research, including environmental and vehicle design elements of prevention and attitudinal research relating to parent and carer perceptions of risk
 - (c) the need for public awareness strategies, including print and electronic media resources that recognise the behavioural, environmental and vehicle design elements of prevention, and
 - (d) the need for regulation of the recreational use of such vehicles on private property, including licensing, registration, and requirements relating to safety equipment such as helmets.
8. DPC should provide detailed advice to the Team on the outcomes of this work, including identified strategies and how they will be progressed.

Chapter 19. Drowning

In 2012, the drowning deaths of 11 children were registered in NSW. This is the lowest number of deaths due to drowning since 2005, and represents a rate of 0.67 deaths per 100,000 children in NSW.

Drowning was the second most common unnatural unintentional cause of death of children in NSW. Overall, it was the third leading external cause of death, after transport fatalities and suicide. It was the leading external cause of death for children aged 1-4 years.

The 11 children drowned in:

- private swimming pools (4)
- natural bodies of water (4), including ocean (2), a lake and a river
- bathtubs (2), and
- an irrigation channel.

The drowning deaths of two of the 11 children reported here are also 'reviewable' deaths and will also be reviewed separately by the Ombudsman.

19.1 Trends in drowning deaths of children in NSW, 1998-2012

Table 62 shows the trends in drowning deaths of children in 1998-2012, by incident location. Over the 15 years, the drowning deaths of 281 children were registered in NSW. There has been a downward trend in the overall drowning rate of children in NSW over that time, with an average mortality rate of approximately 1.15 deaths per 100,000 children.

Over the past 15 years, most drowning deaths have occurred in private pools (39%), natural inland bodies of water (16%), and bathtubs (15%).

Table 62: Trends in deaths of children due to drowning by location – deaths registered 1998-2012, number and (crude mortality rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Pool (private)	5 (0.3)	8 (0.5)	8 (0.5)	4 (0.2)	11 (0.7)	10 (0.6)	7 (0.4)	5 (0.3)	6 (0.4)	13 (0.8)	12 (0.7)	6 (0.4)	6 (0.4)	5 (0.3)	4 (0.2)	110
Natural inland (river, creek, lake)	6 (0.4)	10 (0.6)	5 (0.3)	4 (0.2)	2 -	2 -	2 -	1 -	3 (0.2)	1 -	4 (0.2)	4 (0.4)	4 (0.2)	2 -	2 -	52
Bathtub	7 (0.4)	4 (0.3)	2 -	2 -	6 (0.4)	4 (0.2)	3 (0.2)	1 -	2 -	1 -	2 -	1 -	2 -	3 (0.2)	2 -	42
Natural coastal (ocean, beach, estuary)	3 (0.2)	5 (0.3)	2 -	4 (0.2)	5 (0.3)	5 (0.3)	2 -	0 -	1 -	2 -	2 -	0 -	1 -	3 (0.2)	2 -	37
Dams	5 (0.3)	2 -	1 -	3 (0.2)	3 (0.2)	1 -	1 -	0 -	1 -	0 -	0 -	0 -	1 -	2 -	0 -	20
Pool (public)	0 -	1 -	1 -	1 -	0 -	0 -	0 -	3 -	2 -	1 -	0 -	0 -	0 -	0 -	0 -	9
Other	0 -	2 -	1 -	0 -	2 -	0 -	1 -	0 -	0 -	0 -	1 -	1 -	0 -	2 -	1 -	11
All	26 (1.6)	32 (2.0)	20 (1.2)	18 (1.1)	29 (1.8)	22 (1.4)	16 (1.0)	10 (0.6)	15 (0.9)	18 (1.1)	21 (1.3)	12 (0.7)	14 (0.9)	17 (1.0)	11 (0.7)	281

* Other includes drains, toilets, culverts, sewers, troughs, buckets, etc.

19.2 Demographic and individual characteristics, 2012

Table 63 provides an overview of the key demographic characteristics of the 11 children who drowned and whose deaths were registered in 2012.

Table 63: Key demographic and individual characteristics – deaths of children due to drowning, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	11	100	0.67	0.33 - 1.20		
Gender						
Female	2	18	-	-	-	-
Male	9	82	1.07	0.49 - 2.02	4.26	0.0222
Age						
Under 1 year	1	9	-	-	-	-
1-4 years	6	55	1.57	0.58 - 3.42	-	-
5-9 years	2	18	-	-	-	-
10-14 years	1	9	-	-	-	-
15-17 years	1	9	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	10	91	0.64	0.31 - 1.17	-	-
Aboriginal or Torres Strait Islander	1	9	-	-	-	-
Remoteness						
Major cities	7	64	0.59	0.24 - 1.22		
Inner regional areas	2	18	-	-	-	-
Outer regional areas	2	18	-	-	-	-
Remote	0	0	-	-	-	-
Very remote	0	0	-	-	-	-
Socioeconomic status*						
Quintile 5 (highest)	4	40	0.99	0.27 - 2.53	-	-
Quintile 4	1	10	-	-	-	-
Quintile 3	2	20	-	-	-	-
Quintile 2	1	10	-	-	-	-
Quintile 1 (lowest)	2	20	-	-	-	-

* Socioeconomic status was not calculated in one case.

19.2.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2012, the rate of death of males from drowning was four times that of females. This is consistent with the over-representation of boys in drowning deaths over the past 15 years, as shown in table 64.

One of the children who drowned in 2012 was of Torres Strait Islander descent. This is a notable decrease from 2011, when seven Indigenous children drowned.

Table 64: Trends in drowning deaths of children by gender, 1998-2012, number and (Crude Mortality Rate)

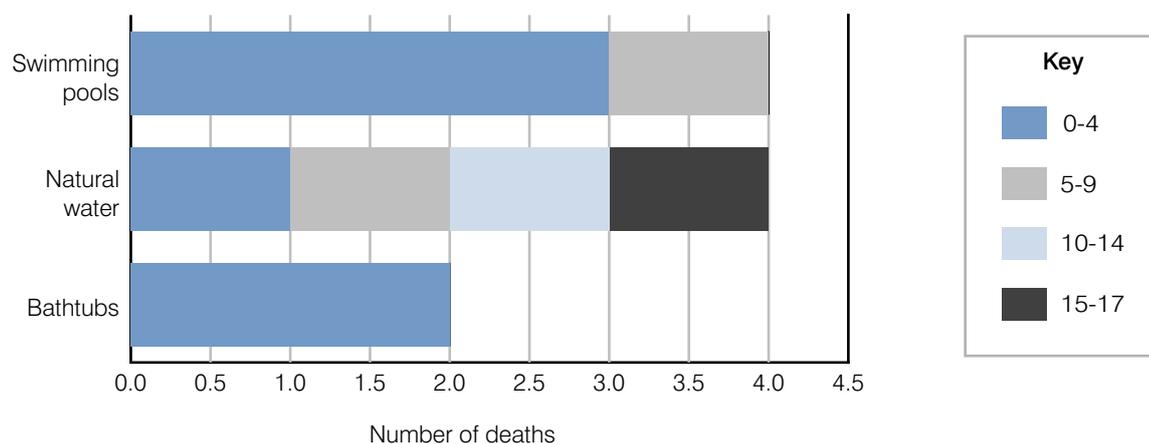
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Female	12 (1.6)	9 (1.2)	3 (0.4)	7 (0.9)	8 (1.0)	5 (0.6)	8 (1.0)	5 (0.6)	3 (0.4)	8 (1.0)	7 (0.8)	6 (0.4)	3 (0.4)	4 (0.5)	2 (0.3)	90
Male	14 (1.7)	23 (2.8)	17 (2.1)	11 (1.3)	21 (2.5)	17 (2.1)	8 (1.0)	5 (0.6)	12 (1.5)	10 (1.7)	14 (1.7)	6 (0.7)	11 (1.3)	13 (1.5)	9 (1.1)	191
Both	26 (1.6)	32 (2.0)	20 (1.2)	18 (1.1)	29 (1.8)	22 (1.4)	16 (1.0)	10 (0.6)	15 (0.9)	18 (1.1)	21 (1.3)	12 (0.7)	14 (0.9)	17 (1.0)	11 (0.7)	281

Consistent with previous years, the majority of the children who drowned in 2012 were very young. Almost two-thirds (7) were four years of age or younger, including four children who were one year of age or less.

As the Team has noted previously, age is strongly linked to the location of drowning in bathtubs and private swimming pools. In 2012, both children who drowned in bathtubs (2) were one year of age or younger, and the vast majority (3) of the four children who drowned in private swimming pools were younger than four years of age.

The age of children who have drowned in natural bodies of water tends to vary. In 2012, deaths from drowning in natural bodies of water occurred across all age groups.

Figure 6: Location of drowning fatality by age, 2012



19.2.2 Remoteness and socioeconomic status

In 2012, four of the 11 drowning deaths were children from families in areas of highest socioeconomic advantage, and seven out of the 11 drowning deaths occurred in a major city. These statistics do not follow any particular pattern over the last 15 years, and differ for statistics in 2011, and 2010.

19.2.3 Child protection history

Families of three of the 11 children who drowned had a child protection history. All three children drowned in swimming pools.

Within the three years prior to their death, two children had been the subject of a report of risk of harm or risk of significant harm to Community Services, and one child had siblings who were the subject of a report. The reported risks related to absconding behaviours of the children (2) and lack of supervision (1). Inadequate supervision was a factor in the deaths of each of these children.

19.3 Private swimming pools

In 2012, four children drowned in swimming pools. All of the deaths occurred in permanent in-ground pools. The children ranged from one to eight years of age.

Over the 15 years between 1998 and 2012, the number of swimming pool drowning deaths has ranged from four to 14 per year. The four deaths in 2012 represent the lowest number of swimming pool drowning deaths in 15 years.

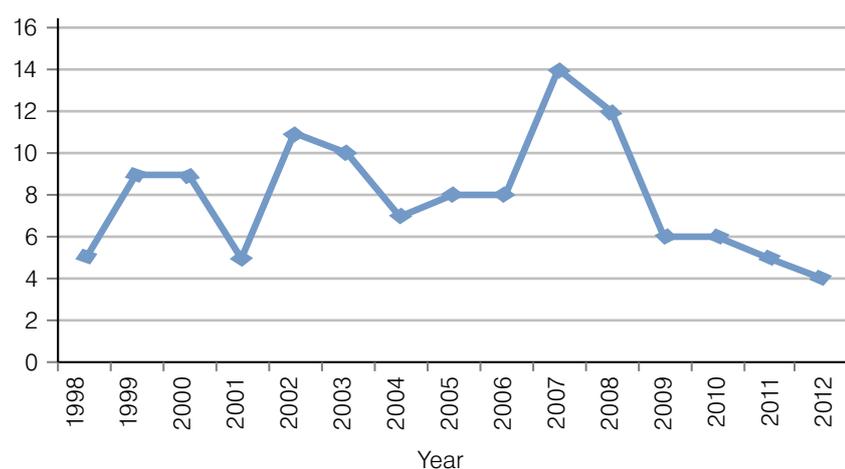
In 2012, half of the drowning deaths in private swimming pools occurred at the child's own residence. One child drowned in a pool at a family friend's residence, and one occurred at a neighbour's residence that was unfamiliar to the child.

In relation to access to the pools, one child was at an age where they were able to access the pool, one pool had a broken side gate, and two pools were unfenced.

All four children were out of sight of adults for periods ranging from five minutes to over an hour. The supervising adults of two children were occupied at the time of the fatality for a short period of time: one parent believed their child to be safe with another adult, and one parent was aware the child was in and around water without supervision.

Charges of manslaughter were laid and subsequently dropped in relation to one of the swimming pool deaths in 2012. The child had accessed the poorly fenced pool of a neighbour.

Figure 7: Swimming pool drowning deaths, 1998 - 2012



19.3.1 Factors associated with drowning in swimming pools and prevention measures

Children under the age of five are most at risk of drowning, and swimming pools located at the properties where children live or visit regularly pose the highest risks. Key factors in the drowning deaths of children in private swimming pools relate to the adequacy of adult supervision and the adequacy of pool barriers to prevent unsupervised access.

In 2013, the Coroner held an inquest into the death of a child in a private swimming pool in 2011, and made recommendations aimed at improving pool safety for children in foster care. The recommendations focused on the need for all care agencies in NSW to ensure that new foster carers at residences with swimming pools provide a certificate of compliance under the *Swimming Pools Act 1992* before being authorised as a carer; and that home visits conducted by providers involve monthly observations of the state of any swimming pool and its safety adherence.

In 2012, the NSW Government amended the *Swimming Pools Act 1992*. The amendments are intended to increase safety around backyard swimming pools, and to reduce drowning and near-drowning incidents by including new obligations, responsibilities and accountability for people with swimming pools. Key changes include requirements for:

- pool owners to register their pools on an online register by 29 October 2013
- pool owners to include a valid certificate of compliance¹⁴¹ or a relevant occupant certificate¹⁴² if they sell or lease their property from 29 April 2014, and
- local councils to develop a pool inspection program to ensure compliance with the *Swimming Pools Act*.

The NSW Swimming Pools Register opened on 29 April 2013. Royal Life Saving has started a public education campaign to ensure that the public understand their responsibilities in relation to the amended legislation, and there are implementation workshops for Council staff responsible for checking compliance.

In January 2013, the Australian Competition and Consumer Commission released the *Consumer Goods (Portable Swimming Pools) Safety Standard 2012* (Cth), which covers labelling requirements for portable swimming pools. The Standard comes into effect on 30 March 2014, and includes requirements to warn users that children have drowned in portable swimming pools, that there must be active arms-length adult supervision at all times, and that the pools should be drained and put away after use.¹⁴³

19.3.2 The Team's recommendations

Last year, following a 10-year review of swimming pool drowning deaths of children, the Team made eight recommendations to improve pool safety and compliance with requirements.

A key focus of the recommendations included the need for Councils to be able to identify properties with swimming pools

¹⁴¹ Pool owners can request the local council or an accredited certifier to inspect the pool for the purpose of obtaining a certificate of compliance. This certificate is valid for three years and states that the swimming pool is registered and complies with the requirements under the Act.

¹⁴² A relevant occupation certificate is an occupation certificate issued under the *Environmental Planning and Assessment Act 1979* that is less than three years old and that authorises the use of the swimming pool.

¹⁴³ Product Safety Australia 2013, *Portable Swimming Pools*, Canberra: Australian Competition and Consumer Commission: <http://www.productsafety.gov.au/content/index.phtml/itemId/998360>, accessed 9 July 2013.

where young children reside or regularly visit, in order to prioritise those premises for inspection. The Division of Local Government has indicated that Councils have access to demographic information that will assist them in assessing risk factors and prioritising inspections, and that it encourages Councils to target resources towards swimming pools used by young children. However, further information is required by the Team to ascertain the adequacy of the proposed measures for addressing the intent of the recommendations.

The Division of Local Government has advised that the Swimming Pools Regulations will give effect to the Team's recommendation that Councils be required to report annually on compliance with the requirements of the Swimming Pools Act. However, the timeframe for release of the Regulations has yet to be advised.

The Team also made recommendations aimed at ensuring the development of a comprehensive education and awareness campaign to accompany the amendments to the legislation, including strategies targeting lessees of rental properties. The Division of Local Government advised the Team of an ongoing campaign that is being conducted with Royal Life Saving Australia (NSW) and other stakeholder agencies, including the development of resources in 16 community languages and multimedia platforms. The Division has indicated that the next phase of the work will include the development of specific resources for lessees of public and private properties.

Recommendations

Department of Premier and Cabinet, Division of Local Government

9. In relation to targeting swimming pool inspection programs to pools at premises where children, particularly those under five years of age, reside or regularly visit, the Division of Local Government should:
 - (a) provide detailed advice to the Team as to the demographic information available to Councils that will enable them to identify and prioritise the inspection of the pools of these premises, and how the Division encourages Councils to target resources towards swimming pools used by young children, and
 - (b) provide a copy of the Division's guidelines to assist Councils to develop their pool inspection programs.
10. The Division of Local Government should advise the Team of the timeframe for issuing the Swimming Pools Regulations.
11. In relation to the development of targeted educational resources in relation to the Swimming Pools Act amendments and safety requirements, the Division of Local Government should provide detailed advice to the Team on progress with:
 - (a) the education and awareness campaign it is conducting with Royal Life Saving Australia (NSW) and other stakeholder agencies, and
 - (b) the development of specific resources for lessees of rental properties on the legal and safety requirements for installing an above-ground or inflatable pool at rented premises.

19.4 Natural bodies of water

Four children drowned in natural bodies of water, including ocean (2), an inland lake and a river. Environmental conditions contributed to each of the deaths, including strong tides and rips, low visibility, strong winds and turbulent water. Two of the deaths occurred in boating incidents, and two occurred during recreational swimming.

19.4.1 Boating

In 2012, two children drowned after boats capsized. In both cases, boating conditions were affected by strong winds and turbulent water. In one of the deaths, the turbulence of the water was related to recent rainfall and a dam release. The children were four and 13 years of age.

Office of Boating Safety and Maritime Affairs data indicates that, in the boating fatalities since 2000, less than five per cent of the people who drowned wore lifejackets.¹⁴⁴ Of the two children who drowned in boating incidents in 2012, one was wearing a personal flotation device, and was in the boat with other adults. The other child was not wearing a personal flotation device, and was self-supervising with a peer. Neither child was a strong swimmer.

¹⁴⁴ The Office of Boating Safety and Maritime Affairs 2012, *Boating Safety Communications & Education Strategy 2012-2015*, Sydney: Transport for NSW, <http://www.transport.nsw.gov.au/sites/default/files/b2b/publications/2012-15-boating-safety-communications-and-education-strategy.pdf>, accessed 16 July 2013.

19.4.2 Recreational activities

Two children drowned while they were swimming or playing with others in the ocean. Both were at beaches known to have strong rips. The children were eight and 15 years of age.

One child who was swimming with peers at a patrolled beach, but outside of the flagged area. At the time of the child's death, there were additional environmental factors of winds and an outgoing tide that contributed to minimal visibility in the water and hazardous conditions. The other child was swimming at a beach that was not patrolled at the time, and was intermittently supervised by adult family friends. The child was not a strong swimmer.

19.4.3 Factors associated with drowning in flood waters and prevention measures

Boating

The Team's reviews continue to highlight the risks associated with the absence of life jackets. Children have a higher likelihood than adults of being unable to cope once in difficulty in the water.

In November 2010, the rules governing the use of lifejackets on recreational vessels on NSW navigable waters were strengthened. Requirements include that children under the age of 12 must wear a lifejacket at all times in a vessel less than 4.8 metres.¹⁴⁵

Last year, the Team recommended that NSW Transport: Office of Boating Safety and Maritime Affairs (OBSMA) should provide advice about its strategies 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.

OBSMA advised that it has enforced sanctions for breaches, and has developed a *Boating Safety Education and Communication Strategy 2012-2015*, which includes a focus on wearing lifejackets. OBSMA reported that the strategy has seen the largest public awareness campaign for lifejackets, which ran from December 2012 to Easter 2013. The agency has linked to a range of stakeholders to promote life jackets use, and has funded the distribution of almost 5,000 life jackets.

Further information regarding OBSMA's response is provided in Chapter 23.3.

19.5 Rural waterways

In 2012, a young child died in an irrigation channel on a rural property. The child was with a sibling and friends, and was intermittently supervised. Unlike previous years, there were no drowning fatalities involving dams.

The Australian Centre for Agricultural Health and Safety (AgHealth) has noted that drowning is the number one cause of child farm fatality in Australia, and that children under five years are at greatest risk. 'Safe play' fenced areas on rural properties are promoted as a key child safety measure.¹⁴⁶ Farmsafe Australia has produced a resource package to inform carers of children on farms about safe play areas.¹⁴⁷

19.6 Bathtubs

The deaths of two children who drowned in bathtubs were registered in 2012. Both children were very young, and were dependant on adults for care. The children were at their family residence, and were not directly supervised by an adult at the time of the fatality.

One child had been placed in the bathtub by the carer, and the other child had been left to play with siblings and accessed the undrained bathtub without the knowledge of the carer. Available information indicates that both children were unsupervised for at least 10 minutes.

As shown in table 65, 21 children in NSW drowned in bathtubs in the 10 years to 2012. Almost three-quarters (15) of the children were under two years of age, and six children were four years of age or older. The older children were noted to have had epilepsy (3), cognitive impairment (2) and/or had a recent illness (2) at the time of the fatality.

145 NSW Marine Safety (General) Regulation 2009.

146 Australian Centre for Agricultural Health and Safety 2013, *Child safety on farms*, Moree NSW: University of Sydney. <http://www.aghealth.org.au/index.php?id=5049>, accessed 9 July 2013

147 Rural Industries Research and Development Corporation 2005, *Safe play areas on farms: A resource package, Version 2*, Barton ACT: RIRDC, http://www.aghealth.org.au/tiny_mce_fm/uploaded/fs_docs/Child%20Safety/aghealth_spa_booklet.pdf, accessed 16 July 2013.

Of the 15 children under the age of two years, just over half (8) were younger than 12 months. The vast majority (13) of the 15 children had been placed in the bath by their carer/adult supervisor, and were unsupervised at the time of the fatality. The other two children accessed bathtubs that contained water, without the carer's knowledge.

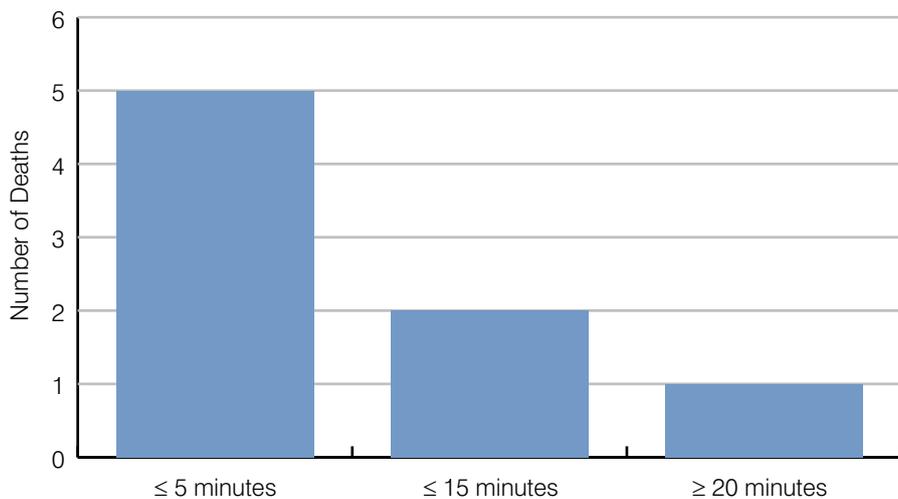
Table 65: Bathtub drowning deaths by age range, 2003-2012

Age range	Number of children
Under three months	2
3 months to under 6 months	nil
6 months to under 12 months	6
12 months to under 2 years	7
2-4 years	1
5-9 years	4
10-17 years	1
Total	21

Supervision was a relevant factor in all of the deaths of children under the age of two years who drowned in bathtubs in NSW in 2003-2012.

Information relating to the length of time children were unsupervised was available for eight children. As shown in the figure below, most (5) were unsupervised for less than five minutes.

Figure 8: Bathtub drowning deaths of children under two years of age, 2003-2012, length of time unsupervised



Reasons why parents or caregivers had left the child unattended included:

- preparation of food/formula (3)
- fell asleep in the bathroom (3)
- left child with sibling (3)
- went to the toilet (1), and
- gave child additional playtime in the bath (1).

Relevant factors in the above matters included that children were left with young siblings (aged 2-5 years), or had been left in a bath that was not completely drained of water. Alcohol was a factor in two of the three fatalities in which the carer fell asleep while in the bathroom with the child.

19.6.1 Factors associated with bathtub drowning, and prevention measures

Royal Lifesaving Australia reports that, on average, five children under the age of five drown and 47 are hospitalised due to bathtub drowning incidents in Australia each year. The majority of bathtub drowning deaths are of children less than two years old who were already in the bathtub when they drowned.¹⁴⁸

Prevention measures focus on ensuring constant and arms-length adult supervision of young children in the bath, and restricting access to bathtubs without supervision. Royal Lifesaving Australia's *Keep Watch @ Bath Time* resources provide clear guidance for carers on preventing bathtub drowning deaths. The resources include a checklist of actions carers should take, including having everything ready for bathing before entering the bathroom, and leaving the bathroom with taps turned off, plug removed, bathtub drained and door closed.¹⁴⁹

148 Royal Lifesaving Society Australia 2013, *Keep watch @ bath time*, Deakin, ACT: RLSA, <http://www.royallifesaving.com.au/programs/keep-watch-toddler-drowning-prevention-program>, accessed 9 July 2013.

149 Royal Life Saving Society Australia 2013, *Keep Watch @ Bath Time* (brochure), Deakin, ACT: RLSA, http://www.royallifesaving.com.au/__data/assets/pdf_file/0018/3942/KW_BathTime_A4toDL_final.pdf, accessed 9 July 2013.

Chapter 20. Deaths from other unintentional external causes

Transport fatalities and drowning consistently account for the majority of deaths of children in NSW from unnatural (external) unintentional causes. This chapter focuses on the deaths of children from other unintentional external causes, such as complications of surgery, falls and accidental poisoning.

Table 66 provides an overview of the key demographic characteristics of the 13 children who died as a result of other unintentional external causes in 2012.

Table 66: Key demographic and individual characteristics – deaths due to other external causes, 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	13	100	0.79	0.42 - 1.35		
Gender						
Female	6	46	0.75	0.28 - 1.63	-	-
Male	7	54	0.83	0.33 - 1.71	1.10	0.4325
Age						
Under 1 year	0	0	-	-	-	-
1-4 years	2	15	-	-	-	-
5-9 years	3	23	-	-	-	-
10-14 years	2	15	-	-	-	-
15-17 years	6	46	2.19	0.06 - 1.89	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	12	92	0.76	0.39 - 1.33		
Aboriginal or Torres Strait Islander	1	8	-	-	-	-
Remoteness*						
Major cities	8	67	0.68	0.29 - 1.34	-	-
Inner regional areas	3	25	-	-	-	-
Outer regional areas	1	8	-	-	-	-
Remote areas	0	0	-	-	-	-
Very remote areas	0	0	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	2	17	-	-	-	-
Quintile 4	2	17	-	-	-	-
Quintile 3	0	0	-	-	-	-
Quintile 2	2	17	-	-	-	-
Quintile 1 (lowest)	6	50	2.16	0.64 - 3.77	-	-

* Remoteness was not calculated in one case.

** Socioeconomic status was not calculated in one case.

The deaths of 13 children¹⁵⁰ in NSW from other unintentional external causes were registered in 2012:

- four children died from complications of surgery or underlying medical conditions, including two deaths associated with organ transplants
- three children died as a result of unintentional poisoning
- the deaths of two children were caused by accidental threats to breathing, including accidental asphyxiation and choking on food
- one child died following a fall from a tree-house during play
- one child died after being hit by a projectile during play
- one child died after being crushed by machinery at a workplace, and
- one child died in a household fire.

The deaths of two of these children are 'reviewable deaths' and will be reviewed separately by the Ombudsman. Both children were in care at the time of their death.

20.1 Demographic and individual characteristics

20.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2012, deaths due to other unintentional external causes occurred predominantly in the 15-17 year age group (6). Six of the children who died were female and seven were male.

This information is largely consistent with deaths from these causes in the last 15 years. In 1998-2012, two-thirds of the children who died from other unintentional external causes were male, and were mainly aged 1-4 years (27%) or 15-17 years (31%).

One child who died due to other unintentional external causes in 2012 was Aboriginal.

20.1.2 Residence, remoteness and socioeconomic status

Of the 13 children who died, 12 usually resided in NSW. One child normally resided overseas, but died while receiving medical treatment in NSW.

Most (8) of the children who died from unintentional external causes lived in major cities. The largest proportion of children (6) lived in areas in the lowest quintile of socioeconomic status.

20.1.3 Where the fatalities occurred

Most (8) of the fatalities occurred at, or in the near vicinity of, the child's home. The other fatalities occurred in hospital (3), a public place and a worksite.

20.1.4 Child protection history

In 2012, the families of five children (38%) who died from other unintentional external causes had a child protection history.

In the three years before their death, four children had been the subject of a report of risk of harm or risk of significant harm to Community Services. One child had a sibling who was the subject of a report to Community Services. Two of the families were also known to a Child Wellbeing Unit.

The nature of reported concerns for the children and/or their siblings varied. For three children, the concerns reported were not related to the risks or circumstances associated with their death.

For two young people, the concerns reported related to significant risk-taking or challenging behaviours, which in both cases was relevant to either the young person's death or other circumstances associated with their death. Reports related to ongoing problems with substance abuse, non-compliance with treatment, historical sexual abuse, violent behaviour, and/or mental health issues.

Two children and young people were in care at the time of their death.

¹⁵⁰ The 13 deaths reported for 2012 do not include four deaths of infants less than one year of age who died suddenly and unexpectedly from unintentional external causes, which have also been classified as explained SUDI. These deaths are discussed in detail in Chapter 15.

20.2 Deaths from complications of medical and surgical care

In 2012, four children died from complications arising from medical treatment or surgery for significant health problems. Two children were organ transplant recipients with substantial ongoing health issues and/or congenital disease. The other two children experienced complications linked to infections arising from long-term illnesses or spinal surgery.

All were older children or young people: two were aged 12-13 years, and two were 16 years old. Most (3) were female.

Following one death, the health service involved with the child conducted an internal review, which considered the child's presentation to the Emergency Department and subsequent management in hospital. The review identified areas for systems improvement, including recognition of paediatric sepsis, arrangements for Medical Emergency Team calls, and referrals involving Emergency and Paediatric services.

20.3 Deaths from unintentional poisoning

The deaths of three young people from unintentional poisoning were registered in 2012. Each of the deaths was associated with drug use: two deaths resulted from the combined effects of multiple drugs, and one child ingested a fatal level of a substance thought not to be toxic.

All three were aged 15-17 years. Two of the teenagers were male, and one was female. Information relating to the unintentional poisoning deaths of the three teenagers in 2012 is largely consistent with deaths from this cause over 15 years. During that time, 67 children have died as a result of unintentional poisoning. Three-quarters (51) of the children were aged 15-17 years, and just under two-thirds (42) were male.

20.3.1 Circumstances of death

Two of the young people who died from accidental poisoning in 2012 died from mixed drug toxicity associated with the use of narcotics and various psychoactive drugs. Both had taken multiple drugs, including opioids (such as methadone or morphine), benzodiazepines, and illicit drugs (such as heroin and/or cannabis). The deaths of the two young people resulted from the combined effects of the drugs, rather than a fatal level of a single drug.

Both of the young people had a background of substance use. One had been involved in a drug treatment program in the months prior to death.

The other young person died after ingesting a toxic quantity of a substance taken for recreational purposes. The young person had ingested multiple tablets of what was believed to be an illicit hallucinogenic drug. However, subsequent toxicology tests found that the ingested substance was a synthetic drug, '251-NBOMe'.

20.3.2 Factors associated with unintentional poisoning

The deaths of children from unintentional poisoning in 2012 reflect broader trends relating to the deaths of 15-17 year olds in NSW from this cause over 15 years. Key factors relate to adolescent risk-taking and experimentation, poly drug use, and vulnerable adolescents with a child protection history.

Risk-taking and experimentation

In 2012, all three unintentional poisoning deaths involved teenagers engaging in risk-taking behaviour.

Developmentally, adolescence is a time when many young people test and push boundaries, and experiment with adult or risk-taking behaviours.¹⁵¹ In the past 15 years, the vast majority (45) of the 51 deaths of children aged 15-17 years occurred in the context of adolescent experimentation.

Of the 51 children aged 15-17 years who died from unintentional poisoning in the past 15 years in NSW, three-quarters (38) died as a result of toxic levels of narcotics and/or psychoactive drugs. Almost two-thirds (31) of the adolescent accidental poisoning deaths involved illicit drugs, including heroin, methamphetamine, amphetamines, cocaine, MDMA (ecstasy), and cannabis.

The deaths of 15 adolescents resulted from an overdose of various drugs (such as methadone, benzodiazepines and antidepressants), alcohol, and/or over-the-counter medications such as paracetamol, opioid analgesics, and other easily

¹⁵¹ Australian Institute of Health and Welfare 2011. *Young Australians: their health and wellbeing 2011*. Cat. No. PHE 140, Canberra: AIHW, pp. 2, 30.

obtainable substances, such as aerosols and butane gas. In most cases, the drugs appeared to have been used by young people to become intoxicated or to offset the effects of stimulants such as amphetamines or cocaine.¹⁵² Information about how the young people obtained the medication was largely unavailable. In a small number of cases, the medication belonged to a family member or associate, and in one case the medication had been prescribed to the young person who died.

The 2010 National Drug Strategy Household Survey found that the use of pharmaceuticals for non-medical purposes by children and young people aged 14 years or older had increased between 2007 and 2010.

Poly drug use¹⁵³

For two of the young people who died from accidental poisoning, death resulted from the combined effects of the multiple drugs they used.

Notably, almost two-thirds (31) of the 51 young people who died from unintentional poisoning in 1998-2012 had engaged in poly-drug use (involving the use of two to five drugs). The combination of drugs typically involved both illicit and prescription drugs, such as heroin or amphetamines and benzodiazepines; or methadone, antidepressants and alcohol.

Poly-substance use is common among adolescents.¹⁵⁴ The likelihood of multiple drug toxicity is noted to be especially high with the use of more than one 'depressant' drug (those that act to slow down the activity of the central nervous system and messages between the brain and body).¹⁵⁵ Depressant agents include opioids (heroin, methadone), benzodiazepines (such as diazepam, oxazepam, and rohypnol), alcohol and cannabis. The effects of these drugs include sedation, muscle relaxation, and reduced anxiety.

In 1998-2012, just over half of the deaths of young people aged 15-17 years from accidental poisoning involved the use of multiple depressants, including two of the young people who died in 2012.

Vulnerability and child protection history

In 2012, two of the three teenagers who died from unintentional poisoning had an extensive child protection history, and a family background of abuse, neglect and childhood trauma. Both were highly vulnerable teenagers with complex and multiple high needs, including substance use, risk-taking behaviour, mental health concerns, criminal and/or anti-social behaviour and school issues.

Amongst the 51 adolescents aged 15-17 years who died from unintentional poisoning in 1998-2012, 59% (30) had complex and multiple needs, and had experienced substantial family dysfunction, childhood trauma and/or abuse. Records identified challenging behaviour and/or extensive contact with the criminal justice system, including, in some cases, periods in custody. Almost all were well known by agencies for their drug use; and many had a history of involvement in detoxification and rehabilitation programs. Over half (29) had a child protection history; seven were living in care at the time of their death.

20.3.3 Prevention measures

Substance use is determined by numerous, inter-related individual, family, social, environmental and other risk factors.¹⁵⁶ Research into adolescent substance abuse has found that maladaptive substance use is often part of a problem behaviour syndrome that includes delinquency, substance abuse, adolescent pregnancy, school failure and dropping out.¹⁵⁷ As a result, interventions that target single-risk factors or risk behaviours are unlikely to be effective.

Youth-specific alcohol and drug treatment services based on holistic treatment and harm-reduction principles are noted to be best suited to meet the needs of young people.¹⁵⁸ Key components include educational and vocational programs; practical assistance to address issues like homelessness; physical and recreational activities; integrated medical and psychological services; and family and peer programs.

A range of drug and alcohol and youth focused organisations currently provide useful information and resources on individual

152 In one case records indicate the prescription drugs present were prescribed to the young person who died.

153 'Poly-drug use involves: using two or more drugs at the same time or on the same occasion, or using two or more drugs within a certain period, but not necessarily at the same time'. Department of Education, Employment and Workplace Relations 2003, *Resilience Education and Drug Information (REDI), A Drug Information Resource for Australian School Communities*, Canberra: DEEWR.

154 NSW Centre for the Advancement of Adolescent Health 2008, *Adolescent Health: GP Resource Kit 2nd ed.*, Westmead, NSW: NSW CAAH, http://www.caah.chw.edu.au/resources/gpkit/Complete_GP_Resource_Kit.pdf, accessed 16 July 2013.

155 Australian Drug Foundation 2013, *Drug Facts – Alcohol and other drugs*, Melbourne: ADF <http://www.druginfo.adf.org.au>, accessed 16 July 2013.

156 Headspace 2013, *Substance use disorders*, Melbourne: National Youth Mental Health Foundation <http://www.headspace.org.au/what-works/research-information/substance-use>, accessed 16 July 2013.

157 Spooner C. Mattick R. & Howard J. 1996, *The nature and treatment of adolescent substance abuse*. National Drug and Alcohol Research Centre Monograph No. 26.

158 *Ibid.*

drugs, their effects, and treatment of substance abuse.¹⁵⁹ There are also numerous strategies and activities that target adolescent and young adult drug use, such as recent information and awareness campaigns on harm reduction in emergency and overdose situations involving illicit drugs; binge drinking and anti-social behaviour; and the impact of frequent cannabis use on lifestyle.¹⁶⁰ In June 2013, the Commonwealth Government announced that new headspace youth mental health services would open across the country to support young people dealing with mental health issues and substance abuse. Seven of the 15 new headspace centres will be located in NSW.

The use of pharmaceuticals (such as opioids and benzodiazepines) by young people, and the risks associated with mixing drugs, are two areas that may warrant attention in future preventative campaigns.

The NSW Government is currently undertaking work aimed at developing and improving services to vulnerable young people. Recent key work, such as the *Better Outcomes for Vulnerable Teens*¹⁶¹ review undertaken by the Department of Family and Community Services, identify the need to shift to a person-centred, place-based approach to support. Key directions include working towards whole-of-government and community strategies, developing opportunities to intervene early in vulnerability, strengthening supports, and improving system capacity. Ongoing reform in this area will be closely monitored by the NSW Ombudsman.

The Team's recommendations

Last year, the Team noted that two children had died (in 2010 and 2011) after accessing and ingesting prescription medication, and directed recommendations to the Clinical Excellence Commission aimed at improving child-resistant safety measures relating to medications.

In response to the Team's recommendations, the Clinical Excellence Commission reviewed the capacity of the iPharmacy software, and designed a specific warning code 'KIDCAP' to identify medicines requiring a child-resistant closure. The Commission advised that the required label changes would take place across NSW over the second half of 2013.

The Commission also advised of other actions that would be taken to improve practice and awareness of child-resistant safety measures, including providing information to pharmacies, updating a Health policy directive, and issuing an information bulletin alerting health services staff to the required changes.

20.4 Threats to breathing

In 2012, two children died from unintentional asphyxia.¹⁶² The children were aged between one and four years old. Both were in the care of a parent when the fatality occurred, and died as a result of restricted breathing in incidents associated with the child's very young age – choking on a small item of inhaled food, and becoming wedged in a gap between a wall and bed.

20.4.1 Factors associated with unintentional threats to breathing, and prevention measures

The two deaths in 2012 are consistent with previous threat to breathing deaths involving young children, and reinforce the need for community messages regarding safe sleeping and keeping home environments free of potential choking hazards.¹⁶³

Over the past 15 years, 83 children less than five years of age have died in accidental asphyxia-related incidents, including unintentional suffocation and strangulation. The vast majority (68) of these children were less than two years of age.

The highest risk of unintentional asphyxia for very young children is related to their bedding and sleep environment, followed by situations where children accidentally inhale or ingest something that causes respiratory obstruction. Strategies to prevent such accidents occurring include ensuring that children are placed for sleep in suitable environments such as cots; and ensuring that children cannot access choking hazards as they become mobile and explore things by putting them in their mouth. Chapter 15 provides a more comprehensive discussion in relation to these issues.

159 Organisations include the Australian Drug Information Network, Australian Drug Foundation, Centre for Youth Drug Studies, Youth Substance Abuse Service, National Drug & Alcohol Research Centre, Youth NSW, Australia's National Youth Mental Health Foundation – *Headspace*, and the Australian Institute of Health and Welfare.

160 NSW Ministry of Health campaigns: Club Drugs – Don't let drugs use you; What Are You Doing to Yourself?; and The Cannabis Campaign. <http://www0.health.nsw.gov.au/mhdao/campaigns.asp>, accessed 16 July 2013.

161 NSW Department of Family and Community Services 2012, *Better Outcomes for Vulnerable Teens – FACS Review*, Sydney: FACS.

162 As noted previously, the deaths of an additional four children under one year in 2012 have been classified as explained SUDI. These deaths are discussed more fully in Chapter 15.

163 Information for parents and caregivers about strategies to prevent suffocation and strangulation in the home environment are published by organisations such as Kidsafe SA Inc.

Chapter 21. Suicide

The deaths of 16 young people registered in NSW in 2012 were suicides. After transport fatalities, suicide was the second leading cause of death for young people aged 15 to 17 years, as was also the case in 2011 and 2010.

NSW Health estimates that for each suicide in NSW, there are 30 to 40 hospitalisations following suicide attempts each year. This information is based on hospital admissions only, and it is likely there are many more suicide attempts that are excluded from this calculation.¹⁶⁴ Suicide rates in NSW are higher for young males,¹⁶⁵ while young women are three times more likely to be hospitalised for self-harm than young men.¹⁶⁶

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 had 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 the indicators include evidence of prior suicide attempts, expressions of suicidal ideation and/or a history of self-harming behaviour. The Team has consistently used this approach in reporting suicide.¹⁶⁷

Of the 16 deaths of young people reported here, the Coroner has determined that seven were the result of suicide. In five cases, the Coroner has dispensed with an inquest without recording findings regarding manner of death. At the time of writing, four cases are still open with the Coroner.

The suicide of one young person is also 'reviewable' by the Ombudsman as the young person was in care at the time of their death.

In this chapter, the terms 'young person' and 'young people' are used, regardless of the age of the child.

21.1 Trends in suicide deaths of young people in NSW 1998-2012

As detailed in table 67 below, the child death register includes 245 suicides over the 15 years from 1998 to 2012. There has been no apparent change in the suicide rate over recent years.

Table 67: Trends in deaths due to suicide by gender – number and (Crude Mortality Rate) 1998-2012

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Male	13 (1.6)	8 (1.0)	10 (1.2)	12 (1.5)	13 (1.6)	12 (1.5)	9 (1.1)	14 (1.7)	6 (0.7)	11 (1.3)	8 (1.0)	14 (1.7)	9 (1.1)	13 (1.5)	9 (1.1)	161
Female	2 -	13 (1.7)	8 (1.0)	5 (0.8)	6 (0.8)	6 (0.8)	7 (0.9)	6 (0.8)	2 -	4 (0.5)	5 (0.6)	4 (0.5)	5 (0.6)	4 (0.5)	7 (0.9)	84
Total	15 (0.9)	21 (1.3)	18 (1.1)	17 (1.1)	19 (1.2)	18 (1.1)	16 (1.0)	20 (1.2)	8 (0.5)	15 (0.9)	13 (0.9)	18 (1.1)	14 (0.9)	17 (1.0)	16 (1.0)	245

21.2 Demographic and individual characteristics

Table 68 below 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 2012.

¹⁶⁴ NSW Department of Health 2010, *NSW Suicide Prevention Strategy 2010-15*, Sydney: NSW DH, p. 10.

¹⁶⁵ Australian Institute of Health and Welfare 2011, *Young Australians: Their health and wellbeing 2011*, cat. no. PHE 140, Canberra: AIHW, p. 33.

¹⁶⁶ NSW Department of Family and Community Services 2013, *Women in NSW 2013*, Sydney: FACS, p. 40.

¹⁶⁷ NSW Child Death Review Team, 2010, *Annual Report 2009*, Sydney: NSW Commission for Children and Young People, p. 141.

Table 68: Key demographic and individual characteristics – deaths of young people due to suicide, in 2012

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	16	100	0.97	0.56 - 1.58		
Gender						
Female	7	44	0.88	0.35 - 1.81	-	-
Male	9	56	1.07	0.49 - 2.02	1.22	0.352
Age						
Under 1 year	0	0	-	-	-	-
1-4 years	0	0	-	-	-	-
5-9 years	0	0	-	-	-	-
10-14 years	2	13	-	-	-	-
15-17 years	14	88	5.10	2.79 - 8.56	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	12	75	0.76	0.39 - 1.33	-	-
Aboriginal or Torres Strait Islander	4	25	5.62	1.53 - 14.39	7.36	0
Remoteness						
Major cities	5	31	0.42	0.14 - 0.99	-	-
Inner regional areas	7	44	2.06	0.83 - 4.25	-	-
Outer regional areas	2	13	-	-	-	-
Remote	2	13	-	-	-	-
Very remote	0	0	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	3	19	-	-	-	-
Quintile 4	4	25	1.37	0.37 - 3.51	-	-
Quintile 3	4	25	1.44	0.39 - 3.69	-	-
Quintile 2	4	25	1.15	0.35 - 3.32	-	-
Quintile 1 (lowest)	1	6	-	-	-	-

21.2.1 Age and gender

Nine of the 16 suicide deaths registered in NSW in 2012 were male and seven were female. Males had a slightly higher rate of death than females; however, this difference was not significant. There were more deaths of females attributed to suicide in 2012 than there had been since 2004.

The young people who died as a result of suicide in 2012 were aged between 13 and 17 years; the majority (14) were 15 years and older. As indicated in the table below, since 1998, two-thirds of young people who died as a result of suicide in NSW were 16 or 17 years of age.

Table 69: Trends in suicide deaths of young people by age, 1998-2012 – number and per cent

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Number (%)
10 years	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1 (<1)
11 years	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2 (<1)
12 years	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	4 (2)
13 years	2	1	1	1	0	1	0	1	1	2	0	0	0	0	1	11 (4)
14 years	0	4	1	0	2	2	4	0	0	1	3	0	1	3	1	22 (9)
15 years	1	5	3	3	2	1	2	4	0	3	1	3	3	7	4	42 (17)
16 years	3	3	5	6	6	6	6	3	3	2	5	7	3	5	3	66 (27)
17 years	8	8	8	6	9	7	2	11	3	7	4	8	7	2	7	97 (40)
Total	15	21	18	17	19	18	16	20	8	15	13	18	14	17	16	245 (100)

21.2.2 Aboriginal and Torres Strait Islander status

There were more young people of Aboriginal or Torres Strait Islander descent who died as a result of suicide in 2012 (4) than in 2011 (2).

21.2.3 Remoteness and socioeconomic status

The majority of the suicide deaths in 2012 occurred in major cities and inner regional areas (12 of 16). There were more deaths in inner regional areas in 2012, in contrast with 2011, when there were more in major cities. There was no apparent pattern in the socioeconomic status of the young people who died as a result of suicide in 2012.

21.2.4 Child protection history

Of the 16 young people who died as a result of suicide in 2012, the families of 11 had a child protection history. This is considerably higher than the proportion in 2011, when the families of four young people who died as a result of suicide had a child protection history.

Within the three years prior to their death, the 11 young people had been the subject of a report of risk of harm or risk of significant harm to Community Services. The nature of reported issues for five of the 11 young people concerned risk of suicide and/or concerns relating to the young person's mental health. The majority of the young people with a child protection history had been the subject of reports concerning their drug and/or alcohol use.

21.2.5 Education and employment circumstances

The majority (11) of the young people were enrolled and attending school. One young person was not attending school due to absenteeism and difficulties finalising enrolment.

The majority (11) had experienced some stress associated with schooling or education, including bullying, behavioural problems, academic failure and a history of suspensions/expulsion from school (see also section 21.4.6).

Two young people were no longer enrolled in school and were not employed or engaged in any further education or training program. Two other young people had become unemployed in the weeks prior to their death.

21.2.6 Usual residence

The majority (10) of the 16 young people lived at home with at least one birth parent; four of the young people lived with both birth parents. Two young people were living with other relatives.

Two young people were residing with the families of friends and one other young person had been moving between friends and family. One young person was living independently.

21.2.7 Place of fatality

Of the 16 young people who died from suicide, half died at their family home or other usual place of residence. Six young people were found in public places and another two young people died at the home of a friend.

21.3 Intent and precipitating factors

21.3.1 Stated or inferred intent

Just over half (9) of the young people who died as a result of suicide documented their intent to do so. The most common documentation was a note or a letter (6). Other documentation included messages of suicidal intent posted on a social networking website; text messages, and, for two young people, the recording of a video diary. Often, the young person used more than one medium of communication.

Another six young people had previously raised the subject of suicide, made suicide threats or attempts, experienced suicidal ideation and/or engaged in self-harming behaviour. For three of these six young people, suicidal threats and/or expressions of a desire to die occurred on the same day as the suicide incident.

21.3.2 Precipitating events

Research indicates that stressful and traumatic events, including interpersonal conflict, can serve as tipping points for young people already experiencing other risk factors of suicide.¹⁶⁸

For deaths in 2012, records indicate possible precipitating events for half (8) of the suicides. For most (7), this included a relationship breakdown with a boy/girlfriend. Other events involved an argument with a close friend or family member, and problems with schooling and future education opportunities.

21.4 Risk factors associated with suicide

There are a range of interrelated biological, social and psychological risk factors associated with suicidal behaviour. These include:

- mental health conditions, such as depression, anxiety disorders, personality disorders and behavioural disorders;¹⁶⁹
- history of suicidal behaviour;^{170, 171}
- substance misuse;¹⁷²
- childhood trauma, including abuse or neglect;¹⁷³
- adverse circumstantial factors, primarily interpersonal or personal stressors;¹⁷⁴ and
- issues related to sexual identity, particularly social experience of sexual identity.¹⁷⁵

Many of these factors are not uncommon among the general population, and suicide among young people has been noted to be sometimes an impulsive act.¹⁷⁶

Suicide Prevention Australia notes that suicide is complex, and generally results from a combination of several individual, social and contextual risk factors; and for young people the grouping of these factors poses the greatest risk.¹⁷⁷

As illustrated in the table below, for the 16 suicide deaths in 2012:

- All 16 young people experienced at least one risk factor associated with suicide. The majority (14) experienced multiple risk factors, the most frequent being mental health issues, previous suicidal behaviour and/or self-harm, substance misuse and a variety of interpersonal or personal stressors.
- Interpersonal or personal stressors were present for all except one young person; with most experiencing a combination of stressors including educational, social, peer, family, personal or other relationship difficulties.
- The majority (13) of young people had experienced mental health issues; either formally diagnosed mental illness or undiagnosed mental health problems. All except one of the 13 young people received some form of treatment, assessment or mental health support in the year before their death.
- The majority (12) of the young people exhibited prior suicidal or self-harming behaviours, or prior suicidal thoughts and/or discussions.

168 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney: SPA, p. 3.

169 NSW Department of Health 2010, *NSW suicide prevention strategy 2010-15*, Sydney: NSW DH, p. 13.

170 History of suicidal behaviour refers to a previous suicide attempt and non-suicidal self-harm.

171 NSW Department of Health 2010, *op. cit.*, p. 14.

172 Suicide Prevention Australia 2011, *Position statement: alcohol, drugs and suicide prevention*, Sydney: SPA.

173 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney: SPA, p. 5.

174 *Ibid.*

175 Plöderl M. Wagenmakers E. J. Tremblay P. Ramsay R. Kralovec K. Fartacek C. & Fartacek R. 2013, *Suicide Risk and Sexual Orientation: A Critical Review*. Archives of Sexual Behavior, In Press (doi: 10.1007/s10508-012-0056-y).

176 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*, Canberra: SCHA, p. 13.

177 Suicide Prevention Australia 2010, *op. cit.*, p. 4.

Table 70: Risk factors for suicide, 2012

	Mental illness or undiagnosed mental health conditions	Previous suicidal behaviour and self-harm	Substance misuse	Difficult family circumstances	Difficulties associated with school, education or employment	Difficult peer relationships, including bullying	Difficult close personal relationships, including relationship breakdown	Psychosocial issues, self-esteem, body image, social isolation	Criminal/anti-social behaviour	Childhood trauma	Total
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	8	
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	8	
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	
5	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	
7	✓	✓	✓	✓	✓	✓	✓	✓	✓	7	
8	✓	✓	✓	✓	✓	✓	✓	✓	✓	6	
9	✓	✓	✓	✓	✓	✓	✓	✓	✓	6	
10	✓	✓	✓	✓	✓	✓	✓	✓	✓	6	
11	✓	✓	✓	✓	✓	✓	✓	✓	✓	4	
12	✓	✓	✓	✓	✓	✓	✓	✓	✓	4	
13	✓	✓	✓	✓	✓	✓	✓	✓	✓	2	
14	✓	✓	✓	✓	✓	✓	✓	✓	✓	2	
15	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	
16	✓	✓	✓	✓	✓	✓	✓	✓	✓	1	
Total	13	12	7	13	11	7	7	6	4	5	

21.4.1 Mental illness

Nine of the 16 young people had been diagnosed with a mental illness.

The range of diagnosed mental illnesses included depression, anxiety, post-traumatic stress disorder (PTSD), oppositional defiance disorder (ODD), attention deficit hyperactivity disorder (ADHD), adjustment disorder, conduct disorder and alcohol dependence. All of the nine young people either had multiple mental health diagnoses and/or exhibited signs of other mental health concerns in addition to the primary diagnosis.

Depression was the most commonly diagnosed mental illness. For the six young people, depression was one of a number of mental illnesses diagnosed. Two other young people exhibited signs of depression in addition to their primary mental illness diagnoses.

Four of the nine young people with a diagnosed mental illness had previously attempted suicide and deliberately self-harmed. Four other young people had threatened and/or discussed suicide; three of these four young people had also engaged in self-harming behaviour.

Eight of the nine young people with a diagnosed mental illness also had a history of substance misuse.

Treatment

Eight of the nine young people with a mental illness received outpatient treatment from health professionals in the 12 months prior to their death.

Treatment was provided by general practitioners, psychologists, psychiatrists, Child and Adolescent Mental Health Services (CAMHS), counsellors and other community mental health providers. The young person who had not received any mental health support was transient during the 12 months prior to their death.

One young person with a diagnosed mental illness had presented to a hospital emergency department twice in the 12 months prior to their death. Records indicate the young person was brought into hospital on both occasions under schedule threatening self-harm and/or suicide, and demonstrating self-harming behaviour. Research indicates that young people brought into emergency departments in relation to suicide attempts and other self-inflicted injuries are at risk of further suicide attempts, with more lethal methods.¹⁷⁸

Four of the young people receiving mental health treatment were prescribed medication. All four young people had been prescribed selective serotonin reuptake inhibitor (SSRI) antidepressant medication at some time in the 12 months prior to their death.

One young person was taking SSRI medication in the period immediately preceding their death and another young person had ceased taking the SSRI and commenced on serotonin and norepinephrine reuptake inhibitor (SNRI) medication one month prior to their death. For two young people, the records are unclear as to whether they were taking the prescribed medication immediately prior to their death.

All four young people prescribed medication were referred to a counselling/psychological service in conjunction with antidepressant medication and as part of a mental health care plan. This is in line with Beyondblue Clinical practice guidelines for treating depression. The degree of engagement with counselling and therapy by the young people was varied. One young person did not regularly attend therapy sessions during the medication period and another young person who attended an initial appointment declined further appointments.

The Beyondblue Clinical practice guidelines note that '*prescription of an SSRI must occur within the context of an ongoing therapeutic relationship and management plan*' and '*young people must be provided with information on adverse effects (including the possibility of emergence or escalations of suicidal thinking) and the need for ongoing monitoring during treatment*'.¹⁷⁹ The guidelines also emphasise that caution is required when prescribing antidepressant medication for young people with depression. The guidelines indicate that the use of antidepressants in adolescents may be appropriate when depression is moderate or severe.

Headspace indicates that it is essential that young people experiencing a depressive disorder are engaged with good clinical care, and that, irrespective of treatment chosen, close monitoring of symptoms or side effects (if medication is prescribed) is imperative.¹⁸⁰

178 Hughes J. & Asarnow J. 2013, *Enhanced mental health interventions in the emergency department: Suicide and suicide attempt prevention*, Clinical Pediatric Emergency Medicine, 14(1): 28-34.

179 Beyondblue: The National Depression Initiative 2010, *Clinical practice guidelines: depression in adolescents and young adults*, Melbourne: Beyondblue, p. 57.

180 Headspace 2012, *Evidence summary: using SSRI antidepressants to treat depression in young people: what are the issues and what is the evidence? Version 2*, Melbourne: National Youth Mental Health Foundation.

21.4.2 Undiagnosed mental health concerns

In addition to the nine young people with a diagnosed mental illness, records show that four young people displayed signs of poor mental health. The range of mental health issues observed in the four young people included depression, anxiety, suicidal threats and/or thoughts, self-harming behaviour, mood instability and disordered eating behaviours.

All four young people had contact with health professionals concerning their mental health in the 12 months prior to their death. These included general practitioners, psychologists, Child and Adolescent Mental Health Services (CAMHS), and school or other counsellors. Three of the young people had received counselling and the other person was referred to a psychologist, however declined to attend. One young person presented to hospital emergency departments on numerous occasions regarding mental health concerns and self-harming behaviours.

Three of the 16 young people had no mental health concerns identified before their death.

21.4.3 Previous suicidal behaviour and self-harm

A previous suicide attempt is considered to be the strongest predictor of a future suicide attempt or suicide.¹⁸¹

In 2012, over one-third of the young people whose deaths were due to suicide (6) had previously attempted suicide. Records indicate that at least two of the young people had previously attempted suicide on more than one occasion. An additional five young people had previously made suicide threats or discussed suicide.

Self-harming behaviour is frequently related to stress reduction, inflicting self-punishment or the signalling of personal distress to others; and there may be no suicidal intent.¹⁸² However research indicates that people who engage in self-harming behaviours are at higher risk of suicide than those who do not.¹⁸³

The majority (10) of young people who previously attempted suicide, made suicide threats or discussed suicide had also engaged in self harming behaviour.

For one-quarter (4) of the 16 young people who died due to suicide in 2012, there was no history of prior self harm or suicidal ideation, from the information available.

21.4.4 Substance misuse

Substance abuse can increase the risk of suicide for young people.¹⁸⁴ Research indicates that cannabis use has been linked to suicidal behaviour; and depression with alcohol abuse has been associated with increased suicidal behaviour.¹⁸⁵

In 2012, almost half (7) of the 16 young people had a history of substance misuse, most commonly cannabis and alcohol use. Records indicate that two of the seven young people solely used cannabis. The other five used cannabis in conjunction with alcohol and/or other substances including amphetamines, prescription drugs and 'petrol sniffing'.

One young person had a provisional diagnosis of substance abuse disorder and had undertaken drug and alcohol counselling. One other young person had attended counselling for substance misuse and treatment had been suggested for a further two young people.

The vast majority (6) of the young people who had a history of substance misuse also had a mental illness or undiagnosed mental health issue. Five young people had either a diagnosis or displayed some signs of depression and/or anxiety.

More than half (9) of the young people who died as a result of suicide in 2012 had no reported substance misuse issues.

21.4.5 Childhood trauma

Adverse and traumatic events in childhood can be precipitating factors in youth suicide attempts or suicides.¹⁸⁶ In particular, bullying, physical abuse, sexual abuse and family violence have been associated with suicide attempts.¹⁸⁷

From the available information, five young people had experienced childhood trauma. Reported childhood trauma included exposure to family violence, physical abuse, sexual harm and the suicide of a parent.

181 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney: SPA, p. 5.

182 Wilkinson P. & Goodyer I. 2011, *Non-suicidal self-injury*, *European child and adolescent psychiatry*, 20(2): 103-108.

183 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney: SPA, p. 5.

184 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney: SPA, p. 4.

185 *Ibid.*

186 Suicide Prevention Australia 2010, *op. cit.*, p. 5.

187 *Ibid.*

21.4.6 Interpersonal and personal stressors

The vast majority (15) of the 16 young people who died as a result of suicide in 2012 had experienced, or were currently experiencing, one or more interpersonal or personal stressors. These included:

- family difficulties, such as conflict with parents and/or other family members, family discord and parents' divorce/separation (13)
- difficulties associated with school, education and/or employment (11)
- difficult peer relationships, including arguments with friends and bullying (7)
- difficulties with close personal relationships, including arguments or relationship breakdowns with boy/girlfriends (7)
- psychosocial issues, such as poor self-esteem, body-image problems and social isolation (6)
- criminal and/or anti-social behaviour (4), and
- a recent health problem/injury (2).

The majority (13) of the young people experienced a combination of interpersonal and/or personal stressors. The most common stressors were difficulties associated with family circumstances, education and employment, and peer related problems.

Family circumstances

Family conflict, familial discord and parental divorce or separation has been associated with an increased risk of suicide for young people.^{188, 189} In 2012, 13 young people who died as a result of suicide experienced familial difficulties. Family difficulties included arguments with parents/carers, arguments with siblings, strained relationships between parent/s and young people, parental divorce/separation, exposure to family violence and estrangement from parents.

Research indicates that family conflict may present as a trigger event in conjunction with other suicide risk factors.¹⁹⁰ Records indicate that 12 of the 13 young people experienced additional interpersonal or personal stressors in conjunction with family difficulties.

Education, school and employment issues

The majority (11) of the young people had experienced some stress associated with schooling or education. Chronic absenteeism was an issue for four young people, and two young people were no longer enrolled in school at the time of their death following periods of disengagement and behavioural problems. For other the other five young people, school related stress was associated with bullying, behavioural problems, academic failure and a history of suspensions/expulsion from school. One young person experienced stress associated with a recent rejection from an education/employment program.

The NSW School-Link Initiative is a collaborative initiative between NSW Health and the Department of Education in order to improve the mental health of children and young people in NSW. This program is aimed to improve prevention, treatment and support for young people experiencing mental health problems. From available records, four young of the young people who died as a result of suicide in 2012, had contact with their school counsellor. Five other young people received some support at school and/or were referred to external support programs for behavioural or absenteeism issues.

Research indicates that young people affected by bullying are at increased risk of suicidality and young people with multiple roles (victim, bully, and bystander) are significantly more likely experience suicidal thoughts.¹⁹¹

NSW Education and Communities *Bullying: Preventing and Responding to Student Bullying in School Policy* stipulates that all students experience school free from the fear of bullying, harassment and anti-social behaviour, and in a secure, ordered and supportive environment.¹⁹² Schools are required to have individual anti-bullying plans that comply with the policy. The plans must be revised at least every three years, and need to reflect emerging issues such as cyber bullying.¹⁹³

Records show that six young people who suicided were subject to bullying; two of these young people were reportedly bullies as well as victims. All six young people were bullied in the school environment, with three of the six young people also bullied over the internet.

188 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney: SPA, p. 6.

189 Australian Institute of Health and Welfare 2011, *Young Australians: Their health and wellbeing 2011*, cat. no. PHE 140, Canberra: AIHW, p. 33.

190 Suicide Prevention Australia 2010, *op. cit.*

191 Rivers I. & Noret N. 2010, *Participant roles in bullying behaviour and their association with thoughts of ending one's life*, *Crisis*, 31(3): 143-148.

192 NSW Department of Education and Communities 2011, *Bullying: preventing and responding to student bullying in schools guidelines*, Sydney: NSW DEC, p. 3.

193 NSW Department of Education and Communities 2011, *op. cit.*

21.5 Prevention measures

As previously noted, suicide is a complex problem, and generally results from a combination of individual, social and contextual risk factors.¹⁹⁴ For young people, the greatest risk arises when there is a grouping of these risk factors.¹⁹⁵

The *NSW Suicide Prevention Strategy 2010-2015* details the NSW Government's directions and proposed outcomes for suicide prevention in NSW.¹⁹⁶ The strategy aligns with the national suicide prevention framework: *Living Is For Everyone*, and provides the basis for a coordinated, whole-of-government approach. Actions that are specifically targeted to children and young people include:

- the continued development and implementation of early childhood and school-based programs promoting resilience and providing support for children and young people to help reduce the risk of suicide (such as the School-Link program),¹⁹⁷ and
- development of multi-media resources to target young people and provide support and information for those affected by suicide.¹⁹⁸

The first report of agencies' progress against the strategy's implementation plan was released in August 2012.¹⁹⁹ The progress report details new School-Link initiatives, including a strategic review of the School-Link program and a School-Link DVD training program aimed at enhancing skills in the recognition, intervention planning, treatment, support and prevention of mental health problems in children and young people.²⁰⁰ A number of local School-Link initiatives are underway.

The Team's recommendations

Since 2010, the Team has monitored progress on three recommendations directed to NSW Health in relation to the NSW Suicide Prevention Strategy. The recommendations, published in the Team's *Annual Report 2009*, focused on making use of new media to deliver prevention services to young people, developing resources to educate young people on the importance of passing on suicide risk concerns about peers, and increasing collaboration between schools and youth mental health services.

NSW Health supported the recommendations and advised the Team of a range of strategies in place to meet them, including a 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', by 2011/2012.²⁰¹ To progress this, and to inform the development of the communication strategy, a suicide prevention market research project was undertaken (to identify and review new media and social media initiatives promoting suicide prevention for young people). The market research project 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 commitment in the Suicide Prevention Strategy – community guidelines for discussing suicide – was being finalised. The Ministry advised that the guidelines would set down key messages that would be incorporated into the social marketing project, which was anticipated to proceed in 2013.

The Ministry of Health also advised the Team that the evaluation of the outcomes of the NSW Suicide Prevention Strategy would start in 2012/13.

Last year, the Team recommended that the Ministry of Health should progress the proposed development of the social marketing campaign and new media resources for suicide prevention in 2013. The recommendation focused on specific aims to:

- develop multimedia and new media resources targeting young people and providing support and information to those affected by a suicide or suicide attempt; and

194 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney: SPA, p. 4.

195 Suicide Prevention Australia 2010, *op. cit.*

196 NSW Department of Health 2010, *NSW Suicide Prevention Strategy 2010-2015*: Sydney: NSW DH, p. 1.

197 NSW Department of Health 2010, *NSW Suicide Prevention Strategy Implementation Plan 2010-2015*, Sydney: NSW DH, p. 10.

198 NSW Department of Health 2010, *op. cit.*, p. 21.

199 NSW Ministry of Health 2012, *First Progress Report of the NSW Suicide Prevention Strategy 2010-2015*, Sydney: NSW Health, http://www0.health.nsw.gov.au/pubs/2012/suicide_prevent_strat.html, accessed 1 July 2013.

200 NSW Ministry of Health 2012, *NSW Suicide Prevention Strategy 2010-2015 First Progress Report September 2010 – March 2012*, Sydney: NSW Health, p. 10.

201 NSW Department of Health 2010, *NSW Suicide Prevention Strategy Implementation Plan 2010-2015*, Sydney: NSW DH, p. 21

-
- 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.

Health has advised that the proposed development of awareness-raising multimedia resources for young people has been superseded by the Ministry contracting the Hunter Institute of Mental Health to develop broader suicide prevention online resources, *Conversations Matter*.

The resources aim to raise community awareness of how to communicate safely and without harm about suicide, and will provide specific advice for particular target populations (including schools, families and community). This includes broad conversations about suicide and its prevention (intervention-focused) and conversations that occur following a suicide death (postvention-focused).

Advice has been sought on the needs of children and young people in talking about suicide from a range of agencies, including the Commission for Children and Young People, Headspace, and MH-Kids.

Health has indicated that future activity in this area is to be guided by work currently underway by the NSW Mental Health Commission to develop an implementation plan that will guide work to prevent and/or reduce suicide, as well as the Strategic Plan for Mental Health.

The Team will monitor the progress of the Ministry of Health's work in relation to *Conversations Matter*, and will meet with the NSW Mental Health Commission to discuss the development and scope of relevant strategic and implementation plans targeting the prevention of suicide deaths of young people, and broader work to evaluate the outcomes of the NSW Suicide Prevention Strategy.

Recommendations

Ministry of Health

- 12. The Ministry of Health should provide detailed advice to the Team on the progress of the project to develop resources to support safe and effective discussion of suicide, *Conversations Matter*. The advice should include information about the intended approach of the project in relation to children and young people, and timeframes for completion.**

Chapter 22. Fatal assault

The deaths of four children registered in NSW in 2012 were the result of fatal assault.

In 1998-2012, 185 children in NSW died from injuries sustained in fatal assaults. The four deaths in 2012 comprise the smallest proportion of child deaths from fatal assault since the Team commenced in 1996. The number of deaths from assault is much lower than may have been expected based on the recent trend: for the past eight years, the number of deaths from this cause has ranged from eight to 14 per year.

However, as previously noted by the Team in its 2008 report on *Trends in the fatal assault of children in NSW: 1996-2005*, '[t]he number of deaths of vulnerable children appears to vary by chance, and caution needs to be exercised in drawing any conclusion... A drop in numbers for any particular year need not indicate an improvement, just as an increase in numbers in any particular year need not indicate a worsening: rather they reflect the erratic nature of such deaths.'²⁰²

Due to the small number of fatal assault deaths in 2012, we have exercised caution in describing the circumstances of these deaths.

22.1 Demographic and individual characteristics

22.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2012, the four children who died as a result of fatal assault were aged between two and 17 years. All of the children were male, and one child was Aboriginal.

As shown in table 72, over the past 15 years, the largest proportion of deaths of children from assault has involved children under the age of five years. One-quarter of the children who died from assault in that period were aged 15-17 years.

Male children are more likely to die as a result of fatal assault than females. Table 71 shows that, over the 15-year period, males accounted for 62 per cent of fatal assault deaths.

Table 71: Fatal assault deaths by age range, 1998-2012

Age	Number (% rounded)
< 1 year	36 (19)
1-4 years	57 (31)
5-9 years	25 (14)
10-14 years	21 (11)
15-17 years	46 (25)
Total	185 (100)

Table 72: Trends in deaths of children due to fatal assault by gender, 1998-2012, number and (Crude Mortality Rate)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Male	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)	4 (0.5)	115
Female	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)	0 -	70
Both	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)	4 (0.2)	185

²⁰² NSW Child Death Review Team 2008, *Trends in the fatal assault of children in NSW: 1996-2005*, Sydney: NSW Commission for Children and Young People, p. 10.

22.1.2 Child protection history

The families of half of the children who died in fatal assault incidents in 2012 had a child protection history. In the three years before their death, one child had been the subject of risk of a significant harm report to Community Services and one child had a sibling who had been the subject of a report.

In NSW, children who have died in circumstances of abuse have consistently been more likely to have had a child protection history. In 2010 and 2011, half of the families of children who died in abuse-related circumstances had a child protection history.²⁰³

22.2 Circumstances of fatal assault

Three of the four assault deaths in 2012 occurred within a familial context, allegedly involving biological parents and a step-parent. One teenager was allegedly killed by a peer. Three of the alleged offenders were male, and two were female.

The children allegedly died as a result of knife wounds (2), blunt force trauma, and other maltreatment. Police have laid charges against four alleged offenders in relation to three of the fatal assault deaths. At the time of writing, these cases were still subject to criminal proceedings. In the fourth case, the alleged perpetrator also died in the incident, which was an apparent murder-suicide.

Most fatal assault deaths of children in Australia are familial homicides.^{204 205} As illustrated in table 73, this has been the case in NSW over the last 15 years with the exception of 2010, when deaths of teenagers allegedly killed by peers outnumbered familial homicide.

More than two-thirds (69%) of the child homicides were committed by family members, primarily parents. The remaining assaults were perpetrated by peers (16%) or other unrelated persons (15%). Peer homicide generally relates to young people in a context of confrontational violence between friends, acquaintances and strangers.²⁰⁶ Peers are generally close in age and social status.

Table 73: Trends in deaths of children due to fatal assault by offender relationship to child, 1997-2011

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Familial	9	10	10	11	5	14	6	12	11	5	12	7	5	8	3	128
Peer	4	2	2	0	1	4	1	1	1	1	2	1	7	2	1	30
Other*	4	3	4	4	3	2	1	1	0	2	0	0	2	1	0	27
Total	17	15	16	15	9	20	8	14	12	8	14	8	14	11	4	185

* 'Other' offender types in fatal assault include where the perpetrator is unknown, a stranger or an acquaintance.

As all fatal assault deaths are reviewable deaths, the deaths reported here will be the subject of further detailed analysis by the Ombudsman.

203 NSW Ombudsman 2013, *Report of reviewable deaths in 2010 and 2011: volume 1: child deaths*, Sydney: NSW Ombudsman, p. 1 and p. 20.

204 Familial homicide includes filicide (custodial and non-custodial parents or step-parents), siblicide, and killings by other family members, including extended family.

205 Australian Institute of Criminology 2013, *Homicide in Australia: 2008–09 to 2009–10 National Homicide Monitoring Program annual report*, cat. no. Monitoring Report 21, Canberra: AIC.

206 NSW Ombudsman 2013, *Report of reviewable deaths in 2010 and 2011: volume 1: child deaths*, Sydney: NSW Ombudsman, p. 25. This report includes an analysis of peer-related homicides 2002-2011.

Chapter 23. Monitoring recommendations

23.1 Sudden Unexpected Death in Infancy (SUDI)

Ministry of Health	
Recommendation 1	NSW Kids and Families response 2013
<p>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:</p> <ul style="list-style-type: none"> • 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. 	<p>In September 2013, NSW Kids and Families advised that the review of the Sudden Infant Death Advisory Committee (SIDAC) had been completed. The agency indicated that it would progress implementation of the review recommendations, including reviewing the Health policy directive <i>Death – Management of Sudden Unexpected Death in Infancy</i>, and the service model underpinning the policy.</p> <p>On related matters, NSW Kids and Families advised in July 2013 that:</p> <ul style="list-style-type: none"> • File audits to assess compliance with the policy directive <i>Death – Management of Sudden Unexpected Death in Infancy</i> had been delayed but had now recommenced. The Clinical Excellence Commission has identified a paediatric medical officer to assist with the audit, and relevant files have been requested from the Local Health Districts. • Release of the revised policy <i>Maternity – Safer Sleeping Practices for Babies in NSW Public Health Organisations</i> has been promoted through Local Health Districts, the Clinical Excellence Commission, and Statewide forums. Chief Executives of NSW Public Health organisations are responsible for ensuring that quality assurance processes are in place, including an annual local audit of safer sleeping practices, to ensure compliance with the policy directive. • NSW Kids and Families is consulting with SIDS and Kids and with Community Services regarding the available education resources and online training packages for staff. A number of packages are currently being assessed, and advice will be provided to LHDs when one or more packages are selected.
Recommendation 2	NSW Kids and Families response 2013
<p>The Ministry of Health should:</p> <ul style="list-style-type: none"> • 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. 	<p>NSW Kids and Families advised that it had engaged an independent consultant to conduct a thorough literature review to determine if there is any known association between SUDI and prop-feeding. In April 2013, the consultant reported that no association could be found in the literature.</p> <p>Health advised that it will continue to encourage parents to breastfeed for as long as possible, and to hold their babies while bottle feeding to encourage optimal parent-infant attachment. Parents will continue to be discouraged from prop feeding their infants, and NSW Kids and Families will continue to monitor the literature for any further evidence on the issue.</p>

The Team's response

The Team notes the work undertaken by NSW Kids and Families to implement the Team's recommendation regarding prop-feeding, and the agency's continued attention to evidence-based practice.

The Team welcomes NSW Kids and Families' advice that it will review the Health policy directive on the management of SUDI, including the underlying service model, and that file audits to assess Local Health Districts' compliance with the policy directive have recommenced.

However, overall, work to progress the Team's recommendations concerning SUDI has been slow. The Team has made further recommendations with the aim of progressing key areas of concern and improving practice in relation to SUDI.

Department of Family and Community Services, Community Services**Recommendation 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

Community Services response 2013

Community Services advised that the agency accepted the recommendation in full and noted that the cohort review would complement the work CS had previously done to promote the awareness of modifiable risk factors for sudden and unexpected infant death.

As at May 2013, the work had involved a survey of staff knowledge, finalisation of data for the sample group, and a review of relevant literature. Community Services has also met with staff from NSW Kids and Families to discuss opportunities and strategies to strengthen the interagency response.

Community Services also noted agreement with the Team's recommendation to the Ministry of Health in relation to reviewing the membership of the NSW Sudden Infant Death Advisory Committee. The agency advised that it would welcome an invitation to participate on this committee.

The Team's response

The Team welcomes Community Services' progress in addressing the recommendation, but notes that the review is in its early stages. The Team will continue to monitor the progress of the cohort review.

23.2 Transport fatalities

Centre for Road Safety**Recommendation 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.

Centre for Road Safety response 2013

The Centre for Road Safety (CRS) advised that it is in the final stages of developing a new database system, Crashlink 2, which includes a spatial layer that will enable the ongoing recording and reporting of off-road incidents that are reported to police. CRS

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.

noted that this would also facilitate the summation of reported off-road low speed run over crashes retrospectively back to approximately 1997.

CRS indicated that it is developing a new website, which will include prominent promotion of driveway safety messaging and (once Crashlink 2 is completed) an off-road crash data summary in the Statistics section.

In 2012, the Transport and Road Safety Research group at the University of NSW completed a data linkage of the NSW crash database to health and emergency data, and Births, Deaths and Marriages data in 2001-2009 for CRS. This data is now being analysed, and will include the analysis of low speed run over incidents that are not reported to police.

CRS is currently initiating the linkage of the 2010 and 2011 datasets and is working with NSW Health to develop a more regular system of linkage.

Recommendation 5	Centre for Road Safety response 2013
<p>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:</p> <ul style="list-style-type: none"> 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. 	<p>In relation to public awareness strategies, CRS advised that, in 2012:</p> <ul style="list-style-type: none"> Transport for NSW sponsored a six-week newspaper campaign: 'Check, See – Turn the Key', which included in-depth articles, distribution of car stickers, a TV spot, and release of a new Wiggles road safety song. CRS released the Road Safety: A guide for families and carers of children 0 to 5 years resource, which includes a section on driveway safety. The resource was distributed to almost 3,500 early childhood centres and to some hospitals. Kids and Traffic delivered 222 workshops to educators in children's services to increase awareness and education around driveway safety, and provided Driveway Safety Display Kits. The Federal Government held a National Road Safety Forum, which included the agencies listed in the Team's recommendation. At the Forum, the Federal Government released a brochure on driveway safety and a report: 'Child Pedestrian safety: Driveway deaths and low speed run-overs'. <p>In 2012, the Minister for Roads and Ports raised the issue of mandating reverse camera technology with the Federal Government, the Australasian New Care Assessment Program, and the Standing Committee on Transport and Infrastructure. In response, the Federal Department for Infrastructure and Transport has initiated an international study of the road safety benefits of reversing technology.</p> <p>CRS advised that, once the analysis of the data on incidents not reported to police is undertaken (see response to recommendation 4), it would convene the stakeholders listed in the Team's recommendation to analyse the new data from the linkage study (and in time, the complete Crashlink 2 dataset of off-road incidents) and determine further countermeasures to address low speed vehicle run overs.</p>

The Team's response

The Team notes the considerable work that is underway by the Centre for Road Safety to improve the collection, analysis and reporting of off-road vehicle crash data, including low speed vehicle run over incidents. However, it is not clear at this stage whether CRS has given consideration to extending the data collection to all non-traffic vehicular incidents resulting in injury or death.

The Team welcomes the range of public awareness strategies implemented by CRS/Transport for NSW to reduce the risk of death and injury of children in low speed vehicle run over incidents. The work to bring together the key injury prevention agencies to consider the findings of the previous CDRT report regarding low speed vehicle run overs is scheduled to take place following CRS' analysis of data relating to off-road vehicle incidents. The Team will monitor CRS' continuing and important work in relation to low speed vehicle run over fatalities.

23.3 Drowning deaths

Boating

Office of Boating Safety and Maritime Affairs (NSW Transport)

Recommendation 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.

Office of Boating Safety and Maritime Affairs response 2013

In line with the new requirements governing life jacket use for recreational boaters introduced in November 2010, the Office of Boating and Safety Maritime Affairs (OBSMA) has enforced sanctions for breaches, and developed a *Boating Safety Education and Communication Strategy 2012-2015*, which includes a focus on the need to wear lifejackets.

OBSMA has advised the Team that 2012/13 saw the largest public awareness campaign for lifejacket wear, aimed at a broad base of boaters, including children. In addition, OBSMA has provided lifejackets to Maritime teachers across NSW in high schools, and partnered with the Boating Industry Association of NSW to deliver safety and information packs at the Sydney International Boat Show. To date, OBSMA has funded the distribution of over 4,000 life jackets.

There are over 60 boating safety officers on NSW waters who educate boaters about water safety. Since November 2010, safety officers have penalised skippers if a child on their boat is not wearing a life jacket.

The Team's Response

The Team notes the actions taken to date by the Office of Boating Safety and Maritime Affairs to promote boating water safety, the safety of children and young people on boats, and education about the life jacket regulations.

Floodwaters

State Emergency Service

Recommendation 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.

State Emergency Service response 2013

The NSW State Emergency Service (SES) advised that it has three targeted education programs for children and their parents that address the risks associated with, and safety strategies around, floodwater and flooded waterways: StormSafe, FloodSafe and TsunamiSafe.

The programs include key safety messaging around never playing in floodwater and staying clear of hazardous watercourses such as drains, gutters, stormwater channels, creeks and rivers.

The SES' 'I'm a StormSafe Kid' and 'I'm a FloodSafe Kid' programs are aimed at empowering young people to help take appropriate responsibility for the preparedness of their family and friends, including encouraging safer behaviour from their peers.

Safety messages are delivered through school programs, engagement at community events and age-specific promotional items. The SES has developed take-home packs to complement the schools-based programs to improve children's education and emergency preparedness.

The SES also advised that it has previously worked with the Australasian Fire and Emergency Services Council and other agencies to develop a series of multi-hazard education community service announcements aimed at primary school children. Copies of the episodes have been provided to all SES Regions and Units to supplement school strategies, and corresponding lesson plans were distributed to all primary schools.

The Team's response

The Team notes the important strategies that the State Emergency Service has put in place to increase the awareness of children and their families of the risks associated with floodwater and flooded waterways.

Private swimming pools

Department of Premier and Cabinet, Division of Local Government

Recommendation 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.

Division of Local Government response 2013

The Division of Local Government (DLG) advised that it has not adopted the Team's recommendation. Instead, the DLG has sought to implement the intent of the recommendation 'by including it as a consideration for Councils in developing their pool inspection programs, given it is a significant risk factor.' DLG advised that Councils have access to demographic information that will assist them in assessing this risk factor and prioritising inspections in their community.

DLG has indicated that it made the decision not to implement the specifics of the recommendation in recognition of the public's sensitivity to revealing how many children and their ages are residing at, or regularly visit, a particular address. The DLG considers that a compulsory response to such questions would have a detrimental effect on the willingness of pool owners to register their pools.

Recommendation 9

If registration is based on self-certification, an evaluation of the scheme should be undertaken within three years of

Division of Local Government response 2012

DLG has advised that the registration scheme is not based on self-certification. Rather, it is based on self-assessment by pool owners followed by external certification by a council officer or private certifier.

implementation, and should include consideration of the frequency of self-certification and the adequacy of self-certification as opposed to external certification.

Recommendation 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 demographics. Model policies would detail the basic requirements for a program, while accommodating for differences in Council size and local 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.

Recommendation 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.

Recommendation 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.

DLG advised that recommendations 10 and 11 have been partially implemented. The Division is drafting guidelines to assist Councils to develop their pool inspection programs.

The guidelines will include the breadth of possible inspection activities, as described by the amended legislation, and will identify the matters that should be considered in taking a risk-based approach to developing such programs.

In addition to the guidelines, other resources and support will be made available to Councils. In this regard, Councils will be provided with a list of risk factors to be considered when developing inspection programs, one of which is local area demographics. DLG advised that it encourages Councils to target resources towards swimming pools used by children, particularly very young children.

Recommendation 13

Amendments to the Swimming Pools Act should be accompanied by a comprehensive education and awareness

DLG advised the Team that, in response to this recommendation, and accompanying the implementation of the state-wide register of swimming pools, an ongoing education and awareness campaign will be conducted

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.

in conjunction with Royal Life Saving Australia (NSW) and other stakeholder agencies from late April 2013 until June 2014.

Resources will be developed in 16 community languages and multimedia platforms, and target key user groups such as parents, pool owners, councils, private certifiers, property conveyance practitioners, lawyers, strata managers, bodies corporate and real estate agents.

Recommendation 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.

The Division has yet to target residential tenants specifically, but is working with Royal Life Saving Australia (NSW) to target information to real estate agents.

As part of the next phase of educational resource development, the Division is seeking to extend this work to include specific resources that can be disseminated to tenants in both public and private lease situations later this year.

The Team's response

It is important that Councils are able to clearly identify swimming pools at properties where young children reside or regularly visit, in order to prioritise inspections. The Team appreciates the reasoning behind the Department of Local Government's decision not to require pool owners to provide such details when registering their pool. However, it is not clear what 'demographic information' Councils have access to that will enable them to adequately identify which pools have children on the premises (either as residents or regular visitors). Given the importance of this issue, the Team has made a further recommendation to DLG.

While the Division indicates that it encourages Councils to target resources towards swimming pools used by young children, it is not clear how this is done, or whether the guidelines in development will address the key elements of the Team's recommendation. The Team has made a further recommendation to DLG in this regard.

The Team notes that reporting requirements relating to compliance with the Swimming Pools Act will not come into effect until the Regulations are finalised and enacted, and DLG has not provided a timeframe for this work. It is not clear whether the Regulations will require reporting of all of the elements recommended by the Team. The Team will continue to pursue this issue.

The Team welcomes the education and awareness program that is being undertaken by DLG and its partners, and notes that the publications include information relating to the key messages identified in the Team's recommendation. The Team notes that work to provide key information to public and private lessees is currently in development, and will monitor progress in this area.

Department of Family and Community Services, Housing NSW**Recommendation 15**

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

Housing NSW response 2013

Since the Team's recommendation, Housing NSW has completed a review of its operational guidelines, including policy, procedure and client communications.

The review has confirmed that the guidelines are correct according to the Swimming Pools Act. However, Housing NSW noted that staff and tenants would benefit from more detail around the policy, which should inform tenants of their obligations, and inform Housing NSW staff of the appropriate action they should take in relation to swimming pools.

Housing NSW has advised that it has worked closely with the Land and Housing Corporation to ensure that staff and clients are aware of the Swimming Pools Act and the requirements of the Pool Safety Act. As part of this work, the agency has:

- developed new guidelines for all staff to ensure that tenants understand their obligations and remove unauthorised pools as soon as possible, and
- included information about tenants' obligations under the Swimming Pools Act in the September 2013 newsletter *Your Home*, and on the agency's website.

The Team's response

The Team notes the actions that have been taken by Housing NSW in response to this recommendation.

23.4 Poisoning

Clinical Excellence Commission/Medication Safety Expert Advisory Group**Recommendation 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.

Clinical Excellence Commission response 2013

The Clinical Excellence Commission (CEC) advised that, following a review of the capacity of the iPharmacy software, a specific warning code 'KIDCAP' has been designed and added to the system to identify medicines requiring a child-resistant closure. For all such medicines, the labels generated in iPharmacy will contain the warning flag 'KIDCAP'. In addition, the warning statements within the iPharmacy system state '*child-resistant packaging required*'.

The warning code has been incorporated into the version of iPharmacy currently available to NSW hospital pharmacies, and has been applied to all relevant medicines as identified by TGO 80 and TGO 80A. The CEC advised that the required label changes are expected to take place over the second half of 2013 across NSW.

Information will be provided to pharmacies across NSW explaining the changes to the iPharmacy system and what action pharmacy staff must take in response to the 'KIDCAP' warning flag. The required actions will include the provision of child-resistant packaging as well as highlighting to consumers the need to retain the product in child-resistant packaging.

The Policy Directive *Medicines Handling in NSW Public Hospitals* is currently being reviewed (due for release in the second half of 2013), and draft revisions include

(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.

statements about the provision of medicines in child-resistant packaging and the use of iPharmacy to prompt this. In the interim, an Information Bulletin will be issued alerting the NSW Health system to the required changes.

The Medication Safety Self Assessment for Australian Hospitals is currently under review. As part of the review process, consideration will be given to incorporating an item related to child-resistant packaging in the relevant section of the tool.

The Team's response

The Team notes the considerable work that has been undertaken by the Clinical Excellence Commission and its partners to address the recommendation.

23.5 Suicide

Ministry of Health

Recommendation 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 affected by 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.

Clinical Excellence Commission response 2013

Health has advised that the proposed development of awareness-raising multimedia resources for young people has been superseded by the Ministry contracting the Hunter Institute of Mental Health to develop broader suicide prevention program online resources, *Conversations Matter*.

The resources aim to raise community awareness of how to communicate safely and without harm about suicide, and will provide specific advice for particular target populations (including schools, families and community). Advice has been sought on the needs of children and young people in talking about suicide from a range of agencies, including the Commission for Children and Young People, headspace, and MH-Kids.

Health has indicated that future activity in this area is to be guided by work currently underway by the NSW Mental Health Commission to develop an implementation plan that will guide work to prevent and/or reduce suicide, as well as the Strategic Plan for Mental Health.

The Team's response

The Team notes the actions taken by the Ministry of Health to contract the development of suicide prevention online resources, and will monitor the progress of this work.

Given the importance of reducing the suicide deaths of young people, the Team will also meet with the NSW Mental Health Commission to discuss the development and scope of relevant strategic and implementation plans targeting this issue, and broader work to evaluate the outcomes of the NSW Suicide Prevention Strategy.

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 for sex and age was taken from the latest ABS release of the NSW population by single year of age.²⁰⁷
- 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.²⁰⁸
- Infant mortality rates were calculated from the number of live births in NSW in 2011²⁰⁹ and the breakdown of population and births in NSW by Statistical Local Area.²¹⁰ 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 2006²¹¹ census 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 2011 was supplied by the ABS to order.

As the ABS is changing its underlying geographic spatial structures from Australian Standard Geographical Classification (ASGC) to Australian Statistical Geography Standard (ASGS), this is the last year that data listed by ASGC will be available. Addresses that were assigned to a given area in the ASGC may be grouped slightly differently under the ASGS and, consequently, geographic patterns may be subject to change in the next report. It is likely that the changes will be minimal at the higher level of remoteness grouping, however caution should be applied when analysing and interpreting changes through time.

The remoteness (ARIA) scores were missing in 2012 for 15 children: four were resident overseas, one was resident interstate, and 10 did not have postcodes, or had postcodes that did not map correctly.

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.

207 Australian Bureau of Statistics, 2013, *3101.0 Australian Demographic Statistics (TABLE 51. New South Wales, 2013)*, Canberra: ABS.

208 Australian Bureau of Statistics, 2013, *Estimated Resident Populations by NSW Remoteness Areas, by age groups*, Canberra: ABS.

209 Australian Bureau of Statistics, 2012, *3301.0DO001_2011 - Births, Australia, 2011* Canberra: ABS.

210 Australian Bureau of Statistics, 2012, *3301.0DO0003_2011 - Births, Australia, 2011* Canberra: ABS.

211 Australian Bureau of Statistics, 2010, *2068.0 Indigenous Status by age by sex (1996-2006)* Canberra: ABS.

212 Australian Bureau of Statistics 2012, *Indigenous experimental population projections by age, by sex – Reference period 2010* Canberra: ABS.

213 Australian Population and Migration Research Centre, 2013, ARIA (Accessibility/Remoteness Index of Australia), Adelaide: APMRC. http://www.adelaide.edu.au/apmrc/research/projects/category/about_aria.html, accessed 19 August 2013.

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.

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 either Aboriginal or Torres Strait Islander on their NSW Births Deaths and Marriages birth certificate.
- Agency records identify the child as Aboriginal or Torres Strait Islander through a number of records, which are corroborative. Records used to do this include the NSW Police Computer Operated Policing System and Community Service KIDS client database, which often hold information that can support Aboriginal or Torres Strait Islander identity. NSW Health and other agency records were also used to assess the child and family background.

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 are reported in the sections pertaining to those underlying causes.

For natural cause deaths, reporting categories align with chapter levels of the International Statistical Classification of Diseases and Related Health Problems (ICD). This is also generally (but not always) the case for external cause deaths, where precedence may be determined according to the most appropriate category for considering prevention.

Calculations

Mortality rates

The Crude Mortality Rates (CMR) were calculated as rates per 100,000 persons. This was done in SQL or Excel by dividing the number of deaths in a given category by the population that was appropriate for the category. For example, the CMR for deaths of children from all causes in 2012 was $(493/1642401 \times 100000) = 30.01$.

Directly Standardised Mortality Rates (DSMR) were also calculated as rates per 100,000 persons. The DSMR differs from the CMR in that it is adjusted for the difference in the age structure of the current population compared with a standard population (in this case, 2001). The adjustment allows comparison between years.

Here, the age-adjustment method used the number of deaths in each year age category for each year and the population in each year age category for each year (and number of deaths and populations separately by gender where appropriate). Calculation of DSMR and associated confidence intervals was performed using the R statistical language,²¹⁵ specifically, using the *ageadjust.direct* function in the *epitools* package.²¹⁶

Infant Mortality Rates (IMR) were calculated as rates per 1,000 live births. The number of infant deaths in a given category is divided by the total number of live births for the year and multiplied by 1000. Data on live births in 2012 were not available at the time of writing this report, so 2011 birth figures were used. For example, in 2012 the IMR for infants (under 1 year) where the cause of death was a disease of the circulatory system was $(5 / 99054 \times 1000) = 0.05$. These calculations were performed in Excel.

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

215 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, <http://www.R-project.org>

216 Aragon, T. 2010, *epitools: Epidemiology Tools*. R package version 0.5-7, Berkeley, CA: University of California, <http://CRAN.R-project.org/package=epitools>

Confidence intervals

If the number of observed cases was less than 100, confidence intervals were calculated directly from the Poisson distribution, as recommended by the Washington State Department of Health.²¹⁷ The `pois.exact` function from the `epitools` package in R was used. When the number of cases was 100 or more, the normal approximation was used to calculate the confidence intervals. The equation applied was: $(\pm 1.96 \times (CMR \text{ or appropriate rate}) / \sqrt{\text{number of deaths}})$.

Incident rate ratios

Incident rate ratios are a pairwise comparison of mortality rates. In the 2012 report, they were calculated to compare male with female rates and Aboriginal/Torres Strait Islander with non-Aboriginal/Torres Strait Islander rates. Where the ratio is equal to one, rates were equal. Where the ratio was greater than one, male or Aboriginal/Torres Strait Islander rates were higher. Where they were less than one, female or non-Aboriginal/Torres Strait Islander rates were higher.

P values

A test procedure called the two-proportion z-test was used to assess the significance of differences between males and females and Aboriginal/Torres Strait Islander and non-Aboriginal/Torres Strait Islander populations. Rates and p values were not calculated where there were less than four deaths in either category, due to unreliability of estimates for very small numbers. Where p is less than 0.05, male or Aboriginal/Torres Strait Islander rates were *significantly* higher than female or non-Aboriginal/Torres Strait Islander rates. The lower the p value below 0.05, the more significant the difference. A p value of <0.001 indicates a very significant difference.

Software

Much of the data extraction and summarisation was done using Microsoft SQL Server 2005 and Microsoft Access, with the remainder of the analysis and all illustrations done in Microsoft Excel. Some of the analysis and processing was done in R statistical language.²¹⁸ The `epitools`²¹⁹ package was used to calculate Directly Standardised Mortality Rates and associated confidence intervals.

217 Washington State Department of Health 2012, *Guidelines for Using Confidence Intervals for Public Health Assessment*, Olympia, WA: DOH <http://www.doh.wa.gov/Portals/1/Documents/5500/ConfIntGuide.pdf>

218 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, <http://www.R-project.org>, accessed 16 July 2013.

219 Aragon, T. 2010, *epitools: Epidemiology Tools*. R package version 0.5-7, Berkeley, CA: University of California, <http://CRAN.R-project.org/package=epitools>, accessed 16 July 2013.

Appendix 2: Definitions

Causes of death

ICD-10 is the International Statistical Classification of Diseases and Related Health Problems, 10th revision (World Health Organization). The ICD-10 has more than 12,000 unique codes in more than 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 Organization 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.²²⁰

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	Includes a range of conditions, including congenital hydrocephalus, trisomy 18 (Edwards syndrome), and Down syndrome.	Q00-Q99
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
Diseases of the nervous system	Includes disorders such as epilepsy, cerebral palsy and muscular dystrophy, as well as inflammatory and degenerative conditions.	G00-G99
Endocrine, nutritional and metabolic diseases	Includes 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. ²²¹ Examples include influenza, gastroenteritis and meningococcal disease.	A00-B99
Neoplasms	Cancers and tumours.	C00-D48
Diseases of the respiratory system	Includes conditions such as pneumonia, influenza and asthma	J00-J99
Other diseases/morbid conditions	Includes diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism; mental and behavioural disorders; diseases of the eye and adnexa; diseases of the ear and mastoid process; diseases of the digestive system; diseases of the skin and subcutaneous tissue; diseases of the genitourinary system; and pregnancy, childbirth and the puerperium.	D50-D89, F00-F99, H00-H59, H60-H95, K00-K93, L00-L99, N00-N99, O00-O99

220 National Centre for Health Information Research and Training 2011 *Review and recommendations for the annual reporting of child deaths in NSW*. Sydney: NSW Ombudsman. Unpublished.

221 World Health Organization 2011, *Infectious Diseases*, Geneva: WHO. http://www.who.int/topics/infectious_diseases/en/, accessed 16 July 2013.

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, and
- 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 before 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 2012, 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 Organization (WHO) for coding diseases for statistical aggregation and reporting purposes.

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-10.²²²

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 is 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.

²²² World Health Organization, 2010, *International Statistical Classification of Diseases and Related Health Problems*, 10th Revision. Geneva: WHO.

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 less than one 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 $<15\text{g}$ 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 ≥ 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.



