

CHAPTER 8

Sudden unexpected deaths in infancy

This chapter provides details of sudden unexpected infant deaths.

KEY FINDINGS

- Sudden unexpected death in infancy is a category of deaths where an infant (aged under 1 year) dies suddenly with no immediately obvious cause. Predominantly, deaths from SUDI are recorded as cause pending until the outcomes of coroners' investigations or post-mortem examinations are concluded and cause of death is determined.
- There were 29 SUDI cases in 2015 – 16, a rate of 46.7 deaths per 100 000 infants. The number and rate of SUDI cases have fluctuated over the last 12 reporting periods; however, the 2015 – 16 number of deaths is the lowest recorded since reporting began in 2004. The highest number of deaths over the period was 55 in 2010 – 11 while the second lowest number was 36 deaths in 2007 – 08).
- Aboriginal and Torres Strait Islander infants are over-represented in SUDI cases. Over the last three years, Indigenous infants died suddenly and unexpectedly at 3.4 times the rate of non-Indigenous infants.
- Encouragingly the Aboriginal and Torres Strait Islander SUDI cases in 2015 – 16 (4 deaths) was the lowest number recorded since 2004.
- Five deaths were, following post-mortem examination, attributed to SIDS and undetermined causes (of the 12 SUDI cases with an official cause of death). Official causes of death were still pending for 17 deaths.
- Seven of the SUDI cases were found to have an explained cause of death. Six children died as a result of infant illnesses unrecognised prior to their deaths and one was a sleep accident.
- Looking at the 2013 – 14 period, where all but one SUDI case had recorded causes of death, the rate of death for SIDS and undetermined causes was 45.5 per 100 000 infants (10% of infant deaths), representing the third highest cause of infant death after perinatal conditions and congenital anomalies.
- Further, SIDS and undetermined causes was the leading cause of infant death in the post-neonatal period (from 1–11 months), representing over a quarter of deaths in this group in 2013 – 14 (28%—24 of the 87 post-neonate deaths).

SUDDEN UNEXPECTED DEATHS IN INFANCY 2013 – 16

An expanded version of Table 8.1 containing data since 2004 is available online at www.qfcc.qld.gov.au.

Table 8.1: Summary of SUDI in Queensland 2013 – 16

	2013 – 14		2014 – 15		2015 – 16		Yearly average
	Total <i>n</i>	Rate per 100 000	Total <i>n</i>	Rate per 100 000	Total <i>n</i>	Rate per 100 000	Rate per 100 000
All sudden unexpected deaths in infancy (SUDI)							
SUDI	43	67.4	39	62.8	29	46.7	59.5
Sex							
Female	20	65.0	15	49.4	17	56.0	57.0
Male	23	69.7	24	75.6	12	37.8	61.9
Aboriginal and Torres Strait Islander status							
Indigenous	12	230.5	11	205.2	4	74.6	167.9
Non-Indigenous	31	52.9	28	49.3	25	44.0	49.3
Geographical area of usual residence (ARIA+)							
Remote	3	*	2	*	1	*	64.4
Regional	20	91.2	19	89.4	12	56.5	80.0
Metropolitan	20	51.8	18	47.6	16	42.3	47.6
Socio-economic status of usual residence (SEIFA)							
Low to very low	31	118.5	24	95.8	19	75.8	98.5
Moderate	6	48.7	7	57.9	0	0.0	35.8
High to very high	6	23.7	8	32.0	10	40.0	32.0
Known to the child protection system							
Known to the child protection system	14	8.4	9	9.3	11	13.1	..
Unexplained SUDI							
Unexplained SUDI	30	47.0	27	43.4	22	35.4	42.4
<i>SIDS</i>	18	28.2	14	22.5	2	*	18.2
<i>Undetermined causes</i>	11	17.2	4	6.4	3	*	9.7
<i>Cause of death pending</i>	1	*	9	14.5	17	27.4	14.5
Explained SUDI							
Explained SUDI	13	20.4	12	19.3	7	11.3	17.2
<i>Unrecognised infant illness</i>	11	17.2	12	19.3	6	9.7	15.6
<i>Sleep accident</i>	1	*	0	0.0	1	*	*
<i>Fatal assault</i>	1	*	0	0.0	0	0.0	*

Data source: Queensland Child Death Register (2013 – 16)

* Rates have not been calculated for numbers less than four.

.. Average across the three-year period has not been calculated due to the break in series (see note 3).

1. Data presented here is current in the Queensland Child Death Register as at August 2016 and thus may differ from those presented in previously published reports.
2. Rates are based on the most up-to-date denominator data available and are calculated per 100 000 children under the age of 1 year (in the sex/Indigenous status/ARIA+ region/SEIFA region) in Queensland each year. Rates for the 2013 – 14 period use the ERP data as at June 2013 and rates for the 2014 – 15 and 2015 – 16 periods use the ERP data as at June 2014.
3. For 2013 – 14, the number of children known to the child protection system represents the number of children whose deaths were registered in the reporting period, who were known to the DCCSDS within the three-year period prior to their death. From 2014 – 15 on, this relates to the deaths of children known to the DCCSDS within the one-year period prior to their death. The denominator for calculating rates is the number of children aged 0–17 who were known to the DCCSDS, through either being subject to a child concern report, notification, investigation and assessment, ongoing intervention, orders or placement, in the one-year period prior to the reporting period.
4. Rates of SUDI for 'Known to the child protection system' are calculated per 100 000 children aged 0–17 years in Queensland, instead of per 100 000 infants under the age of 1 year, in order to provide a comparable rate.
5. Yearly average rates have been calculated using the ERP data as at June 2014.

THE CLASSIFICATION OF SUDDEN UNEXPECTED DEATHS IN INFANCY

Sudden unexpected death in infancy is a research classification and does not correspond with any single medical definition or categorisation. Rather, the aim of this grouping is to report on the deaths of apparently well infants who would be expected to thrive, yet, for reasons often unknown, die suddenly and unexpectedly. Identifying deaths in this way assists in the identification of possible risk factors and associations for SUDI and, most significantly, those factors that may be preventable or amenable to change.

The Police Report of Death to a Coroner (Form 1), which includes a summary of the circumstances surrounding the death as initially reported,⁴³ is used to identify SUDI cases. The circumstances of the death must meet all of the following criteria to be included in the SUDI grouping:

- child less than one year of age
- sudden in nature
- unexpected, with no previously known condition that was likely to cause death
- no immediately obvious cause of death.

The SUDI grouping includes deaths found to be associated with infections or anatomical/developmental abnormalities not recognised before death, sleep accidents such as inhalation of gastric contents, and deaths that initially present as sudden and unexpected but are revealed by investigations to be the result of non-accidental injury. It also includes deaths due to SIDS and infant deaths where a cause could not be determined.⁴⁴

Death certification

A high proportion of SUDI cases (17 of 29 in 2015 – 16) are pending death certification at time of reporting. Paediatric autopsies are amongst the most complex forms of autopsies undertaken, and this contributes to the length of time required to undertake and report on autopsies. Following the development of a new definition of SIDS in 2004 (termed the San Diego definition), all cases of SUDI optimally require the performance of a complete autopsy (including toxicology, microbiology, radiology, vitreous chemistry and metabolic screening studies).⁴⁵

There is also an additional focus on establishing that there is no evidence of unexplained trauma, abuse or unintentional injury before a classification of SIDS can be assigned. This frequently involves more extensive gross and microscopic examination during autopsy than in cases of explained infant and child deaths.

43 In Queensland, section 8 of the Coroners Act requires that all violent or unnatural/unusual deaths be reported to a coroner. All unexpected infant deaths fall within that description. All cases of SUDI require a comprehensive investigation, which should include a full autopsy, examination of the death scene and review of clinical history.

44 Cases of SUDI that were explained at post-mortem are also counted and discussed in the chapter appropriate to their cause of death. Deaths found at autopsy to be caused by previously unrecognised illnesses or congenital anomalies are counted in Chapter 2, Deaths from diseases and morbid conditions.

45 Krous, HF, Beckwith, B, Byard, R, Rognum, TO, Bajanowski, T, Corey, T, Cutz, E, Hanzlick, R, Keens, TG and Mitchell, EA (2004). 'Sudden infant death syndrome and unclassified sudden infant deaths: A definitional and diagnostic approach', *Paediatrics*, 114(1), pp 234–238.

SUDDEN UNEXPECTED DEATHS IN INFANCY: FINDINGS 2015 – 16

During 2015 – 16, 29 SUDI cases were registered in Queensland, at a rate of 46.7 deaths per 100 000 infants. The number and rate of SUDI have fluctuated over the last 12 reporting periods; however, the number and rate of deaths in 2015 – 16 is the lowest recorded since reporting began in 2004. The number of SUDI cases registered since reporting commenced in 2004, ranges from 29 to 55 per year, with an average of 43.9 per year.⁴⁶

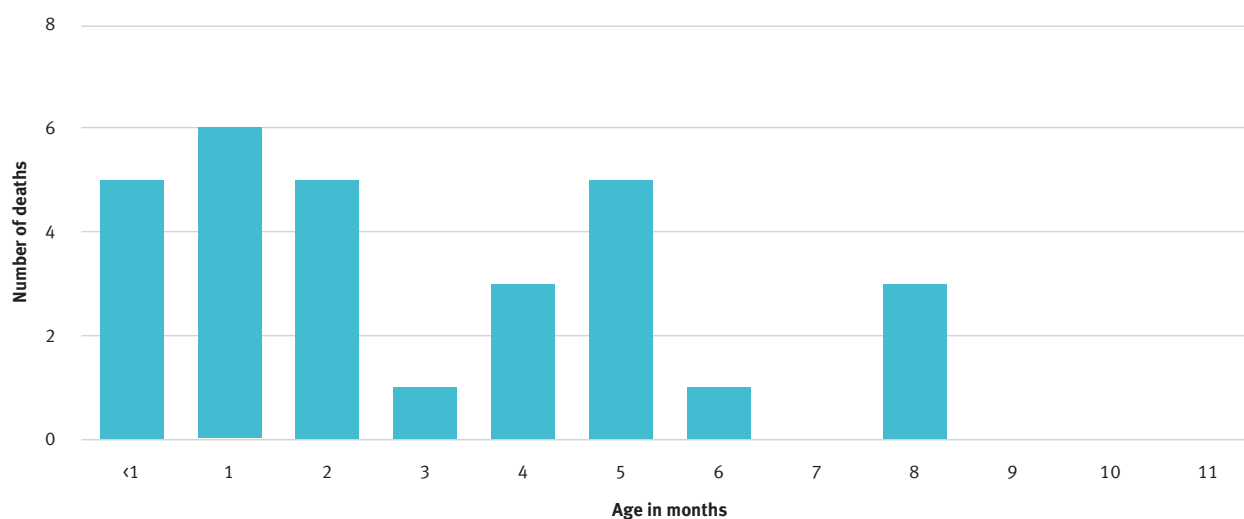
Sex

During 2015 – 16, there were 17 SUDI cases of female infants, compared to 12 male infants. The three-year average SUDI mortality rate for females is similar to the rate for males (57.0 deaths per 100 000 female infants, compared to 61.9 deaths per 100 000 male infants). In the 12 years since reporting commenced, male children are slightly over-represented in SUDI cases.

Age

Figure 8.1 shows SUDI by age at death during 2015 – 16. Infants' age ranged from 2 days to 8 months. The majority of sudden unexpected deaths occurred among infants aged under 6 months (25 of the 29 deaths).

Figure 8.1: SUDI by age at death 2015 – 16



Data source: Queensland Child Death Register (2015 – 16)

⁴⁶ Tables with data for 2004 – 16 are available online at www.qfcc.qld.gov.au

Aboriginal and Torres Strait Islander status

Of the 29 SUDI cases during 2015 – 16, 4 were of Aboriginal and Torres Strait Islander infants. This is the lowest number of Indigenous sudden unexpected deaths in infancy since reporting commenced in 2004. The number recorded over the 12 years since reporting commenced, ranges from 4 to 18 per year, with an average of 10.5 per year.

Over the last three reporting periods, the average annual SUDI mortality rate for Indigenous infants was 3.4 times the rate for non-Indigenous infants (167.9 deaths per 100 000 Indigenous infants, compared to 49.3 deaths per 100 000 non-Indigenous infants).

Geographical area of usual residence (ARIA+)

Of the 29 SUDI cases during 2015 – 16, 1 was of an infant who resided in a remote area of Queensland, 12 were of infants from regional areas and 16 were of infants from metropolitan areas.

Over the last three reporting periods, the average annual SUDI mortality rates for infants from remote and regional areas were greater than the rate for infants residing in metropolitan areas (64.4 and 80.0 deaths per 100 000 infants from remote or regional areas, compared to 47.6 deaths per 100 000 infants from metropolitan areas).

Socio-economic status of usual residence (SEIFA)

Of the 29 SUDI cases during 2015 – 16, 19 were of infants who resided in low to very low SES areas of Queensland, none were of infants from moderate SES areas and 10 were of infants from high to very high SES areas.

Over the last three reporting periods, the average annual SUDI mortality rate for infants from low to very low SES areas was approximately 3 times the rate for children from moderate and high to very high SES areas (98.5 deaths per 100 000 infants from low to very low SES areas, compared to 35.8 and 32.0 deaths per 100 000 infants from moderate or high to very high SES areas). In the 12 years since reporting commenced, infants from areas with moderate SES also show some over-representation, compared to infants from high to very high SES areas.

Children known to the child protection system

Of the 29 SUDI cases during 2015 – 16, 11 were of infants known to the Queensland child protection system within the year before their death.

CAUSE OF DEATH

Cases of SUDI are grouped broadly into two categories:

- **Unexplained SUDI**—those infant deaths where a cause of death could not be determined (including SIDS and undetermined cases and those with a cause of death pending).
- **Explained SUDI**—infant deaths where a cause of death was not immediately obvious; however, post-mortem examinations were able to identify a specific reason for the death (including unrecognised infant illnesses, sleep accidents and deaths as a result of non-accidental injury).

Predominantly, deaths from SUDI are recorded as cause pending until the outcomes of post-mortem examinations or coroner's investigations are concluded. In the period 2013 – 14, where only one of the 43 deaths remained pending a cause, 67% of the SUDI cases were attributed either to SIDS (18 deaths) or undetermined causes (11 deaths). Eleven deaths were found to be due to unrecognised infant illnesses, 1 was a sleep accident and 1 was a fatal assault.

Unexplained sudden unexpected deaths in infancy

At the time of reporting there were 22 unexplained SUDI from 2015 – 16. Five infants had been classified as having an unexplained cause of death following post-mortem examination; and for a further 17, the cause of death had not yet been ascertained.

Sudden Infant Death Syndrome (SIDS) and undetermined causes

The definition of SIDS applied in this report and currently accepted by most experts within Australia⁴⁷ is as follows:

The sudden, unexpected death of an infant under 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.

Cases of SUDI are classified as undetermined if:

- natural disease processes are detected that are not considered sufficient to cause death but that preclude a diagnosis of SIDS
- there are signs of significant stress
- non-accidental, but non-lethal, injuries are present
- toxicology testing detects non-prescribed but non-lethal drugs.

Further classification of the 5 unexplained SUDI in 2015 – 16 identified 2 deaths as SIDS and 3 deaths with cause undetermined.

Looking at the 2013 – 14 period, where all but one SUDI case had recorded a cause of death, the rate of death for SIDS and undetermined causes was 45.5 per 100 000 infants (10% of infant deaths), representing the third highest cause of infant death after perinatal conditions and congenital anomalies. Further, SIDS and undetermined causes was the leading cause of death for infants in the post-neonatal period (1–11 months), representing over a quarter of deaths in this age group (28%—24 of the 87 deaths from all causes).

Risk factors for SIDS

Infant, parental and environmental factors have been associated with an increased risk of SIDS. Infant factors relate to the vulnerability of the infant and include:

- prematurity (less than 37 weeks gestation) and low birth weight (less than 2500 grams)
- multiple gestation (twins, triplets)
- neonatal health problems
- male sex
- history of minor viral respiratory infections and/or gastrointestinal illness in the days leading up to death.

47 Krous H et al, (2004) 'Sudden infant death syndrome and unclassified sudden infant deaths: a definitional and diagnostic approach', *Paediatrics*, vol 114, pp 234–8.

Parental factors include:

- cigarette smoking during pregnancy and after birth
- young maternal age (≤ 20 years)
- single marital status
- high parity (number of births by mother) and short intervals between pregnancies
- poor or delayed prenatal care
- high-risk lifestyles, including alcohol and illicit drug abuse.

Environmental factors include:

- poor SES (social disadvantage and poverty)
- sleeping on soft surfaces and loose bedding
- prone (on stomach) sleeping position and side sleeping position
- overwrapping/overheating
- some forms of shared sleeping.

Infant sleep position

Table 8.2 shows the position of infants, when placed for sleep or when found, whose deaths were classified as unexplained SUDI.

Table 8.2: Unexplained SUDI by sleep position and position when found 2015 – 16

Sleep position	SIDS <i>n</i>	Undetermined <i>n</i>	Cause of death pending <i>n</i>	Total <i>n</i>
Position when placed to sleep				
Back	1	0	7	8
Stomach	0	0	3	3
Side	0	0	1	1
Other	1	0	2	3
Unknown	1	2	4	7
Total	3	2	17	22
Position when found				
Back	1	0	5	6
Stomach	1	0	5	6
Side	0	0	2	2
Other	0	0	3	5
Unknown	1	2	2	3
Total	3	2	17	22

Data source: Queensland Child Death Register (2015 – 16)

Shared sleeping with other risk factors

Eleven of the 22 infants whose deaths were classified as unexplained SUDI were sharing a sleep surface with one or more people at the time of death (2 SIDS, 2 undetermined, 7 cause pending).

Sharing a sleep surface with a baby increases the risk of SIDS and fatal sleep accidents in some circumstances.⁴⁸ Some studies have found there is an increased risk of SIDS only when mothers who smoke share a bed with their infant, although such findings are insufficient to enable complete reassurance that bed sharing is safe for non-smokers. Risks are also associated with shared sleeping if infants are sharing a sleep surface with a caregiver who is under the influence of alcohol or drugs that cause sedation, if the caregiver is excessively tired or there are multiple people in the bed with the infant.

⁴⁸ Blair, PS, Fleming, PJ, Smith, IJ, Platt, MW, Young, J, Nadin, P, Berry, PJ, Golding, J and the CESDI SUDI research group (1999). 'Babies sleeping with parents: case-control study of factors influencing the risk of the sudden infant death syndrome', *BMJ*, vol 319, pp 1457–61.

Explained sudden unexpected deaths in infancy

In 2015 – 16, 7 of the 29 SUDI cases were classified as having an explained cause of death following post-mortem examination. Six infants died as a result of illnesses unrecognised prior to their deaths. These deaths are included in this chapter (as sudden and unexpected); however, they are also included in the chapter relating to the specific cause of the deaths. Table 8.4 shows the breakdown of explained SUDI by cause of death.

Table 8.3: Explained SUDI by cause of death 2015 – 16

Cause of death	Total <i>n</i>
Unrecognised infant illness	6
<i>Certain infectious and parasitic diseases</i>	6
Acute bronchiolitis (J21)	1
Bacterial pneumonia, not elsewhere classified (J15)	1
Benign neoplasm of other and unspecified intrathoracic organs (D15)	1
Pneumonia, organism unspecified (J18)	2
Streptococcal sepsis (A40)	1
Other non-intentional injury/sleep accident	1
Total	7

Data source: Queensland Child Death Register (2015 – 16)

1 ICD-10 underlying cause of death code included in parentheses.