Maternal, Perinatal and Paediatric Mortality in Queensland

1999

Queensland Council on Obstetric and Paediatric Morbidity and Mortality

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Message from the Director-General

This is the final report of the Queensland Council on Obstetric and Paediatric Morbidity and Mortality (QCOPMM). QCOPMM has been dissolved and replaced by two quality councils: The Queensland Paediatric Quality Council and the Queensland Maternal and Perinatal Quality Council. This change recognises the difficulties faced by QCOPMM to adequately address the broad scope of its terms of reference. It is anticipated that each new council will be able to concentrate on activities and energies within its discipline and build on the achievements of QCOPMM.

I would like to acknowledge and thank the members of QCOPMM, and those who support them, for their hard work and dedication in their efforts to improve obstetric, perinatal and paediatric outcomes for Queenslanders.

This report highlights the importance of maternal, infant and paediatric mortality as indicators which can be used to monitor trends and improvements in the health of the community, and offers opportunities to benchmark and compare outcomes between regions and populations.

The report has been produced and coordinated by the secretariat of QCOPMM and the Mater Perinatal Epidemiology Unit and with the collaboration of clinicians across the State.

(Dr) R L Stable
Director-General
11/02/2002

Report from the Chair, 2000/2001

In May 2000, Associate Professor James King resigned from Chair of the Queensland Council of Obstetric and Paediatric Morbidity and Mortality (QCOPMM) to accept the position of Chair of the Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity. Following the resignation of Professor King, Professor David Tudehope was appointed as Chair in December 2000. The Council secretariat remained within the Mater Perinatal Epidemiology Unit (MPEU) with Vicki Flenady as Research Officer of the Council until June 30th 2001. Council reported to the Queensland Health Minister and Director General of Health through the Chief Health Officer. The MPEU provided a core staff to support Council activities and a permanent point of contact for the many interactions between Council and healthcare providers across the State and with various agencies within Queensland Health including the Health Outcomes Unit and the Health Information Centre and in particular the Perinatal Data Collection Unit and the Epidemiology Services Unit. Council also had frequent contact with similar bodies in other States and Territories and with other local regional, national and international organisations. The Terms of Reference of QCOPMM developed in 1995 were broad ranging and included Quality Assurance activities, audit, specific investigational enquiries, perinatal outreach education and operational issues for Queensland Hospitals.

Review of QCOPMM

The departure of the Chair of QCOPMM and appointment of the new Chief Health Officer, (Professor Bryan Campbell), provided a unique opportunity to review the function of QCOPMM.
The outcomes of the extensive review proposed the establishment of two new Councils.

Queensland Maternal and Perinatal Quality Council; and
Queensland Paediatric Quality Council

which would be the prototype of other Quality Councils in Queensland Health. The function of the new Quality Councils is to provide advice to the Minister for Health and Director General of Health through the Chief Health Officer on obstetric, perinatal and paediatric disciplines. The Councils will be gazetted as approved Quality Assurance Committees pursuant to Section 31, Health Services Act 1991.

Achievements of QCOPMM

At this time of transition it is appropriate to reflect on the achievements of Council.

Classification systems for perinatal and paediatric deaths

From 1994 until 1997 all perinatal deaths were classified centrally by the Secretariat of QCOPMM utilising information obtained from various sources including the MR63 Perinatal Data Collection form, death certificates, autopsy and placental pathology when available, and coronial autopsies and reports. Of necessity, the data set available centrally for clinical classification is limited. Council considered that each maternity unit should systematically review all perinatal deaths in order to ascertain the cause of death and to access avoidable and preventable factors. Council provided all maternity units in Queensland, both public and private, with a package of information containing guidelines for local maternal and perinatal mortality audit and classification.

QCOPMM worked tirelessly on improving clinical classification systems for evaluating perinatal and infant deaths. Although the ICD9 classification of perinatal deaths was useful for statistical purposes it was not precise enough for use by clinicians in considerations about causation. Initially the Whitfield modification of the Aberdeen classification was used by Council. This system was further refined and renamed the Queensland Council of Perinatal Mortality and Morbidity Classification and was circulated to clinicians in Queensland for piloting and feedback. QCOPMM adopted the system of classifying neonatal deaths which was developed by the South Australian Perinatal Committee. This classification system attempted to unequivocally identify the primary maternal and/or fetal factors that led to the death. Members of QCOPMM, James King, Vicki Flenady and David Tudehope collaborated with perinatal clinicians in Australia and New Zealand to achieve consensus on new clinical classification systems for perinatal deaths; The Australian and New Zealand antecedent classification for perinatal mortality (ANZACPM) and the Australian and New Zealand neonatal death classification (ANZNNDC).

Zonal maternal and perinatal mortality and morbidity committees.

The Peninsular and Torres Strait Island Committee under the Chairmanship of Professor Michael Humphrey was established to audit and classify all perinatal deaths in the zone. Similar committees were established in 1998 in the Southern Zone (Chairman Professor David Tudehope) and Central Zone (Chairman Associate Professor David Cartwright), to promote systematic maternal and perinatal mortality review throughout Queensland. By close collaboration with maternity hospitals, these committees provided support and education to maternity hospitals. The success of zonal committees can be assessed by the fact that in 1998 only 47% of perinatal deaths were classified at local hospital where as in 1999 this had increased to 57%. In the new structure, zonal committees will still provide a key clinical network facilitated by zonal clinical audit managers.

Coroners Bill 2000 consultation draft.

QCOPMM responded to the invitation of the Department of Justice and Attorney General to comment on the draft of the Coroners Bill 2000.

Obicare

QCOPMM played a significant role in the development of the Obicare reporting system. This data collection system provides easy access to data and meets national requirements for the collection of maternal perinatal morbidity and mortality data.

Publications

The Paediatric Mortality and Morbidity Report for 1994-1996 was the first comprehensive report on paediatric deaths in Queensland.
Trends in perinatal and paediatric mortality in Queensland.
Maternal, perinatal and paediatric morbidity and mortality in Queensland 1994-1996
Maternal, perinatal and paediatric mortality in Queensland. Annual reports; 1997/1998/1999.
Maternal and perinatal mortality audit: Guidelines for Queensland Hospitals. April 1999, updated January 2001
A review of sudden unexpected deaths in infants (SUDI) in Queensland in 1997 and 1998
A review of sudden unexpected deaths in infants (SUDI) Autopsies in Queensland 1997-1998

I would like to acknowledge the major contributions to the production of the 1999 report from Vicki Flenady MMedSc (Clin Epi) Perinatal Epidemiology Research Officer, QCOPMM/MPEU, Richard Hockey BSc, DipAgr Sc Senior Data Analyst MPEU/Queensland Injury Surveillance Unit and Dr Paul Woodgate MBBS, FRACP, MMedSc (Clin Epi). I would like to sincerely thank my colleagues on the Council of QCOPMM over the past 6 years and members of the subcommittees for the successes achieved. The Chief Health Officer, Professor Bryan Campbell and his Principal Project Officer Joan Kennedy need to be congratulated on the review of QCOPMM and establishment of the new quality councils.

Respectfully submitted,

Professor David Tudehope AM, MBBS, FRACP
Chair

Queensland Council on Obstetric and Paediatric Morbidity and Mortality (QCOPMM)

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Ms Marie Barton	Midwifery Course Coordinator, Redcliffe Hospital
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QCOPMM Secretariat

Vicki Flenady	Research Officer, QCOPMM; Manager, Perinatal Epidemiology Unit, Mater Hospital.

Other Mater Perinatal Epidemiology Unit staff assisting the Council

Richard Hockey	Biostatistician/ Data Analyst
Dr Paul Woodgate	Neonatologist, Mater Mothers' Hospital

Terms of reference

The Council was established to provide advice to the Minister for Health and has the following terms of reference:

- to consider, investigate and report to the Minister for Health on the patterns and causation of obstetric and paediatric morbidity and mortality in Queensland so that action may be taken to reduce preventable death and disability;
- to provide direction that will enable Queensland Health to develop and review policies that impact on obstetric and paediatric morbidity and mortality;
- to identify avoidable factors associated with maternal, perinatal and paediatric deaths and implement measures that could assist with the prevention of such deaths, including improvements in health services;
- to provide information and guidance required for members of the health professions and for the community generally in order to assist in the reduction of obstetric and paediatric morbidity and mortality;
- to assist perinatal committees in Queensland Health Regions with data collection, classification and reporting of maternal, perinatal and paediatric deaths;
- to steer the development of a reporting system that will provide easy access to data and meet national requirements for the collection of maternal, perinatal and paediatric morbidity and mortality data;
- to undertake research and other activities relevant to the performance of its functions;
- select members for the Council's subcommittees and determine priority areas to be examined by these subcommittees;
- to co-opt people to assist with the investigation of particular issues where the nature or complexity of the issue renders such an approach as appropriate; and
- to provide a report to the Minister and report on issues as requested by the Minister.

Executive summary

Maternal mortality

- There were 13 maternal deaths (4 Direct, 3 Indirect and 6 Incidental) identified in Queensland during 1999, and 48 044 mothers giving a maternal mortality ratio of 27.1 per 100 000 mothers.

- For the triennium 1997-99 a total of 26 maternal deaths (8 direct, 5 indirect and 13 incidental) were reported to the Council giving a maternal mortality ratio for Queensland of 18.2 per 100 000 mothers.

- The maternal mortality ratio in Queensland by triennia has been consistently higher that the ratio reported for Australia since 1991. The ratios for Queensland and Australia for the triennium 1991-93 were 16.8 and 10.9 and for 1994-96 18.3 and 13.0 per 100 000 mothers respectively.

- The higher maternal death ratio in Queensland compared to Australia is in part due to the higher ratio of indirect deaths but largely due to a consistently higher ratio of incidental deaths.

- The ratio of maternal deaths in Queensland from direct and indirect causes has been fairly stable for the last three triennia over the period 1988 to 1999, however the incidental death ratio has slowly increased from 3.9 per 100 000 mothers in the 1988-90 triennium to 9.1 in the 1997-99 triennium.

- In Queensland for the period 1997-99, the most frequent principal cause of incidental maternal deaths was homicide (3 of the 13 deaths). Homicide was also the most frequent principal cause of incidental deaths for Australia for the period 1994-96 (6 of the 34 incidental deaths).

- In the triennium 1997-99, avoidable factors were thought to be present in 11 (42%) of the 26 maternal deaths. The proportion of direct maternal deaths considered to have avoidable factors (50%) was similar to that reported for Australia (48%).

- In Queensland over the period 1997-99, identification of maternal deaths was increased by 38% with the use of additional sources to that of routine reporting mechanisms (Australian Bureau of Statistics). This level of under reporting is slightly higher than the proportion identified by the Council for the 1994-99 triennium of 27%. All of the additional deaths identified were classified as indirect or incidental deaths.

Perinatal mortality

- There were 48 749 births and 518 perinatal deaths in Queensland for 1999 giving a crude perinatal mortality rate of 10.6 per 1 000 total births. This was comprised of a fetal mortality rate of 7.1 per 1 000 total births and a neonatal mortality rate of 3.5 per 1 000 livebirths.

- Since 1983 the rate of perinatal deaths in Queensland has been similar to that observed for Australia.

- Preterm births (<37 weeks) accounted for 8% of infants and 79% of perinatal deaths. Very preterm births (<28 weeks) accounted for <1% of infants and 57% of perinatal deaths**.**

- Twins and higher order multiple births account for 3% of births, and was considered the primary cause of perinatal death (using the QCPMC classification) in 12% of perinatal deaths.

- The main causes of death according to the Queensland Council Perinatal Mortality Classification were *congenital anomaly* (24%), *unexplained antepartum death* (18%) and *unexplained preterm* (18%).

- The overall rate of *unexplained antepartum death* was 2.0 per 1 000 births which is over three times the rate of SIDS.

- Compared with Australia as a whole Queensland had a higher perinatal mortality rate due to congenital anomalies (2.5 compared with 1.6 per 1000 births).

- Of all fetal deaths 10% were attributed to voluntary interruption of pregnancy ≥20 weeks.

- When perinatal mortality for public facility types is corrected for gestational age the perinatal mortality rate for tertiary women's hospitals was 9.7 per 1 000 births, compared with a rate of 12.5 and 13.3 per 1 000 births for major and other public hospitals respectively.

- The rate of perinatal autopsies for Queensland in 1999 (45%) is lower than the rates observed elsewhere in Australia and overseas.

Paediatric mortality

- During 1999, there were 422 deaths of infants and children aged less than 15 years in Queensland.

- There were 252 post-neonatal deaths (28 days to 14 years), accounting for 60% of all deaths, resulting in a paediatric mortality rate of 34.5 per 100 000 persons for 1999.

- In 1999 Queensland had a similar infant mortality rate compared with the rest of Australia. Previously, Queensland's infant mortality rate has been consistently higher than the rest of Australia.

- In the post-neonatal paediatric population, the mortality rate was highest in the first year of life at 269.2 per 100 000 persons. This has fallen by 16% since 1997.

- Injuries were the most frequent major cause of death, accounting for 92 of the 252 post-neonatal deaths (37%). The overall rate of death for *injury* was 12.4 per 100 000 persons.

- Among post-neonatal infants, the most frequent cause of death was from conditions *determined at birth* with a mortality rate of 101.3 per 100 000 persons.

- There were 31 deaths determined to be due to *SIDS*. Seventeen (58%) of these deaths occurred in male infants.

- The rate of SIDS in Queensland for 1999 was similar to the rest of Australia (0.64 compared with 0.66 per 1 000 live births).

- In those under 5 years, *injury* accounted for 67% of all injury deaths, and was the most frequent cause of death in the age groups 1 to 4 years and 10 to 14 years.

- Of all paediatric deaths due to *injury*, 29% were *transport related* deaths. Most of these were deaths of a *passenger*.

- Twelve of the 92 *injury* deaths were due to *intentional injuries*. Six of these were possible or stated self harm and occurred in the 10 to 14 year age group.

- *Acquired conditions* were responsible for 21% of paediatric deaths in 1999. Malignancies (c*ancer)* accounted for 39% of deaths due to *acquired conditions.* The most frequent malignancy causing death in the paediatric population remains *acute lymphoblastic leukaemia.*

Indigenous mortality

- Data used to calculate perinatal and paediatric mortality rates are derived from different sources. Identification as "Indigenous" is not rigorously and consistently sought, and may be reliant upon self-identification, or the individual who completes the death certificate. Under-ascertainment of indigenous

status is likely. In this report "Indigenous" refers to the combined total of peoples of "Aboriginal" and "Torres Strait Islander" origin.

- There was one registered death of an indigenous mother (maternal death) in 1999.

- In 1999, 6% of births were to indigenous mothers, whilst 9% of perinatal deaths were in babies of Indigenous mothers. The indigenous perinatal mortality rate remains 1.6 times higher than the non-indigenous perinatal mortality rate.

- The perinatal mortality rates for indigenous populations were higher in most gestational age and birth-weight categories. The cause of perinatal death accounting for most of the increased perinatal mortality in indigenous populations was *unexplained preterm*, which occurred at a frequency greater than twice that of the non-indigenous population.

- Neonatal death rate due to *respiratory disorders* was almost four times higher in the indigenous population.

- The indigenous paediatric mortality rate was two times higher than that in the non-indigenous population. The rate of death due to *SIDS* was also two times higher in indigenous infants.

Recommendations

- Suggested areas for further investigation include the reasons for the higher rates of preterm birth in the indigenous population.

- Consideration be given to the establishment of a comprehensive register of congenital abnormalities which includes all terminations of pregnancy for birth defects and those detected following discharge from the hospital of birth.

- A systematic approach be established for the development, implementation and ongoing evaluation of clinical practice guidelines in the areas of pregnancy and childbirth, neonatal and paediatric health care.

- Guidelines prepared by Council for investigation of maternal and perinatal deaths in Queensland be endorsed and disseminated by Queensland Health.

- Consideration be given to the development and implementation of:

  – Guidelines for maternal and perinatal mortality autopsy

  – Guidelines for investigation of paediatric deaths in Queensland which include national standards for investigation of infant deaths.

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Chapter 1: Maternal Mortality

Executive summary

- There were 13 maternal deaths (4 Direct, 3 Indirect and 6 Incidental) identified in Queensland during 1999, and 48 044 mothers giving a maternal mortality ratio of 27.1 per 100 000 mothers.
- For the triennium 1997-99 a total of 26 maternal deaths (8 direct, 5 indirect and 13 incidental) were reported to the Council giving a maternal mortality ratio for Queensland of 18.2 per 100 000 mothers.
- The maternal mortality ratio in Queensland by triennia has been consistently higher that the ratio reported for Australia since 1991. The ratios for Queensland and Australia for the triennium 1991-93 were 16.8 and 10.9 and for 1994-96 18.3 and 13.0 per 100 000 mothers respectively.
- The higher maternal death ratio in Queensland compared to Australia is in part due to the higher ratio of indirect deaths but largely due to a consistently higher ratio of incidental deaths.
- The ratio of maternal deaths in Queensland from direct and indirect causes has been fairly stable for the last three triennia over the period 1988 to 1999, however the incidental death ratio has slowly increased from 3.9 per 100 000 mothers in the 1988-90 triennium to 9.1 in the 1997-99 triennium.
- In Queensland for the period 1997-99, the most frequent principal cause of incidental maternal deaths was homicide (3 of the 13 deaths). Homicide was also the most frequent principal cause of incidental deaths for Australia for the period 1994-96 (6 of the 34 incidental deaths).
- In the triennium 1997-99, avoidable factors were thought to be present in 11 (42%) of the 26 maternal deaths. The proportion of direct maternal deaths considered to have avoidable factors (50%) was similar to that reported for Australia (48%).
- In Queensland over the period 1997-99, identification of maternal deaths was increased by 38% with the use of additional sources to that of routine reporting mechanisms (Australian Bureau of Statistics). This level of under reporting is slightly higher than the proportion identified by the Council for the 1994-99 triennium of 27%. All of the additional deaths identified were classified as indirect or incidental deaths.

Introduction

Maternal mortality is now a very rare event, indicating a high standard of safety in the maternity services, but a detailed review of the circumstances surrounding maternal deaths still reveals aspects where improvements in care can be made. The Maternal Morbidity and Mortality Subcommittee carried out a confidential inquiry and detailed review of all the maternal deaths that occurred in Queensland in 1999. This report includes results of this review for 13 maternal deaths in 1999 and also includes analyses of 26 maternal deaths reported to the Council for the triennium 1997-99.

Definitions

Fetal deaths = stillbirth Defined by the Registration of Births, Deaths and Marriages Act as a child whose heart has not beaten after it has been completely expelled or extracted from its mother and who is either of not less than 20 weeks gestation; or of not less than 400g by weight at birth.

Livebirths: Defined by the Registration of Births, Deaths and Marriages Act as a child whose heart has beaten after it has been completely expelled or extracted from its mother.

Mothers: For the purposes of this report a mother is defined as the number of women having a pregnancy which resulted in a livebirth or fetal death.

Maternal death: A maternal death is defined by the World Health Organisation (WHO) as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. This definition excludes deaths from accidental or incidental causes.
The definition used in this report includes, in addition to the WHO definition, incidental deaths and deaths occurring more than 42 days after termination of the pregnancy, when their origin and illness related to the pregnancy[1].

Maternal mortality ratio: The maternal mortality ratio is defined as:

$$\frac{\text{Number of maternal deaths}}{\text{Number of mothers}} \times 100{,}000$$

Classification of maternal deaths.

Direct deaths are those which result from obstetric complications of the pregnant state (pregnancy, labour and puerperium) including deaths from interventions, omissions, inappropriate treatment, or from a chain of events resulting from any of the above. They are complications of the pregnancy itself.
Indirect deaths are those which result from pre-existing disease or disease that developed during pregnancy and was not due to direct obstetric causes, but which may have been aggravated by physiological effects of pregnancy.
Incidental deaths are those due to conditions occurring during pregnancy, where the pregnancy is unlikely to have contributed significantly to the death, although it is sometimes possible to postulate a distant association.

Avoidable factors are defined as departures from the accepted standard of satisfactory care that may have played a part in the death. *It is not suggested that in cases in which avoidable factors are considered present, death could certainly have been prevented, but such judgements indicate that the expert panel considered that the risk of death could have been lessened had the management been different.* The subcommittee applied these criteria to the individual cases, and further considered whether the avoidability related to the clinical care, or to the setting in which the treatment was provided, or to factors associated with non-compliance.

[1] Maternal Mortality Working Party, NHMRC. Report on Maternal Deaths in Australia 1991-93. Canberra: NHMRC; 1998

Data sources

All deaths, including maternal deaths, are reported via the Registrar General's Office to the Australian Bureau of Statistics (ABS), where deaths are coded according to the International Classification of Diseases 10th Revision (ICD10). A quarterly report is provided via the (Queensland) Office of the Government Statistician (OGS) to the Secretariat of the Council. Notifications of maternal deaths are also received through the annual survey of maternity institutions conducted by the Council Secretariat and by direct notification by clinicians.

Modus operandi

When a maternal death is notified to the Council Secretariat, a confidential inquiry is undertaken, with the authorisation and protection of Sections 154 M&N of the Health Act. The Council relies for the successful conduct of these inquiries on the cooperation it receives from clinicians across the State. The members of the Maternal Morbidity and Mortality Subcommittee are provided with the clinical details for review. Following consideration of these details and the setting in which the death occurred, the primary cause of death is ascertained, the classification is applied, and a judgement is made about the presence of avoidable factors.

Definitions for maternal mortality

Different definitions for maternal mortality are reported.[1] The national Advisory Committee on Maternal Morbidity and Mortality reports the maternal mortality for Australia ratio using the denominator of births (livebirths or stillbirths) of at least 400g or 20 weeks if the weight is unknown. This differs from the definition used for maternal mortality in Queensland in that the denominator includes all liveborn babies regardless of gestation or birthweight and fetal deaths of *either* at least 20 weeks *or* 400g. Although differences in definitions should be considered when making comparisons with national maternal mortality ratio it is reasonable to do so due to the very low numbers of maternal deaths.

The national Advisory Committee also reports national ratios using the World Health Organisation (WHO) definition to facilitate international comparisons. The WHO defines maternal mortality ratio as the number of maternal deaths, related to the numbers of livebirths, as this denominator is more widely available. In an attempt to achieve more uniform data collection across Australia, the national Advisory Committee, in the most recent report on maternal deaths in Australia, has modified this definition to include only deaths among pregnant women or within 42 days of pregnancy being delivered or terminated.[2]

Maternal mortality ratios and trends

The ratios for direct, indirect and incidental maternal deaths in Queensland for the triennium 1997-99 were 5.6, 3.5 and 9.1 per 100 000 mothers respectively. The ratio for direct deaths for the period 1997-99 is lower than the previous two triennium 1991-93 (3.7) and 1994-96 (7.7) and is similar to the ratio for Australia 1994-96 of 6.9 per 100 000.

Maternal mortality ratios for Queensland for the years 1988 to 1999 by classification are shown in Table 1.1. The overall maternal mortality ratio increased from 1988 to 1993 (12.3 and 21.4 per 100 000 mothers respectively) and has since stabilised. The overall maternal mortality ratio for Queensland for 1999 was 27.1 per 100 000 mothers.

When numerators are small and denominators large, as with the maternal mortality ratio, differences in rates and short-term fluctuations render interpretation difficult. To enable more meaningful consideration of maternal death in Queensland including national comparisons, maternal deaths for the years 1997 to 1999 have been combined. The ratio for Queensland for the triennium 1997-99 was 18.2 per 100 000 mothers, which was higher than the national ratio of 13.0 per 100 000 for the triennium 1994-96. Over the period 1991-99 the ratio observed in Queensland was higher than the ratio reported for Australia mainly due to more incidental deaths Table 1.2. This may be directly related to the efforts that the Council in Queensland has made to maximise ascertainment.

The indirect maternal death ratio in Queensland has been stable for the past three triennia over the years 1991 to 1999 (4.4, 3.5 and 3,5 per 100 000 mothers) and has been slightly higher than the ratio for Australia for the triennia 1991-93 and 1994-96 (2.7 and 2.6 per 100 000 mothers respectively).

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[2] Advisory Committee on Maternal Mortality and Morbidity. Report on Maternal Deaths in Australia 1994-96. AIHW cat. no. PER 13. Canberra: AIHW; 2001.

The incidental maternal death ratio in Queensland has also been stable and higher than the ratio for Australia for the past three triennia over the years 1991 to 1999 (16. 8, 18.2 and 18.2 per 100 000 respectively) compared with 10.9 and 13.00 per 100 000 for Australia for the triennia 1991-93 and 1994-96 respectively.

Table 1.1 Maternal mortality, Queensland 1988-99

Year	Total Mothers	Deaths							
		Direct		Indirect		Incidental		All deaths	
		n	ratio[1]	n	ratio[1]	n	ratio[1]	n	ratio[1]
1988	40 628	1	2.5	1	2.5	3	7.4	5	12.3
1989	42 296	3	7.1	0	0.0	1	2.4	4	9.5
1990	44 467	2	4.5	0	0.0	1	2.2	3	6.7
1991	44 131	2	4.5	2	4.5	3	6.8	7	15.9
1992	46 073	0	0.0	3	6.5	3	6.5	6	13.0
1993	46 765	3	6.4	1	2.1	6	12.8	10	21.4
1994	47 356	5	10.6	2	4.2	3	6.3	10	21.1
1995	47 864	5	10.4	3	6.3	2	4.2	10	20.9
1996	47 302	1	2.1	0	0.0	5	10.6	6	12.7
1997	47 163	4	8.5	2	4.2	3	6.4	9	19.1
1998	47 450	0	0.0	0	0.0	4	8.4	4	8.4
1999	**48 044**	**4**	**8.3**	**3**	**6.2**	**6**	**12.5**	**13**	**27.1**

Source: QCOPMM
[1] per 100 000 mothers

Table 1.2 Maternal mortality by triennia, Queensland 1988-99 and Australia 1988-99

Triennia	Total mothers	Deaths							
		Direct		Indirect		Incidental		All deaths	
		n	ratio[1]	n	ratio[1]	n	ratio[1]	n	ratio[1]
Queensland									
1988-90	127 391	6	4.7	1	0.8	5	3.9	12	9.4
1991-93	136 969	5	3.7	6	4.4	12	8.8	23	16.8
1994-96	142 522	11	7.7	5	3.5	10	7.0	26	18.2
1997-99	142 657	8	5.6	5	3.5	13	9.1	26	18.2
Australia									
1988-90	754 468	37	4.9	33	4.4	26	3.4	96	12.7
1991-93	769 253	27	3.5	21	2.7	36	4.7	84	10.9
1994-96	767 448	46	6.0	20	2.6	34	4.4	100	13.0

Source: AIHW Report on Maternal Deaths in Australia, 1994-96.
[1] per 100 000 mothers

Classification of maternal deaths, Queensland 1997-1999

In Queensland there were 4 Direct, 3 Indirect and 6 Incidental deaths in 1999 which were reported to the Council. For the triennium 1997-99 there were 8 Direct, 5 Indirect and 13 Incidental deaths giving the distribution of the classification categories for Queensland 1997-99 of Direct 31%, Indirect 19% and Incidental 50%. This distribution differs from that of Australia for the triennium 1994-96 of 46%, 20% and 34% respectively. The higher proportion of Incidental deaths in Queensland may be partly due to due to increased efforts to identify all maternal deaths in Queensland.

Differences in the application of maternal death classifications across Australian State and Territory Committees have been highlighted in the recent national report, particularly for the non-direct causes of suicide and drug overdose. The report also highlighted the importance of reporting all maternal deaths, including apparently incidental deaths, due the difficulty in determining the relevance of pregnancy to certain causes of death such as murder, suicide or accident.[2]

Causes of maternal deaths, Queensland 1997-1999

The causes of maternal death in Queensland for the period 1997-99 are presented in Table 1.3.

Direct maternal deaths

The causes of the 8 direct deaths in Queensland for the triennium 1997-99 were amniotic fluid embolism (3); postpartum or intrapartum haemorrhage (3); hypertension/eclampsia (1); and anaesthesia related (1). In Australia for the triennium 1994-96, the three principal causes of direct maternal death accounting for 23 of the 45 direct deaths were pulmonary embolus (8); amniotic fluid embolus (8); and pre-eclampsia, pregnancy induced hypertension (7).

Indirect maternal deaths

Of the 5 indirect maternal deaths in Queensland for the triennium 1997-99, 3 were due to pre-existing cardiac disease; 1 was due to septicaemia and 1 due to pulmonary embolus post non-obstetric surgery. Pre-existing cardiovascular disease was also the main principal cause of indirect deaths reported for Australia for the triennium 1994-96 (10 of the 20 indirect deaths).

Incidental maternal deaths

The most frequent principal causes of death in the 13 incidental maternal deaths for Queensland for the period 1997-99 were homicide (3), drug overdose (2) and subarachnoid haemorrhage (2). Homicide was also the most frequent principal cause of incidental deaths for Australia over the period 1994-96 (6 of the 34 incidental deaths) and was the highest recorded in any triennium in Australia, the number reported in the 10 triennia from 1964-66 to 1991-93.[2] Increased efforts in ascertainment of maternal death may partly explain this apparent increase.

There is a growing recognition of the contribution of homicide to maternal death and the increased risk of homicide for women during pregnancy with emerging reports suggesting that much of this violence is perpetrated by intimate partners.[3,4,5] Queensland Health's contribution to the whole of Government approach to domestic violence is the Domestic Violence Initiative (DVI), funded by Crime Prevention Queensland. A primary objective of the initiative is to enhance the capacity of health care professionals to identify women experiencing violence. Following a consultative process and staff training, routine screening for domestic violence was introduced in antenatal clinics and emergency departments at a number of trial sites across Queensland. An evaluation of the process showed that approximately 8% of women were prepared to admit to an abusive relationship, providing an opportunity for intervention and support. The evaluation also involved a survey of over 1500 women to determine their feelings about being asked direct questions about domestic violence in a health care setting. Over 97% of respondents reported feeling comfortable about the

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3 Examining Homicide's Contribution to Pregnancy-Associated Deaths. JAMA 2001; 285:1510-1511.

4 The Department of Health. Why mothers die. Report on Confidential Enquiries into Maternal Deaths in the United Kingdom 1994-1996. London: TSO; 1998

5 Horon I, Cheng D. Enhanced Surveillance for Preganancy-Associated Mortality-Maryland, 1993 – 1998. JAMA 2001;285:1455-1459.

process and believed it was a good idea to ask the questions. Based on these positive results, the Initiative is being rolled out to hospitals throughout the State.[6,7]

Table 1.3: Maternal mortality by cause of death, Queensland 1997-1999

Classification of death	Cause of death	Number
Direct		**8**
	Amniotic fluid embolism	3
	Utero-placental haemorrhage	3
	Postpartum haemorrhage	*2*
	Intrapartum haemorrhage	*1*
	Hypertension/eclampsia	1
	Anaesthesia related	1
Indirect		**5**
	Cardiovascular disease	3
	Marfan's Syndrome	*1*
	Coronary Artery Disease	*1*
	Arrythmogenic Right Ventricular Failure	*1*
	Pulmonary embolism (post non-obstetric surgery)	1
	Septicaemia	1
Incidental		**13**
	Homicide	3
	Drug overdose	2
	Subarachnoid haematoma	2
	Acute asthma	1
	Acute leukaemia	1
	Myoclonic epilepsy	1
	Viral pneumonitis	1
	Unintentional injury	1
	Unknown[1]	1
Total		**26**

Source: QCOPMM
[1] Maternal death not reviewed by the Committee

[6] Initiative to combat the health impact of domestic violence against women. Stage 1 Evaluation Report. Queensland Health, March 2000

[7] Initiative to combat the health impact of domestic violence against women. Stage 2 Report. Queensland Health, March 2001

Avoidable factors

The Subcommittee was guided by the NHMRC Working Party's recommendation that avoidable factors can be considered to be present when there is a departure (for whatever reason) from an accepted standard of care. When avoidable factors were found further classification was undertaken as to whether they should be ascribed to:
1) the clinical care,
2) the clinical setting or
3) to the woman and/or her companion or family.

Consideration of avoidability for direct and indirect deaths is a judgement largely based on assessment of the clinical circumstances. On the other hand, incidental deaths from both intentional and unintentional injury must by definition have avoidable factors, therefore in the context of maternal mortality, are classified as avoidable.

For the triennium 1997-99, avoidable factors were thought to be present in 11 (42%) of the 26 maternal deaths (Table 1.4). Five of the 13 direct or indirect deaths over this period were considered to have avoidable factors (38%). The proportion of direct maternal deaths with avoidable factors in Queensland is similar to the rate reported for Australia of 48% for the period 1994-96.[2] The presence of avoidable factors indicates a continuing need for confidential inquiry into all maternal deaths, and careful addressing of any detected clinical or service deficiencies.

Table 1.4: Maternal mortality, avoidable factors by classification, Queensland 1997-1999

Factor	Direct	Indirect	Incidental	All deaths
	n=8	n=5	n=13	n=26
Clinical care	3	-	-	3
Clinical setting	-	1	-	1
Woman/companion/family	1	-	6	7
Total	**4**	**1**	**6**	**11**

Source: QCOPMM

Ascertainment of maternal deaths in Queensland

In Queensland over the period 1997-99, identification of maternal deaths was increased by 38% with the use of additional sources to that of routine reporting mechanisms from the Australian Bureau of Statistics (ABS) from information included on death certificates. This level of under reporting is slightly higher than the proportion identified by the Council for the 1994-99 triennium of 27%. All of the additional deaths identified were classified as indirect or incidental deaths. The additional sources used were a routine survey of all maternity hospitals in Queensland and an encouragement of clinicians to report maternal deaths to the Council secretariat, which was included in guidelines on maternal and perinatal mortality review prepared by Council for Queensland maternity hospitals.

Nationally and internationally, incomplete ascertainment of maternal deaths is well recognised and poses a serious threat to future prevention of maternal deaths. [2,8] Measures currently underway in Australia which are expected to improve ascertainment of maternal deaths include accessing multiple sources of information (eg State and Territory Committees, ABS mortality data and the National Hospital Morbidity Database) the inclusion of tick boxes for maternal death on death certificates, and multiple cause death coding by the ABS.[2]

Table 1.5: Maternal mortality, notification sources by classification, Queensland 1994-1999

Year	Notification sources								
	Direct		Indirect		Incidental		Total		
	OGS[1]	Other[2]	OGS[1]	Other[2]	OGS[1]	Other[2]	OGS[1]	Other[2] (%)	Deaths
1994-96	11	0	3	2	5	5	19	7 (27)	26
1997-99	8	0	1	3	7	7	16	10 (38)	26
1994-99	**19**	**0**	**4**	**5**	**12**	**12**	**35**	**17 (33)**	**52**

Source: QCOPMM
[1] Notified to QCOPMM by the Office of the Government Statistician (OGS) from ABS information.
[2] Additional notifications to that of routine reporting from the OGS.

[8] Horon I, Cheng D. Enhanced Surveillance for Preganancy-Associated Mortality-Maryland, 1993 – 1998. JAMA 2001; 285:1455-1459.

Review of individual maternal deaths, by classification, Queensland 1999

Direct maternal deaths, Queensland 1999

1. A 35 year old woman, gravida 6, para 5 was taken to operating theatre for manual removal of a retained placenta following spontaneous delivery of a healthy infant. There was a failed intubation at induction of anaesthesia with subsequent respiratory arrest. The woman was transferred to intensive care for continued life support, which was subsequently withdrawn because of hypoxic brain damage. The autopsy showed global brain damage with raised intracranial pressure.

Cause of death: Anaesthetic death
Classification: Direct

2. A 34 year old woman, gravida 3 para 2 with a twin pregnancy was admitted to hospital following prelabour rupture of the fetal membranes at 19 weeks gestation. At 25 weeks gestation the twins were delivered. A large intrapartum haemorrhage occurred during a difficult delivery of Twin 2 by caesarean section. Gross pulmonary oedema developed shortly after delivery and the woman was transferred to intensive care where she died in spite of active resuscitation. The main cause of death at autopsy was found to be intrapartum haemorrhage.

Cause of death: Intrapartum haemorrhage
Classification: Direct

3. A 29 year old primigravid woman, induced for preeclampsia at 41 weeks gestation, suffered seizures during labour and required intubation and mechanically ventilation and delivery by caesarean section. A live baby was delivered weighing 4300g. The autopsy showed evidence of amniotic fluid embolism.

Cause of death: Amniotic fluid embolism
Classification: Direct

4. A 35 year old woman with seven previous pregnancies underwent an elective caesarean section for a breech presentation and Grade 1 posterior placenta praevia at 38 weeks gestation under a spinal anaesthetic. During delivery the woman lost consciousness, convulsed and was intubated and mechanically ventilated. Cardiac arrest and haemorrhage ensued and following unsuccessful active resuscitation, treatment was ceased. The autopsy showed disseminated intravascular coagulation and amniotic fluid embolus.

Cause of death: Amniotic fluid embolism
Classification: Direct

Indirect maternal deaths, Queensland 1999

5. A 23 year old women, para 2, with Marfan's Syndrome and a twin pregnancy at 36 weeks gestation collapsed at home and subsequently suffered a respiratory arrest in the ambulance while being transported to hospital. The woman died shortly after admission to the receiving hospital despite active resuscitation. The autopsy examination revealed Coronary Artery Dissection, Acute Aortic Dissection and confirmed Marfan's Syndrome.

Cause of death: Aortic Dissection due to Marfan's syndrome
Classification: Indirect

6. An 18 year old primiparous woman, nine weeks postpartum collapsed suddenly at home. The autopsy examination showed severe coronary artery atherosclerosis. The woman was a heavy smoker (20 cigarettes per day) and her BMI was 30. The autopsy report indicated the possibility of predisposing familial hyperlipidaemia.

Cause of death: Coronary artery disease
Classification: Indirect

7. A 30 year old primigravid woman at 23 weeks gestation with a history of SLE collapsed at home. Following admission to a rural hospital, a provisional diagnosis of pulmonary embolus was made. Intravenous heparin was commenced and transfer to the intensive care unit of a base hospital was arranged. Severe hypoperfusion and hypoxia persisted from the time of collapse and death ensued in spite of active resuscitation. The autopsy showed myocardial changes consistent with, but not diagnostic of arrhythmogenic right ventricular dysplasia.

Cause of death: Arrhythmogenic right ventricular dysplasia
Classification: Indirect

Incidental maternal deaths, Queensland 1999

8. A 24 year old woman in her first pregnancy at approximately 15 weeks gestation died as a result of drowning following a helicopter crash.

Cause of death: Helicopter crash - drowning
Classification: Incidental

9. A 27 year old woman, para 4, was admitted to hospital following collapse and seizures at home. On admission to hospital a history of intravenous amphetamine use throughout the pregnancy and complaints of a headache prior to having the seizure was noted. Mechanical ventilation was commenced. A CT scan was performed which showed a large subdural haematoma. Autopsy revealed a subarachnoid haemorrhage from a ruptured left middle cerebral artery saccular aneurysm.

Cause of death: Subarachnoid haemorrhage
Classification: Incidental

10. A 24 year old woman in her fourth pregnancy at 32 weeks gestation died suddenly at home. At the time of finalisation of this report, details were not available from the Coroner or the Government Medical Officer who performed an autopsy to enable review by the Subcommittee. Based on the information available, the death has been provisionally classified as incidental.

Cause of death: Unknown
Classification: Incidental

11. A 37 year old woman at approximately 12 weeks gestation with a previous history of acute severe recurrent asthma, cardiomyopathy and heavy smoking, presented at the emergency department of a level 2 hospital with an acute episode of asthma. Treatment included oxygen, ventolin, hydrocortisone and (within a few hours of admission) intubation and ventilation. Due to continued deterioration, transfer was not possible. Cardiac arrest and death ensued. No post mortem examination was conducted.

Cause of death: Acute Asthma
Classification: Incidental

12. A 33 year old woman of unknown parity, known to be a heroin addict on the Naltrexone program, died suddenly at home. The woman was said to be suffering depression following a relationship failure. The autopsy examination revealed a pregnancy of 10 week gestation and multiple drug toxicity.

Cause of death: Drug overdose
Classification: Incidental

13. A 19 year old woman with a history of heroin use was admitted to an intensive care unit with a suspected drug overdose and cardiopulmonary arrest and was noted to have a pregnancy of be approximately twelve weeks gestation. Significant hypoxic brain damage was suspected and death ensured at approximately 36hours after admission. An autopsy was undertaken showing the cause of death as cardiac and respiratory arrest due to a drug overdose.

Cause of death: Drug overdose
Classification: Incidental

Chapter 2: Perinatal Mortality

Executive summary

- There were 48 749 births and 518 perinatal deaths in Queensland for 1999 giving a crude perinatal mortality rate of 10.6 per 1 000 total births. This was comprised of a fetal mortality rate of 7.1 per 1 000 total births and a neonatal mortality rate of 3.5 per 1 000 livebirths.
- Since 1983 the rate of perinatal deaths in Queensland has been similar to that observed for Australia.
- Preterm births (<37 weeks) accounted for 8% of infants and 79% of perinatal deaths. Very preterm births (<28 weeks) accounted for <1% of infants and 57% of perinatal deaths**.**
- Twins and higher order multiple births account for 3% of births, and was considered the primary cause of perinatal death (using the QCPMC classification) in 12% of perinatal deaths.
- The main causes of death according to the Queensland Council Perinatal Mortality Classification were *Congenital Anomaly* (24%), *Unexplained Antepartum Death* (18%) and *Unexplained Preterm* (18%).
- The overall rate of *Unexplained Antepartum Death* was 2.0 per 1 000 births which is over three times the rate of SIDS.
- Compared with Australia as a whole Queensland had a higher perinatal mortality rate due to Congenital Anomalies (2.5 compared with 1.6 per 1000 births).
- Of all fetal deaths 10% were attributed to voluntary interruption of pregnancy ≥20 weeks.
- When perinatal mortality for public facility types is corrected for gestational age the perinatal mortality rate for Tertiary Women's Hospitals was 9.7 per 1 000 births, compared with a rate of 12.5 and 13.3 per 1 000 births for Major and Other Public Hospitals respectively.
- The rate of perinatal autopsies for Queensland in 1999 (45%) compares unfavourably with rates observed elsewhere in Australia and overseas and is well below the recommended rate of 75%.

Modus operandi

Perinatal deaths are notified by the Registrar General's Office to the Perinatal Data Collection (PDC), Data Services Unit of Queensland Health. The Chief Health Officer then requests on behalf of the Council that a copy of the autopsy and other relevant material be sent to the PDC to facilitate classification by the Perinatal Mortality Working Group of the Council Perinatal Subcommittee. The PDC collates and makes available all information on the deaths for review by the Working Group. For the review of deaths for 1999, the Working Group consisted of an obstetrician (Jeremy Oats), neonatologist (David Tudehope), perinatal pathologist (Diane Payton) and the Council Research Officer (Vicki Flenady). During 1999 a number of institutional Mortality Committees collaborated with the Council in the perinatal mortality review process. These were committees at the Mater Mothers' and Royal Women's Hospital, Brisbane; the Kirwan Hospital for Women, Townsville; Ipswich, Nambour, Redcliffe, Caboolture, Rockhampton Hospitals and the Peninsula and Torres Strait Island Committee. The Working Group received case summaries and cause of death classifications assigned by these Committees for 293 (57%) perinatal deaths occurring in 1999.

Each case was classified according to the primary cause of death using the clinical classifications developed by the Council. Two classifications were applied to perinatal deaths: an obstetric antecedent classification (Queensland Council Perinatal Mortality Classification – QCPMC) for all perinatal deaths and the Neonatal Mortality Classification for all neonatal deaths.

Clinical classification for perinatal death

Queensland Council Perinatal Mortality Classification (QCPMC)

In order to develop preventive strategies, it is necessary to be able to focus on those maternal/fetal factors which may have contributed to the death. After extensive experience with classifying perinatal deaths, and in order to overcome several perceived shortcomings of the earlier classification systems and with the ICD 9 system, members of the Council developed a more inclusive, hierarchical and user-friendly system. This Queensland Council Perinatal Mortality Classification system identifies the primary maternal and/ or fetal factors that led to the death, and is the classification system used in this report (Appendix 1).
In 1998 this system was further refined and renamed the Queensland Council Perinatal Mortality Classification, (QCPMC) and was circulated to clinicians in Queensland as part of the document *Maternal and Perinatal Mortality Audit- Guidelines for Queensland Hospitals, April 1999*.

Neonatal Classification

A separate neonatal mortality classification was considered necessary by the Council as the classification of perinatal deaths by obstetric antecedent frequently does not provide sufficient information to appreciate the cause of neonatal death. The Council has adopted (and slightly modified) the system of classifying neonatal deaths developed by the South Australian Perinatal Committee. The Neonatal Classification assists in the identification of preventable aspects of neonatal mortality and is applied to all babies who were born alive and died within 28 days of birth (Appendix 2).

Australia and New Zealand perinatal mortality classifications

In early 2000, the National Perinatal Data Development Committee (NPDDC), following two previous workshops in 1996 and 1998, agreed to attempt to develop uniform classification systems for use throughout Australia and New Zealand. It was agreed at this meeting that draft classifications be developed by the Queensland and South Australian representatives and circulated for comment. At a subsequent workshop in July 2000 the two new classifications, the Australian and New Zealand Classification of Perinatal Mortality (ANZACPM) and the Australian and New Zealand Neonatal Death Classification (ANZNDC) were accepted. These classifications have been circulated to Queensland hospitals in the guidelines update for deaths in Queensland from 2001.

Data sources

The data used in this chapter have been obtained from participating institutional Committees (see above), the Perinatal Data Collection (PDC) of the Data Services Unit in the Health Information Centre of Queensland Health, the Australian Institute of Health and Welfare's National Perinatal Statistics Unit (NPSU) and from the Australian Bureau of Statistics (ABS). It should be noted that there are differences between the reporting practices of the ABS and the PDC with respect to time periods covered, place of usual residence and entry criteria and therefore information from the two sources is not directly comparable.

- The ABS records deaths by year of registration and place of usual residence of the mother and the PDC by year and State of birth occurrence.
- The ABS reports only on deaths of babies of at least 400g birthweight or 20 weeks gestation where birthweight is unknown, whereas the PDC uses **either** 400g **or** 20 weeks as the entry criteria. In 1999 there were 99 births (all perinatal deaths) collected by PDC which fell outside the ABS criteria.

Definitions

Fetal death	Defined by the Registration of Births, Deaths and Marriages Act as a child whose heart has not beaten after it has been completely expelled or extracted from its mother and who is either of not less than 20 weeks gestation; or of not less than 400g by weight at birth.
Live birth	Defined by the Registration of Births, Deaths and Marriages Act as a child whose heart has beaten after it has been completely expelled or extracted from its mother.
Neonatal death	The death of an infant within 28 days of birth.
Infant death	The death of an infant under one year of age.
Perinatal mortality rate	The number of fetal and neonatal deaths per 1 000 total births.
Fetal mortality rate	The number of fetal deaths per 1 000 total births.
Neonatal mortality rate	The number of deaths of live born infants under 28 days of age per 1 000 live births.
Infant mortality rate	The number of deaths of infants under one year of age in a period per 1 000 live births in the same period.

Rates and trends

The crude perinatal mortality rate for Queensland for 1999 was 10.6 per 1 000 total births. This was made up of a fetal mortality rate of 7.1 per 1 000 total births and a neonatal mortality rate of 3.5 per 1 000 livebirths. (Table 2.1)

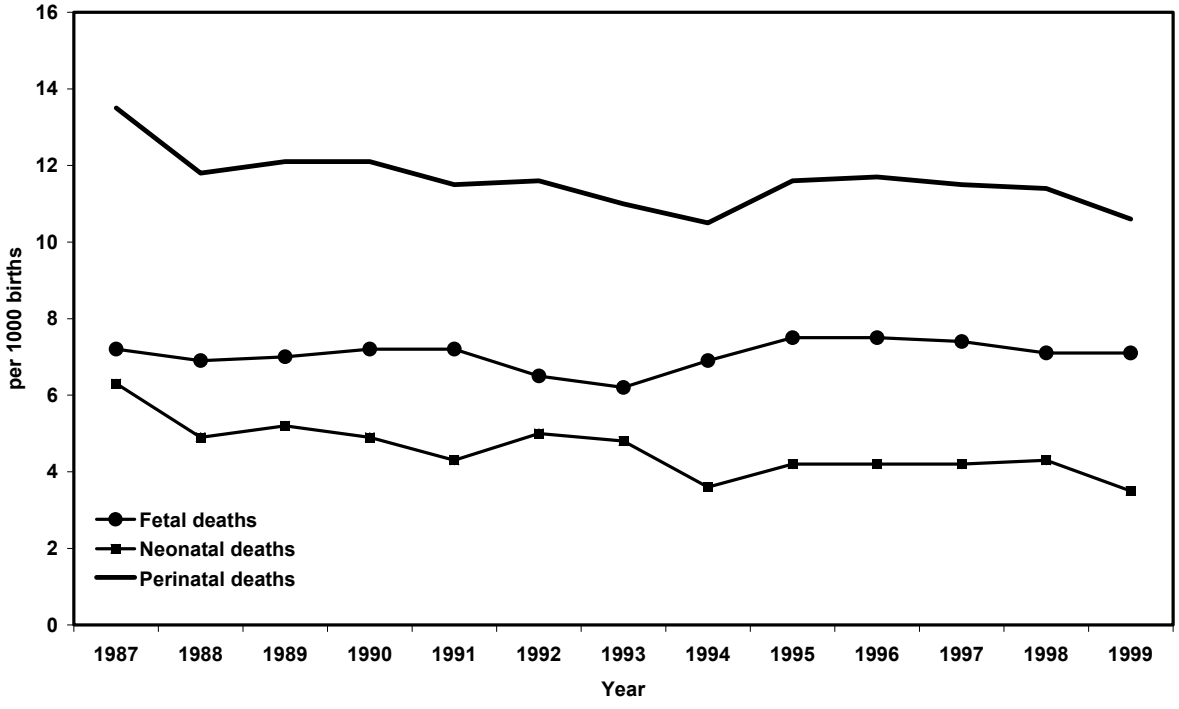
Table 2.1: Fetal, neonatal and perinatal deaths, Queensland 1999

Total Births	Live Births	Fetal deaths		Neonatal deaths		Perinatal deaths	
		n	rate[1]	n	rate[1]	n	rate[1]
48 749	48 402	347	7.1	171	3.5	518	10.6

Source: Perinatal Data Collection, DSU, QH
[1] per 1 000 births

There was a small decline in the perinatal mortality rate over the eight years from 1987 to 1995 and has been relatively stable up to 1998 with a small reduction in 1999 due to a 19% decline in neonatal mortality. The fetal death component increased over the period 1993 to 1995 and has been stable since then. (Figure 2.1). Late terminations of pregnancy (≥20 weeks gestation) as a result of voluntary interruption of pregnancy contributed to this increase in the fetal mortality rate and remains a substantial proportion of fetal deaths (10%).

Figure 2.1: Fetal, neonatal and perinatal mortality rates, Queensland 1987-1999



Source: Perinatal Data Collection, DSU, QH

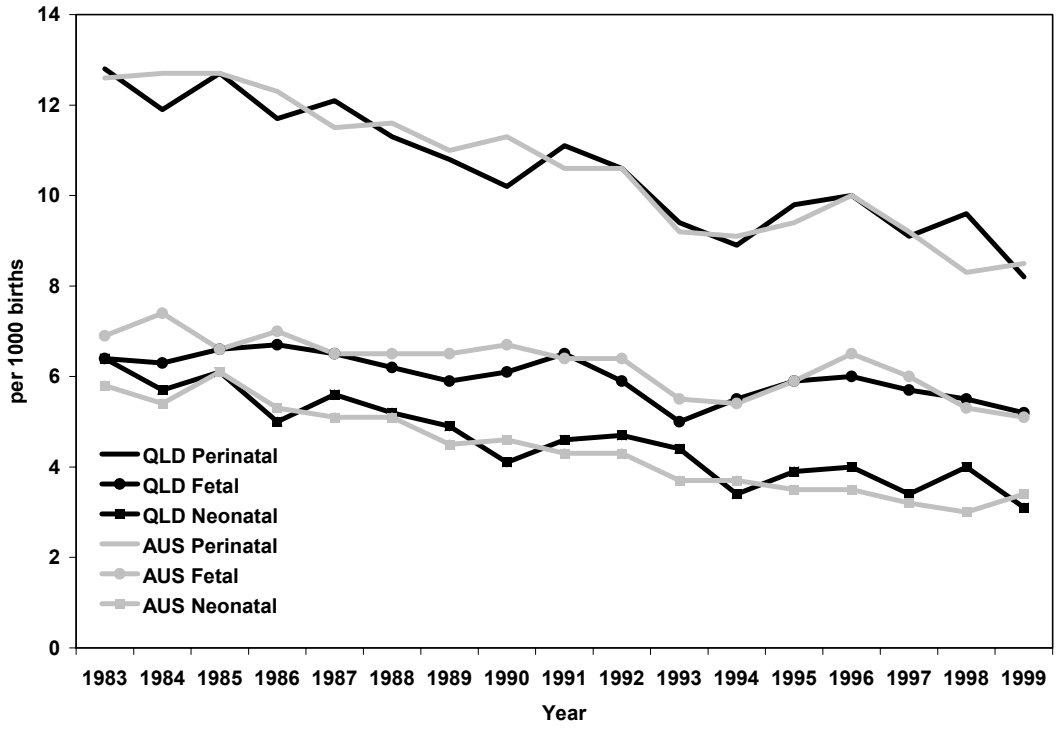
Comparison with Australia

As described above (see Data sources), there are differences in definitions and reporting practices between the Australian Bureau of Statistics (ABS) and the Perinatal Data Collection of Queensland Health (PDC), rendering precise comparisons difficult. In particular, the ABS reports deaths according to the place of usual residence of the mother whereas the PDC reports deaths of all infants born in Queensland.

Thirty five fetal deaths due to late terminations of pregnancy were performed in Queensland many of whom are not usually resident in this State. This may explain why ABS reports a lower fetal death rate than PDC for 1999 (5.2 vs 7.1). Furthermore, there are neonatal deaths of infants born in Queensland to women usually resident outside the State as a result of in-utero transfer. For this reason, ABS also reports a lower neonatal mortality rate than the PDC for 1999 (3.1 vs 3.5).

However, using the ABS definition of 400g birthweight or 20 weeks gestation (where birthweight is unknown) as the entry criteria and by State of usual residence, the rate of decline in perinatal mortality for Queensland and Australia since 1983 is similar. Using this definition, the perinatal mortality rate for women resident in Queensland (8.2 per 1 000 births) was lower than the national rate of 8.5 per 1 000 births in 1999, as a result of a lower neonatal mortality rate (3.1 vs 3.4). (Figure 2.2)

Figure 2.2: Perinatal mortality rates, Queensland and Australia 1983-1999



Source: ABS
rates per 1 000 births (ABS definition).

Gestational age and birthweight specific perinatal mortality rates

Perinatal mortality rates by gestational age and birthweight are displayed in Table 2.2 and Table 2.3, as crude rates and rates corrected for major congenital abnormality.

Preterm births (<37 weeks) accounted for 8% of infants and 79% of perinatal deaths. Very preterm births (<28 weeks) accounted for 0.9% of infants and 57% of perinatal deaths**.**

When corrected for major congenital abnormality, the perinatal mortality rate for infants born at term is extremely low (1.6 per 1000). For non-malformed infants born alive at term (37 to 41 completed weeks), less than one death per 2000 occurred within 28 days. For non-malformed infants at term, the risk of death before birth (fetal death) is four times higher than the risk of death in the 28 days following birth (1.3 compared with 0.3 per 1000).

The fetal death rate for infants born at 42 weeks or greater was 4.8 per 1000 births compared to 1.5 per 1000 for those born at term. The widely disseminated results of the systematic review of randomised trials for post-term pregnancies in 1992 indicated benefit for induction of labour for women at 41 weeks gestation or greater.[9] Although the rate of post-term deliveries has decreased from 3.8% in the triennia 1987-89 to 2.7% over the period 1994-97[10], increasing the application of evidence based practice for women in this high risk group may further reduce the risk of adverse outcome.

[9] Crowley P. Interventions for preventing or improving the outcome of delivery at or beyond term (Cochrane Review). In: The Cochrane Library, Issue 3, 2001. Oxford: Update Software.

[10] Perinatal Data Collection, Data Services Unit, Queensland Health.

Table 2.2: Perinatal mortality rates by gestational age, Queensland 1999

	Gestational age (weeks)									
	<22	22 - 24	25 - 27	28 - 29	30 - 31	32 - 34	35 - 36	37 - 41	42+	Total[1]
Total births	92	168	171	188	255	967	2039	44028	840	48749
% of total births	0.2	0.3	0.4	0.4	0.5	2.0	4.2	90.3	1.7	100.0
Total live births	24	71	140	170	241	937	2018	43964	836	48402
Total fetal deaths	68	97	31	18	14	30	21	64	4	347
% of total fetal deaths	19.6	28.0	8.9	5.2	4.0	8.6	6.1	18.4	1.2	100.0
Fetal death rate[2]	739.1	577.4	181.3	95.7	54.9	31.0	10.3	1.5	4.8	7.1
Total neonatal deaths	24	54	23	5	7	7	12	38	1	171
% of total neonatal deaths	14.0	31.6	13.5	2.9	4.1	4.1	7.0	22.2	0.6	100.0
Neonatal death rate[3]	1000.0	760.6	164.3	29.4	29.0	7.5	5.9	0.9	1.2	3.5
Total perinatal deaths	92	151	54	23	21	37	33	102	5	518
% of total deaths	17.8	29.2	10.4	4.4	4.1	7.1	6.4	19.7	1.0	100.0
Perinatal mortality rate[2]	1000.0	898.8	315.8	122.3	82.4	38.3	16.2	2.3	6.0	10.6
Corrected perinatal mortality[4]										
Fetal death with CA[5]	25	15	5	2	1	2	4	7	0	61
Fetal death rate[2]	641.8	535.9	156.6	86.0	51.2	29.0	8.4	1.3	4.8	5.9
Neonatal death with CA[5]	5	6	4	1	2	6	10	26	1	61
Neonatal death rate[3]	1000.0	738.5	139.7	23.7	20.9	1.1	1.0	0.3	0.0	2.3
Perinatal deaths with CA[5]	30	21	9	3	3	8	14	33	1	122
Perinatal deaths without CA[5]	62	130	45	20	18	29	19	69	4	396
Corrected perinatal mortality rate[2]	1000.0	884.4	277.8	108.1	71.4	30.2	9.4	1.6	4.8	8.1

Source: Perinatal Data Collection, DSU, QH
[1] includes "not stated" – 1 livebirth.
[2] rate per 1 000 births
[3] rate per 1 000 livebirths
[4] corrected for congenital anomaly
[5] congenital anomaly

Table 2.3: Perinatal mortality rates by birthweight, Queensland 1999

	Birthweight (g)														
	<500	500-749	750-999	1000-1249	1250-1499	1500-1749	1750-1999	2000-2249	2250-2499	2500-2999	3000-3499	3500-3999	4000-4499	>4500	Total[1]
Total births	189	129	132	150	191	243	383	673	1196	6923	16861	15538	5211	925	48749
% of total births	0.4	0.3	0.3	0.3	0.4	0.5	0.8	1.4	2.5	14.2	34.6	31.9	10.7	1.9	100.0
Total live births	46	84	112	139	177	233	372	654	1184	6900	16838	15528	5207	923	48402
Total fetal deaths	143	45	20	11	14	10	11	19	12	23	23	10	4	2	347
% of total fetal deaths	41.2	13.0	5.8	3.2	4.0	2.9	3.2	5.5	3.5	6.6	6.6	2.9	1.2	0.6	100.0
Fetal death rate[2]	756.6	348.8	151.5	73.3	73.3	41.2	28.7	28.2	10.0	3.3	1.4	0.6	0.8	2.2	7.1
Total neonatal deaths	40	42	21	5	5	5	5	5	6	11	10	12	3	1	171
% of total neonatal deaths	23.4	24.6	12.3	2.9	2.9	2.9	2.9	2.9	3.5	6.4	5.8	7.0	1.8	0.6	100.0
Neonatal death rate[3]	869.6	500.0	187.5	36.0	28.2	21.5	13.4	7.6	5.1	1.6	0.6	0.8	0.6	1.1	3.5
Total perinatal deaths	183	87	41	16	19	15	16	24	18	34	33	22	7	3	518
% of total deaths	35.3	16.8	7.9	3.1	3.7	2.9	3.1	4.6	3.5	6.6	6.4	4.2	1.4	0.6	100.0
Perinatal mortality rate[2]	968.3	674.4	310.6	106.7	99.5	61.7	41.8	35.7	15.1	4.9	2.0	1.4	1.3	3.2	10.6
Corrected perinatal mortality[4]															
Fetal death with CA[5]	33	8	2	1	3	2	3	3	2	3	1	0	0	0	61
Fetal death rate[2]	705.1	305.8	138.5	67.1	58.5	33.2	21.1	23.9	8.4	2.9	1.3	0.6	0.8	2.2	5.9
Neonatal death with CA[5]	9	1	4	1	4	4	5	4	6	5	6	8	3	1	
Neonatal death rate[3]	837.8	494.0	157.4	29.0	5.8	4.4	0.0	1.5	0.0	0.9	0.2	0.3	0.0	0.0	3.5
Perinatal deaths with CA[5]	42	9	6	2	7	6	8	7	8	8	7	8	3	1	61
Perinatal deaths without CA[5]	141	78	35	14	12	9	8	17	10	26	26	14	4	2	457
Corrected perinatal mortality rate[2]	959.2	650.0	277.8	94.6	65.2	38.0	21.3	25.5	8.4	3.8	1.5	0.9	0.8	2.2	9.4

Source: Perinatal Data Collection, DSU, QH
[1] includes "not stated" – 5 livebirths.
[2] rate per 1 000 births
[3] rate per 1 000 livebirths
[4] corrected for congenital anomaly
[5] congenital anomaly

Multiple pregnancy

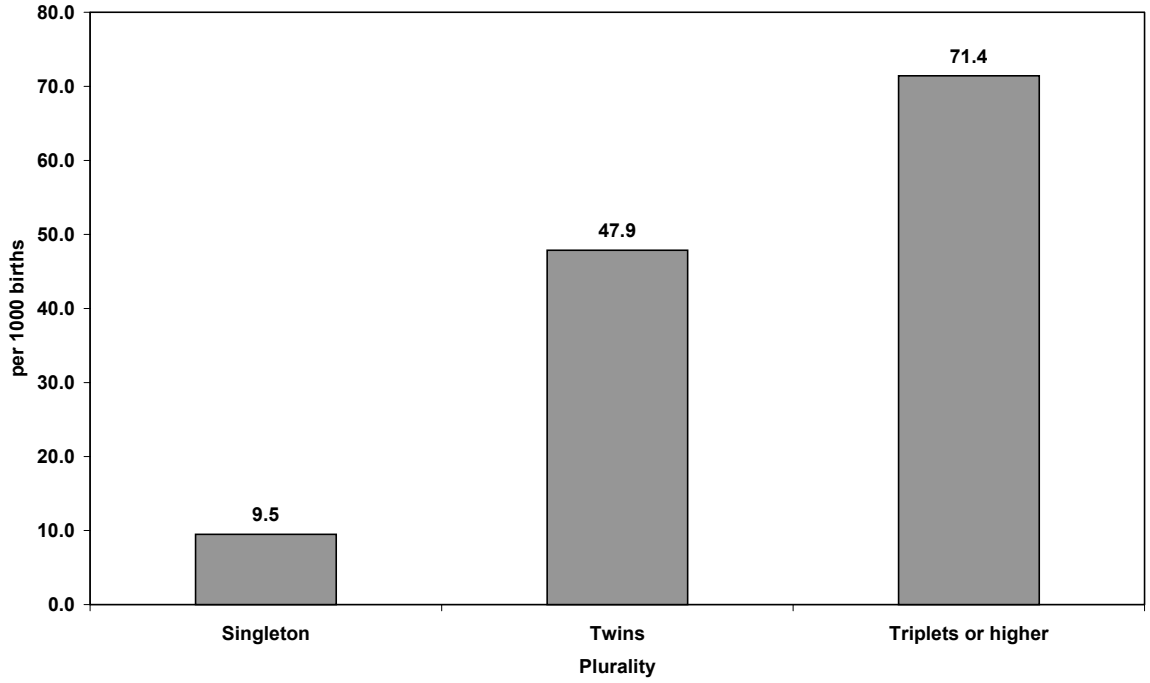
Twins and higher order multiple births account for 3% of births, and was considered the primary cause of perinatal death (using the QCPMC classification) in 10% of perinatal deaths (Table 2.4). Twins had a five fold risk of perinatal mortality compared to singleton births and triplets and higher order multiple births had more than a seven fold greater risk. (Figure 2.3).

Table 2.4: Perinatal deaths by plurality, Queensland 1999

Plurality	Total births	Live births	Fetal deaths		Neonatal deaths		Perinatal deaths	
			n	rate[1]	n	rate[1]	n	rate[1]
Singleton	47363	47050	313	6.6	137	2.9	450	9.5
Twins	1316	1283	33	25.1	30	23.4	63	47.9
Triplets or higher	70	69	1	14.3	4	58.0	5	71.4
Total multiple	1386	1352	34	24.5	34	25.1	68	49.1
Total	48749	48402	347	7.1	171	3.5	518	10.6

Source: Perinatal Data Collection, DSU, QH.
[1] rate per 1 000

Figure 2.3: Perinatal mortality rate by plurality, Queensland 1999



Source: Perinatal Data Collection, DSU, QH

Facility type

Table 2.5: Perinatal mortality rate by gestational age and standardised perinatal mortality rate by facility type, Queensland 1999

Gestational age (weeks)	Facility type							
	Tertiary Women's Hospitals		Major Public Hospitals		Other Public Hospitals		Total[3]	
	n	rate[1]	n	rate[1]	n	rate[1]	n	rate[1]
<23	39	1000.0	55	1000.0	18	1000.0	152	1000.0
23-27	77	409.6	32	727.3	12	600.0	145	519.7
28-32	25	53.8	16	136.8	10	243.9	56	85.6
33-36	22	24.3	20	20.5	6	15.5	58	20.8
37+	26	2.3	36	2.4	26	2.8	107	2.4
Total	**189**	**14.5**	**159**	**9.8**	**72**	**7.5**	**518**	**10.6**
Standardised rate[2]		**9.7**		**12.5**		**13.3**		**10.6**

Source: Perinatal Data Collection, DSU, QH.
[1] per 1 000 births
[2] per 1 000 births standardised by gestational age to all births in Queensland.
[3] includes non-public hospital births

The perinatal morality rate for Tertiary Women's Hospitals, Major Public Hospitals and Other Public Hospitals was 14.5, 9.8 and 7.5 per 1 000 births respectively.[11] The higher rate in the tertiary hospitals reflects the higher risk population attending these facilities as a result of usual referral practices. (Table 2.5). Comparison of gestational age specific perinatal mortality rates across facility types enables more appropriate consideration of outcomes. For infants born 23-27 weeks in a Tertiary Women's Hospital the perinatal mortality rate was 409.6 per thousand births, approximately 45% lower than for those born in major public hospitals and for infants 28-32 weeks the rate was 53.8, 60-80% lower than the other public facilities. However, the perinatal mortality rate for infants born 37 weeks and greater was similar for all facility types (2.3 to 2.8 per 1 000 births).

The perinatal mortality rate for these facility types when corrected for gestational age mix by applying the direct method of standardisation using Queensland as the reference population reveals a perinatal mortality rate for Tertiary Women's Hospitals of 9.7 per 1 000 births, compared to a rate of 12.5 and 13.3 per 1 000 births for Major and Other Public Hospitals respectively.

The reasons for the higher perinatal mortality rates in non-Specialist Public Hospitals are complex. However, the NHMRC guidelines for care around preterm birth recommends that *wherever possible, preterm birth at less than 33 weeks should occur in a perinatal centre that has the expertise to care for the women and her infant*.[12] During 1999 36% of births at less than 33 weeks gestation in Queensland occurred in facilities other than Tertiary Women's Hospitals while 60% of the deaths for this group occurred at these facilities. The reasons for this situation need further investigation.

[11] Groupings for *Facility type*: Tertiary *Women's Hospitals* includes the three tertiary level facilities in Queensland; *Major Public Hospitals* are all Level 2 facilities; *Other Public Hospitals* includes Level 1 facilities and four Level 2 facilities.

[12] NHMRC. Clinical practice guidelines: care around preterm birth. Cat. No. 0014267. Canberra: NHMRC, 2000.

Clinical classification (QCPMC)

Table 2.6 and Figure 2.5 summarises the main causes of death using the Queensland Council Perinatal Mortality Classification (QCPMC). The main causes of death comprising 60% of all perinatal deaths were *Congenital Anomaly*, *Unexplained Antepartum Death* and *Unexplained Preterm*.

Congenital anomaly

Congenital Anomaly (CA) was the leading cause of perinatal mortality with 24% of all deaths (18% of fetal deaths and 36% of neonatal deaths) being attributed to major anomalies. The rate of death from CA was 2.5 per 1 000 total births. This is slightly higher than in 1997 where CA contributed to 19% of perinatal deaths with a rate of 2.2 per 1 000 births. These rates are also higher than those reported for Australia where congenital anomalies accounted for 18% of perinatal deaths in 1996, a rate of 1.6 per 1 000 births.[13]

The three most common categories of congenital anomalies were those of the *central nervous system* (20%), *cardiovascular system* (18%) and *chromosomal/recognised syndrome* (40%). (Table 2.11).

The Cochrane Systematic Review on periconceptual folate supplementation shows a strong protective effect against neural tube defects.[14]
There is, however, no current accurate mechanism in Queensland for monitoring terminations of pregnancy by gestational age or by indication. This lack of information is a major barrier to monitoring the rate of congenital malformations and renders it impossible to gauge the effectiveness or otherwise of public health programs such as periconceptual folate supplementation, as the true incidence of malformations cannot be determined.

Unexplained antepartum death

The next most frequent category of perinatal death was *Unexplained Antepartum Death*. This category includes normally formed infants where no reason for the death can be ascertained. This category accounted for 18% of perinatal and 28% of fetal deaths. When reviewing the information on the 96 deaths in this category, the Perinatal Working Group were aware of deficiencies in the information available which, if available, may have assisted in determining a cause of death. In particular autopsy and placental pathology were not performed in 30% of cases.

The overall rate of unexplained fetal death is 2.0 per 1 000 births which is over three times the rate of Sudden Infant Death Syndrome (SIDS). SIDS has been the focus of much attention in the form of public health campaigns and research. The rate of unexplained fetal death indicates that it is equally deserving of attention.

Unexplained preterm birth

Preterm birth accounted for 8% of births, and 79% of deaths. In 22% of preterm deaths there was no explanation for the death. Unexplained preterm birth accounted for 18% of all perinatal deaths. Ninety two per cent of deaths in this category occurred in the 0.9% of infants who were born at less than 28 weeks gestation.
Any intervention which reduces the rate of preterm birth will result in a reduction in the perinatal death rate.

Prevention of preterm birth continues to be a major focus of research. Despite this, no reduction in the rate of preterm birth is evident over the past 10 years. It is essential that all health care providers follow the best available evidence for care of preterm birth following the NHMRC publication *care around preterm birth* that summarises the best available evidence for the management of preterm birth and provides recommendations for practice.[15]

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13 Hurst T, Hafir E, Day P & Lancaster P. Congenital Malformations Australia 1995 and 1996. AIHW Cat. No. PER 8, 1999. Sydney: Australian Institute of Health and Welfare National Perinatal Statistics Unit (Birth Defects Series No.3).

14 Lumley J, Watson L, Watson M, Bower C. Periconceptional supplementation with folate and/or multivitamins for preventing neural tube defects (Cochrane Review). In: The Cochrane Library, Issue 3, 2001. Oxford: Update Software.

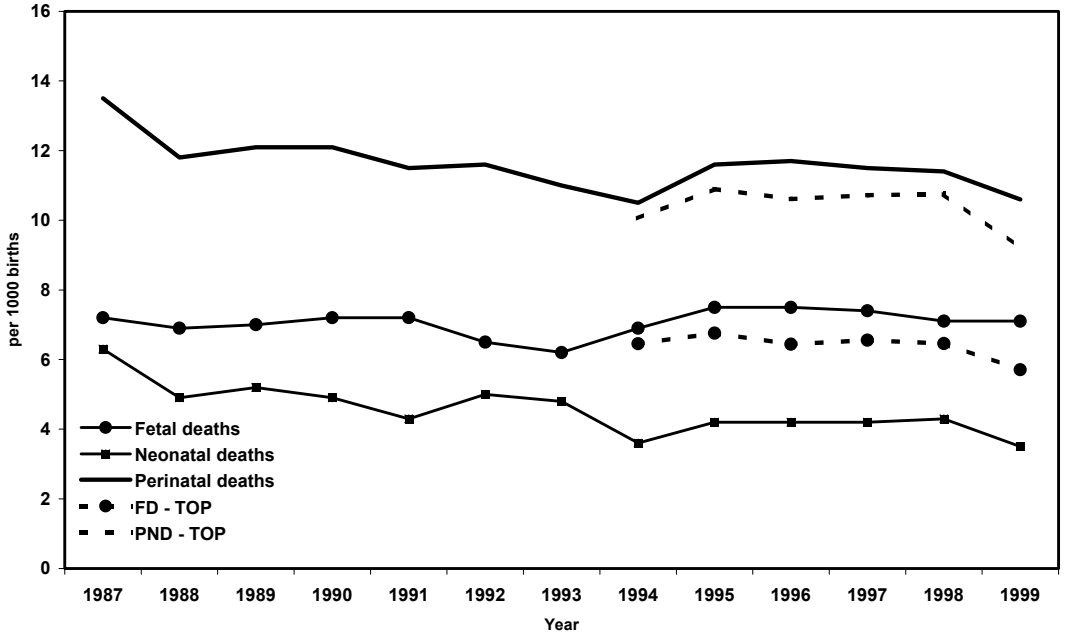
15 NHMRC. Clinical practice guidelines: care around preterm birth. Cat. No. 0014267. Canberra: NHMRC, 2000

Smoking in pregnancy is known to increase the risk of preterm and low birthweight births. A systematic review from the Cochrane Collaboration provides evidence of benefit for smoking cessation programs in pregnancy resulting in a reduction in preterm and low birthweight births.[16]

Maternal Conditions

The main cause of perinatal death in this category was due to fetal deaths from voluntary interruption of pregnancy for other than congenital anomaly. Since 1994 late terminations of pregnancy have comprised 10% of all fetal deaths in this State. Fetal and perinatal death rates for Queensland adjusted for late terminations is presented in Figure 2.4. Information obtained from the ABS indicates that similar deaths in other states are not registered.

Figure 2.4: Fetal, neonatal and perinatal mortality rates corrected for late terminations, Queensland 1987-1999



Source: Perinatal Data Collection, DSU, QH.

Hypoxic peripartum death

This category describes infants who were alive at the onset of labour which resulted in a fetal or neonatal death attributed to an hypoxic insult sometime before birth. *Hypoxic Peripartum Death* occurred in 7 infants- 3 fetal and 4 neonatal deaths. All deaths in this category were 37 weeks gestation or greater. Intrapartum evidence of fetal distress was noted in 3 of the deaths. However the small number of deaths in this group, and the lack of more detailed information, makes it difficult to make any specific recommendations with respect to avoidability.

Antepartum haemorrhage

The largest contribution to the reduction in neonatal mortality in 1999 came from the decline in deaths due to An*tepartum Haemorrhage*. The rate of neonatal death due to APH has declined from 0.61 per 1 000 in 1997 to 0.14 per 1 000 in 1999 a 77% reduction. In 1999 APH made up only 4% of all neonatal deaths while the corresponding figure in 1997 was 15%.

[16] Lumley J, Oliver S, Waters E. Interventions for promoting smoking cessation during pregnancy (Cochrane Review). In: The Cochrane Library, Issue 3, 2001. Oxford: Update Software.

Cause of death by gestational age and birthweight

The clinical classifications of perinatal mortality are further analysed in fetal and neonatal components (Figure 2.5) and according to gestational age and birthweight (Table 2.7 and Table 2.8). Again the problem of unexplained antepartum death is revealed, with 35% of fetal deaths at gestations ≥ 37 weeks being assigned to this category, with a rate of 1 per 1 000 births ≥ 37 weeks.

Table 2.6: Perinatal deaths by cause (QCPMC) and type, Queensland 1999

Cause of death (QCPMC)	Type of perinatal death								
	Fetal death			Neonatal death			Total		
	n	%	rate[1]	n	%	rate[2]	n	%	rate[1]
Congenital anomaly	61	17.6	1.3	61	35.7	1.3	122	23.6	2.5
Infection	4	1.2	0.1	3	1.8	0.1	7	1.4	0.1
Multiple pregnancy	32	9.2	0.7	30	17.5	0.6	62	12.0	1.3
Maternal conditions	46	13.3	0.9	3	1.8	0.1	49	9.5	1.0
Hypertension	7	2.0	0.1	2	1.2	0.0	9	1.7	0.2
Antepartum haemorrhage	25	7.2	0.5	7	4.1	0.1	32	6.2	0.7
Intrauterine growth restriction	13	3.7	0.3	3	1.8	0.1	16	3.1	0.3
Other specific obstetric condition	9	2.6	0.2	5	2.9	0.1	14	2.7	0.3
Unexplained antepartum death	96	27.7	2.0	0	-	-	96	18.5	2.0
Hypoxic peripartum death	3	0.9	0.1	4	2.3	0.1	7	1.4	0.1
Unexplained preterm	48	13.8	1.0	43	25.1	0.9	91	17.6	1.9
No obstetric antecedent	3	0.9	0.1	10	5.8	0.2	13	2.5	0.3
Total	347	100.0	7.1	171	100.0	3.5	518	100.0	10.6

Source: Perinatal Data Collection, DSU, QH
[1] per 1 000 births
[2] per 1 000 livebirths

Figure 2.5: Perinatal deaths by cause (QCPMC) and type, Queensland 1999

Source: Perinatal Data Collection, DSU, QH

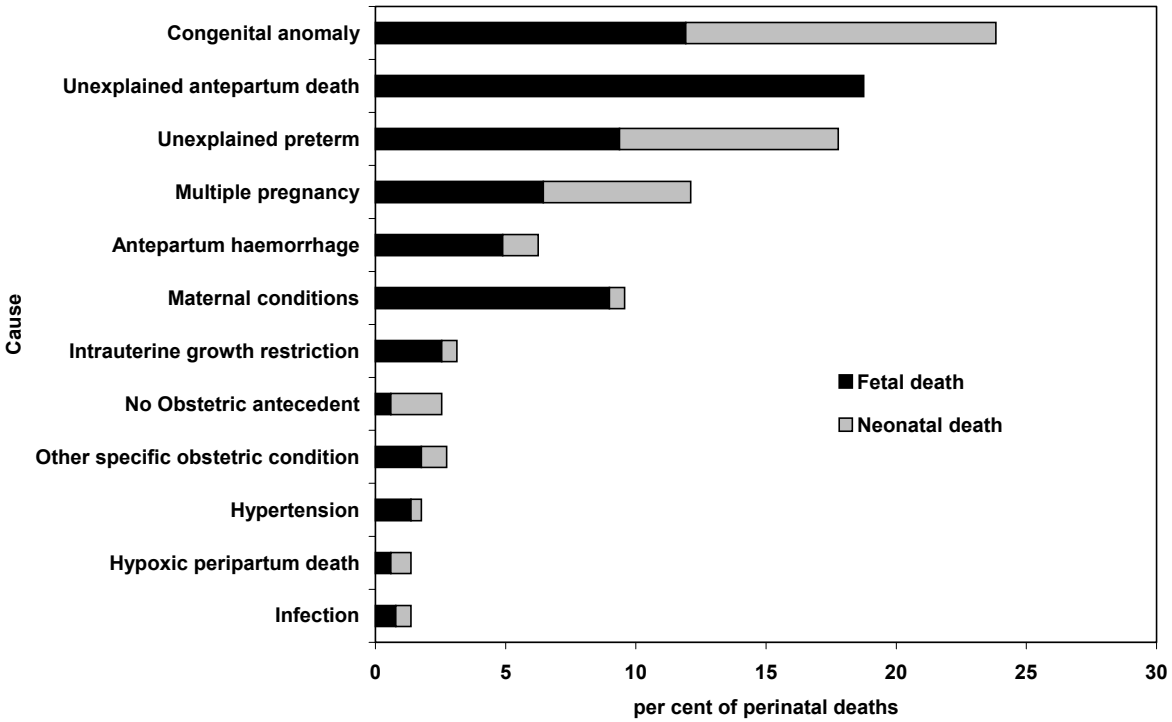


Table 2.7: Perinatal deaths by cause (QCPMC) and gestational age, Queensland 1999

Cause of death (QCPMC)	Gestational age (weeks)							
	<28		28-36		37+		Total[1]	
	n	%	n	%	n	%	n	%
Congenital anomaly	60	20.2	28	24.6	34	31.8	122	23.6
Infection	3	1.0	2	1.8	2	1.9	7	1.4
Multiple pregnancy	45	15.2	13	11.4	4	3.7	62	12.0
Maternal conditions	43	14.5	3	2.6	3	2.8	49	9.5
Hypertension	3	1.0	6	5.3	-	-	9	1.7
Antepartum haemorrhage	19	6.4	10	8.8	3	2.8	32	6.2
Intrauterine growth restriction	7	2.4	6	5.3	3	2.8	16	3.1
Other specific obstetric condition	7	2.4	2	1.8	5	4.7	14	2.7
Unexplained antepartum death	25	8.4	34	29.8	37	34.6	96	18.5
Hypoxic peripartum death	-	-	-	-	7	6.5	7	1.4
Unexplained preterm	84	28.3	6	5.3	1	0.9	91	17.6
No Obstetric antecedent	1	0.3	4	3.5	8	7.5	13	2.5
Total	**297**	**100.0**	**114**	**100.0**	**107**	**100.0**	**518**	**100.0**

Source: Perinatal Data Collection, DSU, QH
[1] includes gestational age not stated

Table 2.8: Perinatal deaths by cause (QCPMC) and birthweight, Queensland 1999

Cause of death (QCPMC)	Birthweight (g)							
	<1000		1000-2499		2500+		Total[1]	
	n	%	n	%	n	%	n	%
Congenital anomaly	57	18.3	38	35.2	27	27.3	122	23.6
Infection	4	1.3	1	0.9	2	2.0	7	1.4
Multiple pregnancy	50	16.1	10	9.3	2	2.0	62	12.0
Maternal conditions	42	13.5	3	2.8	4	4.0	49	9.5
Hypertension	4	1.3	4	3.7	1	1.0	9	1.7
Antepartum haemorrhage	20	6.4	8	7.4	4	4.0	32	6.2
Intrauterine growth restriction	10	3.2	5	4.6	1	1.0	16	3.1
Other specific obstetric condition	7	2.3	2	1.9	5	5.1	14	2.7
Unexplained antepartum death	31	10.0	28	25.9	37	37.4	96	18.5
Hypoxic peripartum death	0	-	1	0.9	6	6.1	7	1.4
Unexplained preterm	84	27.0	6	5.6	1	1.0	91	17.6
No Obstetric antecedent	2	0.6	2	1.9	9	9.1	13	2.5
Total	**311**	**100.0**	**108**	**100.0**	**99**	**100.0**	**518**	**100.0**

Source: Perinatal Data Collection, DSU, QH
[1] includes birthweight not stated

Neonatal Classification

As described in the introductory section, the Council has adapted the Neonatal Death Classification developed by the South Australian Perinatal Committee. The classifications are presented by birthweight and gestational age (Table 2.9 and Table 2.10).

Deaths from *Extreme Immaturity* (less than 26 weeks gestation) and *Congenital Anomaly* are the dominant categories. Fourteen per cent of neonatal deaths were attributed to *Respiratory Distress Syndrome* - 91% of all deaths from RDS were in infants born less than 28 weeks gestation.

Table 2.9: Neonatal mortality by cause (Neonatal Classification) and gestational age, Queensland 1999

Cause of death (Neonatal Classification)	Gestational age (weeks)								
	<28		28-36		37+		Total[1]		
	n	%	n	%	n	%	n	%	rate[2]
Extreme immaturity	54	53.5	0	0.0	0	0.0	54	31.6	1.1
Not resuscitated	46	45.5	0	0.0	0	0.0	46	26.9	1.0
Unsuccessful resuscitation	8	7.9	0	0.0	0	0.0	8	4.7	0.2
Congenital anomaly	15	14.9	19	61.3	27	69.2	61	35.7	1.3
Respiratory disorders	21	20.8	5	16.1	2	5.1	28	16.4	0.6
Neurological	5	5.0	2	6.5	3	7.7	10	5.8	0.2
Gastrointestinal	1	1.0	0	-	0	0.0	1	0.6	0.0
Infection	3	3.0	2	6.5	1	2.6	6	3.5	0.1
Other	2	2.0	3	9.7	6	15.4	11	6.4	0.2
Total	101	100.0	31	100.0	39	100.0	171	100.0	3.5

Source: Perinatal Data Collection, DSU, QH
[1] includes gestational age not stated
[2] rate per 1 000 livebirths

Figure 2.6: Neonatal deaths by cause (Neonatal Classification), Queensland 1999

Source: Perinatal Data Collection, DSU, QH

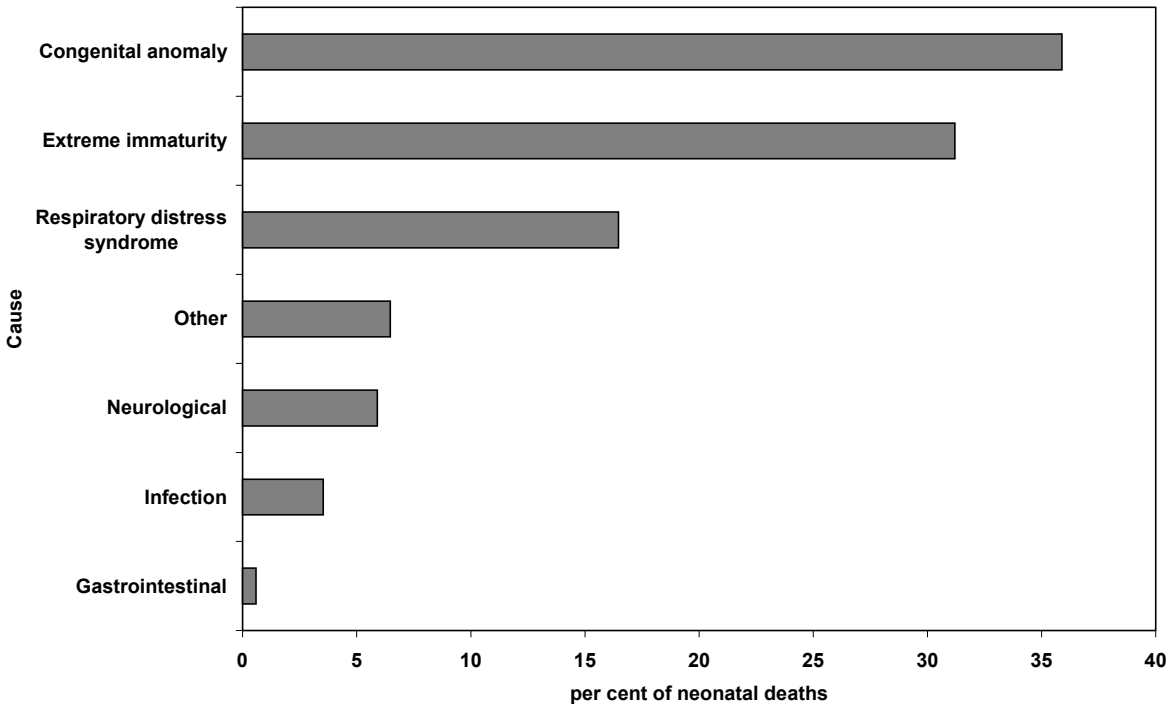
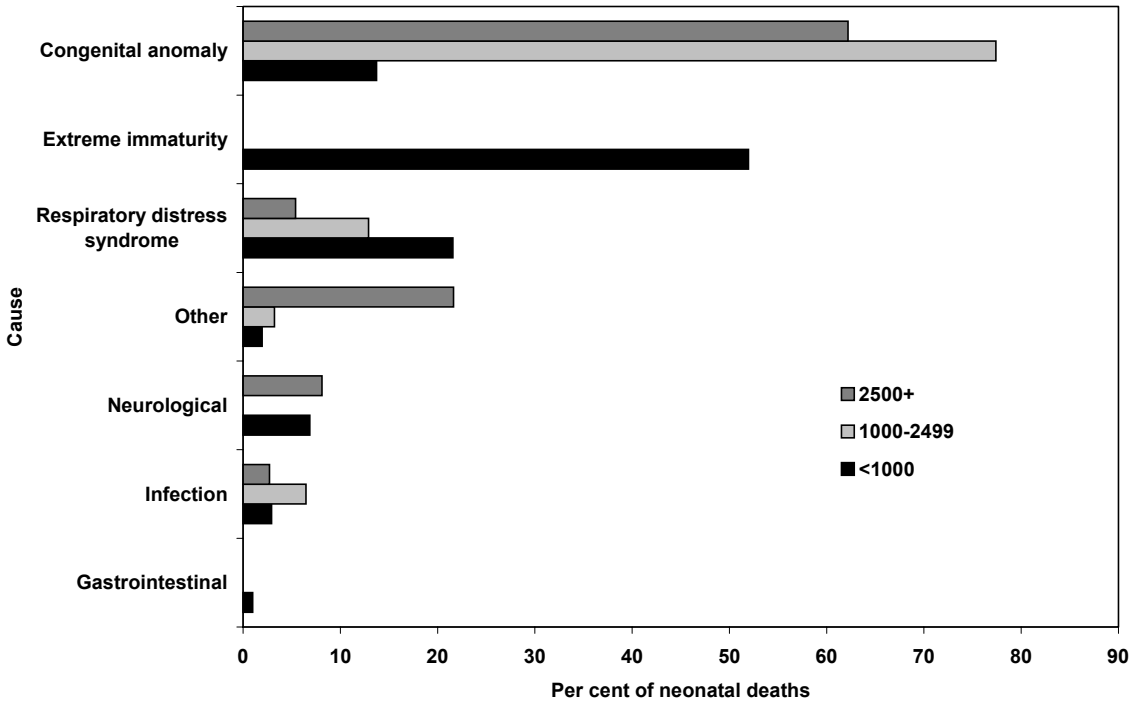


Table 2.10: Neonatal deaths by cause (Neonatal Classification) and birthweight, Queensland 1999

Cause of death (Neonatal Classification)	Birthweight (g) <1000 n	<1000 %	1000-2499 n	1000-2499 %	2500+ n	2500+ %	Total n	Total %
Extreme immaturity	54	52.4	0	0.0	0	0.0	54	31.6
Not resuscitated	46	44.7	0	0.0	0	0.0	46	26.9
Unsuccessful resuscitation	8	7.8	0	0.0	0	0.0	8	4.7
Congenital anomaly	14	13.6	24	77.4	23	62.2	61	35.7
Respiratory disorders	22	21.4	4	12.9	2	5.4	28	16.4
Neurological	7	6.8	0	0.0	3	8.1	10	5.8
Gastrointestinal	1	1.0	0	0.0	0	0.0	1	0.6
Infection	3	2.9	2	6.5	1	2.7	6	3.5
Other	2	1.9	1	3.2	8	21.6	11	6.4
Total	103	100.0	31	100.0	37	100.0	171	100.0

Source: Perinatal Data Collection, DSU, QH

Figure 2.7: Neonatal deaths by cause (Neonatal Classification) and birthweight, Queensland 1999



Source: Perinatal Data Collection, DSU, QH

Table 2.11: Perinatal deaths by cause (QCPMC), all categories, Queensland 1999

Classification	Death Type					
	Fetal death		Neonatal death		Perinatal death	
	n.	%	n	%	n	%
1 Congenital anomaly	61	17.5	61	35.9	122	23.6
1.1 Central nervous system	14	4.0	10	5.9	24	4.6
1.2 Cardiovascular system	4	1.1	18	10.6	22	4.2
1.3 Urinary tract	4	1.1	4	2.4	8	1.5
1.4 Gastrointestinal tract	1	0.3	0	0.0	1	0.2
1.5 Respiratory tract	0	0.0	5	2.9	5	1.0
1.6 Chromosomal abnormality or recognised syndrome	31	8.9	18	10.6	49	9.5
1.7 Metabolic	0	0.0	1	0.6	1	0.2
1.8 Multiple anomalies	2	0.6	4	2.4	6	1.2
1.9 Other	5	1.4	1	0.6	6	1.2
2 Infection	4	1.1	3	1.8	7	1.4
2.1 Group B Streptococcus	1	0.3	1	0.6	2	0.4
2.2 E Coli	0	0.0	0	0.0	0	0.0
2.3 Syphilis	0	0.0	0	0.0	0	0.0
2.4 Viral	0	0.0	1	0.6	1	0.2
2.5 Other	2	0.6	1	0.6	3	0.6
2.6 Unknown	1	0.3	0	0.0	1	0.2
3 Multiple pregnancy	32	9.2	30	17.5	62	12.0
3.1 Twin-to-twin transfusion or "stuck twin" syndrome	4	1.2	4	2.3	8	1.5
3.2 Other	28	8.1	26	15.2	54	10.4
4 Maternal conditions	46	13.2	3	1.8	49	9.5
4.1 Voluntary interruption of pregnancy (excl cong. Anomaly)	35	10.1	0	0.0	35	6.8
4.2 Diabetes mellitus	5	1.4	0	0.0	5	1.0
4.3 Chronic renal disease	1	0.3	0	0.0	1	0.2
4.4 Autoimmune	4	1.1	1	0.6	5	1.0
4.5 Substance abuse	0	0.0	1	0.6	1	0.2
4.6 Other infection (eg. UTI)	0	0.0	0	0.0	0	0.0
4.7 Other	1	0.3	1	0.6	2	0.4
5 Hypertension	7	2.0	2	1.2	9	1.7
5.1 Pre eclampsia	7	2.0	2	1.2	9	1.7
5.2 Essential	0	0.0	0	0.0	0	0.0
5.3 Essential with superimposed pre eclampsia	0	0.0		0.0	0	0.0
6 Antepartum haemorrhage	25	7.2	7	4.1	32	6.2
6.1 Placental abruption	21	6.0	6	3.5	27	5.2
6.2 Placenta praevia	0	0.0	1	0.6	1	0.2
6.3 Vasa praevia	0	0.0	0	0.0	0	0.0
6.4 Undertemined	4	1.1	0	0.0	4	0.8

Table 2.11: Perinatal deaths by cause (QCPMC), all categories, Queensland 1999 (Continued)

Classification	Death Type					
	Fetal death		Neonatal death		Perinatal death	
	n.	%	n	%	n	%
7 Intrauterine growth restriction	13	3.7	3	1.8	16	3.1
7.1 Placental pathology	10	2.9	2	1.2	12	2.3
7.2 No explanation	3	0.9	1	0.6	4	0.8
8 Other specific obstetric conditions	9	2.6	5	2.9	14	2.7
8.1 Idiopathic hydrops	1	0.3	1	0.6	2	0.4
8.2 Fetomaternal haemorrhage	0	0.0	0	0.0	0	0.0
8.3 Cord complications	5	1.4	0	0.0	5	1.0
8.4 Uterine abnormalities/cervical incompetence etc	0	0.0	3	1.8	3	0.6
8.5 Haemolytic disease	0	0.0	0	0.0	0	0.0
8.6 Birth trauma	0	0.0	0	0.0	0	0.0
8.7 Other (includes uterine rupture)	3	0.9	1	0.6	4	0.8
9 Unexplained antepartum death	96	27.6	0	0.0	96	18.5
10 Hypoxic peripartum death	3	0.9	4	2.4	7	1.4
10.1 Intrapartum complications +/- “Fetal distress”	1	0.3	2	1.2	3	0.6
10.2 No apparent cause	2	0.6	2	1.2	4	0.8
11 Unexplained preterm	48	13.8	43	25.3	91	17.6
11.1 Previous bleeding	16	4.6	10	5.9	26	5.0
11.2 No previous bleeding	32	9.2	33	19.4	65	12.5
12 No obstetric antecedent	3	0.9	10	5.9	13	2.5
12.1 SIDS	0	0.0	4	2.4	4	0.8
12.2 Postnatally acquired infection in term infants	0	0.0	0	0.0	0	0.0
12.3 Other (eg. MVA)	3	0.9	6	3.5	9	1.7
Total	347	100.0	171	100.0	518	100.0

Source: Perinatal Data Collection, DSU, QH

Table 2.12: Neonatal deaths by cause (NNDC), all categories, Queensland 1999

Cause of death (Neonatal Classification)	n	%
1 Extreme immaturity	**54**	**31.6**
1.1 Not resuscitated	46	26.9
1.2 Unsuccessful resuscitation	8	4.7
2 Congenital anomaly	**61**	**35.9**
3 Respiratory disorders	**28**	**16.5**
3.1 Respiratory distress syndrome	23	13.5
3.2 Meconium aspiration	1	0.6
3.3 Primary persistent pulmonary hypertension	1	0.6
3.4 Pulmonary hypoplasia	3	1.8
4 Neurological	**10**	**5.9**
4.1 Hypoxic ischaemic encephalopathy/ perinatal asphyxia	3	1.8
4.2 Intracranial haemorrhage	7	4.1
5 Gastrointestinal	**1**	**0.6**
5.1 Necrotising enterocolitis	1	0.6
6 Infection	**6**	**3.5**
6.1 Congenital bacterial	1	0.6
6.2 Congenital virus	1	0.6
6.3 Acquired bacterial	2	1.2
6.6 Other	2	1.2
7 Other	**11**	**6.5**
7.1 SIDS	4	2.4
7.2 Idiopathic hydrops fetalis	1	0.6
7.5 Haemorrhage (inc twin to twin transfusion)	2	1.2
7.6 Unknown/ unexplained	2	1.2
7.7 Other	2	1.2
Total	**171**	**100.0**

Source: Perinatal Data Collection, DSU, QH

Perinatal Autopsies

The rate of autopsy for all perinatal deaths in Queensland for 1999 was 45.2% with autopsy rates of 48.0% and 39.4% for fetal and neonatal deaths respectively (Table 2.13). The autopsy rate in this State falls considerably short of the 75% recommended by the Royal College of Obstetricians and Gynaecologists and the Royal College of Pathologists and is lower than that achieved elsewhere in Australia and overseas.[17,18,19]

Table 2.13: Perinatal autopsies by cause (QCPMC) and type of death, Queensland 1999

Cause of death (QCPMC)	Type of perinatal death					
	Fetal death		Neonatal death		Total	
	n	Autopsy rate(%)	n	Autopsy rate(%)	n	Autopsy rate(%)
Congenital anomaly	61	47.5	61	47.5	122	47.5
Infection	4	50.0	3	66.7	7	57.1
Multiple pregnancy	32	39.4	30	37.9	62	38.7
Maternal conditions	46	17.4	3	33.3	49	18.4
Hypertension	7	28.6	2	0.0	9	22.2
Antepartum haemorrhage	25	36.0	7	14.3	32	31.2
Intrauterine growth restriction	13	76.9	3	33.3	16	68.8
Other specific obstetric condition	9	55.6	5	40.0	14	50.0
Unexplained antepartum death	96	69.8	-	-	96	69.8
Hypoxic peripartum death	3	100.0	4	50.0	7	71.4
Unexplained preterm	48	35.4	43	20.9	91	28.6
No obstetric antecedent	3	66.7	10	90.0	13	84.6
Total	**347**	**48.0**	**171**	**39.4**	**518**	**45.2**

Source: Perinatal Data Collection, DSU, QH
The autopsy status was unknown in 28 cases

[17] Joint working party of the Royal College of Obstetricians and Gynaecologists and the Royal College of Pathologists. Report on Fetal and Perinatal Pathology. London: Royal College of Pathologists, 1988

[18] Khong TY, Mansor FAW, Staples AJ. Are perinatal autopsy rates satisfactory? Med J Aust 1995; 162: 469-470

[19] Khong TY. A review of perinatal autopsy rates worldwide, 1960s to 1990s. Paediatr Perinat Epidemiol 1996; 10: 97-105

Chapter 3: Paediatric Mortality

Executive summary

- There were 252 post-neonatal deaths (28 days to 14 years), accounting for 60% of all deaths, resulting in a paediatric mortality rate of 34.5 per 100 000 persons for 1999.
- In 1999 Queensland had a similar infant mortality rate compared with the rest of Australia. Previously, Queensland's infant mortality rate has been consistently higher than the rest of Australia.
- In the post-neonatal paediatric population, the mortality rate was highest in the first year of life at 269.2 per 100 000 persons. This has fallen by 16% since 1997.
- Injuries were the most frequent major cause of death, accounting for 92 of the 252 post-neonatal deaths (37%). The overall rate of death for *injury* was 12.4 per 100 000 persons.
- Among post-neonatal infants, the most frequent cause of death was from conditions *determined at birth* with a mortality rate of 101.3 per 100 000 persons.
- There were 31 deaths determined to be due to *SIDS*. Seventeen (58%) of these deaths occurred in male infants.
- The rate of SIDS in Queensland for 1999 was similar to the rest of Australia (0.64 compared with 0.66 per 1 000 live births).
- In those under 5 years, *injury* accounted for 67% of all injury deaths, and was the most frequent cause of death in the age groups 1 to 4 years and 10 to 14 years.
- Of all paediatric deaths due to *injury*, 29% were *transport related* deaths. Most of these were deaths of a *passenger.*
- Twelve of the 92 *injury* deaths were due to *intentional injuries*. Six of these were possible or stated self harm and occurred in the 10 to 14 year age group.
- *Acquired conditions* were responsible for 21% of paediatric deaths in 1999. Malignancies (c*ancer)* accounted for 39% of deaths due to *acquired conditions.* The most frequent malignancy causing death in the paediatric population remains *acute lymphoblastic leukaemia.*

Introduction

This chapter contains information on deaths of children aged greater than 27 days and less than 15 years. For the purpose of analysis, this paediatric population has been further divided into four sub-groups: 28 to 364 days; 1 to 4 years; 5 to 9 years; and 10 to 14 years. Information on infant mortality (aged <1 year) is also presented.

Definitions

Paediatric population:	Children aged greater than 27 days and less than 15 years.
Paediatric mortality rate:	The number of deaths of children greater than 27 days and less than 15 years in a period per 100 000 person years.
Infant mortality rate:	The number of deaths of infants under one year of age in a period per 1 000 live births in the same period.
Neonatal mortality rate:	The number of deaths of live born infants under 28 days of age in a period per 1 000 live births in the same period.
Post-neonatal mortality rate:	The number of deaths of infants aged greater than 27 days and less than one year in a period per 1 000 live births in the same period.

Data sources and methods

The Council obtained information on all paediatric deaths occurring in Queensland from the Registrar of Births, Deaths and Marriages. These deaths were then classified by the Paediatric Subcommittee according to the Queensland Council Paediatric Classification (QCPaedC), using information contained on the death certificate, in post mortem, police reports and coronial inquests, if these were conducted.
Rates for mortality were calculated using estimated resident populations published by the Australian Bureau of Statistics (ABS). In the case of the 28 to 364 day age-group population, estimates were derived using estimated populations for persons aged less than one year, total live births and neonatal deaths.
Unless otherwise stated, all rates are presented per 100 000 person years.

QC Paediatric Classification (QCPaedC)

The Council's charter to investigate all paediatric deaths in Queensland and report on the nature and extent of preventable deaths in the State required a system for classifying these deaths.

The Council's system of classification consists of four major cause categories:

1. **Conditions Determined at Birth**
2. **Acquired Conditions**
3. **Sudden Infant Death Syndrome (SIDS) and**
4. **Injury**

They are further subdivided into several levels of minor categories. The full classification is given in Appendix 3. Despite extensive review by the appropriate experts, the cause of death is not always apparent from the available information. These deaths are classified as **Unable to be Determined**.
To maintain uniformity and comparability, *cancer* deaths (within *Acquired conditions*) are classified using the scheme adopted by of the Paediatric Cancer Registry of Queensland, a scheme based on the ICD-O classification system[20]. Similarly, the *injury* deaths classification is based on the *National Data Standards for Injury Surveillance Ver 2.1* developed by the National Injury Surveillance Unit, AIHW[21].
This manner of reporting paediatric deaths in Queensland is still being refined and it is hoped that it will gain wide acceptance and be a forerunner of a uniform classification system for paediatric deaths within Australia.

[20] Birch JM, Marsden HB. (1987). A Classification Scheme for Childhood Cancer. Int J Cancer. 40, 620-624

[21] Australian Institute of Health and Welfare National Injury Surveillance Unit, (1998) National Data Standards for Injury Surveillance, Version 2.1. Adelaide: AIHW National Injury Surveillance Unit

All cause paediatric deaths

In 1999, there were a total of 422 deaths of babies and children aged less than 15 years. Post-neonatal paediatric deaths (greater than 27 days and less than 15 years) accounted for 60% of these. Within the paediatric population, deaths occurred predominantly in the post-neonatal (28 to 364 days) period (43%) and the 1 to 4 year age group (26%). The majority of the deaths were of males (52%) (Table 3.1).

Sixty five per cent of the deaths among the post-neonates were due either to *conditions determined at birth* (41%) or *Sudden Infant Death Syndrome* (24%), while 58% of those aged 1 to 4 years died from *injury*. *Injury* is also responsible for more than 45% of deaths in children aged 10 to 14 years, predominantly among the males (52%). Among the 5 to 9 year olds, who make up 12% of paediatric deaths, the main cause of death was *acquired conditions* especially *cancers* (Table.3.4). In 1999, the cause of nine deaths was not able to be determined.

Table 3.1: Paediatric deaths by age and sex, Queensland 1999.

	Number of deaths		
Age	persons	females	males
0-27 days	170[1]	97	72
28-364 days	108	48	60
1-4 years	66	34	32
5-9 years	30	13	17
10-14 years	48	25	23
Total	**422**	**217**	**204**

Source: QCOPMM

[1] Includes 1 death of indeterminate gender.

Table 3.2: Estimated resident paediatric population by age and gender, Queensland 1999.

	Population		
Age	persons	females	males
28-364 days	43 443	21 155	22 288
1-4 years	194 744	94 942	99 802
5-9 years	255 400	124 506	130 894
10-14 years	251 154	122 073	129 081
Total	**744 741**	**362 676**	**382 065**

Source: ABS

Table 3.3: All cause paediatric mortality by age and gender, Queensland 1999.

	Mortality rate[1]		
Age	persons	females	males
28-364 days	248.6	226.9	269.2
1-4 years	33.9	35.8	32.1
5-9 years	11.7	10.4	13.0
10-14 years	19.1	20.5	17.8
Total	33.8	33.1	34.5

Source: QCOPMM

[1] per 100 000 person years

The highest mortality rate was among the post-neonate infants – at 248.6 deaths per 100 000 persons while the lowest was among children aged 5 to 9 years at 11.7 per 100 000 persons (Table 3.3).

Conditions determined at birth affected the infants aged 28 to 364 days most with a combined age specific mortality rate of 101.3 per 100 000. However, the greatest single cause of death in this group remained *SIDS* with a rate of 59.8 per 100 000 (Table.3.5). Outside this age group, the overall rate of mortality falls, shifting to *acquired conditions* and *injuries;* but *conditions determined at birth* continues to have a significant impact upon mortality throughout childhood. Almost 40% of deaths due to *conditions determined at birth* occurred outside the 28 to 364 day age group (Table.3.4).

Table.3.4: Paediatric deaths by major cause (QCPaedC), age and gender, Queensland 1999

Age		Cause of death (QCPaedC					
		Determined at birth	Acquired condition	SIDS	Injury	Unable to be determined	All causes
28-364 days	**persons**	**44**	**7**	**26**	**24**	**7**	**108**
	females	20	3	11	12	2	48
	males	24	4	15	12	5	60
1-4 years	**persons**	**9**	**17**	**1**	**38**	**1**	**66**
	females	5	11	-	18	-	34
	males	4	6	1	20	1	32
5-9 years	**persons**	**9**	**12**	**-**	**8**	**1**	**30**
	females	5	6	-	2	-	13
	males	4	6	-	6	1	17
10-14 years	**persons**	**8**	**18**	**-**	**22**	**-**	**48**
	females	5	10	-	10	-	25
	males	3	8	-	12	-	23
Total	**persons**	**70**	**54**	**27**	**92**	**9**	**252**
	females	35	30	11	42	2	120
	males	35	24	16	50	7	132

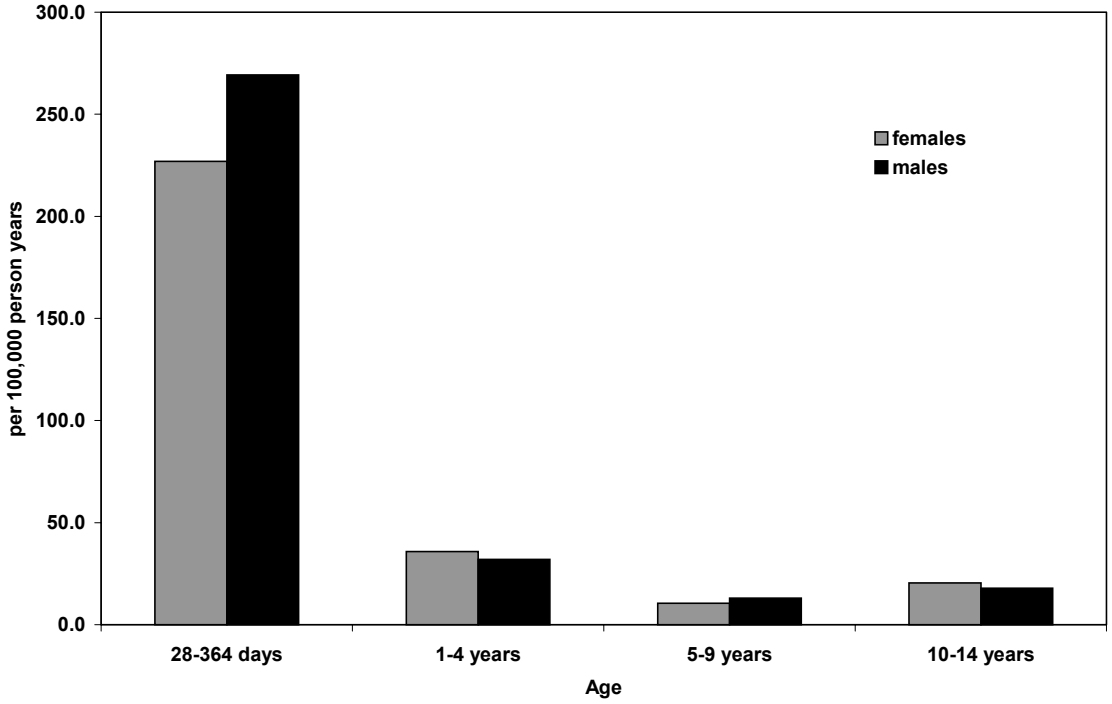
Source: QCOPMM

Table.3.5: Paediatric mortality rate[1] by major cause (QCPaedC), age and gender, Queensland 1999

Age		Cause of death (QCPaedC					
		Determined at birth	Acquired condition	SIDS	Injury	Unable to be determined	All causes
28-364 days	**persons**	101.3	16.1	59.8	55.2	16.1	248.6
	females	94.5	14.2	52.0	56.7	9.5	226.9
	males	107.7	17.9	67.3	53.8	22.4	269.2
1-4 years	**persons**	4.6	8.7	0.5	19.5	0.5	33.9
	females	5.3	11.6	-	19.0	-	35.8
	males	4.0	6.0	1.0	20.0	1.0	32.1
5-9 years	**persons**	3.5	4.7	-	3.1	0.4	11.7
	females	4.0	4.8	-	1.6	-	10.4
	males	3.1	4.6	-	4.6	0.8	13.0
10-14 years	**persons**	3.2	7.2	-	8.8	-	19.1
	females	4.1	8.2	-	8.2	-	20.5
	males	2.3	6.2	-	9.3	-	17.8
Total	**persons**	9.4	7.3	3.6	12.4	1.2	33.8
	females	9.7	8.3	3.0	11.6	0.6	33.1
	males	9.2	6.3	4.2	13.1	1.8	34.5

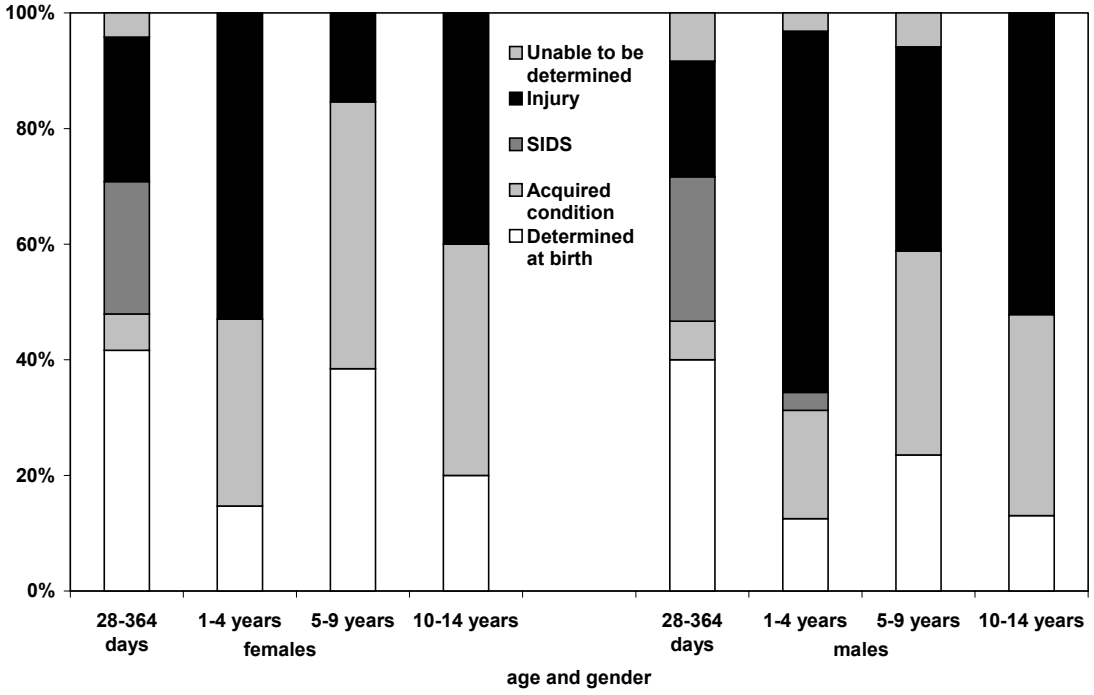
Source: QCOPMM
[1] per 100 000 person years

Figure 3.1: Paediatric mortality rate[1] by age and gender, Queensland 1999



Source: QCOPMM
[1] per 100 000 person years.

Figure 3.2: Paediatric deaths as a proportion of all deaths by major cause (QCPaedC), age and gender, Queensland 1999



Source: QCOPMM

Table 3.6: Paediatric mortality rates[1] by major cause (QCPaedC), and year, Queensland 1994-1999

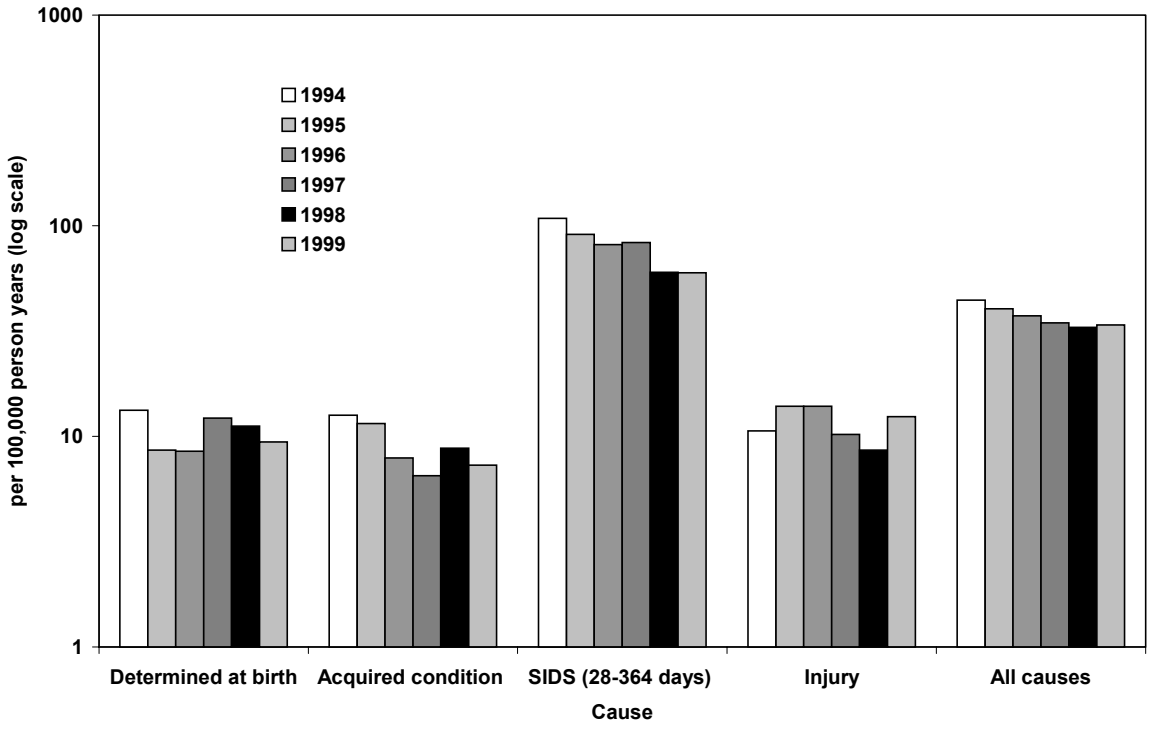
Year	Determined at birth	Acquired condition	SIDS (28-364 days only)	Injury	All causes
1994	13.3	12.6	108.2	10.6	44.3
1995	8.6	11.5	90.9	13.9	40.3
1996	8.5	7.9	81.3	13.9	37.3
1997	12.2	6.5	83.2	10.2	34.6
1998	11.2	8.8	60.0	8.6	32.9
1999	9.4	7.3	59.8	12.4	33.8

Source: QCOPMM
[1] per 100 000 person years

The mortality rate by the major groups of the Paediatric Mortality classification (QCPaedC) over the last four years shows a steady decrease in mortality from all causes. This trend is largely explained by decreases in the rate of deaths due to *acquired conditions* and *SIDS* since 1994 (Table 3.6). The three highest individual causes of death within each age group and gender were examined (Table.3.7). The leading cause of death among infants aged 28 to 364 days was *SIDS* followed by *asphyxia – other* and *prematurity*. This pattern is similar to that in previous years, except for the increased rate of mortality from *asphyxia – other*.[22]
Among children aged 1 to 4 years, *drowning – domestic pool* was the prime cause of death in 1999 especially amongst males. This was followed by *motor vehicle passenger* and *septicaemia – meningococcal*.
Metabolic congenital anomaly was the major cause of death amongst children aged 5 to 9 years in 1999 followed by *leukaemia* and *motor vehicle passenger*.
Similarly, among the children aged 10 to 14 years, *Motor vehicle passenger deaths* were the leading cause of death in 1999. The other main causes of death at this age in 1999 were *self harm, epilepsy, asthma* and *myocarditis*.

[22] Queensland Council on Obstetric and Paediatric Morbidity and Mortality (1998). Maternal, Perinatal and Paediatric Mortality and Morbidity in Queensland, 1994-1996. Brisbane: QCOPMM.

Figure 3.3: Paediatric mortality rate[1] by major cause (QCPaedC) and year Queensland 1994-98



Source: QCOPMM
[1] per 100 000 person years.

Table.3.7 The three most common causes of death (QCPaedC), by age and gender, Queensland 1999.

	Cause of death (QCPaedC)					
	persons		females		males	
Age	cause	rate[1]	cause	rate[1]	cause	rate[1]
28-364 days	**SIDS**	**59.8**	SIDS	51.9	SIDS	67.3
	Asphyxia-other	36.8	Asphyxia-other	37.8	Prematurity	40.3
	Prematurity	32.2	Cardiovascular CA[2] (structural)	33.1	Asphyxia-other	35.9
1-4 years	**Drowning - domestic pool**	**4.6**	Motor vehicle passenger	5.3	Drowning - domestic pool	7.0
	Motor vehicle passenger	3.6	Septicaemia – other	3.2	Pedestrian – low speed	2.0
	Septicaemia – meningococcal	2.1	Pedestrian – high speed	2.1	Asphyxia – rope or cord	2.0
5-9 years	**Metabolic CA**	**2.0**	Metabolic CA	2.4	Neuroblastoma	1.5
	Leukaemia	1.6	Leukaemia	1.6	Motor vehicle passenger	1.5
	Motor vehicle passenger	0.8	House fire	0.8	Struck by object	1.5
10-14 years	**Motor vehicle passenger**	**2.8**	Self harm	3.3	Motor vehicle passenger	2.3
	Self harm	2.4	Motor vehicle passenger	3.3	Self harm	1.5
	Epilepsy	1.2	Myocarditis	2.5	Asthma	1.5

Source: QCOPMM
[1] per 100 000 person years.
[2] congenital anomaly

Infant mortality

To enable comparisons to be made with the rest of Australia and other populations, infant, neonatal and post-neonatal mortality rates were calculated according to standard Australian Bureau of Statistics (ABS) definitions, that is infant deaths per 1000 live births, by year of registration and place of usual residence.
By this definition, the infant mortality rate for Queensland for 1999 was 5.7 per 1 000 live births and was made up of neonatal and post-neonatal mortality rates of 3.4 and 2.3 per 1 000 live births respectively (Table 3.8). The mortality rate was approximately 30% higher in males for both the neonatal and post-neonatal deaths. Queensland's infant mortality rate was similar to that of the rest of Australia (Table 3.9) this year for the first time since 1990 (figure 0.4).

Table 3.8: Infant mortality by gender, Queensland 1999

	females		males		persons	
	number	rate[1]	number	rate[1]	number	rate[1]
Total live births	22 584	-	23 919	-	46 503	-
Neonatal deaths	63	2.8	96	4.0	159	3.4
Post neonatal deaths	44	1.9	63	2.6	107	2.3
Infant deaths	107	4.7	159	6.6	266	5.7

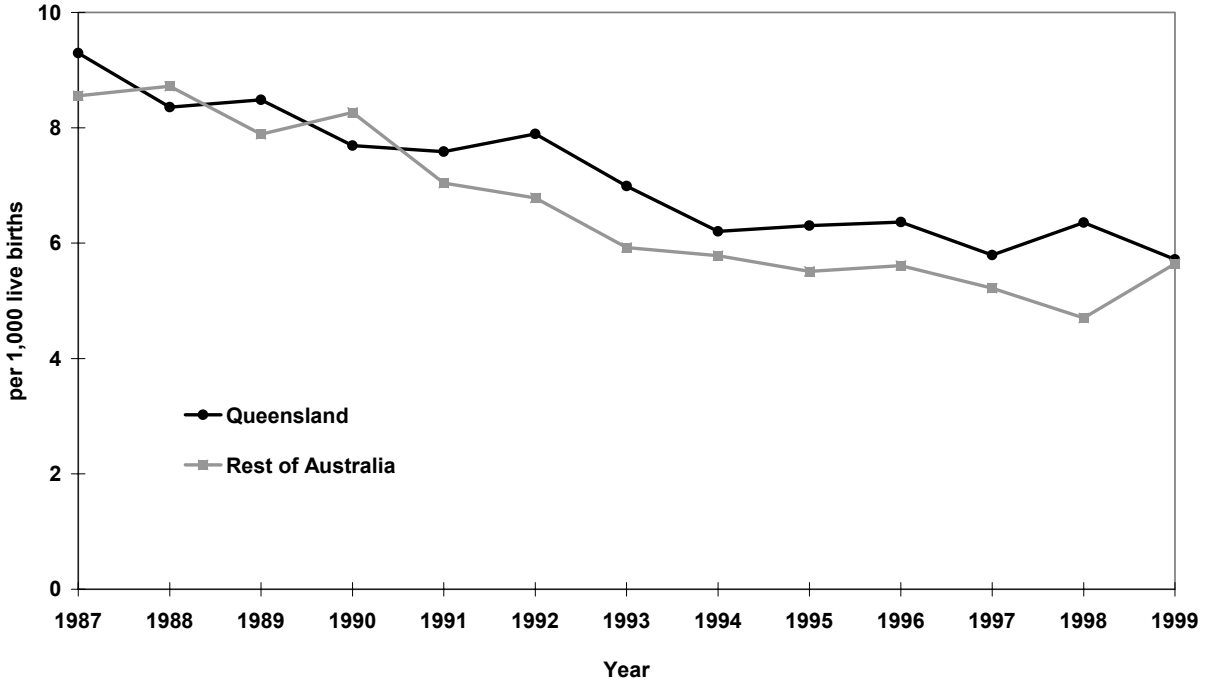
Source: ABS, Deaths Cat. No. 3302.0
[1] per 1 000 live births.

Table 3.9: Infant mortality rates by year of registration, Queensland and the rest of Australia 1987-1999.

	Neonatal death rate[1]		Post-neonatal death rate[1]		Infant death rate[1]	
Year	Queensland	Rest of Australia	Queensland	Rest of Australia	Queensland	Rest of Australia
1987	5.6	5.0	3.7	3.5	9.3	8.6
1988	5.5	5.2	2.9	3.5	8.4	8.7
1989	5.1	4.6	3.4	3.3	8.5	7.9
1990	4.3	5.0	3.4	3.3	7.7	8.3
1991	4.7	4.4	2.9	2.7	7.6	7.0
1992	5.0	4.5	2.9	2.3	7.9	6.8
1993	4.7	3.7	2.3	2.2	7.0	5.9
1994	3.6	4.0	2.6	1.8	6.2	5.8
1995	4.1	3.6	2.2	1.9	6.3	5.5
1996	4.4	3.6	2.0	2.0	6.4	5.6
1997	3.7	3.5	2.0	1.7	5.8	5.2
1998	4.4	3.1	1.9	1.6	6.4	4.7
1999	**3.4**	**3.9**	**2.3**	**1.7**	**5.7**	**5.6**

Source: ABS, Deaths Cat. No. 3302.0
[1] per 1 000 live births.

Figure 3.4: Infant mortality rate, Queensland and the rest of Australia by year, 1987-1999



Source: ABS

Sudden Unexpected Death in Infancy (SUDI), including Sudden Infant Death Syndrome (SIDS)

The SIDS/SUDI Working Group reviewed all paediatric deaths that had been certified as Sudden Infant Death Syndrome or "cot death", as well as all other deaths that were considered to be sudden and unexpected. (A "sudden and unexpected death in infancy", or SUDI, was defined as a death of an infant which was sudden and unexpected from the previous medical history.) The review process consisted of a detailed re-examination of the autopsy report, police and ambulance officer reports including death scene examination where available, and any other available information. Following this review process, a final classification of cause of death was applied. Some deaths were subsequently referred to another working group, such as the Injury or Medical Working Groups, for appropriate classification. The remaining cases of SUDI were then considered for classification as SIDS. (By definition, cases of SIDS were a subset of the larger group of cases of SUDI.) The group was guided by the following definition of SIDS:

The sudden death of any infant or young child which is unexplained by history and in which a thorough post mortem examination fails to demonstrate an adequate cause of death.[23]

The classification system employed in this report differs from that which was used in previous years. The category *SIDS-Undetermined* was deleted in 1998 in order not to include SUDIs of unknown cause which have not been subjected to vigorous and appropriate investigation. As the classification of SIDS is one of exclusion, deaths in which other natural or unnatural causes cannot be reasonably excluded should not be labelled as SIDS of any sub-classification. The investigation and classification of sudden and unexpected deaths in infants is the subject of a recent report.[24]

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[23] Beckwith JB. Discussion of terminology and definition of the sudden infant death syndrome. In: Bergman AB, Beckwith JB, Ray CG, eds, Proceedings of the Second International Conference on Causes of Sudden Deaths in Infants, Seattle: University of Washington Press, 1970; 14-22

[24] Woodagte P, Colditz P, Brookes K et al. A review of sudden unexpected deaths in infants in Queensland, 1997 and 1998. Report from the SUDI working group of the Queensland Council on Obstetric and Paediatric Morbidity and Mortality. Brisbane: QCOPMM, 2000.

During the year 1999, there were 68 deaths within the first year of life that were sudden and unexpected. Of the seven of these deaths that occurred in the neonatal period, four were classified as SIDS. There was one case aged one year of age. Following the detailed review of cases by the SUDI Working Group, there were 26 post-neonatal infant deaths classified as SIDS. Five deaths which were originally certified as SIDS were reclassified *unable to be determined* following detailed review. These deaths were possibly cases of SIDS, but due to inadequacies in either event scene information or autopsy, other causes of death could not be confidently excluded. Ten cases certified as SIDS were classified as *asphyxia.* Following the expert review, four deaths which were sudden and unexpected but certified otherwise were classified as *SIDS.*

Cases of SIDS were sub-classified according to the definitions in Table 3.11. The almost complete lack of event scene information and interviews in some cases significantly hampers the exercise of accurate ascertainment and further sub-classification of *SIDS*. This classification process as in previous reports has once again highlighted a number of issues relating to the quality of the information in autopsy reports including the propensity to offer a *SIDS* diagnosis without adequate supporting evidence. (This issue was dealt with by a separate report from the Council, *A review of sudden and unexpected deaths in infants (SUDI) autopsies in Queensland, 1997-98*.)

There were 15 deaths in 1999 that were considered to be SIDS with no complicating or contributing factors. The rates of SIDS in 1999 for all infants and post-neonatal infants were 63.8 and 59.8 per 100 000 persons respectively. The SIDS rate for 1999 is 54% lower than that reported for Queensland in 1994. The rate of SIDS was 1.3 times higher for males than for females. The rate of SIDS among all infants in the first year of life in Queensland was 0.64 per 1 000 live births. This is similar to the corresponding rate for the rest of Australia, which was 0.66 per 1 000 live births. In view of this it is essential that all those involved in the care of infants and newborns continue to promote the recommendations contained in the *Reduce the Risks* campaign.

Table 3.10: Infant SUDI deaths by cause (QCPaedC), Queensland 1999.

Classification (QCPaedC)	No of deaths
Determined at birth	3
Acquired condition	3
SIDS	**30**
Injury	25
Unable to be determined	7
All SUDI	**68**

Source: QCOPMM

Table 3.11: Classification of *SIDS* (QCPaedC)

Classification (QCPaedC)	Description
3.1	No cause of death apparent from available history and post-mortem examination
3.2	No cause of death apparent from available history and post-mortem examination, but minor abnormalities found which are unlikely to have contributed to the death
3.3	No cause of death apparent from available history and post-mortem examination, but abnormalities found which may have contributed to but not directly caused the death.

Table 3.12: Paediatric and neonatal deaths from *SIDS* (QCPaedC) by age and gender, Queensland 1999.

Cause of death	Total			Age								
				0-27 days			28-364 days			1-4 years		
(QCPaedC)	p	f	m	p	f	m	p	f	m	p	f	m
All SIDS	**31**	**13**	**18**	**4**	**2**	**2**	**26**	**11**	**15**	**1**	**-**	**1**
3.1	16	7	9	1	-	1	14	7	7	1	-	1
3.2	6	1	5	1	-	1	5	1	4	-	-	-
3.3	9	5	4	2	2	-	7	3	4	-	-	-

Source: QCOPMM

Injury deaths

Injuries resulted in 92 child deaths in Queensland in 1999. This represents nearly 37% of all paediatric deaths in the State. More than 40% of all child *injury* deaths involved children aged between 1 and 4 years.

Drowning and *motor vehicle passenger* were the most common cause of death among children aged 1 to 4 years in 1999. Children of this age (1 to 4 years) are of particular interest in that a disproportionate number of *injury* deaths occur within this age group and their pattern of *injury* deaths is different to the other ages. At this age, a child cannot take responsibility for its own welfare and is entirely dependent on his or her carer, and on society to avoid preventable death. *Drowning in domestic swimming pools* or dams and *slow speed pedestrian* deaths are almost entirely restricted to this age group and together with *high speed pedestrian* deaths, comprise some of the highest rates of any specific cause of *injury* deaths between 1 and 14 years. *Drowning in containers*, *dams* and *natural water hazards* occur with similar incidence in this age group and together comprise almost as many fatalities as *domestic pool drownings* (Table 3.14). There was nearly a 50% increase in *domestic pool drownings* in 1999 compared with the previous five years (especially among the males) while there was a decrease in drownings in dams.

Deaths due to *slow speed runovers* were similar to the previous year. Most of these deaths involve 4-wheel drive or similar vehicle with restricted rear vision and almost all involved the victim's parent or close relative, as the driver. These two leading causes of death due to *injury* in this age group were examined in greater detail in the Council's 1994 to 1996 report.

For children within the 10 to 14 years age group, *motor vehicle passenger* deaths was the most common cause of death. This group differs from other *transport related* deaths in older age groups because most are determined by factors outside the control of the child. With the exception of a very few deaths, (such as involving motor cycle riders) the child's role in the death is purely passive. In the 1 to 4 year age group *pedestrian traffic* fatalities usually outnumber *motor vehicle passenger* deaths but this situation is reversed for both of the older age groups. For *pedestrian* and *pedal cyclist* deaths of older children it might be argued that the child's own behaviour made some contribution, although the majority of child *pedestrian* deaths occur before the fifth birthday - an age when the child must be considered the victim of a dangerous road environment.

Of the remaining *other injury* deaths, the majority was due to *asphyxiation* (29%), being *struck by person or object* (8%) and *house fire* (3%).

Thirteen percent of all paediatric *injury* deaths were recorded as being *intentional* of which half were due to *possible or stated self harm*. Children aged less than five years were most at risk from death from parental maltreatment while *self harm* was confined to the 10 to 14 years age group. Amongst females aged 10 to 14 *self harm* was the most frequent cause of death for males the second most frequent cause. A recent study by the Queensland Injury Surveillance Unit examining ED presentations for self harm for this age group found an overall presentation rate for self harm of 64 per 100 000 with increased rates in females and in rural areas[25]. These data suggest that for every completed suicide in this age group there are approximately 20 unsuccessful attempts requiring medical attention. Reducing injury due to self harm is a priority area and ED based interventions targeted at this age group should be investigated.

During 1999 there were 16 deaths of children aged 28 to 365 days classified as *asphyxia – other* comprising 60% of the injury deaths in this age group. (The majority of these deaths were the result of 'sleeping accidents' and had been certified as deaths due to SIDS.) The apparent sharp increase in deaths due to this cause may reflect a more critical and objective approach to the classification of sudden and unexpected deaths in infants. A recent report by the NSW Child Death review Team which undertook a review of all SIDS/SUDI deaths in that State also found similar discrepancies.[26]

This further highlights the need for a systematic approach to compiling information on unexpected deaths in this State, to help identify any patterns or trends such as in SIDS or product related deaths. The establishment of a centralised State Coroner's Office and a State-wide Coronial Information database will go some way to achieving this.

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25 Thomson F, Pitt R. Intentional acts of self harm in 10-14 year olds in three Queensland regions. 17th Annual Scientific Meeting of the Australian College for Emergency medicine. Canberra, 2000.

26 NSW Child Death Review Team. 1999-2000 Report. NSW Commission for Children and Young People. Sydney: 2000.

Table 3.13: Paediatric *injury* deaths by major cause (QCPaedC), age and gender, Queensland 1999

Age		Injury (QC PaedC)			
		Transport related	Drowning	Other injuries	All injuries
Total	persons	27	22	43	92
	females	14	7	21	42
	males	13	15	22	50
28-364 days	persons	1	3	20	24
	females	-	1	11	12
	males	1	2	9	12
1-4 years	persons	13	16	9	38
	females	9	5	4	18
	males	4	11	5	20
5-9 years	persons	2	2	4	8
	females	-	-	2	2
	males	2	2	2	6
10-14 years	persons	11	1	10	22
	females	5	1	4	10
	males	6	-	6	12

Source: QCOPMM

Table 3.14 Numbers and location of *drowning* deaths of children aged 28 days to 4 years, Queensland 1994–1999.

Year	Swimming pool (domestic)	Swimming pool (Other)	bath	dam	Natural water hazard	Other	Total
1994	7	-	2	2	-	1	12
1995	14	2	2	1	3	-	22
1996	11	1	5	2	3	-	22
1997	7	-	1	2	1	2	13
1998	4	-	2	4	-	-	10
1999	**9**	**-**	**2**	**2**	**2**	**4**	**19**

Source: QCOPMM

Table 3.15: Paediatric *injury* deaths by intent and age, Queensland 1999

Intent	Total	Age			
		28-364days	1-4 years	5-9 years	10-14 years
Injury	**92**	**24**	**38**	**8**	**22**
Unintentional injury	80	21	36	7	16
Intentional injuries	12	3	2	1	6
Possible or stated self harm	6	-	-	-	6
Possible or stated maltreatment by parent	5	3	2	-	-
Unspecified assault	1	-	-	1	-

Source: QCOPMM

Table 3.16: Paediatric *injury* deaths by cause (QCPaedC), age and gender, Queensland 1999

Cause of death (QCPaedC)	Total			Age											
				28-364 days			1-4 years			5-9 years			10-14 years		
	p	f	m	p	f	m	p	f	m	p	f	m	p	f	m
Injury	**92**	**42**	**50**	**24**	**12**	**12**	**38**	**18**	**20**	**8**	**2**	**6**	**22**	**10**	**12**
Transport related	27	14	13	1	-	1	13	9	4	2	-	2	11	5	6
Passenger	17	9	8	1	-	1	7	5	2	2	-	2	7	4	3
Driver	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-
Pedal cyclist MV	1	-	1	-	-	-	-	-	-	-	-	-	1	-	1
Pedestrian - high speed	5	3	2	-	-	-	2	2		-	-	-	3	1	2
Pedestrian - low speed	3	1	2	-	-	-	3	1	2	-	-	-	-	-	-
Drowning	22	7	15	3	1	2	16	5	11	2	-	2	1	1	-
Swimming pool - domestic	9	2	7	-	-	-	9	2	7	-	-	-	-	-	-
Swimming pool – other	1	-	1	-	-	-	-	-	-	1	-	1	-	-	-
Bath	2	-	2	2	-	2	-	-	-	-	-	-	-	-	-
Dam	2	1	1	-	-	-	2	1	1	-	-	-	-	-	-
Container, small	3	2	1	1	1	-	2	1	1	-	-	-	-	-	-
Natural water hazard	4	2	2	-	-	-	2	1	1	1	-	1	1	1	-
Other	1	-	1	-	-	-	1	-	1	-	-	-	-	-	-
Asphyxiation	27	12	15	16	8	8	5	1	4	-	-	-	6	3	3
Rope, cord or strap	8	3	5	-	-	-	2	-	2	-	-	-	6	3	3
Foreign body	2	1	1	-	-	-	2	1	1	-	-	-	-	-	-
Other	17	8	9	16	8	8	1	-	1	-	-	-	-	-	-
Firearm	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-
Struck by	7	4	3	3	2	1	2	2	-	2	-	2	2	2	-
Person	5	4	1	3	2	1	2	2	-	-	-	-	-	-	-
Object	2	-	2	-	-	-	-	-	-	2	-	2	-	-	-
Electricity	1	-	1	-	-	-	-	-	-	-	-	-	1	-	1
Poisoning – drugs, med.	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-
Machinery	1	-	1	-	-	-	-	-	-	-	-	-	1	-	1
Fire - house	3	2	1	1	1	-	1	-	1	1	1	-	-	-	-
Other	2	1	1	-	-	-	-	-	-	1	1	-	1	-	1

Source:QCOPMM

Conditions determined at birth

Conditions determined at birth made up 28% of all paediatric mortality in 1999, which was slightly less than that observed in 1998 (Table 3.6).

Congenital conditions/birth defects

Structural cardiovascular anomalies accounted for almost a third of the deaths associated with *congenital conditions* and/or *birth defects* (Table 3.17). N*eurological* and *metabolic* anomalies were the other common congenital conditions that caused death. The 10 deaths due to *metabolic* anomalies included pyruvate dehydrogenase deficiency, mitochondrial encephalopathy/cytopathy, methylmalonicacidemia, Alpers' disease and Hurler's syndrome.

Other conditions determined at birth

Three of the five deaths in this sub-category were from *cerebral palsy*. *Cerebral palsy* was the condition recorded in the death certificate for these cases although it is not an adequate diagnosis for cause of death.

Acquired conditions

There has been a general decline in deaths from *acquired conditions* since 1994, (Table 3.6). The numbers of deaths due to *infections* and *other acquired conditions* reported in 1999 remains virtually unchanged from 1998, while cancers have declined.

Infection

As a proportion of all mortality, *infections* as a cause of death are approximately a third less than they were in 1994. There were no deaths from *H. influenza meningitis* or *pertussis* in 1999.

Other acquired conditions

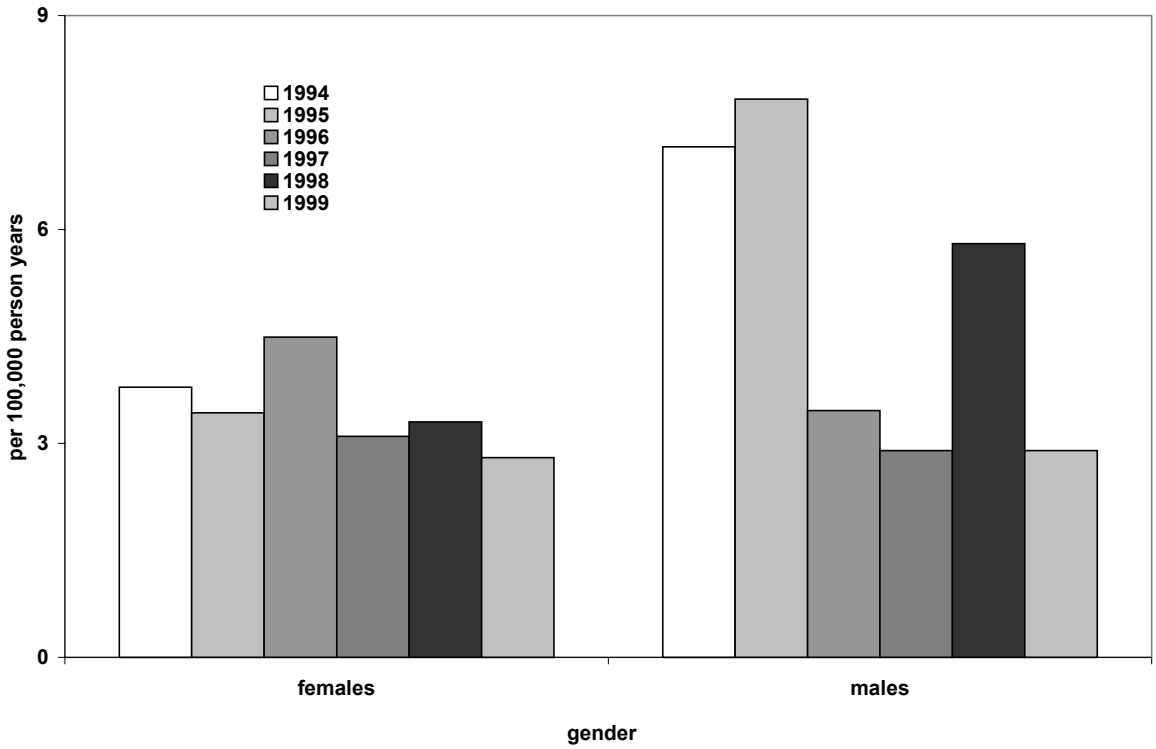
As in the previous four years, *epilepsy* and *asthma* continue to cause deaths in the paediatric population — especially among the older age groups. In 1999 there were two deaths classified *other acquired – other* which included one death due to adrenoleukodystrophy and one death following a 'near SIDS'.

Malignancy

The 21 deaths from cancers made up 8% of all paediatric deaths and 39% of deaths from *acquired conditions* in 1999. Almost 40% of these childhood cancer deaths were due to *leukaemias* especially *acute lymphoblastic leukaemia* (Table 3.19).

In the 1994 to 1996 triennium, most of the deaths from malignancy occurred in the first two years of this triennium (Figure 3.5). The decline observed up until 1997 has continued for 1999. Data from the Australian Paediatric Cancer Registry also suggests that 70% of patients with childhood cancer can be expected to be cured of their disease. Some types of cancer have a particularly good prognosis and it is encouraging to note that there were no recorded deaths in 1999 from *retinoblastoma* and only one from *Wilms' tumour*.

Figure 3.5: Paediatric mortality rate[1] for *cancer* by year and gender, Queensland 1994-98.



Source: QCOPMM
[1] per 100,000 person years.

Table 3.17: Paediatric deaths from *conditions determined at birth* (QCPaedC) by age and gender, Queensland 1999.

Cause of death (QCPaedC)	Total			Age											
				28-364 days			1-4 years			5-9 years			10-14 years		
	p	f	m,	p	f	m	p	f	m	p	f	m	p	f	m
Conditions determined at birth	**70**	**35**	**35**	**44**	**20**	**24**	**9**	**5**	**4**	**9**	**5**	**4**	**8**	**5**	**3**
Congenital condition/Birth defects	51	28	23	26	15	14	8	5	3	8	4	4	6	4	2
Cardiovascular - Structural anomalies	16	9	7	13	7	6	3	2	1	-	-	-	-	-	-
Neurological	8	5	3	3	2	1	1	1	-	2	1	1	2	1	1
Neural tube and brain anomalies	5	4	1	2	2	-	-	-	-	2	1	1	1	1	-
Neurodegenerative	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-
Neuromuscular/SMA	2	-	2	1	-	1	-	-	-	-	-	-	1	-	1
Miscellaneous	27	14	13	13	6	7	4	2	2	6	3	3	4	3	1
Respiratory other	6	2	4	6	2	4	-	-	-	-	-	-	-	-	-
Gastrointestinal other	4	2	2	2	1	1	1	1	-	1	-	1	-	-	-
Metabolic	10	6	4	-	-	-	3	1	2	5	3	2	2	2	-
Chromosomal	4	4	-	3	3	-	-	-	-	-	-	-	1	1	-
Musculoskeletal	1	-	1	-	-	-	-	-	-	-	-	-	1	-	1
Other	2	-	2	2	-	2	-	-	-	-	-	-	-	-	-
Prematurity	14	5	9	14	5	9	-	-	-	-	-	-	-	-	-
Other conditions determined at birth	5	2	3	1	-	1	1	-	1	1	1	-	2	1	1
Birth asphyxia	2	-	2	-	-	1	-	-	-	-	-	-	1	-	1
Cerebral palsy	3	2	1	-	-	-	1	-	1	1	1	-	1	1	-

Source: QCOPMM

Table 3.18: Paediatric deaths from *acquired conditions* (QCPaedC) by age and gender, Queensland 1999.

Cause of death (QCPaedC)	Total			Age											
				28-364 days			1-4 years			5-9 years			10-14 years		
	p	f	m	p	f	m	p	f	m	p	f	m	p	f	m
Acquired condition	**54**	**30**	**24**	**7**	**3**	**4**	**17**	**11**	**6**	**12**	**6**	**6**	**18**	**10**	**8**
Infections	23	15	8	5	2	3	12	8	4	1	1	-	5	4	1
Septicaemia	13	9	4	2	1	1	8	6	2	1	1	-	2	1	1
Meningococcal	5	2	3	1	-	1	4	2	2	-	-	-	-	-	-
Pneumococcal	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-
Other	7	6	1	1	1	-	3	3	-	1	1	-	2	1	1
Respiratory	2	1	1	2	1	1	-	-	-	-	-	-	-	-	-
Bronchopneumonia	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-
Viral inc. Croup	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-
Miscellaneous	8	5	3	1	-	1	4	2	2	-	-	-	3	3	-
Gastroenteritis	3	1	2	1	-	1	2	1	1	-	-	-	-	-	-
Myocarditis	4	4	-	-	-	-	1	1	-	-	-	-	3	3	-
Other	1	-	1	-	-	-	1	-	1	-	-	-	-	-	-
Other acquired	10	5	5	1	-	1	-	-	-	2	1	1	7	4	3
Epilepsy	5	4	1	-	-	-	-	-	-	2	1	1	3	3	-
Asthma	3	1	2	-	-	-	-	-	-	-	-	-	3	1	2
Other	2	-	2	1	-	1	-	-	-	-	-	-	1	-	1

Source: QCOPMM

Table 3.19: Paediatric deaths from *cancer* (QCPaedC) by age and gender, Queensland 1999.

Cause of death (QCPaedC)	Total			Age											
				28-364 days			1-4 years			5-9 years			10-14 years		
	p	f	m	p	f	m	p	f	m	p	f	m	p	f	m
Cancer	**21**	**10**	**11**	**1**	**1**	**-**	**5**	**3**	**2**	**9**	**4**	**5**	**6**	**2**	**4**
All leukaemia	8	5	3	-	-	-	2	2	-	4	2	2	2	1	1
Acute Lymphoblastic	5	3	2	-	-	-	1	1	-	2	1	1	2	1	1
Acute non-Lymphoblastic	2	2	-	-	-	-	1	1	-	1	1	-	-	-	-
Other and unspecified	1	-	1	-	-	-	-	-	-	1	-	1	-	-	-
Lymphomas	3	2	1	-	-	-	-	-	-	1	1	-	2	1	1
Hodgkin's	1	-	1	-	-	-	-	-	-	-	-	-	1	-	1
Non-Hodgkin's	2	2	-	-	-	-	-	-	-	1	1	-	1	1	-
Central nervous system	3	1	2	-	-	-	1	1	-	1	-	1	1	-	1
Ependymoma	1	-	1	-	-	-	-		-	-	-	-	1	-	1
Medulloblastoma, primitive neuroectodermal tumour	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-
Other glioma	1	-	1	-	-	-	-	-	-	1	-	1	-	-	-
Neuroblastoma	3	-	3	-	-	-	1	-	1	2	-	2	-	-	-
Renal tumours	2	1	1	1	1	-	1	-	1	-	-	-	-	-	-
Wilm's tumour	1	-	1	-	-	-	1	-	1	-	-	-	-	-	-
Other and unspecified renal tumours	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-
Rhabdomyosarcoma, embryonal sarcoma and soft tissue Ewing's tumour	2	1	1	-	-	-	-	-	-	1	1	-	1	-	1

Source: QCOPMM

Post mortems

Fifty six per cent of the 252 paediatric deaths in 1999 were reported to have had a post mortem. In the paediatric population the two major causes of death *SIDS* and *Injury* had the highest autopsy rate and *conditions determined at birth* had the lowest rate. Most of the paediatric post mortems were performed on children less than five years (Table 3.20). Less than half of all paediatric post mortems were conducted at the John Tonge Centre for Forensic Sciences of Queensland Health's Pathology and Scientific Services.

Table 3.20 Percentage of paediatric deaths receiving a post mortem by major cause (QCPaedC) and age, Queensland 1999

Cause of death (QCPaedC)	Percentage with post mortem
Total	**56.0**
Determined at birth	2.9
Acquired conditions (excl. Cancers)	42.4
SIDS	100.0
Injury	97.8
Undetermined	88.9
Age	
28-364 days	55.6
1-4 years	69.7
5-9 years	30.0
10-14 years	54.2

Source: QCOPMM

Chapter 4:Indigenous Mortality

Executive summary

- Data used to calculate perinatal and paediatric mortality rates are derived from different sources. Identification as "Indigenous" is not rigorously and consistently sought, and may be reliant upon self-identification, or the individual who completes the death certificate. Under-ascertainment of Indigenous status is likely. In this report "Indigenous" refers to the combined total of peoples of "Aboriginal" and "Torres Strait Islander" origin.

- There was one death of a mother who was registered as Indigenous (maternal death) in 1999.

- In 1999, 6% of births were to Indigenous mothers, whilst 9% of perinatal deaths were in babies of Indigenous mothers. The Indigenous perinatal mortality rate remains 1.6 times higher than the non-Indigenous perinatal mortality rate.

- The perinatal mortality rates for Indigenous populations were higher in most gestational age and birth-weight categories. The cause of perinatal death accounting for most of the increased perinatal mortality in Indigenous populations was *unexplained preterm*, which was more than two times more frequent than in the non-Indigenous population.

- Neonatal death rate due to *respiratory disorders* was almost four times higher in the Indigenous population.

- The Indigenous paediatric mortality rate was two times higher than that in the non-Indigenous population. The rate of death due to *SIDS* was also two times higher in Indigenous infants.

Introduction

Improving the health and well being of the Indigenous population of Australia has been widely accepted by governments as a national priority, and Queensland Health as the leading health agency in Queensland has expressed firm commitment to this.[27] Indigenous outcomes are therefore reported separately in this chapter. It contains information on deaths of mothers, babies and children (to age 14 years), identified as Aboriginal, Torres Strait Islander or both in the perinatal and mortality data.

Definitions

The term **Indigenous** in this chapter refers to an Aboriginal or Torres Strait Islander person. The definition of an Aboriginal or Torres Strait Islander person, as accepted by Queensland Health and other agencies including the Commonwealth government, is:

> a person of Aboriginal or Torres Strait Islander descent who identifies as an Aboriginal or Torres Strait Islander and is accepted as such by the community in which he or she lives.

Fetal death	Defined by the Registration of Births, Deaths and Marriages Act as a child whose heart has not beaten after it has been completely expelled or extracted from its mother and who is either of not less than 20 weeks gestation; or of not less than 400g by weight at birth.
Live birth	Defined by the Registration of Births, Deaths and Marriages Act as a child whose heart has beaten after it has been completely expelled or extracted from its mother.
Neonatal death	The death of a live born infant within 28 days of birth.
Perinatal mortality rate	The number of fetal and neonatal deaths per 1,000 total births.
Fetal mortality rate	The number of fetal deaths per 1,000 total births.
Neonatal mortality rate:	The number of deaths of live born infants under 28 days of age per 1000 live births.
Post-neonatal mortality rate	The number of deaths of infants aged greater than 27 days and less than one year in a period per 1000 live births in the same period.
Paediatric population	Children aged greater than 27 days and less than 15 years.
Paediatric mortality rate	The number of deaths of children greater than 27 days and less than 15 years in a period per 100,000 person years.
Infant mortality rate	The number of deaths of infants under one year of age in a period per 1000 live births in the same period.

Data sources and quality

Perinatal and paediatric deaths are reported separately as they are derived from different sources. The data used for perinatal mortality were obtained from the Perinatal Data Collection (PDC) of the Data Services Unit in the Health Information Centre of Queensland Health, the Australian Institute of Health and Welfare's National Perinatal Statistics Unit (NPSU) and from the Australian Bureau of Statistics (ABS). Information on paediatric deaths is from the Registrar General of Births, Deaths and Marriages.

With perinatal information, it should be noted that there are differences in the numbers of births and deaths reported (both Indigenous and non-Indigenous) according to whether the data are derived from ABS reports or from the Perinatal Data Collection (PDC). Births, perinatal deaths and infant deaths are reported by ABS according to the State of residence of the mother and year of registration, whereas the PDC reports on births and perinatal deaths which occur in Queensland in the year of their occurrence.

The PDC records only the Indigenous status of the mother while birth registration information (used by ABS) is the result of self identification and includes the father's Indigenous status. The ABS estimates that in 1999 nearly 26% of Indigenous births registered in Queensland had an Indigenous father and a non-Indigenous mother.[28]

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[27] Communicable Diseases Unit Queensland Health. Public Health Systems Indigenous Identifiers Project. 1998. Brisbane: Queensland Health.

[28] Australian Bureau of Statistics. Births Australia 1998. Cat. No. 3301.0, 1999. Canberra: ABS.

The system relied upon by the PDC, whereby the birth attendant assigns maternal Indigenous status, has been shown in Victoria to be inconsistent, and highly likely to result in under-ascertainment[29].

Information on Indigenous mortality in Queensland is subject to the death being registered with the Registrar of Births, Deaths and Marriages and to the quality of information on Indigenous status. While information on maternal Indigenous status has been available from perinatal death certificates in Queensland since 1987, general death certificates included a question about Indigenous status only since mid 1996. Thus, 1999 was the first year in which information on Indigenous status of infant and paediatric deaths was recorded and ascertainment of Indigenous status from these improved forms is likely to be still incomplete. Further, the quality of information on Indigenous status is reliant on the individual who includes such information on the death certificate (usually the funeral director or doctor). The reduced propensity to ascertain Indigenous status of the deceased where it is unclear, is likely to result in significant under-reporting of Indigenous deaths. Unlike birth registrations that are self identified and may be required for some benefits and entitlements, death registration is a less rigorous process. Deaths in the rural and remoter parts of Queensland (with a high Indigenous population), may be less likely to be registered.

Inconsistencies in the ascertainment of Indigenous status of births and deaths means that estimations of Indigenous perinatal, infant and paediatric mortality rates need to be interpreted cautiously.

The estimate of the Indigenous paediatric population for 1999 was based on ABS experimental projections[30] and is subject to its assumptions. In the case of the population aged between 28 and 364 days, estimates were derived using estimated populations for persons aged less than one year, total live births and neonatal deaths.

These ABS experimental projections are based on the 1996 Census whose estimates of the Indigenous population have been questioned because they showed an increase of approximately 100% since the 1991 Census. This discrepancy in the Indigenous populations between the two census periods applied particularly to the east coast of Australia. ABS estimates that only about half of this 'significant inter-censal volatility' can be explained by natural increase[31] - thus requiring caution with the denominators as well.

Maternal mortality

During 1999 there was one Indigenous maternal death recorded. The rates of rare events in small populations (such as maternal mortality in the Indigenous population) are prone to unstable fluctuations and cannot be used as indicators of the health of the community. However, the NHMRC report on Maternal Deaths in Australia, 1994-96 found that the relative risk of maternal mortality for Indigenous women versus non-Indigenous women for this period was 3.45 (95% CI, 1.67-7.16).[32]

Perinatal mortality

For the purposes of this Report, perinatal mortality rates for women reported as of Aboriginal or Torres Strait Islander origin are presented in combined form as the numbers are too small to permit valid statistical comparison. Although it is appreciated that combining the data for these two populations may obscure some important differences, there is a risk in over-interpreting differences in rates between populations when the numbers are small.

Perinatal outcomes reflect overall maternal health, which in turn is directly related to socio-economic well-being. Thus declines in the perinatal mortality rate for the Indigenous population will require a larger contribution from improvements in socio-economic conditions than from improvements in medical care alone.

There can be no doubt that in order to reduce morbidity and mortality improvements need to be made in the services available to Indigenous women and many of the recommendations in these reports await appropriate funding.

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[29] Koori Health Unit. How midwives identify women as Aboriginal or Torres Strait Islanders, Koori Health Counts, Number 1: 1994. Melbourne: Department of Human Services, Victoria.

[30] Australian Bureau of Statistics. Experimental projections of the Aboriginal and Torres Strait Islander population 30 June 1996 to 30 June 2006. Cat. No. 3231.0, 1998. Canberra: ABS.

[31] ABS, AIHW. The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples. Cat. No. 4704.0, 1999. Canberra: ABS.

[32] Maternal Mortality Working Party, NHMRC. Report on Maternal Deaths in Australia 1991-93. Canberra: NHMRC; 1998.

Rates and trends

There were 48 perinatal deaths of infants born to Indigenous women, out of a total of 2885 births in 1999. Although only 5.9% of births in Queensland were to Indigenous women these births comprised 9.3% of all perinatal deaths.

The crude perinatal mortality rate of 16.6 per 1 000 births for the Indigenous populations was 1.6 times higher than the non-Indigenous rate (Table 4.1).

For the ten years since 1987 there has been no significant change in the Indigenous perinatal mortality rate. Over the last three years, however there has been a steady decline in the perinatal death rate. (Figure 4.1 to Figure 4.3).

Table 4.1: Indigenous and non-Indigenous perinatal mortality, Queensland 1999

	Total births	Live births	Fetal deaths		Neonatal deaths		Perinatal deaths	
			n	rate[1]	n	Rate[2]	n	rate[1]
non-Indigenous	45 863	45 543	320	7.0	150	3.3	470	10.2
Indigenous	2 885	2 857	28	9.7	20	7.0	48	16.6
Total [3]	48 749	48 401	348	7.1	170	3.5	518	10.6

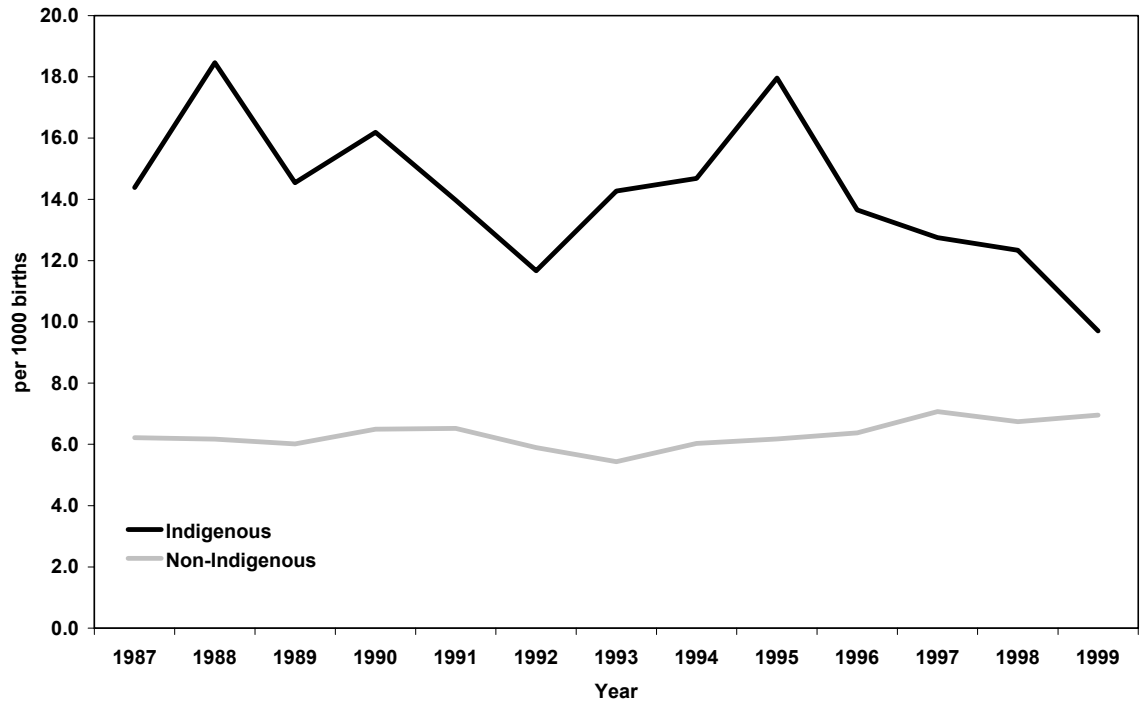
Source: Perinatal Data Collection, DSU, QH

[1] per 1 000 births.

[2] per 1 000 livebirths

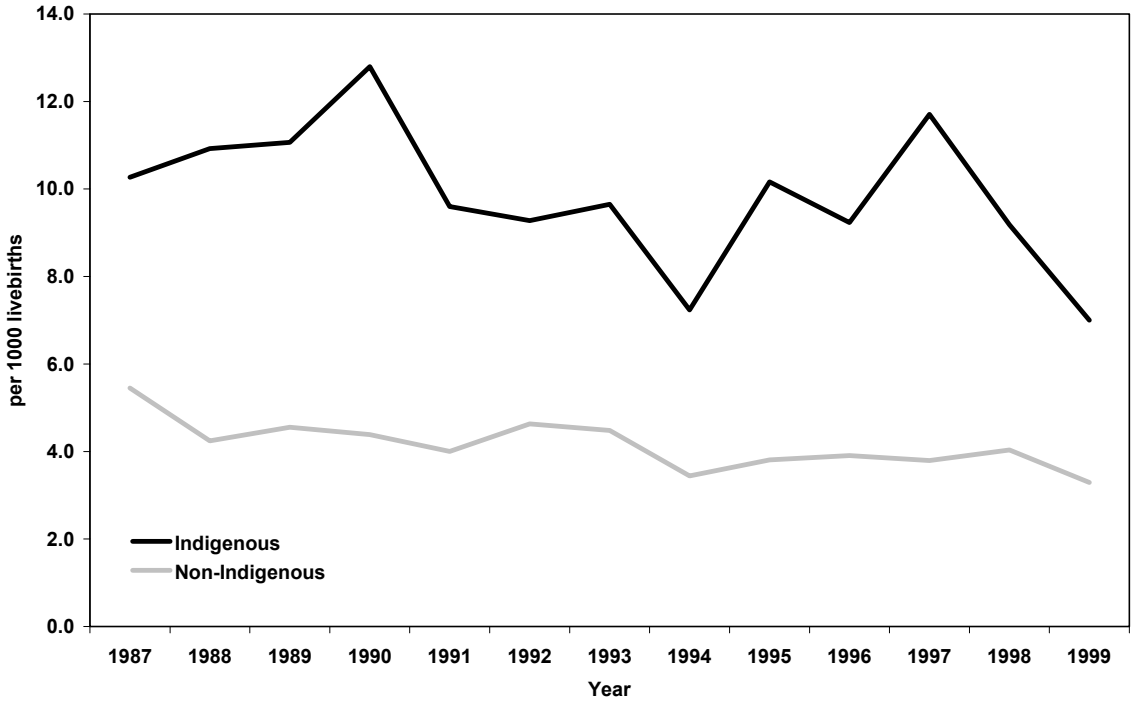
[3] includes outcomes for 1 birth where the Indigenous status of the mother was not stated.

Figure 4.1: Indigenous and non-Indigenous fetal mortality rates, Queensland 1987-1999



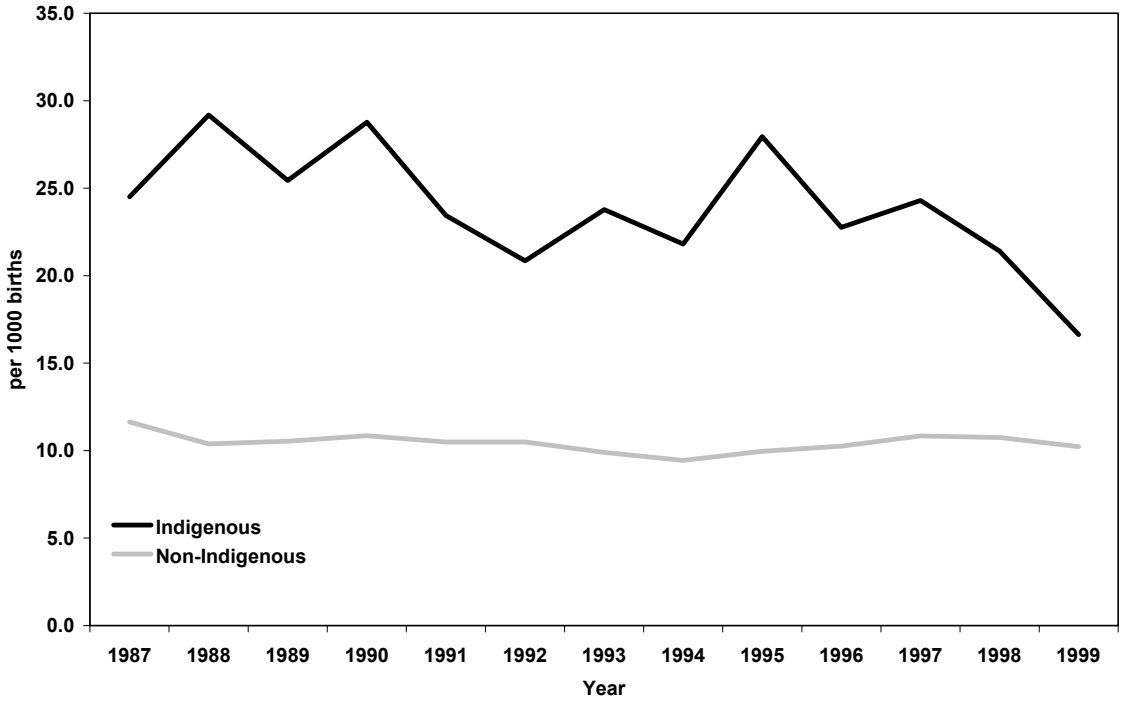
Source: Perinatal Data Collection, DSU, QH

Figure 4.2: Indigenous and non-Indigenous neonatal mortality rates, Queensland 1987-1999



Source: Perinatal Data Collection, DSU, QH

Figure 4.3: Indigenous and non-Indigenous perinatal mortality rates, Queensland 1987-1999



Source: Perinatal Data Collection, DSU, QH

Gestational age and birthweight specific mortality rates for the Indigenous and non-Indigenous populations are presented in Table 4.2 and Table 4.3. The mortality rates for the Indigenous populations were higher in virtually every gestational age and birthweight category. Preterm birth is not only more common in the Indigenous populations, it carries with it a progressively higher risk of perinatal death in every gestational age category, compared to the non-Indigenous population.

For the triennia 1997 to 1999 the crude rate ratio of the two populations was 1.94, while the ratio adjusted for gestational age was 1.18 (p=0.04).

Although the very high mortality rates for the extremely preterm (less than 28 weeks) babies in the two populations are very similar, the Indigenous mortality rates for term babies are 20% higher than that of the non-Indigenous babies. The higher proportion of extremely preterm births (less than 28 weeks) in the Indigenous population (1.5% as opposed to 0.8% in the non-Indigenous) and the very high mortality in this group partly explains the elevated mortality rate in the Indigenous population (Table 4.2).

Table 4.2: Perinatal mortality by gestational age and Indigenous status, Queensland 1999

	Gestational age (weeks)			
	<28	28-36	37+	Total[1]
Indigenous				
Total births	43	309	2532	2885
Total live births	23	303	2530	2857
Total fetal deaths	20	6	2	28
Fetal death rate[2]	465.1	19.4	0.8	9.7
Total neonatal deaths	11	4	5	20
Neonatal death rate[3]	478.3	13.2	2.0	7.0
Total perinatal deaths	31	10	7	48
Perinatal mortality rate[2]	**720.9**	**32.4**	**2.8**	**16.6**
non-Indigenous				
Total births	388	3140	42335	45863
Total live births	211	3063	42269	45543
Total fetal deaths	177	77	66	320
Fetal death rate[2]	456.2	24.5	1.6	7.0
Total neonatal deaths	89	27	34	150
Neonatal death rate[3]	421.8	8.8	0.8	3.3
Total perinatal deaths	266	104	100	470
Perinatal mortality rate[2]	**685.6**	**33.1**	**2.4**	**10.2**
Rate ratio	1.05	0.98	1.17	1.63

Source: Perinatal Data Collection, DSU, QH

[1] Includes 1 birth where gestation was unknown.

[2] rate per 1000 births

[3] rate per 1000 live births

Table 4.3: Perinatal mortality by birthweight and Indigenous status, Queensland 1999

	Birthweight (g)			
	<1000	1000-2499	2500+	Total[1]
Indigenous				
Total births	44	277	2564	2885
Total live births	23	273	2561	2857
Total fetal deaths	21	4	3	28
Fetal death rate[2]	477.3	14.4	1.2	9.7
Total neonatal deaths	11	4	5	20
Neonatal death rate[3]	478.3	14.7	2.0	7.0
Total perinatal deaths	32	8	8	48
Perinatal mortality rate[2]	**727.3**	**28.9**	**3.1**	**16.6**
non-Indigenous				
Total births	405	2559	42894	45863
Total live births	218	2486	42834	45543
Total fetal deaths	187	73	60	320
Fetal death rate[2]	461.7	28.5	1.4	7.0
Total neonatal deaths	91	27	32	150
Neonatal death rate[3]	417.4	10.9	0.7	3.3
Total perinatal deaths	278	100	92	470
Perinatal mortality rate[2]	**686.4**	**39.1**	**2.1**	**10.2**
Rate ratio	1.06	0.74	1.48	1.63

Source: Perinatal Data Collection, DSU, QH
[1] Includes 5 births of unknown birthweight.
[2] rate per 1000 births
[3] rate per 1000 live births

Clinical classification (QCPMC)

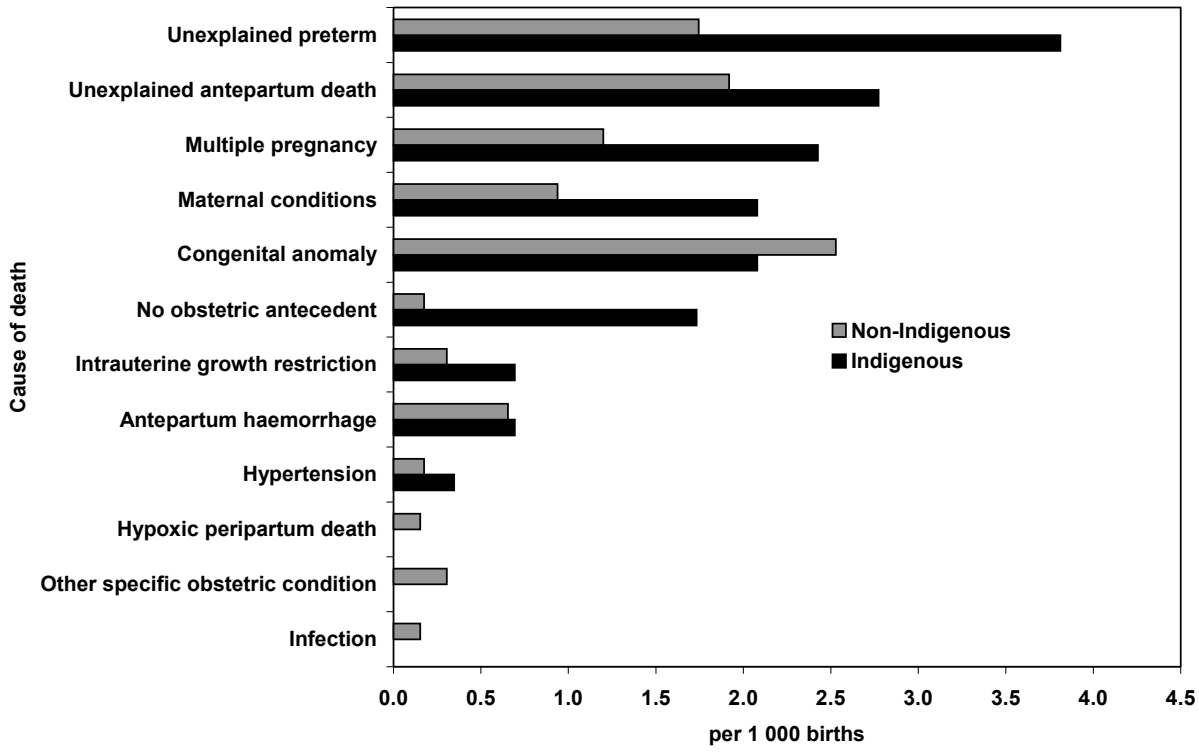
In applying the Queensland Council Perinatal Mortality Classification (QCPMC), the pattern of causation of perinatal death is seen to differ between Indigenous and non-Indigenous populations (Table 4.4). The dominant category for Indigenous perinatal death was *unexplained preterm birth,* whereas for non-Indigenous infants, the dominant category was *congenital anomaly*. It should be noted that this refers to the *proportional* contribution to the overall death rate for each category; the *absolute* rates were higher for the Indigenous population for almost every category (Table 4.4, Figure 4.4). The numbers of deaths in one year are too small to analyse by gestational age and birthweight but the major difference in mortality rates between the two populations relates to higher rates of *unexplained preterm and unexplained antepartum death* in the Indigenous populations. These are likely to be related to poverty and other aspects of socio-economic disadvantage which, to a large extent are outside the scope of conventional obstetrical and neonatal care. However this does not diminish the importance of the need for better and more culturally appropriate antenatal and intrapartum care, as recommended in the Queensland Health reports, *Maternal Health Services in Aboriginal Communities (February 1998)* and *The Ngua Gundi Mother/ Child Project*. There is sound evidence to support investment in health care during pregnancy as a means of breaking the cycle of poor perinatal and infant health, leading to poor childhood, adolescent and adult health.

Table 4.4: Perinatal mortality rates by cause (QCPMC) and Indigenous status, Queensland 1999

Cause of death (QCPMC)	Indigenous			Non-Indigenous		
	n	%	rate[1]	n	%	rate[1]
Congenital anomaly	6	12.5	2.1	116	24.7	2.5
Infection	0	0.0	0.0	7	1.5	0.2
Multiple pregnancy	7	14.6	2.4	55	11.7	1.2
Maternal conditions	6	12.5	2.1	43	9.1	0.9
Hypertension	1	2.1	0.3	8	1.7	0.2
Antepartum haemorrhage	2	4.2	0.7	30	6.4	0.7
Intrauterine growth restriction	2	4.2	0.7	14	3.0	0.3
Other specific obstetric condition	0	0.0	0.0	14	3.0	0.3
Unexplained antepartum death	8	16.7	2.8	88	18.7	1.9
Hypoxic peripartum death	0	0.0	0.0	7	1.5	0.2
Unexplained preterm	11	22.9	3.8	80	17.0	1.7
No obstetric antecedent	5	10.4	1.7	8	1.7	0.2
All causes	**48**	**100.0**	**16.6**	**470**	**100.0**	**10.2**

Source: Perinatal Data Collection, DSU, QH
[1] per 1000 births

Figure 4.4: Perinatal mortality rates by selected cause (QCPMC) and Indigenous status, Queensland 1999



Source: Perinatal Data Collection, DSU, QH

Neonatal Classification

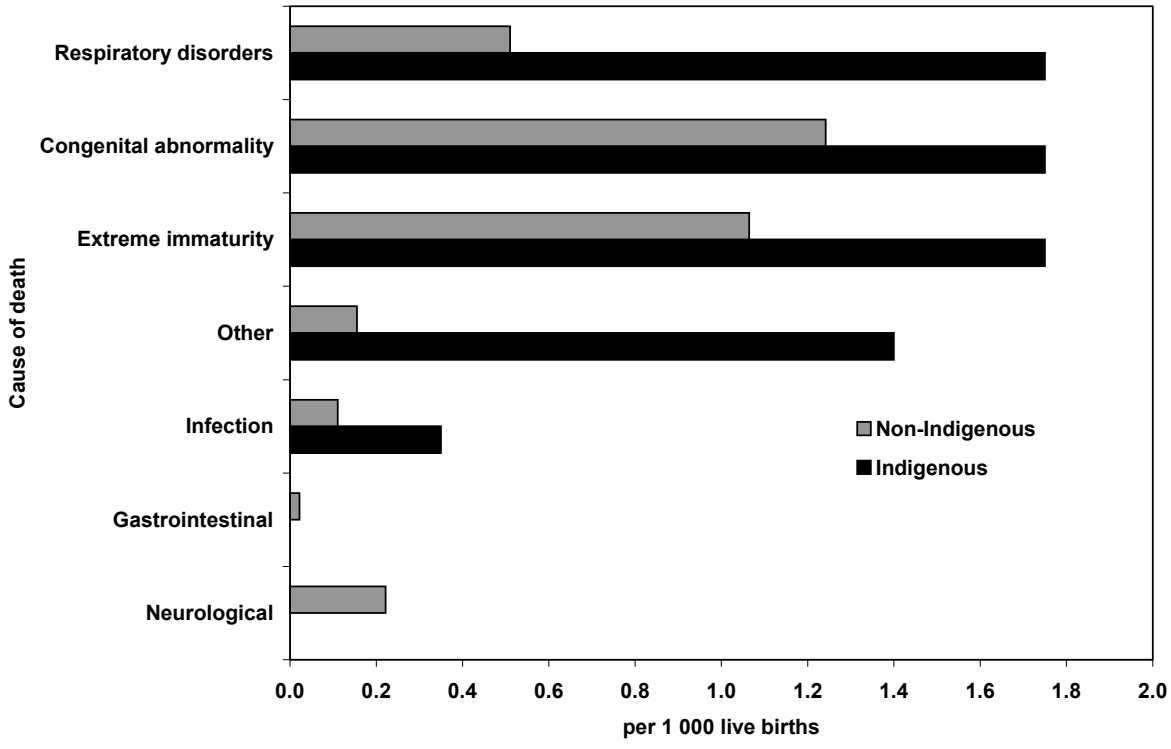
In applying the Neonatal Classification, comparisons between the Indigenous and non-Indigenous population need to be interpreted with caution because of small numbers. The neonatal mortality rate was higher for Indigenous infants in almost every category (Table 4.5, Figure 4.5).

Table 4.5: Neonatal deaths by selected cause (Neonatal Classification) and Indigenous status, Queensland 1999

Cause of death (Neonatal Classification)	Indigenous			non-Indigenous		
	n	%	rate[1]	n	%	rate[1]
Extreme immaturity	5	25.0	1.8	48	32.0	1.1
Congenital abnormality	5	25.0	1.8	56	37.3	1.2
Respiratory disorders	5	25.0	1.8	23	15.3	0.5
Neurological	-	-	-	10	6.7	0.2
Gastrointestinal	-	-	-	1	0.7	0.0
Infection	1	5.0	0.4	5	3.3	0.1
Other	4	20.0	1.4	7	4.7	0.2
Total	20	100.0	7.0	150	100.0	3.3

Source: Perinatal Data Collection, DSU, QH
[1] per 1 000 live births

Figure 4.5: Neonatal mortality rate by selected cause (Neonatal Classification) and Indigenous status, Queensland 1999



Source: Perinatal Data Collection, DSU, QH

Paediatric mortality

In 1999 there were 35 deaths of children aged 28 days to 14 years identified as Aboriginal, Torres Strait Islander or both in the mortality data in Queensland. The distribution of these paediatric deaths by age (Table 4.7), sex (Table 4.8) and cause (Table 4.9) was compared with the non-Indigenous population of Queensland. The Indigenous paediatric mortality rate was two times higher than the non-Indigenous rate.

Table 4.6 Estimated resident paediatric population by age, gender and Indigenous status, Queensland 1999

	Indigenous			non- Indigenous		
Age	female	male	persons	female	male	persons
28–364 days	1 384	1 356	2 740	19 771	20 932	40 703
1–4 years	6 490	6 789	13 280	88 452	93 013	181 465
5–9 years	7 557	8 015	15 572	116 949	122 879	239 828
10–14 years	6 557	6 880	13 437	115 516	122 201	237 717
TOTAL	**21 988**	**23 040**	**45 029**	**340 688**	**359 025**	**699 713**

Source: ABS

Table 4.7: Neonatal and paediatric deaths by age and Indigenous status, Queensland 1999

	Indigenous		non-Indigenous		
Age	number	rate[1]	number	rate[1]	rate ratio
0-27 days[2]	20	7.0	150	3.3	2.1
28–364 days	20	729.9	88	216.2	3.4
1–4 years	9	67.8	57	31.4	2.2
5–9 years	3	19.3	27	11.3	1.7
10–14 years	3	22.3	45	18.9	1.2
TOTAL[3]	**55**	**116.9**	**367**	**52.5**	**2.2**

Source: QCOPMM

[1] per 100 000 person years

[2] per 1 000 live births

[3] per 100 000 person years standardised to the total Queensland population

Table 4.8 Paediatric deaths by gender and Indigenous status, Queensland 1999

	females	males	persons
Indigenous	14	21	35
Non-Indigenous	106	111	217

Source: QCOPMM

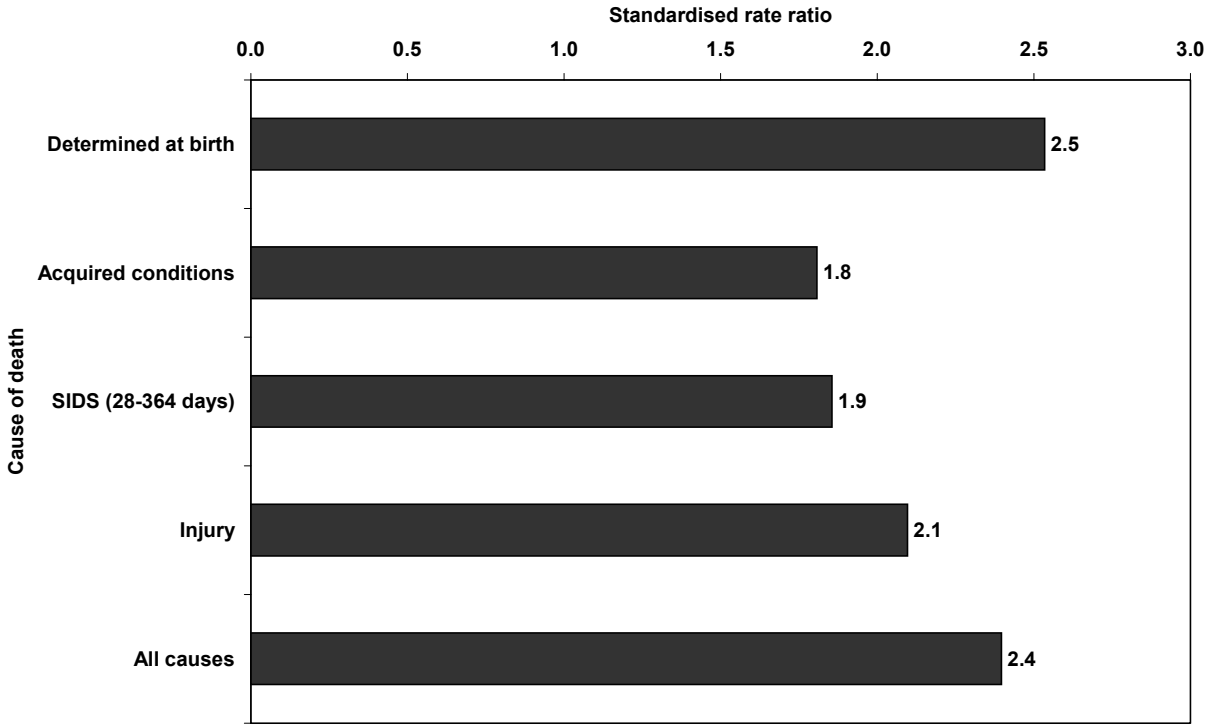
Table 4.9: Paediatric mortality rate by major cause (QCPaedC) and Indigenous status, Queensland 1999

Cause of death	Standardised rate[1]		
(QCPaedC)	Indigenous	non-Indigenous	rate ratio
Determined at birth	21.8	8.6	2.5
Acquired conditions	12.4	6.9	1.8
SIDS (28-364 days)	109.5	56.5	1.9
Injury	24.4	11.7	2.1
TOTAL	74.7	31.2	2.4

Source: QCOPMM

[1] per 100 000 person years standardised to the total Queensland population

Figure 4.6: Indigenous paediatric mortality rate[1], compared with non Indigenous, by major cause (QCPaedC), Queensland 1999



Source: QCOPMM
[1] rate per 100,000 standardised to the total Queensland population

The largest contribution to the higher mortality rate in Indigenous population was from *Acquired conditions* (mainly *Infections*) and *SIDS.* (Table 4.9 and Figure 4.6). These conditions had a bigger impact on the Indigenous population with 15% of all deaths from these causes being of Indigenous children. There were four deaths of Indigenous infants in 1999 ascribed to *SIDS* comprising 15% of all deaths from this cause.

Infant mortality

To enable comparisons to be made with the rest of Australia, infant, neonatal and post-neonatal mortality rates were calculated based on data from the ABS which are reported by year of registration and place of usual residence.[33] Infant deaths are reported as the numbers of deaths occurring in the first year of life in an index year, per 1 000 live births occurring in that year. In 1999 the infant mortality rate for the Indigenous population was 13.7 deaths per 1 000 births, compared with 5.1 for the non-Indigenous population — almost three times the rate.

Table 4.10: Neonatal, post neonatal and infant mortality by Indigenous status, Queensland 1999

	Indigenous		non-Indigenous		rate
	number	rate[1]	number	rate[1]	ratio
Total live births	2 857	-	45 543	-	-
Neonatal deaths	19	6.7	146	3.2	2.1
Post neonatal deaths	20	7.0	88	1.9	3.7
Infant deaths	**39**	**13.7**	**234**	**5.1**	**2.7**

Source: ABS, Deaths.
[1] per 1 000 live births.

[33] Note: The number of Indigenous live births reported by ABS (Table 4.10) is higher than that reported by PDC (Table 4.1). This is consistent with the ABS estimate of 26% higher number of births when paternal Indigenous status is considered.

Appendix 1: QCOPMM classification of perinatal deaths (QCPMC)

1. Congenital anomaly
- 1.1 Central nervous system
- 1.2 Cardiovascular system
- 1.3 Urinary tract
- 1.4 Gastrointestinal tract
- 1.5 Respiratory tract
- 1.6 Chromosomal abnormality or recognised syndrome
- 1.7 Metabolic
- 1.8 Multiple anomalies
- 1.9 Other

2. Infection
- 2.1 Group B Streptococcus
- 2.2 E Coli
- 2.3 Syphilis
- 2.4 Viral
- 2.5 Other
- 2.6 Unknown

3. Multiple pregnancy
- 3.1 Twin-to-twin transfusion or "stuck twin" syndrome
- 3.2 Other (includes IUGR, APH, hypertension, and no other explanation)

4. Maternal conditions
- 4.1 Voluntary interruption of pregnancy (excluding congenital anomaly)
- 4.2 Diabetes mellitus
  - 4.2.1 Pre existing diabetes
  - 4.2.2 Gestational diabetes
- 4.3 Chronic renal disease
- 4.4 Autoimmune (eg. Lupus)
- 4.5 Substance abuse
- 4.6 Other infection (eg. UTI)
- 4.7 Other

5. Hypertension
- 5.1 Pre eclampsia
- 5.2 Essential
- 5.3 Essential with superimposed pre eclampsia

6. Antepartum haemorrhage
- 6.1 Placental abruption
- 6.2 Placenta praevia
- 6.3 Vasa praevia
- 6.4 Undetermined

7. Intrauterine growth restriction
- 7.1 Placental pathology
- 7.2 No explanation

8. Other specific obstetric conditions
- 8.1 Idiopathic hydrops
- 8.2 Fetomaternal haemorrhage
- 8.3 Cord complications (eg cord prolapse at term, true knot with evidence of occlusion)
- 8.4 Uterine abnormalities / cervical incompetence etc.
- 8.5 Haemolytic disease
- 8.6 Birth trauma (≥24 weeks gestation)
- 8.7 Other (includes uterine rupture)

9. Unexplained antepartum death

10. Hypoxic peripartum death (≥24 weeks gestation)
- 10.1 Intrapartum complications +/- "Fetal distress"
- 10.2 No apparent cause

11. Unexplained preterm.
- 11.1 Previous bleeding
  - 11.1.1 Chorioamnionitis with membranes ruptured ≥12 hours
  - 11.1.2 Chorioamnionitis with membranes intact or membranes ruptured <12 hours
  - 11.1.3 No chorioamnionitis
- 11.2 No previous bleeding
  - 11.2.1 Chorioamnionitis with membranes ruptured ≥12 hours
  - 11.2.2 Chorioamnionitis with membranes intact or membranes ruptured <12 hours
  - 11.2.3 No chorioamnionitis

12. No obstetric antecedent
- 12.1 SIDS
- 12.2 Postnatally acquired infection in term infants
- 12.3 Other (e.g MVA)

Appendix 2: Classification of neonatal deaths

1 Extreme immaturity (<26 weeks gestation)
- 1.1 Not resuscitated
- 1.2 Unsuccessful resuscitation

2 Congenital abnormality

3 Respiratory disorders
- 3.1 Respiratory Distress Syndrome
  - 3.1.1 RDS alone
  - 3.1.2 RDS with pulmonary air leak
  - 3.1.3 RDS with pulmonary haemorrhage
  - 3.1.4 RDS with septicaemia
  - 3.1.5 RDS with IVH
  - 3.1.6 RDS with NEC
- 3.2 Meconium aspiration
- 3.3 Primary persistent pulmonary hypertension
- 3.4 Pulmonary hypoplasia
- 3.5 Bronchopulmonary dysplasia
- 3.6 Other

4 Neurological
- 4.1 Hypoxic ischaemic encephalopathy/Perinatal asphyxia
- 4.2 Intracranial haemorrhage
- 4.3 Other

5 Gastrointestinal
- 5.1 Necrotising enterocolitis
- 5.2 Other

6 Infection
- 6.1 Congenital bacterial
- 6.2 Congenital viral
- 6.3 Acquired bacterial
- 6.4 Acquired viral
- 6.5 Acquired fungal
- 6.6 Other

7 Other
- 7.1 SIDS
- 7.2 Idiopathic hydrops fetalis
- 7.3 Birth trauma
- 7.4 Accident, poisoning or violence (postnatal)
- 7.5 Haemorrhage (includes twin to twin transfusion)
- 7.6 Unknown/unexplained
- 7.7 Other

Appendix 3: QCOPMM classification of paediatric deaths (QCPaedC)

1 Determined at birth
- 1.1 Congenital condition/ birth defect
  - 1.1.1 cardiovascular
    - 1.1.1.1 structural anomalies
    - 1.1.1.2 cardiomyopathy
  - 1.1.2 neurological
    - 1.1.2.1 neural tube and brain anomalies
    - 1.1.2.2 neurodegenerative
    - 1.1.2.3 neuromuscular / SMA
  - 1.1.3 miscellaneous
    - 1.1.3.1 respiratory
    - 1.1.3.2 cystic fibrosis
    - 1.1.3.3 gastrointestinal
    - 1.1.3.4 extra hepatic biliary atresia
    - 1.1.3.5 metabolic
    - 1.1.3.6 chromosomal
    - 1.1.3.7 musculoskeletal
    - 1.1.3.8 other
- 1.2 Prematurity
- 1.3 Other conditions determined at birth
  - 1.3.1 hypoxia
  - 1.3.2 cerebral palsy
  - 1.3.3 other

2 Acquired condition
- 2.1 Infections
  - 2.1.1 septicaemia
    - 2.1.1.1 meningococcal
    - 2.1.1.2 pneumococcal
    - 2.1.1.3 Group B streptococcal
    - 2.1.1.4 other
  - 2.1.2 meningitis
    - 2.1.2.1 pneumococcal
    - 2.1.2.2 H. influenzae
    - 2.1.2.3 other
  - 2.1.3 respiratory
    - 2.1.3.1 bronchopneumonia
    - 2.1.3.2 bacterial inc.pertussis
    - 2.1.3.3 viral inc.croup
    - 2.1.3.4 other (incl. Pneumocystis)
  - 2.1.4 miscellaneous
    - 2.1.4.1 gastroenteritis
    - 2.1.4.2 myocarditis
    - 2.1.4.3 HIV
    - 2.1.4.4 other
- 2.2 Malignancies
  - 2.2.1 leukaemias
    - 2.2.1.1 acute lymphoblastic leukaemia
    - 2.2.1.2 other lymphoid leukaemia
    - 2.2.1.3 acute non-lymphoblastic leukaemia
    - 2.2.1.4 chronic myeloid leukaemia
    - 2.2.1.5 other and unspecified leukaemia

2.2.2 lymphomas
- 2.2.2.1 Hodgkin's disease
- 2.2.2.2 non-Hodgkin's lymphoma
- 2.2.2.3 Burkitt's lymphoma
- 2.2.2.4 unspecified lymphomas
- 2.2.2.5 histocytosis-x
- 2.2.2.6 other reticuloendothelial neoplasms

2.2.3 central nervous system
- 2.2.3.1 ependymoma
- 2.2.3.2 astrocytoma
- 2.2.3.3 medulloblastoma, primitive neuroectodermal tumour
- 2.2.3.4 other glioma
- 2.2.3.5 miscellaneous intracranial and intraspinal

2.2.4 sympathetic nervous system
- 2.2.4.1 neuroblastoma
- 2.2.4.2 other

2.2.5 retinoblastomas

2.2.6 renal tumours
- 2.2.6.1 Wilms' tumour
- 2.2.6.2 renal carcinoma
- 2.2.6.3 other and unspecified renal tumours

2.2.7 hepatic tumours
- 2.2.7.1 hepatoblastoma
- 2.2.7.2 hepatic carcinoma
- 2.2.7.3 other and unspecified malignant hepatic tumours

2.2.8 malignant bone tumours
- 2.2.8.1 osteosarcoma
- 2.2.8.2 chondrosarcoma
- 2.2.8.3 Ewing's sarcoma
- 2.2.8.4 other and unspecified malignant bone tumours

2.2.9 soft-tissue sarcomas
- 2.2.9.1 rhabdomyosarcoma, embryonal sarcoma and soft-tissue ewing's tumour
- 2.2.9.2 fibrosarcoma, neurofibrosarcoma, and other fibromatous neoplasms
- 2.2.9.3 other soft-tissue sarcoma

2.2.10 germ-cell, trophoblastic and other gonadal neoplasms
- 2.2.10.1 non-gonadal germ-cell and trophoblastic neoplasm
- 2.2.10.2 gonadal germ-cell and trophoblastic neoplasms
- 2.2.10.3 gonadal carcinoma
- 2.2.10.4 other and unspecified malignant gonadal tumours

2.2.11 carcinoma and other malignant epithelial neoplasms
- 2.2.11.1 adrenocortical carcinoma
- 2.2.11.2 thyroid carcinoma
- 2.2.11.3 nasopharygeal carcinoma
- 2.2.11.4 melanomatous neoplasms
- 2.2.11.5 other carcinoma

2.2.12 other and unspecified malignant neoplasms

2.3 Other acquired
- 2.3.1 epilepsy
- 2.3.2 asthma
- 2.3.3 other

3 Sudden Infant Death Syndrome

3.1 SIDS with no cause of death apparent from available history and post-mortem examination.

3.2 SIDS with no cause of death apparent from available history and post-mortem examination, but minor abnormalities found which are unlikely to have contributed to the death

3.3 SIDS with no cause of death apparent from available history and post-mortem examination, but abnormalities found which may have contributed to but not directly caused the death

4 Injury

- 4.1 Transport related
  - 4.1.1 passenger
  - 4.1.2 driver
  - 4.1.3 pedal cyclist MV
  - 4.1.4 pedal cyclist other
  - 4.1.5 pedestrian -high speed
  - 4.1.6 pedestrian -low speed
  - 4.1.7 other transport
- 4.2 Drowning
  - 4.2.1 swimming pool -domestic
  - 4.2.2 swimming pool -other
  - 4.2.3 bath
  - 4.2.4 dam
  - 4.2.5 canal
  - 4.2.6 container large eg. tank, trough, bin
  - 4.2.7 container small eg. bucket
  - 4.2.8 natural water hazard
  - 4.2.9 other
- 4.3 Asphyxiation
  - 4.3.1 rope, cord or strap
  - 4.3.2 foreign body
  - 4.3.3 other
- 4.4 Firearm
- 4.5 Cutting, piercing object
- 4.6 Struck by
  - 4.6.1 person
  - 4.6.2 object
- 4.7 Electricity
- 4.8 Poisoning
  - 4.8.1 drugs, medicines
  - 4.8.2 other
- 4.9 Machinery in operation
- 4.10 Fire, flames, smoke
  - 4.10.1 house fire
  - 4.10.2 other
- 4.11 Animal related
  - 4.11.1 horse
  - 4.11.2 dog
  - 4.11.3 other
- 4.12 Fall
  - 4.12.1 high
  - 4.12.2 low
- 4.13 Others

Appendix 4: Working group membership

Maternal Mortality Working Group

Membership

Prof Jeremy Oats (Chair)	Director of Obstetrics, Mater Mothers' Hospital
Ms Marie Barton	Midwifery Course Coordinator, Redcliffe Hospital
Ms Vicki Flenady	Research Officer, QCOPMM
Dr Karen Lust	General & Obstetric Physician, Mater Mothers' Hospital
Dr Dianne Payton	Director, Anatomical Pathology, Mater Misericordiae Hospital
Dr Ian Stephens	Director of Anaesthetics, Mater Mothers' Hospital
Prof Michael Humphrey	Director, Department of Obstetrics and Gynaecology, Cairns Base Hospital
Dr Donald Cave	Obstetrician/Gynaecologist, Director of Obstetrics, Royal Women's Hospital (1995 - 2000)

Perinatal Mortality Working Group

Membership

Dr David Tudehope (Chair)	Director of Neonatology, Mater Mothers' Hospital
Vicki Flenady	Research Officer, QCOPMM
Prof Jeremy Oats	Director of Obstetrics, Mater Mothers' Hospital
Dr Diane Payton	Director, Anatomical Pathology, Mater Adult Hospital

Zonal Committees

Northern Zone Maternal and Perinatal Mortality Committee

Prof. Michael Humphrey (Chair)	Professor Obstetrics and Gynaecology, James Cook University, Cairns Base Hospital Campus
Dr David Farlow	Medical Superintendent, Proserpine Hospital
Dr Grant McBride	Pathologist, Townsville General Hospital
Ms Cathy Styles	Midwife, Mackay Base Hospital
Dr Paul Tofilau	Director, O&G, Mt Isa Hospital
Ms Cherrill Urquhart	Neonatal Nurse, Kirwan Hospital
Prof. John Whitehall	Director of Neonatology, Kirwan Hospital

Central Zone Maternal and Perinatal Mortality Committee

Dr David Cartwright (Chair)	Director of Neonatology, Royal Women's Hospital
Ms Vicki Assenheim	Director, Central Zone, District Coordination Unit
Ms Marie Barton	Coordinator Education/Staff Development, Maternity and Children's Services, Redcliffe Hospital
Dr John Birks	Obstetrician, Rockhampton
Dr David Cartwright	Director of Neonatology, Royal Women's Hospital
Ms Jan Cornfoot	Consumer Representative
Dr John Evans	General Practitioner Obstetrician, RDAQS
Vicki Flenady	Research Officer, QCOPMM

Southern Zone Maternal and Perinatal Mortality Committee

Prof David Tudehope (Chair)	Director of Neonatology, Mater Mothers' Hospital
Ms Ann Brosnan	Clinical Nurse Manager, Sunnybank Private Hospital
Dr Yogesh Chadha	Director, Obstetrics and Gynaecology, Toowoomba Hospital
Dr Deryck Charters	Director, Obstetrics and Gynaecology, Gold Coast Hospital
Ms Freda Coorey	CNC, SCN, Toowoomba Hospital
Vicki Flenady	Research Officer, QCOPMM
Dr John Gavranich	Director Paediatrics, Ipswich Hospital
Dr Susan Moloney	Director of Paediatrics, Gold Coast Hospital
Prof Jeremy Oats	Director, Obstetrics and Gynaecology, Mater Mothers' Hospital
Dr Lucinda Pallis	Staff Specialist, Obstetrics and Gynaecology, Gold Coast Hospital
Dr Diane Payton	Director, Anatomical Pathology, Mater Hospital
Ms Barbara Soong	Maternal Fetal Medicine, Mater Mothers' Hospital
Dr Thomas Tait	Director, Obstetrics and Gynaecology, Gold Coast Hospital
Dr Grahame Vaughan	Director of Obstetric and Gynaecology, Redland Hospital
Dr Stephen Withers	Director of Paediatrics, Logan Hospital
Dr Paul Woodgate	Neonatologist, Mater Mothers' Hospital

Paediatric Mortality Working Group

Membership

Ms Kathleen Brookes	Chief Executive Officer, SIDS Queensland
Prof Paul Colditz	Neonatologist, Director, Perinatal Research Centre, Royal Women's Hospital
Dr Julie McEniery	Director, Paediatric Intensive Care, Royal Children's Hospital
Dr Diane Payton	Director, Anatomical Pathology, Mater Adult Hospital
Dr Robert Pitt	Director, Emergency Department, Mater Children's Hospital; Director, QISU
Dr Phil Sargent	Paediatric Intensivist, Mater Children's Hospital
Dr Paul Woodgate	Neonatologist, Mater Mothers' Hospital

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