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Perinatal deaths in Australia 1993–2012

PERINATAL DEATHS SERIES NO. 1

Australian Government
Australian Institute of Health and Welfare

Authoritative information and statistics to promote better health and wellbeing

PERINATAL DEATHS SERIES
Number 1

Perinatal deaths in Australia

1993–2012

Australian Institute of Health and Welfare
Canberra
Cat. no. PER 86

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This publication is part of the Australian Institute of Health and Welfare's perinatal deaths series. A complete list of the Institute's publications is available from the Institute's website <www.aihw.gov.au>.

ISSN 2206-9852
ISBN 978-1-76054-016-6 (PDF)
ISBN 978-1-76054-017-3 (Print)

Suggested citation

AIHW: Monk A, Harris K, Donnolley N, Hilder L, Humphrey M, Gordon A & Chambers GM 2016. Perinatal deaths in Australia, 1993–2012. Perinatal deaths series no. 1. Cat. no. PER 86. Canberra: AIHW.

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Published by the Australian Institute of Health and Welfare

Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.

Contents

Preface

The authors would like to acknowledge the many parents and families whose losses are documented in the following pages and express their sincere condolences to them. This report presents a range of information about babies who have been lost to stillbirth and neonatal death in Australia between 1993 and 2012. While this report may present as impersonal to some parents, we understand and recognise that every one of those numbers represents the loss of a precious life.

The aim of investigating and reporting perinatal deaths is to find answers for those who experience such loss personally, and for clinicians involved in the provision of care. Not all stillbirths and neonatal deaths are preventable, but, through research and analysis of data such as that presented in this report, we hope to gain better understanding of how to prevent those deaths that are.

Often the death of a baby can leave parents feeling isolated and alone in their experience. Tragically, around 3,000 families each year in Australia will mourn the loss of a baby who was either stillborn or died in the first 4 weeks of life. By compiling the different factors associated with those deaths that occurred over a 20-year period in a single national report, we hope to shine a light on the significance of this issue and to demonstrate that every one of those deaths counts.

Acknowledgments

The National Perinatal Epidemiology and Statistics Unit (NPESU) is a formally affiliated institution of the University of New South Wales (UNSW), School of Women's and Children's Health and the Centre for Big Data Research in Health at the Faculty of Medicine. The NPESU is a collaborating centre of the Australian Institute of Health and Welfare (AIHW). Funding for this report was provided by the Department of Health as part of the National Maternity Data Development Project.

The NPESU values the time, effort and expertise contributed by all states and territories, including maternity staff, in collecting and providing the data used in this report. We would like to acknowledge the staff members of the state and territory health authorities who provided data and reviewed the tables:

- Lee Taylor, Tim Harrold and Kim Lim, Epidemiology and Biostatistics, Centre for Epidemiology and Evidence, NSW Ministry of Health
- Kirsty Anderson, Katharine Gibson and Vickie Veitch, Clinical Councils' Unit, Consultative Council on Obstetric and Paediatric Mortality and Morbidity, Department of Health and Human Services, Victoria
- Sue Cornes, Joanne Ellerington, Neil Gardiner, Ben Wilkinson, Vesna Dunne and Taku Endo, Health Statistics Unit, Queensland Health
- Maureen Hutchinson and Alan Joyce, Perinatal and Infant Mortality Committee; and Vivian Gee and John Newnham, Maternal and Child Health Unit, Department of Health, Western Australia
- Wendy Scheil and Robyn Kennare, Pregnancy Outcome Unit; and Britt Catcheside, Kevin Priest and Kamalesh Venugopal, Epidemiology Branch, Department of Health, South Australia
- Peter Mansfield, Data Standards and Integrity Unit, Department of Health and Human Services, Tasmania
- Rosalind Sexton, Louise Freebairn, Wayne Anderson and Hai Phung, Epidemiology Section, ACT Health
- Leanne O'Neil and Shu Qin Li, Department of Health, Northern Territory.

We gratefully acknowledge Zhichao Zou's and Jolie Hutchinson's assistance with data management and analysis, and AIHW staff for their guidance and assistance.

The NPESU would also like to acknowledge and thank members of the National Perinatal Mortality Report Advisory Group and the National Aboriginal and Torres Strait Islander Perinatal Reference Group for their expert advice during this project (see Appendix E for a list of members).

Abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AHMC	Australian Health Ministers' Conference
AIHW	Australian Institute of Health and Welfare
ARIA+	Accessibility/Remoteness Index of Australia
BMI	body mass index
ICD-10	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian modification
ICD-PM	International Statistical Classification of Diseases and Related Health Problems—Perinatal Mortality
IRSD	Index of Relative Socio-Economic Disadvantage
NMDDP	National Maternity Data Development Project
No.	number
NPDC	National Perinatal Data Collection
NPESU	National Perinatal Epidemiology and Statistics Unit
NSW	New South Wales
NT	Northern Territory
PDC	perinatal data collection
PMRC	perinatal mortality review committee
P-NMDS	Perinatal National Minimum Data Set
PSANZ	Perinatal Society of Australia and New Zealand
PSANZ-NDC	Perinatal Society of Australia and New Zealand—Neonatal Death Classification
PSANZ-PDC	Perinatal Society of Australia and New Zealand—Perinatal Death Classification
Qld	Queensland
SA	South Australia

SEIFA	Socio-Economic Index for Areas
SES	socioeconomic status
SIDS	sudden infant death syndrome
SIMC	Statistical Information Management Committee
Tas	Tasmania
TOP	termination/s of pregnancy
UNSW	University of New South Wales
Vic	Victoria
WA	Western Australia
WHO	World Health Organization

Symbols

. .	not applicable
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data

Summary

The loss of a baby who was either stillborn or died in the first weeks of life is a tragic event that affects around 3,000 families every year in Australia. Perinatal mortality is widely recognised as an important indicator of population health. While Australia is one of the safest places in the world to give birth, almost 1 in 100 pregnancies at or beyond 20 weeks gestation will end in a perinatal death.

Perinatal Deaths in Australia 1993–2012 represents the first comprehensive national report on perinatal mortality in Australia and includes a detailed analysis of data relating to stillbirths and neonatal deaths for the period 2011–2012 and an analysis of trends for 1993–2012. The aim of this report is to gain a better understanding of the causes of perinatal deaths at a population level and identify changes in perinatal mortality over time. Data used for this report come from information recorded in jurisdictional perinatal data collections and information collated by state and territory perinatal mortality review committees.

For the 2 years 2011 and 2012, just over 6,000 babies died during the perinatal period: a rate of 9.9 deaths per 1,000 births. Approximately three-quarters of those deaths were stillbirths (4,485) with the remaining 1,580 deaths being neonatal deaths. The rate of perinatal mortality varied by the state or territory in which babies were born, with the highest perinatal mortality rate recorded in Victoria (12.2 deaths per 1,000 births) and the lowest in New South Wales (8.3 deaths per 1,000 births).

The rates also varied considerably between different subgroups including those based on mothers' level of remoteness, socioeconomic status, age, smoking status, body mass index (BMI) and Indigenous status. The perinatal mortality rate of babies born to mothers who identified as Aboriginal or Torres Strait Islander was almost double that of babies of non-Indigenous mothers (17.1 versus 9.6 deaths per 1,000 births). Similarly, the perinatal mortality rate was almost 50% higher among babies whose mothers smoked compared with those who did not smoke (13.3 versus 8.9 deaths per 1,000 births). The stillbirth rate for babies of teenage mothers and mothers older than 45 was more than double that for mothers aged 30–34 (13.9 and 17.1 versus 6.4 deaths per 1,000 births).

Over the 20-year period 1993–2012, the overall perinatal mortality rate was stable at around 10 deaths per 1,000 live births. There was a decrease in the rate of neonatal death (3.2 to 2.4 deaths per 1,000 live births) and an increase in the stillbirth rate (6.4 to 7.2 deaths per 1,000 births). Although remaining high, the report shows a decrease of 20% in the perinatal mortality rate among babies of Aboriginal and Torres Strait Islander mothers.

During 2011 and 2012, congenital abnormality was the leading condition in the fetus classified by the PSANZ Perinatal Death Classification as the cause of stillbirths (26.3% of stillbirths) and neonatal deaths (33.1%). An additional PSANZ Neonatal Death Classification of extreme prematurity was the leading condition contributing to deaths in the neonatal period (33.5%). When examined by Indigenous status, however, the leading cause of perinatal death among babies of Aboriginal and Torres Strait Islander mothers was spontaneous pre-term birth (26.8% of stillbirths and 48.0% of neonatal deaths).

This report provides insight into the trends in perinatal mortality in Australia, and highlights variations in some of Australia's most vulnerable and disadvantaged population subgroups. This indicates areas that warrant further investigation and attention by clinicians, researchers and health policy makers.

1 Introduction

Perinatal deaths in Australia 1993–2012 is the first comprehensive national report of perinatal mortality in this country. Perinatal deaths consist of stillbirths (the death of an unborn baby who is over 20 weeks gestation or 400 grams birthweight) and neonatal deaths (the death of a live born baby up to and including 27 days after birth). This report includes a detailed analysis of data regarding stillbirths and neonatal deaths to mothers who gave birth in Australia between 1993 and 2012.

1.1 Background to the report

Perinatal mortality, which is the rate of perinatal deaths per 1,000 births, is widely recognised as an important indicator of population health status (AHMC 2011). Australia has one of the lowest perinatal mortality rates in the world at 9.6 per 1,000 births in 2012 (Hilder et al. 2014), which has reduced by more than 50% over the past 40 years (AHMC 2011). However, the perinatal mortality rates vary significantly between subgroups within the population including between the Indigenous and non-Indigenous groups, socially and economically disadvantaged and non-disadvantaged groups, and maternal age groups.

The 3 main sources of data on perinatal mortality in Australia are:

- the National Perinatal Data Collection (NPDC), which is compiled by the AIHW from state and territory perinatal data collections (PDCs)
- vital registration data reported by the Australian Bureau of Statistics (ABS) in the *Causes of Death, Australia* series (ABS cat. no. 3303.0), *Births, Australia* (ABS cat. no. 3301.0) and *Deaths, Australia* (ABS cat. no. 3302.0)
- the state and territory perinatal mortality review committees (PMRCs) who review perinatal deaths (AIHW 2014).

The ability of these data collections to report all perinatal deaths are limited (AIHW 2014). The former Commonwealth Department of Health and Ageing (now Department of Health) funded the National Maternity Data Development Project (NMDDP) to improve data collection and national reporting of maternal and perinatal mortality (AIHW 2014). This report is one of the key outputs from this project.

1.2 Aims of this report

The aim of this report is to gain a better understanding of perinatal mortality in Australia, including the causes of stillbirth and neonatal deaths at a population level and identify changes in perinatal mortality over time.

The report reviews in detail some of the key risk factors relating to perinatal mortality, including the age of the mother and babies' weight at birth, as well as outcomes for different population groups. The report presents a focused analysis of the statistics for stillbirths and neonatal deaths in Australia for the calendar years 2011 and 2012, as well as an overview of trends for the period 1993 to 2012.

1.3 Stakeholder consultation

This report was developed in close consultation with relevant stakeholders. The National Perinatal Mortality Report Advisory Group provided expert advice and includes representatives from the state and territory PMRCs, professional colleges and societies, data custodians, the ABS, the AIHW and consumers. The National Aboriginal and Torres Strait Islander Perinatal Reference Group provided community perspectives and advice on content relating to the health of Aboriginal and Torres Strait Islander mothers and their babies.

1.4 Structure of this report

Chapter 1 provides the background and aims of the report.

Chapter 2 provides the definitions, including information on the classification of perinatal deaths, the methods and data used for the report.

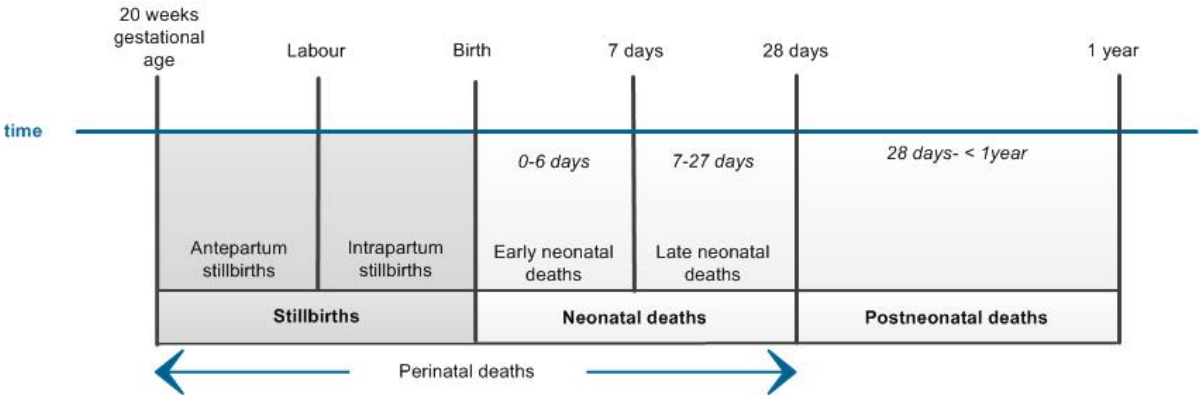
Chapter 3 provides an overview of perinatal deaths in Australia for 2011 and 2012.

Chapter 4 provides information on the causes of perinatal deaths in Australia for 2011 and 2012.

Chapter 5 outlines the trends in perinatal deaths from 1993 to 2012.

2 Definitions and methods

The perinatal period commences at 20 completed weeks (140 days) of gestation and ends 27 completed days after birth (Figure 2.1) (AIHW 2012). Perinatal outcomes are divided into 3 categories: stillbirths, live born neonatal survivors, and neonatal deaths. Table 2.1 provides the characteristics used to describe these groups.



Source: AIHW: Hilder et al. 2014.

Figure 2.1: Perinatal death periods for reporting used in Australia

Table 2.1: Definitions used in *Perinatal deaths in Australia 1993–2012*

Category	Definition
Live birth	The birth of a baby who is greater than or equal to 20 weeks gestation or 400 grams birthweight at birth who show signs of life such as voluntary muscle movement, pulsating of the umbilical cord or presence of a heartbeat at birth, regardless of whether the placenta is still attached or the umbilical cord has been cut[(a)]
Stillbirth	The birth of a baby who is 20 or more completed weeks of gestation or of 400 grams or more birthweight who is expelled or extracted from his or her mother and shows no signs of life such as a heartbeat, voluntary muscle movement or pulsation of the umbilical cord[(b)]
Neonatal death	The death of a live born baby within 28 days of birth. This can be further categorised as early neonatal deaths, which occur 0–6 days after birth, and late neonatal deaths, which occur between 7 and 27 days after birth[(b)(c)]
Neonatal survivor	A live born baby who has not been notified as having died.

(a) The definition of live birth is derived from the WHO, with the birthweight and gestational age parameters of the NPDC added (AIHW 2012).

(b) Definition from National Health Data Dictionary (AIHW 2012).

(c) As the NPDC records age in completed days, an age of 27 days is used as the end point for the definition of the neonatal period in this report, because a death that occurred on the 28th day, but before the completion of that day, would be recorded as 27 days.

2.1 Measuring perinatal mortality

Perinatal mortality is measured as the number of stillbirths and neonatal deaths per 1,000 total births. In the context of this report, 'total births' is the combination of live births and stillbirths derived from the *Birth status* variable in the NPDC. The rate of stillbirth is also calculated with total births as the denominator, and expressed per 1,000 births. Neonatal mortality rate is the number of neonatal deaths per 1,000 total 'live births', where live births is derived from the *Birth status* variable in the NPDC and fact of death is derived from *Baby outcome*. The formulas for calculating perinatal mortality rates are outlined in Box 2.1.

Box 2.1: Calculating perinatal mortality rates

The **stillbirth rate** is calculated as the number of stillbirths (numerator) divided by the total number of births (denominator). This is expressed per 1,000 births.

$$\text{Stillbirth rate} = \frac{\text{Number of stillbirths}}{\text{Total number of births}} \times 1{,}000$$

The **neonatal mortality rate** is calculated as the number of neonatal deaths (numerator) divided by the total number of *live* births (denominator). This is expressed per 1,000 *live* births.

$$\text{Neonatal mortality rate} = \frac{\text{Number of neonatal deaths}}{\text{Total number of } \textit{live} \text{ births}} \times 1{,}000$$

The **perinatal mortality rate** is calculated as the number of perinatal deaths (numerator) divided by the total number of births (denominator). This is expressed per 1,000 births.

$$\text{Perinatal mortality rate} = \frac{\text{Number of perinatal deaths (stillbirths + neonatal deaths)}}{\text{Total number of births}} \times 1{,}000$$

In this report, the rates of stillbirth, neonatal mortality and perinatal mortality are presented for the whole population. This includes the use of 'Unknown' and 'Not stated' values in the calculation of total rates. In addition, factor-specific rates are calculated for each population subgroup by dividing the number of perinatal deaths, stillbirths or neonatal deaths with the factor by the number of total births or live births (depending on the numerator) with the factor. Rates are not provided for values of 'Not stated' or 'Unknown'. For example, sex-specific perinatal mortality rates are calculated separately for male and female babies (Box 2.2).

Box 2.2 Calculating factor-specific rates

$$\text{Factor-specific perinatal mortality rate} = \frac{\text{No. of perinatal deaths with the 'factor'}}{\text{No. of births with the 'factor'}} \times 1{,}000$$

Gestation-specific risk of perinatal mortality

The 'fetuses at risk' method was developed to calculate gestational-age specific perinatal mortality rates (Joseph 2004; Yukdkin et al. 1987). Rather than restricting the denominator only to babies born at a specified gestation, the fetuses-at-risk method uses a denominator of all babies at risk of perinatal death related to a specific gestation at birth. Babies at risk are those babies born *and* still in utero at a specified gestation. The gestation-specific risk of perinatal mortality is expressed as the proportion per 1,000 fetuses at risk (Box 2.3).

Box 2.3: Calculating perinatal mortality rates using the fetuses-at-risk approach

$$\text{Gestation-specific risk of perinatal mortality} = \frac{\text{No. of perinatal deaths at a specified gestational age}}{\text{No. total unborn babies at the start of the gestation interval}} \times 1{,}000$$

For example, to calculate the gestation-specific risk of perinatal mortality at 24 weeks gestation in Australia, 2011–2012:

$$\frac{\text{No. of babies born at 24 weeks gestation who are stillborn or die within 28 days of birth}}{\text{Total number of babies born at and after 24 weeks gestation}} \times 1{,}000$$

Note: This calculation is undertaken excluding babies whose gestational age at birth is unknown.

2.2 Cause of death classification

There are over 30 different systems used around the world for classifying the causes of stillbirth and neonatal death (Flenady et al. 2009a). Two systems are predominantly in use in Australia and have been used to determine cause of perinatal death in this report: the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) and the Perinatal Society of Australia and New Zealand Perinatal Mortality Classification, incorporating the Perinatal Death Classification (PSANZ-PDC) and Neonatal Death Classification (PSANZ-NDC). Figure 2.2 outlines the process of coding Australian perinatal death data to ICD-10 and PSANZ-PDC/NDC.

ICD-10 classification

The ICD-10 is an internationally accepted classification system developed under the auspices of the World Health Organization (WHO) and is used for both mortality and morbidity reporting. There is a local modification of ICD-10 in use in Australia for hospital morbidity coding (ICD-10-AM), but the international version of ICD-10 is used for coding cause of death for all deaths in Australia to allow for international reporting and comparisons (WHO 2011).

Following a death, the 'Medical Certificate of Cause of Perinatal Death' is completed by a medical officer or coroner. The certificate records information on the diseases or conditions of the fetus/infant and mother that may have contributed to the death and these are coded to ICD-10 by the ABS. However, the ICD-10 has minimal subcategories applicable to perinatal deaths, resulting in a large proportion categorised as 'unspecified'. Furthermore, the ICD-10 classification system does not determine the degree of influence that maternal/fetal/infant conditions had on the cause of death. The WHO is developing an ICD-Perinatal Mortality (ICD-PM), which is a new classification system specifically for perinatal mortality due for release in 2017 (Flenady 2014).

PSANZ classification

The PSANZ Perinatal Mortality Classification System, incorporating the Perinatal Death Classification (PSANZ-PDC) and Neonatal Death Classification (PSANZ-NDC) was developed by a multidisciplinary special interest group of PSANZ specifically for use in Australia and New Zealand, to use as part of the process of clinical audit of perinatal deaths. Like the ICD-10, it is subject to regular reviews and updates. The system is designed to

classify the main obstetric antecedent factor that caused perinatal deaths using the PSANZ-PDC. In addition, for neonatal deaths the PSANZ-NDC is used to classify the single most important factor present during the neonatal period that contributed to the death (Flenady et al. 2009b). PSANZ coding is applied to a death during multidisciplinary review at the hospital or state/territory level, or both, depending on jurisdictional processes.

For a perinatal death classification system to be of value, it must be able to identify not just the underlying causes of death but also the most important and significant factors that started the chain of events that resulted in the fetal or neonatal death. In contrast to mortality classification using ICD-10, the PSANZ classification system provides a method to identify more than just a single cause of death and acknowledges the complex clinical situation that often accompanies a perinatal death.

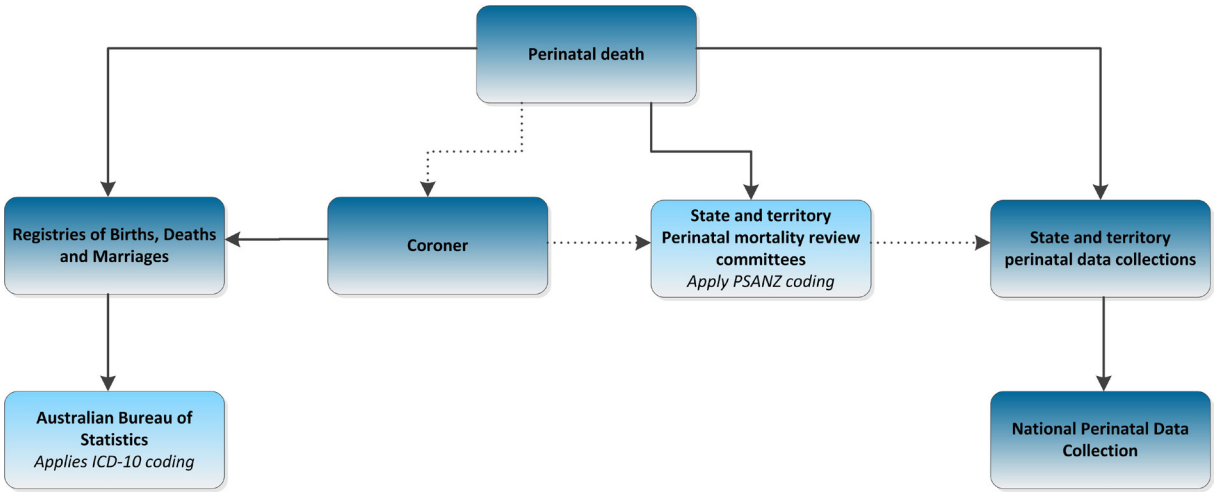


Figure 2.2: Process of coding Australian perinatal death data

2.3 Investigation of perinatal deaths

When a baby is stillborn or dies in the neonatal period in Australia, an investigation and review of the death takes place. This will usually be conducted by clinicians at the hospital where the birth and/or death occurred or in some cases by the coroner. Although the process varies between individual institutions and jurisdictions, the *PSANZ clinical practice guideline for perinatal mortality* (Flenady et al. 2009b) is used throughout Australia to provide best-practice guidance to hospitals and clinicians in the process of *clinical investigation* and *audit* of perinatal death. These are 2 distinct but inter-related processes: clinical investigation of the death (including clinical tests, examination and autopsy) to assist in determining the medical cause of death; and perinatal mortality audit to review potential contributing factors, quality of the care provided around the time of death and the development of recommendations for improving care. These processes are important for the parents and family of the baby for their own grief process as well as future pregnancy care. They also assist the clinicians involved to identify causes and contributing factors, provide appropriate counselling, and plan maternity care in the future.

Although the number and type of tests may differ between stillbirths and neonatal deaths, the general process of investigation and audit is the same. This may include:

- clinical examination of the mother and baby (including examination of the placenta, membranes and cord, ultrasounds, photographs and measurements)

- testing blood and tissue samples of the mother and baby
- post mortem examination conducted by a trained clinician and/or specialist perinatal pathologist (depending on parental consent this may be a full autopsy, limited autopsy, external examination only or a step-wise examination)
- review by a multidisciplinary committee at the hospital (or regional health network)
- communication of any findings with the family and clinicians involved and reporting to the state or territory perinatal mortality review committee.

Following review of a perinatal death, the PSANZ-PDC (and in the case of neonatal deaths, the PSANZ-NDC) is assigned for the main cause of death and associated maternal, fetal or neonatal conditions (see '2.1 Cause of death classification' for further details about the PSANZ-PDC and PSANZ-NDC).

2.4 Data used in this report

Data used for this report come from births and deaths in the NPDC, which includes data from the PMRCs (Figure 2.3). The numbers presented in this report may differ slightly to state and territory publications due to regular updates of the PDCs and also because a small number of live births before 20 weeks gestation and under 400 grams at birth are included in some jurisdictional PDCs yet not included in the NPDC (Donnolley & Li 2012); therefore caution should be taken when making comparisons.

State and territory perinatal data collections

States and territories collect information on hospital and community births, including data relating to pregnancy, labour, birth and the immediate postnatal period. Data are collected by midwives and other caregivers using a variety of information systems, including hospital administration systems, clinical information systems and patient medical records. Data collection usually occurs shortly after birth and before discharge home. These data are collated centrally in each state and territory into a single data collection, which undergoes rigorous validation before submission to the AIHW to form the NPDC.

The scope of the state and territory PDC varies between each jurisdiction, with some collecting more information than others (AIHW 2013). However, PDCs include 'mandatory' data elements from the Perinatal National Minimum Data Set (P-NMDS) (AIHW 2012). The P-NMDS contains national data standards for ensuring that data reported is standardised and comparable. An example of a mandatory item is *Birth status*, which identifies whether the baby was a live birth or stillbirth. PDCs also contain a range of 'voluntary' data items, which are variably reported by jurisdictions. An example of a voluntary item is *Baby outcome*, which is the only variable in PDCs that records neonatal death.

Perinatal mortality review committees

Within each state and territory (with the exception of the Northern Territory), perinatal deaths are reviewed by a multidisciplinary expert committee to ascertain the underlying and contributory cause/s of death (AIHW 2014). All jurisdictions currently use the PSANZ-PDC and PSANZ-NDC to classify the cause/s of death.

These review committees go by a variety of titles, but are known throughout this report as perinatal mortality review committees (PMRCs). The PMRCs predominantly review deaths

that have been reported to the PDC, although they may be notified of deaths through other means (such as the coroner). PMRCs may send information back to state and territory health departments for inclusion in the PDC, but this is not standard practice across all jurisdictions.

All states and territories publish information about perinatal deaths that have occurred in their jurisdiction or for their residents from PMRC and PDC data. These data may be provided as a chapter within the jurisdiction's birth report or they may be a standalone mortality publication (with or without maternal mortality data).

National Perinatal Data Collection

Each state and territory sends de-identified extracts from their PDC, including P-NMDS and voluntary items, to the AIHW for inclusion in the NPDC. The NPDC is a relational database that consists of: mother data, baby data and baby death data (Figure 2.3). Two data items from the baby data, *Baby outcome* and *Birth status,* are the source of 'fact of death' data that distinguish stillbirths, neonatal deaths and live born survivors.

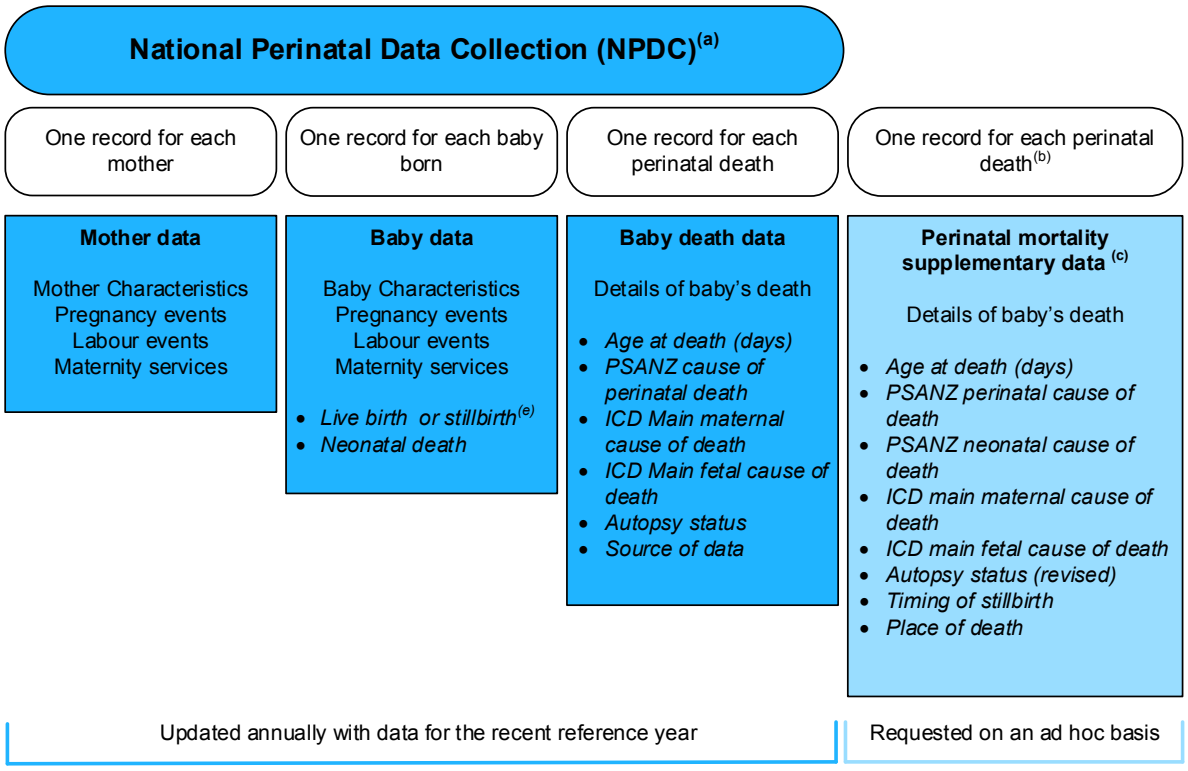
Information in the NPDC on fact of stillbirth is considered to be near complete, because *Birth status* is a mandatory P-NMDS item. Stillbirths may include terminations of pregnancy (TOP) after 20 weeks, fetus papyraceous and fetus compressus, depending on the jurisdiction. South Australian data may not include TOP performed for psychosocial reasons after 20 weeks gestation (Donnolley & Li 2012). Neonatal deaths are not completely captured by the NPDC, firstly because *Baby outcome* is only supplied to the NPDC on a voluntary basis, and secondly because a neonatal death that occurs outside of the birthing facility or after completion of the birth episode may not be captured in the PDC (AIHW 2014).

Perinatal mortality is reported annually in the *Australia's mothers and babies* report series using NPDC data. Options for improving the level of ascertainment have been investigated and have been reported elsewhere (AIHW 2014).

Supplementary data obtained for this report

To update perinatal mortality records with missing data and to supplement the NPDC baby death data with additional items on timing of stillbirth, autopsy status and cause of perinatal death, supplementary data were requested from the state and territory PMRCs. These additional data are referred to in Figure 2.3 as perinatal mortality supplementary data throughout this report as 'supplementary data'. Supplementary data items included:

- timing of stillbirth in relation to labour
- time of death
- exact age of neonate at time of death in hours (death at less than 1 completed day of life) or days
- revised autopsy status to include information about autopsy requests that were refused
- neonatal cause of death classification (PSANZ-NDC).



(a) Includes the Perinatal National Minimum Data Set (PNMDS)—mandated data items supplied by states and territories to an agreed standard and voluntary (non-standard) data items.

(b) Includes records for baby deaths not previously reported to the NPDC.

(c) Supplied through perinatal mortality review committees in each state and territory. The supplementary data will be incorporated in the NPDC in future years.

Figure 2.3: Data source for Perinatal deaths in Australia 1993–2012

2.5 Data availability, presentation and interpretation

Data availability

Not all NPDC data requested for use in this report were available for all years or for all jurisdictions, particularly the supplementary data requested from the PMRCs. All tables and figures presented in this report are footnoted where applicable to indicate when data are missing or incomplete, and to indicate where supplementary data were used to update existing NPDC data. Summary information on the ascertainment of NPDC baby death data and PMRC supplementary data are provided in Appendixes A and B.

There were 39 babies who had unknown *Birth status* and *Baby outcome*. These babies have been excluded from analysis.

Care should be taken when comparing data in this publication with other available sources of information on perinatal deaths, such as the perinatal death data published by the ABS, which is sourced from state and territory Registrars of Births, Deaths and Marriages. Perinatal death data reported by the ABS are not directly comparable with the NPDC data reported in this report, which is sourced from midwives, and other staff, who collect information from mothers and perinatal administrative and clinical record systems (AIHW 2014).

Data quality

Data for the PDC and NPDC are generally collected by midwives retrospectively during the birth episode and may be supplemented by data sourced from a variety of other sources, including clinical information systems and administrative data systems, such as hospital patient administration systems. For some data items, predominantly those that are supplied voluntarily to the NPDC, this can result in a relatively high number of 'Unknown' or 'Not stated' values. Data items that are particularly affected by this issue include *Remoteness of usual residence*, *Socioeconomic status*, *Number of antenatal visits*, *Gestation at first antenatal visit* and *Smoking status* (especially after 20 weeks of pregnancy).

The definition and collection methods used for some data items provided on a voluntary basis are not based on national data standards in the same way as items reported from the P-NMDS. For this reason, the definition and timing of collection of some items may not be uniform across all states and territories that supplied data. This includes the items for *Body Mass Index* and *Smoking status* where timing of collection of the data and the definition may vary slightly between states and territories.

Data presentation

In line with guidelines for protecting the privacy of individuals, the AIHW policy on reporting to manage confidentiality and reliability has been applied in this report (for more information, see <http://www.aihw.gov.au/privacy-of-data/>). Where there are values in categories of 'Unknown' or 'Not stated', the total numbers are presented, but the mortality rates are not published because they do not provide any meaningful information and could be subject to misinterpretation. These rates will appear as 'n.p.'.

Throughout the report, total percentages may not add up to 100.0 due to rounding error.

Interpreting the data

Caution should be used when interpreting rates in tables with small numbers, because small fluctuations in the number of events from year to year can result in large differences in the corresponding rates, which may be misinterpreted. Rates of perinatal mortality reported here may vary from published jurisdictional and national reports due to updates of the PDCs.

Rates will vary when compared with ABS published perinatal mortality rates. The scope of, and definitions used in, the ABS perinatal mortality collection differ to the NPDC so caution should be taken when making comparisons between data presented in this report and ABS data. See the data quality statement in Appendix C for more information.

International comparisons

The definitions for perinatal death vary internationally mainly due to different gestational ages in the definitions of stillbirth. For example, in some other countries, the gestation at which stillbirths are counted as perinatal deaths varies from 22 to 28 weeks gestation and may or may not include TOPs (AIHW: Hilder et al. 2014). Therefore caution should be taken when making comparisons between data presented in this report for Australia and data published for other countries.

Multiple births

The number of babies is higher than the number of mothers because of multiple births. For multiple births, the data may be different for each baby, such as birthweight, gestational age, presentation and method of birth. When a baby is from the same mother, the maternal characteristics are repeated for each multiple birth infant.

Aboriginal and Torres Strait Islander status

Indigenous status in this report represents people who self-identify as being of Aboriginal and/or Torres Strait Islander descent or origin (AIHW 2012). The 3-part working definition of Aboriginality used by the Australian Government requires descent, self-identification and community recognition to be established for Aboriginality to be formally recognised (NACCHO 2015). When reading and interpreting any tables relating to Aboriginal and Torres Strait Islander people, consideration should be given to the fact that data in this report does not represent people whose Indigenous status is based on the third part of the definition (AIHW 2012).

3 Perinatal deaths in Australia 2011 and 2012

This chapter presents perinatal mortality rates for babies born in the calendar years 2011–2012. They are presented by jurisdiction and by maternal and baby characteristics.

3.1 Perinatal mortality rates

In the period 2011–2012, 604,817 mothers gave birth to 614,139 babies (Table 3.1). Approximately 10 in 1,000 of these babies died during the perinatal period. Stillbirths accounted for 4,485 (74%) of these deaths, giving a rate of 7.3 deaths per 1,000 births, and 1,580 were neonatal deaths, accounting for 2.6 perinatal deaths per 1,000 births.

Table 3.1: Perinatal mortality rates, Australia 2011–2012

				Stillbirths		Neonatal deaths		Perinatal deaths	
Year	Mothers	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
2011	297,343	302,023	299,793	2,230	7.4	843	2.8	3,073	10.2
2012	307,474	312,116	309,861	2,255	7.2	737	2.4	2,992	9.6
Total	**604,817**	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births during the specified years. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

3.2 Perinatal mortality not due to congenital anomaly in late pregnancy

Reporting perinatal mortality rates inclusive of all causes of death has limitations as a benchmark for the quality of maternity care in late pregnancy. However, a standard based on non-congenital anomaly specific perinatal mortality of singleton infants avoids differences that may arise as a result of multiple birth and practices for antenatal screening for and management of lethal anomalies.

The term singleton non-congenital anomaly specific stillbirth, neonatal mortality and perinatal mortality rates for births in 2011–2012 for Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory combined were, respectively, 1.2 stillbirths per 1,000 total births, 0.3 neonatal deaths per 1,000 live births and 1.5 perinatal deaths per 1,000 total births. The respective non-congenital anomaly specific mortality rates for singletons born at 32–36 weeks in the same population were 13.3 stillbirths per 1,000 total births, 1.6 neonatal deaths per 1,000 live births and 14.9 perinatal deaths per 1,000 total births.

These rates may underestimate singleton non-congenital specific perinatal mortality rates because post-mortem investigations are not universally undertaken in Australia (Table 3.12) and consequently some less visible congenital anomalies may be missed. The denominator used in the calculation would also contain surviving infants with congenital anomalies.

3.3 Perinatal deaths by state and territory

The rates of stillbirth and neonatal deaths varied by the state or territory in which babies were born (Table 3.2). The highest rate of stillbirth was in Victoria (9.4 deaths per 1,000 births) and the lowest was in New South Wales (6.0 deaths per 1,000 births). The rate of neonatal deaths ranged from 1.7 per 1,000 live births in Western Australia to 4.4 in the Northern Territory. The overall rate of perinatal mortality was highest in Victoria (12.2 deaths per 1,000 births) and lowest in New South Wales (8.3 deaths per 1,000 births).

Most babies were born in the same state or territory as where their mother usually resided (Table 3.2). However, almost 13% of babies born in the Australian Capital Territory were born to mothers who usually resided in another state or territory. The mothers of these babies may have had high-risk pregnancies, which led to transfer from smaller maternity units in rural or regional New South Wales to larger maternity units in the Australian Capital Territory that are better equipped to manage high-risk births. Therefore the rate of perinatal death by state or territory of birth may be inflated for babies born in the Australian Capital Territory.

For the remaining jurisdictions, the proportion of babies born in a different state or territory to where their mother resided ranged between 0.1% and 2.0%.

Table 3.2: Stillbirths, neonatal deaths and perinatal deaths by state or territory, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
State/ territory	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
			State or territory of birth					
NSW	196,708	195,536	1,172	6.0	459	2.3	1,631	8.3
Vic[c]	152,507	151,078	1,429	9.4	430	2.8	1,859	12.2
Qld	125,880	125,020	860	6.8	382	3.1	1,242	9.9
SA	41,010	40,722	288	7.0	90	2.2	378	9.2
WA[d]	66,066	65,560	506	7.7	111	1.7	617	9.3
TAS	12,263	12,184	79	6.4	37	3.0	116	9.5
NT	7,957	7,902	55	6.9	35	4.4	90	11.3
ACT	11,748	11,652	96	8.2	36	3.1	132	11.2
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**
			State or territory of usual residence of mother					
NSW	200,110	198,840	1,270	6.4	481	2.4	1,751	8.8
VIC[c]	149,470	148,252	1,218	8.2	415	2.8	1,633	10.9
QLD	126,589	125,666	923	7.3	376	3.0	1,299	10.3
SA	40,839	40,549	290	7.1	90	2.2	380	9.3
WA[d]	66,159	65,629	530	8.0	112	1.7	642	9.7
TAS	12,286	12,202	84	6.8	39	3.2	123	10.0
NT	7,951	7,884	67	8.4	37	4.7	104	13.1
ACT	10,243	10,169	74	7.2	25	2.5	99	9.7

(continued)

Table 3.2 (continued): Stillbirths, neonatal deaths and perinatal deaths by state or territory, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
State/ territory	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
Not stated	492	463	29	n.p.	5	n.p.	34	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births for the specified jurisdictions. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) For Victoria, perinatal deaths include late terminations for psychosocial indications. The majority of such procedures performed in Australia occur in Victoria, and many women travel from interstate (and overseas) to have terminations undertaken.

(d) For WA, perinatal deaths include late termination of pregnancy.

3.4 Perinatal deaths by maternal characteristics

Country of birth

Nearly two-thirds of the mothers of babies born during 2011–2012 were born in Australia (69.7%), followed by Asia (14.4%), New Zealand (3.0%) and the United Kingdom (2.7%) (Table 3.3). The perinatal mortality rate for babies of Australian-born mothers was 9.9 deaths per 1,000 births.

The babies of women born in China and in Europe had the lowest rates of stillbirth (each 5.1 deaths per 1,000 births) and perinatal mortality (6.8 and 6.9 deaths per 1,000 births), while the highest rates of stillbirth and perinatal mortality were among babies of women born in Africa (11.1 and 13.5 deaths per 1,000 births) and the South Pacific (9.7 and 13.6 deaths per 1,000 births).

Babies of mothers born in Northern America and China had the lowest rates of neonatal death (1.5 and 1.7 deaths per 1,000 live births), and babies of mothers born in Lebanon and the South Pacific the highest (3.4 and 3.9 deaths per 1,000 live births).

Table 3.3: Stillbirths, neonatal deaths and perinatal deaths by maternal country of birth, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Maternal country of birth	**Total births[a]**	**Live births**	**No.**	**Rate[b]**	**No.**	**Rate[b]**	**No.**	**Rate[b]**
Australia	427,760	424,665	3,095	7.2	1,146	2.7	4,241	9.9
South Asia	30,065	29,812	253	8.4	86	2.9	339	11.3
India	*20,191*	*20,001*	*190*	*9.4*	*54*	*2.7*	*244*	*12.1*
Other[c]	*9,874*	*9,811*	*63*	*6.4*	*32*	*3.3*	*95*	*9.6*
Other Asia	24,967	24,797	170	6.8	51	2.1	221	8.9
New Zealand	18,290	18,141	149	8.1	47	2.6	196	10.7
China and Hong Kong	17,341	17,252	89	5.1	29	1.7	118	6.8
UK	16,414	16,306	108	6.6	29	1.8	137	8.3
Europe	16,268	16,185	83	5.1	29	1.8	112	6.9
Other Middle East and North Africa	12,790	12,689	101	7.9	38	3.0	139	10.9
Africa (excluding North Africa)	11,762	11,632	130	11.1	29	2.5	159	13.5
Vietnam	8,995	8,947	48	5.3	19	2.1	67	7.4
Philippines	7,307	7,261	46	6.3	17	2.3	63	8.6
South Pacific	5,901	5,844	57	9.7	23	3.9	80	13.6
Northern America	4,562	4,531	31	6.8	7	1.5	38	8.3
South and Central America and Caribbean	4,169	4,144	25	6.0	8	1.9	33	7.9
Lebanon	3,848	3,812	36	9.4	13	3.4	49	12.7
Other	531	528	3	5.6	0	. .	3	5.6
Not stated	3,169	3,108	61	n.p.	9	n.p.	70	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified country. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) Includes Bangladesh, Bhutan, Maldives, Nepal, Pakistan, Sri Lanka and Southern Asia not further defined.

Remoteness

A measure of remoteness is assigned to each woman's area of residence. It is important to note that not all capital cities will necessarily be classified as *Major cities*. For example, although Sydney is classed as *Major cities*, Hobart is classed as *Inner regional* and Darwin *Outer regional*.

The majority of the mothers of babies born in 2011–2012 lived in *Major cities* (70.1%), and only 1.1% of mothers lived in *Very remote* areas (Table 3.4). The perinatal mortality rate was highest in babies of mothers who resided in *Very remote* areas (16.5 deaths per 1,000 births) and lowest among those who lived in *Major cities* (9.0 deaths per 1,000 births). This may be related to poorer access to antenatal care and higher rates of smoking in *Remote* and *Very remote* areas of Australia (AIHW NPESU & AIHW 2013).

Table 3.4: Stillbirths, neonatal deaths and perinatal deaths by remoteness of usual residence, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Remoteness[(a)]	Total births[(b)]	Live births	No.	Rate[(c)]	No.	Rate[(c)]	No.	Rate[(c)]
Major cities	430,580	427,732	2,848	6.6	1,035	2.4	3,883	9.0
Inner regional	101,093	100,364	729	7.2	286	2.8	1,015	10.0
Outer regional	53,681	53,253	428	8.0	161	3.0	589	11.0
Remote	9,864	9,795	69	7.0	30	3.1	99	10.0
Very remote	6,615	6,541	74	11.2	35	5.4	109	16.5
Not stated	12,306	11,969	337	n.p.	33	n.p.	370	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Area of remoteness is determined by the Accessibility/Remoteness Index of Australia (ARIA+), which is calculated based on the area of mother's usual residence. Remoteness area was only calculated where the geographic area of usual residence was provided.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified remoteness group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Socioeconomic status

Socioeconomic status (SES) is determined by assigning the ABS Socio-Economic Index for Areas (SEIFA) and Index of Relative Socio-Economic Disadvantage (IRSD) to the mothers' area of residence. The distribution of SES quintiles varies across jurisdictions.

The rate of perinatal mortality decreased with increasing socioeconomic advantage, starting at 11.0 deaths per 1,000 births for babies whose mothers lived in the most disadvantaged areas, decreasing to 8.2 in the least disadvantaged areas (Table 3.5). A similar trend was seen with the rate of stillbirths and neonatal deaths.

Table 3.5: Stillbirths, neonatal deaths and perinatal deaths by socioeconomic disadvantage, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Socioeconomic (SES) quintile[a]	**Total births[b]**	**Live births**	**No.**	**Rate[c]**	**No.**	**Rate[c]**	**No.**	**Rate[c]**
SES quintile 1 (Most disadvantaged)	131,028	130,001	1,027	7.8	424	3.3	1,451	11.1
SES quintile 2	121,163	120,283	880	7.3	331	2.8	1,211	10.0
SES quintile 3	121,158	120,327	831	6.9	330	2.7	1,161	9.6
SES quintile 4	118,843	118,126	717	6.0	254	2.2	971	8.2
SES quintile 5 (Least disadvantaged)	109,590	108,898	692	6.3	208	1.9	900	8.2
Unknown	12,357	12,019	338	n.p.	33	n.p.	371	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Socioeconomic quintiles were derived by assigning the ABS Socioeconomic Index for Areas (SEIFAs) and the Index of Relative Socio-Economic Disadvantage (IRSD) to the mothers' area of usual residence.

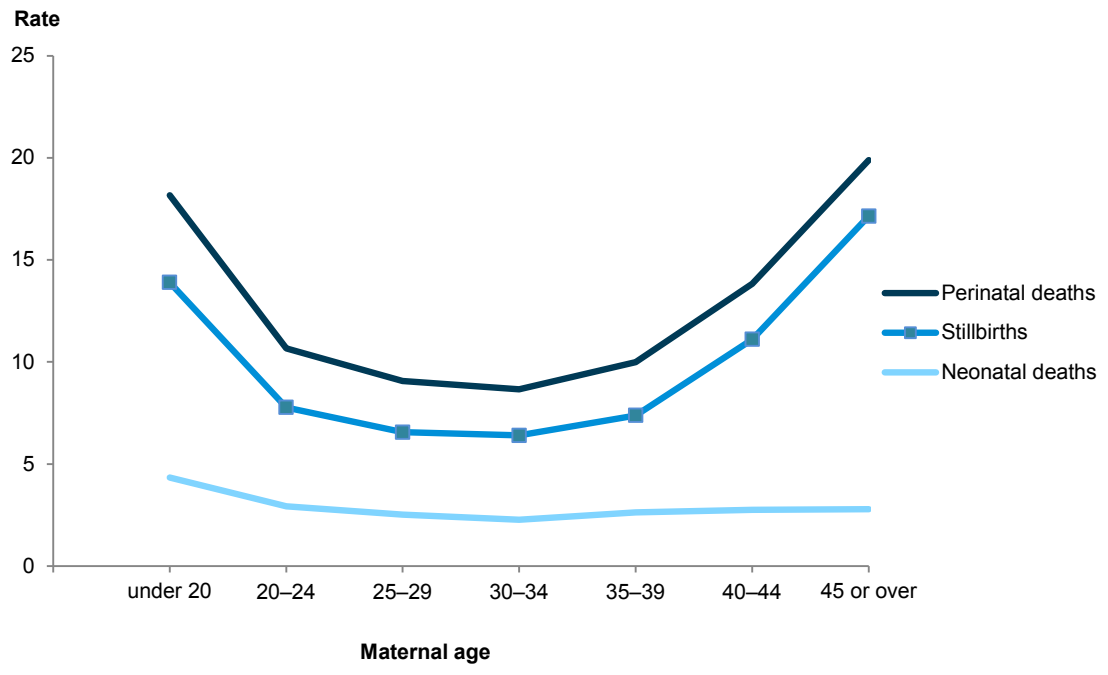
(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified socioeconomic quintile. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Maternal age

Figure 3.1 illustrates the rate of perinatal deaths, stillbirths and neonatal deaths by maternal age for the period 2011–2012. The rate of stillbirth was highest in mothers aged 45 and over at 17.1 deaths per 1,000 births, followed by those aged under 20 (13.9 deaths per 1,000 births). The rate of neonatal death was fairly stable between the different maternal age groups (2.6 deaths per 1,000 live births), except for an increase among babies of teenage mothers (4.3 deaths per 1,000 live births). The number of neonatal deaths is relatively small compared with stillbirths and as a proportion of perinatal deaths, especially at the extremes of maternal age (teenagers and mothers aged 45 or over). As a consequence, these neonatal mortality rates are subject to greater variability and should be interpreted with caution.

The reason the perinatal mortality rate was higher among younger mothers is uncertain. It could be due to a number of factors including higher rates of smoking, inadequate antenatal care and gynaecological immaturity (Conde-Agudelo et al. 2005; Ganchimeg et al. 2014). The evidence regarding the increased rates of perinatal mortality for older mothers is clearer, with existing research showing that advanced age itself increases the biological risk (Ludford et al. 2012). In addition to the effects of age, older mothers may also experience other conditions such as diabetes and hypertension, which also increase the risk of perinatal mortality by affecting fetal growth and development (Flenady et al. 2011). As a consequence of the presence of co-morbidities such as diabetes and hypertension, older mothers may also require interventions during pregnancy that can result in pre-term birth, which also increases the risk of perinatal mortality (Carolan 2013). Lastly, the risks of congenital anomaly also increase progressively with maternal age (Cleary-Goldman et al. 2005).



Notes

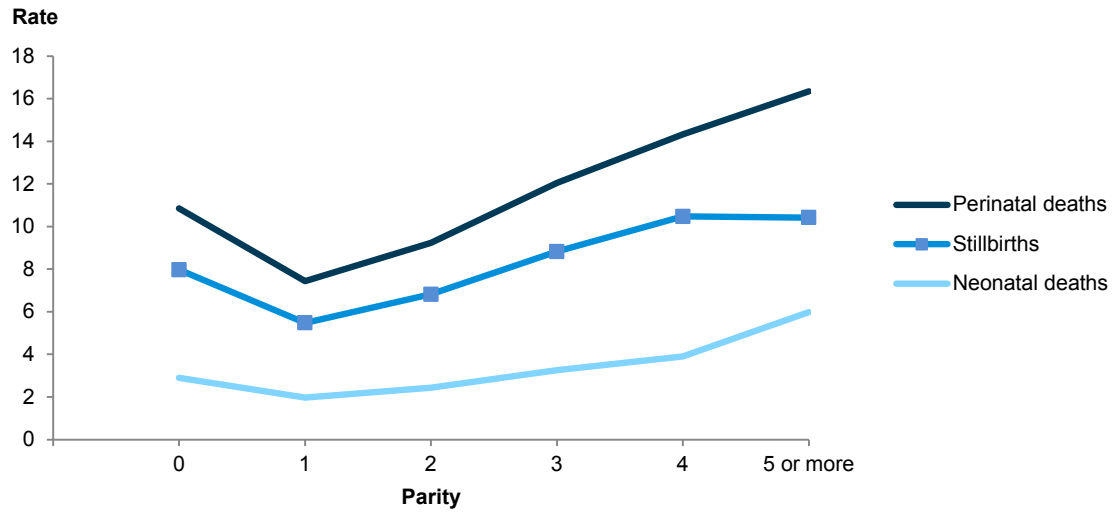
1. The rate is the number of deaths per 1,000 births. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.
2. Data for this figure are in Table D1.

Figure 3.1: Stillbirths, neonatal deaths and perinatal deaths by age of mother, Australia 2011–2012

Parity

Parity is the number of times a woman has previously given birth to a baby who was at least 20 weeks gestation or had a birthweight of at least 400 grams. In 2011–2012, babies of mothers who had 1 previous birth had the lowest rate of perinatal mortality (7.4 deaths per 1,000 births), and babies of mothers who had 5 or more had the highest rate (16.3 deaths per 1,000 births) (Figure 3.2). The rates of neonatal mortality showed a similar pattern, with the lowest rate being among babies of mothers who had 1 previous birth and the highest being among babies of mothers who had 5 or more previous births (2.0 and 6.0 deaths per 1,000 live births).

These findings should be interpreted with caution, because the increased risk might be partially explained by other factors, such as advanced maternal age and socioeconomic status that can change alongside parity. For example, women who have had 5 or more previous pregnancies are likely to be older and may also experience more social disadvantage. Both of these factors have also been shown in this report to increase the risk of perinatal mortality. A full analysis of how these different factors relate to each other and whether they contribute independently to the increased risk of perinatal mortality is outside the scope of this report, although there is some exploration of maternal age and parity in the following section.



Notes

1. The rate is the number of deaths per 1,000 births. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.
2. Data for this figure are in Table D2.

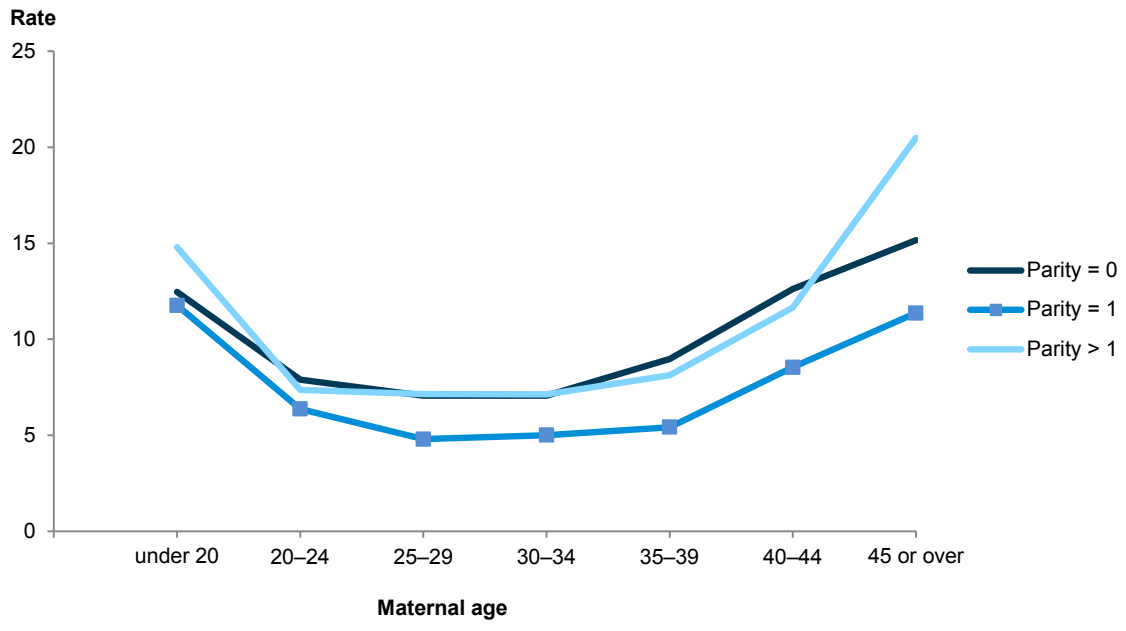
Figure 3.2: Stillbirths, neonatal deaths and perinatal deaths by parity of mother, Australia 2011–2012

Maternal age and parity

Figures 3.3 and 3.4 go some way to explore the magnitude of the combined effects of maternal age and parity on stillbirth and neonatal death. Figure 3.3 indicates that, for babies whose mothers were aged between 20 and 24, parity had the least effect on rates of stillbirth. The effect of parity increased with advancing maternal age, as evidenced by widening of the gap between mortality rates of babies of mothers with no previous birth and other parity groups. For all age groups, babies of mothers with 1 previous birth had the lowest rates of stillbirth compared with first-time mothers (women with no previous births) and multiparous women with more than 1 previous birth.

The widening gap between the different parity groups as age increased, suggests that parity on its own does not explain the full increased risk of stillbirth, but that the mother's age also contributes to it. Other published studies have shown that parity and maternal age both independently influence the risk of stillbirth, even when other factors such as clinical risk factors (diabetes, hypertension and other conditions) and socioeconomic factors are taken into consideration (Gordon et al. 2013).

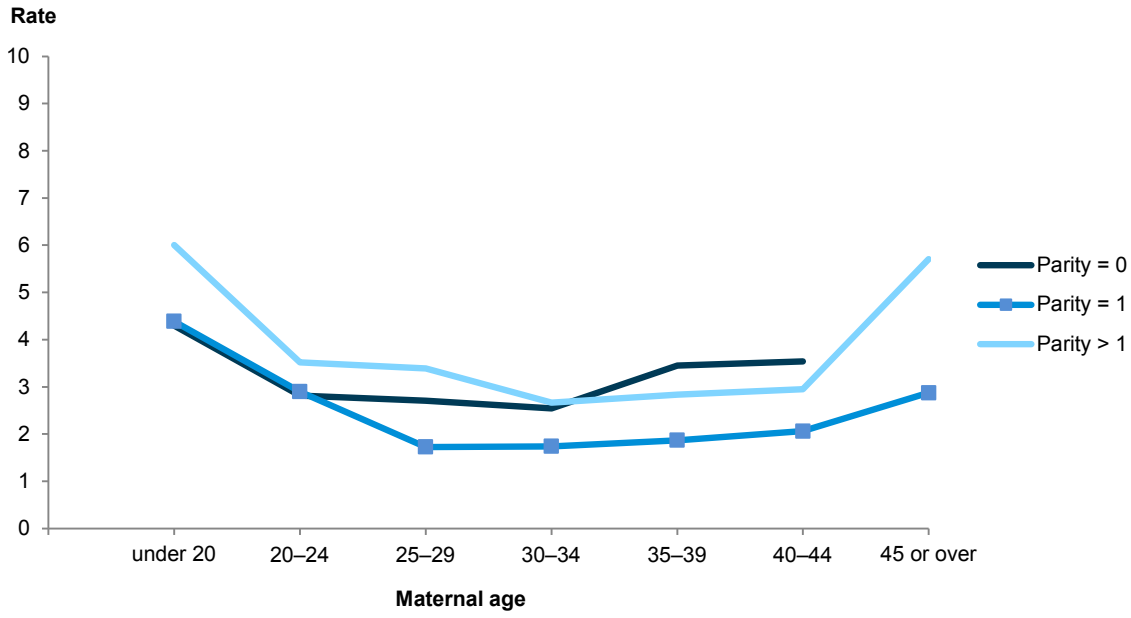
The effect of parity on the rate of neonatal death (Figure 3.4) was slightly smaller than for stillbirths. Babies of mothers with 1 previous birth had the lowest rates of neonatal death and the effects of parity were greater among older women. Due to smaller numbers of neonatal deaths, caution should be taken when interpreting the effects of parity on the 2 extreme age groups.



Notes

1. The rate is the number of deaths per 1,000 births (live births and stillbirths).
2. Data for this figure are in Table D3.

Figure 3.3: Stillbirths by parity and age of mother, Australia 2011–2012



Notes

1. The rate is the number of deaths per 1,000 live births.
2. Data for this figure are in Table D3.

Figure 3.4: Neonatal deaths by parity and age of mother, Australia 2011–2012

Antenatal visits

The antenatal period provides health professionals the opportunity to provide care to pregnant women. Provision of at least 4 episodes of antenatal care increases the likelihood of mothers receiving effective maternal health interventions vital to their health and wellbeing and that of their babies (WHO 2015). The number of mothers commencing antenatal care in the first trimester of pregnancy is also an indicator of the accessibility of maternity care (AIHW NPESU & AIHW 2013).

In 2011–2012, information about the number of antenatal visits was available from all jurisdictions except for Victoria, with data from Western Australia only available from July 2012. Data on the gestation at first antenatal visit were available from all states and territories. Table 3.6 shows that, overall, perinatal mortality rates were lower among women who had 5 or more antenatal visits (2.7 per 1,000 births) compared with women with 1–4 antenatal visits (5.9 per 1,000). This difference was more pronounced among term births than among births at 32–36 weeks gestational age. Babies born between 32 and 36 weeks gestation have a higher rate of perinatal mortality than babies born at term regardless of number of antenatal visits (Table 3.6).

As shown in Table 3.7, lower rates of perinatal mortality were also evident for babies whose mothers commenced antenatal care before 14 weeks of gestational age (8.5 per 1,000 births) compared with babies whose mothers commenced antenatal care at 14 weeks or later (10.7 per 1,000 births). These differences were slightly more pronounced for neonatal deaths than for stillbirths.

It was not possible to distinguish babies of mothers who had no antenatal care from those where the number of antenatal visits was not recorded. These babies are included with babies with 'unknown' number of antenatal visits in Table 3.6 and 'unknown' gestation at

first antenatal visit in Table 3.7. Caution should be used when interpreting data in this section, because data recorded about antenatal visits is based on visits recorded in the woman's clinical record and may not include all antenatal visits outside the hospital setting, such as with a general practitioner or private obstetrician.

Table 3.6: Stillbirths, neonatal deaths and perinatal deaths by number of antenatal visits and gestation at birth[a], 2011–2012

No. of antenatal visits	Total births[b]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
32–36 weeks gestation at birth								
1 to 4	2,717	2,665	52	19.1	14	5.3	66	24.3
5 or more	23,876	23,570	306	12.8	97	4.1	403	16.9
Unknown	1,532	1,504	28	n.p.	7	n.p.	35	n.p.
Total	**28,125**	**27,739**	**386**	**13.7**	**118**	**4.3**	**504**	**17.9**
37 weeks gestation and over at birth								
1 to 4	15,779	15,753	26	1.6	18	1.1	44	2.8
5 or more	347,086	346,627	459	1.3	144	0.4	603	1.7
Unknown	14,896	14,864	32	n.p.	8	n.p.	40	n.p.
Total	**377,761**	**377,244**	**517**	**1.4**	**170**	**0.5**	**687**	**1.8**

(a) Victoria did not supply data on antenatal visits for 2011 and 2012, nor did Western Australia before July 2012. Births that occurred in Victoria (n = 201) and Western Australia (n = 616) during these periods have been excluded from analysis.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified antenatal visit grouping. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table 3.7: Stillbirths, neonatal deaths and perinatal deaths by gestation at first antenatal visits and gestation at birth, 2011–2012

Gestation at first antenatal visit (weeks)	Total births[a]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
Less than 32 weeks gestation at birth								
1–13	5,534	3,969	1,565	282.8	647	163.0	2,212	399.7
14 and over	3,617	2,378	1,239	342.5	373	156.9	1,612	445.7
Unknown	995	678	317	n.p.	116	n.p.	433	n.p.
Total	**10,146**	**7,025**	**3,121**	**307.6**	**1,136**	**161.7**	**4,257**	**419.6**
32 weeks gestation and over at birth								
1–13	375,911	375,106	805	2.1	240	0.6	1,045	2.8
14 and over	206,427	205,962	465	2.3	173	0.8	638	3.1
Unknown	21,505	21,426	79	n.p.	31	n.p.	110	n.p.
Total	**603,843**	**602,494**	**1,349**	**2.2**	**444**	**0.7**	**1,793**	**3.0**
Unknown gestational age at birth								
Total	**150**	**135**	**15**	**100**	**0**	**. .**	**15**	**100**
All births								
1 to 13	381,534	379,162	2,372	6.2	887	2.3	3,259	8.5
14 to 42	210,071	208,359	1,712	8.1	546	2.6	2,258	10.7
Unknown	22,534	22,133	401	n.p.	147	n.p.	548	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified gestation at first antenatal visit group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Smoking

Tobacco smoking during pregnancy is associated with a range of poor perinatal health outcomes, including pre-term birth and low birthweight (Laws et al. 2006). However, cessation of smoking in early pregnancy can reduce the risk of poor outcomes (AIHW NPESU & AIHW 2013).

The mothers of 12.5% of babies born in 2011–2012 smoked during pregnancy (Table 3.8). The rate of perinatal mortality was almost 50% higher among babies whose mothers smoked compared with the babies of mothers who did not smoke (13.3 versus 8.9 deaths per 1,000 births).

Table 3.8 shows an overall decrease in the proportion of mothers who smoke between the first and second half of pregnancy; however, despite this, the rates of perinatal mortality among the babies of mothers who smoked were similar (13.3 versus 13.9 deaths per 1,000 births).

Table 3.8: Stillbirths, neonatal deaths and perinatal deaths by maternal tobacco smoking status during pregnancy, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Smoking status[(a)]	Total births[(b)]	Live births	No.	Rate[(c)]	No.	Rate[(c)]	No.	Rate[(c)]
Smoking status in first 20 weeks of pregnancy								
Smoked	75,512	74,793	719	9.5	287	3.8	1,006	13.3
Did not smoke	529,652	526,143	3,509	6.6	1,228	2.3	4,737	8.9
Not stated	8,975	8,718	257	n.p.	65	n.p.	322	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**
Smoking status after 20 weeks of pregnancy								
Smoked	55,623	55,076	547	9.8	225	4.1	772	13.9
Did not smoke	540,583	536,978	3,605	6.7	1,277	2.4	4,882	9.0
Not stated	17,933	17,600	333	n.p.	78	n.p.	411	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) For WA, 'Did not smoke' includes women who smoked an undetermined number of cigarettes in the first 20 weeks of pregnancy and after 20 weeks of pregnancy.

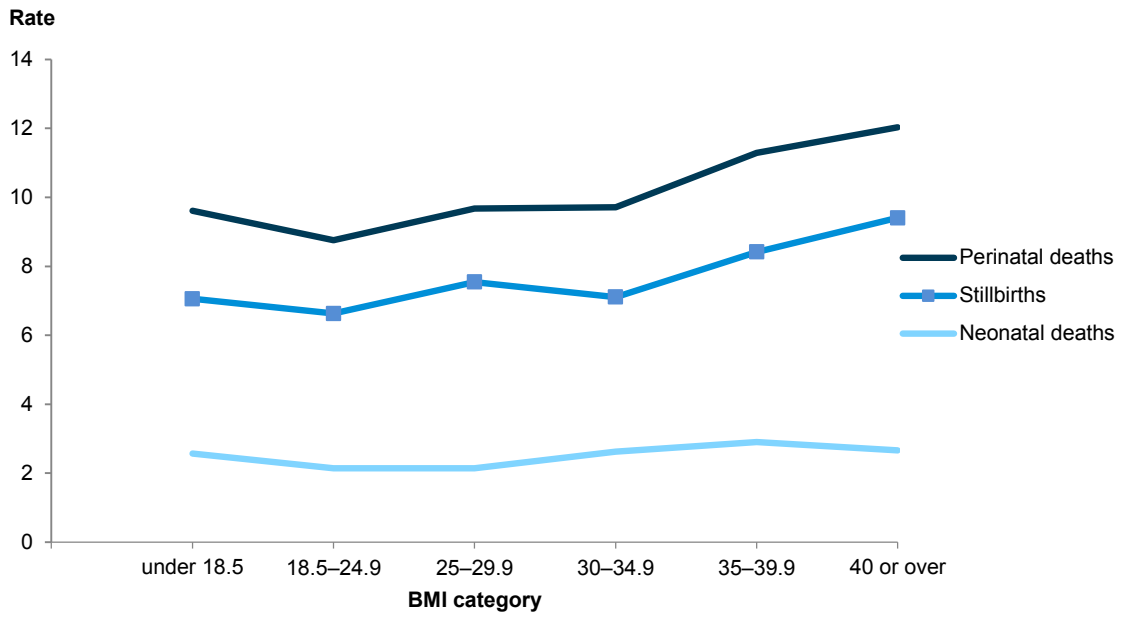
(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified smoking status group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Body mass index

BMI is a ratio of weight and height that can be used to classify adults as either underweight, overweight or obese. A pre-pregnancy BMI of less than 18.5 kg/m^2 is considered as 'underweight', 18.5–24.9 kg/m^2 'normal', 25.0–29.9 kg/m^2 'overweight', 30.0–34.9 kg/m^2 'class I obese', 35.0–39.9 kg/m^2 'class II obese' and greater than or equal to 40.0 kg/m^2 'class III obese' (AHMAC 2012).

In 2011–2012, data on BMI were collected by all states and territories, with the exception of New South Wales and the Northern Territory. In those jurisdictions that collected data, the mothers of 17.6% of babies were obese (classes I, II and III) during pregnancy (Table D4). Figure 3.5 shows an increase in perinatal mortality in babies of obese mothers and, to a lesser extent, babies of underweight mothers.



Notes

1. The rate is the number of deaths per 1,000 births. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.
2. Data on BMI were not provided by New South Wales and the Northern Territory and were therefore excluded from analysis.
3. Care must be taken when interpreting results, because the BMI source data and methods used for collection are not uniform across jurisdictions.
4. Data for this figure are in Table D4.

Figure 3.5: Stillbirths, neonatal deaths and perinatal deaths by maternal BMI, Australia 2011–2012

3.5 Perinatal deaths by baby characteristics

Sex of baby

Table 3.9 shows that the rate of perinatal mortality was slightly higher among males than females (9.9 versus 9.2 deaths per 1,000 births). The rate of perinatal mortality among babies of indeterminate sex was approximately 90 times higher than in babies whose sex was determined at birth (868.4 versus 9.6 deaths per 1,000 births). Of the 165 babies of indeterminate sex resulting in a perinatal death (137/165) 83% of these were born 20–23 weeks gestation. The reason the babies of indeterminate sex have higher rates of perinatal mortality may be related to the presence of a maternal condition or congenital abnormality, which are the 2 leading causes of death among this group.

Table 3.9: Stillbirths, neonatal deaths and perinatal deaths by sex of baby, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Sex	**Total births[a]**	**Live births**	**No.**	**Rate[b]**	**No.**	**Rate[b]**	**No.**	**Rate[b]**
Male	316,002	313,737	2,265	7.2	872	2.8	3,137	9.9
Female	297,834	295,793	2,041	6.9	701	2.4	2,742	9.2
Indeterminate	190	31	159	836.8	6	193.5	165	868.4
Not stated	113	93	20	n.p.	1	n.p.	21	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.592**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Birth plurality

In 2011–2012, 18,577 babies (3.0% of all babies) were a twin or triplet (Table 3.10). Compared with babies of a singleton birth, the rate of perinatal death was nearly 4 times as high for babies of twin birth (34.3 versus 9.1 deaths per 1,000 births), and nearly 11 times as high for babies of a triplet or higher order multiple pregnancies (98.3 versus 9.1 deaths per 1,000 births).

Further information is required to interpret these results properly. In particular, zygosity (that is, whether the babies of a multiple pregnancy are identical or non-identical) and chorionicity (that is, whether the babies of a multiple pregnancy share a placenta) are known to impact on perinatal outcomes; however, this information is not available in the NPDC.

Table 3.10: Stillbirths, neonatal deaths and perinatal deaths by plurality, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Plurality	**Total births[a]**	**Live births**	**No.**	**Rate[b]**	**No.**	**Rate[b]**	**No.**	**Rate[b]**
Singleton	595,560	591,493	4,067	6.8	1,335	2.3	5,402	9.1
Twins	18,160	17,773	387	21.3	235	13.2	622	34.3
Triplets and more	417	386	31	74.3	10	25.9	41	98.3
Not stated	2	2	0	. .	0	. .	0	. .
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified plurality group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Gestational age

Rate of perinatal mortality

Babies with a gestational age of 20–23 weeks had the highest rates of stillbirth and neonatal mortality compared with other gestational groups, with a total perinatal mortality rate of 979.2 deaths per 1,000 births (Table 3.11). Although the number of TOPs in Australia is unknown, a proportion of deaths in this lower gestational age group are known to be due to terminations.

The rate of perinatal mortality decreased as gestational age increased until 42 weeks gestation (Figure 3.6). Babies born at 37–41 weeks had the lowest rates of stillbirth (1.4 deaths per 1,000 births) and neonatal mortality (0.5 deaths per 1,000 live births). At 42 weeks gestation and over, there was a 2.4 fold increase in the rate of perinatal mortality compared with babies born at term (4.5 versus 1.9 deaths per 1,000 births).

Risk of perinatal mortality—using the fetuses-at-risk approach

An alternative method for calculating the gestational age-specific rates of perinatal mortality is the fetuses-at-risk approach outlined in Box 2.3 in 'Chapter 2 Definitions and methods'. This method is based upon the rationale that all babies who reach a specific gestational age—whether born at that gestation or not—are at risk of perinatal mortality (not just those *born* at that specified gestation, as per the traditional method described above) (Joseph 2011).

Figure 3.7 shows that the gestation-specific risk of perinatal death for babies in utero at 20–40 weeks ranged from 0.2 to 1.3 perinatal deaths per 1,000 fetuses at risk. The initial peak at 21 weeks gestation (1.3 deaths per 1,000 fetuses at risk) fell to 0.2 perinatal deaths per

1,000 fetuses at risk by 27 weeks gestation. There was little variation until 36 weeks gestation, whereby the increase in gestation-specific risk of perinatal mortality was exponential, with substantial week-on-week increases until 42 weeks gestation. Babies born from 42 weeks gestation or later had the highest gestation-specific risk of perinatal mortality (4.5 deaths per 1,000 babies born or yet to be born). At this gestational age, the gestation-specific risk of perinatal mortality is the same as the gestation-specific perinatal mortality rate.

TOPs cannot be distinguished among stillbirths or neonatal deaths. Their inclusion inflates the gestation-specific risk and rate of perinatal mortality, particularly at earlier gestations.

Table 3.11: Stillbirths, neonatal deaths and perinatal deaths by gestation at birth, Australia, 2011–2012

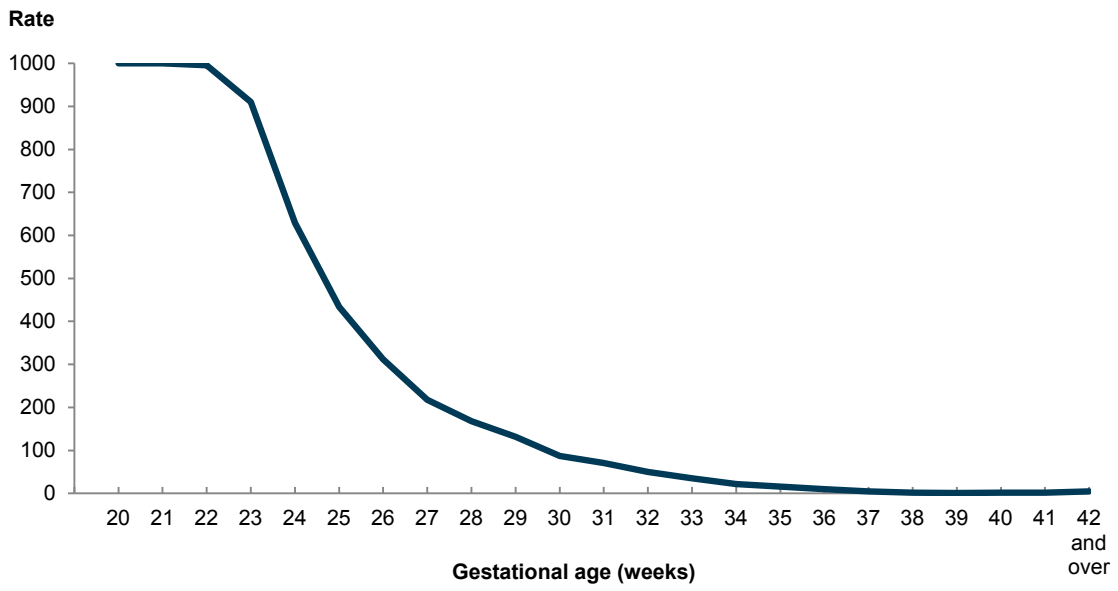
Gestational age (weeks)	Total births[a]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
			Pre-term					
20–23[c][d]	2,831	785	2,046	722.7	726	924.8	2,772	979.2
24–27	2,512	1,836	676	269.1	300	163.4	976	388.5
28–31	4,803	4,404	399	83.1	110	25.0	509	106.0
32–36	41,519	40,946	573	13.8	168	4.1	741	17.8
Total	**51,665**	**47,971**	**3,694**	**71.5**	**1,304**	**27.2**	**4,998**	**96.7**
			Term					
37–41	558,345	557,577	768	1.4	266	0.5	1,034	1.9
42 and over	3,979	3,971	8	2.0	10	2.5	18	4.5
Total	**562,324**	**561,548**	**776**	**1.4**	**276**	**0.5**	**1,052**	**1.9**
			Gestation not stated					
Total	**150**	**135**	**15**	**n.p.**	**0**	**. .**	**15**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified gestational group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) There were 5 babies in the NPDC with a gestational age of less than 20 weeks.

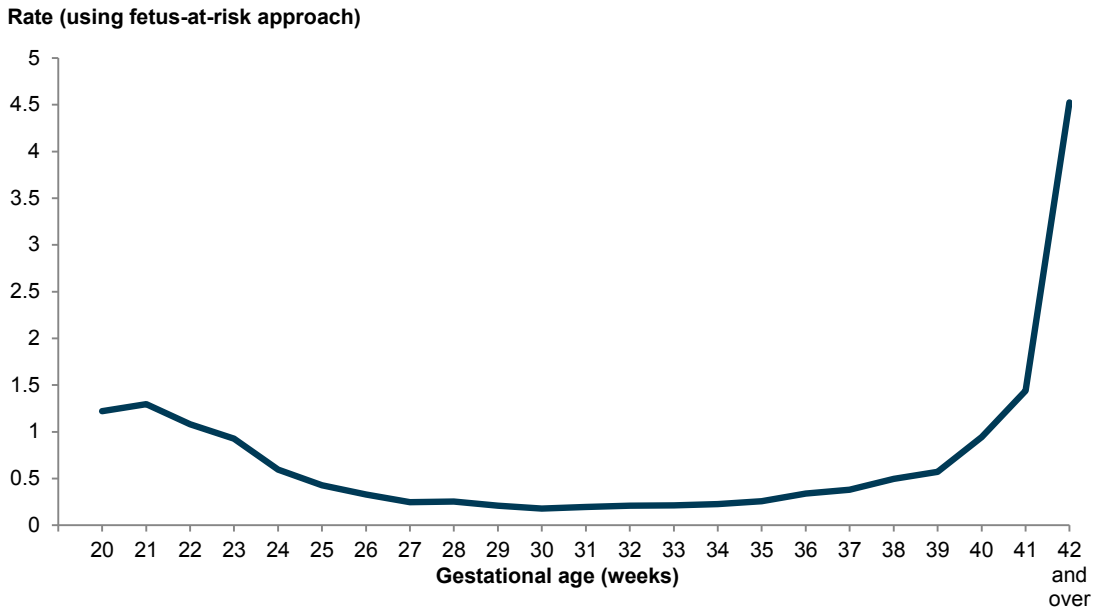
(d) This group may include terminations of pregnancy (TOP). Because TOP are not consistently reported in the NPDC or supplementary data, their contribution to the rates of perinatal mortality is unknown.



Notes

1. The rate is the number of deaths per 1,000 births.
2. Babies with unknown gestational age have been excluded.
3. Data for this figure are in Table D5.

Figure 3.6: Rates of perinatal mortality by gestational age, Australia 2011–2012



Notes

1. Rate is per 1,000 babies remaining in utero at and above the specified gestations.
2. Babies with unknown gestational age have been excluded.
3. Data for this figure are in Table D6.

Figure 3.7: Risk of perinatal mortality by gestational age using fetus-at-risk approach, Australia 2011–2012

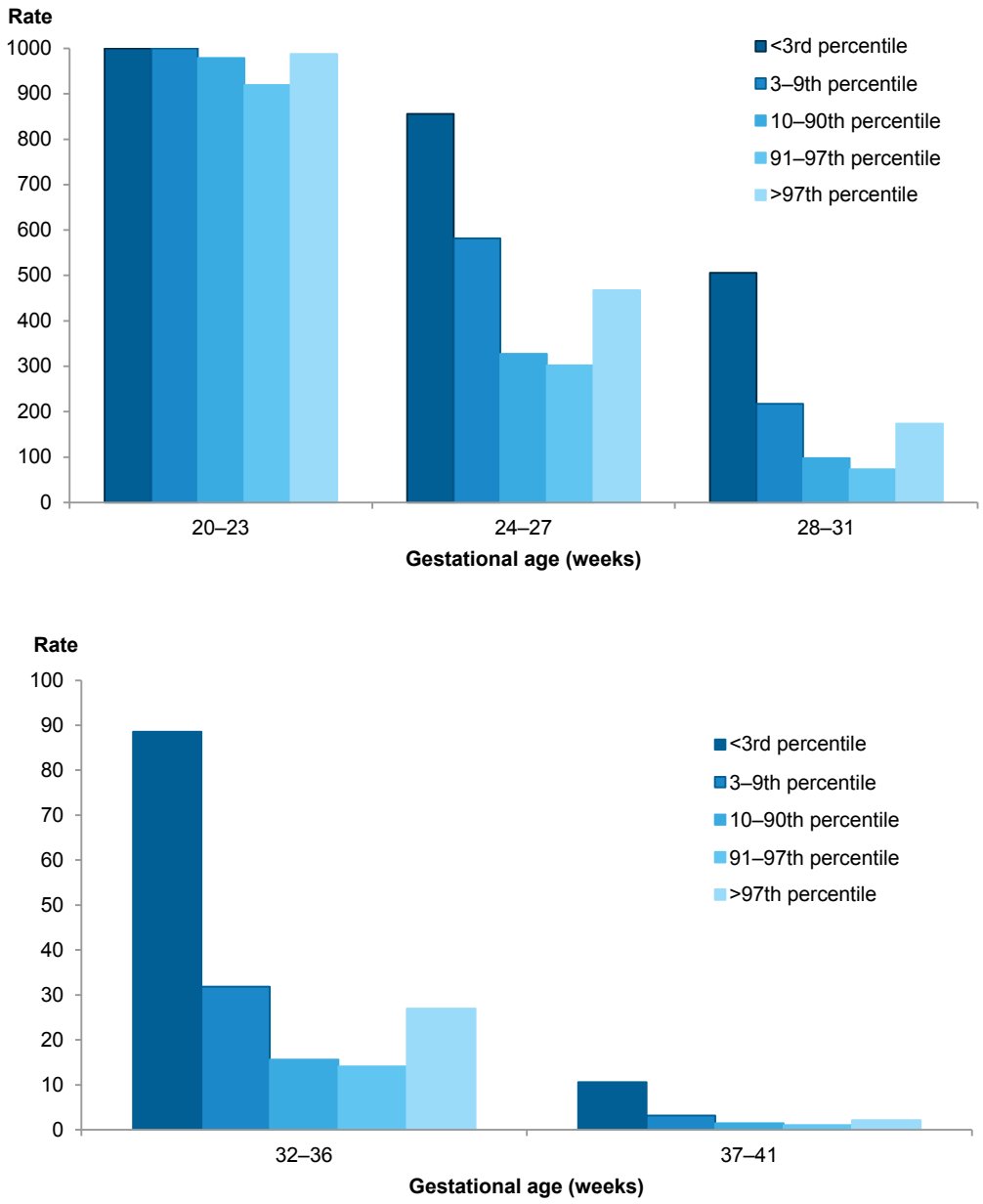
Birthweight

Birthweight percentiles indicate the weight of a baby in relation to his or her gestational age at birth, and are used to identify babies at higher risk of perinatal morbidity (Dobbins et al. 2012). Birthweights below the 10th percentile indicate babies who are small for their gestational age, and babies over the 90th percentile are large for their gestational age (Dobbins et al. 2012).

Figure 3.8 shows the rate of perinatal death by birthweight percentiles for singleton babies. The perinatal mortality rates of babies born with a birthweight percentile of less than 10 were consistently higher than babies with a birthweight percentile of 10 and over. Babies born with a birthweight percentile of less than 3 had the highest perinatal mortality rate across all gestational age groups. The exception for this was for babies born at 20–23 weeks gestation, where the rate of perinatal mortality was similar across all birthweight percentile groups.

The lowest rates of perinatal mortality across all gestational groups were among babies in the 91–97th percentile, followed closely by the 10–90th percentile (5.9 and 7.0 deaths per 1,000 births). The perinatal mortality rate for babies with a weight for gestational age above the 97th percentile was nearly double that of babies whose birthweight percentile was 91–97th (11.4 versus 5.9 deaths per 1,000 births) (Figure 3.8).

Rates of perinatal mortality by absolute birthweight are presented in Table D7. 'Very low birthweight' describes babies weighing less than 1,500 grams at birth , 'low birthweight' is defined as 1,500–2,500 grams and 'normal birthweight' over 2,500 grams, while 'term' describes babies greater than or equal to 37 weeks gestation at birth. Rates of perinatal mortality were highest among babies with 'very low birthweight' and lowest among those weighing between 2,500 and 4,499 grams (453.5 and 1.9 deaths per 1,000 births).



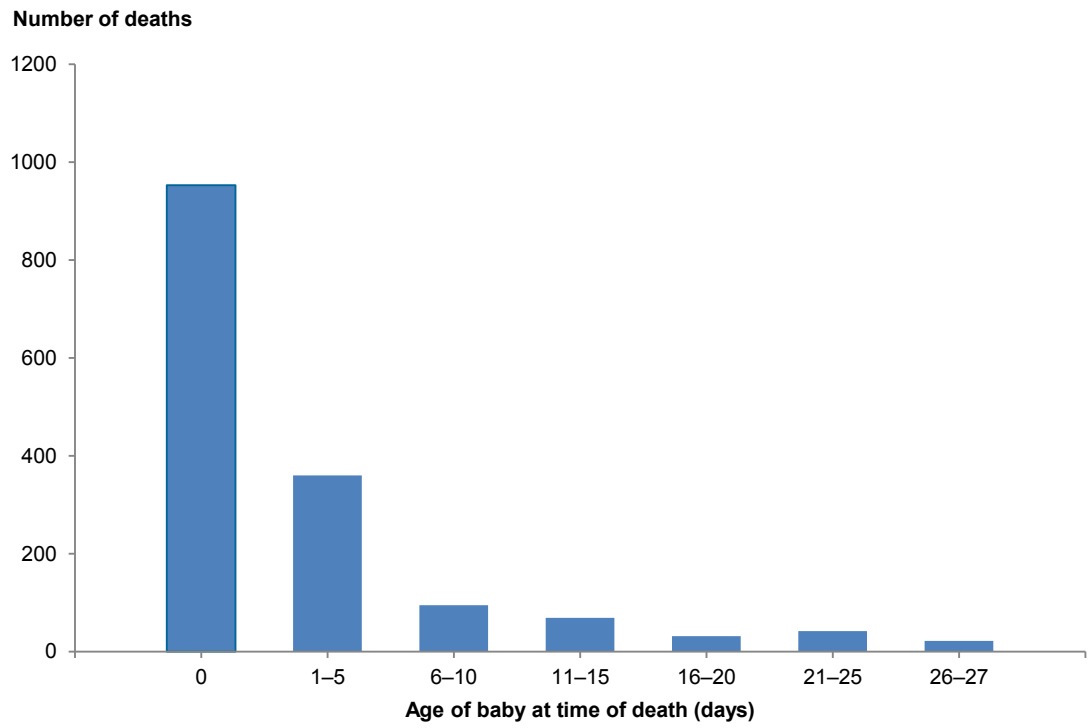
Notes

1. The rate is the number of deaths per 1,000 births.
2. Data for this figure are in Table D8.
3. Excludes babies less than 20 weeks gestation, greater than 41 weeks gestation, and those with unknown birthweight, gestational age and sex (n = 4,727 singleton births).

Figure 3.8: Rate of perinatal mortality by birthweight for gestational age for singleton births, Australia 2011–2012

Age of baby at time of death

Most neonatal deaths occurred on day 0 (953; 60.3%); that is, 0–23 hours after birth, and a further 22.8% (360) died between days 1 and 5. From day 6 onwards, the frequency of neonatal deaths gradually declined (Figure 3.9).



Note: Data for this figure are in Table D9.

Figure 3.9: Age (days) of baby at time of neonatal death, Australia 2011–2012

Autopsy

Autopsy status is obtained from supplementary data from the PMRCs and from NPDC baby death data. It is not a mandatory item in the PDCs and was not supplied by New South Wales or the Northern Territory. The performance of an autopsy is not obligatory for stillbirths or neonatal deaths, unless the death is referred to a coroner. Consent for autopsy must be given by the parents following discussion with the appropriate clinical staff before an autopsy can be undertaken.

Of the 4,344 perinatal deaths in 2011–2012, 38.7% were known to have undergone an autopsy examination, and over half (57.5%) were recorded as not having an autopsy performed (Table 3.12).

Table 3.12: Autopsy rates (%) for stillbirths, neonatal deaths and perinatal deaths, Australia, 2011–2012[(a)]

	Stillbirths		Neonatal deaths		Perinatal deaths	
Autopsy status	**No.**	**%**	**No.**	**%**	**No.**	**%**
No autopsy performed	1,761	54.1	735	67.7	2,496	57.5
Autopsy performed	1,377	42.3	306	28.2	1,683	38.7
Unknown	120	3.7	45	4.1	165	3.8
Total	**3,258**	**100.0**	**1,086**	**100.0**	**4,344**	**100.0**

(a) Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory (n = 4,344 perinatal deaths). Data not available from New South Wales and the Northern Territory (n = 1,721 perinatal deaths).

Timing of stillbirth

Timing of stillbirth is a data item reported using supplementary data provided voluntarily by state and territory PMRCs. This item is nearly completely reported for stillbirths for the 2 states that provided data (Victoria and Queensland). Caution should be used when interpreting these results because the findings may not be representative of all Australian states and territories.

In Victoria and Queensland in 2011–2012, 14.9% of babies who were stillborn were known to have died during the intrapartum period, and 80.3% were reported as antepartum stillbirths (Table 3.13).

Table 3.13: Timing of death for stillbirths, Victoria and Queensland, 2011–2012[(a)]

Time of death	No.	%
Intrapartum	342	14.9
Antepartum	1,839	80.3
Unknown	108	4.7
Total	**2,289**	**100.0**

(a) This table may include terminations of pregnancy (TOP). Because TOP are not consistently reported in the NPDC or supplementary data, their contribution to the rates of perinatal mortality is unknown. TOP may be reported as intrapartum or antepartum stillbirths.

Place of death

Supplementary data relating to place of death for babies who died in the neonatal period were available from Victoria, Queensland, South Australia and Tasmania. Caution should be used when interpreting these results because the findings may not be representative of all Australian states and territories.

The majority (83.6%) of neonatal deaths in these jurisdictions in 2011–2012 occurred in the hospital of birth (Table 3.14).

Table 3.14: Place of death for neonatal deaths, selected states, 2011–2012[(a)]

Place of death	No.	%
Birth hospital	785	83.6
Non-birth hospital[(b)]	123	13.1
Home	27	2.9
Not stated	4	0.4
Total	**939**	**100**

(a) Includes Victoria, Queensland and South Australia (n = 939 neonatal deaths).

(b) A 'Non-birth hospital' indicates a hospital facility other than that where the baby was born. This could mean that the death occurred after transfer to another hospital facility following the birth or it could be a separate admission.

3.6 Perinatal deaths among the Aboriginal and Torres Strait Islander population

Aboriginal and Torres Strait Islander status of the mother

In Australia, the mothers of 24,345 (4.0%) babies born in 2011–2012 identified as being Aboriginal and/or Torres Strait Islander (Table 3.15). Of these babies, 416 died during the perinatal period, giving a perinatal mortality rate of 17.1 deaths per 1,000 births.

In comparison, the mothers of 588,392 babies born during the same period identified as being non-Indigenous, and 5,628 of these babies died during the perinatal period. The rate of perinatal mortality of babies of non-Indigenous mothers was nearly half that of babies born to Aboriginal and/or Torres Strait Islander mothers (9.6 versus 17.1 deaths per 1,000 births).

Looking at the subgroups of Indigenous mothers, the mothers of 89.1% of babies identified as Aboriginal, 5.7% identified as Torres Strait Islander, and 5.2% identified as Aboriginal and Torres Strait Islander (Table 3.15). The perinatal mortality rate was highest for babies of Aboriginal and Torres Strait Islander mothers (19.0 deaths per 1,000 births) and lowest in babies of Torres Strait Islander mothers (11.5 deaths per 1,000 births). Caution should be exercised when interpreting differences between subgroups of Indigenous mothers due to small numbers of stillbirths and neonatal deaths within the subgroups.

The absolute number of perinatal deaths in babies of Aboriginal and/or Torres Strait Islander mothers (416) was relatively small compared with the number of deaths of babies born to non-Indigenous mothers (5,628) in 2011–2012, and associated factors such as socioeconomic status, maternal age and remoteness of usual residence, are not controlled for

in data analysis. Therefore caution should be exercised when interpreting differences between Indigenous and non-Indigenous groups.

Table 3.15: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Indigenous status (mother)	**Total births[a]**	**Live births**	**No.**	**Rate[b]**	**No.**	**Rate[b]**	**No.**	**Rate[b]**
				Indigenous				
Aboriginal	21,690	21,420	270	12.4	106	4.9	376	17.3
Torres Strait Islander	1,389	1,380	9	6.5	7	5.1	16	11.5
Aboriginal and Torres Strait Islander	1,266	1,253	13	10.3	11	8.8	24	19.0
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
				Non-Indigenous				
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
				Unknown Indigenous status				
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified Indigenous group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births. These rates are not age-standardised.

Aboriginal and Torres Strait Islander status of baby

In addition to the Indigenous status of the mother, the NPDC also collects data about the Indigenous status of the baby (which may differ to that of the baby's mother). Most Indigenous babies born in 2011–2012 were Aboriginal (86.8%), 6.9% were Aboriginal and Torres Strait Islander and 6.3% were Torres Strait Islander (Table 3.16). The perinatal mortality rate was highest in Aboriginal and Torres Strait Islander babies and lowest in Torres Strait Islander babies (17.3 and 10.7 deaths per 1,000 births). Perinatal mortality was higher among Indigenous babies compared with non-Indigenous babies (14.5 versus 8.4 deaths per 1,000 births). Caution should be exercised when interpreting differences between subgroups of Indigenous babies due to small numbers of stillbirths and neonatal deaths within the subgroups.

Note that data on Indigenous status of the baby was not available for Victoria or South Australia.

Table 3.16: Perinatal mortality by Aboriginal and Torres Strait Islander status of baby, selected jurisdictions, 2011–2012[a]

			Stillbirths		Neonatal deaths		Perinatal deaths	
Indigenous status (baby)	**Total births**[b]	**Live births**	**No.**	**Rate**[c]	**No.**	**Rate**[c]	**No.**	**Rate**[c]
				Indigenous				
Aboriginal	23,279	23,042	237	10.2	103	4.5	340	14.6
Torres Strait Islander	1,681	1,671	10	5.9	8	4.8	18	10.7
Aboriginal & Torres Strait Islander	1,848	1,832	16	8.7	16	8.7	32	17.3
Total	**26,808**	**26,545**	**263**	**9.8**	**127**	**4.8**	**390**	**14.5**
				Non-Indigenous				
Total	**516,964**	**513,934**	**3,030**	**5.9**	**1,312**	**2.6**	**4,342**	**8.4**
				Unknown Indigenous status				
Total	**17,819**	**17,046**	**773**	**n.p.**	**34**	**n.p.**	**807**	**n.p.**

(a) Includes births from New South Wales, Queensland, the Northern Territory, Western Australia, Tasmania and the Australian Capital Territory.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified Indigenous group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Maternal age and Aboriginal and Torres Strait Islander status

In 2011–2012, a greater proportion of Aboriginal and Torres Strait Islander mothers were aged under 20 (18.6%) compared with non-Indigenous mothers (3.0%) (Table 3.17). Aboriginal and Torres Strait Islander mothers in this age group made up a greater proportion of all mothers ages under 20 (excluding those with unknown Indigenous status) than any of the other age groups. For example, babies of Aboriginal and Torres Strait Islander mothers made up 20.4% of all babies born to mothers aged under 20, compared with 8.5% of babies born to mothers aged 20–24 and 3.2% born to mothers aged 25–29.

Perinatal mortality rates were consistently higher among the babies of Aboriginal and Torres Strait Islander mothers compared with babies of non-Indigenous mothers in almost all age groups. The exception to this was in mothers under 20, where perinatal mortality rates were similar (17.7 versus 18.3 deaths per 1,000 births).

Table 3.17: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and maternal age, 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Age (years)	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
			Indigenous					
Under 20	4,518	4,463	55	12.2	25	5.6	80	17.7
20–24	9,333	9,234	99	10.6	45	4.9	144	15.4
25–29	4,682	4,627	55	11.7	29	6.3	84	17.9
30–34	3,590	3,544	46	12.8	19	5.4	65	18.1
35 and over	2,220	2,183	37	16.7	6	2.7	43	19.4
Not stated	2	2	0	. .	0	. .	0	. .
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
			Non-Indigenous					
Under 20	17,670	17,416	254	14.4	69	4.0	323	18.3
20–24	99,866	99,143	723	7.2	267	2.7	990	9.9
25–29	140,263	139,373	890	6.3	324	2.3	1,214	8.7
30–34	193,744	192,530	1,214	6.3	427	2.2	1,641	8.5
35 and over	136,686	135,589	1,097	8.0	360	2.7	1,457	10.7
Not stated	163	160	3	n.p.	0	. .	3	n.p.
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
			Unknown Indigenous status					
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified age group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Birthweight and Aboriginal and Torres Strait Islander status

Birthweight percentiles indicate the weight of babies in relation to their gestational age at birth, and they are used to identify babies at higher risk of perinatal morbidity (Dobbins et al. 2012). Birthweights below the 10th percentile indicate babies who are small for their gestational age, and babies over the 90th percentile are large for their gestational age (Dobbins et al. 2012).

Table 3.18 shows the rate of perinatal death by birthweight percentiles and Indigenous status for singleton births. The rates of stillbirth, neonatal death and perinatal death of babies born to Aboriginal and Torres Strait Islander mothers were higher than those born to non-Indigenous mothers across almost all birthweight percentile groups. The exception to this was for neonatal deaths of babies born with a birthweight percentile less than 3 to Indigenous mothers, where the rate of perinatal mortality was lower than that of babies born to non-Indigenous mothers in the same birthweight percentile (4.3 versus 7.3 deaths per 1,000 live births). Caution should be used when interpreting these results due to the small number of stillbirths and neonatal deaths among singleton births of Aboriginal and Torres Strait Islander mothers.

Comparisons of perinatal mortality by Indigenous status and absolute birthweight groups showed varying results (Table D10). Babies who weighed 2,500–4,499 grams born to Aboriginal and Torres Strait Islander mothers had higher rates of perinatal mortality compared with babies of non-Indigenous mothers (3.2 versus 1.9 deaths per 1,000 births) as did babies greater than or equal to 4,500 grams at birth (13.6 versus 1.7 deaths per 1,000 births).

However, babies who weighed between 1,500 and 2,499 grams born to Aboriginal and Torres Strait Islander mothers had *similar* perinatal mortality rates to babies of non-Indigenous women (19.0 versus 19.9 deaths per 1,000 births) and a *lower* perinatal mortality rate when born weighing less than 1,500 grams (414.1 versus 457.6 deaths per 1,000 births). Among the latter group, babies of Aboriginal and Torres Strait Islander mothers had a 14.6% lower rate of stillbirth than babies of non-Indigenous mothers.

Table 3.18: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and birthweight percentiles for singleton births, 2011–2012

Weight for gestational age (birthweight percentile)	Total births[a]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
			Indigenous					
<3	1,210	1,152	58	47.9	5	4.3	63	52.1
3–9	2,254	2,218	36	16.0	15	6.8	51	22.6
10–90	17,984	17,837	147	8.2	75	4.2	222	12.3
91–97	1,433	1,420	13	9.1	8	5.6	21	14.7
>97	778	767	11	14.1	6	7.8	17	21.9
Unknown	22	6	16	n.p.	1	n.p.	17	n.p.
Total	**23,681**	**23,400**	**281**	**11.9**	**110**	**4.7**	**391**	**16.5**
			Non-Indigenous					
<3	14,115	13,495	620	43.9	98	7.3	718	50.9
3–9	36,248	35,851	397	11.0	100	2.8	497	13.7
10–90	457,620	455,413	2,207	4.8	877	1.9	3,084	6.7
91–97	42,273	42,102	171	4.0	65	1.5	236	5.6
>97	19,581	19,426	155	7.9	60	3.1	215	11.0
Unknown	708	484	224	n.p.	16	n.p.	240	n.p.
Total	**570,545**	**566,771**	**3,774**	**6.6**	**1,216**	**2.1**	**4,990**	**8.7**
			Unknown Indigenous status					
Total	**1,334**	**1,322**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified birthweight group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Gestational age and Aboriginal and Torres Strait Islander status

The rates of perinatal mortality decreased with increasing gestational age until 42 weeks gestation for the babies of both Aboriginal and/or Torres Strait Islander and non-Indigenous mothers.

The perinatal mortality rate of babies born to Aboriginal and Torres Strait Islander mothers was lower than those of non-Indigenous mothers in each of the age groups up to 32 weeks gestation (Table 3.19). For babies born between 28 and 31 weeks gestation, the stillbirth rate of babies of Aboriginal and Torres Strait Islander mothers was considerably lower (39.1%) than babies of non-Indigenous mothers (52.5 versus 86.2 stillbirths per 1,000 births). This pattern has also been reported by the authors of a large population database study in Western Australia, although the reason for the pattern is unclear (Freemantle et al. 2006).

After 32 weeks gestation, the perinatal mortality rate of babies of Aboriginal and Torres Strait Islander mothers was higher compared with those of non-Indigenous mothers, peaking at almost 3 times the rate for babies born at 41 weeks and over (4.7 versus 1.9 deaths per 1,000 births).

An alternative method for calculating the gestational age-specific rates of perinatal mortality is the fetuses-at-risk approach outlined in Box 2.3 in 'Chapter 2 Definitions and methods'. This method is based upon the rationale that all babies who reach a specific gestational age—whether born at that gestation or not—are at risk of perinatal mortality (not just those *born* at that specified gestation, as per the traditional method described above) (Joseph 2011). The gestational specific risk of perinatal mortality at each gestational age applies to all unborn babies, whereas the traditional gestational-age rate applies only to babies born at that stage of pregnancy. The gestational specific risks are useful for counselling pregnant women, particularly later in pregnancy.

The gestation-specific risk of perinatal death for babies born to Aboriginal and Torres Strait Islander mothers was higher across all gestational age groups compared with babies of non-Indigenous mothers (Table 3.19). The difference in risk between babies of Indigenous and non-Indigenous mothers was the lowest at 28–31 weeks gestation (1.3 versus 0.8 deaths per 1,000 fetuses at risk) and highest at 20–23 weeks gestation (7.7 versus 4.4 deaths per 1,000 fetuses at risk) and 41 weeks and over (4.7 versus 1.6 deaths per 1,000 fetuses at risk).

TOP cannot be distinguished among stillbirths or neonatal deaths. Their inclusion inflates the gestation-specific risk of perinatal mortality, particularly at earlier gestations.

Table 3.19: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and gestational age, 2011–2012

				Stillbirths		Neonatal deaths		Perinatal deaths		
Gestational age (weeks)	Total births[a]	Fetuses at risk (FAR)	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]	Rate (FAR)[c]
					Indigenous					
20–23[d]	195	24,341	62	133	682.1	55	887.1	188	964.1	7.7
24–27	215	24,146	164	51	237.2	24	146.3	75	348.8	3.1
28–31	381	23,931	361	20	52.5	10	27.7	30	78.7	1.3
32–36	2,632	23,550	2,593	39	14.8	15	5.8	54	20.5	2.3
37–40	18,371	20,918	18,329	42	2.3	15	0.8	57	3.1	2.7
41 and over	2,547	2,547	2,540	7	2.7	5	2.0	12	4.7	4.7
Not stated	4	. .	4	0	. .	0	. .	0	. .	. .
Total	**24,345**	**. .**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**	**. .**
					Non-Indigenous					
20–23[d]	2,623	588,257	718	1,905	726.3	667	929.0	2,572	980.6	4.4
24–27	2,290	585,634	1,665	625	272.9	275	165.2	900	393.0	1.5
28–31	4,392	583,344	4,014	378	86.1	99	24.7	477	108.6	0.8
32–36	38,753	578,952	38,221	532	13.7	150	3.9	682	17.6	1.2
37–40	462,311	540,199	461,669	642	1.4	218	0.5	860	1.9	1.6
41 and over	77,888	77,888	77,804	84	1.1	38	0.5	122	1.6	1.6
Not stated	135	. .	120	15	n.p.	0	. .	15	n.p.	. .
Total	**588,392**	**. .**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**	**. .**
					Unknown Indigenous status					
Total	**1,402**	**. .**	**1,390**	**12**	**8.6**	**9**	**6.5**	**21**	**15.0**	**. .**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified gestational age grouping. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) The rate is calculated using the fetuses-at-risk approach, by dividing the number of perinatal deaths occurring at a specified gestation by the number of babies born at or above the specified gestations (that is, 'babies at risk'), and multiplying the result by 1,000.

(d) There were 5 babies in the NPDC with a gestational age of less than 20 weeks. This group may include terminations of pregnancy (TOP). Because TOP are not consistently reported in the NPDC or supplementary data, their contribution to the rates of perinatal mortality is unknown.

Birthweight of term babies by Aboriginal and Torres Strait Islander status

'Low birthweight' is defined as being less than 2,500 grams at birth and 'normal birthweight' 2,500 grams and over at birth. 'Term' is greater than or equal to 37 weeks gestation at birth.

Low birthweight, term babies born to Aboriginal and Torres Strait Islander mothers had a 25.5% lower perinatal mortality rate than babies of non-Indigenous mothers (10.8 versus 14.5 deaths per 1,000 births) (Table 3.20). The inverse was the case for babies weighing 2,500 grams or more at birth born to Aboriginal and Torres Strait Islander mothers, who had a perinatal mortality rate that was double that of babies born to non-Indigenous mothers (3.0 versus 1.5 deaths per 1,000 births). The reason for this pattern is unclear and requires more detailed analysis taking into account differences in maternal morbidity, particularly diabetes, as well as social and service related factors such as access to antenatal care.

These results should be interpreted with caution due to the small number of perinatal deaths among the Indigenous term babies with low birthweight and the inability to investigate whether the other factors mentioned above are also involved.

Table 3.20: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and birthweight for term babies, 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Birthweight (grams)	**Total births[a]**	**Live births**	**No.**	**Rate[b]**	**No.**	**Rate[b]**	**No.**	**Rate[b]**
				Indigenous				
Less than 2,500	930	920	10	10.8	0	. .	10	10.8
2,500 and over	19,987	19,948	39	2.0	20	1.0	59	3.0
Unknown birthweight	1	1	0	. .	0	. .	0	. .
Total	**20,918**	**20,869**	**49**	**2.3**	**20**	**1.0**	**69**	**3.3**
				Non-Indigenous				
Less than 2,500	10,237	10,124	113	11.0	35	3.5	148	14.5
2,500 and over	529,689	529,086	603	1.1	216	0.4	819	1.5
Unknown birthweight	273	263	10	n.p.	5	n.p.	15	n.p.
Total	**540,199**	**539,473**	**726**	**1.3**	**256**	**0.5**	**982**	**1.8**
				Unknown Indigenous status				
Total	**1,207**	**1,206**	**1**	**n.p.**	0	**. .**	**1**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified birthweight group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Notes

1. Term babies are greater than or equal to 37 weeks gestation.
2. Does not include babies with 'Unknown' gestation.

Smoking and Aboriginal and Torres Strait Islander status

Tobacco smoking during pregnancy is associated with a range of poor perinatal health outcomes including pre-term birth and low birthweight (Laws et al. 2006). However, cessation of smoking in early pregnancy can reduce the risk of poor outcomes (AIHW NPESU & AIHW 2013).

A considerably higher proportion of Aboriginal and Torres Strait Islander mothers reported smoking in the first 20 weeks of pregnancy (47.4%) compared with non-Indigenous mothers (10.8%) (Table 3.21) and after 20 weeks of pregnancy (41.8% versus 7.7%) (Table 3.22).

The rate of perinatal mortality was 40.8% higher in the babies of Aboriginal and Torres Strait Islander mothers who smoked in the first 20 weeks of pregnancy compared with babies of non-Indigenous mothers who smoked (17.6 versus 12.5 deaths per 1,000 births), and 29.8% higher for those whose mothers smoked in the second 20 weeks of pregnancy (17.0 versus 13.1 deaths per 1,000 births).

Table 3.21: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and tobacco smoking status during the first 20 weeks of pregnancy, 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Smoking status[a]	Total births[b]	Live births	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
			Indigenous					
Smoked	11,535	11,396	139	12.1	64	5.6	203	17.6
Did not smoke	12,135	12,008	127	10.5	48	4.0	175	14.4
Not stated	675	649	26	n.p.	12	n.p.	38	n.p.
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
			Non-Indigenous					
Smoked	63,794	63,216	578	9.1	220	3.5	798	12.5
Did not smoke	516,363	512,990	3,373	6.5	1,176	2.3	4,549	8.8
Not stated	8,235	8,005	230	n.p.	51	n.p.	281	n.p.
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
			Unknown Indigenous status					
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) For WA, 'Did not smoke' includes women who smoked an undetermined number of cigarettes in the first 20 weeks of pregnancy and after 20 weeks of pregnancy.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified smoking group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table 3.22: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and tobacco smoking status after 20 weeks of pregnancy, 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Smoking status[(a)]	Total births[(b)]	Live births	No.	Rate[(c)]	No.	Rate[(c)]	No.	Rate[(c)]
				Indigenous				
Smoked	10,173	10,057	116	11.4	57	5.7	173	17.0
Did not smoke	13,015	12,874	141	10.8	55	4.3	196	15.1
Not stated	1,157	1,122	35	n.p.	12	n.p.	47	n.p.
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
				Non-Indigenous				
Smoked	45,326	44,896	430	9.5	165	3.7	595	13.1
Did not smoke	526,413	522,958	3,455	6.6	1,218	2.3	4,673	8.9
Not stated	16,653	16,357	296	n.p.	64	n.p.	360	n.p.
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
				Unknown Indigenous status				
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) For WA, 'Did not smoke' includes women who smoked an undetermined number of cigarettes in the first 20 weeks of pregnancy and after 20 weeks of pregnancy.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified smoking group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Remoteness and Aboriginal and Torres Strait Islander status

A measure of remoteness is assigned to each woman's area of residence and reflects their distance from and access to government and non-government services.

The distribution of the population varied between Aboriginal and Torres Strait Islander and non-Indigenous mothers (Table 3.23). The Aboriginal and Torres Strait Islander mothers of approximately one-third (30.0%) of babies born lived in *Major cities* compared with two-thirds (71.8%) of babies born to non-Indigenous mothers. The inverse was the case for mothers living in *Very remote* areas. The Aboriginal and Torres Strait Islander mothers of 15.6% of babies born lived in *Very remote* areas, whereas the non-Indigenous mothers of only 0.5% of babies born lived in these areas.

The perinatal mortality rate was higher for babies born to Aboriginal and Torres Strait Islander mothers in all areas of usual residence; however, the patterns of perinatal mortality differed between the Indigenous and non-Indigenous groups (Table 3.23). For babies of Aboriginal and Torres Strait Islander mothers, the rate of perinatal mortality was lowest in *Inner regional* areas and highest in *Very remote* areas (12.5 and 21.6 deaths per 1,000 births). For babies of non-Indigenous mothers, the rate of perinatal mortality was lowest in *Remote* areas and highest in *Outer regional* areas (7.9 and 10.1 deaths per 1,000).

Table 3.23: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and remoteness of usual residence, 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Remoteness area[a]	Total births[b]	Live births	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
			Indigenous					
Major cities	7,307	7,217	90	12.3	23	3.2	113	15.5
Inner regional	5,028	4,987	41	8.2	22	4.4	63	12.5
Outer regional	5,605	5,537	68	12.1	33	6.0	101	18.0
Remote	2,303	2,281	22	9.6	17	7.5	39	16.9
Very remote	3,800	3,745	55	14.5	27	7.2	82	21.6
Not stated	302	286	16	n.p.	2	n.p.	18	n.p.
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
			Non-Indigenous					
Major cities	422,367	419,617	2,750	6.5	1,004	2.4	3,754	8.9
Inner regional	95,781	95,094	687	7.2	263	2.8	950	9.9
Outer regional	47,904	47,546	358	7.5	128	2.7	486	10.1
Remote	7,549	7,502	47	6.2	13	1.7	60	7.9
Very remote	2,811	2,792	19	6.8	8	2.9	27	9.6
Not stated	11,980	11,660	320	n.p.	31	n.p.	351	n.p.
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
			Unknown Indigenous status					
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) Area of remoteness is determined by the Accessibility/Remoteness Index of Australia (ARIA+), which is calculated based on the area of mother's usual residence.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified remoteness area group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Socioeconomic status and Aboriginal and Torres Strait Islander status

Table 3.24 presents perinatal mortality by Aboriginal and Torres Strait Islander status of mother and socioeconomic status. The proportion of Aboriginal and Torres Strait Islander mothers in the most disadvantaged quintile was 49.1% compared with 19.8% of non-Indigenous mothers, and only 3.8% of Aboriginal and Torres Strait Islander mothers were in the least disadvantaged compared with 18.4% non-Indigenous mothers.

The perinatal mortality rate was higher for babies born to Aboriginal and Torres Strait Islander mothers in all socioeconomic quintiles of relative disadvantage compared with those born to non-Indigenous mothers. The rate of perinatal mortality in babies of non-Indigenous mothers in the most disadvantaged quintile (10.3 deaths per 1,000 births) was lower than that in babies of Indigenous mothers in the least disadvantaged quintile (14.0 deaths per 1,000 births).

Table 3.24: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and socioeconomic status, 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Socioeconomic quintile[a]	Total births[b]	Live births	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
			Indigenous					
SES quintile 1 (most disadvantaged)	11,951	11,802	149	12.5	67	5.7	216	18.1
SES quintile 2	5,731	5,672	59	10.3	29	5.1	88	15.4
SES quintile 3	3,645	3,607	38	10.4	16	4.4	54	14.8
SES quintile 4	1,785	1,765	20	11.2	7	4.0	27	15.1
SES quintile 5 (least disadvantaged)	930	920	10	10.8	3	3.3	13	14.0
Not stated	303	287	16	n.p.	2	n.p.	18	n.p.
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
			Non-Indigenous					
SES quintile 1 (most disadvantaged)	116,710	115,858	852	7.3	351	3.0	1,203	10.3
SES quintile 2	115,739	114,916	823	7.1	303	2.6	1,126	9.7
SES quintile 3	117,640	116,837	803	6.8	313	2.7	1,116	9.5
SES quintile 4	118,037	117,328	709	6.0	246	2.1	955	8.1
SES quintile 5 (least disadvantaged)	108,236	107,563	673	6.2	203	1.9	876	8.1
Not stated	12,030	11,709	321	n.p.	31	n.p.	352	n.p.
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
			Unknown Indigenous status					
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) Socioeconomic quintiles were derived by assigning the ABS Socioeconomic Index for Areas (SEIFAs) and the Index of Relative Socio-Economic Disadvantage (IRSD) to mothers' area of usual residence.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified socioeconomic quintile. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Antenatal visits and Aboriginal and Torres Strait Islander status

The antenatal period provides health professionals the opportunity to provide care to pregnant women. Provision of at least 4 episodes of antenatal care increases the likelihood of mothers receiving effective maternal health interventions vital to their health and wellbeing and that of their babies (WHO 2015). The number of mothers commencing antenatal care in the first trimester of pregnancy is also an indicator of the accessibility of maternity care (AIHW NPESU & AIHW 2013).

In 2011–2012, information about the number of antenatal visits was available from all jurisdictions except for Victoria, with data from Western Australian only available from July 2012. Data on the gestation at first antenatal visit were available from all states and territories. Table 3.25 shows that there were 15,933 (82.9%) babies of Aboriginal and Torres Strait Islander mothers who attended 5 or more antenatal visits compared with 354,650 (91.8%) babies of the non-Indigenous mothers, and 13.7% attended 1–4 visits compared with 4.1%, respectively.

In both the Aboriginal and Torres Strait Islander group and the non-Indigenous group, babies of women who had 1–4 antenatal visits had higher rates of perinatal mortality (7.2 and 5.8 deaths per 1,000 births) than babies of women who had 5 or more visits (4.3 and 2.6 deaths per 1,000 births).

The proportion of Aboriginal and Torres Strait Islander mothers who attended their first antenatal visit during the first trimester (48.1%) was lower than non-Indigenous mothers (62.7%) (Table 3.26). This may be related to the higher proportion of Aboriginal and Torres Strait Islander mothers who live in *Remote and very remote* areas (Table 3.23), who have been reported to receive less antenatal care in the first trimester of pregnancy than those who live in *Major cities* and *Inner regional* areas (AIHW NPESU & AIHW 2013).

Babies of Aboriginal and Torres Strait Islander mothers who attended their first antenatal visit at 1–13 weeks gestation had a higher perinatal mortality rate than those who attended their first visit during the second and third trimester (16.1 versus 14.3 deaths per 1,000 births). The reason for this pattern is unclear, particularly as the inverse is the case for babies of non-Indigenous mothers (8.3 versus 10.5 deaths per 1,000 births).

Caution should be taken when interpreting data in this section, because data recorded about antenatal visits is based on visits recorded in the woman's clinical record and may not include all antenatal visits outside the hospital setting, such as with a general practitioner or private obstetrician. The presence of possible confounding factors, including remoteness of mother's area of residence and disadvantage quintile of mother's area of residence may also affect the data and have not been accounted for in the analysis. In addition, 15.9% of perinatal deaths of babies with an Aboriginal and Torres Strait Islander mother had an unknown number of antenatal visits, which may also impact upon the findings. It was not possible to distinguish babies of mothers who had no antenatal care across all jurisdictions. These babies are included with babies with 'unknown' number of antenatal visits in Table 3.25 and 'unknown' gestation at first antenatal visit in Table 3.26.

Table 3.25: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and number of antenatal visits, Australia 2011–2012[a]

No. of antenatal visits	Total births[b]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
			Indigenous					
1–4	2,636	2,621	15	5.7	4	1.5	19	7.2
5 or more	15,933	15,887	46	2.9	23	1.4	69	4.3
Unknown	655	649	6	n.p.	0	. .	6	n.p.
Total	**19,224**	**19,157**	**67**	**3.5**	**27**	**41.6**	**94**	**4.9**
			Non-Indigenous					
1–4	15,786	15,723	63	4.0	28	1.8	91	5.8
5 or more	354,650	353,931	719	2.0	218	0.6	937	2.6
Unknown	15,689	15,635	54	n.p.	15	n.p.	69	n.p.
Total	**386,125**	**385,289**	**836**	**2.2**	**261**	**0.7**	**1,097**	**2.8**
			Unknown Indigenous status					
Total	**537**	**537**	**0**	**. .**	**0**	**. .**	**0**	**. .**

(a) Victoria did not supply data on antenatal visits for 2011 and 2012, nor did Western Australia before July 2012. Births that occurred in Victoria and Western Australia (n = 201,616) during these periods have been excluded from analysis.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births per specified antenatal visit grouping. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table 3.26: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and gestation at first antenatal visit, Australia 2011–2012

Gestation at first antenatal visit (weeks)	Total births[a]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
			Indigenous					
1–13	11,704	11,581	123	10.5	66	5.7	189	16.1
14–42	11,254	11,134	120	10.7	41	3.7	161	14.3
Unknown	1,387	1,338	49	n.p.	17	n.p.	66	n.p.
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
			Non-Indigenous					
1–13	369,098	366,855	2,243	6.1	819	2.2	3,062	8.3
14–42	198,247	196,660	1,587	8.0	501	2.5	2,088	10.5
Unknown	21,047	20,696	351	n.p.	127	n.p.	478	n.p.
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
			Unknown Indigenous status					
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified gestation at first antenatal visit group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

4 Cause of perinatal deaths in Australia

This chapter details the cause of perinatal deaths 2011–2012, including cause of death by Indigenous status, plurality, birthweight and gestation.

Cause of perinatal deaths for stillborn babies and babies who died during the neonatal period is determined by PSANZ-PDC cause of death codes from NPDC 'Baby death' data and PMRC supplementary data. PSANZ-PDC coding was available from Victoria, Queensland, South Australia, Western Australia, Tasmania and the Australian Capital Territory for 98.1% of perinatal deaths in these jurisdictions, representing 71.6% of all perinatal deaths for 2011–2012.

Cause of neonatal deaths is also determined using PSANZ-NDC cause of death codes. These were available from the jurisdictional PMRC supplementary data of Victoria, Queensland, South Australia, Western Australia and Australian Capital Territory (2011 only) for 98.1% of neonatal deaths in these jurisdictions.

4.1 PSANZ-PDC and PSANZ-NDC cause of perinatal deaths

Table 4.1 and Figure 4.1 provide a summary of PSANZ-PDC causes of death for 3,258 stillbirths and 1,086 neonatal deaths in Australia 2011–2012. Each major perinatal death classification consists of a number of subcategories (Table D11). The PSANZ-PDC classifies the main obstetric antecedent factor that caused the perinatal death.

Congenital abnormality was the leading cause of stillbirths (26.3% of stillbirths), and 26.8% of these babies died due to a chromosomal abnormality. It is known that a proportion of these stillbirths were due to terminations of pregnancy (TOP), but the number of TOP cannot be determined because they are not consistently reported in the NPDC or supplementary data. The second leading cause of stillbirth was unexplained antepartum death (19.8% of stillbirths) followed by maternal conditions (12.3%). Over three-quarters (78.3%) of these stillbirths due to maternal conditions were a result of TOP for maternal psychosocial indications.

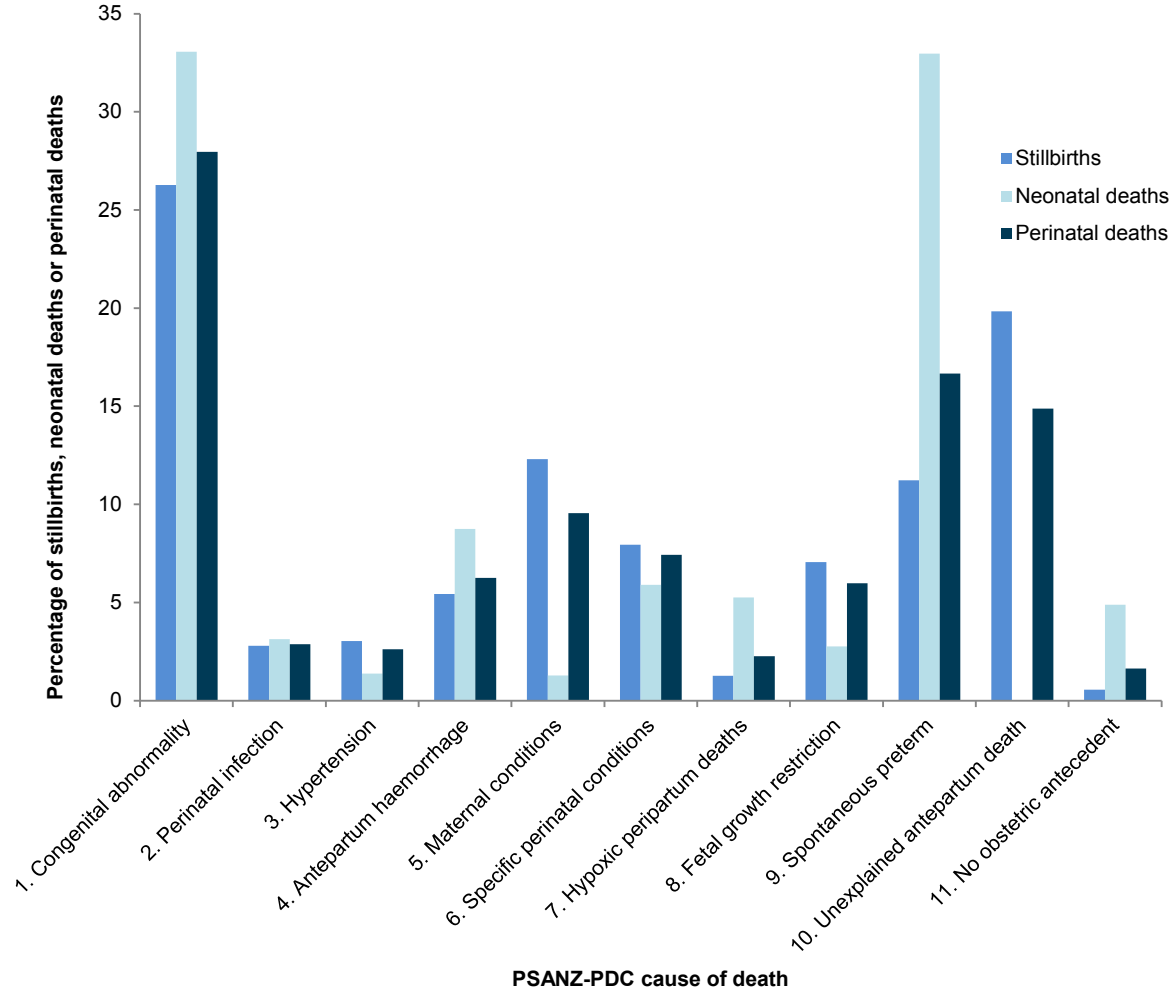
Among the least common causes of stillbirth were: perinatal infection (2.8%) including Group B Streptococcus and cytomegalovirus; hypertension (3.0%) including pre-eclampsia; and hypoxic peripartum death (1.3%) including uterine rupture and cord prolapse.

Similar to stillbirths, the leading PSANZ-PDC category for cause of neonatal deaths was congenital abnormality (33.1%), followed closely by spontaneous pre-term birth (33.0%). Congenital abnormalities involving the central nervous system and the cardiovascular system were the most common types of congenital abnormalities, making up a combined total of 40.5% of neonatal deaths in this group. In neonatal deaths following a spontaneous pre-term birth, 28.5% were in babies with chorioamnionitis on placental histopathology whose membranes remained intact (or were ruptured less than 24 hours before birth) (Table D11). The other leading causes of neonatal death were: antepartum haemorrhage (8.7% of neonatal deaths) including placental abruption; specific perinatal conditions (5.9%) including twin-to-twin transfusion and uterine abnormalities; hypoxic peripartum death (5.2%); and neonatal deaths with no obstetric antecedent (4.9%) including sudden infant death syndrome (SIDS).

Table 4.1: Summary of Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths, selected jurisdictions, 2011–2012[(a)]

	Stillbirths		Neonatal deaths		Perinatal deaths	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
1. Congenital abnormality	856	26.3	359	33.1	1,215	28.0
2. Perinatal infection	91	2.8	34	3.1	125	2.9
3. Hypertension	99	3.0	15	1.4	114	2.6
4. Antepartum haemorrhage (APH)	177	5.4	95	8.7	272	6.3
5. Maternal conditions	401	12.3	14	1.3	415	9.6
6. Specific perinatal conditions	259	7.9	64	5.9	323	7.4
7. Hypoxic peripartum death	41	1.3	57	5.2	98	2.3
8. Fetal growth restriction (FGR)	230	7.1	30	2.8	260	6.0
9. Spontaneous pre-term	366	11.2	358	33.0	724	16.7
10. Unexplained antepartum death	646	19.8	0	0.0	646	14.9
11. No obstetric antecedent	18	0.6	53	4.9	71	1.6
Not stated	74	2.3	7	0.6	81	1.9
Total	**3,258**	**100.0**	**1,086**	**100.0**	**4,344**	**100**

(a) Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory (n = 4,344 perinatal deaths). Data were not available from New South Wales and the Northern Territory (n = 1,721 perinatal deaths).



Notes

1. Data for this figure are in Table 4.1 and Table D11.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital territory (n = 4,344 perinatal deaths).
3. Data were not available from New South Wales and the Northern Territory (n = 1,721 perinatal deaths).

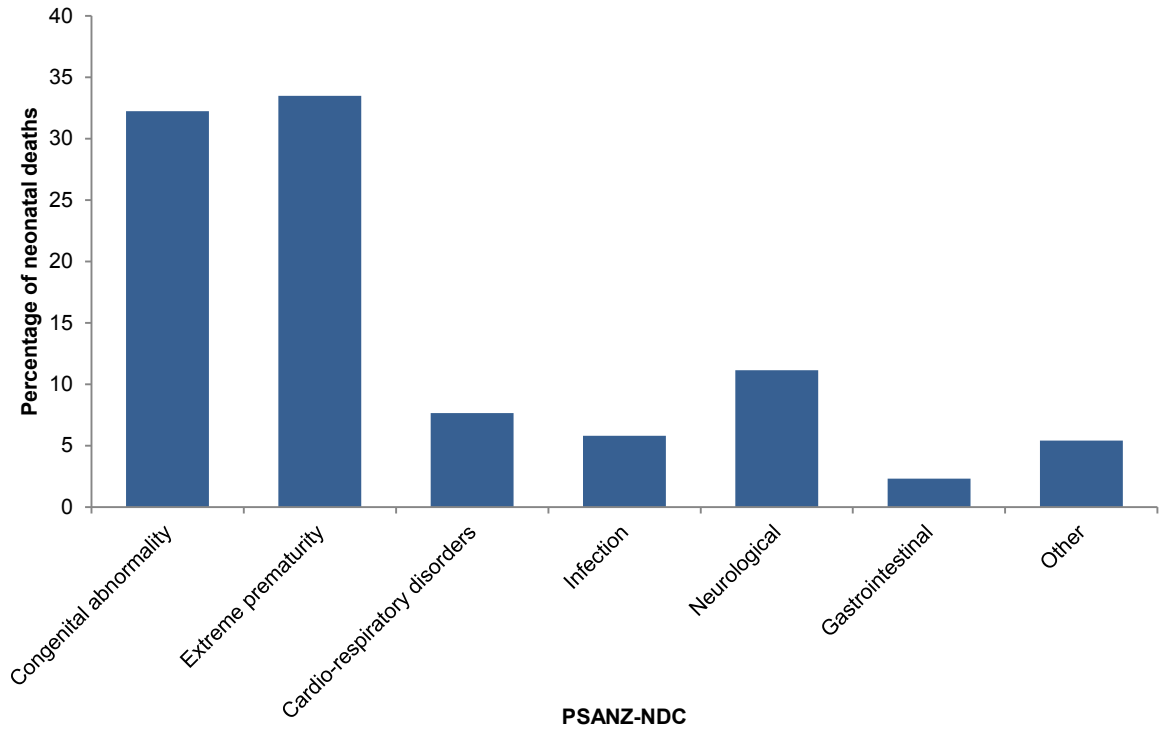
Figure 4.1: Summary of Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths, selected jurisdictions 2011–2012

Table 4.2 and Figure 4.2 provide a summary of the PSANZ-NDC for 1,033 neonatal deaths. In the case of neonatal deaths, in addition to the PSANZ-PDC classification, the PSANZ-NDC classifies the single most important factor present during the neonatal period that contributed to the death. Extreme prematurity followed by congenital abnormality were the most common PSANZ-NDC categories for cause of neonatal deaths (33.5% and 32.2% of neonatal deaths) (Table 4.2 and Figure 4.2).

Table 4.2: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths, selected jurisdictions 2011–2012[(a)]

PSANZ Neonatal Death Classification	No.	%
Congenital abnormality	333	32.2
Extreme prematurity	346	33.5
Cardio-respiratory disorders	79	7.6
Infection	60	5.8
Neurological	115	11.1
Gastrointestinal	24	2.3
Other	56	5.4
Not stated	20	1.9
Total	**1,033**	**100.0**

(a) Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths). Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).



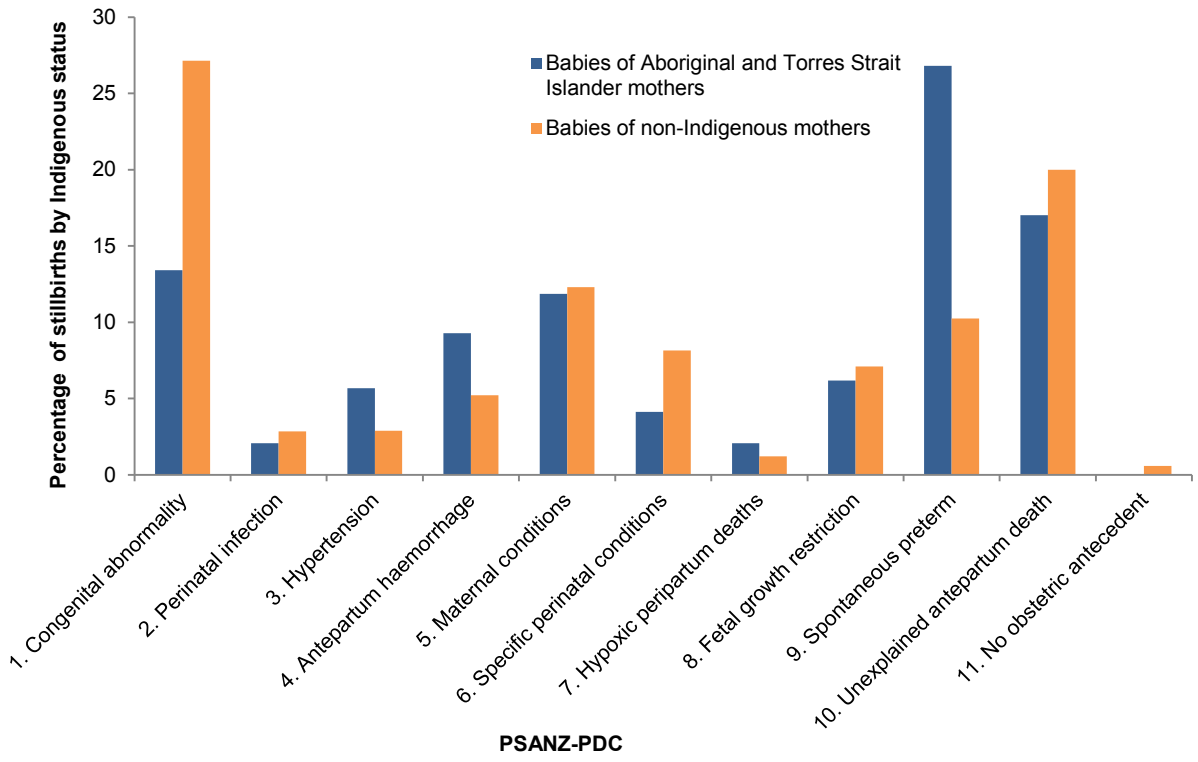
Notes

1. Data for this figure are in Table 4.2.
2. Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths).
3. Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Figure 4.2: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths, selected jurisdictions 2011–2012

PSANZ-PDC and maternal Indigenous status

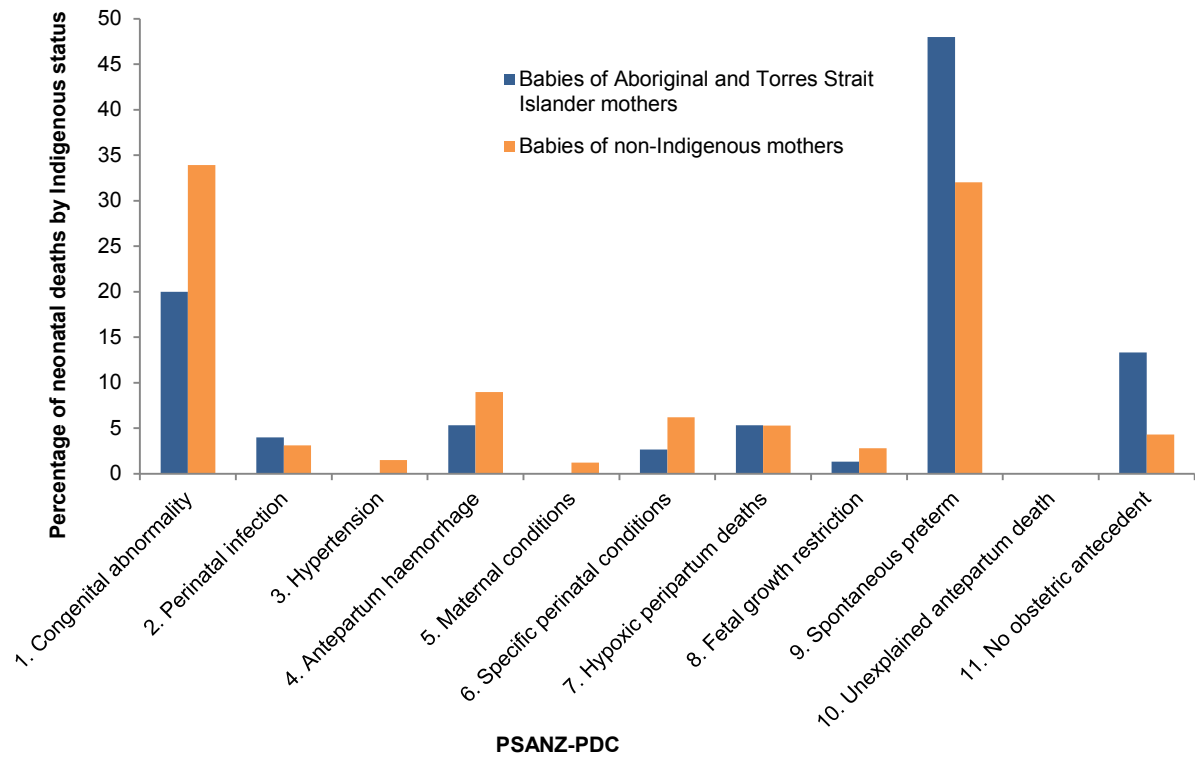
The leading cause of perinatal mortality differed depending on the Indigenous status of the mother (figures 4.3 and 4.4). Spontaneous pre-term birth was the leading cause of stillbirth and neonatal death among babies of Aboriginal and Torres Strait Islander mothers (26.8% of stillbirths and 48.0% of neonatal deaths of babies of Aboriginal and Torres Strait Islander mothers). Congenital abnormality was the leading cause of stillbirth and neonatal death among babies of non-Indigenous mothers (27.1% and 33.9%). Note that the non-availability of data for New South Wales and the Northern Territory on PSANZ cause of death means that approximately 35% of Indigenous perinatal deaths and 28% of non-Indigenous perinatal deaths are excluded from the analysis.



Notes

1. Data for this figure are in Table D12.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory. The total number of stillborn babies of Aboriginal and Torres Strait Islander mothers in these jurisdictions was 194, and 3,055 were of non-Indigenous mothers.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.3: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths by maternal Aboriginal and Torres Strait Islander status, selected jurisdictions 2011–2012



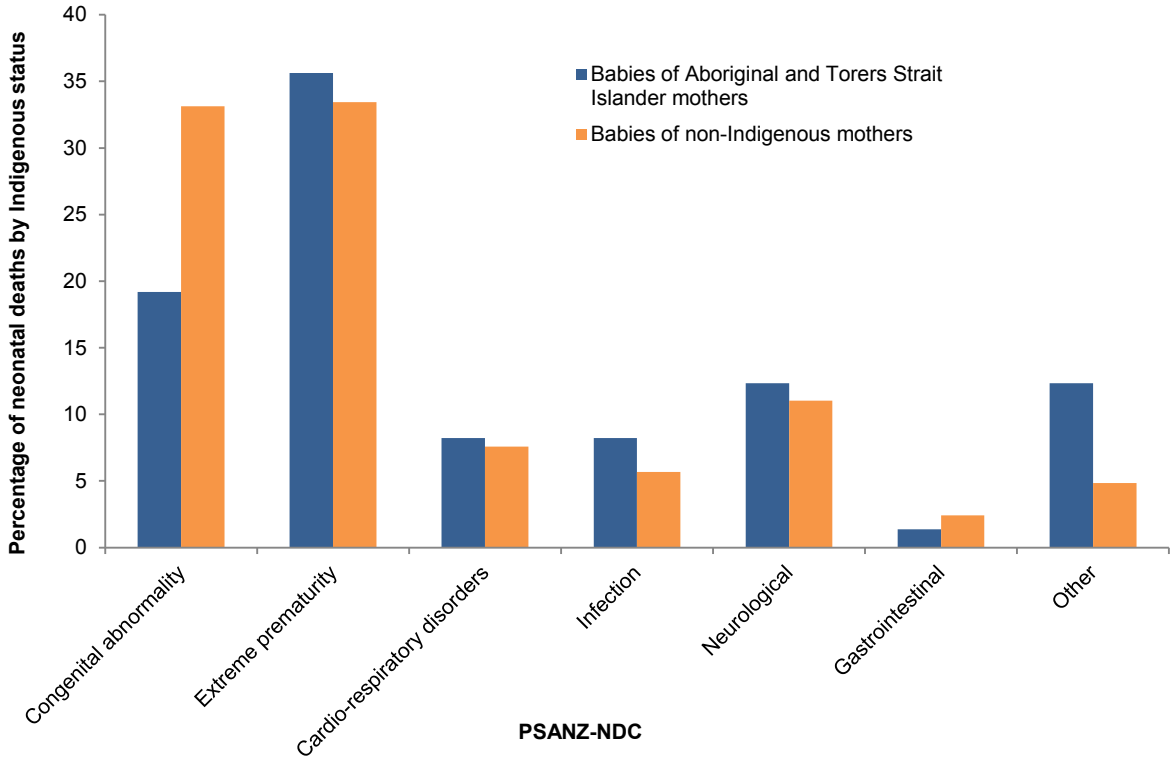
Notes

1. Data for this figure are in Table D12.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory. The total number of neonatal deaths of babies born to Aboriginal and Torres Strait Islander mothers was 75 and 1,002 neonatal deaths were of babies born to non-Indigenous mothers.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.4: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of neonatal deaths by maternal Aboriginal and Torres Strait Islander status, selected jurisdictions 2011–2012

PSANZ-NDC and maternal Indigenous status

Figure 4.5 presents causes of neonatal deaths as coded by the PSANZ-NDC. Extreme prematurity was the leading cause of neonatal deaths of babies of Aboriginal and Torres Strait Islander mothers (35.6% of all neonatal deaths of babies of Aboriginal and Torres Strait Islander mothers). Congenital abnormality and extreme prematurity were the leading causes of neonatal deaths of babies of non-Indigenous mothers (33.1% and 33.4%).



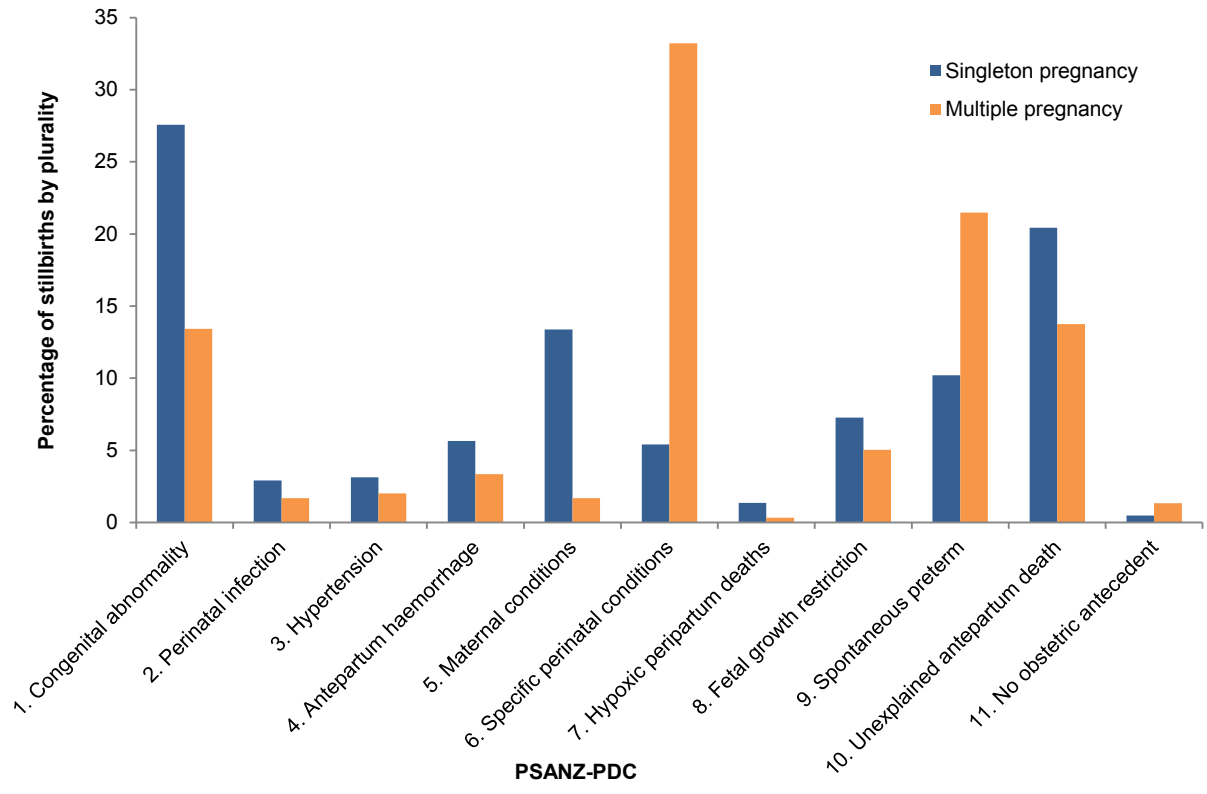
Notes

1. Data for this figure are in Table D13.
2. Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths). The total number of neonatal deaths of babies born to Aboriginal and Torres Strait Islander mothers in these jurisdictions was 73, and 951 neonatal deaths were of babies born to non-Indigenous mothers.
3. Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Figure 4.5: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by maternal Aboriginal and Torres Strait Islander status, selected jurisdictions 2011–2012

PSANZ-PDC and plurality

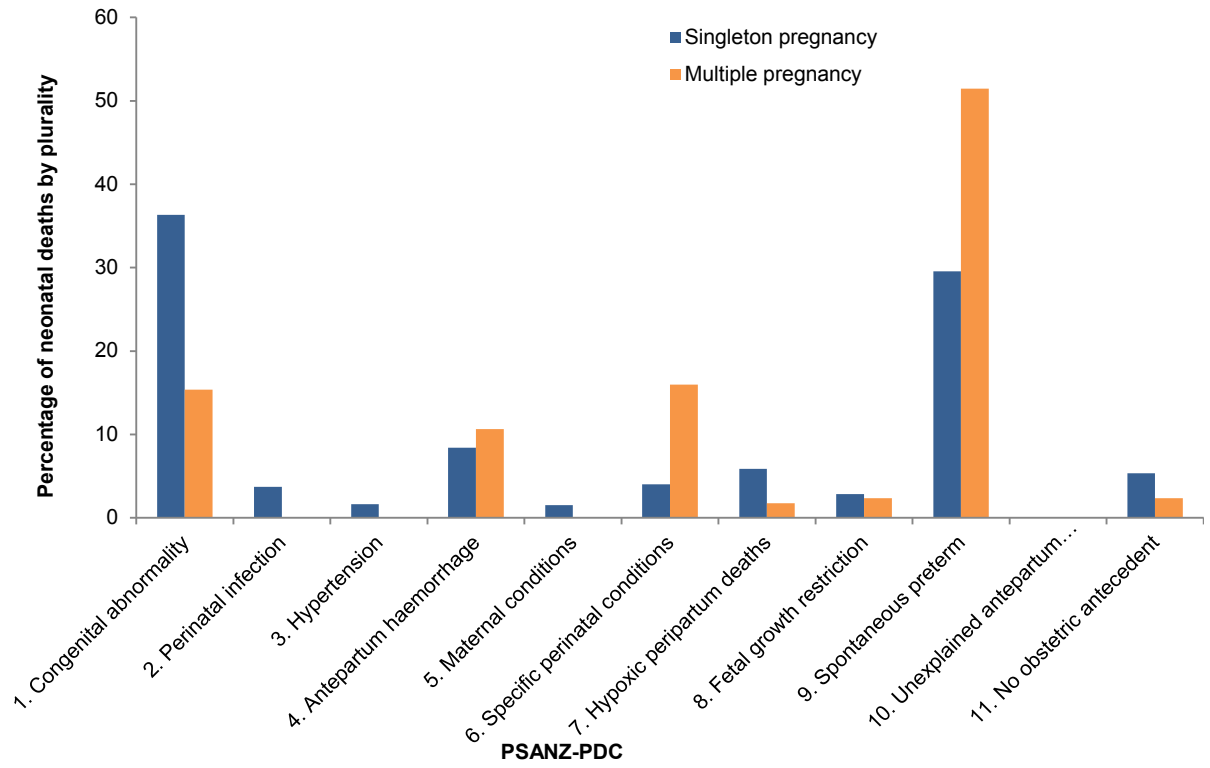
The leading cause of stillbirth among babies of a singleton pregnancy was congenital abnormality (27.6%), while the leading cause of stillbirth among babies of multiple pregnancies were specific perinatal conditions (33.2%) which includes twin-to-twin transfusion syndrome and uterine abnormalities (Figure 4.6). Congenital abnormality was the leading category for cause of death of singleton neonatal deaths (36.3%), while the leading cause of neonatal death among babies of multiple pregnancies was spontaneous pre-term birth (51.5%) (Figure 4.7).



Notes

1. Data for this figure are in Table D14.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.6: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths by plurality, selected jurisdictions 2011–2012



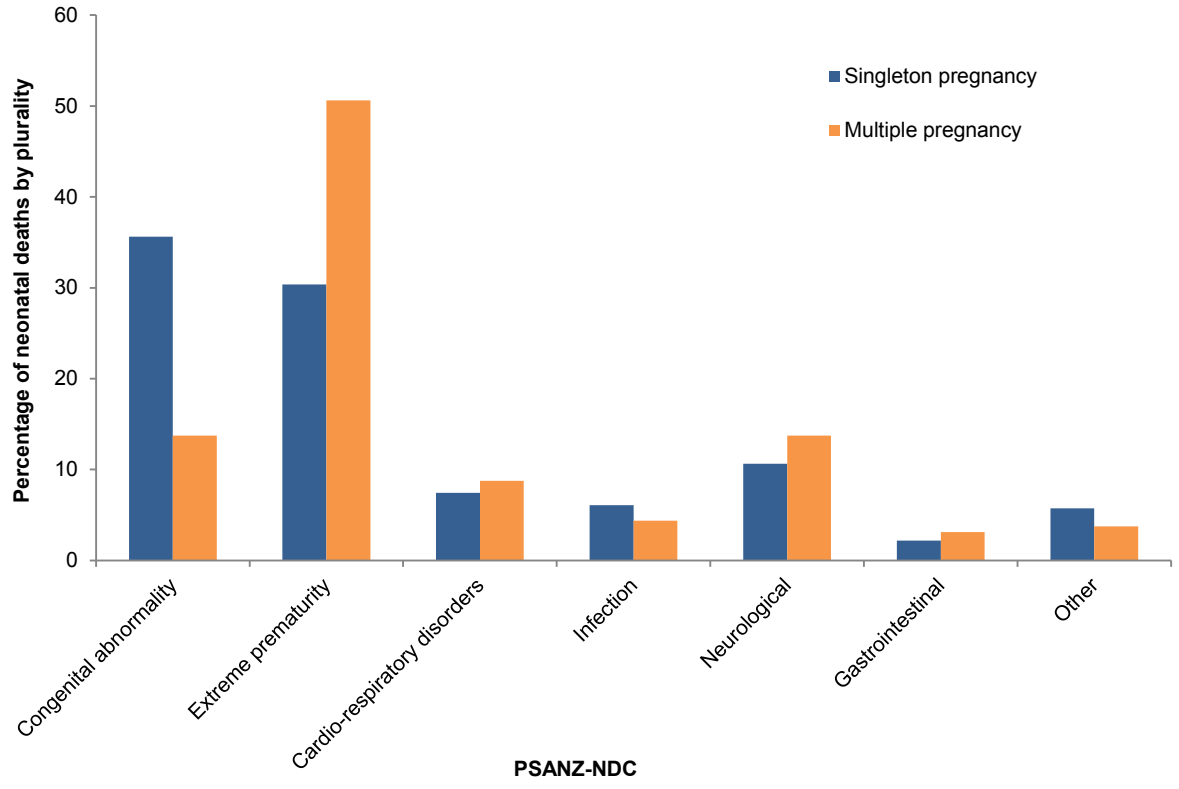
Notes

1. Data for this figure are in Table D14.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.7: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of neonatal deaths by plurality, selected jurisdictions 2011–2012

PSANZ-NDC and plurality

The PSANZ-NDC coding of cause of neonatal death reported the leading cause of neonatal death of babies of singleton pregnancies was congenital abnormality (35.6%) and extreme prematurity was the leading cause of neonatal death of babies of multiple pregnancies (50.6%) (Figure 4.8).



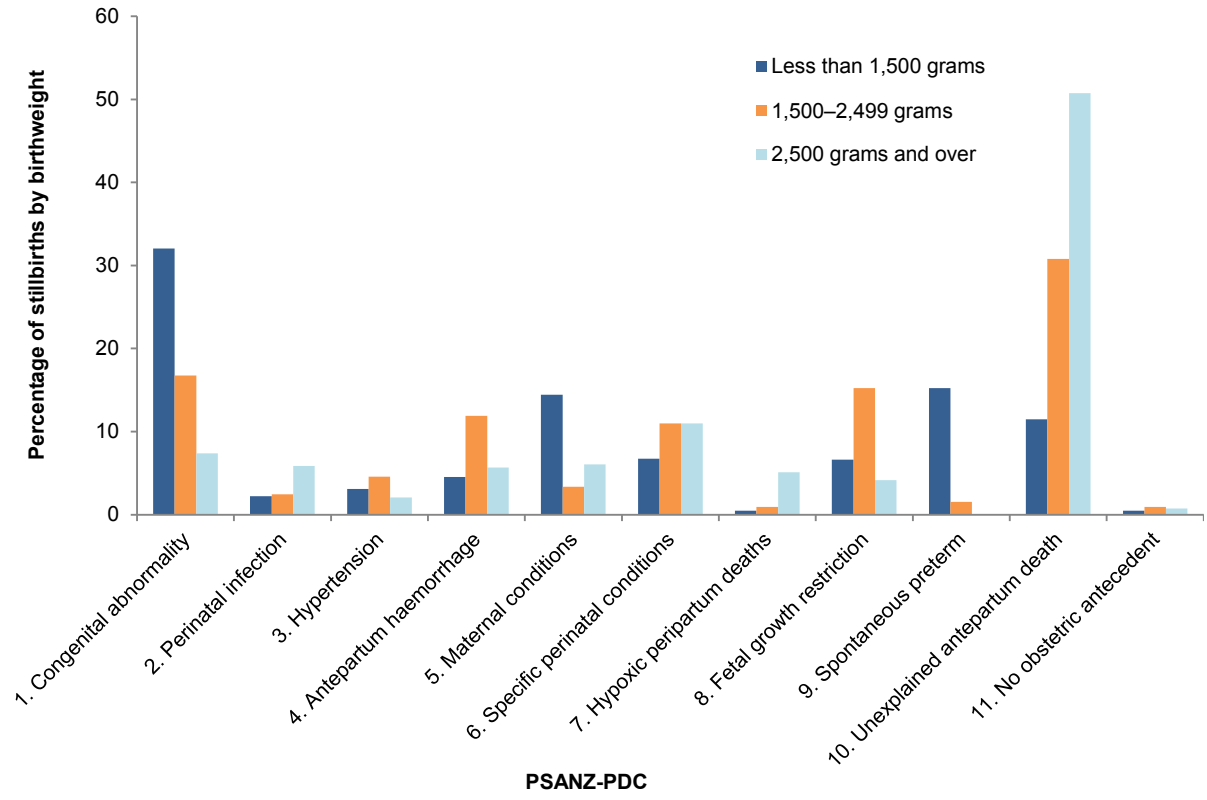
Notes

1. Data for this figure are in Table D15.
2. Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths).
3. Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Figure 4.8: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by plurality, selected jurisdictions 2011–2012

PSANZ-PDC and birthweight

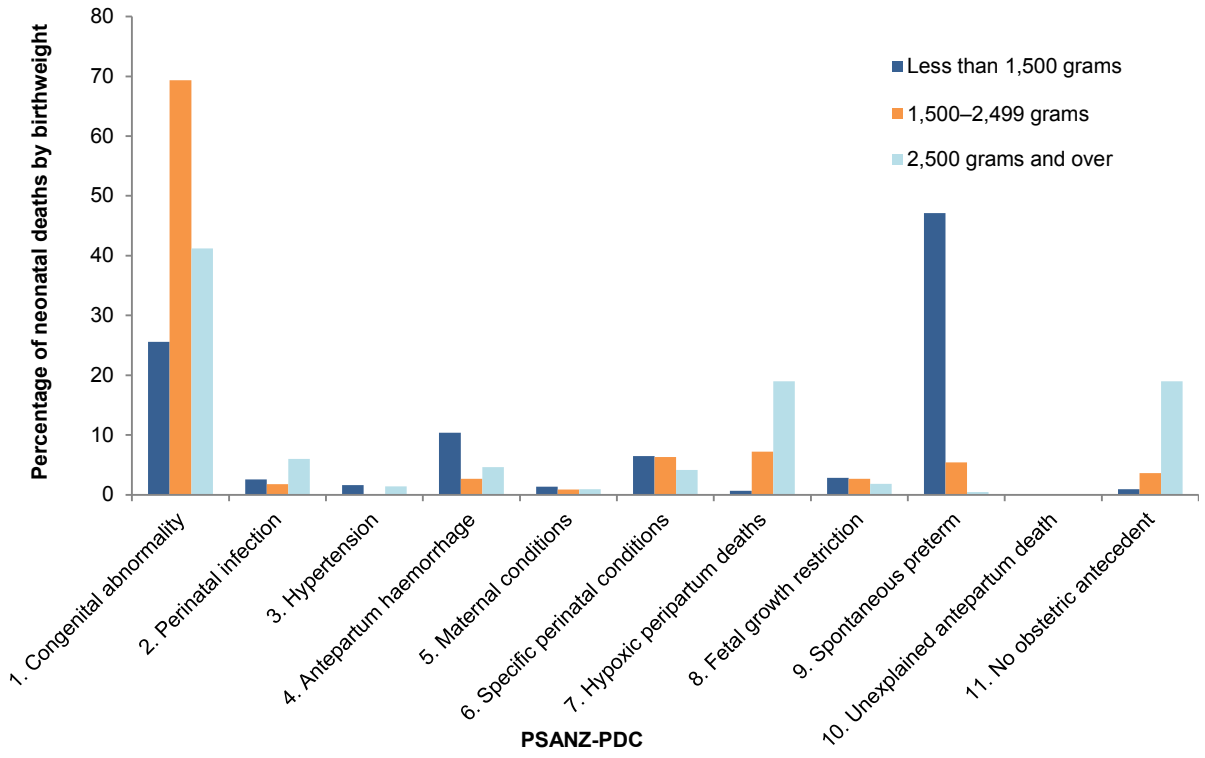
The leading cause of stillbirth for babies weighing less than 1,500 grams was congenital abnormality (32.0%) (Figure 4.9). The most common category for cause of stillbirth of babies weighing 1,500–2,499 grams and 2,500 grams and over at birth was unexplained antepartum death (30.8% and 50.8%). Spontaneous pre-term birth was the most common cause of neonatal death for babies weighing less than 1,500 grams (47.1%), while the leading cause of neonatal death of babies weighing 1,500–2,499 grams and 2,500 grams and over was congenital abnormality (69.4% and 41.2%) (Figure 4.10).



Notes

1. Data for this figure are in Table D16.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.9: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths by birthweight, selected jurisdictions 2011–2012



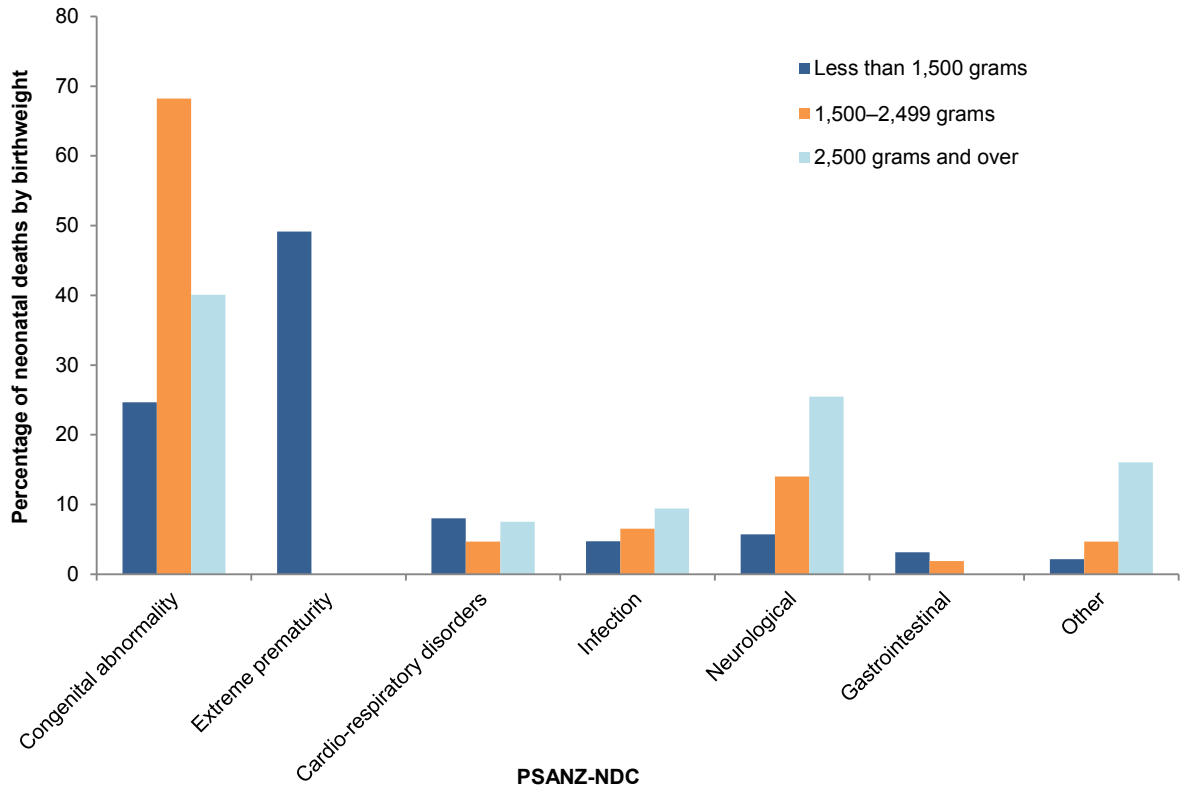
Notes

1. Data for this figure are in Table D16.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.10: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of neonatal deaths by birthweight, selected jurisdictions 2011–2012

PSANZ-NDC and birthweight

According to the PSANZ-NDC, the conditions in the neonate that were the most common cause of death for babies weighing less than 1,500 grams was extreme prematurity (49.1%), and the leading cause of neonatal death for babies weighing 1,500–2,499 grams and 2,500 grams and over at birth was congenital abnormality (68.2% and 40.1%) (Figure 4.11).



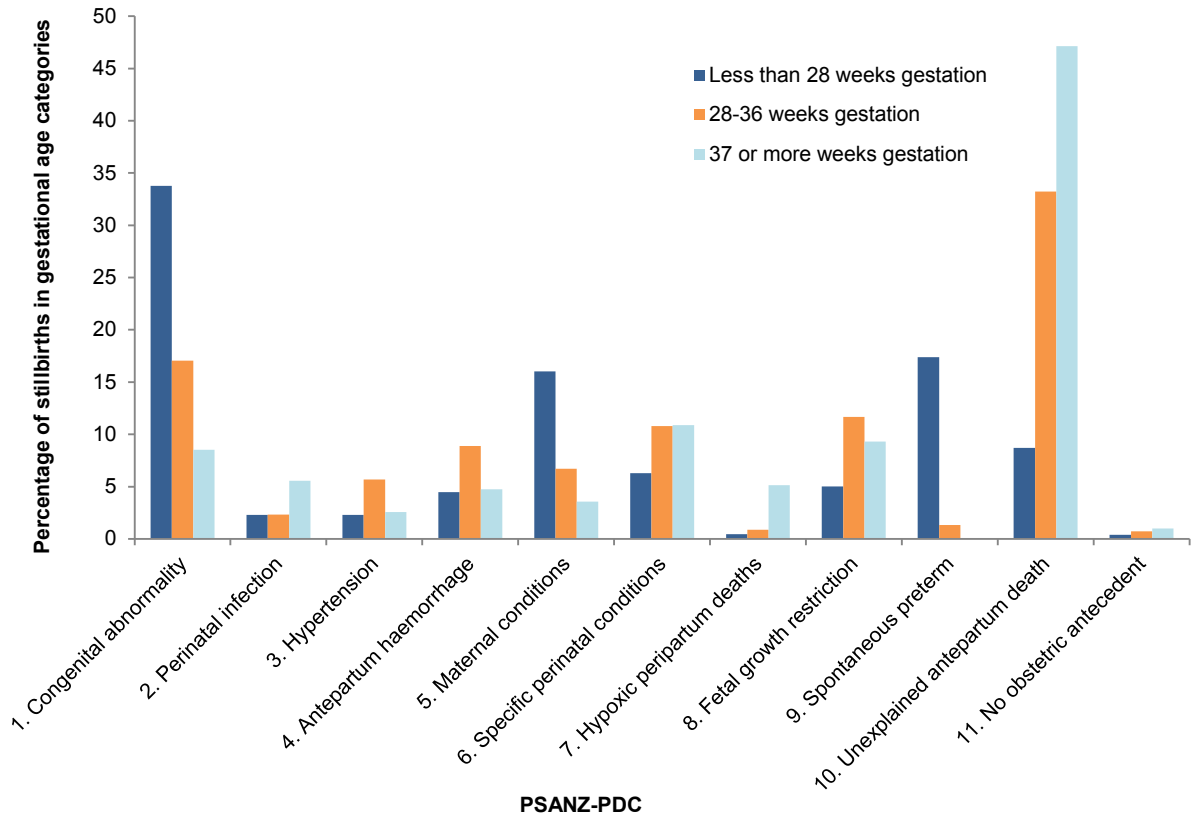
Notes

1. Data for this figure are in Table D17.
2. Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths).
3. Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Figure 4.11: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by birthweight, selected jurisdictions 2011–2012

PSANZ-PDC and gestation

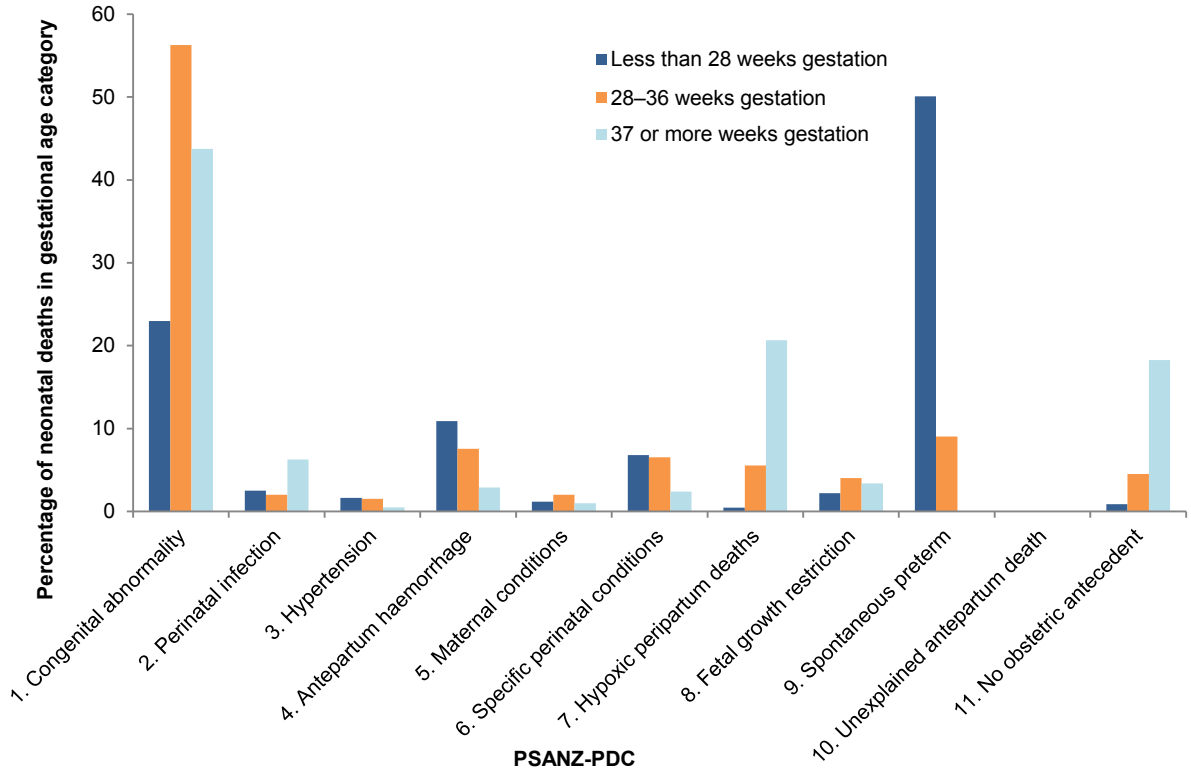
The leading cause of stillbirth for babies 18–27 weeks gestation at birth was congenital abnormality (33.8%), and the leading cause of stillbirth for babies 28–36 weeks and 37 weeks and over was unexplained antepartum death (33.2% and 47.1%) (Figure 4.12). The most common cause of neonatal death for babies born at 18–27 weeks gestation was spontaneous pre-term birth (50.1%), and congenital abnormality was the leading cause of neonatal death for babies whose gestational age was 28–36 and 37 weeks and over at birth (56.3% and 43.8%) (Figure 4.13).



Notes

1. Data for this figure are in Table D18.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.12: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths by gestation at birth (weeks), selected jurisdictions 2011–2012



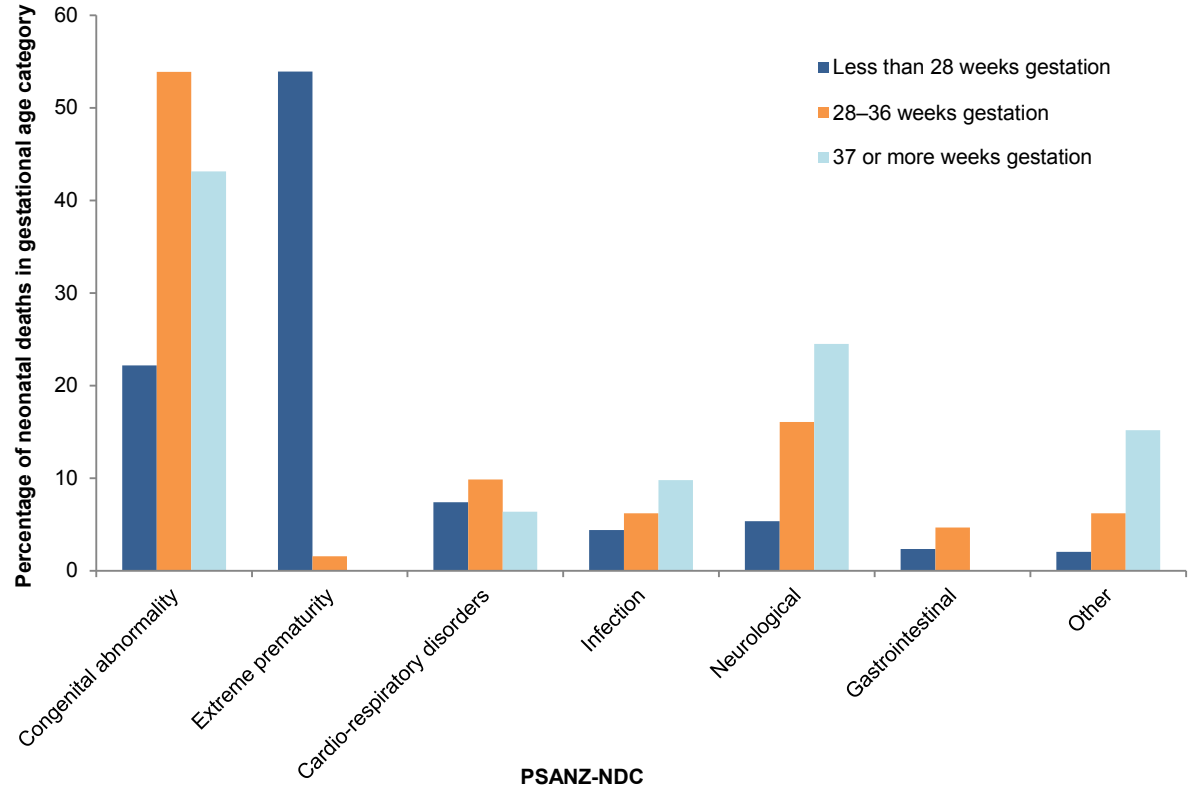
Notes

1. Data for this figure are in Table D18.
2. Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory.
3. Data were not available from New South Wales and the Northern Territory.

Figure 4.13: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of neonatal deaths by gestation at birth (weeks), selected jurisdictions 2011–2012

PSANZ-NDC and gestation

The most common category of conditions in the neonate for cause of neonatal death for babies less than 28 weeks gestation was extreme prematurity (53.9%) (Figure 4.14). The leading cause of neonatal deaths for babies 28–36 weeks gestation and babies 37 or more weeks gestation was congenital abnormality (53.9% and 43.1%).



Notes

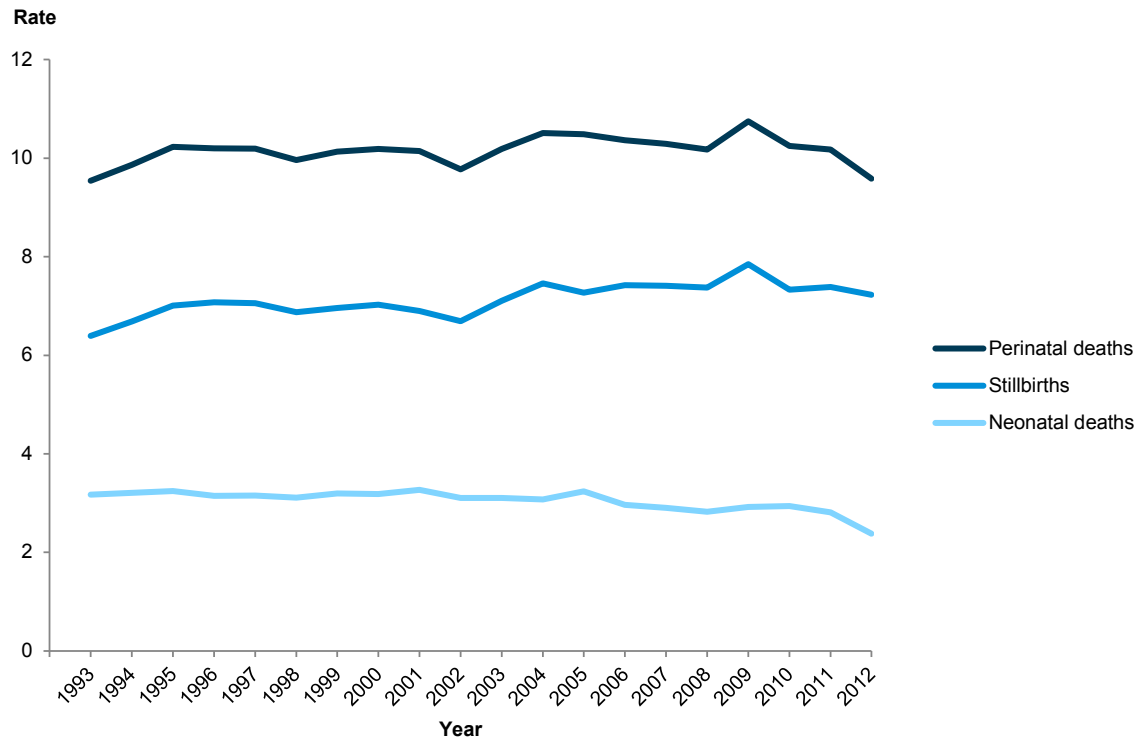
1. Data for this figure are in Table D19.
2. Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths).
3. Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Figure 4.14: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by gestation at birth (weeks), selected jurisdictions 2011–2012

5 Trends in perinatal mortality

This chapter outlines the trends in perinatal mortality, including stillbirths and neonatal deaths from 1993 to 2012 in Australia in relation to maternal age, parity, birth plurality, gestational age and maternal Indigenous status. Data quality for some data items may have changed over time so trends should be interpreted with caution. See the data quality statement in Appendix C for more information.

In the period 1993–2012, the overall rate of perinatal mortality remained fairly stable around 10 deaths per 1,000 births (Figure 5.1). There was a (27%) fall in the rate of neonatal mortality from 3.3 deaths per 1,000 live births in 2001 to 2.4 deaths per 1,000 live births in 2012. Within a similar time period, there was a 16% rise in the rate of stillbirth from 6.7 deaths per 1,000 births in 2002 to 7.8 deaths per 1,000 births in 2009, followed by a decline to 7.2 deaths per 1,000 births in 2012.



Notes

1. The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.
2. Neonatal death data were not available from Victoria in 2009. Therefore, these were imputed as the mean of 2008 and 2010 data.
3. The Australian Capital Territory reported no neonatal deaths in 1993. The average number of neonatal deaths each year in the Australian Capital Territory was 21. Because the potential missing neonatal deaths in the Australian Capital Territory in 1993 did not appear to adversely affect national numbers of neonatal deaths in 1993, the numbers were not imputed.
4. Data for this figure are in Table D20.

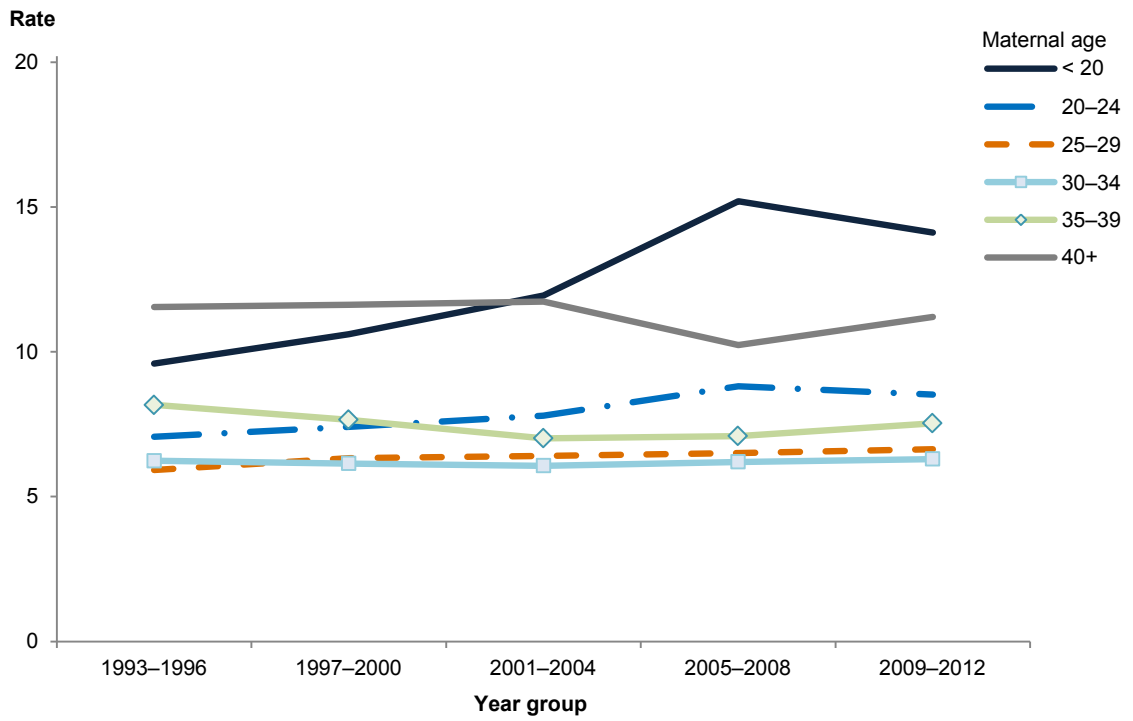
Figure 5.1: Stillbirth, neonatal and perinatal mortality rates, Australia, 1993–2012

5.1 Maternal age

Figure 5.2 shows the trends in stillbirth by maternal age. The babies of mothers aged under 20 showed an increase in rate of stillbirth between 1993 and 2012 (from 9.6 to 14.1 stillbirths per 1,000 births), and to a lesser extent babies born to mothers aged 20–24 (from 7.1 to 8.5 stillbirths per 1,000 births). There was a minimal increase in the rate of stillbirth for babies born to women aged 25–29 over the same time period, with little change in the older age groups.

Figure 5.3 illustrates the trends in neonatal death by maternal age between 1993 and 2012. There was a downward trend in neonatal mortality across all other age groups except for under 20 from 1993 to 2012, with the largest reduction seen among babies of mothers aged 40 and over (from 4.9 to 3.4 neonatal deaths per 1,000 live births).

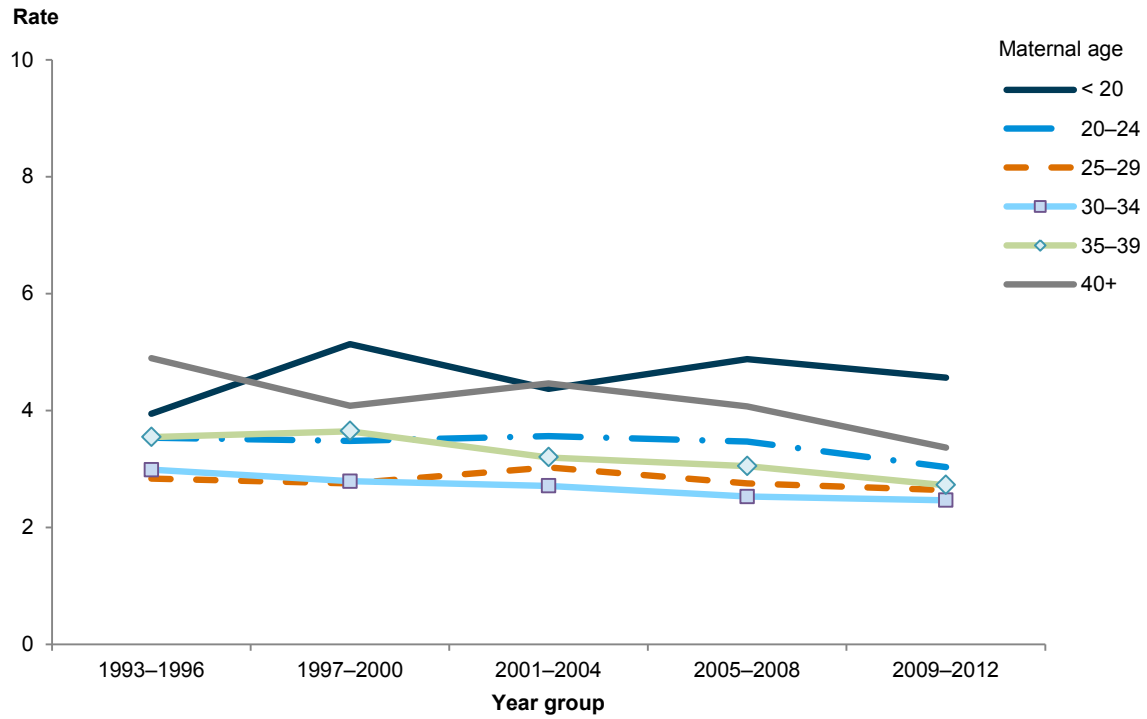
There were decreasing trends in rates of perinatal mortality between 1993 and 2012 for babies of mothers aged 30–34, 35–39 and 40 and over, with the overall reduction increasing as maternal age increased (Figure 5.4). The inverse was the case for babies of younger mothers (aged under 20 and 20–24), with an overall increase in the rate of perinatal mortality during the same time period.



Notes

1. The mothers of 1,561 babies born in 1993–2012 (n = 1,467 live births, n = 94 stillbirths, n = 6 neonatal deaths) had an unknown maternal age.
2. The rate is the number of deaths per 1,000 births (live births and stillbirths).
3. Data for this figure are in Table D23.

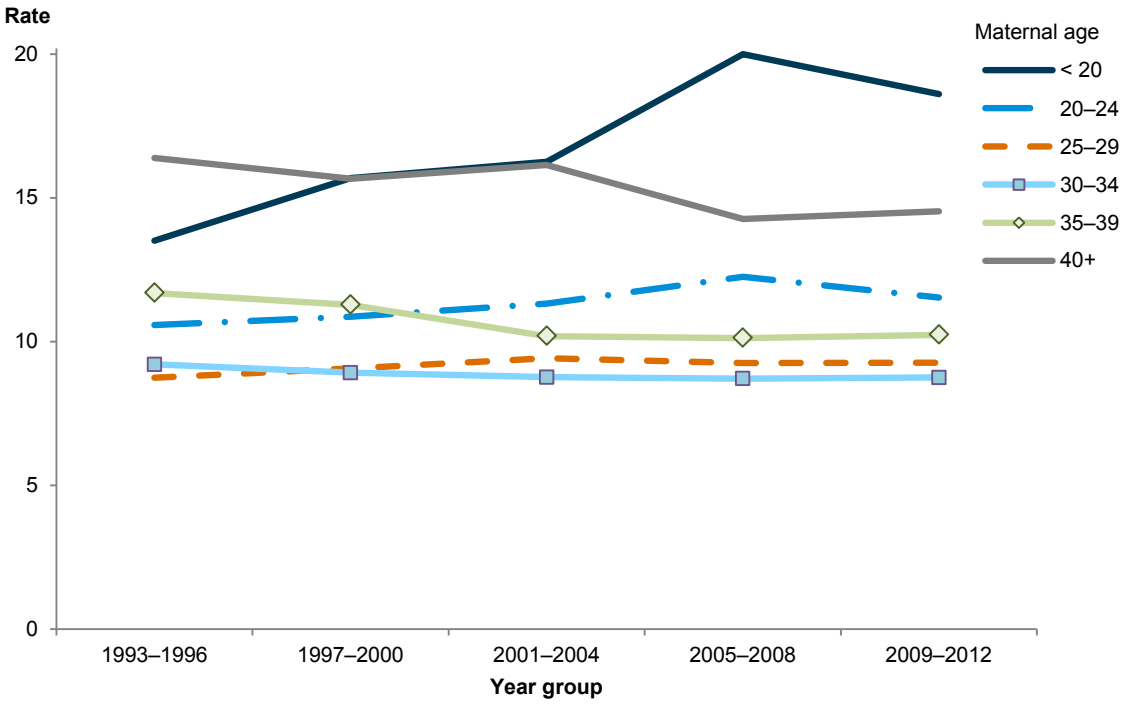
Figure 5.2: Trends in stillbirths by maternal age, Australia, 1993–2012



Notes

1. The mothers of 1561 babies born in 1993–2012 (n = 1,467 live births, n = 94 stillbirths, n = 6 neonatal deaths) had an unknown maternal age.
2. The rate is the number of deaths per 1,000 live births.
3. Data for this figure are in Table D23.

Figure 5.3: Trends in neonatal deaths by maternal age, Australia, 1993–2012



Notes

1. The mothers of 1,561 babies born in 1993–2012 (n = 1,467 live births, n = 94 stillbirths, n = 6 neonatal deaths) had an unknown maternal age.
2. The rate is the number of deaths per 1,000 births (live births and stillbirths).
3. Data for this figure are in Table D23.

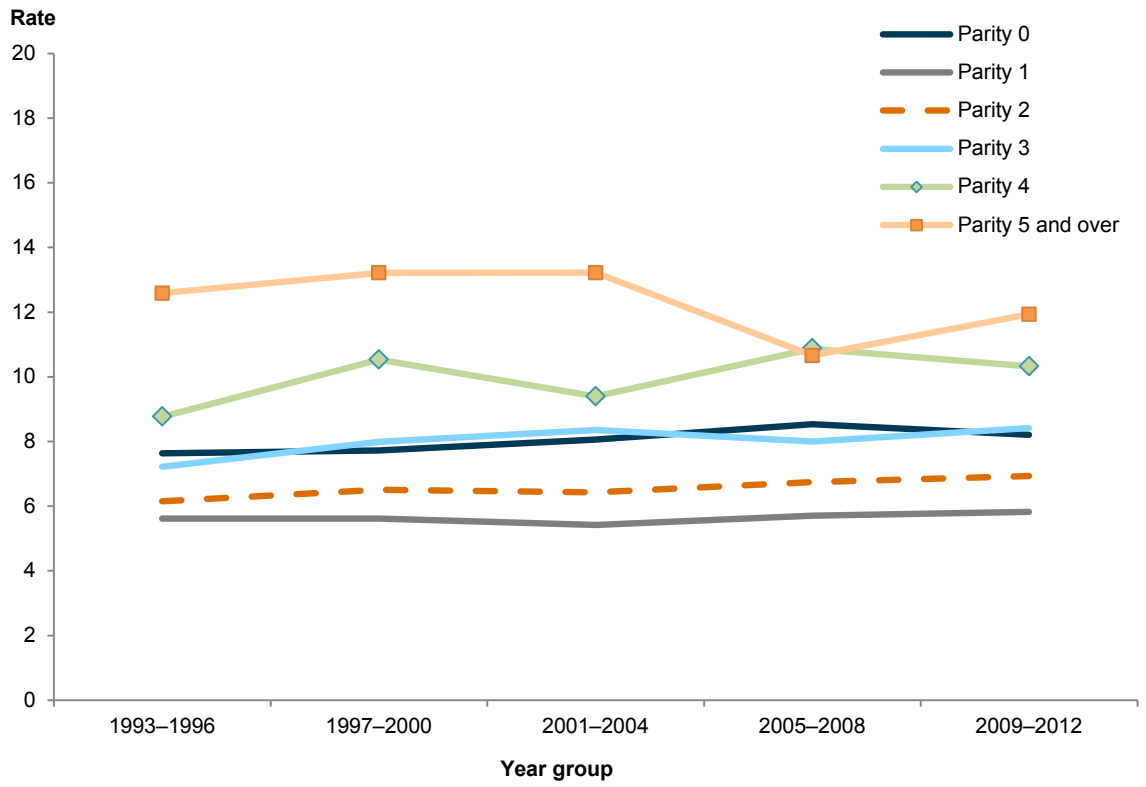
Figure 5.4: Trends in perinatal mortality by maternal age, Australia, 1993–2012

5.2 Parity

Figures 5.5, 5.6 and 5.7 show the trends in stillbirth, neonatal death and overall perinatal death by parity between 1993 and 2012.

There was a very slight increase in the rate of stillbirth for women in all parity groups, except for women with 5 or more previous births, with the largest increase in women with 4 previous births (8.8 increasing to 10.3 stillbirths per 1,000 births) (Figure 5.5). There was some fluctuation in the rate of stillbirth for women with 5 or more previous births, but the relatively small number of stillbirths in this category contributed to this fluctuation.

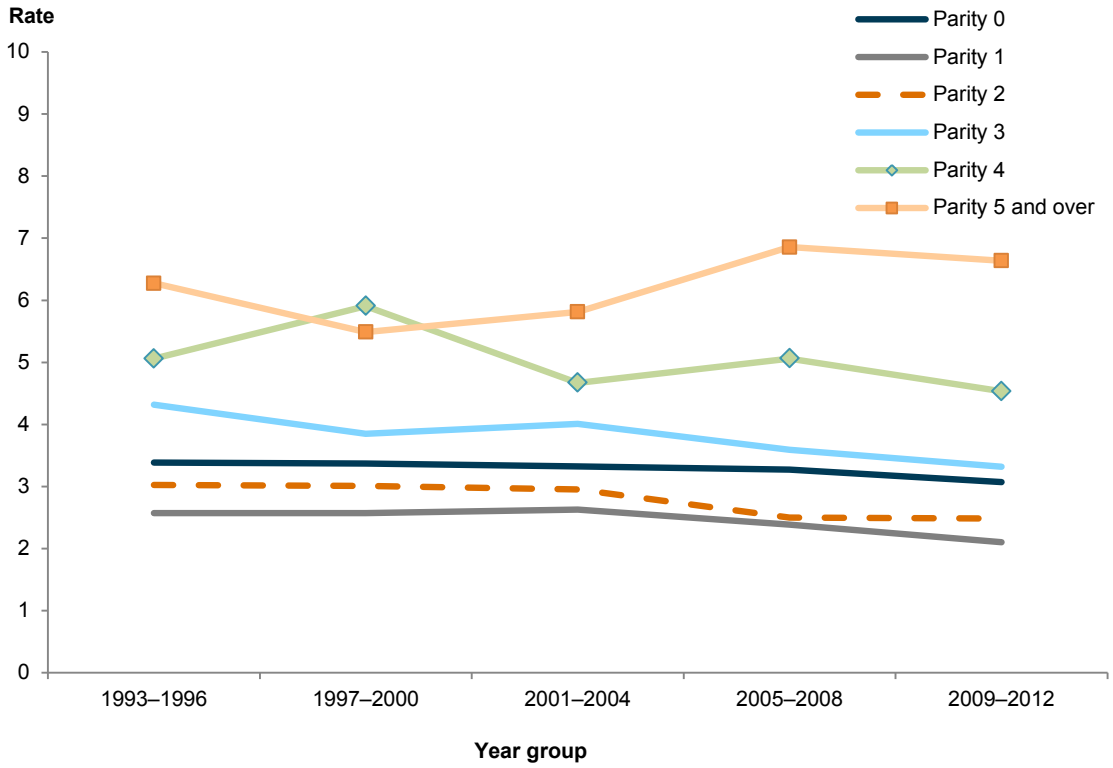
The opposite trend was seen for neonatal deaths, with most parity groups observing a very slight decrease in the neonatal mortality rate (Figure 5.6). However, there was considerable fluctuation in the rate of neonatal deaths to women with 4 or 5 or more previous births, with these last 2 groups also having a relatively small number of deaths, which can contribute to such fluctuations.



Notes

1. Data on parity were not available for Victoria 2009. The distribution of parity among total births, live births, still births and neonatal deaths were calculated for Victoria 2008 and 2010, and an average (mean) of these was calculated as an estimated distribution for 2009. The estimated numbers in each parity category in Victoria 2009 were then added to the respective category for the rest of Australia in 2009.
2. The parity of the mothers of 11,114 babies born in 1993–2012 (n = 10,885 live births, n = 229 stillbirths, n = 36 neonatal deaths) was unknown.
3. The rate is the number of deaths per 1,000 births (live births and stillbirths).
4. Data for this figure are in Table D24.

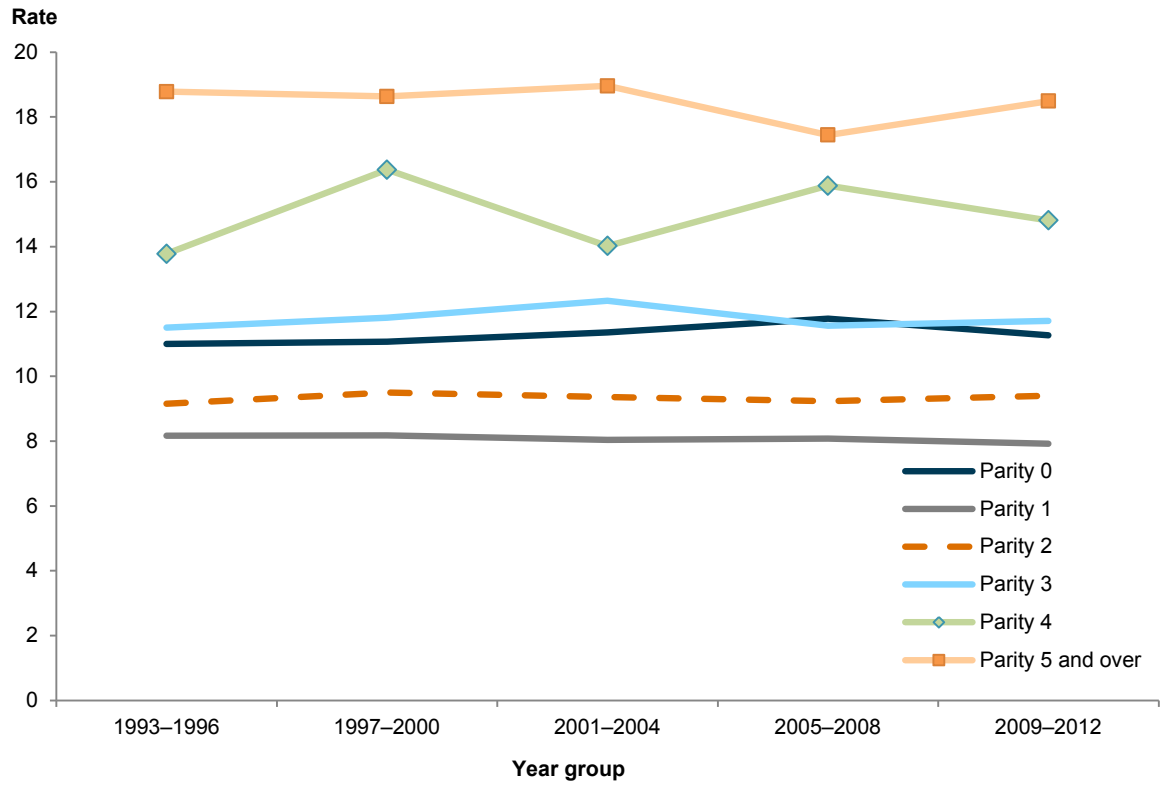
Figure 5.5: Trends in stillbirth by parity, Australia, 1993–2012



Notes

1. Data on parity were not available for Victoria for 2009. To accommodate this, the distribution of parity among total births, live births, stillbirths and neonatal deaths were calculated for Victoria in 2008 and 2010, with an average (mean) of these used as an estimated distribution for 2009. The estimated numbers in each parity category in Victoria for 2009 were then added to the respective categories for the rest of Australia in 2009.
2. The parity of the mothers of 11,114 babies born in 1993–2012 (n = 10,885 live births, n = 229 stillbirths, n = 6 neonatal deaths) was unknown.
3. The rate is the number of deaths per 1,000 births, (live births and stillbirths).
4. Data for this figure are in Table D24.

Figure 5.6: Trends in neonatal death by parity, Australia, 1993–2012



Notes

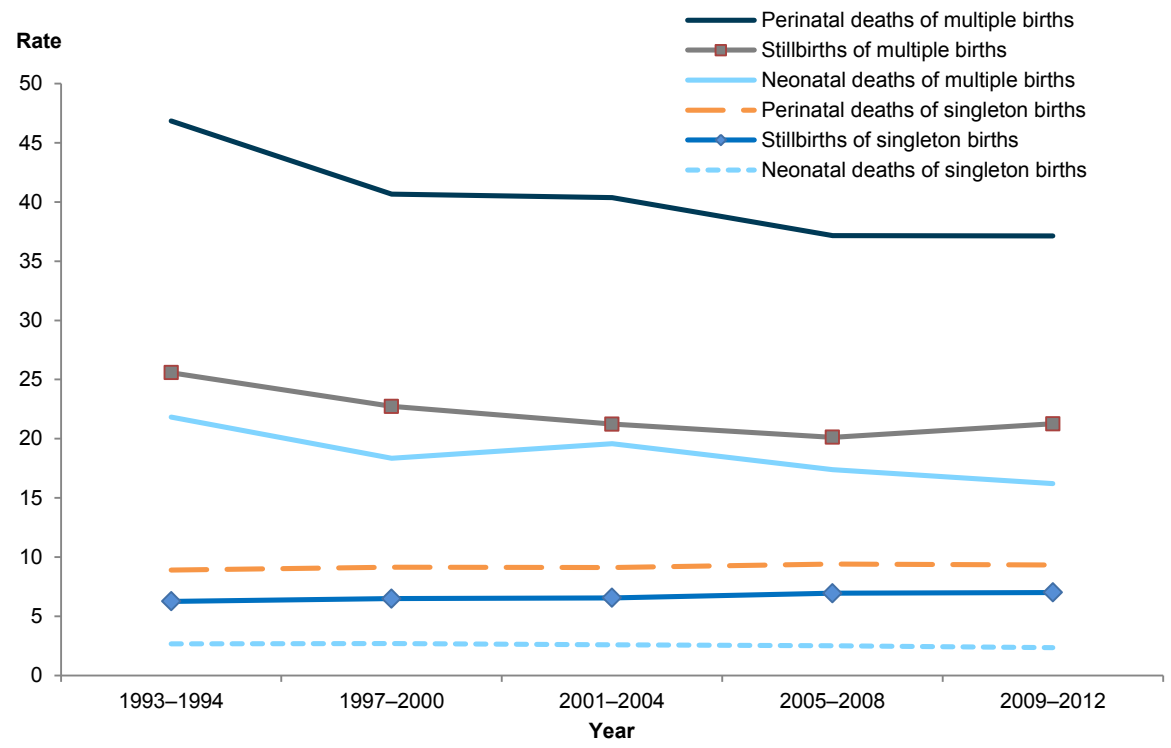
1. Data on parity were not available for Victoria for 2009. To accommodate this, the distribution of parity among total births, live births, stillbirths and neonatal deaths were calculated for Victoria in 2008 and 2010, with an average (mean) of these used as an estimated distribution for 2009. The estimated numbers in each parity category in Victoria for 2009 were then added to the respective categories for the rest of Australia in 2009.
2. The parity of the mothers of 11,114 babies born in 1993–2012 (n = 10,885 live births, n = 229 stillbirths, n = 36 neonatal deaths) was unknown.
3. The rate is the number of deaths per 1,000 births (live births and stillbirths).
4. Data for this figure are in Table D24.

Figure 5.7: Trends in perinatal mortality by parity, Australia, 1993–2012

5.3 Birth plurality

Figure 5.8 compares the trends in the stillbirth, neonatal death and perinatal mortality rates from 1993 to 2012 among babies born as singletons and multiple births (twins and high-order multiple births). There was a decline in perinatal deaths among multiple births during the period 1993–2008 (46.9 to 37.2 deaths per 1,000 births), with little appreciable change in 2009–2012. Although there was an overall decline in the rate of stillbirth for multiple births, there was a very slight rise for singletons from 6.9 deaths per 1,000 births in 2005–2008 to 7.0 in 2009–2012. There was some fluctuation in the rate of neonatal mortality for multiple births between 1993 and 2000, with a steady decline in the years 2005–2008 and 2009–2012.

For singleton births, the rates of perinatal mortality, stillbirth and neonatal deaths were substantially lower than those of multiple births. There was a small increase in the rate of stillbirth for singleton births between 1993 and 2012, and a small decrease in the rate of neonatal deaths.



Notes

1. The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.
2. Data for this figure are in Table D21.

Figure 5.8: Trends in stillbirth, neonatal deaths and perinatal mortality by plurality, Australia, 1993–2012

5.4 Gestational age

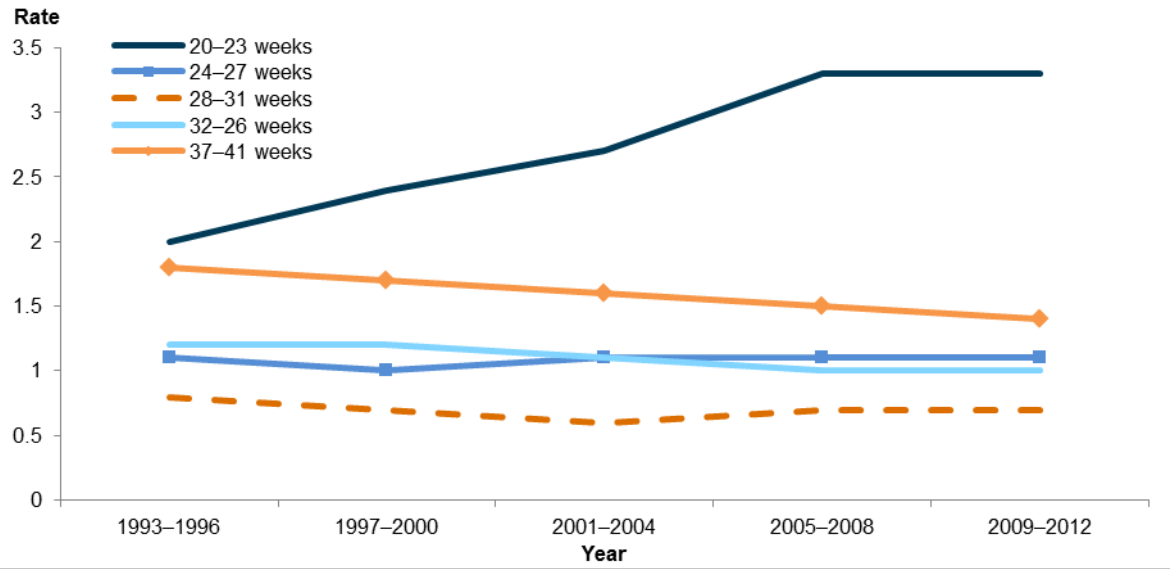
The fetuses-at-risk approach was used to calculate the gestational age-specific rates of perinatal mortality and stillbirth. This method is based upon the rationale that all babies who

reach a specific gestational age—whether born at that gestation or not—are at risk of perinatal mortality (not just those *born* at that specified gestation, as per the traditional method described by the perinatal mortality rate) (Joseph 2011). Further detail on the fetuses-at-risk approach can been found in 'Chapter 2 Definitions and methods'. The rate of neonatal deaths from 1993 to 2012 was calculated using the standard method: that is, the number of deaths per 1,000 births for a specified gestational age grouping, using live births as the denominator.

Between 1993 and 2012 there was an overall increase in gestation-specific risk of stillbirth for babies in utero at 20–23 weeks gestation and to a lesser extent for those babies in utero at 24–27 weeks (Figure 5.9). This increased risk at lower gestations may be due to an increase in TOP at these gestations. The magnitude of change in gestation-specific risk of stillbirth for other gestational groups was smaller, with a slight reduction for babies in utero at 32–26 and 37–41 weeks gestation.

Figure 5.10 shows the trends in neonatal deaths between 1993 and 2012. There was no discernible change in the rate of neonatal death over this time period for babies born at 20–23 weeks gestation. All other gestational groupings showed varying degrees of a reduction in the rate of neonatal death between 1993 and 2012, ranging from a 25% decrease for babies born at 37–41 weeks gestation to a 42% decrease for babies born at 28–31 weeks gestation.

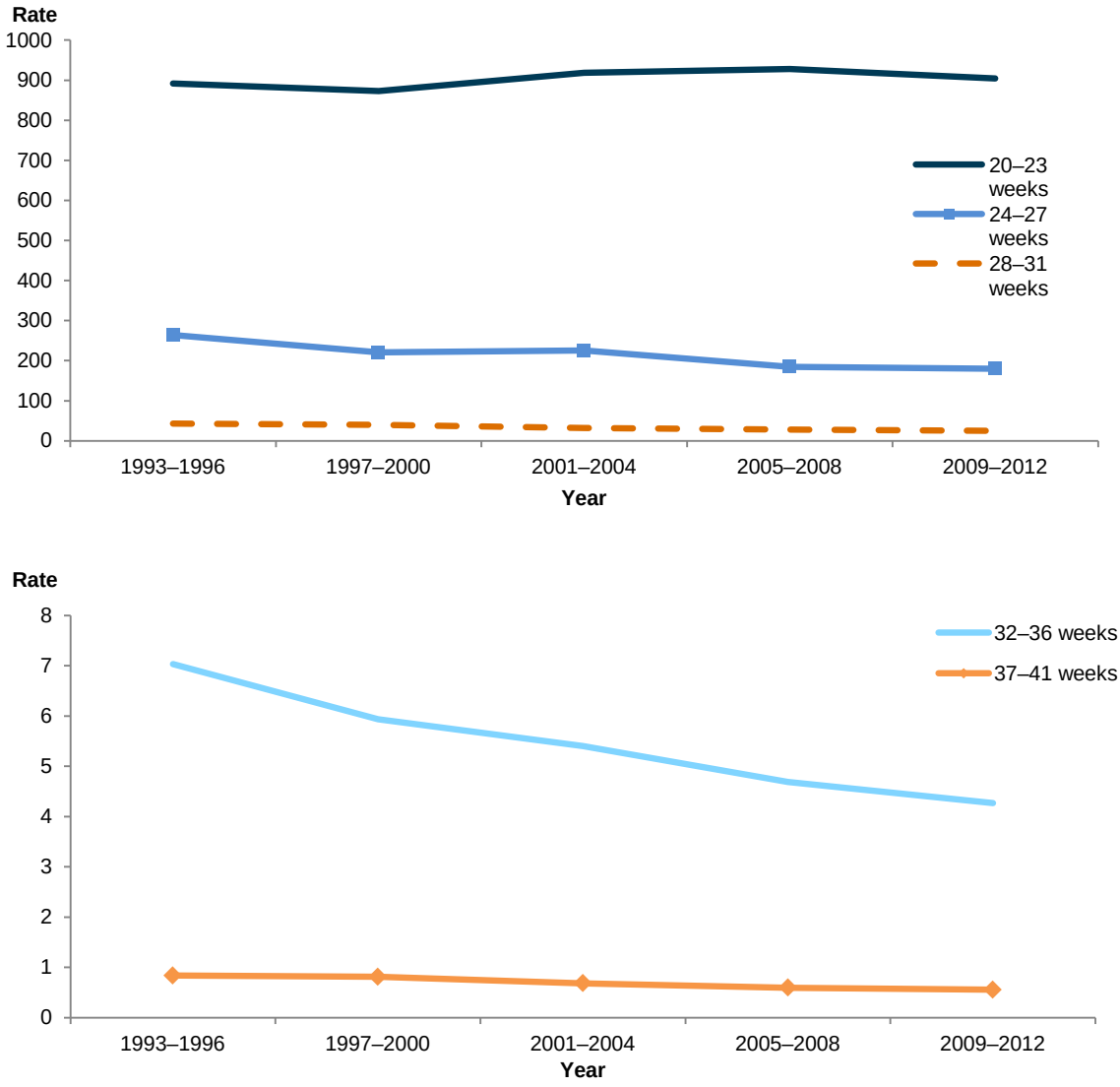
Overall, there were marginal downward trends in the risk of perinatal mortality for babies remaining in utero at 24–27, 28–31, 32–36 and 37–41 weeks gestation between 1993 and 2012 (Figure 5.11). There was a 59% increase in the risk of perinatal mortality for babies remaining in in utero at 20–23 weeks gestation between 1993 and 2008, after which there was no discernible change.



Notes

1. Babies 42 weeks and over (n = 197 stillbirths, n = 89 neonatal deaths, n = 86,164 live births and n = 86,361 total births) and those with unknown gestational age at birth (n = 155 stillbirths, n = 39 neonatal deaths, n = 86,164 live births and n = 4,632 total births) were excluded. Perinatal mortality rates are not presented for babies born at 42 weeks gestation and over due to small numbers in comparison with other gestational groups.
2. Includes 44 babies with a gestational age of <20 weeks.
3. The rate is calculated using the fetuses-at-risk (FAR) approach, by dividing the number of stillbirths occurring at a specified gestation by the number of babies born at or above the specified gestations (that is, 'fetuses at risk'), and multiplying the result by 1,000. The FAR calculation includes babies born at 42 weeks gestation and over, and excludes babies with unknown gestation at birth.
4. Data for this figure are in Table D22.

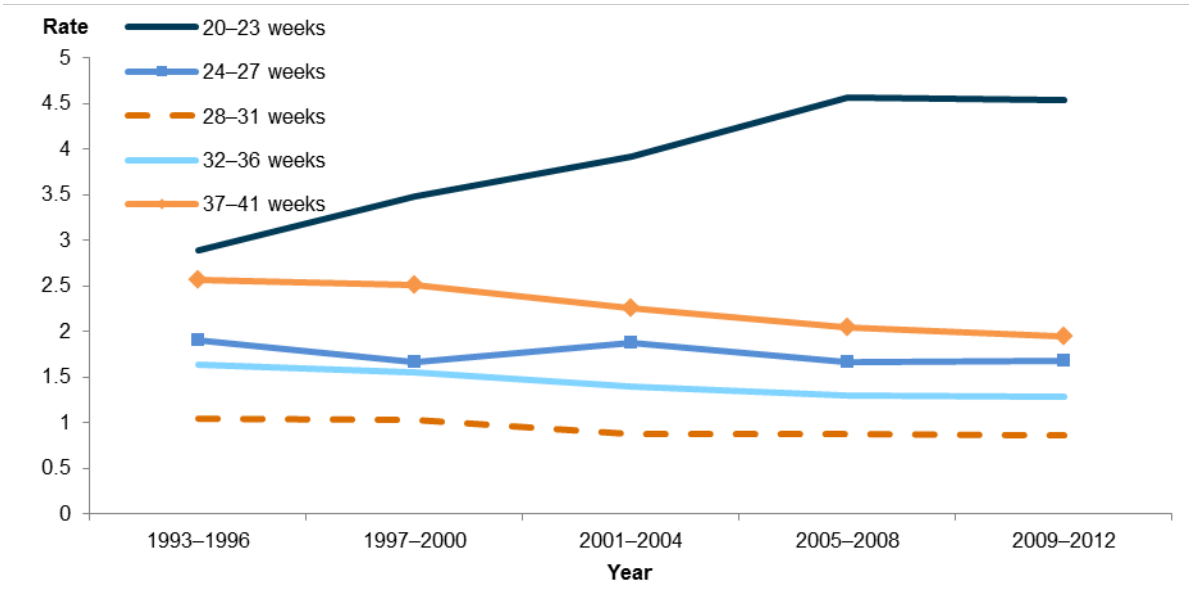
Figure 5.9: Trends in risk of stillbirth by gestational age at birth, Australia, 1993–2012



Notes

1. Babies 42 weeks and over (n = 197 stillbirths, n = 89 neonatal deaths, n = 86,164 live births and n = 86,361 total births) and those with unknown gestational age at birth (n = 155 stillbirths, n = 39 neonatal deaths, n = 86,164 live births and n = 4,632 total births) were excluded. Perinatal mortality rates are not presented for babies born at 42 weeks gestation and over due to small numbers in comparison with other gestational groups.
2. Includes 44 babies with a gestational age of <20 weeks.
3. The rate is the number of deaths per 1,000 births per specified gestational age grouping, using live births as the denominator.
4. Data for this figure are in Table D22.

Figure 5.10: Trends in neonatal death by gestational age at birth, Australia, 1993–2012



Notes

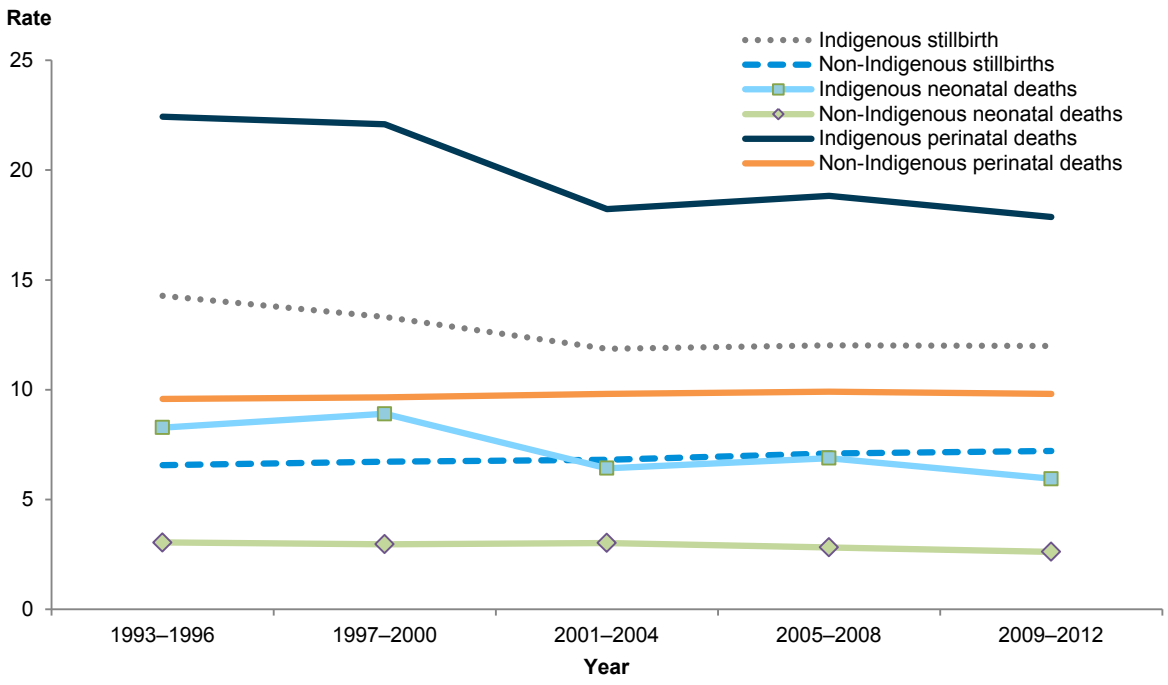
1. Babies 42 weeks and over (n = 197 stillbirths, n = 89 neonatal deaths, n = 86,164 live births and n = 86,361 total births) and those with unknown gestational age at birth (n = 155 stillbirths, n = 39 neonatal deaths, n = 86,164 live births and n = 4,632 total births) were excluded. Perinatal mortality rates are not presented for babies born at 42 weeks gestation and over due to small cell sizes in comparison with other gestational groups.
2. Includes 44 babies with a gestational age of <20 weeks.
3. The rate is calculated using the fetuses-at-risk (FAR) approach, by dividing the number of perinatal deaths occurring at a specified gestation by the number of babies born at or above the specified gestations (that is, 'fetuses at risk'), and multiplying the result by 1,000. The FAR calculation includes babies born at 42 weeks gestation and over, and excludes babies with unknown gestation at birth.
4. Data for this figure are in Table D22.

Figure 5.11: Trends in risk of perinatal death by gestational age at birth using fetus-at-risk approach, Australia, 1993–2012

5.5 Maternal Indigenous status

Figure 5.12 compares the trends in the rates of stillbirth, neonatal death and perinatal mortality between 1993 and 2012 of babies born to Indigenous and non-Indigenous mothers. It shows a marked decrease in the overall perinatal mortality rate among babies of Aboriginal and Torres Strait Islander mothers (from a rate of 22.4 to 17.9 deaths per 1,000 births) over the 20-year period. This decrease was experienced in both the rates of stillbirth and neonatal death, with the rate of stillbirth among babies of Aboriginal and Torres Strait Islander mothers in the period between 1993–1996 and 2009–2012 decreasing from 14.3 to 12.0 deaths per 1,000 births, and the rate of neonatal deaths decreasing by a similar amount (8.3 to 5.9 deaths per 1,000 births). Trends should be interpreted with caution because the quality of maternal Indigenous status data may have changed over time.

There was a marginal increase in the rate of stillbirth in 1993–2012 for babies born to non-Indigenous women (from 6.6 to 7.2 stillbirths per 1,000 births). The rate of neonatal death for babies born to non-Indigenous women remained relatively stable between 1993–1996 and 2001–2004 at 3.0 deaths per 1,000 live births, after which time it gradually decreased to a rate of 2.6 deaths per 1,000 live births in 2009–2012.



Notes

1. The Indigenous status of the mothers of 51,428 babies born in 1993–2012 (n = 50,819 live births, n = 609 stillbirths, n = 157 neonatal deaths) was unknown.
2. The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.
3. The rate of neonatal deaths of babies of Indigenous mothers in the years 1997–2000 (8.9 deaths per 1,000 babies) and the subsequent reduction in the rate of neonatal deaths in 2001–2004 may be related to the recording of neonatal deaths in the Northern Territory during this period. Specifically, the Northern Territory reported 64 neonatal deaths to Indigenous mothers in the year 2000, and 0 in years 2001 and 2002. It is possible that the 64 neonatal deaths in 2000 actually occurred during the period 2000–2002.
4. Data for this figure are in Table D25.

Figure 5.12: Trends in stillbirths, neonatal deaths and perinatal mortality by maternal Indigenous status, Australia, 1993–2012

6 Conclusion

This is the first comprehensive national report focusing on perinatal mortality, including stillbirths and neonatal deaths, in Australia. For the period 1993–2012, it shows a steady decrease in the rate of neonatal deaths and a small increase in the stillbirth rate. This resulted in a relatively stable overall perinatal mortality rate of 10 deaths per 1,000 live births in 1993–2012. While Australia remains one of the safest places to give birth and to be born, this report has highlighted that there are still disparities in the perinatal outcomes of mothers and babies from different population subgroups. Differences were observed based on the often interrelated factors of remoteness of mother's residence, socioeconomic status, mother's age, smoking status, body-mass index and Indigenous status.

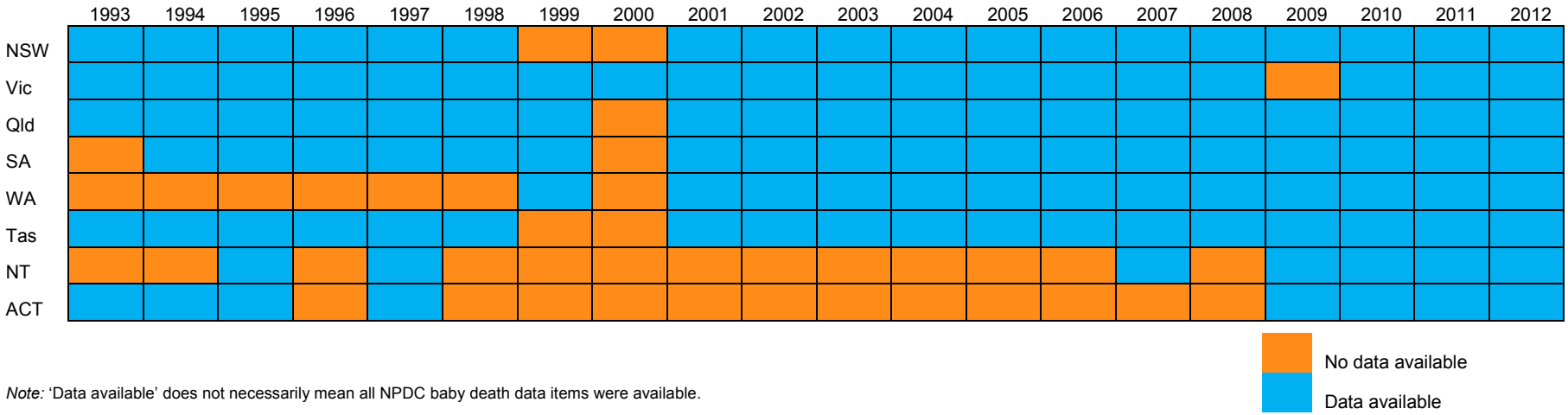
The perinatal mortality rate of babies born to women who identify as Aboriginal or Torres Strait Islander remains almost double that of babies born to non-Indigenous women (17.1 versus 9.6 deaths per 1,000 births in 2011–2012); however, the gap is reducing.

This report used the 'fetuses-at-risk' approach to calculate the gestational-specific rates of perinatal mortality, which provides a clearer indication of the gestational ages most at risk of perinatal mortality. This approach demonstrated that the risk of perinatal mortality was higher at both early (1.3 perinatal deaths per 1,000 fetuses at risk at 21 weeks) and late (4.5 at 42 weeks) gestations and remained relatively stable between 27 and 36 weeks.

For the period 2011–2012, the leading cause of stillbirth and neonatal death according to the PSANZ-Perinatal Mortality Classification system was congenital abnormality (26.3% and 33.1%) followed closely by unexplained antepartum death for stillbirths (19.8%) and spontaneous pre-term birth for neonatal death (33.0%). Classifying the cause of perinatal death correctly relies on the results of perinatal mortality investigation and audit. This includes the performing of autopsy for both stillbirths and neonatal deaths. In those jurisdictions that reported autopsy status, only 38.7% of perinatal deaths were known to have undergone an autopsy examination (42.3% of stillbirths and 28.2% of neonatal deaths). Under-investigation of perinatal deaths can result in more deaths being classified as 'unexplained'.

This is the first time that perinatal mortality has been the focus of such a detailed analysis at the national level in Australia and while it shows steady improvement in neonatal mortality rates over the past 20 years, it also indicates areas that require further investigation and attention.

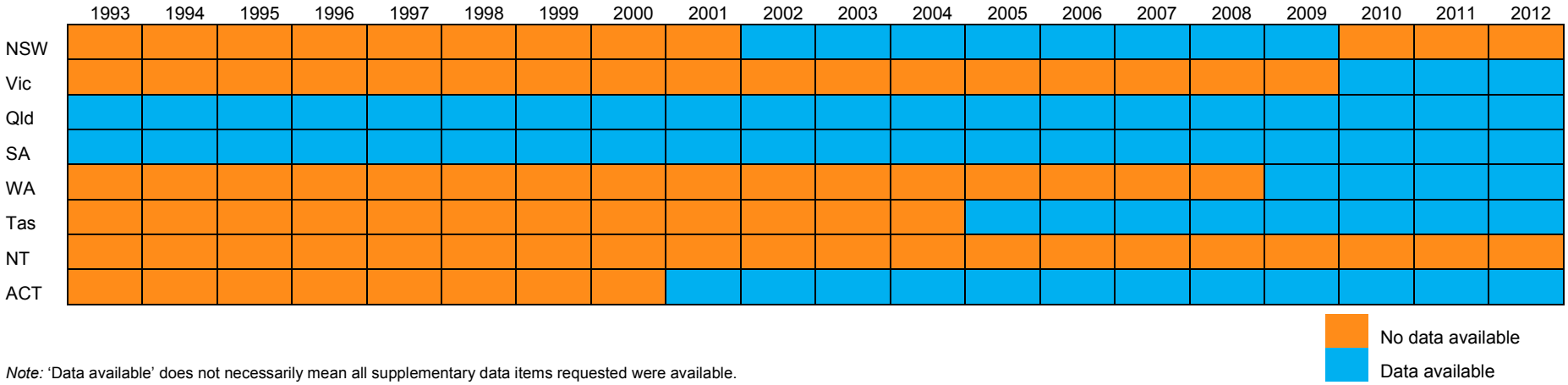
Appendix A: NPDC ‘Baby death’ data available for this report



Note: ‘Data available’ does not necessarily mean all NPDC baby death data items were available.

Figure A1: Ascertainment of NPDC baby death data by year and jurisdiction, available for *Perinatal deaths in Australia, 1993–2012*

Appendix B: Supplementary data available for this report



Note: 'Data available' does not necessarily mean all supplementary data items requested were available.

Figure B1: Ascertainment of supplementary death data by year and jurisdiction, available for *Perinatal deaths in Australia, 1993–2012*

Appendix C: The national perinatal mortality data collection data quality statement

Summary of key issues

- The death of a baby during pregnancy, birth or within 28 days of birth is a key indicator of the quality of maternity care.
- The perinatal mortality component of the National Perinatal Data Collection (NPDC) adds mortality data to the data collected at the time of birth. In other words, the NPDC has been updated with information collected after birth about babies who died within 28 days of birth.
- Care should be taken when comparing data in this publication with other available sources of information on perinatal deaths, such as the perinatal death data published by the ABS, which are sourced from state and territory Registrars of Births, Deaths and Marriages. Perinatal death data reported by the ABS are not directly comparable with the NPDC data reported in this report, which are sourced from midwives, and other staff, who collect information from mothers and perinatal administrative and clinical record systems (AIHW 2014).
- Data describing perinatal deaths is incomplete for some years and states for the period 1993–2012.
- Supplementary data obtained from state and territory perinatal mortality review committees have improved ascertainment of neonatal deaths that occur within each jurisdiction, but are not yet able to integrate neonatal deaths related to cross-border flows. Further, supplementary data have extended the range and improved the completeness of data items related to perinatal death.
- The integration of perinatal mortality data with birth data enables assessment of the outcomes of pregnancy and childbirth interventions, and of mothers, and the characteristics and outcomes of their babies.
- With the exception of stillbirth status at birth, perinatal mortality data items are voluntarily supplied.
- Perinatal deaths are rare events. Care is needed when considering perinatal mortality among small population subgroups.

Description

The NPDC is a national population-based cross-sectional data collection that collates information about pregnancy and childbirth provided annually by state and territory health authorities from jurisdictional perinatal data collections (PDCs). The NPDC holds annual birth data from 1991 onwards and includes a subset of data about stillbirths and neonatal deaths. Births in hospital and in the community are encompassed in the scope of the collection, which includes all live births and stillbirths of at least 400 grams birthweight or at least 20 weeks gestation. Also included in the collection are births following termination of pregnancy (TOP), although some jurisdictions may not record TOP for psychosocial reasons

as stillbirths (Donnolley & Li 2012). The NPDC also includes all babies from a multiple birth where at least 1 baby is in scope, thus can include fetus papyraceous or fetus compresses. Minor variations in jurisdictional provision of births at the lowest gestational ages and birthweights are detailed in NPDC annual reports and data quality statements (AIHW 2013).

The NPDC data are obtained from the birth hospital and may not include information about deaths that occur among babies who died after transfer to a different hospital or after discharge home.

Care should be taken when comparing data in this publication with other available sources of information on perinatal deaths, such as the perinatal death data published by the ABS, which are sourced from state and territory Registrars of Births, Deaths and Marriages. Perinatal death data reported by the ABS are not directly comparable with the NPDC data reported in this report, which are sourced from midwives, and other staff, who collect information from mothers and perinatal administrative and clinical record systems (AIHW 2014). The NPDC data are obtained from the birth hospital and may not include information about deaths that occur among babies who died after transfer to a different hospital or after discharge home.

Some states and territories provided 'Baby death' data obtained only from their PDC. Others augmented PDC data with data from other sources. The most common sources were multidisciplinary committees undertaking reviews of perinatal deaths and inpatient separations. This enabled some states and territories to include information about neonatal deaths that occurred after discharge or transfer from the birth hospital at the time annual updates for the NPDC were supplied. These sources also provided information about cause of death and autopsy status. Before 2000, cause of death was provided as International Classification of Diseases (WHO 2011) codes for the main maternal and main fetal cause of death, but, since 2002, most states and territories provided Perinatal Society of Australia and New Zealand (PSANZ) perinatal death classification (PSANZ-PDC) and neonatal death classification (PSANZ-NDC).

Data describing perinatal deaths is incomplete for some years and states. This is indicated in Figure A1 for NPDC 'Baby death' data for the period 1993–2012. In New South Wales, 'Baby death' data were not available in 1999 and 2000. In Victoria, only 2009 data were not available. In Queensland, only 2000 data were not available. In South Australia, data were not available in 1993 and 2000. In Western Australia, data were not available 1993 to 1998 (inclusive) and 2000. In Tasmania, data were not available in 1999 and 2000. In the Northern Territory, data were not available 1993 and 1994, 1996, 1998–2006, and 2008 (that is, data were available in 1995, 1997, 2007 and 2009–2012). In the Australia Capital Territory, data were not available in 1996 and 1998 to 2008 (inclusive).

There have been 2 ad hoc requests for supplementary data to update information about baby deaths in the NPDC. The first, in 2010 was requested from states and territories with missing PSANZ-PDC in preparation for the *Stillbirths in Australia, 1991–2009* report (AIHW: Hilder et al. 2014). The second request in 2014 was in preparation for the current report. This request was the first to specify that data should be sourced from jurisdictional perinatal mortality review committees. This request included new data items to better classify age at neonatal death, for timing of stillbirth, and PSANZ cause of neonatal death (PSANZ-NDC), but also provided a further opportunity to update missing baby death data in preparation for the current report.

Figure A2 describes the availability for supplementary death data in the period 1993–2012. In New South Wales, data were only available from 2002 to 2009. In Victoria and Western Australia, data were only available from 2010 to 2012. In Queensland and South Australia, data were available for the whole period 1993–2012. In Tasmania, data were available from 2005 to 2012. In the Australian Capital Territory, data were available in 2001 and 2012. In the Northern Territory, no supplementary data were available for the whole period 1993–2012.

Institutional environment

Between 1994 and 2013, the NPDC was managed by the National Perinatal Epidemiology & Statistics Unit (NPESU) (formerly the National Perinatal Statistics Unit), which was a collaborating unit of the Australian Institute of Health and Welfare (AIHW). Since 1997, the unit has been located at the University of New South Wales (UNSW). The NPESU undertakes national reporting of and research into reproductive and perinatal health in Australia. During 2013 and 2014, management of the NPDC transitioned to the data custodian, the AIHW. Between 2014 and 2016, the NPESU managed the process of updating the perinatal mortality component of the NPDC and production of perinatal mortality reporting under contract to the AIHW.

The AIHW is Australia's national agency for health and welfare statistics and information. The role of the AIHW is to provide information on Australia's health and welfare, through statistics and data development that informs discussion and decisions on policy and services.

The AIHW works closely with all state, territory and Australian Government health authorities in collecting, analysing and disseminating data. The AIHW is an independent statutory authority within the Health portfolio, and is responsible to the Minister for Health and Aged care. The AIHW is governed by a board, which is accountable to the Parliament of Australia through the Minister.

Timeliness

Perinatal mortality data for the NPDC has been provided annually with the core perinatal data supplied approximately 18 months after the end of each calendar year reference period. The majority of jurisdictions need at least 12 months lead time after the end of the data collection period to complete data processing. This does not always allow sufficient time to include data in the NPDC from perinatal mortality review committees or other sources.

Furthermore, not all states and territories were able to provide perinatal mortality data for the NPDC each year. The use of ad hoc data requests allowed for delays in completing reviews of perinatal deaths. Delays may have occurred if determination of the cause of death required coronial investigation or if there had been disruption to committee processes. In Queensland, reviewed data for cause of perinatal deaths from 2005 to 2009 were delayed and the committee in New South Wales that provided jurisdictional review of perinatal deaths has not been convened since 2012. More populous jurisdictions such as New South Wales may have been subject to additional processes to integrate perinatal mortality data with PDC birth data, which added to the lead time required for data supply.

Accessibility

Summary perinatal mortality data from the NPDC have been published in the AIHW *Australia's mothers and babies* report series, which is released in November/December each year. These are available in hard copy for a small cost, but can be downloaded without charge from the AIHW website.

The first dedicated report of perinatal mortality from the NPDC was for stillbirths, which are the major component of perinatal deaths, was *Stillbirths in Australia, 1991–2009* (AIHW: Hilder et al. 2014). This report, *Perinatal Deaths in Australia 1993–2012*, is the first comprehensive report on perinatal mortality data from the NPDC and includes neonatal deaths as well as stillbirths.

Interpretability

Perinatal mortality data have been included in the NPDC since its inception. Over this time there have been no changes in perinatal mortality definitions, which comply with those set out by the World Health Organization (WHO 2011). These are incorporated into metadata for the NPDC.

There have been progressive enhancements in the process of collecting and refining of information for the NPDC. The Perinatal National Minimum Dataset (PNMDS) was implemented in July 1998 to standardise data reported to the NPDC by states and territories. A program of national perinatal data development has led to improvements in data provision and reporting. A major review of the PNMDS was undertaken in 2005. Since then, an ongoing program of revision of existing metadata and development of new data items has expanded the PNMDS.

Data specifications and supporting metadata for the PNMDS are documented in the AIHW's online metadata repository (METeOR) available at: <http://meteor.aihw.gov.au/content/index.phtml/itemId/181162>.

Perinatal mortality data in the NPDC include information about vital status at birth (live birth or stillbirth), which is collected as part of PNMDS data supplied to the AIHW by state and territory health authorities. States and territories supplied NMDS data under the terms of the National Health Information Agreement available at: <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442475527>.

Information about the other perinatal mortality data supplied by state and territory health authorities for the NPDC are summarised in the 'Perinatal mortality' sub-section of the Maternity Information Matrix: <http://maternitymatrix.aihw.gov.au/>.

Supporting information on the use and quality of the NPDC data, including information about perinatal mortality data items are published annually in *Australia's mothers and babies* (Chapter 1), which is available in hard copy or on the AIHW website. Readers are advised to read caveat information to ensure appropriate interpretation of data. Metadata information for the NPDC are published in METeOR, the National health data dictionary and the Maternity Information Matrix.

Relevance

The death of a baby during pregnancy, birth or within 28 days of birth is a key indicator of the quality of maternity care. Perinatal mortality data have been obtained, where available, for all babies born in Australia. Most perinatal deaths occur before or soon after birth and are captured within jurisdictional PDCs. Enhancement of PDC and NPDC data with data obtained from perinatal mortality review collections adds information about perinatal deaths for babies born within each jurisdiction. These data are enhanced by the application of classifications for which standards have been nationally agreed (PSANZ-PDC and PSANZ-NDC) standardised and clinically relevant systems for classifying cause of death (Flenady et al. 2009b). The Perinatal Society of Australia and New Zealand (PSANZ) developed these classifications, which are supported by guidelines to enable high-quality systematic approach to the investigation of perinatal deaths and facilitate comprehensive and comparable perinatal mortality information across Australia and New Zealand.

Data collected at birth for all babies have been updated with information obtained up to 28 days after birth from perinatal mortality review committees. Survival at least to 28 days can be inferred for babies whose records are not updated. The integration of perinatal mortality data with birth data is critical for their use as an indicator of the quality of care during pregnancy and childbirth.

Perinatal deaths are rare events. Care is needed when considering perinatal mortality among population subgroups. Robust results for small subgroups may not be feasible or require aggregation over time.

Accuracy

Stillbirth and neonatal death are well defined and well understood concepts. Live birth or stillbirth status has been included as a core item in the PNMDS from its inception in 1998. Reporting of neonatal death has not been standardised for the NPDC. Jurisdictional differences in the organisation of maternity services affect the proportion of babies who died after transfer or discharge from the birth hospital. This can result in differential ascertainment of neonatal deaths. These differences have been overcome largely by the inclusion of supplementary perinatal mortality data in the NPDC, as described above. Some differences remain because there is no mechanism to share information between jurisdictions for babies who are transferred after birth and die interstate.

Descriptive perinatal mortality data items, such as those included in the NPDC have not been standardised. Some, such as age at death or autopsy status use commonly understood definitions. Classifications of PSANZ cause of death standards have been nationally agreed (PSANZ-PDC and PSANZ-NDC) and are supported by guidelines (Flenady et al. 2009b).

Due to the rarity of perinatal and, particularly, neonatal deaths, true differences in perinatal mortality rates may be difficult to distinguish from statistical fluctuations. States and territories vary in their capacity to include neonatal deaths that occur outside the birth hospital. Until there is universal ascertainment of neonatal deaths, comparison of neonatal mortality rates between states and territories are not valid.

The NPESU and AIHW relied on jurisdictions to provide accurate data to the NPDC. Neither the AIHW nor NPESU had direct access to perinatal records to determine accuracy of the data provided. However, the NPESU and AIHW undertook validation upon receipt of data. Data received from states and territories were checked for completeness, validity and logical

errors. Potential errors were queried with jurisdictions, and corrections and resubmissions were made in response to amend these errors. The NPDC data have not been adjusted to account for possible data errors or to correct for missing data. However, when reporting trends in perinatal mortality presented in this report, data has been imputed to account for missing information about neonatal deaths from Victoria in 2009.

Coherence

The Australian Bureau of Statistics (ABS) and National Hospital Morbidity Database (NHMD) also provide perinatal mortality data for Australia. ABS is the official source of perinatal mortality statistics in Australia. The ABS compiles statistics and publishes reports on completed registrations of live births and perinatal deaths from data made available by the Registrars of Births, Deaths and Marriages in each state and territory from birth and death registration. The scope of the ABS perinatal mortality collection includes deaths among all live births, irrespective of gestational age at birth, and stillbirths of at least 400 grams, or at least 20 weeks gestation where birthweight is unknown. However, not all perinatal death registrations are completed. ABS reports are by registration year, not year of birth.

The NHMD includes information about neonatal deaths that occur in hospital. The NHMD is compiled from data supplied by the state and territory health authorities. It is a collection of electronic confidential summary records for separations (that is, episodes of care) in public and private hospitals in Australia. Because death is a singular event for each person, NHMD mortality data, unlike morbidity data, does not over-count persons. Deaths in the community will not be captured.

Methodological differences between ABS, NHMD mortality data and perinatal mortality data in the NPDC requires caution to be used when results are compared.

Rising stillbirth rates among births before 24 weeks gestation have been attributed to late TOP as a result of increased availability and uptake of screening for fetal abnormality in Australia (AIHW: Hilder et al. 2014). It has not been possible to identify stillbirths that resulted from TOP within the NPDC. Most will have cause of stillbirth attributed to congenital anomaly. However, reporting of cause of perinatal death remains incomplete.

Development of the NPDC for perinatal mortality reporting is relatively recent. New data items requested in 2014 are not generally available before 2010 and the availability of many perinatal mortality data items varies over time and between jurisdictions.

Definitions of some perinatal mortality risk factors varied over time and across jurisdictions. Methods used to report gestational age changed over the course of the collection. The original data item estimated gestational age from the date of the last menstrual period. This was superseded by the current standard that estimates gestational age based on the best available information, including ultrasound scans. Standardised data items for smoking during pregnancy were not added to the NPDC until 2010. Some variations between jurisdictions persist: for example, for women who gave birth in South Australia, smoking status includes women who quit before the first antenatal visit; in the Northern Territory smoking status was recorded at the first antenatal visit. Indigenous status of the baby was first available nationally from 2011. Prior to 1999, data for Indigenous status of the mother were substantially missing or unknown in some jurisdictions so non-Indigenous status could not be confirmed. Not all data items are complete across all time periods. Therefore trends over time and comparison across different jurisdictions should also be made with caution.

Appendix D: Data used in figures

Table D1: Stillbirths, neonatal deaths and perinatal deaths by age of mother, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Maternal age (years)	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
Less than 20	22,244	21,935	309	13.9	95	4.3	404	18.2
20–24	83,789	83,138	651	7.8	243	2.9	894	10.7
25–29	170,951	169,830	1,121	6.6	428	2.5	1,549	9.1
30–34	197,754	196,489	1,265	6.4	447	2.3	1,712	8.7
35–39	112,455	111,625	830	7.4	293	2.6	1,123	10.0
40–44	25,309	25,028	281	11.1	69	2.8	350	13.8
45 or more	1,458	1,433	25	17.1	4	2.8	29	19.9
Not stated	179	176	3	n.p.	1	n.p.	4	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births for the specified maternal age group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table D2: Stillbirths, neonatal deaths and perinatal deaths by parity of mother, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Parity	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
0	262,403	260,310	2,093	8.0	753	2.9	2,846	10.8
1	204,551	203,431	1,120	5.5	400	2.0	1,520	7.4
2	88,143	87,542	601	6.8	213	2.4	814	9.2
3	31,030	30,756	274	8.8	100	3.3	374	12.1
4	11,933	11,808	125	10.5	46	3.9	171	14.3
5 or more	9,787	9,685	102	10.4	58	6.0	160	16.3
Not stated	6,292	6,122	170	n.p.	10	n.p.	180	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births for the specified parity groups. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table D3: Stillbirths, neonatal deaths and perinatal deaths by maternal age and parity, Australia 2011–2012

Maternal age (years)	Total births[a]	Total live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
Nulliparous women (parity = 0)								
Less than 20	18,610	18,378	232	12.5	79	4.3	311	16.7
20–24	46,886	46,516	370	7.9	131	2.8	501	10.7
25–29	84,190	83,595	595	7.1	226	2.7	821	9.8
30–34	75,128	74,597	531	7.1	190	2.5	721	9.6
35–39	30,433	30,160	273	9.0	104	3.4	377	12.4
40–44	6,577	6,494	83	12.6	23	3.5	106	16.1
45 or more	528	520	8	15.2	0	. .	8	15.2
Not stated	51	50	1	n.p.	0	. .	1	n.p.
Total	**262,403**	**260,310**	**2,093**	**8.0**	**753**	**2.9**	**2,846**	**10.8**
Multiparous women (parity = 1)								
Less than 20	3,229	3,191	38	11.8	14	4.4	52	16.1
20–24	26,058	25,892	166	6.4	75	2.9	241	9.2
25–29	52,926	52,672	254	4.8	91	1.7	345	6.5
30–34	72,185	71,823	362	5.0	125	1.7	487	6.7
35–39	41,446	41,221	225	5.4	77	1.9	302	7.3
40–44	8,313	8,242	71	8.5	17	2.1	88	10.6
45 or more	352	348	4	11.4	1	2.9	5	14.2
Not stated	42	42	0	. .	0	. .	0	. .
Total	**204,551**	**203,431**	**1,120**	**5.5**	**400**	**2.0**	**1,520**	**7.4**
Multiparous women (parity >1)								
Less than 20	338	333	5	14.8	2	6.0	7	20.7
20–24	10,599	10,521	78	7.4	37	3.5	115	10.9
25–29	32,690	32,456	234	7.2	110	3.4	344	10.5
30–34	47,989	47,647	342	7.1	127	2.7	469	9.8
35–39	38,766	38,451	315	8.1	109	2.8	424	10.9
40–44	9,949	9,833	116	11.7	29	2.9	145	14.6
45 or more	537	526	11	20.5	3	5.7	14	26.1
Not stated	25	24	1	n.p.	0	. .	1	n.p.
Total	**140,893**	**139,791**	**1,102**	**7.8**	**417**	**3.0**	**1,519**	**10.8**
Unknown parity								
Total	**6,292**	**6,122**	**170**	**n.p.**	**10**	**n.p.**	**180**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births for the specified maternal age group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table D4: Perinatal mortality by maternal BMI, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Maternal BMI (kg/m^2)	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
Less than 18.5	13,322	13,228	94	7.1	34	2.6	128	9.6
18.5–24.9	168,028	166,914	1,114	6.6	358	2.1	1,472	8.8
25–29.9	92,122	91,427	695	7.5	196	2.1	891	9.7
30–34.9	43,043	42,737	306	7.1	112	2.6	418	9.7
35–39.9	18,419	18,264	155	8.4	53	2.9	208	11.3
40 or more	10,636	10,536	100	9.4	28	2.7	128	12.0
Not stated	63,904	63,110	794	n.p.	305	n.p.	1,099	n.p.
Total	**409,474**	**406,216**	**3,258**	**8.0**	**1,086**	**2.7**	**4,344**	**10.6**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified smoking status group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Notes

1. Data on BMI not provided by New South Wales and the Northern Territory and have therefore been excluded from analysis.
2. Care must be taken when interpreting results, because the BMI source data and methods used for collection are not uniform across jurisdictions.

Table D5: Rates of perinatal mortality by gestational age, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Gestational age (weeks)	Total births[a]	Live births	No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
20[c]	749	139	610	814.4	139	1,000.0	749	1,000.0
21	795	189	606	762.3	189	1,000.0	795	1,000.0
22	664	216	448	674.7	213	986.1	661	995.5
23	623	241	382	613.2	185	767.6	567	910.1
24	579	339	240	414.5	124	365.8	364	628.7
25	604	427	177	293.0	85	199.1	262	433.8
26	641	503	138	215.3	62	123.3	200	312.0
27	688	567	121	175.9	29	51.2	150	218.0
28	924	814	110	119.0	45	55.3	155	167.8
29	973	870	103	105.9	25	28.7	128	131.6
30	1,244	1,155	89	71.5	19	16.5	108	86.8
31	1,662	1,565	97	58.4	21	13.4	118	71.0
32	2,539	2,441	98	38.6	29	11.9	127	50.0
33	3,649	3,549	100	27.4	28	7.9	128	35.1
34	6,275	6,170	105	16.7	31	5.0	136	21.7
35	9,854	9,730	124	12.6	29	3.0	153	15.5
36	19,202	19,056	146	7.6	51	2.7	197	10.3
37	44,558	44,396	162	3.6	51	1.2	213	4.8
38	119,882	119,687	195	1.6	62	0.5	257	2.1
39	164,707	164,535	172	1.0	56	0.3	228	1.4

(continued)

Table D5 (continued): Rates of perinatal mortality by gestational age, Australia 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Gestational age (weeks)	**Total births[a]**	**Live births**	**No.**	**Rate[b]**	**No.**	**Rate[b]**	**No.**	**Rate[b]**
40	152,533	152,377	156	1.0	64	0.4	220	1.4
41	76,665	76,582	83	1.1	33	0.4	116	1.5
42 and over	3,979	3,971	8	2.0	10	2.5	18	4.5
Unknown	150	135	15	n.p.	0	. .	15	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified gestational age group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) Includes 5 babies with a gestational age of less than 20 weeks.

Table D6: Risk of perinatal mortality by gestational age using the fetuses-at-risk approach, Australia 2011–2012

Gestational age (weeks)	Total births	Babies at risk[a]	Live births	Stillbirths	Neonatal deaths	Perinatal deaths	Perinatal mortality rate[b]
20[c]	749	613,989	139	610	139	749	1.2
21	795	613,240	189	606	189	795	1.3
22	664	612,445	216	448	213	661	1.1
23	623	611,781	241	382	185	567	0.9
24	579	611,158	339	240	124	364	0.6
25	604	610,579	427	177	85	262	0.4
26	641	609,975	503	138	62	200	0.3
27	688	609,334	567	121	29	150	0.2
28	924	608,646	814	110	45	155	0.3
29	973	607,722	870	103	25	128	0.2
30	1,244	606,749	1,155	89	19	108	0.2
31	1,662	605,505	1,565	97	21	118	0.2
32	2,539	603,843	2,441	98	29	127	0.2
33	3,649	601,304	3,549	100	28	128	0.2
34	6,275	597,655	6,170	105	31	136	0.2
35	9,854	591,380	9,730	124	29	153	0.3
36	19,202	581,526	19,056	146	51	197	0.3
37	44,558	562,324	44,396	162	51	213	0.4
38	119,882	517,766	119,687	195	62	257	0.5
39	164,707	397,884	164,535	172	56	228	0.6
40	152,533	233,177	152,377	156	64	220	0.9
41	76,665	80,644	76,582	83	33	116	1.4
42 and over	3,979	3,979	3,971	8	10	18	4.5
Unknown	150	. .	135	15	0	15	. .
Total	**614,139**	**. .**	**609,654**	**4,485**	**1,580**	**6,065**	**. .**

(a) Cumulative number of babies born at a specified gestation or later (excluding babies with an unknown gestational age). Excludes babies with unknown gestational age at birth (n = 150 births and n = 15 perinatal deaths).

(b) The rate is calculated using the fetuses-at-risk approach, by dividing the number of perinatal deaths occurring at a specified gestation by the number of babies born at or above the specified gestations (that is, 'babies at risk'), and multiplying the result by 1,000.

(c) Includes 5 babies with a gestational age of less than 20 weeks.

Table D7: Stillbirths, neonatal deaths and perinatal deaths by birthweight, Australia, 2011–2012

Birthweight (grams)	Total births[a]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[b]	No.	Rate[b]	No.	Rate[b]
Less than 1,500[c]	9,219	6,158	3,061	332.0	1,120	181.9	4,181	453.5
1,500–2,499	32,409	31,924	485	15.0	158	4.9	643	19.8
2,500–4,499	561,730	560,943	787	1.4	281	0.5	1,068	1.9
4,500 and over	10,324	10,307	17	1.6	5	0.5	22	2.1
Unknown	457	322	135	n.p.	16	n.p.	151	n.p.
Total	**614,139**	**609,654**	**4,485**	**7.3**	**1,580**	**2.6**	**6,065**	**9.9**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified birthweight group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) This group may include terminations of pregnancy (TOP). Because TOP are not consistently reported in the NPDC or supplementary data, their contribution to the rates of perinatal mortality is unknown.

Table D8: Rate of perinatal mortality by birthweight for gestational age for singleton births, Australia 2011–2012

	Gestational age					
	20–23	24–27	28–31	32–36	37–41	Total[a]
<3rd birthweight percentile						
Total births[b]	280	208	172	1,016	13,593	**15,269**
Perinatal deaths	280	178	87	90	144	**779**
Rate[c]	1,000.0	855.8	505.8	88.6	10.6	**51.0**
3–9th birthweight percentile						
Total births	216	165	253	2,261	35,467	**38,362**
Perinatal deaths	216	96	55	72	112	**551**
Rate	1,000.0	581.8	217.4	31.8	3.2	**14.4**
10–90th birthweight percentile						
Total births	1,617	1,338	2,581	25,325	442,600	**473,461**
Perinatal deaths	1,583	438	252	395	635	**3,303**
Rate	979.0	327.4	97.6	15.6	1.4	**7.0**
91–97th birthweight percentile						
Total births	124	139	300	2,551	40,383	**43,497**
Perinatal deaths	114	42	22	36	42	**256**
Rate	919.4	302.2	73.3	14.1	1.0	**5.9**
>97th birthweight centile						
Total births	82	92	173	1,372	18,525	**20,244**
Perinatal deaths	81	43	30	37	39	**230**
Rate	987.8	467.4	173.4	27.0	2.1	**11.4**

(a) Excludes babies less than 20 weeks gestation, greater than 41 weeks gestation, and those with unknown birthweight, gestational age and sex (n = 4,727 singleton births).

(b) Total births comprise live births and stillbirths.

(c) The rate is the number of deaths per 1,000 births per specified gestational group, calculated using all births (live births and stillbirths).

Table D9: Age (days) of baby at time of neonatal death, Australia 2011–2012

	Neonatal deaths	
Days survived	**No.**	**%**
0	953	60.3
1–5	360	22.8
6–10	95	6.0
11–15	69	4.4
16–20	32	2.0
21–25	42	2.7
26–27	22	1.4
Missing	7	0.4
Total	**1,580**	**100**

Table D10: Perinatal mortality by Aboriginal and Torres Strait Islander status of mother and birthweight, 2011–2012

			Stillbirths		Neonatal deaths		Perinatal deaths	
Birthweight (grams)	**Total births[a]**	**Live births**	**No.**	**Rate[b]**	**No.**	**Rate[b]**	**No.**	**Rate[b]**
				Indigenous				
Less than 1,500[c]	693	494	199	287.2	88	178.1	287	414.1
1,500–2,499	2,474	2,439	35	14.1	12	4.9	47	19.0
2,500–4,499	20,799	20,755	44	2.1	23	1.1	67	3.2
4,500 and over	368	363	5	13.6	0	. .	5	13.6
Unknown	11	2	9	n.p.	1	n.p.	10	n.p.
Total	**24,345**	**24,053**	**292**	**12.0**	**124**	**5.2**	**416**	**17.1**
				Non-Indigenous				
Less than 1,500[c]	8,482	5,629	2,853	336.4	1,028	182.6	3,881	457.6
1,500–2,499	29,826	29,377	449	15.1	144	4.9	593	19.9
2,500–4,499	539,720	538,978	742	1.4	258	0.5	1,000	1.9
4,500 and over	9,935	9,923	12	1.2	5	0.5	17	1.7
Unknown	429	304	125	n.p.	12	n.p.	137	n.p.
Total	**588,392**	**584,211**	**4,181**	**7.1**	**1,447**	**2.5**	**5,628**	**9.6**
				Unknown Indigenous status				
Total	**1,402**	**1,390**	**12**	**n.p.**	**9**	**n.p.**	**21**	**n.p.**

(a) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(b) The rate is the number of deaths per 1,000 births per specified birthweight group. Stillbirths and perinatal death rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) This group may include terminations of pregnancy (TOP). Because TOP are not consistently reported in the NPDC or supplementary data, their contribution to the rates of perinatal mortality is unknown.

Table D11: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ- PDC) of stillbirths, neonatal deaths and perinatal deaths, selected jurisdictions 2011–2012[a]

	Stillbirth		Neonatal death		Perinatal death	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
1. Congenital abnormality	**856**	**26.3**	**359**	**33.1**	**1,215**	**28.0**
1.1 Central nervous system	194	6.0	73	6.7	267	6.1
1.2 Cardiovascular system	119	3.7	73	6.7	192	4.4
1.3 Urinary system	38	1.2	22	2.0	60	1.4
1.4 Gastrointestinal system	21	0.6	9	0.8	30	0.7
1.5 Chromosomal	229	7.0	65	6.0	294	6.8
1.6 Metabolic	5	0.2	6	0.6	11	0.3
1.7 Multiple/non-chromosomal syndromes	116	3.6	46	4.2	162	3.7
1.8 Other congenital abnormality	5	0.2	2	0.2	7	0.2
1.81 Musculoskeletal	50	1.5	17	1.6	67	1.5
1.82 Respiratory	2	0.1	7	0.6	9	0.2
1.83 Diaphragmatic hernia	11	0.3	15	1.4	26	0.6
1.84 Haematological	11	0.3	2	0.2	13	0.3
1.85 Tumours	9	0.3	7	0.6	16	0.4
1.88 Other specified congenital abnormality	14	0.4	3	0.3	17	0.4
1.9 Unspecified congenital abnormality[b]	32	1.0	12	1.1	44	1.0
2. Perinatal infection	**91**	**2.8**	**34**	**3.1**	**125**	**2.9**
2.1 Bacterial	3	0.1	1	0.1	4	0.1
2.11 Group B Streptococcus	21	0.6	10	0.9	31	0.7
2.12 E coli	7	0.2	2	0.2	9	0.2
2.13 Listeria monocytogenes	0	0.0	1	0.1	1	0.0
2.14 Spirochaetal e.g. Syphilis	2	0.1	0	0.0	2	0.0
2.18 Other bacterial	11	0.3	7	0.6	18	0.4
2.19 Unspecified bacterial	7	0.2	2	0.2	9	0.2
2.20 Viral	5	0.2	0	0.0	5	0.1
2.21 Cytomegalovirus	16	0.5	2	0.2	18	0.4
2.22 Parvovirus	9	0.3	0	0.0	9	0.2
2.23 Herpes simplex virus	0	0.0	3	0.3	3	0.1
2.24 Rubella virus	1	0.0	0	0.0	1	0.0
2.3 Protozoal e.g. Toxoplasma	3	0.1	1	0.1	4	0.1
2.5 Fungal	0	0.0	1	0.1	1	0.0
2.8 Other specified organism	2	0.1	0	0.0	2	0.0
2.9 Other unspecified organism[b]	4	0.1	4	0.4	8	0.2

(continued)

Table D11 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ- PDC) of stillbirths, neonatal deaths and perinatal deaths, selected jurisdictions 2011–2012[a]

	Stillbirth		Neonatal death		Perinatal death	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
3. Hypertension	**99**	**3.0**	**15**	**1.4**	**114**	**2.6**
3.1 Chronic hypertension: essential	8	0.2	0	0.0	8	0.2
3.2 Chronic hypertension: secondary, e.g. renal disease	1	0.0	0	0.0	1	0.0
3.3 Chronic hypertension: unspecified	2	0.1	0	0.0	2	0.0
3.4 Gestational hypertension	9	0.3	2	0.2	11	0.3
3.5 Pre-eclampsia	63	1.9	10	0.9	73	1.7
3.51 With laboratory evidence of thrombophilia	4	0.1	0	0.0	4	0.1
3.6 Pre-eclampsia superimposed on chronic hypertension	7	0.2	1	0.1	8	0.2
3.61 With laboratory evidence of thrombophilia	1	0.0	1	0.1	2	0.0
3.9 Unspecified hypertension[b]	4	0.1	1	0.1	5	0.1
4. Antepartum haemorrhage (APH)	**177**	**5.4**	**95**	**8.7**	**272**	**6.3**
4.1 Placental abruption	140	4.3	69	6.4	209	4.8
4.11 With laboratory evidence of thrombophilia	9	0.3	1	0.1	10	0.2
4.2 Placenta praevia	4	0.1	2	0.2	6	0.1
4.3 Vasa praevia	1	0.0	1	0.1	2	0.0
4.8 Other APH	8	0.2	7	0.6	15	0.3
4.9 APH of undetermined origin[b]	15	0.5	15	1.4	30	0.7
5. Maternal conditions	**401**	**12.3**	**14**	**1.3**	**415**	**9.6**
5.1 Termination of pregnancy for maternal psychosocial indications	317	9.7	0	0.0	317	7.3
5.2 Diabetes/Gestational diabetes	31	1.0	0	0.0	31	0.7
5.31 Maternal injury—accidental	4	0.1	2	0.2	6	0.1
5.32 Maternal injury—non accidental	0	0.0	1	0.1	1	0.0
5.4 Maternal sepsis	4	0.1	1	0.1	5	0.1
5.5 Antiphospholipid syndrome	10	0.3	1	0.1	11	0.3
5.6 Obstetric cholestasis	3	0.1	0	0.0	3	0.1
5.8 Other specified maternal conditions	31	1.0	9	0.8	40	0.9
Not specified[b]	1	0.0	0	0.0	1	0.0

(continued)

Table D11 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ- PDC) of stillbirths, neonatal deaths and perinatal deaths, selected jurisdictions 2011–2012[a]

	Stillbirth		Neonatal death		Perinatal death	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
6. Specific perinatal conditions	**259**	**7.9**	**64**	**5.9**	**323**	**7.4**
6.1 Twin-twin transfusion	86	2.6	21	1.9	107	2.5
6.2 Fetomaternal haemorrhage	28	0.9	3	0.3	31	0.7
6.3 Antepartum cord complications	36	1.1	0	0.0	36	0.8
6.31 Cord haemorrhage	1	0.0	0	0.0	1	0.0
6.32 True knot with evidence of occlusion	11	0.3	0	0.0	11	0.3
6.38 Other	17	0.5	1	0.1	18	0.4
6.39 Unspecified	6	0.2	0	0.0	6	0.1
6.4 Uterine abnormalities, e.g. bicornuate uterus, cervical incompetence	18	0.6	18	1.7	36	0.8
6.61 Rhesus	8	0.2	0	0.0	8	0.2
6.64 Alloimmune thrombocytopenia	1	0.0	0	0.0	1	0.0
6.68 Other	0	0.0	1	0.1	1	0.0
6.69 Unspecified	1	0.0	0	0.0	1	0.0
6.7 Idiopathic hydrops	22	0.7	10	0.9	32	0.7
6.8 Other specific perinatal conditions	7	0.2	1	0.1	8	0.2
6.81 Rupture of membranes after amniocentesis	2	0.1	2	0.2	4	0.1
6.82 Termination of pregnancy for suspected but unconfirmed congenital abnormality.	4	0.1	1	0.1	5	0.1
6.88 Other	4	0.1	0	0.0	4	0.1
6.89 Unspecified[b]	7	0.2	6	0.6	13	0.3
7. Hypoxic peripartum death	**41**	**1.3**	**57**	**5.2**	**98**	**2.3**
7.1 With intrapartum complications	1	0.0	1	0.1	2	0.0
7.11 Uterine rupture	5	0.2	3	0.3	8	0.2
7.12 Cord prolapse	9	0.3	2	0.2	11	0.3
7.18 Other	4	0.1	13	1.2	17	0.4
7.2 Evidence of non-reassuring fetal status in a normally grown infant (e.g. abnormal fetal heart rate, fetal scalp pH/lactate, fetal pulse oximetry without intrapartum complications)	15	0.5	26	2.4	41	0.9
7.3 No intrapartum complications and no evidence of non-reassuring fetal status.	0	0.0	3	0.3	3	0.1
7.9 Unspecified hypoxic peripartum death[b]	7	0.2	9	0.8	16	0.4

(continued)

Table D11 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ- PDC) of stillbirths, neonatal deaths and perinatal deaths, selected jurisdictions 2011–2012[a]

	Stillbirth		Neonatal death		Perinatal death	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
8. Fetal growth restriction (FGR)	**230**	**7.1**	**30**	**2.8**	**260**	**6.0**
8.1 With evidence of reduced vascular perfusion on Doppler studies and /or placental histopathology (e.g. significant infarction, acute atherosis, maternal and/or fetal vascular thrombosis or maternal floor infarction)	118	3.6	17	1.6	135	3.1
8.2 With chronic villitis	17	0.5	2	0.2	19	0.4
8.3 No placental pathology	31	1.0	2	0.2	33	0.8
8.4 No examination of placenta	5	0.2	3	0.3	8	0.2
8.8 Other specified placental pathology	36	1.1	2	0.2	38	0.9
8.9 Unspecified or not known whether placenta examined[b]	23	0.7	4	0.4	27	0.6
9. Spontaneous pre-term	**366**	**11.2**	**358**	**33.0**	**724**	**16.7**
9.1 Spontaneous pre-term with intact membranes, or membrane rupture <24 hours before delivery	38	1.2	13	1.2	51	1.2
9.11 With chorioamnionitis on placental histopathology	78	2.4	102	9.4	180	4.1
9.12 Without chorioamnionitis on placental histopathology	29	0.9	49	4.5	78	1.8
9.13 With clinical evidence of chorioamnionitis, no examination of placenta	1	0.0	5	0.5	6	0.1
9.17 No clinical signs of chorioamnionitis, no examination of placenta	0	0.0	9	0.8	9	0.2
9.19 Unspecified or not known whether placenta examined	19	0.6	21	1.9	40	0.9
9.2 Spontaneous pre-term with membrane rupture >24 hours before delivery	1	0.0	0	0.0	1	0.0
9.21 With chorioamnionitis on placental histopathology	67	2.1	70	6.4	137	3.2
9.22 Without chorioamnionitis on placental histopathology	10	0.3	16	1.5	26	0.6
9.23 With clinical evidence of chorioamnionitis, no examination of placenta	3	0.1	2	0.2	5	0.1
9.27 No clinical signs of chorioamnionitis, no examination of placenta	1	0.0	2	0.2	3	0.1
9.29 Unspecified or not known whether placenta examined	12	0.4	7	0.6	19	0.4
9.31 Spontaneous pre-term with membrane rupture of unknown duration before delivery With chorioamnionitis on placental histopathology	15	0.5	18	1.7	33	0.8
9.32 Without chorioamnionitis on placental histopathology	5	0.2	5	0.5	10	0.2
9.33 With clinical evidence of chorioamnionitis, no examination of placenta	2	0.1	0	0.0	2	0.0
9.37 No clinical signs of chorioamnionitis, no examination of placenta	1	0.0	1	0.1	2	0.0
9.39 Unspecified or not known whether placenta examined	16	0.5	14	1.3	30	0.7
Not specified[b]	68	2.1	24	2.2	92	2.1

(continued)

Table D11 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ- PDC) of stillbirths, neonatal deaths and perinatal deaths, selected jurisdictions 2011–2012[(a)]

	Stillbirth		Neonatal death		Perinatal death	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
10. Unexplained antepartum death	**646**	**19.8**	**0**	**0.0**	**646**	**14.9**
10.1 With evidence of reduced vascular perfusion on Doppler studies and /or placental histopathology (e.g. significant infarction, acute atherosis, maternal and/or fetal vascular thrombosis or maternal floor infarction)	98	3.0	0	0.0	98	2.3
10.2 With chronic villitis	18	0.6	0	0.0	18	0.4
10.3 No placental pathology	311	9.5	0	0.0	311	7.2
10.4 No examination of placenta	26	0.8	0	0.0	26	0.6
10.8 Other specified placental pathology	138	4.2	0	0.0	138	3.2
10.9 Unspecified or not known whether placenta examined[(b)]	55	1.7	0	0.0	55	1.3
11. No obstetric antecedent	**18**	**0.6**	**53**	**4.9**	**71**	**1.6**
11.1 Sudden infant death syndrome (SIDS)	0	0.0	2	0.2	2	0.0
11.11 SIDS Category IA: Classic features of SIDS present and completely documented.	0	0.0	2	0.2	2	0.0
11.13 SIDS Category II : Infant deaths that meet Category I except for 1 or more features.	0	0.0	11	1.0	11	0.3
11.2 Postnatally acquired infection	0	0.0	6	0.6	6	0.1
11.4 Other accident, poisoning or violence (postnatal)	1	0.0	0	0.0	1	0.0
11.8 Other specified	1	0.0	5	0.5	6	0.1
11.9 Unknown/Undetermined	16	0.5	19	1.7	35	0.8
11.91 Unclassified sudden infant death	0	0.0	3	0.3	3	0.1
11.92 Other Unknown/Undetermined[(b)]	0	0.0	5	0.5	5	0.1
Missing cause of death classification	**74**	**2.3**	**7**	**0.6**	**81**	**1.9**
Total	**3,258**	**100**	**1,086**	**100**	**4,344**	**100**

(a) Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory. Data from New South Wales and the Northern Territory were not available (n = 1,721 perinatal deaths).

(b) Records with only summary PSANZ-PDC cause of death codes were included with the 'unspecified' cause of death groups.

Table D12: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths by maternal Aboriginal and Torres Strait Islander status, selected jurisdictions 2011–2012[(a)(b)]

	Stillbirths		Neonatal deaths		Perinatal deaths	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
			Indigenous			
1. Congenital abnormality	26	13.4	15	20.0	41	15.2
2. Perinatal infection	4	2.1	3	4.0	7	2.6
3. Hypertension	11	5.7	0	0.0	11	4.1
4. Antepartum haemorrhage	18	9.3	4	5.3	22	8.2
5. Maternal conditions	23	11.9	0	0.0	23	8.6
6. Specific perinatal conditions	8	4.1	2	2.7	10	3.7
7. Hypoxic peripartum deaths	4	2.1	4	5.3	8	3.0
8. Fetal growth restriction	12	6.2	1	1.3	13	4.8
9. Spontaneous pre-term	52	26.8	36	48.0	88	32.7
10. Unexplained antepartum death	33	17.0	0	0.0	33	12.3
11. No obstetric antecedent	0	0.0	10	13.3	10	3.7
Not stated	3	1.5	0	0.0	3	1.1
Total	**194**	**100.0**	**75**	**100.0**	**269**	**100.0**
			Non-Indigenous			
1. Congenital abnormality	829	27.1	340	33.9	1,169	28.8
2. Perinatal infection	87	2.8	31	3.1	118	2.9
3. Hypertension	88	2.9	15	1.5	103	2.5
4. Antepartum haemorrhage	159	5.2	90	9.0	249	6.1
5. Maternal conditions	376	12.3	12	1.2	388	9.6
6. Specific perinatal conditions	249	8.2	62	6.2	311	7.7
7. Hypoxic peripartum deaths	37	1.2	53	5.3	90	2.2
8. Fetal growth restriction	217	7.1	28	2.8	245	6.0
9. Spontaneous pre-term	313	10.2	321	32.0	634	15.6
10. Unexplained antepartum death	611	20.0	0	0.0	611	15.1
11. No obstetric antecedent	18	0.6	43	4.3	61	1.5
Not stated	71	2.3	7	0.7	78	1.9
Total	**3,055**	**100.0**	**1,002**	**100.0**	**4,057**	**100**
			Unknown Indigenous status			
Total	**9**	**100.0**	**9**	**100.0**	**18**	**100.0**

(a) Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital territory (n = 4,344 perinatal deaths).

(b) Data were not available from New South Wales and the Northern Territory (n = 1,721 perinatal deaths).

Table D13: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by maternal Aboriginal and Torres Strait Islander Status, selected jurisdictions 2011–2012[(a)]

	Indigenous		Non-Indigenous		Unknown Indigenous status	
PSANZ Neonatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
Congenital abnormality	14	19.2	315	33.1	4	44.4
Extreme prematurity	26	35.6	318	33.4	2	22.2
Cardio-respiratory disorders	6	8.2	72	7.6	1	11.1
Infection	6	8.2	54	5.7	0	0.0
Neurological	9	12.3	105	11.0	1	11.1
Gastrointestinal	1	1.4	23	2.4	0	0.0
Other	9	12.3	46	4.8	1	11.1
Not stated	2	2.7	18	1.9	0	0.0
Total	**73**	**100.0**	**951**	**100.0**	**9**	**100.0**

(a) Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths). Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Table D14: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths by plurality, selected jurisdictions 2011–2012[(a)(b)]

	Stillbirths		Neonatal deaths		Perinatal deaths	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
			Singleton pregnancy			
1. Congenital abnormality	816	27.6	333	36.3	1,149	29.6
2. Perinatal infection	86	2.9	34	3.7	120	3.1
3. Hypertension	93	3.1	15	1.6	108	2.8
4. Antepartum haemorrhage	167	5.6	77	8.4	244	6.3
5. Maternal conditions	396	13.4	14	1.5	410	10.6
6. Specific perinatal conditions	160	5.4	37	4.0	197	5.1
7. Hypoxic peripartum deaths	40	1.4	54	5.9	94	2.4
8. Fetal growth restriction	215	7.3	26	2.8	241	6.2
9. Spontaneous pre-term	302	10.2	271	29.6	573	14.8
10. Unexplained antepartum death	605	20.4	0	0.0	605	15.6
11. No obstetric antecedent	14	0.5	49	5.3	63	1.6
Not stated	66	2.2	7	0.8	73	1.9
Total	**2,960**	**100.0**	**917**	**100.0**	**3,877**	**100.0**
			Multiple pregnancy			
1. Congenital abnormality	40	13.4	26	15.4	66	14.1
2. Perinatal infection	5	1.7	0	0.0	5	1.1
3. Hypertension	6	2.0	0	0.0	6	1.3
4. Antepartum haemorrhage	10	3.4	18	10.7	28	6.0
5. Maternal conditions	5	1.7	0	0.0	5	1.1
6. Specific perinatal conditions	99	33.2	27	16.0	126	27.0
7. Hypoxic peripartum deaths	1	0.3	3	1.8	4	0.9
8. Fetal growth restriction	15	5.0	4	2.4	19	4.1
9. Spontaneous pre-term	64	21.5	87	51.5	151	32.3
10. Unexplained antepartum death	41	13.8	0	0.0	41	8.8
11. No obstetric antecedent	4	1.3	4	2.4	8	1.7
Not stated	8	2.7	0	0.0	8	1.7
Total	**298**	**100.0**	**169**	**100.0**	**467**	**100.0**

(a) Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital territory (n = 4,344 perinatal deaths).

(b) Data were not available from New South Wales and the Northern Territory (n = 1,721 perinatal deaths).

Table D15: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by plurality, selected jurisdictions 2011–2012[(a)(b)]

	Singleton		Multiple	
PSANZ Neonatal Death Classification	**No.**	**%**	**No.**	**%**
Congenital abnormality	311	35.6	22	13.8
Extreme prematurity	265	30.4	81	50.6
Cardio-respiratory disorders	65	7.4	14	8.8
Infection	53	6.1	7	4.4
Neurological	93	10.7	22	13.8
Gastrointestinal	19	2.2	5	3.1
Other	50	5.7	6	3.8
Not stated	17	1.9	3	1.9
Total	**873**	**100.0**	**160**	**100.0**

(a) Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths).

(b) Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Table D16: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths by birthweight, selected jurisdictions 2011–2012[(a)(b)]

	Stillbirths		Neonatal Deaths		Perinatal Deaths	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
			Less than 1,500 grams			
1. Congenital abnormality	754	32.0	190	25.6	944	30.5
2. Perinatal infection	52	2.2	19	2.6	71	2.3
3. Hypertension	73	3.1	12	1.6	85	2.7
4. Antepartum haemorrhage	107	4.5	77	10.4	184	5.9
5. Maternal conditions	340	14.4	10	1.3	350	11.3
6. Specific perinatal conditions	159	6.8	48	6.5	207	6.7
7. Hypoxic peripartum deaths	11	0.5	5	0.7	16	0.5
8. Fetal growth restriction	156	6.6	21	2.8	177	5.7
9. Spontaneous pre-term	359	15.3	350	47.1	709	22.9
10. Unexplained antepartum death	270	11.5	0	0.0	270	8.7
11. No obstetric antecedent	11	0.5	7	0.9	18	0.6
Not stated	62	2.6	4	0.5	66	2.1
Total	**2,354**	**100.0**	**743**	**100.0**	**3,097**	**100.0**

(continued)

Table D16 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths by birthweight, selected jurisdictions 2011–2012[(a)(b)]

	Stillbirths		Neonatal deaths		Perinatal deaths	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
			1,500–2,499 grams			
1. Congenital abnormality	55	16.8	77	69.4	132	30.1
2. Perinatal infection	8	2.4	2	1.8	10	2.3
3. Hypertension	15	4.6	0	0.0	15	3.4
4. Antepartum haemorrhage	39	11.9	3	2.7	42	9.6
5. Maternal conditions	11	3.4	1	0.9	12	2.7
6. Specific perinatal conditions	36	11.0	7	6.3	43	9.8
7. Hypoxic peripartum deaths	3	0.9	8	7.2	11	2.5
8. Fetal growth restriction	50	15.2	3	2.7	53	12.1
9. Spontaneous pre-term	5	1.5	6	5.4	11	2.5
10. Unexplained antepartum death	101	30.8	0	0.0	101	23.0
11. No obstetric antecedent	3	0.9	4	3.6	7	1.6
Not stated	2	0.6	0	0.0	2	0.5
Total	**328**	**100.0**	**111**	**100.0**	**439**	**100.0**
			2,500 grams and over			
1. Congenital abnormality	39	7.4	89	41.2	128	17.2
2. Perinatal infection	31	5.9	13	6.0	44	5.9
3. Hypertension	11	2.1	3	1.4	14	1.9
4. Antepartum haemorrhage	30	5.7	10	4.6	40	5.4
5. Maternal conditions	32	6.1	2	0.9	34	4.6
6. Specific perinatal conditions	58	11.0	9	4.2	67	9.0
7. Hypoxic peripartum deaths	27	5.1	41	19.0	68	9.1
8. Fetal growth restriction	22	4.2	4	1.9	26	3.5
9. Spontaneous pre-term	0	0.0	1	0.5	1	0.1
10. Unexplained antepartum death	268	50.8	0	0.0	268	36.0
11. No obstetric antecedent	4	0.8	41	19.0	45	6.0
Not stated	6	1.1	3	1.4	9	1.2
Total	**528**	**100.0**	**216**	**100.0**	**744**	**100.0**
			Unknown birthweight			
Total	**48**	**100.0**	**16**	**100.0**	**64**	**100.0**

(a) Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital territory (n = 4,344 perinatal deaths).

(b) Data were not available from New South Wales and the Northern Territory (n = 1,721 perinatal deaths).

Table D17: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by birthweight, selected jurisdictions 2011–2012[(a)(b)]

PSANZ Neonatal Death Classification	Less than 1,500 grams		1,500–2,499 grams		2,500 grams and over		Unknown birthweight	
	No.	%	No.	%	No.	%	No.	%
Congenital abnormality	172	24.6	73	68.2	85	40.1	3	18.8
Extreme prematurity	343	49.1	0	0.0	0	0.0	3	18.8
Cardio-respiratory disorders	56	8.0	5	4.7	16	7.5	2	12.5
Infection	33	4.7	7	6.5	20	9.4	0	0.0
Neurological	40	5.7	15	14.0	54	25.5	6	37.5
Gastrointestinal	22	3.2	2	1.9	0	0.0	0	0.0
Other	15	2.1	5	4.7	34	16.0	2	12.5
Not stated	17	2.4	0	0.0	3	1.4	0	0.0
Total	**698**	**100.0**	**107**	**100.0**	**212**	**100.0**	**16**	**100.0**

(a) Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths).

(b) Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Table D18: Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths by gestation at birth (weeks), selected jurisdictions 2011–2012[(a)(b)]

PSANZ Perinatal Death Classification	Stillbirths		Neonatal deaths		Perinatal deaths	
	No.	%	No.	%	No.	%
			18–27 weeks			
1. Congenital abnormality	694	33.8	156	23.0	850	31.1
2. Perinatal infection	47	2.3	17	2.5	64	2.3
3. Hypertension	47	2.3	11	1.6	58	2.1
4. Antepartum haemorrhage	92	4.5	74	10.9	166	6.1
5. Maternal conditions	329	16.0	8	1.2	337	12.3
6. Specific perinatal conditions	129	6.3	46	6.8	175	6.4
7. Hypoxic peripartum deaths	9	0.4	3	0.4	12	0.4
8. Fetal growth restriction	103	5.0	15	2.2	118	4.3
9. Spontaneous pre-term	357	17.4	340	50.1	697	25.5
10. Unexplained antepartum death	179	8.7	0	0.0	179	6.5
11. No obstetric antecedent	8	0.4	6	0.9	14	0.5
Not stated	60	2.9	3	0.4	63	2.3
Total	**2,054**	**100.0**	**679**	**100.0**	**2,733**	**100.0**

(continued)

Table D18 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) of stillbirths, neonatal deaths and perinatal deaths by gestation at birth (weeks), selected jurisdictions 2011–2012[(a)(b)]

	Stillbirths		Neonatal deaths		Perinatal deaths	
PSANZ Perinatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
			28–36 weeks			
1. Congenital abnormality	117	17.1	112	56.3	229	25.9
2. Perinatal infection	16	2.3	4	2.0	20	2.3
3. Hypertension	39	5.7	3	1.5	42	4.7
4. Antepartum haemorrhage	61	8.9	15	7.5	76	8.6
5. Maternal conditions	46	6.7	4	2.0	50	5.6
6. Specific perinatal conditions	74	10.8	13	6.5	87	9.8
7. Hypoxic peripartum deaths	6	0.9	11	5.5	17	1.9
8. Fetal growth restriction	80	11.7	8	4.0	88	9.9
9. Spontaneous pre-term	9	1.3	18	9.0	27	3.1
10. Unexplained antepartum death	228	33.2	0	0.0	228	25.8
11. No obstetric antecedent	5	0.7	9	4.5	14	1.6
Not stated	5	0.7	2	1.0	7	0.8
Total	**686**	**100.0**	**199**	**100.0**	**885**	**100.0**
			37 weeks and over			
1. Congenital abnormality	43	8.5	91	43.8	134	18.8
2. Perinatal infection	28	5.5	13	6.3	41	5.8
3. Hypertension	13	2.6	1	0.5	14	2.0
4. Antepartum haemorrhage	24	4.8	6	2.9	30	4.2
5. Maternal conditions	18	3.6	2	1.0	20	2.8
6. Specific perinatal conditions	55	10.9	5	2.4	60	8.4
7. Hypoxic peripartum deaths	26	5.1	43	20.7	69	9.7
8. Fetal growth restriction	47	9.3	7	3.4	54	7.6
9. Spontaneous pre-term	0	0.0	0	0.0	0	0.0
10. Unexplained antepartum death	238	47.1	0	0.0	238	33.4
11. No obstetric antecedent	5	1.0	38	18.3	43	6.0
Not stated	8	1.6	2	1.0	10	1.4
Total	**505**	**100.0**	**208**	**100.0**	**713**	**100.0**
			Unknown gestational age			
Total	**13**	**100.0**	**0**	**0**	**13**	**100.0**

(a) Includes Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital territory (n = 4,344 perinatal deaths).

(b) Data were not available from New South Wales and the Northern Territory (n = 1,721 perinatal deaths).

Table D19: Perinatal Society of Australia and New Zealand Neonatal Death Classification (PSANZ-NDC) of neonatal deaths by gestation at birth, selected jurisdictions 2011–2012[(a)(b)]

	Less than 28 weeks		28–36 weeks		37 or more weeks	
PSANZ Neonatal Death Classification	**No.**	**%**	**No.**	**%**	**No.**	**%**
Congenital abnormality	141	22.2	104	53.9	88	43.1
Extreme prematurity	343	53.9	3	1.6	0	0.0
Cardio-respiratory disorders	47	7.4	19	9.8	13	6.4
Infection	28	4.4	12	6.2	20	9.8
Neurological	34	5.3	31	16.1	50	24.5
Gastrointestinal	15	2.4	9	4.7	0	0.0
Other	13	2.0	12	6.2	31	15.2
Not stated	15	2.4	3	1.6	2	1.0
Total	**636**	**100.0**	**193**	**100.0**	**204**	**100.0**

(a) Includes the Australian Capital Territory (2011 only), Victoria, Queensland, Western Australia and South Australia (n = 1,033 neonatal deaths).

(b) Data not available from the Australian Capital Territory (2012 only), New South Wales, Tasmania and the Northern Territory (n = 547 neonatal deaths).

Table D20: Stillbirth, neonatal and perinatal mortality rates, Australia, 1993–2012[a][b]

Year	Total births[c]	Live births	Stillbirths		Neonatal deaths		Perinatal deaths	
			No.	Rate[d]	No.	Rate[d]	No.	Rate[d]
1993	260,331	258,667	1,664	6.4	820	3.2	2,484	9.5
1994	261,079	259,334	1,745	6.7	831	3.2	2,576	9.9
1995	260,023	258,200	1,823	7.0	837	3.2	2,660	10.2
1996	256,614	254,799	1,815	7.1	802	3.1	2,617	10.2
1997	256,955	255,141	1,814	7.1	805	3.2	2,619	10.2
1998	255,207	253,452	1,755	6.9	788	3.1	2,543	10.0
1999	257,413	255,621	1,792	7.0	816	3.2	2,608	10.1
2000	257,238	255,431	1,807	7.0	813	3.2	2,620	10.2
2001	254,326	252,572	1,754	6.9	826	3.3	2,580	10.1
2002	255,095	253,388	1,707	6.7	786	3.1	2,493	9.8
2003	256,925	255,099	1,826	7.1	791	3.1	2,617	10.2
2004	257,205	255,286	1,919	7.5	785	3.1	2,704	10.5
2005	272,421	270,440	1,981	7.3	875	3.2	2,856	10.5
2006	282,173	280,079	2,094	7.4	830	3.0	2,924	10.4
2007	294,207	292,027	2,180	7.4	848	2.9	3,028	10.3
2008	296,928	294,739	2,189	7.4	833	2.8	3,022	10.2
2009	299,139	296,791	2,348	7.8	866	2.9	3,214	10.7
2010	300,215	298,014	2,201	7.3	876	2.9	3,077	10.2
2011	302,023	299,793	2,230	7.4	843	2.8	3,073	10.2
2012	312,116	309,861	2,255	7.2	737	2.4	2,992	9.6

(a) Neonatal death data from were not available from Victoria in 2009. The number of neonatal deaths in Victoria 2009 were estimated using complete date from 2008 and 2010, and used to calculate the rate of neonatal death. The neonatal death rate for Australia in 2009 is therefore an estimate.

(b) The Australian Capital Territory reported 0 neonatal deaths in 1993. The average number of neonatal deaths each year in the Australian Capital Territory was 21. Because the potential missing neonatal deaths in the Australian Capital Territory in 1993 did not appear to adversely affect national numbers of neonatal deaths in 1993, the numbers were not imputed.

(c) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(d) The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table D21: Trends in perinatal mortality by plurality, Australia, 1993–2012[a]

Plurality		1993–1996	1997–2000	2001–2004	2005–2008	2009–2012
				Total births[b]		
Singleton	No.	1,009,192	995,352	989,356	1,108,404	1,176,188
Multiple	No.	28,855	31,457	34,195	37,325	37,300
				Live births		
Singleton	No.	1,002,883	988,900	982,876	1,100,711	1,167,947
Multiple	No.	28,117	30,742	33,469	36,,574	36,507
				Stillbirths		
Singleton	No.	6,309	6,452	6,480	7,693	8,241
	Rate[c]	6.3	6.5	6.5	6.9	7.0
Multiple	No.	738	715	726	751	793
	Rate[c]	25.6	22.7	21.2	20.1	21.3
				Neonatal deaths		
Singleton	No.	2,676	2,658	2,533	2,750	2,730
	Rate[c]	2.7	2.7	2.6	2.5	2.3
Multiple	No.	614	564	655	636	592
	Rate[c]	21.8	18.3	19.6	17.4	16.2
				Perinatal deaths		
Singleton	No.	8,985	9,110	9,013	10,443	10,971
	Rate[c]	8.9	9.2	9.1	9.4	9.3
Multiple	No.	1,352	1,279	1,381	1,387	1,385
	Rate[c]	46.9	40.7	40.4	37.2	37.1

(a) In 1993–2012, 9 babies in the NPDC (n = 8 live births, n = 1 stillbirth, n = 0 neonatal deaths) were recorded as having an unknown plurality. They have not been presented in this table.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

Table D22: Trends in perinatal mortality by gestation at birth, Australia, 1993–2012[a]

	20–23 weeks gestation[b]			24–27 weeks gestation			28–31 weeks gestation			32–36 weeks gestation			37–41 weeks gestation		
Year	No.	Fetuses at risk (FAR)	Rate[c]	No.	FAR	Rate[c]	No.	FAR	Rate[c]	No.	FAR	Rate[c]	No.	FAR	Rate[c]
							Total births								
1993–1996	3,103	1,034,741	. .	4,210	1,031,638	. .	7,809	1,027,428	. .	58,134	1,019,619	. .	931,579	961,485	. .
1997–2000	3,725	1,026,361	. .	4,184	1,022,636	. .	8,358	1,018,452	. .	61,687	1,010,094	. .	928,437	948,407	. .
2001–2004	4,121	1,023,443	. .	4,468	1,019,322	. .	8,305	1,014,854	. .	64,144	1,006,549	. .	926,836	942,405	. .
1005–2008	5,346	1,145,580	. .	4,822	1,140,234	. .	9,280	1,135,412	. .	74,093	1,126,132	. .	1,040,084	1,052,039	. .
2009–2012	5,652	1,212,876	. .	5,071	1,207,224	. .	9,623	1,202,153	. .	80,689	1,192,530	. .	1,102,880	1,111,841	. .
							Live births								
1993–1996	1,072	. .	. .	3,041	. .	. .	7,033	. .	. .	56,867	. .	. .	929,891	. .	. .
1997–2000	1,234	. .	. .	3,179	. .	. .	7,611	. .	. .	60,475	. .	. .	926,803	. .	. .
2001–2004	1,314	. .	. .	3,300	. .	. .	7,655	. .	. .	63,083	. .	. .	925,345	. .	. .
2005–2008	1,618	. .	. .	3,581	. .	. .	8,524	. .	. .	72,975	. .	. .	1,038,552	. .	. .
2009–2012	1,616	. .	. .	3,708	. .	. .	8,804	. .	. .	79,493	. .	. .	1,101,328	. .	. .
							Stillbirths								
1993–1996	2,031	1,034,741	2.0	1,169	1,031,638	1.1	776	1,027,428	0.8	1,267	1,019,619	1.2	1,688	961,485	1.8
1997–2000	2,491	1,026,361	2.4	1,005	1,022,636	1.0	747	1,018,452	0.7	1,212	1,010,094	1.2	1,634	948,407	1.7
2001–2004	2,807	1,023,443	2.7	1,168	1,019,322	1.1	650	1,014,854	0.6	1,061	1,006,549	1.1	1,491	942,405	1.6
2005–2008	3,728	1,145,580	3.3	1,241	1,140,234	1.1	756	1,135,412	0.7	1,118	1,126,132	1.0	1,532	1,052,039	1.5
2009–2012	4,045	1,212,876	3.3	1,363	1,207,224	1.1	819	1,202,153	0.7	1,196	1,192,530	1.0	1,552	1,111,841	1.4

(continued)

Table D22 (continued): Trends in perinatal mortality by gestation at birth, Australia, 1993–2012[a]

	20–23 weeks gestation[b]			24–27 weeks gestation			28–31 weeks gestation			32–36 weeks gestation			37–41 weeks gestation		
Year	No.	Fetuses at risk (FAR)	Rate[c]	No.	FAR	Rate[c]	No.	FAR	Rate[c]	No.	FAR	Rate[c]	No.	FAR	Rate[c]
							Neonatal deaths								
1993–1996	956	. .	891.8	803	. .	264.1	305	. .	43.4	400	. .	7.0	779	. .	0.8
1997–2000	1,077	. .	872.8	702	. .	220.8	304	. .	39.9	359	. .	5.9	754	. .	0.8
2001–2004	1,207	. .	918.6	744	. .	225.5	247	. .	32.3	341	. .	5.4	632	. .	0.7
2005–2008	1,502	. .	928.3	661	. .	184.6	241	. .	28.3	342	. .	4.7	621	. .	0.6
2009–2012	1,462	. .	904.7	667	. .	179.9	221	. .	25.1	339	. .	4.3	613	. .	0.6
							Perinatal deaths								
1993–1996	2,987	1,034,741	2.9	1,972	1,031,638	1.9	1,081	1,027,428	1.1	1,667	1,019,619	1.6	2,467	961,485	2.6
1997–2000	3,568	1,026,361	3.5	1,707	1,022,636	1.7	1,051	1,018,452	1.0	1,571	1,010,094	1.6	2,388	948,407	2.5
2001–2004	4,014	1,023,443	3.9	1,912	1,019,322	1.9	897	1,014,854	0.9	1,402	1,006,549	1.4	2,123	942,405	2.3
2005–2008	5,230	1,145,580	4.6	1,902	1,140,234	1.7	997	1,135,412	0.9	1,460	1,126,132	1.3	2,153	1,052,039	2.0
2009–2012	5,507	1,212,876	4.5	2,030	1,207,224	1.7	1,040	1,202,153	0.9	1,535	1,192,530	1.3	2,165	1,111,841	1.9

(a) Babies 42 weeks and over (n = 197 stillbirths, n = 89 neonatal deaths, n = 86,164 live births and n = 86,361 total births) and those with unknown gestational age at birth (n = 155 stillbirths, n = 39 neonatal deaths, n = 86,164 live births and n = 4,632 total births) were excluded. Perinatal mortality rates are not presented for babies born at 42 weeks gestation and over due to small cell sizes in comparison with other gestational groups.

(b) Includes 44 babies with a gestational age of <20 weeks.

(c) For neonatal deaths, the rate is the number of deaths per 1,000 births per specified gestational age grouping, using live births as the denominator. For stillbirths and perinatal deaths, the rate is calculated using the fetuses-at-risk (FAR) approach, by dividing the number of stillbirths or perinatal deaths occurring at a specified gestation by the number of babies born at or above the specified gestations (that is, fetuses at risk'), and multiplying the result by 1,000. The FAR calculation includes babies born at 42 weeks gestation and over, and excludes babies with unknown gestation at birth.

Table D23: Trends in perinatal mortality by maternal age, Australia, 1993–2012[a]

	1993–1996		1997–2000		2001–2004		2005–2008		2009–2012	
Maternal age (years)	**No.**	**Rate**[b]	**No.**	**Rate**[b]	**No.**	**Rate**[b]	**No.**	**Rate**[b]	**No.**	**Rate**[b]
					Total births[c]					
Less than 20	54,708	. .	52,141	. .	48,162	. .	48,231	. .	45,560	. .
20–24	197,367	. .	166,536	. .	152,753	. .	165,836	. .	168,468	. .
25–29	342,923	. .	330,575	. .	289,855	. .	305,071	. .	335,197	. .
30–34	307,558	. .	311,595	. .	342,265	. .	375,466	. .	386,326	. .
35–39	116,283	. .	141,434	. .	158,564	. .	210,326	. .	226,355	. .
40 and over	18,797	. .	24,265	. .	31,716	. .	40,665	. .	51,074	. .
					Live births					
Less than 20	54,183	. .	51,588	. .	47,587	. .	47,498	. .	44,917	. .
20–24	195,972	. .	165,302	. .	151,563	. .	164,375	. .	167,032	. .
25–29	340,894	. .	328,483	. .	287,997	. .	303,085	. .	332,971	. .
30–34	305,640	. .	309,681	. .	340,189	. .	373,139	. .	383,893	. .
35–39	115,333	. .	140,351	. .	157,452	. .	208,834	. .	224,650	. .
40 and over	18,580	. .	23,983	. .	31,344	. .	40,249	. .	50,502	. .
					Stillbirths					
Less than 20	525	9.6	553	10.6	575	11.9	733	15.2	643	14.1
20–24	1,395	7.1	1,234	7.4	1,190	7.8	1,461	8.8	1,436	8.5
25–29	2,029	5.9	2,092	6.3	1,858	6.4	1,986	6.5	2,226	6.6
30–34	1,918	6.2	1,914	6.1	2,076	6.1	2,327	6.2	2,433	6.3
35–39	950	8.2	1,083	7.7	1,112	7.0	1,492	7.1	1,705	7.5
40 and over	217	11.5	282	11.6	372	11.7	416	10.2	572	11.2
					Neonatal deaths					
Less than 20	214	3.9	265	5.1	208	4.4	232	4.9	205	4.6
20–24	693	3.5	576	3.5	540	3.6	571	3.5	507	3.0
25–29	968	2.8	906	2.8	872	3.0	836	2.8	879	2.6
30–34	914	3.0	865	2.8	923	2.7	944	2.5	947	2.5
35–39	409	3.5	512	3.6	504	3.2	637	3.1	612	2.7
40 and over	91	4.9	98	4.1	140	4.5	164	4.1	170	3.4
					Perinatal deaths					
Less than 20	739	13.5	818	15.7	783	16.3	965	20.0	848	18.6
20–24	2,088	10.6	1,810	10.9	1,730	11.3	2,032	12.3	1,943	11.5
25–29	2,997	8.7	2,998	9.1	2,730	9.4	2,822	9.3	3,105	9.3
30–34	2,832	9.2	2,779	8.9	2,999	8.8	3,271	8.7	3,380	8.7
35–39	1,359	11.7	1,595	11.3	1,616	10.2	2,129	10.1	2,317	10.2
40 and over	308	16.4	380	15.7	512	16.1	580	14.3	742	14.5

(a) In 1993–2012, the mothers of 1,561 babies born (n = 1,467 live births, n = 94 stillbirths, n = 6 neonatal deaths) had an unknown age.

(b) The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(c) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

Table D24: Trends in perinatal mortality by parity, Australia, 1993–2012[a][b]

Year	Parity 0		Parity 1		Parity 2		Parity 3		Parity 4		Parity 5 and over		Parity unknown	
	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
							Total births[d]							
1993–1996	412,419	. .	348,310	. .	173,508	. .	64,831	. .	22,138	. .	15,335	. .	1,506	. .
1997–2000	416,385	. .	347,519	. .	163,578	. .	60,982	. .	21,559	. .	15,511	. .	1,279	. .
2001–2004	425,758	. .	347,011	. .	156,383	. .	56,839	. .	21,186	. .	16,036	. .	338	. .
2005–2008	477,173	. .	383,317	. .	175,299	. .	64,502	. .	24,373	. .	19,606	. .	1,459	. .
2009–2012	516,023	. .	405,300	. .	177,373	. .	63,469	. .	24,515	. .	20,281	. .	6,532	. .
							Live births							
1993–1996	409,270	. .	346,355	. .	172,441	. .	64,363	. .	21,944	. .	15,142	. .	1,485	. .
1997–2000	413,168	. .	345,567	. .	162,513	. .	60,495	. .	21,332	. .	15,306	. .	1,264	. .
2001–2004	422,327	. .	345,130	. .	155,378	. .	56,364	. .	20,987	. .	15,824	. .	335	. .
2005–2008	473,101	. .	381,131	. .	174,116	. .	63,986	. .	24,108	. .	19,397	. .	1,446	. .
2009–2012	511,793	. .	402,932	. .	176,143	. .	62,934	. .	24,262	. .	20,040	. .	6,355	. .
							Stillbirths							
1993–1996	3,149	7.6	1,955	5.6	1,067	6.1	468	7.2	194	8.8	193	12.6	21	. .
1997–2000	3,217	7.7	1,952	5.6	1,065	6.5	487	8.0	227	10.5	205	13.2	15	. .
2001–2004	3,431	8.1	1,881	5.4	1,005	6.4	475	8.4	199	9.4	212	13.2	3	. .
2005–2008	4,072	8.5	2,186	5.7	1,183	6.7	516	8.0	265	10.9	209	10.7	13	. .
2009–2012	4,238	8.2	2,361	5.8	1,229	6.9	534	8.4	253	10.3	242	11.9	177	. .

(continued)

Table D24 (continued): Trends in perinatal mortality by parity, Australia, 1993–2012[a][b]

	Parity 0		Parity 1		Parity 2		Parity 3		Parity 4		Parity 5 and over		Parity unknown	
Year	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
							Neonatal deaths							
1993–1996	1,386	3.4	891	2.6	522	3.0	278	4.3	111	5.1	95	6.3	7	. .
1997–2000	1,393	3.4	889	2.6	489	3.0	233	3.9	126	5.9	84	5.5	8	. .
2001–2004	1,404	3.3	908	2.6	459	3.0	226	4.0	98	4.7	92	5.8	1	. .
2005–2008	1,548	3.3	909	2.4	435	2.5	230	3.6	122	5.1	133	6.9	9	. .
2009–2012	1,573	3.1	848	2.1	438	2.5	209	3.3	110	4.5	133	6.6	11	. .
							Perinatal deaths							
1993–1996	4,535	11.0	2,846	8.2	1,589	9.2	746	11.5	305	13.8	288	18.8	28	. .
1997–2000	4,610	11.1	2,841	8.2	1,554	9.5	720	11.8	353	16.4	289	18.6	23	. .
2001–2004	4,835	11.4	2,789	8.0	1,464	9.4	701	12.3	297	14.0	304	19.0	4	. .
2005–2008	5,620	11.8	3,095	8.1	1,618	9.2	746	11.6	387	15.9	342	17.4	22	. .
2009–2012	5,811	11.3	3,209	7.9	1,667	9.4	743	11.7	363	14.8	375	18.5	188	. .

(a) Data on parity were not available for Victoria 2009. The distribution of parity among total births, live births, still births and neonatal deaths were calculated for Victoria 2008 and 2010, and an average (mean) of these was calculated as an estimated distribution for 2009. The estimated numbers in each parity category in Victoria 2009 were then added to the respective category for the rest of Australia in 2009.

(b) The parity of the mothers of 11,114 babies born in 1993–2012 (n = 10,885 live births, n = 229 stillbirths, n = 36 neonatal deaths) was unknown.

(c) The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(d) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

Table D25: Trends in perinatal mortality by Indigenous status, Australia, 1993–2012[a]

	Total births[b]		Live births		Stillbirths				Neonatal deaths				Perinatal deaths			
	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous		Non-Indigenous		Indigenous		Non-Indigenous		Indigenous		Non-Indigenous	
Year	No.	No.	No.	No.	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]	No.	Rate[c]
1993–1996	30,759	1,001,180	30,320	994,614	439	14.3	6,566	6.6	251	8.3	3,026	3.0	690	22.4	9,592	9.6
1997–2000	34,489	974,350	34,030	967,805	459	13.3	6,545	6.7	303	8.9[d]	2,865	3.0	762	22.1	9,410	9.7
2001–2004	36,061	965,136	35,633	958,563	428	11.9	6,573	6.8	229	6.4	2,897	3.0	657	18.2	9,470	9.8
2005–2008	42,653	1,101,637	42,140	1,093,815	513	12.0	7,822	7.1	290	6.9	3,087	2.8	803	18.8	10,909	9.9
2009–2012	47,374	1,162,566	46,806	1,154,189	568	12.0	8,377	7.2	278	5.9	3,025	2.6	846	17.9	11,402	9.8

(a) The Indigenous status of the mothers of 51,428 babies born in 1993–2012 (n = 50,819 live births, n = 609 stillbirths, n = 157 neonatal deaths) was unknown.

(b) Total births comprise live births and stillbirths. Neonatal deaths are included with live births.

(c) The rate is the number of deaths per 1,000 births. Stillbirth rates were calculated using all births (live births and stillbirths). Neonatal death rates were calculated using all live births.

(d) The rate of neonatal deaths of babies born to Indigenous mothers in the years 1997–2000 (8.9 deaths per 1,000 babies) and the subsequent reduction in the rate of neonatal deaths in 2001–2004 may be related to the recording of neonatal deaths in the Northern Territory during this period. Specifically, the Northern Territory reported 64 neonatal deaths of babies born to Indigenous mothers in the year 2000, and 0 in years 2001 and 2002. It is possible that the 64 neonatal deaths in 2000 actually occurred during the period 2000–2002.

Appendix E: Expert advisory group members

This appendix provides a list of National Perinatal Mortality Reporting Advisory Group members and National Aboriginal and Torres Strait Islander Perinatal Reference Group members.

National Perinatal Mortality Reporting Advisory Group members

Dr Adrienne Gordon	NSW Maternal and Perinatal Committee
Associate Professor Alison Kent	ACT Maternal and Perinatal Mortality Committee
Associate Professor Amanda Dennis	Tasmanian Council of Obstetric & Paediatric Mortality & Morbidity
Professor David Ellwood	Australian and New Zealand Stillbirth Alliance
Mr Graham Kraak	Maternity Services Inter-Jurisdictional Committee (MSIJC)
Mr Jamie Stewart	Australian Bureau of Statistics
Dr Jane Warland	Australian College of Midwives (ACM)
Professor Jeanine Young	SIDS and Kids (National)
Professor Jeremy Oats	Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM)
Ms Joanne Ellerington	National Perinatal Data Development Committee representative
Professor Jodie Dodd	South Australian Maternal, Perinatal and Infant Mortality Committee
Professor John Whitehall	Royal Australian College of Physicians—neonatologist
Dr Lucy Cooke	Queensland Maternal and Perinatal Quality Council
Ms Mary Beneforti	AIHW
Professor Michael Humphrey	Queensland Health
Professor Michael Permezel	Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG)
Mr Paull Hoffmann	Australian Bureau of Statistics
Ms Sam Paior	Consumer Representative
Professor Sue Walker	Queensland University of Technology (ICD 10)

Associate Professor Vicki Flenady	Perinatal Society of Australia and New Zealand
Ms Vickie Veitch	Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity
Ms Vivien Gee	Perinatal and Infant Mortality Committee, Data Integrity Directorate Department of Health Western Australia.
Professor Yee Khong	The Royal College of Pathologists Australasia (RCPA)

National Aboriginal and Torres Strait Islander Perinatal Reference Group members

Dr Jenny Hunt	Aboriginal Health and Medical Research Council of NSW
Dr Marianne Wood	Aboriginal Health Council of Western Australia
Dr Maureen Davey	Tasmanian Aboriginal Centre
Dr Sarah Fraser	Aboriginal Health Council of South Australia Inc.
Previously: Julieanne Graham and Ms Melinda Hassell	Queensland Aboriginal and Islander Health Council (QAIHC)

Glossary

Aboriginal and Torres Strait Islander: A person who self-identifies as Aboriginal and/or Torres Strait Islander.

Aboriginal: A person of who self-identifies as an Aboriginal person.

antenatal: The period covering conception up to the time of birth. Synonymous with prenatal.

antepartum haemorrhage: Bleeding from the uterus that occurs during pregnancy or early in labour but before birth.

antepartum stillbirth: Stillbirth occurring before the onset of labour.

ARIA+: Area of remoteness is determined by the Accessibility/Remoteness Index of Australia (ARIA+), which is based on a locality's distance by road to 5 different levels of service centres (National Centre for Social Applications of Geographic Information Systems 2011). Service centres are localities with a population of greater than 1,000, and service centre categories are assigned according to the size of the population.

birth status: Status of the baby immediately after birth. Values include live birth or stillbirth.

birthweight: The first weight of the baby (stillborn or live born) obtained after birth (usually measured to the nearest 5 grams and obtained within 1 hour of birth).

chorioamnionitis: An inflammation, usually from infection, of the membranes surrounding the fetus.

diabetes (diabetes mellitus): A chronic condition in which the body cannot properly use its main energy source, the sugar glucose. This is due to a relative or absolute deficiency in insulin, a hormone that is produced by the pancreas and helps glucose enter the body's cells from the blood stream and then be processed by them. Diabetes is marked by an abnormal build-up of glucose in the blood, and it can have serious short- and long-term effects.

early neonatal death: Death of a live born baby which occurs 0–6 days after birth.

factor-specific rate of perinatal mortality: The perinatal mortality rate applied to subpopulations with different characteristics for a given factor. For example, the factor 'maternal age' can be used to calculate the perinatal mortality rate for different maternal age groups. For women aged 25–29, the numerator is the number of stillbirths for women aged 25–29 and the denominator is the number of total births for women aged 25–29.

fetal death: See **Stillbirth**

fetus papyraceous and fetus compressus: Products of conception recognisable as a deceased fetus.

gestational age: The duration of pregnancy in completed weeks calculated from the date of the first day of a woman's last menstrual period and her baby's date of birth, or via ultrasound, or derived from clinical assessment during pregnancy or from examination of the baby after birth.

gestational diabetes: A form of diabetes that is first diagnosed during pregnancy (gestation). It may disappear after pregnancy but signals a high risk of diabetes occurring later on.

gestational hypertension: A form of hypertension that is first diagnosed during pregnancy (gestation).

hypertension: The definition of high blood pressure (also known as hypertension) can vary but a well-accepted one is from the World Health Organization: a systolic blood pressure of 1,400 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or [the person is] receiving medication for high blood pressure.

Indigenous: A person who self-identifies as Aboriginal and/or Torres Strait Islander. The 3-part working definition of Aboriginality used by the Australian Government requires descent, self-identification and community recognition to be established for Aboriginality to formally be recognised (NACCHO 2015).

intrapartum stillbirth: Fetal death occurring during labour.

late neonatal death: Death of a live born baby between 7 and 27 days after birth.

live birth: The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered live born (WHO definition).

low birthweight: Weight of a baby at birth that is less than 2,500 grams.

maternal age: Mother's age in completed years at the birth of her baby.

National Minimum Data Set (NMDS): A minimum set of data elements agreed for mandatory collection and reporting at a national level.

National Perinatal Data Collection (NPDC): A national population-based, cross-sectional collection of data about pregnancy and childbirth. The data are based on births reported to the perinatal data collection in each state and territory in Australia.

neonatal death: Death of a live born baby within 28 days of birth.

neonatal mortality rate: Number of neonatal deaths per 1,000 live births.

non-Indigenous: A person of who does not self-identify as an Aboriginal and/or Torres Strait Islander.

other Australians: A person who does not self-identify as an Aboriginal and/or Torres Strait Islander. 'Other Australians' also includes people whose Indigenous status is 'not stated'.

parity: Number of previous pregnancies resulting in live births or stillbirths, excluding the current pregnancy.

perinatal death: A fetal or neonatal death of at least 20 weeks gestation or at least 400 grams birthweight.

perinatal mortality rate: The number of perinatal deaths per 1,000 total births (fetal deaths plus live births).

Perinatal mortality review committees (PMRCs): State and territory-based multidisciplinary committees that review perinatal deaths to ascertain the underlying and contributory cause/s of death.

Perinatal National Minimum Data Set (P-NMDS): An agreed set of standardised data items within the PDC used for national reporting of information about births.

perinatal: Pertaining to, or occurring in, the period shortly before or after birth (usually up to 28 days after).

plurality: The number of births resulting from a pregnancy.

postneonatal death: Death of a live born baby after 28 days and within 1 year of birth.

risk of perinatal mortality: The chance of a perinatal death within a specified gestation interval among all babies born at that or a later week of gestational age.

Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage (IRSD): Derived from Census variables related to disadvantage, such as low income, low educational attainment, unemployment and dwellings without motor vehicles.

stillbirth rate: Number of stillbirths per 1,000 total births (stillbirths plus live births).

stillbirth: Fetal death prior to the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400 grams or more birthweight. The death is indicated by the fact that after such separation, the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles.

supplementary data: Data items sourced from PMRCs that supplement existing NPDC data relating to baby deaths.

Torres Strait Islander: A person who self-identifies as a Torres Strait Islander.

total births: The combined number of live births and stillbirths.

voluntary data: PDC data items that are provided to the NPDC on a voluntary basis.

References

AHMAC (Australian Health Ministers' Advisory Council) 2012. Clinical practice guidelines: antenatal care—module 1. Canberra: Australian Government Department of Health and Ageing. Viewed 26 August 2015, <http://www.health.gov.au/antenatal>.

AHMC (Australian Health Ministers' Conference) 2011. National maternity services plan. Canberra: Australian Government Department of Health. Viewed 20 February 2015, <http://www.health.gov.au/internet/main/publishing.nsf/Content/maternityservicesplan>.

AIHW (Australian Institute of Health and Welfare) 2012. National health data dictionary. Version 16. Cat. no. HWI 119. Canberra: AIHW.

AIHW 2013. Maternity information matrix (MIM). Canberra: AIHW. Viewed 5 August 2015, <http://maternitymatrix.aihw.gov.au/Pages/About-the-MIM.aspx>.

AIHW 2014. National perinatal mortality data reporting project: issues paper, October 2012. Foundations for enhanced maternity data collection and reporting in Australia: National Maternity Data Development Project Stage 1. Cat. no. PER 66. Canberra: AIHW.

AIHW: Hilder L, Li Z, Zeki R & Sullivan EA 2014. Stillbirths in Australia, 1991–2009. Perinatal statistics series no. 29. Cat. no. PER 63. Canberra: AIHW NPESU.

AIHW NPESU (National Perinatal Epidemiology and Statistics Unit) & AIHW 2013. National core maternity indicators. Cat. no. PER 58. Canberra: AIHW.

Carolan M 2013. Maternal age >45 years and maternal and perinatal outcomes: a review of the evidence. Midwifery 29:479–89.

Cleary-Goldman J, Malone FD, Vidaver J, Ball RH, Nyberg DA, Comstock CH et al. 2005. Impact of maternal age on obstetric outcome. Obstetrics & Gynecology 105:983–90.

Conde-Agudelo A, Belizan JM & Lammers C 2005. Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: cross-sectional study. American Journal of Obstetrics & Gynecology 192:342–9.

Dobbins TA, Sullivan EA, Roberts CL & Simpson JM 2012. Australian national birthweight percentiles by sex and gestational age, 1998–2007. Medical Journal of Australia 197:291–4.

Donnolley N & Li Z 2012. Perinatal National Minimum Data Set compliance evaluation 2006 to 2009. Perinatal Statistics series no. 26. Cat. no. PER 54. Canberra: AIHW NPESU.

Flenady V 2014. Perinatal mortality. Presentation at the PSANZ 18th Annual Congress, Perth, April.

Flenady V, Froen JF, Pinar H, Torabi R, Saastad E, Guyon G et al. 2009a. An evaluation of classification systems for stillbirth. BMC Pregnancy & Childbirth 9:24.

Flenady V, King J, Charles A, Gardener G, Ellwood D, Day K et al. 2009b. PSANZ clinical practice guideline for perinatal mortality. Version 2.2. Queensland: PSANZ. Viewed 20 February 2015, <http://www.stillbirthalliance.org.au/doc/Section_1_Version_2.2_April_2009.pdf>.

Flenady V, Koopmans L, Middleton P, Frøen JF, Smith GC, Gibbons K et al. 2011. Major risk factors for stillbirth in high-income countries: a systematic review and meta-analysis. The Lancet 377:1331–40.

Freemantle J, Read A, de Klerk N, McAullay D, Anderson I & Stanley F 2006. Patterns, trends and increasing disparities in mortality for Aboriginal and non-Aboriginal infants born in Western Australia, 1980–2001: population database study. Lancet 367:1758–66.

Ganchimeg T, Ota E, Morisaki N, Laopaiboon M, Lumbiganon P, Zhang J et al. 2014. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. BJOG: An International Journal of Obstetrics & Gynaecology 121 Suppl 1:40–8.

Gordon A, Raynes-Greenow C, McGeechan K, Morris J & Jeffery H 2013. Risk factors for antepartum stillbirth and the influence of maternal age in New South Wales Australia: a population based study. BMC Pregnancy & Childbirth 13(1):1–10.

Hilder L, Zhichao Z, Parker M, Jahan S & Chambers GM 2014. Australia's mothers and babies 2012. Perinatal statistics series no. 30. Cat. no. PER 69. Canberra: AIHW.

Joseph KS 2004. Incidence-based measures of birth, growth restriction, and death can free perinatal epidemiology from erroneous concepts of risk. Journal of Clinical Epidemiology 57:889–97.

Joseph KS 2011. The fetuses-at-risk approach: causal and non-causal models. In: Buck Louis GM & Platt RW (eds). Reproductive and perinatal epidemiology. New York: Oxford University Press.

Laws P, Grayson N & Sullivan E 2006. Smoking and pregnancy. AIHW Cat. no. PER 33. Sydney: AIHW NPESU.

Ludford I, Scheil W, Tucker G & Grivell R 2012. Pregnancy outcomes for nulliparous women of advanced maternal age in South Australia, 1998–2008. Australian & New Zealand Journal of Obstetrics & Gynaecology 52:235–41.

NACCHO (National Aboriginal Community Controlled Health Organisation) 2015. Definitions. Viewed 11 August 2015, <http://www.naccho.org.au/aboriginal-health/definitions/>.

National Centre for Social Applications of Geographic Information Systems 2011. ARIA (Accessibility/Remoteness Index of Australia). Viewed 13 August 2015, <http://www.adelaide.edu.au/apmrc/research/projects/category/about_aria.html>.

WHO (World Health Organization) 2011. International statistical classification of diseases and related health problems, 10th revision (ICD-10). Geneva: WHO. Viewed 20 February 2015, <http://apps.who.int/classifications/icd10/browse/2010/en>.

WHO 2015. World Health Statistics 2015. Indicator compendium. Viewed 9 December 2012, <http://www.who.int/gho/publications/world_health_statistics/WHS2015_IndicatorCompendium.pdf>.

Yukdkin PL, Wood L & Redman C 1987. Risk of unexplained stillbirth at different gestational ages. Lancet 1:1192–94.

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Related publications

This report, *Perinatal Deaths in Australia, 1993–2012* is part of the National Maternity Data Development Project (NMDDP). The following publications relating to the NMDDP might also be of interest:

- AIHW 2014. National perinatal mortality data reporting project: issues paper, October 2012. Foundations for enhanced maternity data collection and reporting in Australia: National Maternity Data Development Project Stage 1. Cat. no. PER 66. Canberra: AIHW.
- AIHW 2016. Enhancing maternity data collection and reporting in Australia: National Maternity Data Development Project Stage 2. Cat. no. PER 73. Canberra: AIHW.

This report presents an analysis of the statistics for stillbirths and neonatal deaths in Australia for the calendar years 2011 and 2012, as well as selected trend information for 1993–2012. The aim of this report is to gain a better understanding of the characteristics and causes of stillbirths and neonatal deaths in Australia at a population level and identify changes in perinatal mortality over time. This report is one of several components of the National Maternity Data Development Project.