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Stillbirths in Australia 1991–2009

Perinatal statistics series No. 29

Australian Government
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Authoritative information and statistics to promote better health and wellbeing

PERINATAL STATISTICS SERIES
Number 29

Stillbirths in Australia

1991–2009

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Abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
ICD	International Classification of Diseases
IRSD	Index of Relative Socio-Economic Disadvantage
NHDD	*National health data dictionary*
NHMD	National Hospital Morbidity Database
NMDS	National Minimum Data Set
NMDDP	National Maternity Data Development Project
NPDC	National Perinatal Data Collection
NPESU	National Perinatal Epidemiology and Statistics Unit
NSW	New South Wales
NT	Northern Territory
P-NMDS	Perinatal National Minimum Data Set
PDC	Perinatal data collection
PSANZ-NDC	Perinatal Society of Australia and New Zealand Neonatal Deaths Classification
PSANZ-PDC	Perinatal Society of Australia and New Zealand Perinatal Death Classification
Qld	Queensland
SA	South Australia
SEIFA	Socio-Economic Index for Areas
SGA	small for gestational age
STPDR	state and territory perinatal death review
Tas	Tasmania
UNSW	University of New South Wales
Vic	Victoria
WA	Western Australia

WHO World Health Organization

Symbols

–	nil or rounded to zero
n.p.	Data not published to maintain confidentiality of small numbers or other concerns about the quality of the data

Summary

Australia is considered to be one of the safest countries in which to give birth. Viewed against comparable statistics worldwide, the rate of stillbirth in Australia is among the lowest in the world. Yet 1 baby for every 135 born in this country is a stillbirth. The definition of a 'stillbirth' varies internationally. A 'stillbirth' in Australia is defined as the birth of a baby who shows no signs of life, after a pregnancy of at least 20 weeks gestation or weighing 400g or more.

This first Australian report of stillbirths examines the association of maternal, pregnancy and birth factors with stillbirth. The report makes use of the extensive data about pregnancy and birth that have been collected in all states and territories since 1991. For the period 1991–2009, the stillbirth rate ranged from 6.4–7.8 per 1,000 births, with no discernable trend. In 2009, the stillbirth rate was 7.8 per 1,000 births. In contrast, over these years there has been a continuing slow decline in neonatal mortality from 3.8–2.8 per 1,000 live births.

However, there have been changes over time in the stillbirth rate within subgroups of women with different characteristics. Between 1991 and 2009, the stillbirth rates in mothers aged 40 or older fell from 12.7 to 10.6 per 1,000 births, but rose in teenage mothers from 9.5 to 15.0 per 1,000 births. The increasing rate of stillbirth among younger women warrants further investigation. Among Aboriginal and Torres Strait Islander mothers, stillbirth rates fell from 15.5 per 1,000 total births in 1991–94 to 12.3 per 1,000 total births in 2005–09, while stillbirth rates among babies born to non-Indigenous mothers rose from 6.6 to 7.2 per 1,000 total births. Similarly falling rates of stillbirth over time among babies with higher birthweights were offset by increasing rates among babies with low birthweight; falling rates of stillbirth among twins were offset by increasing rates among singletons and higher order multiple births.

Information about the causes of stillbirth from 2004–08 was provided from state and territory committees where a review of perinatal deaths was undertaken and each death classified to the Perinatal Society of Australia and New Zealand (PSANZ) Perinatal Death Classification. The most common specified cause of stillbirth in Australia was congenital anomaly, accounting for 21% of all stillbirths. However as a group, the PSANZ category for unexplained antepartum stillbirths was slightly more common, accounting for 22% of stillbirths. The number of antepartum stillbirths of unknown cause aligns with findings elsewhere, but must be viewed cautiously because of the low rates of autopsy, which was 38.1% overall, and the lack of available data on placental post-mortem examinations.

Since 1991 there have been progressive increases in the risk of stillbirth from 20–23 weeks gestational age. Most of these deaths were due to congenital anomaly and this increase coincides with the expansion of screening programs for fetal anomaly. It is currently not possible to differentiate stillbirths that arise secondary to late second trimester termination of pregnancy from those that occur for other reasons.

The most important finding in this report is the progressive trends of reduced risk of stillbirth in pregnancies that ended in birth at or after 28 weeks of gestation. Some of this reduction in risk of stillbirth may be due to a shift in mortality to earlier gestations. However, when considered in relation to the overall decline in stillbirth rates over time for older women, this may suggest that some interventions in later pregnancy may have been of benefit and that further reductions in stillbirth are possible.

1 Introduction

This chapter provides background, rationale for the report, definitions of stillbirth and classifications for cause of stillbirths.

Australia is considered to be one of the safest countries in which to give birth. Viewed against comparable statistics worldwide, the rate of stillbirth in Australia is among the lowest in the world. Yet 1 baby for every 135 born in this country is a stillbirth. This makes stillbirth the most common form of mortality associated with childbirth; it is twice as common as neonatal death (ABS 2012). Furthermore, while neonatal and infant mortality rates have declined over the past 10 years stillbirth rates have remained relatively unchanged (Flenady et al. 2011).

Stillbirth is associated with profound and long-lasting grief for mothers, fathers and families. Stillbirth has been called 'the hidden loss' in recognition of the difference in responses between such a death and that of a liveborn child. Globally these deaths are often not considered as deaths, or if they are recognised as deaths they are poorly counted, or not counted at all (Frøen et al. 2011). In Australia, stillbirths are recorded in perinatal data collections maintained by health authorities. For vital registration purposes they are included with birth collections by the Registrar of Births Deaths and Marriages office, generating a certificate of stillbirth. Liveborn babies who die have a birth certificate and a death certificate. Western Australia is alone in including stillbirth registrations with other death registrations for statistical purposes. If the birth is in hospital, then a stillbirth does not generate a hospital record. Thus, even in Australia, stillbirths are not given the same status as neonatal deaths. Frøen and colleagues have suggested that official and administrative discounting of stillbirths reflects the current societal attitude that a stillborn baby is of lesser value than a baby who lived for even a few minutes (Frøen et al. 2011).

When stillbirths are presented in perinatal mortality measures, there is often little focus on the stillbirth component. From a public health perspective, it is important that stillbirth statistics are presented independently of other infant mortality measures. *The Lancet's* published Stillbirth Series highlights the *invisibility* of stillbirth as a major factor, given its absence from health policy agendas globally (Flenady et al. 2011). This is evident in high-income countries such as Australia where, relative to neonatal and infants deaths, interventions for reduction of stillbirth and stillbirth rarely feature as on outcome in clinical trials of methods to improve maternal and infant health (Goldenberg et al. 2011; Flenady et al. 2011).

The Lancet series <http://www.thelancet.com/series/stillbirth> points out that the key to preventing stillbirths is to ensure that stillbirths are counted and count. This means using information about each stillbirth effectively to advance local knowledge about the local causes and aetiology of these deaths. In addition to advancing the understanding of stillbirths and the interplay of the many biological, social and service-related factors that contribute to the risk of stillbirth, research that develops and tests prevention strategies should be undertaken and driven to implement the best relevant findings into practice. There are not only health-care provider and public health issues, but also community, societal and economic impacts of stillbirth which remain poorly understood.

1.1 Rationale for the report

This first national report of maternal, pregnancy and birth factors associated with stillbirth in Australia utilises the extensive data about pregnancy and birth that have been collected annually since 1991 by clinicians attending births in Australia, and by others who provide administrative support for these data collections. The critical measure of pregnancy is birth outcome—liveborn or stillbirth. This report analyses trends over time and looks in more detail at the risk of stillbirth across different populations.

Data on stillbirths enable health professionals, health service planners and health consumers to identify opportunities to improve practices or services, and provide a baseline from which to monitor future change.

The report will also examine the gaps in information about stillbirth, and determine priorities for improvements in data collection and reporting on stillbirth. The structure of the report is outlined in '1.5 Structure of this report' below.

1.2 What is a stillbirth?

A 'stillbirth' is a baby born without signs of life. The definition of 'stillbirth' (fetal death) in the *National health data dictionary* (NHDD) (Box 1.1) is widely applied across Australia to birth registrations and perinatal data collections from maternity care providers for public health surveillance and monitoring. One notable exception is the statutory definition of 'stillbirth' for birth registration in South Australia, where induced termination of pregnancy is explicitly excluded from the definition of a stillbirth (South Australia 2011). There are some other, more subtle differences in the rules applied by agencies and different jurisdictions when information about gestational age or birthweight is missing (Li et al. 2013).

Box 1.1: Definition of 'stillbirth' in Australia

A 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 400g 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.

Source: AIHW 2012a:2024.

The term 'fetal death' is used in the Australian definition as synonymous with stillbirth, but this is a broader term that applies also to the death of a fetus at earlier stages of pregnancy and does not recognise the birth. 'Stillbirth' is therefore the preferred term (Frøen et al. 2011). Figure 1.1 shows the temporal relationship of stillbirths with other perinatal and infant deaths.

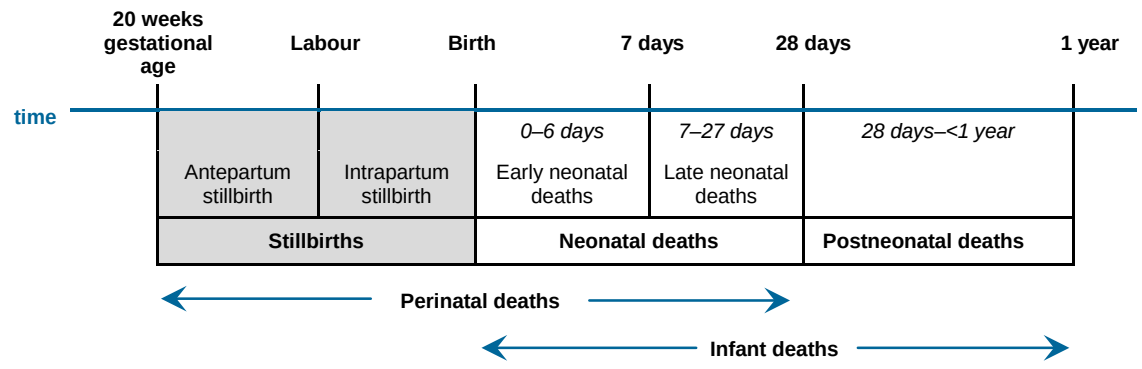


Figure 1.1: Categories of perinatal and infant deaths by gestational age

International differences in definitions of stillbirths

In Australia a baby who is stillborn must be of at least 20 weeks gestational age or weigh 400g or more. In other countries, different weight and gestational age cut-offs apply. New Zealand defines 'stillbirths' to include all fetal deaths from 20 week gestational age or 400g birthweight (PMMRC 2013). In Canada, the definition of a 'stillbirth' includes fetal deaths from 20 week gestational age or 500g birthweight in all provinces except Quebec where only the birthweight criterion applies (PHAC 2008). The United States requires states to report fetal deaths of 20 or more weeks gestation, but the definition of a 'fetal death' specifically excludes deaths that result from induced termination of pregnancy (Kowaleski 1997). The United Kingdom applies a lower limit of 24 weeks gestational age to define 'stillbirths', but includes all fetal deaths that meet this criterion, while across the rest of Europe, the lower limit ranges from 16–26 weeks gestational age and member states vary in their capacity to include late termination of pregnancy that meet their gestation criterion for a stillbirth (Gissler 2012).Thus, when data from Australia are compared with those from other countries, international standards for reporting are applied (WHO 2011).

The World Health Organization (WHO) recommends reporting stillbirths weighing 500g, or born at or after 22 weeks gestational age, or 25 centimetres crown-heel length if neither birthweight nor gestational age is known, but restricting the stillbirths used for international reporting to those weighing 1,000g (or born at or after 28 weeks gestational age or 35 centimetres crown-heel length) (WHO 2011).

The definition applied can impact on reported rates. It has been noted that fewer stillbirths are included for reporting when weight criteria only are applied, than if gestational age is used exclusively or in combination with birthweight (Frøen et al. 2009).

Stillbirth rates and the risk of stillbirth

The 'stillbirth rate' is defined by the WHO as the number of fetal deaths per 1,000 total births (WHO 2011). In this report, stillbirth rates are presented for the whole population and factor-specific stillbirth rates are presented for subgroups of the population. Factor-specific rates are calculated by dividing the number of stillbirths with the factor by the number of total births with the factor. In most cases the result is expressed per 1,000 total births. The risk of stillbirth for population groups with a specific factor can be equated to the factor-specific rate of stillbirth.

This does not hold true for gestational age. The gestation-specific rate of stillbirth, calculated as the number of stillbirths at a specified gestation divided by the number of births at that gestation, is not actually a measure of the risk of stillbirth at that gestation. This is because the denominator, which comprises only the babies born at that gestation, does not include all the babies who were at risk. At any given gestation, babies who are yet to be born and remain in utero also need to be included (Yudkin et al. 1987).

Risk of stillbirth at a given gestational period is best measured as the proportion of babies not yet born at the start of the measurement period, who are stillborn within the time period (Smith 2005). This has been called the 'prospective risk of stillbirth' (Crowley 2007), but in this report is referred to as the 'risk of stillbirth for a given gestation interval'. The prospective risk of stillbirth is a proxy for the risk of fetal death at a given gestation, because there is no fixed interval between the time of death and the birth.

Risks of stillbirth over a given gestation period can be compared across groups, but within-group-risks across gestational age are not directly comparable because WHO standard gestational age groups are not of uniform duration. Groups comprise three 4-week periods of 20–23, 24–27 and 28–31 completed weeks of gestational age respectively and two 5-week periods of 32–36 and 37–41 completed weeks of gestational age. The average weekly risk of stillbirth can be used to compare early and late gestation-specific risk of stillbirth. For example, at 20 and 23 weeks gestational age, the average weekly risk of a stillbirth is 0.78 per 1,000 singletons compared with 0.28 per 1,000 singletons at term (37–41 completed weeks of gestation). However, for most purposes, the grouped data clearly show the stage of pregnancy at which babies are most at risk of a stillbirth.

1.3 Classifications for cause of death among stillbirths

The fundamental question for mothers, fathers and family members following a stillbirth is 'Why did my baby die?' Answering this question is important for parents, and for clinicians who need to advise on the recurrence risk and management of future pregnancies.

This question is also fundamentally important to policymakers and planners, but to be of value there needs to be a suitable framework to assemble cause-of-death data. Classification systems are information management tools and are usually designed for a specific purpose. Cause-of-death classifications are primarily intended either for audit or for public health purposes to assist with assessment of the quality of health care and development of programs to prevent or reduce mortality rates overall or for specific causes.

There are over 30 classification systems for stillbirths globally and several are widely used currently (Flenady et al. 2009). The Perinatal Society of Australia and New Zealand (PSANZ) Perinatal Death Classification system is used for classification of the causes of important contributing factors for stillbirths in Australia and is discussed in more detail further in this section.

Classification systems are only as good as the information that populates them. The need for accurate information about cause of death is evident. The cause of stillbirth is often multifactorial and a detailed investigation and multidisciplinary panel review are required to correctly identify the causes and associated conditions. The extent of post-mortem investigations undertaken, that is whether or not there is an autopsy and placental histopathology carried out by an experienced perinatal pathologist, and the range of

laboratory tests carried out, will impact the capacity to assign a specific cause of death and minimise the proportion of stillbirth that remains unexplained (Flenady et al. 2009).

International Classification of Diseases

The internationally accepted system for classifying cause of death is the *International Classification of Diseases* (ICD), currently in its 10th edition (ICD-10) (WHO 2011). It has been developed by panels of experts from around the world under the umbrella of the WHO. The system is complex and detailed and designed to provide a standardised system for categorising and comparing mortality and morbidity nationally and internationally.

The ICD is the international standard for reporting and comparing information about cause of death, and is used in conjunction with the WHO-recommended forms for medical notification of cause of death designed to identify the underlying cause of death. Detailed coding rules are used by agencies to code cause of death to ICD. However, the forms and coding rules applied to stillbirths and neonatal deaths are different. The causal chain-of-events format is replaced by 2 lists: maternal causes; and fetal or neonatal causes. It is not possible to determine the relative importance of each cause. The first cause listed is reported by ABS as the primary maternal or fetal/neonatal cause respectively.

The ICD-10 has other limitations in coding and classifying cause of death in stillbirth. These include the failure of ICD-10 to recognise the stillborn baby as an individual with their own diseases, conditions and events which are distinct from those of the mother (Frøen et al. 2009); the need to standardise the application of 'O' and 'P' codes; and the absolute lack of codes for a number of specific placental conditions (Frøen et al. 2009).

These concerns echo the views expressed by Australian clinicians active in perinatal mortality reviews within the PSANZ Perinatal Mortality Group (Flenady et al. 2009), and the decision by jurisdictional perinatal death review committees to apply the PSANZ classification system to classify causes of stillbirth.

The ICD classification is reviewed and revised regularly. ICD-11 is due to replace ICD-10 in 2017. It remains to be seen whether the new version will be more appropriate for classifying cause of death for stillbirths.

Perinatal Society of Australia and New Zealand Perinatal Death Classification

The PSANZ-PDC and the complementary Neonatal Deaths Classification (PSANZ-NDC) were developed in the 1990s by a multidisciplinary special interest group within the PSANZ to assist the process of perinatal mortality audit and identify the single most important fetal or maternal factor that initiated the chain of events that resulted in the stillbirth or neonatal death (King & Warren 2006; Flenady et al. 2009). Further work has been undertaken since then to accommodate additional causes in recognition of the relatively high level of co-morbidity in some cases.

The classification system is designed to be used in conjunction with the PSANZ *Clinical Practice Guidelines for Perinatal Mortality* (Flenady et al. 2009). The purpose of these guidelines is to enable a systematic approach to the investigation and audit of stillbirths and neonatal deaths across Australia and New Zealand. The guidelines recommend a standardised data collection for all stillbirths and neonatal deaths to inform high-quality audit as to the causes

and contributing factors of deaths at both the hospital and health department levels. This data collection has been developed in consultation with the NPESU.

Use of the PSANZ classification system is supported by professional bodies and clinicians and is currently used in all Australian states and territories to assign cause of death following multidisciplinary review, which in most states is undertaken by specially constituted committees. These committees are discussed in more detail below.

1.4 Information about stillbirths

Vital registration data

The primary function of vital registration is to maintain accurate records and issue certificates for the vital events of birth, death and marriage. These vital registrations support various civil functions such as proof of identity and nationality, and national demography. Each Australian jurisdiction has its own legislation that governs the procedures for the collection, processing, reporting and release of information collected through vital registration. These procedures are broadly similar, but not identical, across each of the states and territories.

The legislation also makes provision for the capture of statistical information and release of this information for national reporting by the Australian Bureau of Statistics (ABS). The ABS is the repository of official statistics from vital registration.

In all Australian states and territories, information about stillbirths is captured in birth registration data collections, which require notification of cause of stillbirth by the attending doctor and by 1 or both parents. Both forms of notification are required to fully register a stillbirth. However, many parents do not notify their local registrar of the stillbirth. There is provision in most jurisdictions for partial registration, but the capacity of registrars to follow up on partially registered stillbirths is limited. Only information from fully registered cases can be forwarded to the ABS for inclusion in national statistics. The certifier can update information about cause of death if this changes as a result of post-mortem investigations, but this involves additional communication with the registrar. Differences in the cause of death between registration and post-mortem investigation sources in Western Australia suggest that such updating was not being done (Measey 2007).

The ABS has a key role in the application of ICD coding to information provided on the medical certificates of cause of death, and combines information provided from stillbirth registrations with that of neonatal death registrations. Information about perinatal deaths are reported by ABS, either as a section of the national mortality report (ABS 2012) or as a separate report (ABS 2013).

Perinatal data collections by health-care agencies

In parallel with vital registrations, all states and territories have developed data collections about all births within their jurisdictions and mechanisms for clinician review of perinatal deaths (stillbirths and neonatal deaths). These health collections have evolved to serve public health, clinical audit and epidemiological needs.

Perinatal data collected by health-care agencies are used as the primary source of information in this report and are described in detail in Chapter 2. These data are supplemented with data from other jurisdictional health department data collections.

1.5 Structure of this report

Chapter 1—Introduction: provides background, the rationale for the report, definitions of stillbirth and classifications for cause of stillbirths.

Chapter 2—Sources of information for this report: outlines the data sources used for this report.

Chapter 3—Trends in stillbirth: outlines the trends in stillbirth from 1991–2009, including rates of stillbirth for multiple pregnancies, maternal age, maternal Indigenous status and others.

Chapter 4—Cause of stillbirth: details the cause of stillbirth 1991–2009, including causes for different gestational age, different maternal age and across states and territories.

Chapter 5—Recent data: presents the risk of stillbirth 2005–09, allowing for differences among singeltons at each gestational age and among multiple birth by key socio-demographic , maternal and infant conditions.

Chapter 6—International comparison: provides stillbirth rates in Australia and other countries based on the World Health Organization definition of stillbirth for international comparison.

Chapter 7—The way forward: outlines some important considerations for further reducing stillbirths in Australia.

Appendix A—Fetal Deaths Report Expert Reference Group: provides a list of members of this group.

Appendix B—Statistical methods used in the report: outlines the statistical methods used in the report.

Appendix C—Data quality statement National Perinatal Data Collection: provides information on the quality of data in the National Perinatal Data Collection.

Appendix D—Data used in figures: provides the data used to generate figures in the report.

Appendix E—Enhancing maternity data for births in New South Wales with details of perinatal deaths: outlines the data linkage undertaken to enhance the data on stillbirths in NSW.

2 Sources of information for this report

This chapter outlines the data sources used for this report.

2.1 National Perinatal Data Collection and Perinatal National Minimum Data Set

The National Perinatal Data Collection (NPDC) is a national population-based epidemiological data collection of pregnancy and childbirth. Information is included in the NPDC for all live births and stillbirths of at least 400g birthweight or at least 20 weeks gestation.

NPDC data incorporates the Perinatal National Minimum Data Set (P-NMDS) and a series of additional data items. The P-NMDS is an agreed set of standardised perinatal data items used for national reporting (HDSC 2011) and currently contributes to a series of national performance indicators (COAG 2011). The standards make data collection activities more efficient and effective, ensuring comparable and consistent data are available nationally for reporting purposes. An NMDS includes agreement on specified data elements (discrete items of information or variables) and supporting data element concepts, as well as the scope of the application of those data elements and the statistical units for collection.

The national information on births are collated from data from state and territory collections. P-NMDS data and most NPDC data derive from the jurisdictional perinatal data collections. Supplementary data on perinatal deaths, including PSANZ causes of death are derived from perinatal mortality review data. These jurisdictional data sources are described in more detail below and in the NPDC data quality statement (DQS) (Appendix C). Data for the year ending 31 December are provided annually to the AIHW.

Birth status (live birth or stillbirth) has been included in the P-NMDS since its inception in 1997. However, information about stillbirths has been included in the NPDC from 1991 onwards.

2.2 State and territory perinatal data collections

Each state and territory receives notifications collected of all births in hospitals, birth centres and the community within their jurisdiction. Data are collected from administrative, epidemiological and clinical record systems and forwarded regularly to the perinatal data collection (PDC) in each state and territory. Midwives and other staff, using information obtained from mothers and from hospital or other records, complete notification forms for each birth in each jurisdiction.

All states and territories have a similar or wider scope for their PDC. Many states apply the NHDD and WHO definitions of a 'live birth', which include those babies born alive before 20 weeks gestation and weighing less than 400g. As explained earlier, South Australian legislation does not recognise terminations of pregnancy as births. The data provided by South Australia for the NPDC is therefore supplemented with data from the Birth Defects Data collection which includes information about all births terminated for congenital anomaly or maternal medical indications. It is recognised that stillbirths following late termination of pregnancy for social indications are not captured.

The range of data, arrangements for data collection, and processing and validation of data vary by jurisdiction.

2.3 State and territory perinatal death review committees

Clinical guidelines recommend that all hospital committees undertake audit and classification of all perinatal deaths, and that the cause of death is reported to the health department (Flenady et al. 2009). The clinical information relating to each perinatal death is collated and revised, including the results of post-mortem investigations, and classification of cause of death is assigned.

State and territory perinatal death review (STPDR) committees are currently convened by health authorities in all jurisdictions except the Northern Territory, although some committees were inactive during some years covered by this report. Territory-wide coverage of data about stillbirths is expected to improve as a result of the recently enacted Perinatal Regulations under the NT Public and Enviorimental Health Act, 2011. Like Queensland and New South Wales, the Northern Territory supports first-line review of perinatal deaths locally, and the PSANZ cause of death is assigned for deaths in tertiary hospitals in the Northern Territory. The Queensland committee was disbanded for some years and was reconstituted in 2011. One of the first tasks undertaken by the re-formed committee was to review and classify the backlog of perinatal deaths which is now complete. Restructuring of the New South Wales Ministry of Health resulted in responsibility for this committee being moved in 2012.

Procedures for perinatal death reviews vary between jurisdictions, reflecting the differences in the size of their populations, legislative arrangements and possibly also the resources available for these activities. However, all committees have in common: a multidisciplinary membership with expert representation from obstetricians, midwives, neonatologists and dedicated perinatal pathologists; following the *PSANZ Clinical Practice Guidelines* (Flenady et al. 2009); and some degree of legal privilege that supports frank and full examination of the cause of death.

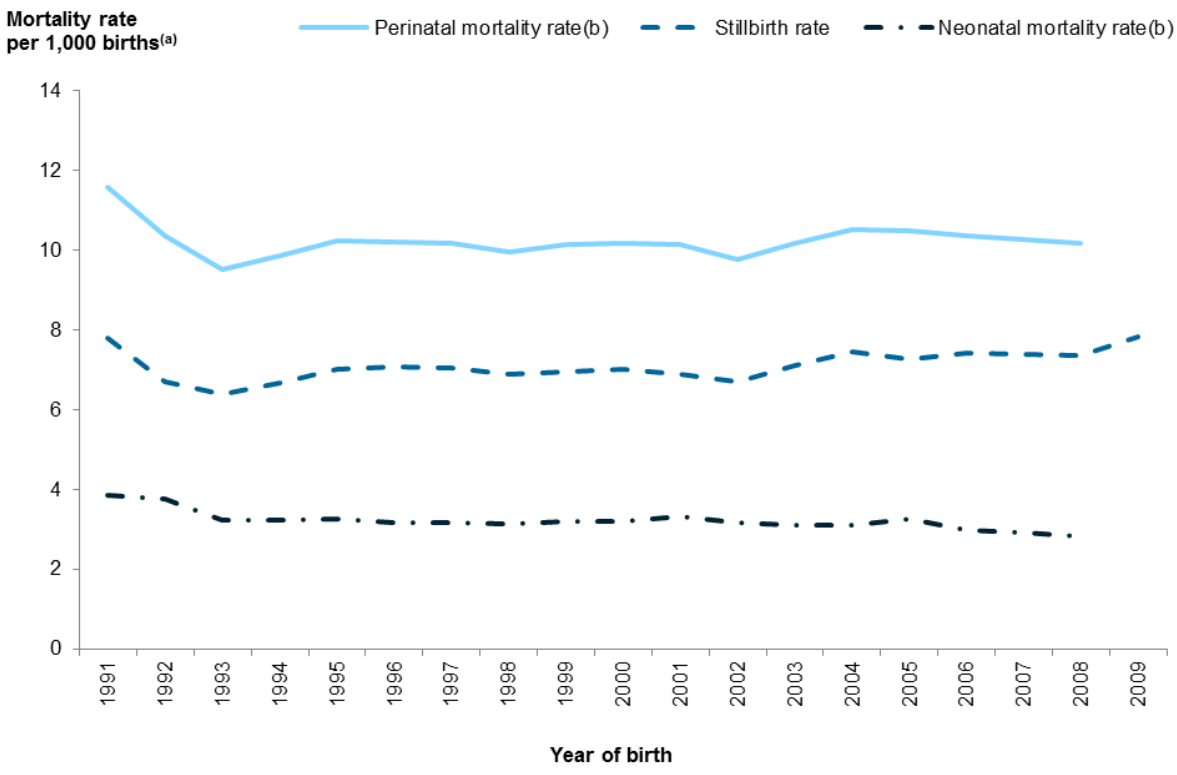
In states and territories with an active STPDR committee, supplementary data about perinatal deaths were available for integration or linkage with PDC data. However, at the time this report was commissioned, New South Wales Health did not hold PDC data combined with data from the Perinatal Deaths Database. The New South Wales linked PDC and perinatal deaths data for this report were provided from a research study undertaken by NPESU, details of which are provided in Appendix E.

3 Trends in stillbirth

This chapter outlines the trends in stillbirth from 1991–2009, including rates of stillbirth for multiple pregnancies, maternal age, maternal Indigenous status and others.

3.1 Stillbirths in relation to perinatal mortality

Stillbirths, combined with neonatal deaths, are termed 'perinatal deaths'. The common way to report perinatal deaths is as a 'perinatal mortality rate', which is defined as the number of perinatal deaths per 1,000 births. Stillbirths account for approximately two-thirds of perinatal deaths. Perinatal mortality rates in Australia fell progressively during the 1960s, 1970s and 1980s, levelled in the early 1990s, then did not change appreciably until after 2001 when some fluctuation occurred. From this period, a marginal fall in the average annual neonatal mortality rate of 0.04 per 1,000 live births was matched by a rise in the average annual rate of stillbirth (Figure 3.1) of 0.03 per 1,000 births. Figure 3.1 presents annual stillbirth, neonatal and perinatal mortality rates from 1991–2009.



(a) Stillbirth and perinatal mortality are presented per 1,000 total births and neonatal mortality is presented per 1,000 live births.

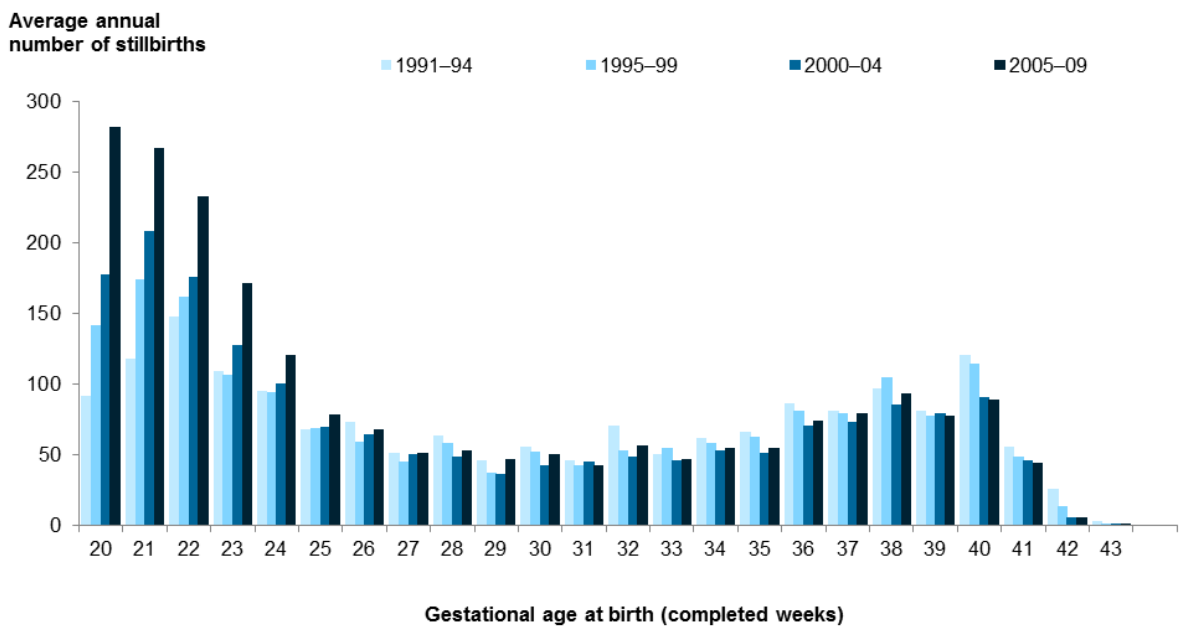
(b) Perinatal and neonatal mortality rates were not available for Australia in 2009 as Victoria did not provide data on neonatal deaths.

Note: Data for this figure are in Table D1.

Figure 3.1: Trends in stillbirth, neonatal and perinatal mortality rates, Australia, 1991–2009

3.2 Number of stillbirths

There were 2,341 stillbirths in Australia in 2009, an increase on 1991 when 2,006 stillbirths were reported. Figure 3.2 shows the average annual number of stillbirths in each of the aggregated year groups from 1991–2009. The distribution of stillbirths across gestational age groups is bimodal with peaks at 20–23 weeks and at term (37–41 weeks). During this period, the number of stillbirths varied at each gestational age, noting that increases in 2005–09 reflect in part the 16.3% increase in births in Australia. Nevertheless, there is an apparent increase in the proportion of stillbirths at very early gestational ages in 2005–09, that is less than 25 weeks, compared to later in pregnancy. In recent years, the number of stillbirths occurring from 20–24 weeks gestation has greatly exceeded the number of stillbirths at term (from 37–41 weeks gestation).



Note: Data for this figure are in Table D2.

Figure 3.2: Stillbirths at each week of gestational age, Australia, 1991–2009

3.3 Multiple births

Multiple birth carries a substantially increased risk of stillbirth. In Australia from 2005–09, the stillbirth rate was 7 per 1,000 singleton babies compared with 19.4 per 1,000 twin babies. Twin and triplet babies were respectively twice and 5 times more likely to die before birth than singleton babies (Table 3.1).

The risk that a woman will give birth to a stillborn baby is 4 times higher if she is giving birth to twins and over 11 times higher if she is giving birth to triplets or higher order multiples. From 2005–09, 1 in every 35 women carrying twins for 20 weeks or longer experienced a stillbirth. In contrast, 7 per 1,000 women, or 1 in 143 women with a singleton pregnancy experienced stillbirth.

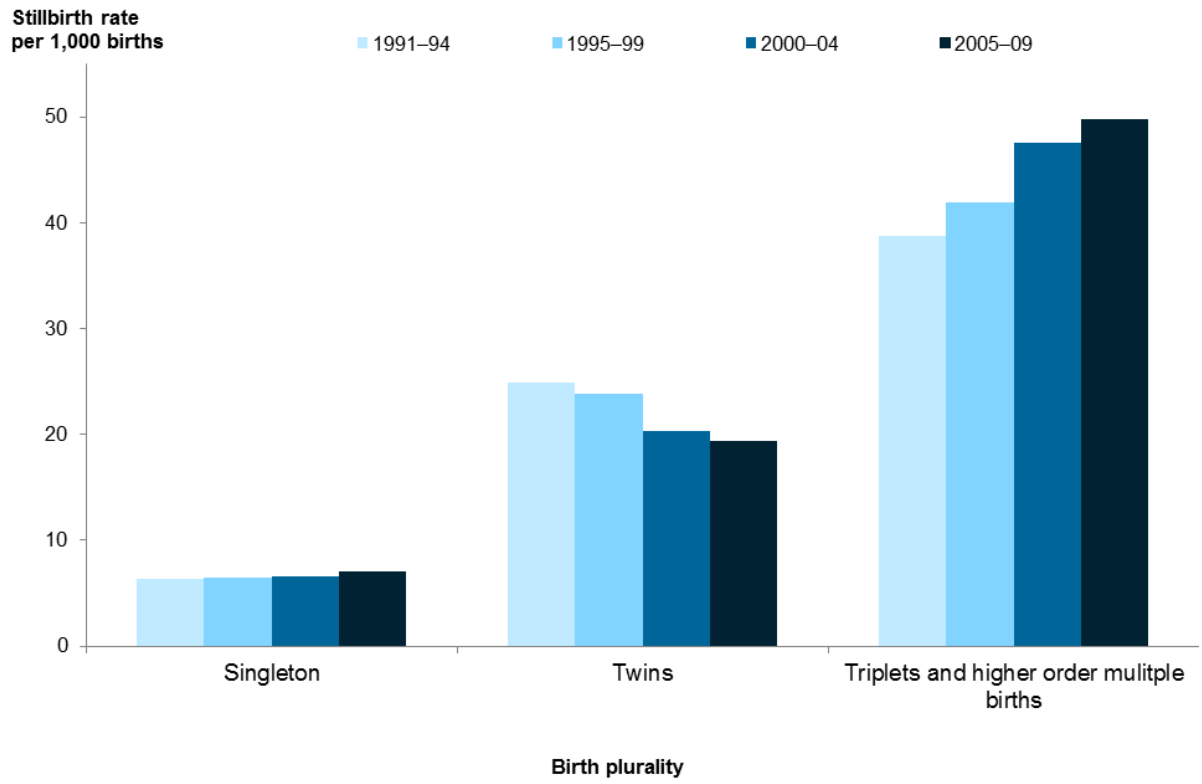
Furthermore, in a multi-fetal pregnancy more than 1 baby may die before birth. Both babies died before birth in almost one-third of twin pregnancies that ended with stillbirth. In Australia from 2005–09, the risk that no baby was liveborn was 9.2 per 1,000 twin pregnancies and 17.1 per 1,000 triplet pregnancies, compared with 7 per 1,000 singleton pregnancies.

Table 3.1: Birth multiplicity and stillbirth rate among pregnancies and births, Australia, 2005–09

			Stillbirths per pregnancy					Stillbirth rate	
	Pregnancies	Births	1	2	3	1 or more	Total stillbirths	per 1,000 pregnancies	per 1,000 births
Singleton	1,398,323	1,398,323	9,832	–	–	9,832	9,832	7.0	7.0
Twin	22,669	45,338	464	208	–	672	880	29.6	19.4
Triplet	410	1,230	16	10	7	33	57	80.5	46.3
Quadruplet	14	56				4	7	285.7	125.0
All[(a)]	**1,421,422**	**1,444,953**	**10,312**	**218**	**7**	**10,541**	**10,776**		

(a) Includes plurality 'not stated'.

Figure 3.3 compares the trends in the stillbirth rate from 1991–2009 among babies born as singletons, as twins and as higher order multiple births. Since 1991 there have been very small, but progressive increases in the rate of stillbirths among singleton births—from 6.4 per 1,000 total births in 1991–94 to 7.0 per 1,000 total births in 2005–09. In contrast, the stillbirth rate among twin births and higher order births has changed markedly. The stillbirth rate for twins declined while for higher-order multiple births the late fetal mortality rate per birth increased.



Note: Data for this figure are in Table D3.

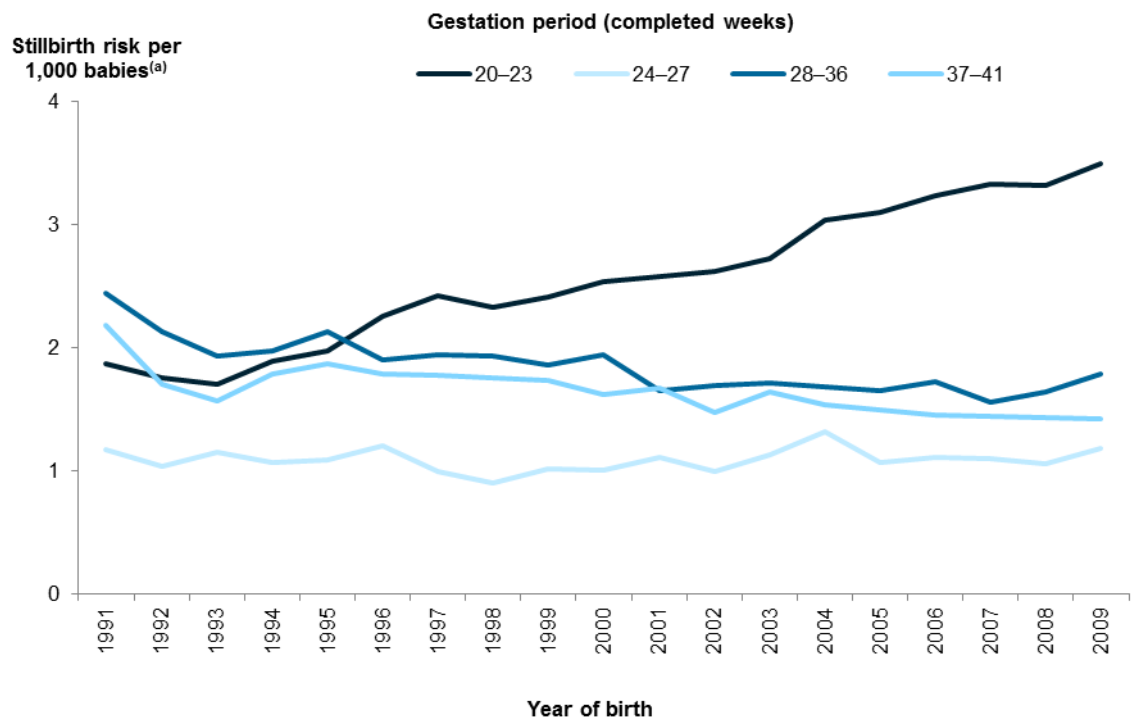
Figure 3.3: Stillbirth rates by plurality, Australia, 1991–2009

3.4 Births at different gestations

From 2005–09, 94% of babies born at 20 weeks gestation were stillborn. With each advancing week of pregnancy the proportion of babies who were live-born increased progressively. The rate of stillbirth (per 1,000 births) at 39, 40 and 41 weeks of gestation respectively was 1.4 per 1,000 births. Since 1991 there has been a steady decline in the number of post-term births defined as birth after 41 weeks of gestation. There were insufficient babies born in the post-term period during these years to determine a reliable rate of stillbirth.

Gestation at birth is different to other factors considered here, because gestation is a measure of the timing of events. Risk is a measure of the likelihood of an adverse event occurring across the whole population. To assess the risk of stillbirth at different times during pregnancy, it is necessary to consider all the babies that could be affected at that time. For the risk of stillbirth, this is the population of unborn babies. The prospective risk of stillbirth, is a measure of the risk that a baby not yet born at the start of each defined gestational period will be a stillbirth during the nominated time. Details of how this risk is calculated are provided in Appendix B.

Trends in the prospective risk of stillbirth for gestational age are shown in Figure 3.4. This shows the risk of stillbirth in the later gestational periods 28–36 weeks and 37–41 weeks decreased between 1991 and 2009. This is offset by increases in the prospective risk of stillbirths from 20–27 weeks gestation. Over this time period, the stillbirth risk increased slightly at 24–27 weeks gestation, but increased progressively and substantially at gestations less than 24 weeks, from 1.9 to 3.5 per 1,000 total babies (born and yet to be born).



(a) Babies at each gestation includes the babies born at that gestation and all the babies yet to be born. See Appendix B for more information about this measure.

Note: Data for this figure are in Table D4.

Figure 3.4: Trends in stillbirth risk by gestational age at birth, Australia, 1991–2009

3.5 Size of the baby at birth

Table 3.2 shows the trends in the birthweight-specific stillbirth rate between the period 1991–94 and 2005–09. Birthweight-specific analyses show variable changes in low birthweight births (less than 2,500g). For babies weighing less than 1,500g, the rate of stillbirth increased from 279.2 per 1,000 births in 1991–94 to 327.3 per 1,000 births in 2005–09. In contrast, the stillbirth rate decreased among births of babies weighing 1,500–2,499g between 1991–94 and 2005–09 (23.0 and 16.5 per 1,000 births respectively).

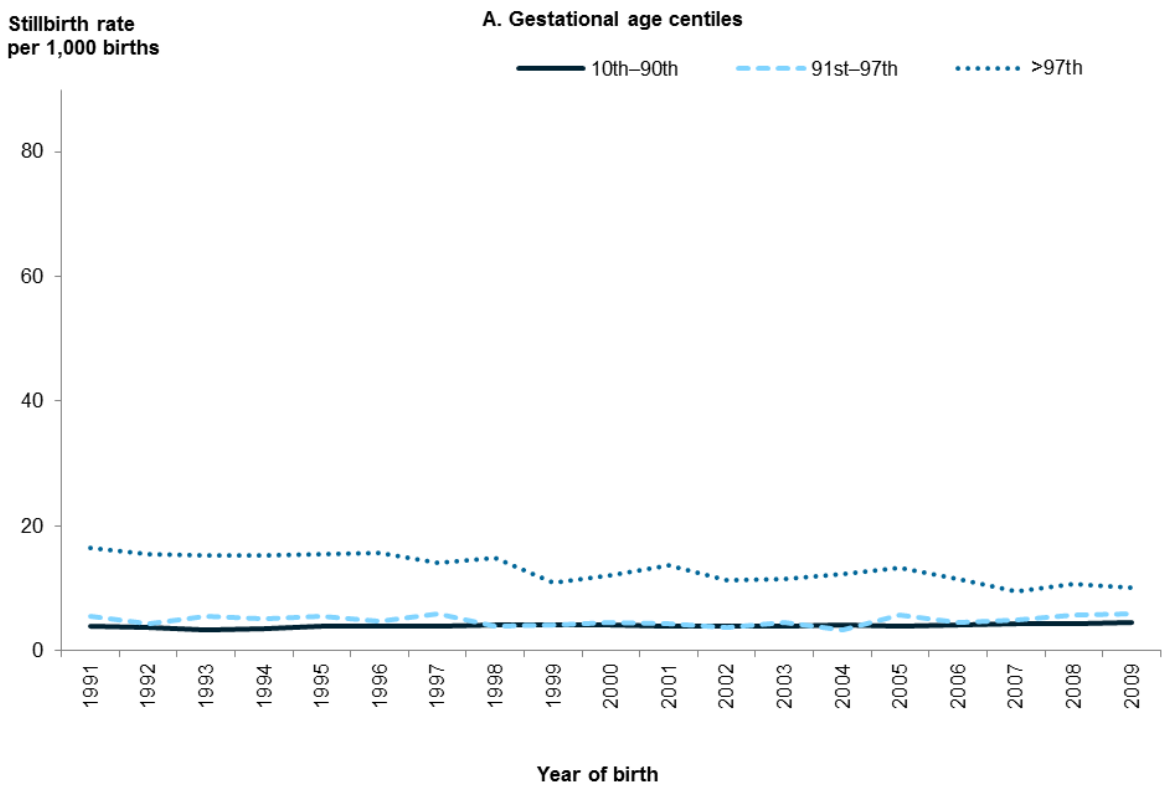
Table 3.2: Trends in birthweight-specific stillbirth rates, Australia, 1991–2009

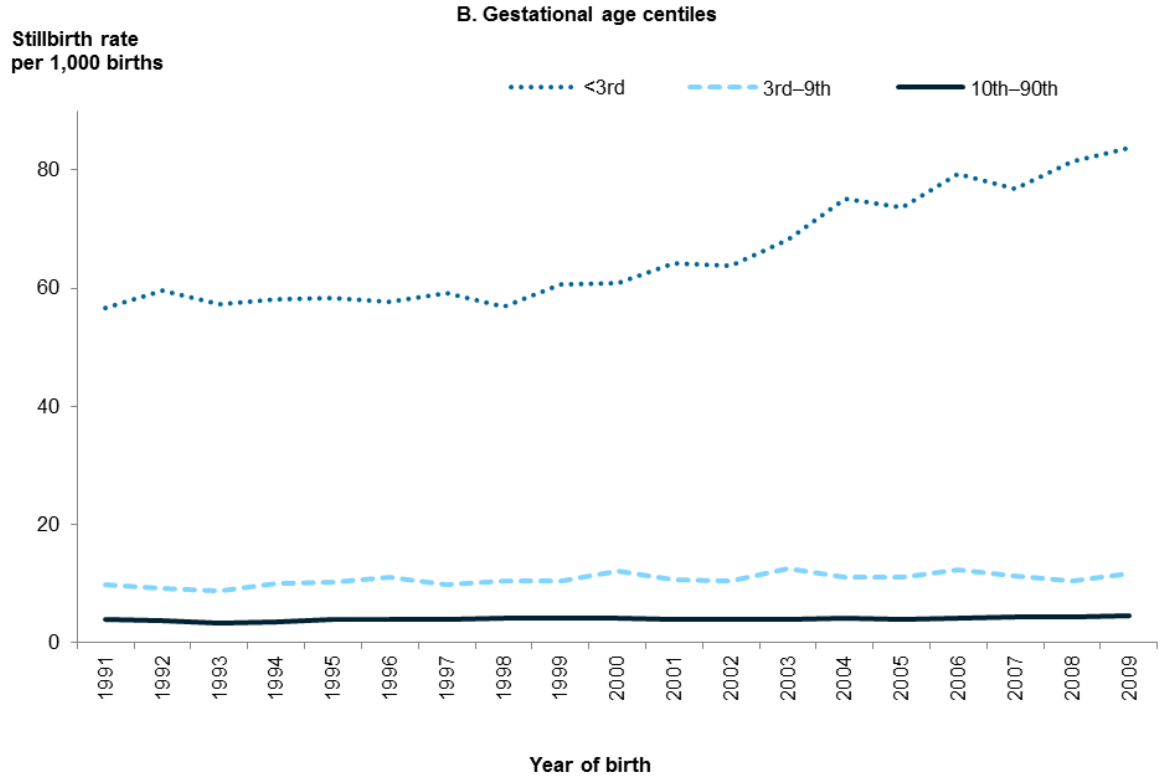
	Year of birth			
Birthweight (grams)	**1991–94**	**1995–99**	**2000–04**	**2005–09**
	Rate per 1,000 births			
Less than 1,500	279.2	289.0	297.4	327.3
1,500–2,499	23.0	21.4	16.6	16.5
2,500–2,999	4.3	4.1	3.8	3.4
3,000–3,999	1.4	1.4	1.2	1.1
4,000 or more	1.4	1.4	1.1	1.1

Note: Data used to calculate rates for this table are in Supplementary Table S3.2.

The rate of stillbirth among singleton babies varies when birthweight is considered in relation to fetal weight standards at each gestational age (Hadlock 1991). The centile value indicates where the observed birthweight lies in the distribution of normal fetal weights at a given gestational age. Weights above than the 97th centile indicate that the baby is extremely large for gestational age, while weights below the third centile indicate that the baby is extremely small for its gestational age.

Figure 3.5 shows that between 1991 and 2009, stillbirth rates among largest singleton babies declined while for smallest singleton babies the stillbirth rate increased. The stillbirth rate among singleton babies with a fetal weight greater than 97th centile weight halved from 19.9 per 1,000 births in 1991 to 10.2 per 1,000 births in 2009. In contrast, the rate of stillbirth increased from 58.3 per 1,000 singleton births in 1991 to 83.0 per 1,000 singleton births in 2009 among babies with a weight less than than the 3rd centile. There was no appreciable change among moderately large (91st to 97th centiles) or moderately small babies (3rd to 9th centiles). The stillbirth rate for singleton babies with a fetal weight between the 10th and the 90th centiles is shown in both graphs and remained stable between 1991 and 2009 at around 4.0 per 1,000 births.



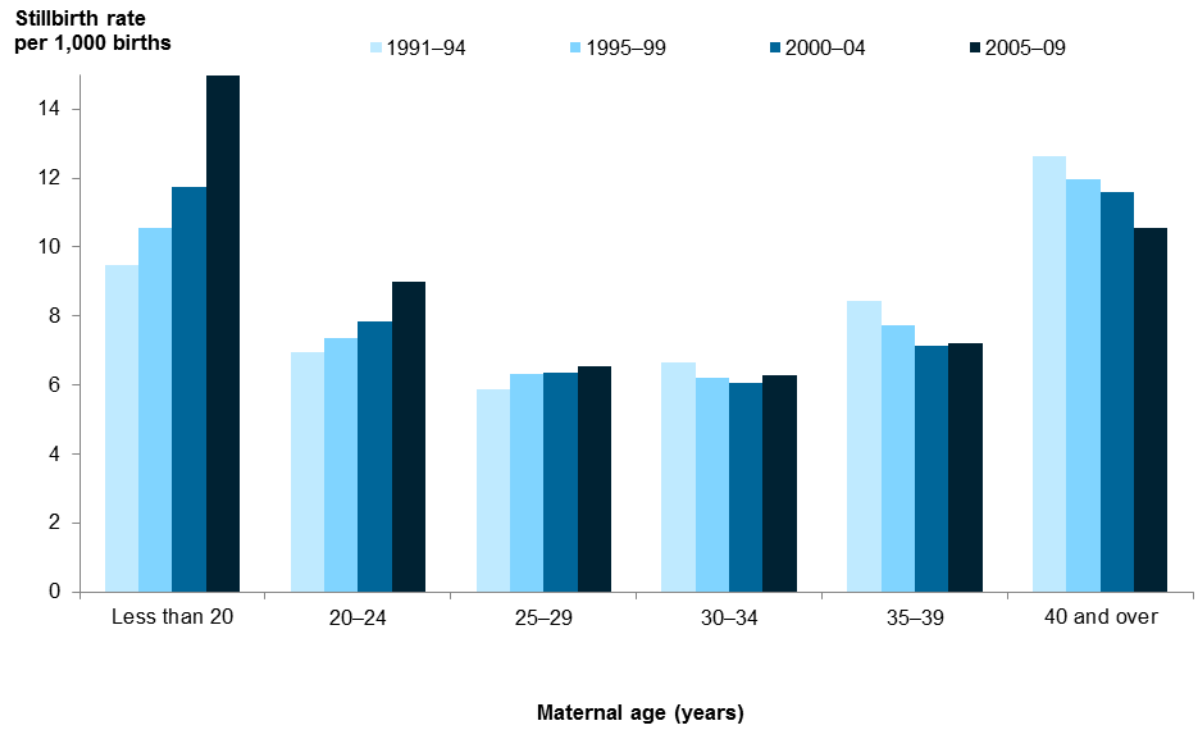


Note: Data for this figure are in Table D5.

Figure 3.5: Trends in stillbirth rates in singleton babies by size of baby, Australia, 1991–2009

3.6 Maternal age

Figure 3.6 illustrates the trend in stillbirth rate by maternal age in the period from 1991–94 to 2005–09. The rate of stillbirth increased during this period among babies to mothers aged less than 20 years, and to a lesser extent among mothers aged 20–24 years. Over the same period, the rate of stillbirth fluctuated among babies to mothers aged 30–34. For babies to mothers aged 40 years and over, the stillbirth rate fell from 12.7 per 1,000 births in 1991–94 to 10.6 per 1,000 births in 2005–09.

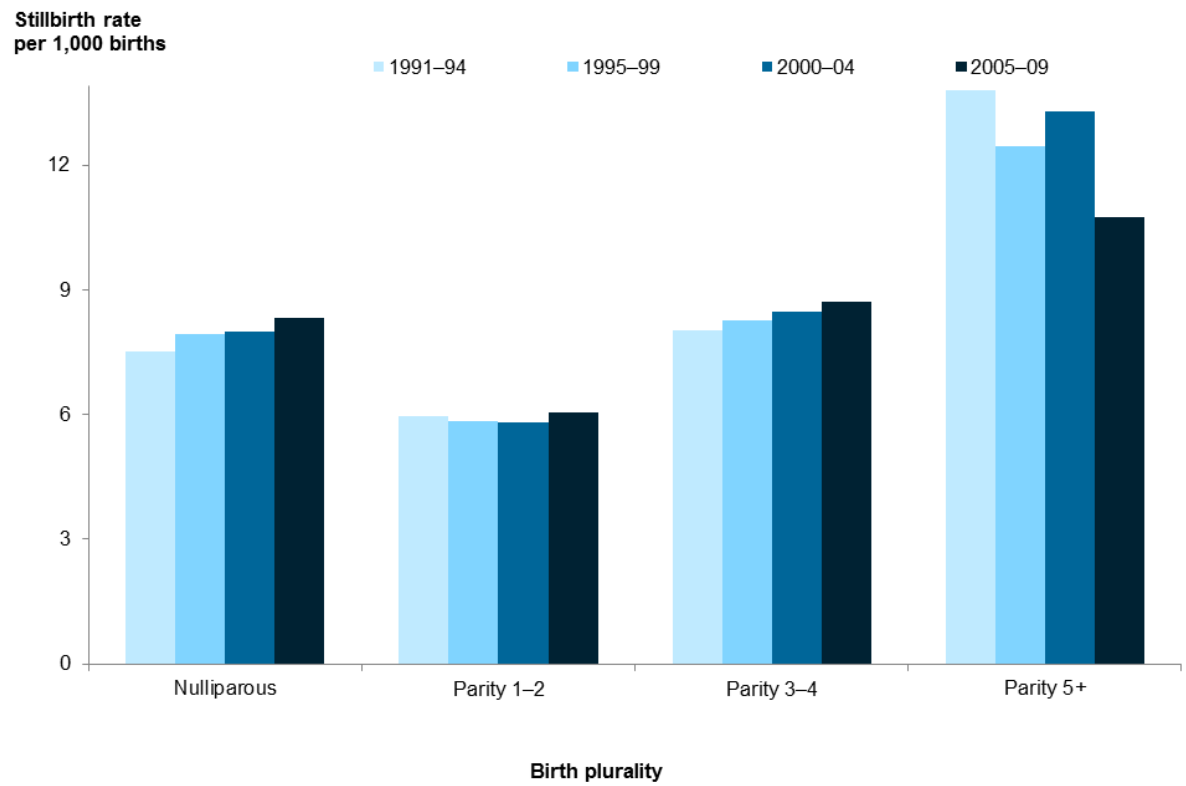


Note: Data for this figure are in Table D6.

Figure 3.6: Trends in stillbirth rate by maternal age, Australia, 1991–2009

3.7 Parity

'Parity' is a clinical term for the number of pregnancies a woman has had that ended with a birth prior to the current pregnancy. From 1991–2009, babies to mothers who had 5 or more previous births had the highest rate of stillbirth, while babies to mothers who had 1 or 2 previous births had the lowest risk of stillbirth. During this time period, the stillbirth rate among babies to mothers who had 5 or more previous births fluctuated with the lowest reported rate of 10.8 per 1,000 births in 2005–09. For babies to mothers who had 1 or 2 previous births, the risk of stillbirth steadily declined over the period from 1991–94 to 2000–04. This was followed by a marked increase during 2005–09 (6.0 per 1,000 births). Between 1991 and 2009, the risk of stillbirth gradually increased among babies to first-time mothers and to women who have had 3 or 4 previous births (Figure 3.7). Parity is generally positively associated with maternal age; that is higher parity tends to be associated with older mothers. However, later childbearing has increased the average age of women having a first baby (Li et al. 2013) and may impose biological limits on parity. Over the last 20 years, the average number of children in families has declined, particularly in families with relatively advantaged women.

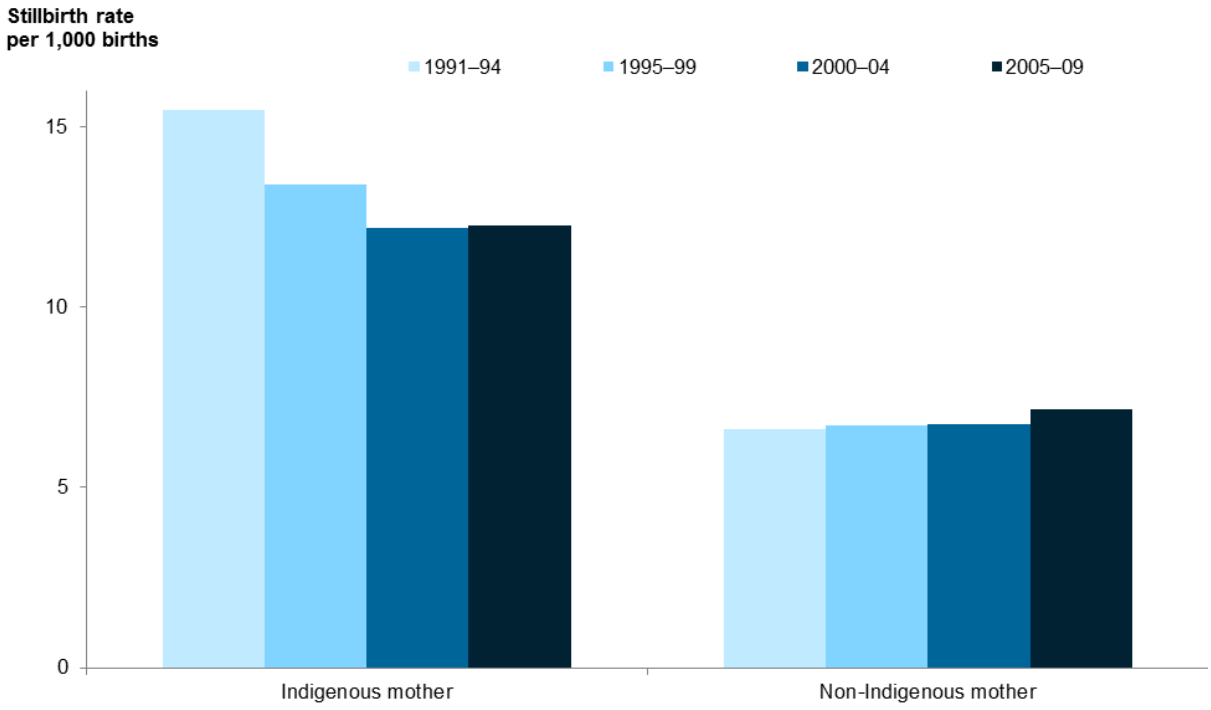


Note: Data for this figure are in Table D7.

Figure 3.7: Trends in stillbirth rate by parity, Australia, 1991–2009

3.8 Maternal Indigenous status

Figure 3.8 compares the trend in the rate of stillbirth between 1991 and 2009 of babies born to Indigenous mothers and babies born to non-Indigenous mothers. It shows a decrease in the risk of stillbirth among babies to Indigenous mother in the period between 1991–94 and 2000–04 (from 15.5 to 12.2 per 1,000 births). For the subsequent 5-year period the risk remained stable at just over 12.2 per 1,000 births. In contrast, the risk of stillbirth of babies to non-Indigenous mothers has slowly risen from 6.6 per 1,000 births in 1991–95 to 7.2 per 1,000 births in 2005–09.



Note: Data for this figure are in Table D8.

Figure 3.8: Trends in stillbirth risk by maternal Indigenous status, Australia, 1991–2009

3.9 Remoteness of mother's area of usual residence

Table 3.3 shows the trend in the stillbirth rate over time by mother's area of usual residence. During the period 2000–09, babies to mothers who lived in *Very remote areas* had the highest rate of stillbirth, which peaked at 15.2 per 1,000 births in 2006. The rate of stillbirth fluctuated among babies to mothers who lived in *Major cities*, ranging from 6.4 per 1,000 births in 2002 to 7.6 per 1,000 births in 2009.

Table 3.3: Trends in stillbirth rate[(a)] by mother's area of usual residence, Australia, 2000–09

	Year of birth									
Mother's usual residence	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Major city	6.7	6.6	6.4	6.8	7.2	6.9	7.2	7.1	7.2	7.6
Inner regional area	6.6	6.5	7.1	7.1	7.7	7.1	7.0	7.4	7.4	7.3
Outer regional area	8.5	8.2	6.8	7.6	7.6	8.2	7.8	7.5	7.3	8.6
Remote area	8.4	8.3	8.1	8.9	7.6	7.1	8.8	8.5	8.1	9.0
Very remote area	12.6	12.2	8.1	12.8	8.1	14.4	15.2	13.4	7.6	15.0

(a) Stillbirth rate is expressed per 1,000 births.

Note: Data used to calculate rates for this table are in Supplementary Table S3.3.

4 Cause of stillbirth

This chapter details the cause of stillbirth 1991–2009, including causes for different gestational age, different maternal age and across states and territories.

All states and territories with a perinatal deaths review committee have implemented the PSANZ-PDC to classify causes of stillbirths. Seven of the jurisdictions provided causes of stillbirths for the years 2004–08, according to the PSANZ-PDC. These were New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory. Data from the Northern Territory were not available. It is estimated that 2% of all stillbirths occur in the Northern Territory.

Tables 4.1–4.4 provide an overview of the causes of stillbirth in Australia.

Congenital abnormality was the leading cause of stillbirth in Western Australia, South Australia, Tasmania and the Australian Capital Territory, with unexplained antepartum stillbirth as the next most common category of PSANZ cause of death. In New South Wales and Queensland, the leading PSANZ category for cause of stillbirth was unexplained antepartum death, at 1.7 and 2.0 per 1,000 births respectively. Maternal conditions were the leading cause of stillbirth for Victoria with a rate of 2.7per 1,000 births (Table 4.1).

Table 4.1: Stillbirths by Perinatal Society of Australia and New Zealand Perinatal Death Classification, by state and territory[a], 2004–08

Cause of death	NSW[b]	Vic[c][d]	Qld	WA	SA	Tas	ACT
			Number				
Congenital abnormality	226	663	427	277	204	46	56
Perinatal infection	36	68	46	52	42	<5	6
Hypertension	50	87	51	49	22	<5	<5
Antepartum haemorrhage	107	204	135	58	47	25	16
Maternal conditions	60	939	65	43	17	12	5
Specific perinatal conditions	94	219	154	94	76	24	35
Hypoxic peripartum death	n.p.	36	36	30	13	14	<5
Fetal growth restriction	77	190	100	76	82	35	36
Spontaneous pre-term	155	265	293	161	64	18	24
Unexplained antepartum death	470	581	571	171	96	27	33
No obstetric antecedent	<5	–	35	–	–	<5	<5
Not stated	386	2	–	1	–	7	7
Total[e]	**1,688**	**3,254**	**1,913**	**1,012**	**663**	**219**	**226**
			Rate per 1,000 total births				
Congenital abnormality	0.8	1.9	1.5	2.0	2.2	1.5	2.1
Perinatal infection	0.1	0.2	0.2	0.4	0.4	n.p.	0.2
Hypertension	0.2	0.3	0.2	0.3	0.2	n.p.	n.p.
Antepartum haemorrhage	0.4	0.6	0.5	0.4	0.5	0.8	0.6
Maternal conditions	0.2	2.7	0.2	0.3	0.2	0.4	0.2
Specific perinatal conditions	0.3	0.6	0.5	0.7	0.8	0.8	1.3
Hypoxic peripartum death	n.p.	0.1	0.1	0.2	0.1	0.5	n.p.
Fetal growth restriction	0.3	0.6	0.4	0.5	0.9	1.2	1.3
Spontaneous pre-term	0.6	0.8	1.0	1.1	0.7	0.6	0.9
Unexplained antepartum death	1.7	1.7	2.0	1.2	1.0	0.9	1.2
No obstetric antecedent	n.p.	–	0.1	–	–	n.p.	n.p.
Total[e]	**6.3**	**9.4**	**6.7**	**7.1**	**7.0**	**7.2**	**8.5**

(a) The main Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) cause of death was supplied by all states and territories except NT.

(b) NSW supplied PSANZ-PDC cause of death for 2004–06. Up to 2005, the Perinatal Outcomes Working Party of the NSW Maternal and Perinatal Committee reviewed perinatal deaths of at least 500g birthweight and/or at least 22 weeks gestation.

(c) Victoria supplied summary PSANZ-PDC data only.

(d) Death rates may be higher as the majority of late terminations for psychosocial indications are undertaken in Victoria.

(e) 'Not stated' comprise stillbirth records missing cause of death data.

Table 4.2: Perinatal Society of Australia and New Zealand Perinatal Death Classification[a][b][c], 2004–08

Perinatal Society of Australia and New Zealand Perinatal Death Classification	Full code		Summary code	
	Number	Per cent	Number	Per cent
1. Congenital abnormality			1,891	22.3
1.1 Central nervous system	404	4.8		
1.2 Cardiovascular system	215	2.5		
1.3 Urinary system	102	1.2		
1.4 Gastrointestinal system	31	0.4		
1.5 Chromosomal	513	6.0		
1.6 Metabolic	6	0.1		
1.7 Multiple/non chromosomal syndromes	302	3.6		
1.8 Other congenital abnormality	21	0.2		
1.81 Musculoskeletal	101	1.2		
1.82 Respiratory	12	0.1		
1.83 Diaphragmatic hernia	21	0.2		
1.85 Tumours	14	0.2		
1.88 Other specified congenital abnormality[d]	29	0.3		
1.9 Unspecified congenital abnormality[e]	120	1.4		
2. Perinatal infection			251	3.5
2.1 Bacterial	24	0.3		
2.11 Group B *Streptococcus*	59	0.7		
2.12 *E coli*	25	0.3		
2.13 *Listeria* monocytogenes	2	0.0		
2.14 Spirochaetal e.g. syphilis	1	0.0		
2.18 Other bacterial	31	0.4		
2.19 Unspecified bacterial	16	0.2		
2.2 Viral	5	0.1		
2.21 Cytomegalovirus	28	0.3		
2.22 Parvovirus	14	0.2		
2.3 Protozoal, e.g. Toxoplasma	4	0.0		
2.9 Other unspecified organism[e]	42	0.5		
3. Hypertension			265	3.1
3.1 Chronic hypertension: essential	23	0.3		
3.2 Chronic hypertension: secondary, e.g. renal disease	6	0.1		
3.3 Chronic hypertension: unspecified	3	0.0		

(continued)

Table 4.2 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification[a][b][c], 2004–08

Perinatal Society of Australia and New Zealand Perinatal Death Classification	Full code		Summary code	
	Number	Per cent	Number	Per cent
3.4 Gestational hypertension	24	0.3		
3.5 Pre-eclampsia	156	1.8		
3.51 With laboratory evidence of thrombophilia	12	0.1		
3.6 Pre-eclampsia superimposed on chronic hypertension	19	0.2		
3.9 Unspecified hypertension[e][f]	22	0.3		
4. Antepartum haemorrhage (APH)			589	6.9
4.1 Placental abruption	474	5.6		
4.11 With laboratory evidence of thrombophilia	11	0.1		
4.2 Placenta praevia	12	0.1		
4.3 Vasa praevia	13	0.2		
4.8 Other APH	15	0.2		
4.9 APH of undetermined origin[e]	64	0.8		
5. Maternal conditions			1,141	13.4
5.1 Termination of pregnancy for maternal psychosocial indications	882	10.4		
5.2 Diabetes / gestational diabetes	118	1.4		
5.3 Maternal injury	8	0.1		
5.31 Accidental	16	0.2		
5.32 Non-accidental	3	0.0		
5.4 Maternal sepsis	13	0.2		
5.5 Antiphospholipid syndrome	17	0.2		
5.6 Obstetric cholestasis	3	0.0		
5.8 Other specified maternal conditions	72	0.8		
Not specified[e]	9	0.1		
6. Specific perinatal conditions			684	8.1
6.1 Twin-twin transfusion	239	2.8		
6.2 Fetomaternal haemorrhage	73	0.9		
6.3 Antepartum cord complications	159	1.9		
6.4 Uterine abnormalities, e.g. bicornuate uterus, cervical incompetence	64	0.8		
6.6 Alloimmune disease	8	0.1		
Not specified[e]	34	0.4		

(continued)

Table 4.2 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification[a][b][c], 2004–08

Perinatal Society of Australia and New Zealand Perinatal Death Classification	Full code		Summary code	
	Number	Per cent	Number	Per cent
7. Hypoxic peripartum death			159	1.9
7.1 With intrapartum complications	21	0.2		
7.11 Uterine rupture	11	0.1		
7.12 Cord prolapse	10	0.1		
7.18 Other[g]	22	0.3		
7.2 Evidence of non-reassuring fetal status in a normally grown infant	37	0.4		
7.3 No intrapartum complications and no evidence of non-reassuring fetal status.	14	0.2		
7.9 Unspecified hypoxic peripartum death[e]	44	0.5		
8. Fetal growth restriction (FGR)			593	7.0
8.1 With evidence of reduced vascular perfusion	256	3.0		
8.2 With chronic villitis	21	0.2		
8.3 No placental pathology	115	1.4		
8.4 No examination of placenta	30	0.4		
8.8 Other specified placental pathology	52	0.6		
8.9 Unspecified or not known whether placenta examined	44	0.5		
Not specified[e]	75	0.9		
9. Spontaneous pre-term (<37 weeks gestation)			980	11.5
9.1 Spontaneous pre-term (membranes intact or rupture <24 hours before delivery)	131	1.5		
9.11 With chorioamnionitis on placental histopathology	111	1.3		
9.12 Without chorioamnionitis on placental histopathology	66	0.8		
9.13 With clinical evidence of chorioamnionitis, no examination of placenta	11	0.1		
9.17 No clinical signs of chorioamnionitis, no examination of placenta	14	0.2		
9.19 Unspecified or not known whether placenta examined	62	0.7		
9.2 Spontaneous pre-term with membrane rupture >24 hours before delivery	64	0.8		
9.21 With chorioamnionitis on placental histopathology	164	1.9		
9.22 Without chorioamnionitis on placental histopathology	44	0.5		
9.29 Unspecified or not known whether placenta examined	69	0.8		

(continued)

Table 4.2 (continued): Perinatal Society of Australia and New Zealand Perinatal Death Classification[(a)(b)(c)], 2004–08

Perinatal Society of Australia and New Zealand Perinatal Death Classification	Full code		Summary code	
	Number	Per cent	Number	Per cent
9.3 Spontaneous pre-term with membrane rupture of unknown duration before delivery	26	0.3		
9.31 With chorioamnionitis on placental histopathology	46	0.5		
9.32 Without chorioamnionitis on placental histopathology	15	0.2		
9.33 With clinical evidence of chorioamnionitis, no examination of placenta	5	0.1		
9.37 No clinical signs of chorioamnionitis, no examination of placenta	5	0.1		
9.39 Unspecified or not known whether placenta examined	90	1.1		
Not specified[(e)]	41	0.5		
10. Unexplained antepartum death			1,896	22.3
10.1 With evidence of reduced vascular perfusion	244	2.9		
10.2 With chronic villitis	32	0.4		
10.3 No placental pathology	996	11.7		
10.4 No examination of placenta	93	1.1		
10.8 Other specified placental pathology	178	2.1		
10.9 Unspecified or not known whether placenta examined	285	3.4		
Not specified[(e)]	68	0.8		
11. No obstetric antecedent			41	0.5
11.9 Unknown/undetermined	30	0.4		
11.92 Other unknown/undetermined	5	0.1		
Not further specified[(e)(h)]	6	0.1		
All causes	**8,490**	**100.0**	**8,490**	**100.0**

(a) The main Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ PDC) cause of death was supplied by all states and territories except NT.

(b) NSW supplied PSANZ PDC cause of death for 2004 to 2006. Up to 2005, the Perinatal Outcomes Working Party of the NSW Maternal and Perinatal Committee reviewed perinatal deaths of at least 500g birthweight and/or at least 22 weeks gestation.

(c) Victoria supplied summary PSANZ PDC data only. The detailed PSANZ PDC data were sourced from Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity annual report (CCOPMM 2012).

(d) Includes <3 records classified as ' Other congenital anomaly—Haematological'.

(e) Records with summary cause of death were included with 'not specified', which was added to each summary category if none was available.

(f) Includes <3 records classified as 'With laboratory evidence of thrombophilia'.

(g) Includes <3 records classified as 'Other accident, poisoning or violence (postnatal)' pending confirmation from state/territory of stillbirth status.

(h) Includes <3 records classified as 'Shoulder dystocia'.

More than one-quarter (26.1%) of stillbirths to mothers aged 40 years and over were caused by congenital abnormalities (Table 4.3). This was also the leading cause of stillbirths for mothers aged 20–24 years and 35–39 years with 21.2% and 23.5% respectively. Unexplained antepartum death was the most common category for cause death of stillbirths for babies to mothers aged 25–29 years and 30–34 years (24.0% and 24.2% respectively). Mothers aged less than 20 years were most likely to have a stillbirth due to maternal conditions (40.0%), which include termination of pregnancy for psychosocial reasons.

Table 4.3: Stillbirths by Perinatal Society of Australia and New Zealand Perinatal Death Classification[a][b] and maternal age, 2004–08

	Maternal age (years)							
Cause of death	**Less than 20**	**20–24**	**25–29**	**30–34**	**35–39**	**40 and over**	**Not stated**	**Total**
				Number				
Congenital abnormality	96	327	467	527	362	115	5	1,899
Perinatal infection	24	38	56	76	44	16	–	254
Hypertension	21	37	64	78	53	12	–	265
Antepartum haemorrhage	41	112	146	157	114	22	–	592
Maternal conditions	324	303	196	154	92	40	32	1,141
Specific perinatal conditions	27	91	157	241	156	24	–	696
Hypoxic peripartum death	<5	32	42	41	32	n.p.	–	159
Fetal growth restriction	39	110	143	166	104	34	–	596
Spontaneous pre-term	88	140	250	280	180	42	–	980
Unexplained antepartum death	122	291	514	594	330	96	2	1,949
No obstetric antecedent	n.p.	7	7	6	12	<5	–	41
Not stated	19	58	99	136	63	28	–	403
Total	**810**	**1,546**	**2,141**	**2,456**	**1,542**	**441**	**39**	**8,975**
				Per cent				
Congenital abnormality	11.9	21.2	21.8	21.5	23.5	26.1	12.8	21.2
Perinatal infection	3.0	2.5	2.6	3.1	2.9	3.6	–	2.8
Hypertension	2.6	2.4	3.0	3.2	3.4	2.7	–	3.0
Antepartum haemorrhage	5.1	7.2	6.8	6.4	7.4	5.0	–	6.6
Maternal conditions	40.0	19.6	9.2	6.3	6.0	9.1	82.1	12.7
Specific perinatal conditions	3.3	5.9	7.3	9.8	10.1	5.4	–	7.8
Hypoxic peripartum death	n.p.	2.1	2.0	1.7	2.1	n.p.	–	1.8
Fetal growth restriction	4.8	7.1	6.7	6.8	6.7	7.7	–	6.6
Spontaneous pre-term	10.9	9.1	11.7	11.4	11.7	9.5	–	10.9
Unexplained antepartum death	15.1	18.8	24.0	24.2	21.4	21.8	5.1	21.7
No obstetric antecedent	n.p.	0.5	0.3	0.2	0.8	n.p.	–	0.5
Not stated	2.3	3.8	4.6	5.5	4.1	6.3	–	4.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) The main Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) cause of death was supplied by all states and territories except NT.

(b) NSW supplied PSANZ-PDC cause of death for 2004–06. Up to 2005, the Perinatal Outcomes Working Party of the NSW Maternal and Perinatal Committee reviewed perinatal deaths of at least 500g birthweight and/or at least 22 weeks gestation.

The main category for causes of deaths of stillbirths from 2004–08 were unexplained antepartum death (21.7%), congenital abnormalities (21.2%) and maternal conditions (12.7%) with rates of 1.6, 1.6 and 1.0 per 1,000 births respectively. These 3 categories of causes accounted for more than half of all perinatal deaths in Australia (55.6%). Spontaneous pre-term (10.9%) was also a common cause of stillbirths, with a rate of 0.8 per 1,000 births (Table 4.4).

Table 4.4: Stillbirths by Perinatal Society of Australia and New Zealand Perinatal Death Classification[(a)(b)] and year, 2004–08

Cause of death	2004	2005	2006	2007	2008	Total
			Number			
Congenital abnormality	341	354	473	381	350	1,899
Perinatal infection	37	47	68	49	53	254
Hypertension	71	48	73	34	39	265
Antepartum haemorrhage	127	116	148	87	114	592
Maternal conditions	254	246	208	209	224	1,141
Specific perinatal conditions	122	129	164	120	161	696
Hypoxic peripartum death	37	31	34	25	32	159
Fetal growth restriction	97	116	150	116	117	596
Spontaneous pre-term	193	180	242	172	193	980
Unexplained antepartum death	461	463	427	314	284	1,949
No obstetric antecedent	8	18	n.p.	6	<5	41
Not stated	148	189	n.p.	2	n.p.	403
Total	**1,896**	**1,937**	**2,050**	**1,515**	**1,577**	**8,975**
			Per cent			
Congenital abnormality	18.0	18.3	23.1	25.1	22.2	21.2
Perinatal infection	2.0	2.4	3.3	3.2	3.4	2.8
Hypertension	3.7	2.5	3.6	2.2	2.5	3.0
Antepartum haemorrhage	6.7	6.0	7.2	5.7	7.2	6.6
Maternal conditions	13.4	12.7	10.1	13.8	14.2	12.7
Specific perinatal conditions	6.4	6.7	8.0	7.9	10.2	7.8
Hypoxic peripartum death	2.0	1.6	1.7	1.7	2.0	1.8
Fetal growth restriction	5.1	6.0	7.3	7.7	7.4	6.6
Spontaneous pre-term	10.2	9.3	11.8	11.4	12.2	10.9
Unexplained antepartum death	24.3	23.9	20.8	20.7	18.0	21.7
No obstetric antecedent	0.4	0.9	n.p.	0.4	n.p.	0.5
Not stated	7.8	9.8	n.p.	0.1	n.p.	4.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(continued)

Table 4.4 (continued): Stillbirths by Perinatal Society of Australia and New Zealand Perinatal Death Classification[a][b] and year, 2004–08

Cause of death	2004	2005	2006	2007	2008	Total
			Rate per 1,000 total births[c]			
Congenital abnormality	1.3	1.3	1.7	2.0	1.8	1.6
Perinatal infection	0.1	0.2	0.2	0.3	0.3	0.2
Hypertension	0.3	0.2	0.3	0.2	0.2	0.2
Antepartum haemorrhage	0.5	0.4	0.5	0.4	0.6	0.5
Maternal conditions	1.0	0.9	0.7	1.1	1.1	1.0
Specific perinatal conditions	0.5	0.5	0.6	0.6	0.8	0.6
Hypoxic peripartum death	0.1	0.1	0.1	0.1	0.2	0.1
Fetal growth restriction	0.4	0.4	0.5	0.6	0.6	0.5
Spontaneous pre-term	0.8	0.7	0.9	0.9	1.0	0.8
Unexplained antepartum death	1.8	1.7	1.5	1.6	1.4	1.6
No obstetric antecedent	0.0	0.1	0.0	0.0	0.0	0.0
Not stated	0.6	0.7	0.2	0.0	0.0	0.3
Total	**7.5**	**7.2**	**7.4**	**7.8**	**8.0**	**7.5**

(a) The main Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) cause of death was supplied by all states and territories except NT.

(b) NSW supplied PSANZ-PDC cause of death for 2004–06. Up to 2005, the Perinatal Outcomes Working Party of the NSW Maternal and Perinatal Committee reviewed perinatal deaths of at least 500g birthweight and/or at least 22 weeks gestation.

(c) Total births include live births and stillbirths for states and territories that supplied PSANZ-PDC data in each year.

Table 4.5 presents causes of perinatal deaths by gestational age group and plurality for 2004–08. The majority of singleton stillbirths caused by congenital abnormality (71.4%) and spontaneous pre-term (68.6%) occurred from 20–23 weeks. Congenital abnormality was the leading cause of singleton stillbirths at 20–23 weeks, while unexplained antepartum death was the leading category for cause of death of singleton stillbirths from 28–41 weeks. At 24–27 weeks, 26.1% of singleton stillbirths were a result of maternal conditions. For twins, the leading cause of death categories were specific perinatal conditions (38.5%), spontaneous pre-term (16.9%) and unexplained antepartum death (14.6%) (Table 4.5).

Table 4.5: Stillbirths by Perinatal Society of Australia and New Zealand Perinatal Death Classification[a][b] for singleton births by gestational age, twin births and total births, 2004–08

	Singleton births at gestational age (weeks)						Twin	Total
Cause of death	**20–23**	**24–27**	**28–31**	**32–36**	**37–41**	**All**	**births**	**births**
				Number				
Congenital abnormality	1,356	174	110	109	69	1,825	71	1,899
Perinatal infection	91	33	20	20	76	242	11	254
Hypertension	37	80	52	47	40	256	8	265
Antepartum haemorrhage	182	76	62	142	101	564	27	592
Maternal conditions	564	327	33	71	81	1,115	25	1,141
Specific perinatal conditions	123	45	39	55	126	389	292	696
Hypoxic peripartum death	<5	n.p.	n.p.	12	122	154	5	159
Fetal growth restriction	90	103	89	121	164	568	25	596
Spontaneous pre-term	672	115	27	16	–	830	128	980
Unexplained antepartum death	284	259	231	383	665	1,834	111	1,949
No obstetric antecedent	n.p.	<5	<5	5	10	35	6	41
Not stated	220	30	23	32	46	353	49	403
All causes	**3,634**	**1,253**	**695**	**1,013**	**1,500**	**8,166**	**758**	**8,975**
				Per cent of total births				
Congenital abnormality	71.4	9.2	5.8	5.7	3.6	96.1	3.7	100.0
Perinatal infection	35.8	13.0	7.9	7.9	29.9	95.3	4.3	100.0
Hypertension	14.0	30.2	19.6	17.7	15.1	96.6	3.0	100.0
Antepartum haemorrhage	30.7	12.8	10.5	24.0	17.1	95.3	4.6	100.0
Maternal conditions	49.4	28.7	2.9	6.2	7.1	97.7	2.2	100.0
Specific perinatal conditions	17.7	6.5	5.6	7.9	18.1	55.9	42.0	100.0
Hypoxic peripartum death	n.p.	n.p.	n.p.	7.5	76.7	96.9	3.1	100.0
Fetal growth restriction (FGR)	15.1	17.3	14.9	20.3	27.5	95.3	4.2	100.0
Spontaneous pre-term	68.6	11.7	2.8	1.6	–	84.7	13.1	100.0
Unexplained antepartum death	14.6	13.3	11.9	19.7	34.1	94.1	5.7	100.0
No obstetric antecedent	n.p.	n.p.	n.p.	12.2	24.4	85.4	14.6	100.0
Not stated	54.6	7.4	5.7	7.9	11.4	87.6	12.2	100.0

(continued)

Table 4.5 (continued): Stillbirths by Perinatal Society of Australia and New Zealand Perinatal Death Classification[(a)(b)] for singleton births by gestational age, twin births and total births, 2004–08

	Singleton births at gestational age (weeks)						Twin	Total
Cause of death	**20–23**	**24–27**	**28–31**	**32–36**	**37–41**	**All**	**births**	**births**
				Per cent of all causes				
Congenital abnormality	37.3	13.9	15.8	10.8	4.6	22.3	9.4	21.2
Perinatal infection	2.5	2.6	2.9	2.0	5.1	3.0	1.5	2.8
Hypertension	1.0	6.4	7.5	4.6	2.7	3.1	1.1	3.0
Antepartum haemorrhage	5.0	6.1	8.9	14.0	6.7	6.9	3.6	6.6
Maternal conditions	15.5	26.1	4.7	7.0	5.4	13.7	3.3	12.7
Specific perinatal conditions	3.4	3.6	5.6	5.4	8.4	4.8	38.5	7.8
Hypoxic peripartum death	n.p.	n.p.	n.p.	1.2	8.1	1.9	0.7	1.8
Fetal growth restriction (FGR)	2.5	8.2	12.8	11.9	10.9	7.0	3.3	6.6
Spontaneous pre-term	18.5	9.2	3.9	1.6	–	10.2	16.9	10.9
Unexplained antepartum death	7.8	20.7	33.2	37.8	44.3	22.5	14.6	21.7
No obstetric antecedent	n.p.	n.p.	n.p.	0.5	0.7	0.4	0.8	0.5
Not stated	6.1	2.4	3.3	3.2	3.1	4.3	6.5	4.5
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

(a) The main Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) cause of death was supplied by all states and territories except NT.

(b) NSW supplied PSANZ-PDC cause of death for 2004–06. Up to 2005 the Perinatal Outcomes Working Party of the NSW Maternal and Perinatal Committee reviewed perinatal deaths of at least 500g birthweight and/or at least 22 weeks gestation.

Autopsy rates

Autopsy rates for stillbirth were reported by 5 of the 8 jurisdictions from 2004–08. These were New South Wales, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory. Autopsy rates ranged from 26.9% in Tasmania to 65.5% in Western Australia (Table 4.6). The completeness of autopsy data varied by state and territory, ranging from 73.5% in New South Wales to 100% in Queensland and South Australia.

Table 4.6: Stillbirths by autopsy status[(a)] and state and territory, 2004–08

Autopsy status	NSW	Vic	Qld	WA	SA[(b)]	Tas	ACT[(c)]
				Number			
Autopsy	536	1035	587	663	415	59	123
No autopsy	704	2117	1326	326	248	156	85
Missing data	448	102	–	23	–	4	15
				Per cent			
Autopsy	31.8	31.8	30.7	65.5	62.6	26.9	55.2
No autopsy	41.7	65.1	69.3	32.2	37.4	71.2	38.1
Missing data	26.5	3.1	–	2.3	–	1.8	6.7

(a) Autopsy data were not available from NT for 2004–08 and NSW for 2007–08.

(b) For SA, 'autopsy' also includes limited dissection and other examination such as formal external examination with radiological survey.

(c) Aggregate data for this table were supplied by the ACT.

Table 4.7 presents stillbirths by cause of death and autopsy status. Autopsy was reported for 38.1% of all stillbirths. Perinatal infections had the highest autopsy rate (74.0%) followed by fetal growth restriction (65.1%). Autopsy was performed for less than half of the unexplained antepartum deaths (47.0%).

Table 4.7: Stillbirths by cause of death and autopsy status[(a)(b)(c)], 2004–08

Summary PSANZ-PDC cause of death	Autopsy		No autopsy		Total[(d)]	
	Number	Per cent	Number	Per cent	Number	Per cent
Congenital abnormality	872	45.9	1,005	52.9	1,900	100.0
Perinatal infection	188	74.0	66	26.0	254	100.0
Hypertension	126	47.5	134	50.6	265	100.0
Antepartum haemorrhage	159	26.9	419	70.8	592	100.0
Maternal conditions	133	11.7	998	87.5	1,141	100.0
Specific perinatal conditions	291	41.7	384	55.0	698	100.0
Hypoxic peripartum death	70	44.0	86	54.1	159	100.0
Fetal growth restriction	389	65.1	196	32.8	598	100.0
Spontaneous pre-term	259	26.4	674	68.8	980	100.0
Unexplained antepartum death	917	47.0	967	49.6	1,949	100.0
No obstetric antecedent	10	25.0	30	75.0	40	100.0
Not stated	4	1.0	3	0.8	396	100.0
All causes	**3,418**	**38.1**	**4,962**	**55.3**	**8,972**	**100.0**

(a) The main Perinatal Society of Australia and New Zealand Perinatal Death Classification (PSANZ-PDC) cause of death was supplied by all states and territories except NT.

(b) NSW supplied PSANZ-PDC cause of death for 2004–06. Up to 2005, the Perinatal Outcomes Working Party of the NSW Maternal and Perinatal Committee reviewed perinatal deaths of at least 500g birthweight and/or at least 22 weeks gestation.

(c) Aggregate data for this table were supplied by the ACT.

(d) Includes autopsy status 'Not Stated'.

5 Recent data

This chapter presents the risk of stillbirth 2005–09, allowing for differences among singeltons at each gestational age and among multiple birth by key socio-demographic, maternal and infant conditions.

From 2005–09, there were 10,079 stillbirths reported to the NPDC, representing a national stillbirth rate of 7.5 per 1,000 total births. In this chapter, births during the most recent 5-year period for all of Australia are used to examine the various risk factors for stillbirth stratified by the 2 major confounders: gestational age and birth plurality.

Overall, the stillbirth rate among singleton births was 7.0 per 1,000 total stillbirths, while among twins the rate of stillbirth was more than 2.5 times higher (19.4 per 1,000 total twin births). Singleton births have been further stratified by gestational age using the internationally recognised standard groups (WHO 2011). Chapter 4 (Table 4.5) shows how the causes of stillbirth vary across the perinatal period, as do the strategies for prevention and the application of interventions in pregnancy. This chapter presents information on the risk factors for stillbirth available in the NPDC to assist in clinical decision-making, as well as provide baseline data for surveillance and monitoring.

Post-term singleton births are now relatively uncommon and despite the higher risk of stillbirth, these events are too sparse to support stratification. Births from 42 weeks onwards (31 stillbirths) and higher order multiple births (64 stillbirths) from 2005–09 have been included with the all singleton births and total births respectively.

5.1 Risk of stillbirth by state and territory

The jurisdiction-specific risk of stillbirth varied by state and territory, and ranged from:

- 5.8 per 1,000 for all singletons born in New South Wales to 9.2 per 1,000 for all singletons born in Victoria
- 16.4 per 1,000 twins in the Australian Capital Territory to 39.3 per 1,000 twins born in the Northern Territory.

The elevated risk of stillbirth for all singletons in Victoria is due to higher risks of stillbirth at very early gestations (less than 28 weeks). The Northern Territory, in contrast, which has a comparable overall risk of stillbirth, has a higher stillbirth risk for singletons across all gestations.

Geographical mobility during pregnancy is not uncommon and impacts on jurisdictional risk of stillbirth. This is evident from the risk of stillbirth for women usually resident in a particular jurisdiction compared with the risk among women who give birth in a different state or territory. The risk of stillbirth for both singletons (9.5 per 1,000) and twins (41.3 per 1,000) was higher for Northern Territory residents than for women who gave birth in the Northern Territory (Table 5.1). Residents of the Australian Capital Territory, in contrast had lower risks of stillbirth overall than women who gave birth there, but not for all gestations for women giving birth to singletons. A higher proportion of women had a singleton stillbirth at 20–23 weeks gestation among women who gave birth in the Australian Capital Territory compared with usual residents, but the reverse was observed from 37 weeks gestational age onwards, with usual residents appearing to be at greater risk of stillbirth.

Table 5.1: Stratified risk of stillbirth, by state or territory of birth and usual residence for singleton births by gestational age, twin births and total births, 2005–09

	Singleton births at gestational age (weeks)						Twin births	Total births[b]
	20–23	24–27	28–31	32–36	37–41	All[a]		
	Risk of stillbirth per 1,000 babies[c]							
State of birth								
New South Wales	2.1	0.9	0.6	0.9	1.4	**5.8**	**16.8**	**6.2**
Victoria	4.6	1.6	0.6	0.9	1.4	**9.2**	**21.6**	**9.6**
Queensland	2.7	0.8	0.6	1.0	1.4	**6.3**	**20.1**	**6.8**
Western Australia	3.2	0.8	0.6	0.8	1.4	**6.8**	**19.8**	**7.2**
South Australia	3.6	0.7	0.6	0.8	1.3	**6.8**	**17.6**	**7.1**
Tasmania	3.1	0.7	0.7	1.2	1.5	**7.1**	**19.7**	**7.5**
Australian Capital Territory	3.7	1.1	1.0	0.9	1.7	**8.2**	**16.4**	**8.5**
Northern Territory	3.1	1.2	1.3	1.8	1.8	**9.1**	**39.3**	**9.8**
State of usual residence								
New South Wales	2.4	1.1	0.6	0.9	1.4	**6.3**	**17.0**	**6.7**
Victoria	3.7	1.1	0.6	0.9	1.4	**7.6**	**21.3**	**8.1**
Queensland	3.0	0.9	0.6	1.0	1.3	**6.8**	**20.2**	**7.2**
Western Australia	3.6	1.0	0.6	0.9	1.4	**7.3**	**19.8**	**7.7**
South Australia	3.5	0.8	0.6	0.8	1.3	**7.0**	**16.5**	**7.3**
Tasmania	3.3	0.8	0.8	1.2	1.5	**7.5**	**19.6**	**7.8**
Australian Capital Territory	3.0	1.1	0.9	0.8	1.8	**7.5**	**16.8**	**7.8**
Northern Territory	3.4	1.4	1.4	1.8	1.8	**9.5**	**41.3**	**10.3**
Total	**3.1**	**1.1**	**0.6**	**0.9**	**1.4**	**7.0**	**19.4**	**7.5**

(a) All singleton births include births after 41 weeks (31 stillbirths) and missing gestational age (65 stillbirths).

(b) Total births include higher order multiple births (64 stillbirths) and missing plurality (6 stillbirths).

(c) Risk of stillbirth is measured as the stillbirth rate for all singletons, twins and total births and as the prospective risk of stillbirth at each gestation. The number of babies at risk of a stillbirth declines progressively throughout pregnancy as babies are born. This needs to be taken into account when combining the risks of stillbirth among singleton babies in each period of gestation (see Appendix B).

Note: Data used to calculate risk of stillbirth for this table are in Supplementary Table S5.1.

5.2 Risk of stillbirth by maternal sociodemographic characteristics

Maternal age

Teenage mothers and mothers aged 40 and over were at higher risk of having a stillbirth compared to mothers in the middle central age ranges. Mothers aged 30–34 had the lowest risk of stillbirth in all plurality and gestational age strata, with the stillbirth rate for singletons, twins and total births of 5.8, 17.3 and 6.3 per 1,000 births at risk respectively (Table 5.2). The risk of having a singleton stillbirth at 20–23 weeks gestational age was more

than double the risk at 24–27 weeks gestational age for mothers aged less than 20 (7.0 and 3.1 per 1,000 births at risk respectively) and among mothers aged 40 and over (4.0 and 1.7 per 1,000 births at risk respectively) (Table 5.2).

Parity

The parity-specific risk of stillbirth has a U-shaped distribution in all plurality and gestational age strata. Mothers of singletons who had 4 or more previous births had a higher risk of singleton stillbirth at 20–23 weeks gestation than mothers who had 1 previous birth at the same gestational age (4.0 and 2.4 per 1,000 births at risk respectively) (Table 5.2). Twins born to mothers who had 2 previous births had the lowest risk of stillbirth (16.5 per 1,000 births at risk), while twin babies born to mothers who previously had 4 or more births had the highest risk of stillbirth (22.5 per 1,000 births at risk) (Table 5.2).

Partner status

Mothers who had no partner had almost double the risk of stillbirths compared to mothers who were married or had a de facto partner. In 2005–09, the risk of stillbirth for all births was 12.5 per 1,000 births at risk to mothers who had no partner compared to 6.3 per 1,000 births at risk to mothers who were married or had a de facto partner (Table 5.2).

Maternal cigarette smoking

Smoking during pregnancy increases the risk of stillbirths across all gestational ages. For singleton births, the risk of stillbirths was 9.2 per 1,000 births at risk to mothers who smoked during pregnancy compared to 5.9 per 1,000 births at risk to mothers who did not smoke (Table 5.2).

Socioeconomic status

Data on the geographical location of the usual residence of the mother were provided as state and statistical local area and/or postcode. These data have been mapped to socioeconomic status using the ABS's Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage (IRSD), and levels of remoteness using the ABS's Australian Standard Geographical Classification (ASGC) Remoteness Structure.

The risk of stillbirths was higher in more disadvantaged areas. For all births, the risk of stillbirth ranged from 6.5 per 1,000 births at risk to mothers who lived in the least disadvantaged areas to 8.4 per 1,000 births at risk to mothers who lived in the most disadvantaged areas (Table 5.2).

Babies born to mothers who resided in *Remote* and *Very remote* areas had a higher risk of stillbirth. For all births from 2005–09 the risk of stillbirth ranged from 7.2 per 1,000 births at risk to mothers lived in *Major cities* and *Inner regional* areas to 13.1 per 1,000 births at risk to mothers who lived in *Very remote* areas (Table 5.2).

Table 5.2: Risk of stillbirth by maternal characteristics for singleton births by gestational age, twin births and total births, 2005–09

	Singleton births at gestational age (weeks)						Twin	Total
	20–23	24–27	28–31	32–36	37–41	All[a]	births	births[b]
	Risk of stillbirth per 1,000 babies[c]							
Maternal age								
Less than 20	7.0	3.1	1.3	1.4	1.8	**14.7**	**32.7**	**15.0**
20–24	3.8	1.3	0.8	1.2	1.5	**8.6**	**27.3**	**9.0**
25–29	2.6	0.9	0.5	0.8	1.4	**6.1**	**20.1**	**6.5**
30–34	2.6	0.8	0.5	0.8	1.2	**5.8**	**17.3**	**6.3**
35–39	3.0	0.9	0.6	0.9	1.4	**6.7**	**17.5**	**7.2**
40 and older	4.0	1.7	0.8	1.4	2.3	**10.0**	**21.4**	**10.6**
Parity during pregnancy								
0	3.4	1.3	0.7	0.9	1.6	**7.8**	**21.7**	**8.3**
1	2.4	0.7	0.5	0.8	1.0	**5.4**	**17.0**	**5.7**
2	3.0	0.8	0.5	0.9	1.2	**6.4**	**16.5**	**6.7**
3	3.2	0.9	0.8	1.2	1.6	**7.6**	**16.8**	**7.9**
4 or more	4.0	1.6	0.9	1.6	2.3	**10.2**	**22.5**	**10.7**
Maternal marital status								
Married/de facto	2.5	0.8	0.5	0.8	1.3	**5.9**	**18.4**	**6.3**
No partner	5.7	2.3	1.0	1.4	1.8	**12.2**	**26.9**	**12.5**
Smoking in pregnancy								
Smoked	3.6	1.3	1.1	1.6	1.9	**9.2**	**22.0**	**9.6**
Did not smoke	2.5	0.8	0.5	0.8	1.3	**5.9**	**18.0**	**6.3**
SEIFA IRSD quintile[d]								
Quintile 1 (Most disadvantaged)	3.4	1.2	0.7	1.2	1.7	**8.0**	**20.2**	**8.4**
Quintile 2	3.1	1.1	0.8	0.9	1.6	**7.4**	**21.8**	**7.9**
Quintile 3	3.1	1.0	0.5	0.9	1.2	**6.8**	**18.5**	**7.1**
Quintile 4	3.0	1.0	0.5	0.8	1.1	**6.4**	**17.9**	**6.8**
Quintile 5 (Least disadvantaged)	2.8	0.9	0.5	0.7	1.1	**6.1**	**18.9**	**6.5**

(continued)

Table 5.2 (continued): Risk of stillbirth by maternal characteristics for singleton births by gestational age, twin births and total births, 2005–09

	Singleton births at gestational age (weeks)						Twin	Total
	20–23	24–27	28–31	32–36	37–41	All[a]	births	births[b]
Remoteness								
Major cities	3.0	1.0	0.6	0.8	1.3	**6.8**	**19.0**	**7.2**
Inner regional	2.9	0.9	0.7	1.1	1.5	**6.8**	**18.9**	**7.2**
Outer regional	3.3	1.0	0.6	1.1	1.4	**7.4**	**21.0**	**7.9**
Remote	3.8	0.9	0.8	0.9	1.7	**8.0**	**18.5**	**8.3**
Very remote	4.7	2.3	1.4	1.8	2.4	**12.4**	**47.8**	**13.1**

(a) All singleton births include births after 41 weeks (31 stillbirths) and missing gestational age (65 stillbirths).

(b) Total births include higher order multiple births (64 stillbirths) and missing plurality (6 stillbirths).

(c) Risk of stillbirth is measured as the stillbirth rate for all singletons, twins and total births and as the prospective risk of stillbirth at each gestation. The number of babies at risk of a stillbirth declines progressively throughout pregnancy as babies are born. This needs to be taken into account when combining the risks of stillbirth among singleton babies in each period of gestation (see Appendix B).

(d) Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage (IRSD) score was assigned to the mother's area of usual residence. Data are available for 2006–09.

Note: Data used to calculate risk of stillbirth for this table are in Supplementary Table S5.2.

Maternal Indigenous status

Aboriginal and Torres Strait Islander mothers had a higher risk of stillbirth than non-Indigenous mothers. The risk of stillbirth was 12.2 per 1,000 babies born to Indigenous mothers compared to 7.2 per 1,000 babies born to non-Indigenous mothers (Table 5.3). The risk of singleton stillbirth to Aboriginal and Torres Strait Islander mothers relative to singletons born to non-Indigenous mothers is 76.1% higher overall, but this difference is not uniform across all gestations, with risks more than doubled at 28–31 weeks gestation and 32–36 weeks.

Table 5.3: Risk of stillbirth by maternal Indigenous status for singleton births by gestational age, twin births and total births, 2005–09

Maternal Indigenous status	Singletons births at gestational age (weeks)						Twin	Total
	20–23	24–27	28–31	32–36	37–41	All[a]	births	births[b]
	Risk of stillbirth per 1,000 babies[c]							
Aboriginal or Torres Strait Islander	4.6	1.8	1.4	2.0	2.4	**11.8**	**25.0**	**12.2**
Non-Indigenous	3.0	1.0	0.6	0.9	1.3	**6.7**	**19.3**	**7.2**

(a) All singleton births include births after 41 weeks (31 stillbirths) and missing gestational age (65 stillbirths).

(b) Total births include higher order multiple births (64 stillbirths) and missing plurality (6 stillbirths).

(c) 'Risk of stillbirth' is measured as the stillbirth rate for all singletons, twins and total births and as the prospective risk of stillbirth at each gestation. The number of babies at risk of a stillbirth declines progressively throughout pregnancy as babies are born. This needs to be taken into account when combining the risks of stillbirth among singleton babies in each period of gestation (see Appendix B).

Note: Data used to calculate risk of stillbirth for this table are in Supplementary Table S5.3.

Maternal morbidity and obstetric history

The risk of stillbirth varied in women with pre-existing maternal conditions and complications arising in pregnancy. Mothers with pre-existing diabetes had more than a twofold higher risk of having a stillbirth (19.9 per 1,000 births at risk) than non-diabetic mothers (7.4 per 1,000 births), while mothers who developed diabetes during their pregnancy (gestational diabetes) had a lower risk of stillbirth (3.7 per 1,000 births) compared with non-diabetic mothers (7.4 per 1,000 births) (Table 5.4). These risk differences were evident across all gestations among women with a singleton pregnancy. The increased risk was more marked for women with a singleton pregnancy that it was for women who gave birth to twins. The elevated risk of stillbirth for mothers with pre-existing diabetes is due to higher risks of stillbirth at late gestations (after 32 weeks).

For singletons at 24–27 weeks gestation, the risk of stillbirth increased from 1.0 per 1,000 births at risk for non-hypertensive mothers to 2.5 per 1,000 births at risk for hypertensive mothers. The risk of stillbirth in twin births ranged from 3.4 per 1,000 births at risk for mothers who had gestational hypertension to 26.3 per 1,000 births at risk for mothers with pre-existing hypertension (Table 5.4).

Antepartum haemorrhage also increased the risk of stillbirths. For all births, the risk of stillbirth for mothers who experienced antepartum haemorrhage was 45.8 per 1,000 births at risk compared to 7.0 per 1,000 births at risk to mothers who did not have antepartum haemorrhage (Table 5.4).

History of previous stillbirth

The risk of stillbirth was 31.3 per 1,000 births at risk for mothers with 2 or more previous stillbirths. This was markedly higher than the risk of stillbirth for mothers with 1 previous stillbirth (19.1 per 1,000 births at risk) and for mothers with no previous stillbirths (6.7 per 1,000 births at risk) (Table 5.4).

Table 5.4: Risk of stillbirth by maternal morbidity, previous stillbirth and previous caesarean for singleton births by gestational age, twin births and total births, 2005–09

	Singleton births at gestational age (weeks)						Twin	Total
	20–23	24–27	28–31	32–36	37–41	All[a]	births	births[b]
	Risk of stillbirth per 1,000 babies[c]							
Maternal morbidity								
Pre-existing diabetes	4.9	2.0	2.0	5.1	7.6	**19.7**	**24.8**	**19.9**
Gestational diabetes	0.5	0.2	0.4	1.0	1.6	**3.5**	**6.6**	**3.7**
No diabetes	3.1	1.0	0.6	0.9	1.3	**6.9**	**20.0**	**7.4**
Pre-existing hypertension	4.0	2.5	2.0	1.8	2.1	**12.0**	**26.3**	**12.7**
Gestational hypertension	0.8	1.3	1.0	1.2	1.4	**5.4**	**3.4**	**5.3**
No hypertension	3.5	1.0	0.6	0.9	1.4	**7.3**	**21.5**	**7.7**
Pre-existing epilepsy	n.p.	n.p.	n.p.	n.p.	n.p.	**9.8**	**n.p.**	**9.9**
No pre-existing epilepsy	3.4	1.1	0.6	0.9	1.4	**7.4**	**20.3**	**7.8**
Antepartum haemorrhage	13.1	6.7	6.5	14.0	11.5	**44.9**	**67.5**	**45.8**
No antepartum haemorrhage	3.1	1.0	0.5	0.7	1.3	**6.6**	**18.1**	**7.0**
Previous stillbirth[d]								
None	2.9	0.8	0.5	0.9	1.2	**6.2**	**19.1**	**6.7**
1	8.6	3.6	1.9	2.9	2.2	**18.7**	**27.5**	**19.1**
2 or more	n.p.	n.p.	n.p.	n.p.	n.p.	**33.2**	**n.p.**	**31.3**
Previous caesarean section								
No	2.7	0.8	0.6	0.9	1.3	**6.2**	**17.8**	**6.5**
Yes	2.9	0.9	0.5	1.1	1.0	**6.3**	**16.5**	**6.7**

(a) All singleton births include births after 41 weeks (31 stillbirths) and missing gestational age (65 stillbirths).

(b) Total births include higher order multiple births (64 stillbirths) and missing plurality (6 stillbirths).

(c) 'Risk of stillbirth' is measured as the stillbirth rate for all singletons, twins and total births and as the prospective risk of stillbirth at each gestation. The number of babies at risk of a stillbirth declines progressively throughout pregnancy as babies are born. This needs to be taken into account when combining the risks of stillbirth among singleton babies in each period of gestation (see Appendix B).

(d) Only includes multiparous women.

Note: Data used to calculate risk of stillbirth for this table are in Supplementary Table S5.4.

5.3 Risk of stillbirth by baby characteristics

Sex

The risk of stillbirth was higher among males than females for both singletons (7.1 and 6.7 per 1,000 births at risk respectively) and twins (20.1 and 17.6 per 1,000 births at risk respectively). For singletons, the risk of stillbirths was lowest among births at 28–31 weeks and highest among births at 20–23 weeks for both male and female births (Table 5.5).

Birthweight for gestational age

Babies identified as small for gestational age (SGA) had a lower weight than the 10th percentile fetal weight for gestational age, while those extremely small had weights less than the 3rd centile of a fetal weight standard for singleton babies (Hadlock 1991). Singleton babies who were small or large for gestational age were at increased risk of stillbirth compared with babies with normal weight for gestational age (between the 10th and the 90th centile). For singleton births where the weight for gestational age was less than the 3rd centile, the risk of stillbirth decreased with increasing gestational age, from 26.5 per 1,000 births born at 20–23 weeks gestation to 10.2 per 1,000 births born at 37–41 weeks gestation. For babies where the weight for gestational age was greater than the 97th centile, the risk of stillbirth was higher among term births than babies born from 24–36 weeks gestation (Table 5.5).

Table 5.5: Risk of stillbirth by baby characteristics for singleton births by gestational age, twin births and total births, 2005–09

	Singleton births at gestational age (weeks)						Twin	Total
	20–23	24–27	28–31	32–36	37–41	All[a]	births	births[b]
	Risk of stillbirth per 1,000 babies[c]							
Baby sex								
Male	3.2	1.0	0.6	1.0	1.3	**7.1**	**20.1**	**7.5**
Female	2.8	1.0	0.6	0.9	1.4	**6.7**	**17.6**	**7.1**
Weight for gestational age[d]								
Less than 3rd centile	26.5	23.9	11.7	12.1	10.2	**79.0**	**n.a.**	**n.a.**
≥3rd, <10th centile	4.2	1.3	1.2	2.1	3.0	**11.4**	**n.a.**	**n.a.**
≥10th, ≤90th centile	2.0	0.4	0.3	0.6	1.1	**4.3**	**n.a.**	**n.a.**
>90th, ≤97th centile	3.3	0.4	0.2	0.6	1.0	**5.4**	**n.a.**	**n.a.**
Greater than 97th centile	6.0	1.1	1.2	1.1	1.8	**10.9**	**n.a.**	**n.a.**

(a) All singleton births include births after 41 weeks (31 stillbirths) and missing gestational age (65 stillbirths).

(b) Total births include higher order multiple births (64 stillbirths) and missing plurality (6 stillbirths).

(c) 'Risk of stillbirth' is measured as the stillbirth rate for all singletons, twins and total births and as the prospective risk of stillbirth at each gestation. The number of babies at risk of a stillbirth declines progressively throughout pregnancy as babies are born. This needs to be taken into account when combining the risks of stillbirth among singleton babies in each period of gestation (see Appendix B).

(d) Fetal weight for gestational age standards were only for singleton births.

Note: Data used to calculate risk of stillbirth for this table are in Supplementary Table S5.5.

Hospital sector and antenatal care

For singleton, twins and all births, the risk of stillbirth was higher among babies born to mothers admitted to a public hospital than mothers admitted to a private hospital. The risk of stillbirth was 45.6 per 1,000 births at risk for babies born to mothers with 2–4 antenatal visits. This rate was markedly higher than that for babies born to mothers with 5 or more visits (3.6 per 1,000 births at risk). For mothers with no antenatal visit, the risk of stillbirth was high for singletons born at early and late gestation (25.0 per 1,000 births born at 20–23 weeks, and 14.3 per 1,000 births born at 37–41 weeks). This was different for mothers with 1 to 4 antenatal visits where stillbirth mainly occurred before 27 weeks gestation (Table 5.6).

Table 5.6: Risk of stillbirth by hospital sector of birth, number of antenatal visits and gestation at first antenatal visit for singleton births by gestational age, twin births and total births, 2005–09

	Singleton births at gestational age (weeks)						Twin	Total
	20–23	24–27	28–31	32–36	37–41	All[a]	births	births[b]
	Risk of stillbirth per 1,000 babies[c]							
Hospital sector								
Public	3.3	1.0	0.7	1.0	1.6	**7.5**	**22.5**	**8.0**
Private	2.4	1.0	0.3	0.6	0.9	**5.3**	**12.2**	**5.5**
Number of antenatal visits[d]								
None	25.0	8.7	13.5	6.3	14.3	**65.3**	**n.p.**	**65.9**
1 visit	49.5	15.2	4.3	8.2	3.6	**79.0**	**n.p.**	**81.1**
2–4 visits[e]	29.3	5.5	3.3	3.4	2.3	**42.6**	**148.9**	**45.6**
5 or more visits	0.7	0.3	0.4	0.7	1.2	**3.2**	**12.6**	**3.6**
Gestation at first antenatal visit[f]								
Before 14 weeks	2.3	0.9	0.5	0.7	1.3	**5.7**	**17.0**	**6.0**
14–19 weeks	2.7	0.8	0.6	1.0	1.5	**6.7**	**24.3**	**7.1**
20 or more weeks	n.p.	1.0	0.8	1.6	1.6	**6.5**	**16.1**	**6.7**

(a) All singleton births include births after 41 weeks (31 stillbirths) and missing gestational age (65 stillbirths).

(b) Total births include higher order multiple births (64 stillbirths) and missing plurality (6 stillbirths).

(c) 'Risk of stillbirth' is measured as the stillbirth rate for all singletons, twins and total births and as the prospective risk of stillbirth at each gestation. The number of babies at risk of a stillbirth declines progressively throughout pregnancy as babies are born. This needs to be taken into account when combining the risks of stillbirth among singleton babies in each period of gestation (see Appendix B).

(d) Information about the number of antenatal visits was available for Qld, SA, ACT and NT from 2007.

(e) For 2009 ACT, 2–4 antenatal visits include women who had 1 antenatal visit and 5 antenatal visits.

(f) Information about the gestation at first antenatal visits was available for NSW, SA, NT and ACT from January 2007, and Qld from 1 July 2009.

Note: Data used to calculate risk of stillbirth for this table are in Supplementary Table S5.6.

Country of birth

The risk of stillbirth for babies to mothers born in Australia for the 5-year period 2005–09 was 7.2 per 1,000 births at risk. It was lower than the risk of stillbirth for babies to mothers born in New Zealand (8.9 per 1,000 births) and India (10.8 per 1,000 births). For Australian-born mothers, the risk of having a singleton stillbirth at 20–23 weeks gestation (2.9 per 1,000 births at risk) is more than double the risk of singletons born at 37–41 weeks gestation (1.3 per 1,000 births at risk) (Table 5.7).

Table 5.7: Risk of stillbirth by maternal country of birth for singleton births by gestational age, twin births and total births, 2005–09

	Singleton births at gestational age (weeks)						Twin	Total
Country of birth	20–23	24–27	28–31	32–36	37–41	All[a]	births	births[b]
	Risk of stillbirth per 1,000 babies[c]							
Australia	2.9	1.0	0.6	0.9	1.3	**6.7**	**18.9**	**7.2**
New Zealand	4.2	1.2	0.5	1.0	1.5	**8.4**	**23.8**	**8.9**
India	5.1	1.3	0.6	1.1	2.3	**10.3**	**26.5**	**10.8**
United Kingdom	3.4	0.8	0.3	0.6	1.3	**6.3**	**15.7**	**6.6**
Vietnam	3.4	0.8	0.7	0.7	1.0	**6.5**	**23.9**	**6.9**
China (excludes SARs[d] and Taiwan)	3.7	1.2	0.6	0.5	0.9	**6.8**	**10.9**	**6.9**

(a) All singleton births include births after 41 weeks (31 stillbirths) and missing gestational age (65 stillbirths).

(b) Total births include higher order multiple births (64 stillbirths) and missing plurality (6 stillbirths).

(c) 'Risk of stillbirth' is measured as the stillbirth rate for all singletons, twins and total births and as the prospective risk of stillbirth at each gestation. The number of babies at risk of a stillbirth declines progressively throughout pregnancy as babies are born. This needs to be taken into account when combining the risks of stillbirth among singleton babies in each period of gestation (see Appendix B).

(d) SAR = special administrative region.

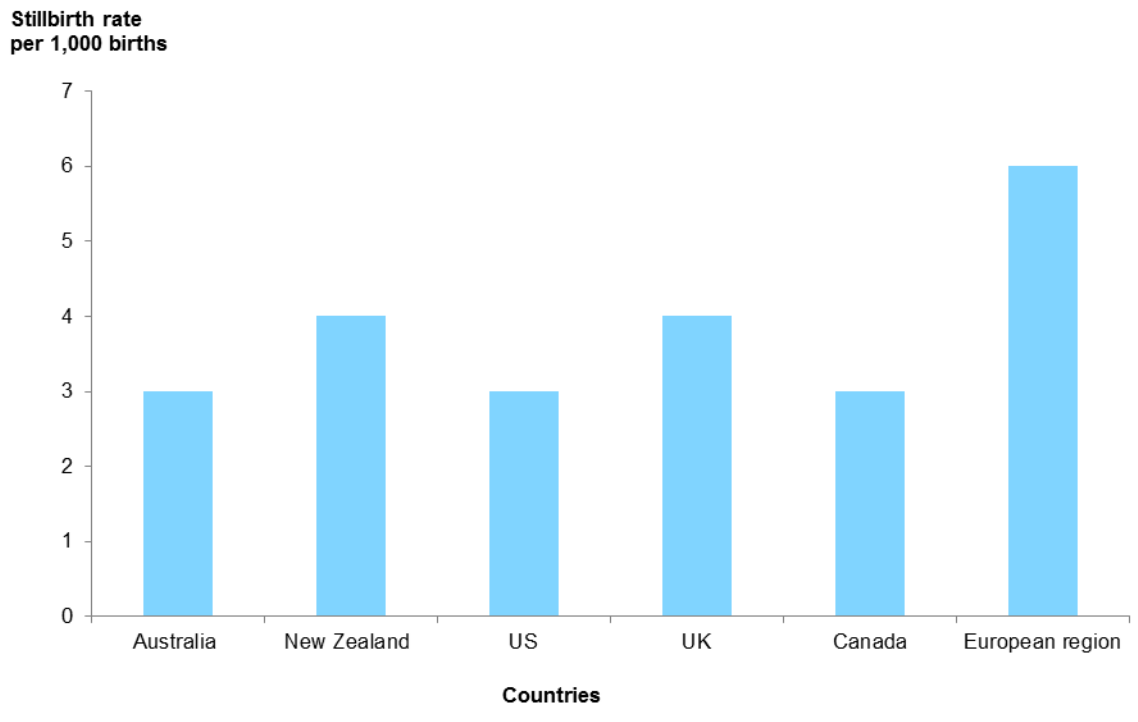
Note: Data used to calculate risk of stillbirth for this table are in Supplementary Table S5.7.

6 International comparison

This chapter provides stillbirth rates in Australia and other countries based on the World Health Organization definition of stillbirth for international comparison.

The World Health Organization's (WHO) recommended definition of 'stillbirth' for international comparison includes fetuses weighting 1,000g or more and/or at least 28 weeks gestation (WHO 2006). This differs from the definition used in Australia for reporting and registering a stillbirth or fetal death. The stillbirth rate reported in previous chapters is based on the NHDD definition, where a 'stillbirth' is defined as a 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 400g or more.

In its 2013 report, *World health statistics 2013*, the WHO reported the stillbirth rate in Australia for 2009 as 3 per 1,000 births (fetuses weighting 1,000g or more and/or at least 28 weeks gestation) which was among the lowest in the world (WHO 2013). The international stillbirth rate for 2009 ranged from 2 per 1,000 births to 47 per 1,000 births with a median of 12 per 1,000 births (fetuses weighting 1,000g or more and/or at least 28 weeks gestation) (WHO 2013). The rate of stillbirth reported by the WHO for Australia in 2009 is therefore a lower estimate than the stillbirth rate of 7.8 per 1,000 births (fetuses at least 20 weeks gestation and/or weighting 400g or more) reported in previous chapters, due to the restricted definition used by the WHO for international comparison.



Source: WHO 2013.

Figure 6.1: Stillbirth rate in selected countries and regions, 2009

Figure 6.1 details the stillbirth rate based on the WHO definition in selected countries and regions in 2009. Comparatively, Australia showed a similar stillbirth rate to the United States and Canada (3 per 1,000 births), which was marginally lower than the stillbirth rate in New Zealand and the United Kingdom (4 per 1,000 births), and in contrast to the higher rate seen in the European region (6 per 1,000 births). In 2009, Australia had the second lowest stillbirth rate in the Western Pacific region. The WHO reported that the stillbirth rate of the Western Pacific region was 10 per 1,000 births and ranged from 2 per 1,000 births in Singapore to 18 per 1,000 births in Cambodia (WHO 2013). The stillbirth rate in Australia was similar to other high-income countries, where the average stillbirth rate was 3 per 1,000 births (WHO 2013).

7 Conclusion and the way forward

This chapter outlines some important considerations for further reducing stillbirths in Australia.

This report establishes a baseline for ongoing stillbirth surveillance in Australia. It presents a comprehensive account of available national data in the NPDC provided from jurisdictional health authorities.

This observational population-based report of available data complements current reporting of stillbirths in their demographic context by ABS (ABS 2012) and as a primary outcome of maternity care for Australia's mothers and babies (Li et al. 2013). Importantly this report provides for a focused view of information about stillbirths and has provided a more in-depth analysis of national maternity data than is feasible to include when stillbirth is viewed as 1 of many outcomes.

7.1 Further reduction of stillbirth is possible

Australia is one country where stillbirth is uncommon. Even so, further reductions in stillbirth are possible.

A recent review of population-based studies considered the impact of risk factors for stillbirth, and ranked maternal overweight and obesity highest, followed by advancing maternal age, maternal smoking, primiparity, placental pathology and pre-existing maternal disease, in particular diabetes and hypertension (Flenady et al. 2011). The prominence of potentially modifiable risk factors, such as maternal overweight and maternal smoking, points to the possibility of further reductions in stillbirth in Australia. Australian and New Zealand Stillbirth Alliance <www.stillbirthalliance.org.au> and the Perinatal Society of Australia and New Zealand <www.psanz.com.au> provide an ongoing program of education for health-care professionals though Improving Perinatal Mortality Review and Outcomes Via Education (IMPROVE) workshops and are actively promoting research to improve clinical practice and reduce stillbirth.

7.2 Improving national maternity data

Nationally consistent data on stillbirth are needed to monitor the impact of interventions and strategies to reduce stillbirth. The need for further data development to monitor pregnancy outcomes was recommended in the Maternity Services Review (Commonwealth of Australia 2009) and is a key platform of the National Maternity Services Plan (AHMAC 2011). The National Maternity Data Development Project (NMDDP) is currently in the third of a 4-year program to develop a nationally consistent and comprehensive maternity data collection in Australia (AIHW 2014a).

In its first year, the NMDDP identified and refined a set of priority data items to produce standard data items for inclusion in the NHDD and the P-NMDS. This process ensures that data provided from each of the 8 Australian states and territories, who have their own arrangements for data collection from health services within their jurisdiction, are consistent and can be meaningfully aggregated in national data collections (AIHW 2007). The first phase of data development included maternal weight and height, body mass index, diabetes and hypertension included in are all relevant to stillbirth (AIHW 2014a).

The NMDDP scoping also identified cause of death and timing of stillbirth (antepartum or intrapartum) as priority data items (AIHW 2014a). Australia benefits from the professional and jurisdictional support for multidisciplinary reviews of perinatal deaths, of which stillbirths contribute the majority of cases, to assign cause of death using a common system of classification. Although the governance basis for state and territory perinatal mortality review committees differ, all have some form of statutory requirement to obtain and review sensitive data and a degree of legal protection for information provided to the review panel.

Perinatal review committee data are the most reliable sources for cause of death for 2 reasons. Firstly, perinatal review committee consideration of cause of a death is assigned based on the most complete set of information available, including the circumstances of the birth and the results of all post-mortem investigations. In some jurisdictions the committee has an oversight role and reviews the cause of death in the context of supporting documentation provided following a local perinatal mortality audit meeting. The second reason is the multidisciplinary nature of the committee.

There is currently no routine collation of perinatal review committee data with perinatal data across all jurisdictions. New South Wales and the Australian Capital Territory undertook bespoke linkage to provide integrated data for this report. In New South Wales, this required ethics approval to link data from the 2 data sources and retain the linked data in the NPDC. New South Wales Health now holds integrated PDC and Perinatal Deaths Database records that were linked by the Centre for Health Record Linkage <www.cherel.org.au> in a Maternal and Child Health Register established under the NSW Public Health Act 2010, which will facilitate future provision of perinatal mortality data for national reporting.

The perinatal mortality report project being undertaken in phase 2 of the NMDDP will enhance outcome reporting from the NPDC. The project aims to formalise national collection of information about stillbirths and neonatal deaths from jurisdictional perinatal mortality review committees that are integrated with data about pregnancy and births.

7.3 Stillbirth diversity

The only common characteristic of stillbirths is that they occur before a baby is born. This report demonstrates the distribution of causes of death and how the distribution varies across the duration of pregnancy (Table 4.5) and for women at different times in their childbearing years (Table 4.3).

In the absence of comprehensive data for cause of death in recent years, this report has considered contemporary risk factors for stillbirth in relation to major confounders, gestational age and birth multiplicity.

7.4 Impact of termination of pregnancy on stillbirth rates

There is little doubt that over the past decade improvements in the quality and range of prenatal diagnosis techniques combined with increased access to and uptake of antenatal screening for fetal abnormality have resulted in an increased detection of severe fetal abnormality and a consequent rise in the number of pregnancies that end in termination of pregnancy in Australia. Many of the tests for fetal abnormality are routinely performed after 16 weeks of pregnancy and additional testing may be required to confirm abnormal results.

Women and their families need time to come to terms with a diagnosis of a severely affected baby and make decisions about how to proceed. Terminations of pregnancy carried out after 20 weeks gestational age are counted as births within the national perinatal data, but cannot be reliably identified in all jurisdictions. The contribution of termination of pregnancy to the increased risk of stillbirth before 24 weeks gestation (Figure 3.2) cannot be confirmed, but is consistent with the concentration of stillbirths due to congenital abnormality among stillbirths at these gestations (Table 4.5).

The impact of termination of pregnancy after 20 weeks on perinatal statistics may reduce the value of the perinatal mortality as an indicator of the quality of maternity care (Gissler et al. 1994). With rare exceptions, termination of pregnancy after 20 weeks is undertaken following detection of severe fetal congenital abnormalities. The aetiology and strategies for preventing congenital abnormalities are very different to those for preventing stillbirth. These deaths are better considered in the context of all babies with congenital abnormalities.

Future requests for PSANZ-PDC cause of death for the NPDC will, subject to availability, request the recently expanded coding that flags perinatal deaths that follow termination of pregnancy. This will allow for future stillbirth reports to consider spontaneous stillbirths separately from stillbirths that follow termination of pregnancy. The United States has for some time separated vital statistics reporting of spontaneous fetal deaths from deaths that resulted from induced abortions (MacDorman et al. 2012). The separation of termination of pregnancy from spontaneous stillbirth enables health planners, policy makers and researchers to focus their attention on interventions aimed at reducing spontaneous stillbirth.

7.5 In conclusion

The report demonstrates the wide range of relevant data available about stillbirth. The program of data development of cause of death and timing of stillbirth (antepartum or intrapartum) will enhance the quality and utility of stillbirth reporting. This report provides a baseline to evaluate current strategies and programs aimed at reducing the burden of stillbirth in Australia.

Appendix A: Fetal Deaths Report Expert Reference Group

This appendix provides a list of members of this group.

Representing the National Perinatal Data Development Committee:

Ms Joanne Ellerington
Principal Data Collection Officer
Data Collections Unit
Health Statistics Centre
Queensland Health

Representing Perinatal Society for Australia and New Zealand:

Professor David Ellwood
Professor of Obstetrics and Gynaecology
School of Medicine
Griffith University
Queensland

Representing the Australian and New Zealand Stillbirth Alliance:

Associate Professor Vicki Flenady
Director, Translating Research Into Practice Centre
Mater Research Institute, University of Queensland
South Brisbane, Queensland
Secretary, Australia and New Zealand Stillbirth Alliance
Australia

Representing the Australian College of Midwives:

Belinda Jennings
Clinical Midwife Consultant
Perinatal Loss Service
King Edward Memorial Hospital
Perth, Western Australia

Representing the Australasian College of Pathologists:

Dr Diane Payton

Royal Brisbane Hospital

Department of Anatomical Pathology

The Royal College of Pathologists of Australasia

Brisbane, Queensland

Representing consumers:

Ros Richardson

General Manager, Services

SIDS and Kids NSW and Victoria

Representing the Royal College of Obstetricians and Gynaecologists:

Professor Michael Permezel

Head of Department of Obstetrics and Gynaecology

Faculty of Medicine, Dentistry and Health Sciences

The University of Melbourne

replacing from January 2014

Associate Professor Glyn Teale

Clinical Services Director

Women's and Children's Services

Western Health

Appendix B: Statistical methods used in the report

This appendix outlines the statistical methods used in the report.

Measures of frequency

Stillbirth rate is the proportion of births in a specified population defined in time and place which are stillbirths. This is calculated by dividing the number of stillbirths (numerator) by the number of total births (denominator). This proportion is expressed per 1,000 total births.

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

Factor-specific stillbirth rate is the stillbirth rate applied to subpopulations with different characteristics for a given factor.

$$\text{Factor specific stillbirth rate} = \frac{\text{Number of stillbirths with the factor characteristic}}{\text{Number of total births with the factor characteristic}} \times 1{,}000$$

Risk of stillbirth, or more properly the gestational age-specific risk of stillbirth is the chance of a stillbirth within a specified gestation interval. This is calculated by dividing the number of stillbirths within the interval (numerator) by the total number of unborn babies at the start of the interval (denominator). This has also been called the 'prospective risk of stillbirth' (Crowley 2007).

$$\text{Risk of stillbirth} = \frac{\text{Number of stillbirths within a specified gestational age}}{\text{Number of total unborn births at the start of the interval}} \times 1{,}000$$

The stillbirth rate and the gestation-specific risk of stillbirth are related measures of the chance or likelihood of risk. Different denominators apply to reflect the population at risk when applied to different factors. Gestational age is different from other risk factors as it measures duration, which is a function of time. At any given gestation babies at risk of a stillbirth are not confined to those born, but include those still in utero (Yudkin et al. 1987). The use of all fetuses reaching a given gestation as the appropriate denominator for measuring gestation-specific risk of stillbirth has been referred to as the 'fetus-at-risk' method (Joseph 2004) and is now generally accepted (Smith 2005; Kramer et al. 2002; Wilcox 2004; MacDorman et al. 2012).

Calculating risk of stillbirth

The risk of stillbirth is calculated by dividing the number of stillbirths reported with that gestational age at birth by the total number of fetuses present, who by definition are undelivered, at the beginning of the gestation interval.

The number of fetuses present at the beginning of each gestation interval is calculated using a simple actuarial approach used for survival analysis. For any birth cohort, the total number of fetuses is equal to the number of total births. All fetuses will be present at the onset of the

first gestation interval, in this case the beginning of the 20th completed week of gestation. The number of fetuses recorded as born during the 20th to the 23rd completed week are subtracted from the number present at the start of the preceding interval to give the number of fetuses at the beginning of the 24th completed week of gestation. This process is repeated for each successive interval. In the final interval, the number of fetuses at the start of the interval will be the same as the number of babies born during that interval.

To sum factor-specific stillbirth rates to the overall stillbirth rate is a simple additive process. In contrast, for gestation-specific risks, the denominator is not constant and declines progressively as pregnancy progresses. Therefore, to calculate the cumulative risk the individual risks must each be weighted with the proportion of total fetuses present at the onset of the interval before they can be added together.

Statistical methods

Tabulated data were produced for Chapter 5 ('Recent data') by stratifying by multiple birth status and for singletons by gestational age at birth, using standard categories for gestational age (WHO 2011).

Processing the data was undertaken using SAS Version 9.3 and SPSS Version 20.

Appendix C: Data quality statement National Perinatal Data Collection

This appendix provides information on the quality of data in the National Perinatal Data Collection.

Summary of key issues

- The NPDC provides national information on the pregnancy and childbirth of mothers, and the characteristics and outcomes of their babies.
- It contains information on all births in Australia in hospitals, birth centres and the community.
- Data items about neonatal deaths collected as part of the NPDC may be incomplete.
- PSANZ classified cause of death and autopsy data were added to the NPDC by states and territories following perinatal mortality review by expert committees

Description

The NPDC is a national population-based cross-sectional data collection of pregnancy and childbirth. The data are based on births reported to the perinatal data collection in each state and territory in Australia. Midwives and other staff, using information obtained from mothers and from hospital or other records, complete notification forms for each birth. These data are supplemented in some jurisdictions with perinatal mortality data from the Perinatal Mortality Review Committees. Selected information is compiled annually into this national data set by the NPESU. Information is included in the NPDC on both live births, and stillbirths of at least 400g birthweight or at least 20 weeks gestation, except in Western Australia, where the births included were at least 20 weeks gestation or, if gestation was unknown, the birthweight was at least 400g.

Institutional environment

Data in the NPDC include data collected as part of the P-NMDS and supplied by state and territory health authorities to the NPESU, a collaborating unit of the AIHW. The state and territory health authorities receive these data from patient administrative and clinical records. This information is usually collected by midwives or other birth attendants. States and territories use these data for service planning, monitoring and internal and public reporting.

States and territories supplied these data under the terms of the National Health Information Agreement:

National Health Information Agreement
<http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442475527>.

Data specifications for the NPDC are documented in the AIHW online metadata repository, METeOR, and the Maternity Information Matrix:

METeOR - AIHW online metadata repository:
<http://meteor.aihw.gov.au/content/index.phtml/itemId/181162>.

Perinatal National Minimum Data Set (P-NMDS):

<http://meteor.aihw.gov.au/content/index.phtml/itemId/426735>.

Maternity Information Matrix:

<http://maternitymatrix.aihw.gov.au>.

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 inform 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. The AIHW is governed by a board, which is accountable to the Parliament of Australia through the minister.

Timeliness

NPDC data are collated annually for calendar years. The majority of jurisdictions need 12 months lead time to undertake data entry, validation and linking with hospital as required after the end of the data collection period. Data are published in the *Australia's mothers and babies* report in November/December each year, about 2 years after the end of the data collection period. The National Health Information Standards and Statistics Committee agreed to move to financial year data collection from July 2013.

Accessibility

The NPESU provides a variety of products that draw upon the NPDC. Published products available are:

- *Australia's mothers and babies* annual report (Li et al. 2013)
- *Indigenous mothers and their babies* reports (Leeds et al. 2007)
- METeOR—online metadata repository <http://meteor.aihw.gov.au/content/index.phtml/itemId/181162>
- *National health data dictionary* (AIHW 2012a).

Ad hoc data are also available on request (charges apply to recover costs).

Data for selected indicators are also published biennially in reports such as *Australia's Health* (AIHW 2014b), *Aboriginal and Torres Strait Islander Health Performance Framework* (AIHW 2013), *A Picture of Australia's Children* (AIHW 2012b), and *Overcoming Indigenous Disadvantage* (SCRGSP 2011).

The latest publication on the National Perinatal Data Collection is *Australia's mothers and babies 2011* (Li et al. 2013). This is the 21st annual report on pregnancy and childbirth in Australia, providing national information on women who gave birth and the characteristics and outcomes of their babies.

Interpretability

Supporting information on the use and quality of the NPDC are published annually in *Australia's mothers and babies* (Chapter 1), which is available in hard copy or on the AIHW website <http://www.aihw.gov.au/publication-detail/?id=60129545702>. Comprehensive information on the quality of Perinatal NMDS elements are published in *Perinatal National Minimum Data Set compliance evaluation 2006 to 2009* (Donnolley & Li 2012). Readers are

advised to read caveat information to ensure appropriate interpretation of data. Metadata information for the NPDC are published in METeOR, the NHDD and the Maternity Information Matrix.

Relevance

The NPDC comprises data items as specified in the Perinatal National Minimum Data Set plus additional items collected by the states and territories. The purpose of the NPDC is to collect information at birth for monitoring pregnancy, childbirth and the neonatal period for both the mother and baby.

The NPDC is a specification for data collected on all births in Australia in hospitals, birth centres and the community. It includes information for all live births and stillbirths of at least 400g birthweight, or at least 20 weeks gestation. It includes data items relating to the mother, including demographic characteristics and factors relating to the pregnancy, labour and birth; and data items relating to the baby, including birth status, sex, gestational age at birth, birthweight and neonatal morbidity and stillbirths. PSANZ classified cause of death and autopsy data are added by states and territories following perinatal mortality review by expert committees.

Accuracy

Inaccurate responses may occur in all data provided to the NPESU. The NPESU does not have direct access to perinatal records to determine the accuracy of the data provided. However, the NPESU undertakes validation on receipt of data. Data received from states and territories are checked for completeness, validity and logical errors. Potential errors are queried with jurisdictions, and corrections and resubmissions are made in response to these edit queries. The NPESU does not adjust data to account for possible data errors.

Errors may occur during the processing of data by the states and territories or at the NPESU. Processing errors before data supply may be found through the validation checks applied by the NPESU.

Before publication, data are referred back to jurisdictions for checking and review. The NPESU does not adjust the data to correct for missing values. Note that because of data editing and subsequent updates of state/territory databases, numbers reported may differ from those in reports published by the states and territories.

Additional data items about neonatal deaths collected as part of the NPDC may be incomplete. In some jurisdictions, neonatal deaths for babies transferred to another hospital or readmitted to hospital and those dying at home may not be included. Due to the small number of deaths, interpretation can be limited as to whether differences in mortality rates are due to statistical fluctuations or differential ascertainment.

Coherence

NPDC data are reported and published annually by the AIHW. While definitions and data domains of some individual data elements have changed over time in response to data development, in many cases it is possible to map coding changes to make meaningful comparisons over time.

The other national data sources on perinatal data are the ABS and the National Hospital Morbidity Database (NHMD). The ABS compiles statistics and publishes reports on registrations of live births and perinatal deaths from data made available by the Registrars of

Births, Deaths and Marriages in each state and territory. The ABS collection includes all live births that were not previously registered and stillbirths of at least 400g, or at least 20 weeks gestation where birthweight is unknown. The NHMD is compiled from data supplied by the state and territory health authorities. It is a collection of electronic confidentialised summary records for separations (that is, episodes of care) in public and private hospitals in Australia.

As these collections differ greatly from NPDC in scope, collection methodology, definitions and reference periods, comparisons between collections should be made with caution.

Appendix D: Data used in figures

This appendix provides the data used to generate figures in the report.

Table D1: Stillbirth, neonatal and perinatal mortality rates, Australia, 1991–2009

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Stillbirth rate[(a)]	7.8	6.7	6.4	6.7	7.0	7.1	7.1	6.9	7.0	7.0	6.9	6.7	7.1	7.5	7.3	7.4	7.4	7.4	7.8
Neonatal mortality rate[(a)(b)]	3.8	3.7	3.2	3.2	3.2	3.1	3.2	3.1	3.2	3.2	3.3	3.1	3.1	3.1	3.2	3.0	2.9	2.8	–
Perinatal mortality rate [(a)(b)]	11.6	10.4	9.5	9.9	10.2	10.2	10.2	10.0	10.1	10.2	10.1	9.8	10.2	10.5	10.5	10.3	10.3	10.2	–

(a) Stillbirth and perinatal mortality are presented per 1,000 total births and neonatal mortality is presented per 1,000 live births.

(b) Perinatal mortality rates were not available for Australia in 2009 as Victoria did not provide data on neonatal deaths.

Note: Data used to calculate stillbirth, neonatal and perinatal mortality rates for this table are in Supplementary Table SD1.

Table D2: Stillbirths at each week of gestation, Australia, 1991–2009

Gestational age at birth (completed weeks)	1991–94	1995–99	2000–04	2005–09
	Number of stillbirths			
20	92	142	178	282
21	118	174	208	267
22	148	162	176	233
23	109	106	127	171
24	95	95	100	121
25	68	69	69	78
26	73	59	65	68
27	51	45	51	52
28	64	58	48	53
29	46	37	36	47
30	56	52	43	50
31	46	43	45	43
32	71	53	49	56
33	50	54	46	47
34	62	58	53	54
35	66	63	52	55
36	87	81	70	74
37	81	79	73	79
38	97	105	86	93
39	81	77	79	78
40	121	114	90	89
41	56	49	46	45
42	26	13	6	6
43	3	1	1	0

Table D3: Stillbirth rates by plurality, Australia, 1991–2009

Birth plurality	1991–94	1995–99	2000–04	2005–09
	Stillbirth rate per 1,000 total births			
Singleton	6.4	6.5	6.6	7.0
Twins	24.9	23.8	20.4	19.4
Triplets and higher order multiple births	38.8	41.9	47.5	49.7

Note: Data used to calculate risk of stillbirth rates for this table are in Supplementary Table SD3.

Table D4: Trends in stillbirth risk by gestation at birth, Australia, 1991–2009

Gestational age at birth (completed weeks)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Risk of stillbirth per 1,000 babies[(a)]																		
20–23	1.9	1.8	1.7	1.9	2.0	2.3	2.4	2.3	2.4	2.5	2.6	2.6	2.7	3.0	3.1	3.2	3.3	3.3	3.5
24–27	1.2	1.0	1.2	1.1	1.1	1.2	1.0	0.9	1.0	1.0	1.1	1.0	1.1	1.3	1.1	1.1	1.1	1.1	1.2
28–36	2.4	2.1	1.9	2.0	2.1	1.9	1.9	1.9	1.9	1.9	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.8
37–41	2.2	1.7	1.6	1.8	1.9	1.8	1.8	1.8	1.7	1.6	1.7	1.5	1.6	1.5	1.5	1.5	1.4	1.4	1.4

(a) Babies at risk of stillbirth are those not yet born.

Note: Data used to calculate risks of stillbirth for this table are in Supplementary Table SD4.

Table D5: Trends in stillbirth rates by size of baby, Australia, 1991–2009

Year of birth	<3rd centile	≥3rd, <10th centile	≥10th, ≤90th centile	>90th, ≤97th centile	>97th centile
			Stillbirth rate per 1,000 total births		
1991	56.6	9.9	4.0	5.5	16.5
1992	59.7	9.2	3.7	4.3	15.4
1993	57.4	8.7	3.3	5.6	15.2
1994	58.1	10.0	3.6	5.2	15.2
1995	58.3	10.2	4.0	5.6	15.5
1996	57.8	11.1	4.0	4.7	15.6
1997	59.1	9.9	4.0	6.0	14.0
1998	56.8	10.5	4.2	3.9	14.8
1999	60.7	10.4	4.2	4.1	10.9
2000	60.8	12.2	4.1	4.6	12.0
2001	64.2	10.7	4.0	4.4	13.7
2002	63.8	10.5	3.9	3.8	11.2
2003	68.3	12.5	3.9	4.6	11.5
2004	75.1	11.1	4.2	3.4	12.2
2005	73.7	11.1	3.9	5.7	13.2
2006	79.3	12.4	4.2	4.6	11.4
2007	76.8	11.3	4.3	5.0	9.4
2008	81.4	10.5	4.3	5.7	10.7
2009	83.8	11.8	4.5	5.9	10.1

Note: Data used to calculate stillbirth rates for this table are in Supplementary Table SD5.

Table D6: Trends in stillbirth risk by maternal age, Australia, 1991–2009

Maternal age (years)	1991–94	1995–99	2000–04	2005–09
		Stillbirth rate per 1,000 total births		
Less than 20	9.5	10.5	11.8	15.0
20–24	7.0	7.4	7.8	9.0
25–29	5.9	6.3	6.3	6.5
30–34	6.6	6.2	6.1	6.3
35–39	8.4	7.7	7.1	7.2
40 and over	12.7	12.0	11.6	10.6

Note: Data used to calculate stillbirth rates for this table are in Supplementary Table SD6.

Table D7: Trends in stillbirth risk by parity, Australia, 1991–2009

Parity	1991–94	1995–99	2000–04	2005–09
	Stillbirth rate per 1,000 total births			
Nulliparous	7.5	7.9	8.0	8.3
1–2	6.0	5.9	5.8	6.0
3–4	8.0	8.3	8.5	8.7
5 or more	13.8	12.5	13.3	10.8

Note: Data used to calculate stillbirth rates for this table are in Supplementary Table SD7.

Table D8: Trends in stillbirth risk by maternal Indigenous status, Australia, 1991–2009

Maternal Indigenous status	1991–94	1995–99	2000–04	2005–09
	Stillbirth rate per 1,000 total births			
Aboriginal or Torres Strait Islander	15.5	13.4	12.2	12.3
Non-Indigenous	6.6	6.7	6.8	7.2

Note: Data used to calculate stillbirth rates for this table are in Supplementary Table SD8.

Appendix E: Enhancing maternity data for births in New South Wales with details of perinatal deaths

This appendix outlines the data linkage undertaken to enhance the data on stillbirths in NSW.

The NSW Perinatal Data Collection (PDC), formerly the Midwives Data Collection, is the data source for information about births in NSW provided to the NPDC. The only perinatal death data included in the NSW PDC about stillbirths and neonatal deaths is categorical (yes/no) information and the date of neonatal death. Therefore there has been no supply of data for the PSANZ–PDC, the PSANZ–NDC, or data on whether autopsy was undertaken.

The NSW Maternal and Perinatal Committee is appointed by the NSW Minister for Health to review maternal and perinatal morbidity and mortality in NSW. The Committee's Perinatal Outcomes Working Party carries out confidential reviews of perinatal deaths. Up to 2005, the scope of the reviews was limited to fetuses or infants of at least 22 weeks gestational age at birth or at least 500g birthweight. From 2006 onwards, the Committee has aimed to review perinatal deaths occurring among fetuses or infants of at least 20 weeks gestational age at birth or at least 400g birthweight, bringing the Committee's review process into line with the criteria used by the NSW PDC for reporting of births.

A data linkage project was undertaken to provide de-identified unit record data to update the NSW Health contribution to the NPDC for the purpose of national reporting of perinatal mortality. Ethics committee approval was obtained from the NSW Population Health Research Ethics Committee (HREC/10/CIPHS41). Data linkage was undertaken by the NSW Centre for Health Records Linkage (CHeReL) in 2011. The CHeReL uses probabilistic methods to link person identifying data extracts provided by source data custodians. The most contemporaneous data available at the time of data linkage in 2011 was used for the project.

Two sets of linked de-identified data were released, subject to conditions set out by NSW Health for the project (Table E1). These were combined and used to update the NPDC.

Table E1: Enhancing maternity data for births in NSW

NSW Maternal and Perinatal Committee Perinatal Deaths Review Database	NSW Perinatal Data Collection
Records for perinatal deaths for the years 2000–06	Records for perinatal death in the period 2000–08
• Project person number[(a)]	• Project person number[(a)]
• Year of birth	• Year of birth
• PSANZ-PDC cause of death	• Serial number[(b)]
• PSANZ-NDC cause of death	• Birth order
• Autopsy undertaken (yes/no)	• Baby's date of death

(a) The project person number is assigned by CHeReL to uniquely identify persons in linked project records.

(b) The serial number is that supplied with the NSW PDC to the NPDC.

Glossary

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.

Australian Statistical Geography Classification (ASGC) Remoteness Structure: Provides a classification for the release of statistics that inform policy development by classifying Australia into large regions that share common characteristics of remoteness.

birth status: Status of the baby immediately after birth.

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

caesarean section: Operative birth by surgical incision through the abdominal wall and uterus.

chorioamnionitis: An inflammation, usually from an 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 bloodstream 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.

epilepsy: A disturbance of brain function marked by recurrent fits and loss of consciousness.

factor-specific rate of stillbirth: Is the stillbirth rate applied to subpopulations with different characteristics for a given factor. For example, the factor 'maternal age' can be used to calculate the stillbirth 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. For more detail, see Appendix B.

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 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or [the person is] receiving medication for high blood pressure.

Index of Socio-Economic Disadvantage: See Socio-Economic Index for Areas.

induction of labour: Intervention to stimulate the onset of labour.

intrapartum stillbirth: Stillbirth occurring after the onset of labour.

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 liveborn (WHO definition).

low birthweight: Birthweight of less than 2,500g.

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

multiparous: Pregnant woman who has had at least 1 previous pregnancy resulting in a live birth or stillbirth.

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

National Perinatal Data Collection (NPDC): The NPDC is a national population-based cross-sectionalcollection 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 liveborn baby within 28 days of birth.

O codes: Refers to codes O00.0 to O99.9 in Chapter 15 of the *International Statistical Classification of Diseases and Related Health Problems 10th revision* for conditions related to or aggravated by the pregnancy, childbirth or by the puerperium (maternal causes or obstetric causes).

P codes: Refers to codesP00.0 to P96.9 used in Chapter 16 of the *International Statistical Classification of Diseases and Related Health Problems 10th revision* for conditions that have their origin in the perinatal period even though death or morbidity occurs later.

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

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

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

Perinatal NMDS (P-NMDS): The P-NMDS is an agreed set of standardised data items used for national reporting of information about births.

plurality: The number of births resulting from a pregnancy.

post-term birth: Birth at 42 or more completed weeks of gestation.

rate of stillbirth: Is the proportion of births in a specified population defined in time and place which are stillbirths. For more detail, see Appendix B.

risk of stillbirth: Is the chance of a stillbirth within a specified gestation interval among all babies born at that or a later week of gestational age. For more detail, see Appendix B.

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

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 400g 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.

teenage mother: Mother aged less than 20 at the birth of her baby.

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

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Related publications

This report, *Stillbirths in Australia 1991–2009*, is part of the Perinatal statistics series reports.

The following AIHW publications relating to mothers and babies might also be of interest.

Donnolley N & Li Z 2012. Perinatal National Minimum Data Set compliance evaluation 2006 to 2009. Perinatal statistics series no. 26. Cat. no. PER 54. Sydney: AIHW National Perinatal Epidemiology and Statistics Unit.

Leeds K, Gourley M, Laws P, Zhang J, Al-Yaman F & Sullivan EA 2007. Indigenous mothers and their babies, Australia 2001–2004. Perinatal statistics series no. 19. Cat. no. PER 38. Canberra: AIHW.

Li Z, Zeki R, Hilder L & Sullivan EA 2013. Australia's mothers and babies 2011. Perinatal statistics series no. 28. Cat. no. PER 59. Canberra: AIHW National Perinatal Epidemiology and Statistics Unit.

Macaldowie A, Wang YA, Chambers GM & Sullivan EA 2012. Assisted reproductive technology in Australia and New Zealand 2010. Assisted reproduction technology series no. 16. Cat. no. PER 55. Canberra: AIHW.

This is the first national report on the epidemiology of stillbirth in Australia. The report makes use of the extensive data about pregnancy and birth that have been collected in all states and territories since 1991. For the period 1991–2009, the stillbirth rate ranged from 6.4–7.8 per 1,000 births.