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Abbreviations

AIHW	Australian Institute of Health and Welfare
GDM	gestational diabetes mellitus
ICD-10-AM	International Classification of Diseases, 10th Revision, Australian modification
NHMD	National Hospital Morbidity Database
NPDC	National Perinatal Data Collection
NICU	neonatal intensive care unit
SCN	special care nursery

Summary

Diabetes is known to adversely affect women and their babies during pregnancy, labour and delivery. This differs by maternal diabetes status and has not been described at the national level before. This report explores these differences in Australian mothers and their babies.

Key points

Diabetes in pregnancy is common, affecting about 1 in 20 pregnancies

- Pre-existing diabetes in pregnancy affected less than 1% of pregnancies, and gestational diabetes mellitus (GDM) affected about 5% in 2005–07.
- Among Aboriginal and Torres Strait Islander mothers, pre-existing diabetes affecting pregnancy was 3 to 4 times as common, and GDM twice as common, as in non-Indigenous mothers. The rate of Type 2 diabetes in Indigenous mothers was 10 times as high.
- Mothers born in high-diabetes-risk regions, such as Polynesia, Asia and the Middle East, were slightly more likely to have Type 2 diabetes, and 3 times as likely to have GDM, as mothers born in Australia.

Mothers with pre-existing diabetes, and their babies, were at highest risk of adverse effects…

- Mothers with pre-existing diabetes were more likely to have pre-term birth, pre-term induced labour, caesarean section, hypertension and longer stay in hospital than mothers with GDM or without diabetes in pregnancy.
- Babies of mothers with pre-existing diabetes had higher rates of stillbirth, pre-term birth, high birthweight, low Apgar score, high-level resuscitation, admission to special care nursery/neonatal intensive care unit, and longer stay in hospital than babies of mothers with GDM or without diabetes in pregnancy.

…and there were differences depending on the type of pre-existing diabetes

- Mothers with Type 1 diabetes had higher rates of caesarean section, hypertension and pre-term birth than mothers with Type 2 diabetes.
- Babies of mothers with Type 2 diabetes were more likely to be stillborn than babies of mothers with Type 1 diabetes.

Mothers with GDM, and their babies, were also at higher risk of adverse outcomes

- Mothers with GDM were at highest risk of induced labour and were more likely to have a pre-term birth, caesarean section, hypertension and longer hospital stay than mothers without diabetes in pregnancy.
- Babies of mothers with GDM had higher rates of all adverse effects studied, with the exception of stillbirth, and high and low birthweight, than babies of mothers without diabetes.

The occurrence of adverse effects differed between population groups

- Aboriginal and Torres Strait Islander mothers and their babies were more likely to have most adverse effects of pregnancy, labour and delivery studied than non-Indigenous mothers and their babies.
- Mothers born in high-diabetes-risk regions, such as Polynesia, Asia and the Middle East, were less likely to have most adverse effects of pregnancy, labour and delivery than Australian-born mothers. Babies of mothers from high-diabetes-risk regions had similar or lower rates of these adverse effects compared with babies of Australian-born mothers.

1 Introduction

1.1 Purpose and structure of this report

Gestational diabetes mellitus (GDM) and pre-existing diabetes complicating pregnancy, grouped as 'diabetes in pregnancy', have implications for the health of the mother and her baby in the immediate, short-term and long-term. This work aims to provide baseline information on pregnancy, labour and delivery for women affected by diabetes in pregnancy, and their babies, compared with those not affected by diabetes.

The report seeks to answer the following questions:

1. What are the rates of key characteristics, outcomes, interventions and conditions of mothers and their babies related to pregnancy, labour and delivery?
2. Are there differences in the occurrence of these characteristics, outcomes, interventions and conditions between types of diabetes in pregnancy?
3. Are there differences by maternal Indigenous status or region of birth?

Box 1.1: Terminology

The term 'effects' is used to describe the key characteristics (infant gestational age and birthweight), outcomes (duration of pregnancy, stillbirth, Apgar score), conditions (hypertension) and interventions (onset of labour, caesarean section, resuscitation, special care nursery/neonatal intensive care unit admission) looked at in this report.

When referring to data from the National Perinatal Data Collection (NPDC), the terms 'woman who gave birth', 'woman' and 'mother' are used as synonyms for a unique pregnancy resulting in the live birth or stillbirth of one or more babies.

When referring to data from the National Hospital Morbidity Database (NHMD), the terms 'woman who gave birth in hospital' and 'mother' are used as synonyms for a unique outcome of delivery (birth event) resulting in the live birth or stillbirth of one or more babies in hospital.

In both data sets, 'maternal' refers to the characteristics of 'women who gave birth' or 'mothers'; for example, maternal age refers to the age of the women who gave birth.

Data by region of birth are based on self-reported maternal country of birth information. Women who were born in Polynesian, Asian and Middle Eastern countries are considered to be at increased risk for Type 2 diabetes and GDM. These women have been grouped as 'women born in high-diabetes-risk regions' and are compared with women born in Australia.

The term 'Australian' is used in this report to mean all women who gave birth in Australia, and may include non-citizens.

The report is presented in 5 chapters:

Chapter 1, the introduction, details the purpose and structure of the report, defines diabetes in pregnancy, presents a literature review of current knowledge on the effects of diabetes in pregnancy for women who gave birth, and their babies, and introduces the data sources, their uses and their limitations.

Chapter 2 presents characteristics and short-term effects of diabetes during pregnancy, labour and delivery for all women who gave birth in Australia, and their babies.

Chapter 3 presents characteristics and short-term effects of diabetes during pregnancy, labour and delivery for Aboriginal and Torres Strait Islander women who gave birth, and their babies. Comparisons are made between Indigenous and non-Indigenous women, and their babies.

Chapter 4 presents characteristics and short-term effects of diabetes during pregnancy, labour and delivery for women born in high-diabetes-risk regions, and their babies. Comparisons are made between women born in high-diabetes-risk regions and those born in Australia, and their babies.

Chapter 5 discusses the results, proposes directions for further work in this area, and draws conclusions about the impact of diabetes in pregnancy on women and their babies.

Analytical methods and supplementary tables are presented in the appendixes.

Clinical and technical terms are explained in the glossary.

1.2 What is diabetes in pregnancy?

Diabetes in pregnancy, whether pre-existing (Type 1 or Type 2 diabetes) or arising in pregnancy as gestational diabetes mellitus (GDM), increases the risk of serious complications in both mother and child. Adverse effects associated with diabetes in pregnancy can be short-term or longer-term.

Types of diabetes in pregnancy

Type 1 diabetes

Type 1 diabetes mostly arises in children or young adults, but it can occur at any age. It is marked by the inability to produce insulin. People with Type 1 diabetes need insulin replacement for survival. Based on self-reported data from the 2007–08 National Health Survey, an estimated 81,600 (0.4%) Australians were affected by Type 1 diabetes in 2007–08 (AIHW analysis of the 2007–08 National Health Survey). The prevalence of the condition among women of child-bearing age (15–49 years) was similar, accounting for nearly 23,000 (0.4%) women in that age group.

Type 2 diabetes

Type 2 diabetes is the most common form of diabetes. Although uncommon in childhood, it is becoming increasingly recognised in that group. People with Type 2 diabetes produce insulin, but do not produce enough and/or cannot use it effectively. Type 2 diabetes may be managed with changes to diet and exercise, oral glucose-lowering drugs, non-insulin injectable glucose-lowering medications, insulin injections, or a combination of these. Based on self-reported data from the National Health Survey, an estimated 718,200 (3.5%)

Australians were affected Type 2 diabetes in 2007–08 (AIHW analysis of the 2007–08 National Health Survey). Among women of child-bearing age (15–49 years) the prevalence of Type 2 diabetes was much lower, accounting for about 53,600 (1.0%) women in that age group.

Gestational diabetes

Gestational diabetes is a form of diabetes that develops, or is first diagnosed, during pregnancy in some women. This form of diabetes is characterised by abnormal blood glucose levels in pregnancy among women who have not previously been diagnosed with other forms of diabetes (Virjee et al. 2001). Mostly it develops during the second or third trimester of pregnancy. It usually disappears after the baby is born; however, it can recur in later pregnancies. It is also a marker of increased risk of developing Type 2 diabetes later in life.

Some cases of gestational diabetes are managed with changes to diet and exercise alone, and some may require insulin treatment. The number of women with gestational diabetes can be estimated from the National Hospital Morbidity Database (AIHW 2008). In 2007–08, about 14,400 (5.0%) females aged 15–49 years who gave birth in hospital had been diagnosed with GDM, with more than one-third of cases occurring among females aged 35 years and over (AIHW 2010).

Screening and diagnosis of diabetes in pregnancy

Pre-existing diabetes

A diagnosis of Type 1 or Type 2 diabetes made before conception or during the first trimester of pregnancy will be grouped as pre-existing diabetes in pregnancy. A diagnosis of diabetes is made by a 75-gram oral glucose tolerance test result of:

- fasting (0 hour) venous plasma glucose level of greater than or equal to 7.0 mmol/L, and/or
- 2-hour venous plasma glucose level of greater than or equal to 11.1 mmol/L.

There are no existing screening programs for Type 1 or Type 2 diabetes among women of reproductive age.

Gestational diabetes

The 1998 Australasian Diabetes in Pregnancy Society guidelines recommend that all pregnant women be screened to find those who need to undergo a diagnostic test for GDM (Hoffman et al. 1998). Universal screening for GDM is being implemented across Australia. A positive screening test indicates that a woman is at risk for GDM, and a diagnostic test then needs to be performed.

Women at high risk of GDM may be referred directly for a diagnostic test, without undergoing screening. Pregnant women at high risk include those who: have glucose in their urine; are aged over 30 years; are overweight or obese at the time of conception; have a family history of Type 2 diabetes, GDM or glucose intolerance; are from an Australian Aboriginal or Torres Strait Islander background; or are of Polynesian, Middle Eastern, South Asian (Indian), or other Asian background. Women who are diagnosed with GDM are at increased risk for Type 2 diabetes later in life, and are encouraged to attend follow-up testing for this condition starting 6–8 weeks after giving birth (Hoffman et al. 1998).

The current recommended screening and diagnostic tests for GDM in Australia are outlined in Box 1.2 and are the most commonly used tests for GDM in Australia. Some clinicians may use other criteria not listed here.

Box 1.2: Screening and diagnosis for gestational diabetes mellitus

Screening for GDM

Screening for GDM should be performed at 26–28 weeks' gestation. A positive screening test result is either:

- 50-gram glucose load (morning, non-fasting) with a 1-hour venous plasma glucose level of 7.8 mmol/L or over
- 75-gram glucose load (morning, non-fasting) with a 1-hour venous plasma glucose level of 8.0 mmol/L or over.

Diagnosis of GDM

Diagnostic testing for GDM can be performed at 26–30 weeks' gestation, following a positive screening test, or at any stage of pregnancy if a woman is thought to be at high risk of GDM. Additionally, a venous plasma glucose level of more than 11.0 mmol/L resulting from a screening test is considered diagnostic of GDM by many clinicians, and treatment is started without proceeding to the diagnostic test below.

A positive diagnosis of GDM is made based on a 75-gram oral glucose tolerance test result of either:

- fasting (0 hour) venous plasma glucose level 5.5 mmol/L or over
- 1-hour venous plasma glucose level 10.0 mmol/L or over
- 2-hour venous plasma glucose level 8.0 mmol/L or over.

Follow-up testing for Type 2 diabetes

Women with GDM are at increased risk of developing Type 2 diabetes. A follow-up oral glucose tolerance test (diagnostic test) should be performed about 6–8 weeks after giving birth to assess whether the woman's blood glucose level is within the normal range.
A positive diagnosis of diabetes is made by a 75-gram oral glucose tolerance test result of either:

- fasting (0 hour) venous plasma glucose level of greater than or equal to 7.0 mmol/L
- 2-hour venous plasma glucose level of greater than or equal to 11.1 mmol/L.

The oral glucose tolerance test should be repeated yearly if the first test shows abnormal glucose levels but is not diagnostic of diabetes. That is, the venous plasma glucose levels are within the range for impaired fasting glucose or impaired glucose tolerance:

- fasting (0 hour) venous plasma glucose level of greater than 6.1 mmol/L, but less than 7.0 mmol/L, and 2-hour venous plasma glucose level of less than 7.8 mmol/L (impaired fasting glucose)
- fasting (0 hour) venous plasma glucose level of less than 7.0 mmol/L, and 2-hour venous plasma glucose level of 7.8 mmol/L, but less than 11.0 mmol/L (impaired glucose tolerance).

If the results of the first test are normal, the oral glucose tolerance test should be repeated every 3 years to determine whether there has been progression to abnormal glucose tolerance. More frequent testing may be recommended for women intending to have more children (Simmons et al. 2002).

Source: Hoffman et al. 1998.

Although universal screening for GDM is recommended in Australia, no national data sources are currently available to assess the proportion of pregnant women who are being screened. Changes to the diagnostic thresholds and the screening and diagnostic process may be introduced at a national level in Australia in the near future, in accordance with the published recommendations from the International Association of Diabetes in Pregnancy Study Groups Consensus Panel (IADPSGCP 2010).

Public health programs to promote awareness of risk factors and the uptake of universal screening programs can affect the number of women being diagnosed with GDM. Screening of more pregnant women for GDM may result in more women being diagnosed with the condition, while public awareness of the risk factors and the steps that can be taken to modify these can reduce the number of women developing GDM. These changes would need to be taken into account when comparing the proportion of pregnant women affected by GDM over time.

1.3 What is the impact of diabetes in pregnancy?

The impact of diabetes in pregnancy can be seen in the short-term and longer-term, for both mother and baby. The short-term impact includes those characteristics, outcomes, conditions and interventions that can be seen during pregnancy, and labour and shortly after birth, such as: duration of pregnancy, fetal growth characteristics, outcome of pregnancy, type of labour, method of birth, need for resuscitation and intensive care admissions. The longer-term impact may be seen as the ongoing impact of a short-term effect or may not become evident for many years.

The impact of diabetes in pregnancy, drawn from existing literature, is described below.

Short-term impact: mothers

Pre-existing diabetes

In the short term, pre-existing diabetes in mothers is associated with a higher risk of miscarriage, pre-eclampsia, pre-term delivery, induced labour, caesarean section, and the first appearance or progression of diabetes-related kidney and ophthalmic complications (AIHW 2006; de Valk et al. 2006; Yang et al. 2006).

A 2002 Canadian study by Yang et al. (2006) found that the rate of caesarean sections was 49% in mothers with pre-existing diabetes, compared with 20% in mothers without diabetes.

Studies have shown that maternal, fetal and neonatal outcomes in women with Type 2 diabetes are similar to, if not worse than, those in pregnancies complicated by Type 1 diabetes (de Valk et al. 2006; Cheung et al. 2005; Clausen et al. 2005).

Gestational diabetes mellitus

In the short term, gestational diabetes mellitus is associated with a higher risk of pregnancy-induced hypertension and pre-eclampsia, induced labour, and operative delivery (Suhonen & Teramo 1993).

A Victorian study done in 1996 indicated that 37% of women with GDM had labour induced compared with 23% of women without GDM, and that 41% of women with GDM had an

operative delivery (forceps, vacuum extraction and caesarean) compared with 29% of women without GDM (Stone et al. 2002).

Short-term impact: babies

Pre-existing diabetes

The short-term adverse effects among babies born to mothers with pre-existing diabetes include increased risk of miscarriage, congenital malformations of the spine, heart and kidneys, stillbirth, macrosomia, birth injuries, respiratory distress and hypoglycaemia (Hall et al. 2001; Gabbe & Graves 2003; de Valk et al. 2006; Yang et al. 2006; NCC-WCH 2008).

Both increased risk of miscarriage and congenital malformations may result from high blood glucose levels at conception and during the first trimester, affecting early fetal development. A study done in the Netherlands found that congenital malformations occurred in 9% of babies born to mothers with Type 1 diabetes, which was 3 times the risk of the national population (Evers et al. 2004).

Gestational diabetes mellitus

The short-term adverse effects for babies born to mothers with GDM include: increased risk of stillbirth, caesarean section, macrosomia, shoulder dystocia, respiratory distress syndrome and jaundice (Coustan 1995; Stone et al. 2002; WHA 2005; Carpenter 2007; Gonzalez-Quintero et al. 2007).

A 1996 Victorian study by Stone et al. (2002) showed that when compared with babies born to mothers who did not have any form of diabetes, babies born to mothers with GDM were more likely to:

- be macrosomic (17% compared with 10%)
- suffer from neonatal jaundice (13% compared with 7%)
- be delivered by caesarean (32% compared with 19%).

Longer-term impact: mothers

Pre-existing diabetes

The longer-term effects of pre-existing diabetes in pregnancy are related to the progression of diabetes complications such as eye disease, kidney disease and cardiovascular disease. These are serious complications associated with Type 1 and Type 2 diabetes, and contribute significantly to poor quality of life, hospitalisation and death among people with these forms of diabetes.

Gestational diabetes mellitus

The longer-term effects of GDM include higher risk of recurrent GDM in subsequent pregnancies and of progression to Type 2 diabetes (Metzger 2007). About 17% of Australian women who have had GDM develop Type 2 diabetes within 10 years, and up to 50% within 30 years (Lee et al. 2007). Women with GDM also have an increased risk of developing cardiovascular disease (Retnakaran & Baiju 2009).

Longer-term impact: babies

The longer-term effects of maternal diabetes on babies include living with congenital anomalies arising from exposure to maternal diabetes, and being at increased risk of obesity, impaired glucose tolerance and Type 2 diabetes in early adulthood (Fetita et al. 2007).

1.4 Which population groups are at greatest risk?

Literature shows that women who identify as being of Aboriginal and Torres Strait Islander origin, or who were born in Polynesia, Southern Asia, the Middle East and other Asian countries, are more likely to have Type 2 diabetes, and are at greater risk of GDM than other Australian women (AIHW: Holdenson et al. 2003; Hoffman et al. 1998). Indigenous women have also been shown to experience poorer outcomes of pregnancy compared with non-Indigenous women (AIHW: Leeds et al. 2007). There appears to be no evidence on the comparative pregnancy outcomes among women from high-diabetes-risk regions and Australian-born women. These two high-diabetes-risk populations have been given special consideration in this report, to determine whether women from these population groups experience the adverse effects of diabetes in pregnancy at a greater rate than other women.

Other independent risk factors for Type 2 diabetes and GDM, such as age and overweight and obesity, have not been addressed in detail in this report, but may be considered for future reporting on this theme.

1.5 Data sources

Two sources of data are used in this report: the National Hospital Morbidity Database (NHMD) and the National Perinatal Data Collection (NPDC) database. These were selected because they contain national data on pregnancies or individual women with diagnosed diabetes in pregnancy, and on the effects of those pregnancies for women and their babies.

Both data sources allow for the calculation of the occurrence of adverse maternal outcomes of diabetes in pregnancy among women who gave birth in Australia, and comparative analyses by maternal diabetes status and population groups. Analyses on the occurrence of adverse infant outcomes, by maternal diabetes status and population groups, are based on the NPDC data only.

While data on infants are available from the NHMD, the nature of the database prevents the infant data being linked with maternal diabetes status or other maternal characteristics essential to the analyses in this report. For this reason, data on infants collected in the NHMD have not been included in this report.

More details of the NHMD and NPDC data used in this report are given below.

National Hospital Morbidity Database

The NHMD is an administrative data set maintained by the AIHW. It is a collection of information about care provided to patients admitted to Australian hospitals.

The NHMD contains demographic, diagnostic, procedural and duration-of-stay information on episodes of care for patients admitted to hospital. Diagnostic information relevant only to

the current episode of care, including conditions or disorders that affect the treatment received by the patient during the episode, are included. The collection comprises comparable state and territory hospitalisation data. These data are episode-based and do not equate to individuals.

The analyses in this report are based on 3 years of combined data from the NHMD, from 1 July 2005 to 30 June 2008 (2005–06 to 2007–08).

Episodes of care that involve the birth of one or more babies in hospital are assigned an 'outcome of delivery' code (see 'Appendix 1 Methods'). Although individual women who give birth in hospital cannot be identified, each outcome of delivery can be correlated to a unique pregnancy, as these codes are assigned only once for each birth. It is possible that some women will give birth more than once in the 3-year period analysed in this report, and these unique pregnancies are referred to as 'women'.

It is estimated that about 0.2% of all births in Australia are homebirths, and some may occur in birthing centres or other locations outside the hospital system (Laws et al. 2007). These births are not captured by the NHMD.

Two sets of codes in the NHMD can be used to assign a diagnosis of diabetes mellitus, sourced from the International Classification of Disease, 10th Edition, Australian Modification (ICD-10-AM). The first set comprises the codes E10, E11, E13 and E14, representing Type 1, Type 2 and other/unspecified forms of diabetes. The second set comprises the O24 codes, which represent diabetes complicating pregnancy.

The O24 codes include gestational diabetes, which is assigned when diabetes is diagnosed at or after 24 weeks gestation, and pre-existing Type 1, Type 2 and other/unspecified forms of diabetes in pregnancy, which are only assigned when the diagnosis of diabetes pre-dates the current pregnancy. Some episodes of care with an outcome of delivery code have codes from the first and second set, some only from the first set, and some only from the second.

As a result of the conflicting ICD-10-AM codes in some records, the NCMD devised an analytical method to ensure that diabetes in pregnancy status was assigned with the greatest possible accuracy. This method used a hierarchy to assign diabetes status, whereby pre-existing diabetes codes from the first and second code sets take precedence over GDM codes from the second set. For example, if a record had a Type 2 code from the first set and a GDM code from the second set, the record ('woman') was assigned pre-existing Type 2 diabetes in pregnancy. For more specific detail on the method, see 'Appendix 1 Methods'.

National Perinatal Data Collection

The NPDC is a national data set maintained by the National Perinatal Statistics Unit, one of the collaborating units of the AIHW and part of the University of New South Wales.

The NPDC contains selected information relating to births that are reported to the perinatal data collection in each Australian state and territory. The NPDC includes demographic, diagnostic, procedural and duration-of-stay information for both mothers and babies. Selected information is compiled annually into the NPDC by the National Perinatal Statistics Unit.

Information on the method and scope of the data collection, data validation and reporting of data are shown below. Further information on the method used to assign diabetes in pregnancy status, as well as the coding and collection method used by each state and territory are available in 'Appendix 1 Methods'.

Information on pre-existing diabetes and gestational diabetes is collected in all state and territory perinatal data collections. In the period 2005–2007, there were no changes in the method of collection of diabetes information in any of the states or territories. There was, however, variation in the conditions each state or territory included when reporting pre-existing or gestational diabetes, and the way in which these are collected. These are outlined below, and detailed further in 'Appendix 1 Methods'.

Each state and territory collection contains tick boxes to record diabetes on paper-based perinatal forms and/or in electronic systems. Four of the jurisdictions—Victoria, Queensland, Western Australia and the Australian Capital Territory—also collect diabetes information according to ICD–10–AM codes. For Victoria and the Australian Capital Territory, these are obtained from hospital data only. For Queensland, ICD codes are collected directly via the perinatal form and electronic system, which have an underlying code that corresponds with each tick box. For Western Australia, ICD codes are only collected directly via the perinatal form and electronic system.

In a survey of the eight jurisdictions, six jurisdictions reported that midwives are provided with guidelines or a data collection manual to help record diabetes information. The amount of detail in guidelines varies widely. Of these jurisdictions, three reported that training is provided to midwives for completion of perinatal information. Where education has been provided, it is general and not specific to the recording of diabetes information alone.

Diabetes data are not routinely validated in any of the states or territories where there is more than one source of data. For example, in the Australian Capital Territory, diabetes is recorded in the perinatal data collection if either the hospital or perinatal data indicate diabetes. Four jurisdictions have done one-off validation studies of diabetes data in perinatal collections. In South Australia, a validation study showed no conflict between data sources. A New South Wales validation study carried out for 1998 data compared information from the perinatal form with information contained in the medical records for a sample of 1,680 births. The study showed 99.7% agreement for diabetes mellitus and 99.1% for gestational diabetes (Taylor et al. 2000). A validation study was conducted in Victoria in 2006 on the overall accuracy of perinatal data, including diabetes status, recorded in 2003. Gestational diabetes was found to be 99.7% accurate, and pre-existing diabetes was found to be 100.0% accurate. In the Northern Territory, an audit of 2004 perinatal data was done at Royal Darwin Hospital, looking at missing cases of gestational diabetes only. This study found a missing case rate of 0.04%, which, when applied to the total number of women giving births in the Northern Territory, equated to an estimated 49 missing cases of GDM in the Northern Territory in 2004.

As a result of the variation in validation methods, collection methods and coding of diabetes, these data are not considered comparable by state and territory, so only national data have been included in this report.

2 All mothers and infants

Key points

- In 2005–2007, more than 5% of pregnancies were complicated by diabetes: less than 1% of mothers had pre-existing diabetes, and about 5% had GDM (NPDC data).
- In 2005–06 to 2007–08, more than 5% of pregnancies were complicated by diabetes: 0.3% had pre-existing Type 1, 0.3% had pre-existing Type 2, and about 5% had GDM (NHMD data).
- Mothers with pre-existing diabetes had higher rates of pre-term birth, caesarean section, birth without labour, and longer stay in hospital, compared with mothers with GDM and mothers without diabetes in pregnancy.
- Mothers with Type 1 diabetes were more likely to have a pre-term birth, caesarean section and hypertension, compared with mothers with Type 2 diabetes.
- Mothers with GDM had a higher rate of induced labour compared with mothers with pre-existing diabetes, and were more likely to give birth pre-term, have a caesarean section, have hypertension or stay longer in hospital than mothers without diabetes in pregnancy.
- Babies of mothers with pre-existing diabetes had higher rates of stillbirth, pre-term birth, high birthweight, low Apgar score, high-level resuscitation, special care nursery/neonatal intensive care unit admission and longer stay in hospital compared with babies of mothers with GDM or babies of mothers without diabetes in pregnancy.
- Babies of mothers with pre-existing Type 2 diabetes were more likely to be stillborn, compared with babies of mothers with pre-existing Type 1 diabetes.
- Babies of mothers with GDM had the lowest rate of fetal death, about half that of babies of mothers without diabetes in pregnancy.

This chapter describes the effects of pregnancy, labour and delivery on all women who gave birth in Australia and their babies. It highlights differences in characteristics by maternal diabetes in pregnancy status. For differences between population groups, see Chapter 3 and Chapter 4.

The data used in this chapter are sourced from the National Perinatal Data Collection (NPDC), and include all women who gave birth during 2005–2007. The NPDC data are supplemented by data from the National Hospital Morbidity Database (NHMD), including data on additional outcomes not available in the NPDC and data by type of pre-existing diabetes (Type 1 and Type 2). These NHMD data include all women who gave birth in hospital from 2005–06 to 2007–08.

Note that, where crude and age-standardised rates are presented in a table, only the age-standardised rates are discussed in the text.

2.1 Maternal characteristics

Diabetes in pregnancy status

This section provides an overview of diabetes in pregnancy status for all women who gave birth.

In the 3-year period 2005–2007, the NPDC recorded information on 833,710 women who gave birth in Australia and whose age and diabetes in pregnancy status was recorded. Of these:

- 4,952 (0.6%) had pre-existing diabetes
- 39,139 (4.7%) were diagnosed with GDM
- 789,619 (94.7%) did not have diabetes (Table 2.1).

Table 2.1: Women who gave birth in Australia, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes	Total[(a)]
Number of mothers	4,952	39,139	789,619	**833,710**
Per cent	0.6	4.7	94.7	**100.0**

(a) Total excludes 1,015 women who gave birth and had missing or not stated diabetes in pregnancy status (901) or missing age (114).

Source: AIHW analysis of NPDC data.

In the 3-year period 2005–06 to 2007–08, the NHMD recorded information on 839,033 women who gave birth in Australia (Table 2.2). Of these:

- 4,603 (0.5%) had pre-existing diabetes, with:
  - 2,119 (0.3%) with Type 1 diabetes
  - 2,219 (0.3%) with Type 2 diabetes
- 40,776 (4.9%) were diagnosed with GDM
- 791,890 (94.4%) did not have diabetes (Table 2.2).

Table 2.2: Women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	All pre-existing diabetes[(a)]	Gestational diabetes mellitus	No diabetes	Total[(b)]
Number of mothers	2,119	2,219	4,603	40,776	791,890	**839,033**
Per cent[(c)]	0.3	0.3	0.5	4.9	94.4	**100.0**

(a) Includes 'diabetes—other/unspecified'.

(b) Total includes 'diabetes in pregnancy—onset unspecified'.

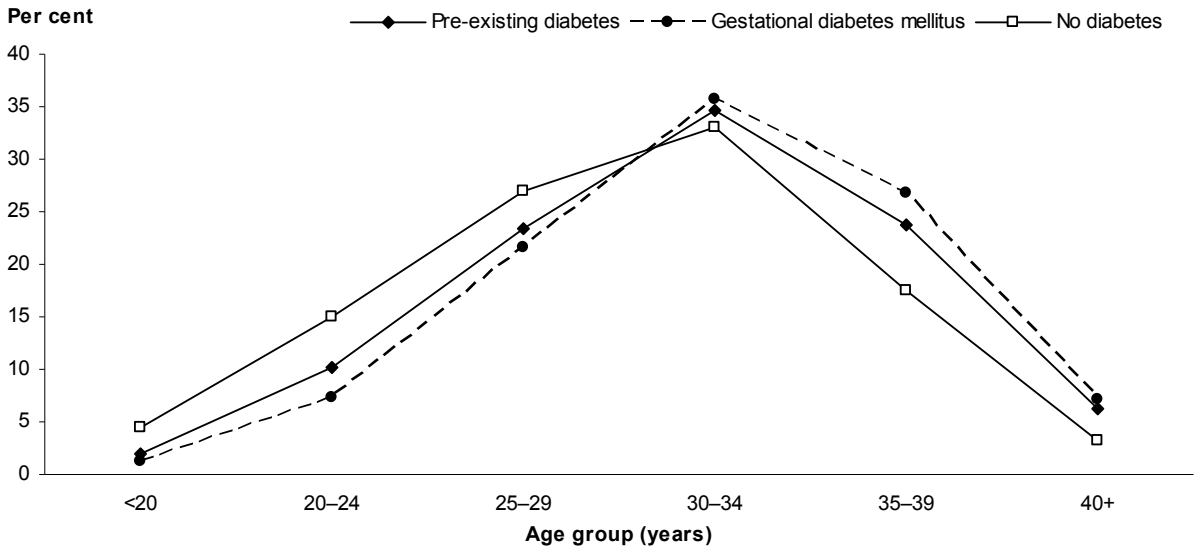
(c) Percentages have been rounded to 1 decimal place and may not sum to the total.

Source: AIHW NHMD.

Age distribution

This section provides an overview of the age distribution of all women who gave birth, by diabetes in pregnancy status from 2005 to 2007.

In 2005–2007, the peak age of women who gave birth was 30–34 years, with about 33% of all mothers in this age group (Figure 2.1). Less than half (46%) of all mothers were aged less than 30 years. Women who gave birth with GDM and those with pre-existing diabetes in pregnancy were more likely to be older (aged 30 years and over) than women who gave birth without diabetes, at 70%, 65% and 54%, respectively. To take account of this age difference by diabetes in pregnancy status, all subsequent analyses of NPDC data in this report have been age-standardised.

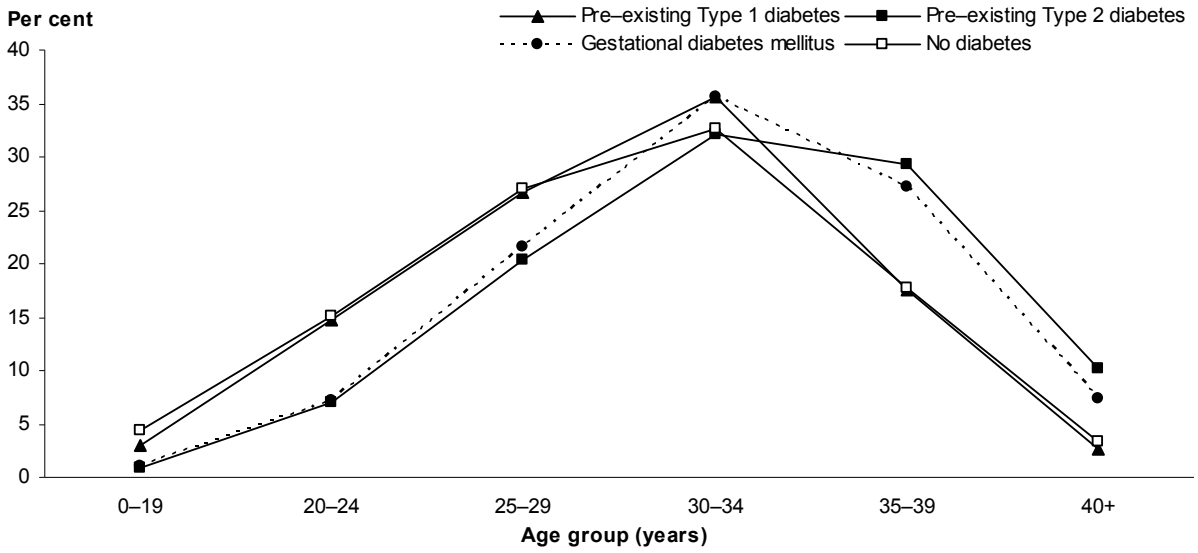


Note: For summary data, see 'Appendix 2 Supplementary tables', Table A2.1.

Source: AIHW analysis of NPDC data.

Figure 2.1: Age distribution among women who gave birth, by diabetes in pregnancy status, 2005–2007

Among women who gave birth in hospital in 2005–06 to 2007–08, the peak age was 30–34 years across all diabetes status groups (Figure 2.2). Women who gave birth with Type 2 diabetes and those with GDM tended to be older than other women who gave birth. About 71% of mothers with Type 2 diabetes or with GDM were aged 30 years and over, compared with about 55% of mothers with Type 1 diabetes or without diabetes in pregnancy.



Note: For summary data, see 'Appendix 2 Supplementary tables', Table A2.2.

Source: AIHW NHMD.

Figure 2.2: Age distribution among women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

Parity

Parity refers to the number of pregnancies that resulted in the birth of one or more live or stillborn babies (Laws & Sullivan 2009). Women who have had no previous pregnancies resulting in a birth are called 'primiparous' mothers and those who have had at least one pregnancy resulting in a birth are called 'multiparous' mothers.

This section provides an overview of parity among Australian women.

The majority of Australian women who gave birth were multiparous (Table 2.3). Differences in the incidence of multiparity were found by diabetes in pregnancy status:

- Women who gave birth with pre-existing diabetes in pregnancy (59%) were more likely to be multiparous compared with those with GDM (56%).
- Women who gave birth with GDM were less likely to be multiparous compared with those without diabetes (58%).

There was no statistically significant difference at the 95% confidence level in parity between women with pre-existing diabetes and women without diabetes in pregnancy.

Table 2.3: Parity among women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Primiparous	1,826	36.9	15,147	38.7	330,072	41.8
Multiparous	3,115	62.9	23,956	61.2	458,363	58.0
Total[(a)]	**4,952**	**100.0**	**39,139**	**100.0**	**789,619**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Primiparous	40.6	(40.0–41.2)	44.1	(43.9–44.7)	41.8	(41.2–42.4)
Multiparous	59.2	(58.5–60.0)	55.9	(55.1–56.6)	58.0	(57.3–58.8)

(a) Totals may not add up due to missing values.

Notes

1. Parity was not stated for: 11 mothers with pre-existing diabetes, 36 mothers with gestational diabetes mellitus and 1,184 mothers without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 maternal population without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Plurality

Plurality refers to the number of babies resulting from one pregnancy (Laws & Sullivan 2009). In this analysis, singleton births (one baby) and multiple births (two or more babies) are presented. The chance of twin or higher-order multiple pregnancies increases with maternal age and the use of assisted reproductive technologies (such as IVF). Multiple birth pregnancies are at increased risk of caesarean section and pre-term birth (Lancaster 1996).

This section provides an overview of plurality among Australian women.

According to data sourced from the NPDC, there was a statistically significant difference in the incidence of multiple births by maternal diabetes status in the period 2005 to 2007:

- Mothers with GDM (2.3%) were more likely to have a multiple birth compared with mothers with pre-existing diabetes in pregnancy (1.7%) (Table 2.4).
- Mothers with GDM were also more likely to have a multiple birth than mothers without diabetes in pregnancy (1.6%).

There was no significant difference in the rate of multiple births between mothers with pre-existing diabetes and mothers without diabetes in pregnancy. Similarly, there was no difference in incidence of singleton births by diabetes in pregnancy status.

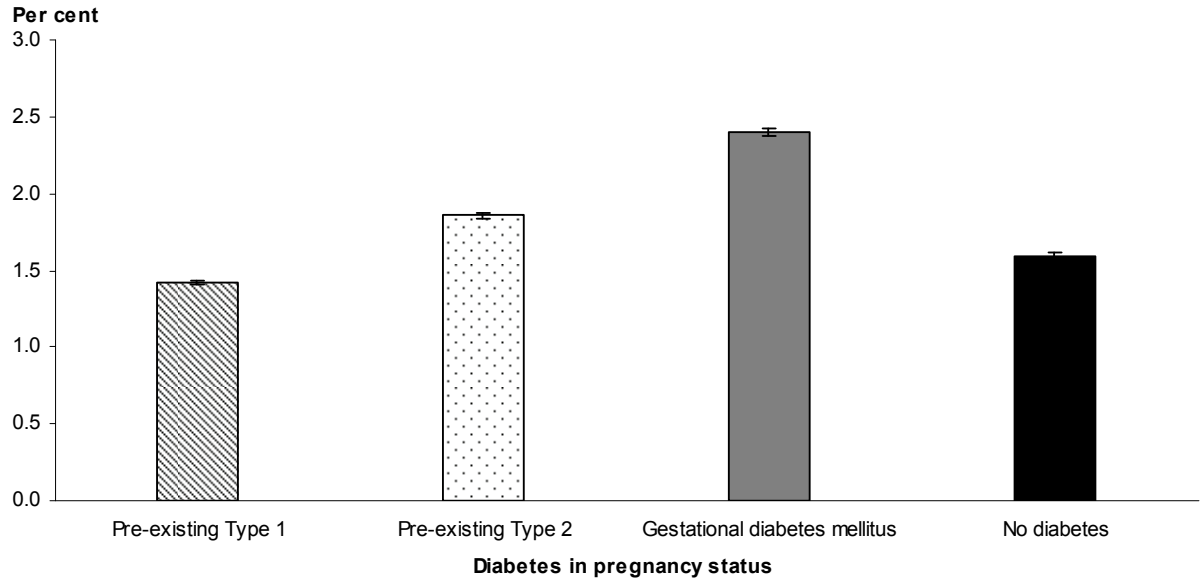
Table 2.4: Plurality among women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Singleton birth	4,862	98.2	38,171	97.5	776,898	98.4
Multiple birth	90	1.8	968	2.5	12,721	1.6
Total	**4,952**	**100.0**	**39,139**	**100.0**	**789,619**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Singleton birth	98.3	(97.4–99.3)	97.7	(96.7–98.6)	98.4	(97.4–99.3)
Multiple birth	1.7	(1.6–1.8)	2.3	(2.2–2.5)	1.6	(1.5–1.7)

Note: Directly age-standardised to the 2005–2007 maternal population without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

According to data from the NHMD, the proportion of multiple births among women who gave birth in hospital in 2005–06 to 2007–08 was greatest among women with a diagnosis of GDM (2.4%), followed by those with Type 2 diabetes (1.9%) and those without diabetes (1.6%). Women with Type 1 diabetes in pregnancy had the lowest rate of multiple births in this period (1.4%) (Figure 2.3).



Notes

1. Directly age-standardised to the 2005–06 to 2007–08 maternal population without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

2. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A2.3.

Source: AIHW NHMD.

Figure 2.3: Proportion of multiple births among women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

2.2 Maternal outcomes

Duration of pregnancy

Women who give birth at 37 to 41 completed weeks of pregnancy are considered to have had a pregnancy 'to term' (or full term), with births at 42 weeks or more considered 'post-term'. Women who give birth at less than 37 weeks are considered to have had a 'pre-term' birth, with births before 32 weeks considered 'very pre-term' (Laws & Sullivan 2009). Multiple births, maternal age (older and younger) and maternal morbidity, such as hypertension and diabetes, are risk factors for pre-term births (Lykke et al. 2009; Khashu et al. 2009).

This section provides an overview of duration of pregnancy and the incidence of pre-term birth among Australian women who gave birth.

More information on the adverse outcomes of pre-term birth among babies can be found in 'Section 2.3—Infant outcomes'.

Women who gave birth with pre-existing diabetes in pregnancy were more likely to have a pre-term or very pre-term birth compared with other women:

- One-fifth (21.5%) of mothers with pre-existing diabetes gave birth at 32–36 weeks gestation, compared with 8.6% of mothers with GDM and 5.6% of mothers without diabetes (Table 2.5).
- Mothers with pre-existing diabetes were 5 and 3 times as likely to have a very pre-term birth as mothers with GDM and mothers without diabetes, respectively.

Table 2.5: Duration of pregnancy among women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
20–31 weeks[(a)]	219	4.4	368	0.9	12,140	1.5
32–36 weeks	1,030	20.8	3,400	8.7	44,043	5.6
≥ 37 weeks	3,702	74.8	35,371	90.4	733,320	92.9
Total[(b)]	**4,952**	**100.0**	**39,139**	**100.0**	**789,619**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
20–31 weeks[(a)]	4.6	(4.4–4.8)	0.9	(0.8–1.0)	1.5	(1.4–1.7)
32–36 weeks	21.5	(21.1–22.0)	8.6	(8.3–8.9)	5.6	(5.4–5.8)
≥ 37 weeks	73.8	(73.0–74.7)	90.5	(89.6–91.4)	92.9	(91.9–93.8)

(a) Includes 5 births of less than 20 weeks duration.

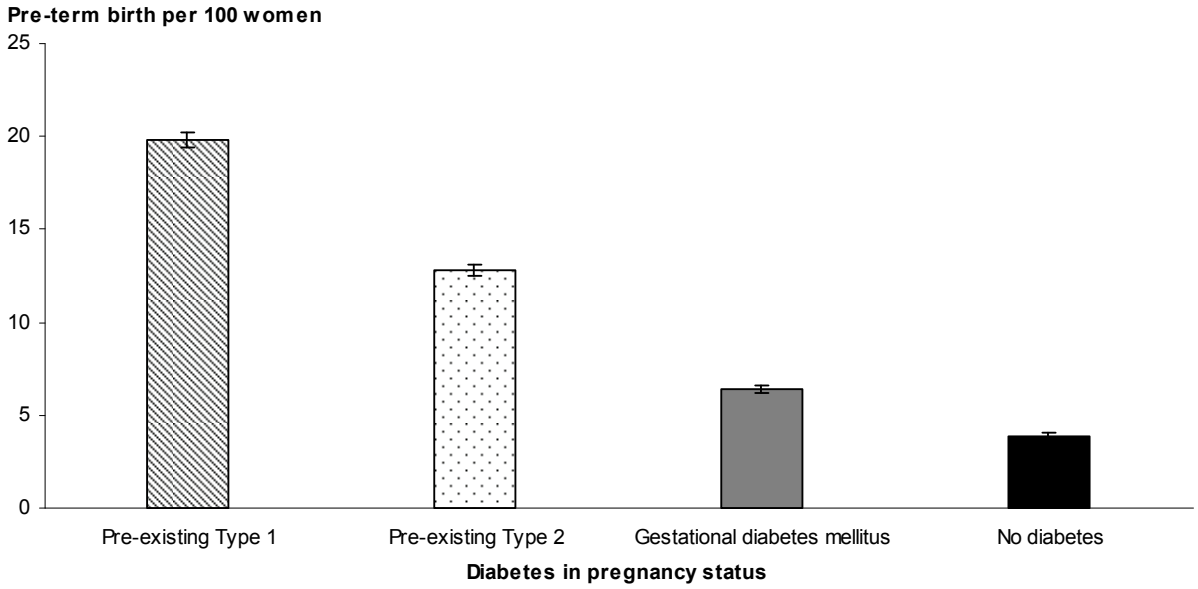
(b) Totals may not add up due to missing values.

Notes

1. Duration of pregnancy was not stated for: 1 mother with pre-existing diabetes, and 116 women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 maternal population without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Among women giving birth in hospital in 2005–06 to 2007–08, those with a diagnosis of Type 1 diabetes in pregnancy (20%) were most likely to have a pre-term birth, followed by those with Type 2 diabetes (13%), GDM (6%) and those without a diagnosis of diabetes in pregnancy (4%) (Figure 2.4).



Notes

1. Delivery at 36 weeks or less is considered pre-term.
2. Directly age-standardised to the 2005–06 to 2007–08 maternal population without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.
3. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A2.4.

Source: AIHW NHMD.

Figure 2.4: Pre-term birth among women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

Labour

A normal labour comes on spontaneously and progresses through stages of contraction to result in a vaginal delivery. In some high-diabetes-risk pregnancies, labour may be brought on through the use of medicines (induced labour), or bypassed altogether (no labour). Reasons for an induced labour may be to prevent the development or progression of pregnancy-related complications such as pre-eclampsia, maternal conditions such as unstable diabetes, or complications relating to baby growth, such as large size (macrosomia).

This section provides an overview of labour among Australian women who gave birth in 2005–2007.

Women who gave birth with pre-existing diabetes or with GDM were more likely to be induced or deliver without going into labour, compared with women who gave birth without diabetes in pregnancy:

- The majority (58%) of women who gave birth without diabetes had a spontaneous labour.
- Women who gave birth with GDM had the highest incidence of induced labour (40%), followed by those with pre-existing diabetes (36%) and those without diabetes in pregnancy (25%).
- Women who gave birth with pre-existing diabetes had the highest incidence of delivery without labour (39%), followed by those with GDM (22%) and those without diabetes in pregnancy (18%) (Table 2.6).

Table 2.6: Onset of labour among women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Spontaneous	1,224	24.7	14,305	36.6	455,954	57.7
Induced	1,730	34.9	15,018	38.4	194,462	24.6
No labour	1,994	40.3	9,805	25.1	139,034	17.6
Total[(a)]	**4,952**	**100.0**	**39,139**	**100.0**	**789,619**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Spontaneous	25.3	(24.8–25.8)	37.7	(37.1–38.3)	57.7	(57.0–58.5)
Induced	35.7	(35.2–36.3)	39.8	(39.2–40.4)	24.6	(24.2–25.1)
No labour	38.9	(38.3–39.5)	22.4	(22.0–22.9)	17.6	(17.2–18.0)

(a) Totals may not add up due to missing values.

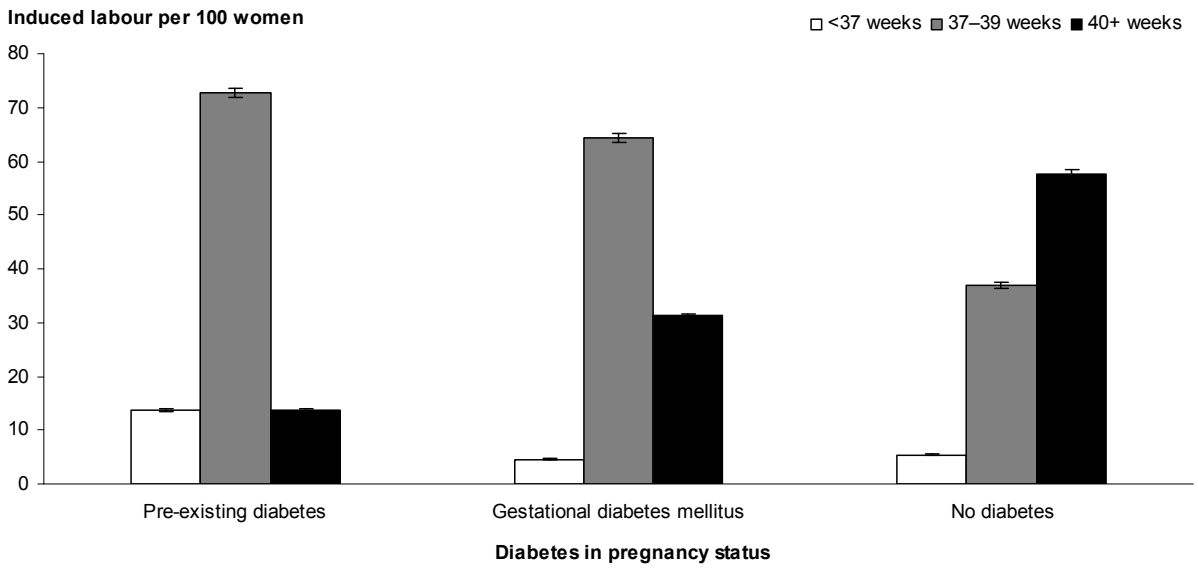
Notes

1. Onset of labour was not stated for: 4 women with pre-existing diabetes, 11 women with gestational diabetes mellitus, and 169 women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 maternal population without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

About two-thirds of induced labour among women who gave birth with pre-existing diabetes (73%) or with GDM (64%) was performed at 37–39 weeks gestation, while the majority of inductions among women who gave birth without diabetes in pregnancy (58%) were performed at 40 weeks or more gestation (Figure 2.5).

About 14% of women who gave birth with pre-existing diabetes had an induced labour at less than 37 weeks gestation. Women with pre-existing diabetes were 3 times as likely to be induced at less than 37 weeks duration compared with women who gave birth with GDM or women who gave birth without diabetes in pregnancy.



Notes

1. Type of labour was not stated for: 4 women with pre-existing diabetes, 11 women with gestational diabetes mellitus, and 169 women without diabetes in pregnancy.
2. Duration of pregnancy was not stated for: 1 woman who gave birth with pre-existing diabetes, and 52 women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 maternal population with induced labour and without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
4. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A2.5.

Source: AIHW analysis of NPDC data.

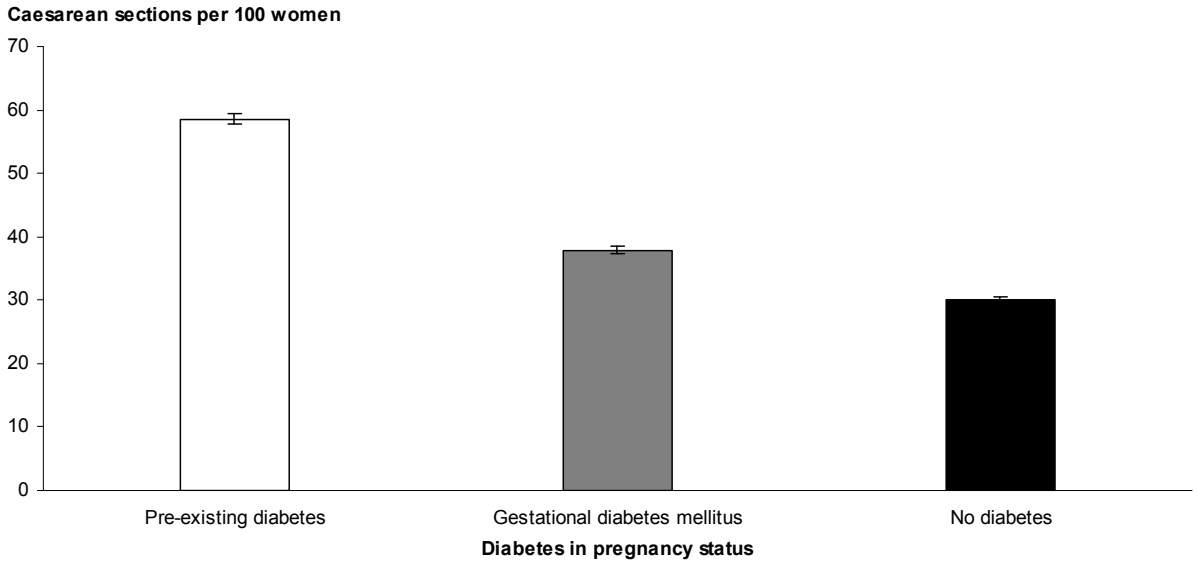
Figure 2.5: Induced labour among women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

Caesarean section

Caesarean sections may be performed where there is a risk of adverse outcomes for the mother and/or baby from labour and vaginal delivery. Reasons for caesarean section may include: pelvic abnormalities, previous caesarean section, plurality and hypertension in the mother and abnormal presentation, distress (rapid or slow heart rate), large size (macrosomia), and shoulder dystocia in the baby (Remsberg et al. 1999). Caesarean sections may be performed as an elective procedure or in emergency situations.

This section presents the incidence of caesarean sections among Australian women who gave birth in the period under study.

More than half (59%) of all women with pre-existing diabetes had a caesarean section, compared with 38% of women who gave birth with GDM and 30% of women who gave birth without diabetes in pregnancy (Figure 2.6).



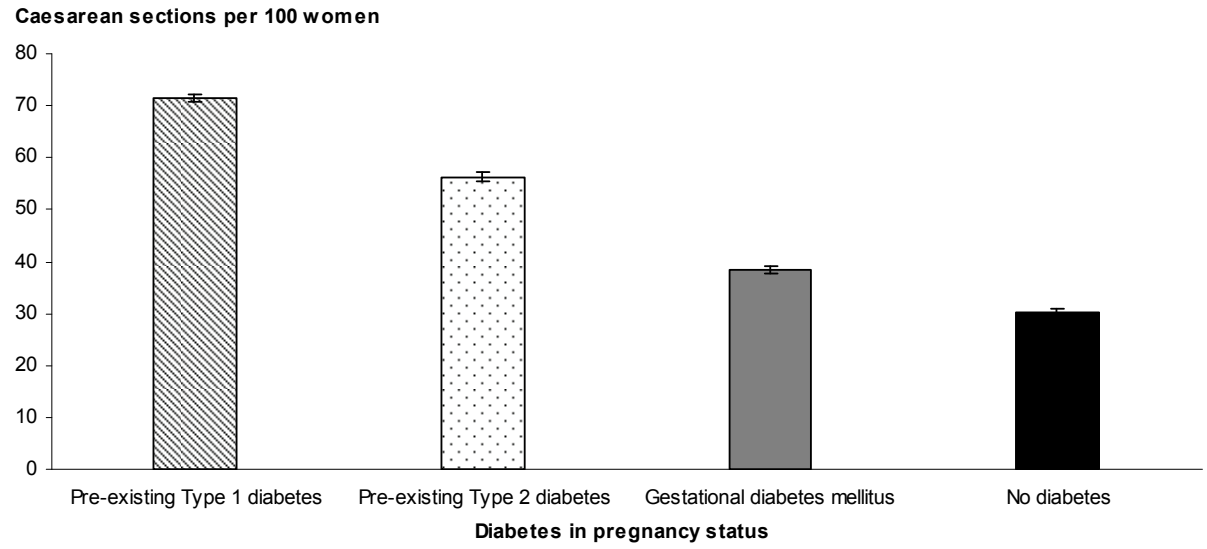
Notes

1. Directly age-standardised to the 2005–2007 maternal population without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
2. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A2.6.

Source: AIHW analysis of NPDC data.

Figure 2.6: Caesarean section among women who gave birth, by diabetes in pregnancy status, 2005–2007

The vast majority of women who gave birth in hospital in 2005–06 to 2007–08 with a diagnosis of Type 1 diabetes underwent a caesarean section (71%). Women who gave birth with Type 2 diabetes had the next highest rate of caesarean section (56%), followed by those with a diagnosis of GDM (38%) and those without a diagnosis of diabetes in pregnancy (30%) (Figure 2.7).



Notes

1. Directly age-standardised to the 2005–06 to 2007–08 maternal population without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

2. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A2.7.

Source: AIHW NHMD.

Figure 2.7: Caesarean section among women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

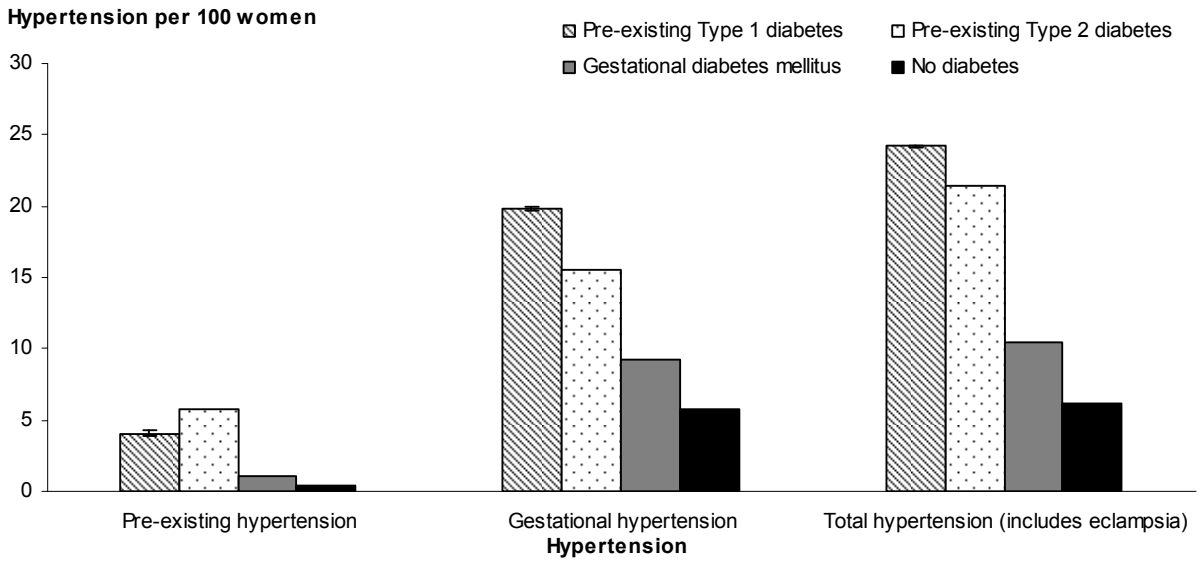
Hypertension

Hypertension (high blood pressure) in pregnancy can cause maternal and baby morbidity and mortality, may lead to the development of pregnancy-related conditions, such as pre-eclampsia, and may contribute to longer-term conditions such as ischaemic heart disease and stroke (Wacker et al. 1999 Government of South Australia 2005). Hypertension can be a pre-existing condition that complicates pregnancy or be diagnosed first during pregnancy (gestational hypertension and eclampsia or pre-eclampsia).

This section provides an overview of diagnosed hypertension among Australian women giving birth in hospital, sourced from the NHMD.

Australian women giving birth in hospital with diabetes in pregnancy were more likely to have a concurrent diagnosis of hypertension—Type 1 diabetes (24%), Type 2 diabetes (21%) or GDM (11%)—compared with women who did not have diabetes in pregnancy (6%) (Figure 2.8).

The highest incidence of pre-existing hypertension was 6%, among women with Type 2 diabetes. The highest incidence of gestational hypertension was 20% among women with Type 1 diabetes. Gestational hypertension was more common than pre-existing hypertension across all diabetes in pregnancy groups.



Notes

1. Directly age-standardised to the 2005–06 to 2007–08 maternal population without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

2. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A2.8.

Source: AIHW NHMD.

Figure 2.8: Hypertension among women who gave birth in hospital, by type of hypertension and diabetes in pregnancy status, 2005–06 to 2007–08

Length of stay in hospital

Antenatal length of stay refers to the number of days a mother was in hospital before giving birth. The reasons for increased antenatal length of stay may include signs of pre-term labour or treatment for maternal and fetal conditions and complications.

Postnatal length of stay refers to the number of days a mother is in hospital after giving birth. Increased postnatal length of stay may be due to the method of delivery (longer for caesarean section), treatment required for complications of labour and delivery, infant morbidity and hospital policy on discharging women who gave birth—for example, requirements for doctor consultation before discharge or no facilities for discharge on weekends.

This section provides an overview of antenatal and postnatal length of stay among Australian women who gave birth, sourced from the NPDC, and median length of stay, sourced from the NHMD.

Antenatal

The vast majority (79% or more) of women who gave birth were hospitalised for 1 day or less before giving birth (Table 2.7), with a median length of stay of 0–1 days. Of those women who were hospitalised for 2 or more days before giving birth:

- mothers with pre-existing diabetes were 3 times as likely to have an antenatal stay of 2–6 days compared with those without diabetes in pregnancy
- mothers with pre-existing diabetes were also 6 times as likely to have an antenatal stay for 7 or more days compared with those without diabetes in pregnancy
- mothers with GDM were twice as likely to have an antenatal stay of 2–6 days or 7 or more days compared with those without diabetes.

Table 2.7: Antenatal length of stay in hospital among women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–1 day	3,913	79.4	34,574	89.2	719,033	93.8
2–6 days	690	14.0	3,046	7.9	33,099	4.3
≥ 7 days	244	5.0	707	1.8	6,110	0.8
Total[(a)]	**4,928**	**100.0**	**38,761**	**100.0**	**766,729**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–1 day	78.6	(77.8–79.5)	88.5	(87.6–89.4)	93.8	(92.9–94.7)
2–6 days	14.7	(14.3–15.0)	8.5	(8.3–8.8)	4.3	(4.1–4.5)
≥ 7 days	5.0	(4.8–5.2)	1.8	(1.7–1.9)	0.8	(0.7–0.9)

(a) Totals may not add up due to missing values.

Notes

1. Includes mothers who gave birth in hospital only.
2. Antenatal stay was not stated for: 81 women with pre-existing diabetes, 434 women with gestational diabetes mellitus, and 8,487 women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 maternal population without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Postnatal

The majority (79% of more) of women stayed in hospital for 2–6 days after giving birth (Table 2.8), with a median length of stay of 3–4 days. Of those women who were hospitalised for a shorter or longer period:

- mothers without diabetes were twice as likely to have a postnatal stay of 1 day or less compared with those with pre-existing diabetes
- mothers without diabetes were 50% more likely to have a postnatal stay of 1 day or less compared with those with GDM
- mothers with pre-existing diabetes were 3 times as likely to have a postnatal stay of 7 or more days compared with those without diabetes
- mothers with GDM were 30% more likely to have a postnatal stay of 7 or more days compared with those without diabetes.

Table 2.8: Postnatal length of stay in hospital among women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
0–1 day	262	5.5	3,133	8.3	96,719	13.0
2–6 days	3,874	81.7	32,596	86.1	616,300	82.7
≥ 7 days	528	11.1	1,696	4.5	24,686	3.3
Total[(a)]	**4,742**	**100.0**	**37,844**	**100.0**	**745,619**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–1 day	5.7	(5.5–6.0)	8.7	(8.5–9.0)	13.0	(12.6–13.3)
2–6 days	79.2	(78.4–80.1)	83.5	(82.6–84.4)	82.7	(81.6–83.5)
≥ 7 days	11.1	(10.8–11.4)	4.2	(4.0–4.4)	3.3	(3.1–3.5)

(a) Totals may not add up due to missing values.

Notes

1. Includes mothers who gave birth in hospital and were discharged home only.
2. Postnatal length of stay was not stated for: 78 women with pre-existing diabetes, 419 women with gestational diabetes mellitus, and 7,914 women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 maternal population without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

2.3 Infant outcomes

Birth status

Infant birth status is determined immediately after birth and categorised as a live birth or a fetal death (also called stillbirth). The NPDC includes only those babies born at or beyond 20 weeks gestation or weighing at least 400 grams.

This section presents birth status data for babies born to Australian women, sourced from the NPDC. These data include 5 babies born at less than 20 weeks gestation. Additional data are presented for singleton babies born to Australian mothers in hospital, sourced from the NHMD.

Note that the analyses presented from Table 2.10 onwards, based on NPDC data, include only live born babies, and that all analyses by maternal diabetes in pregnancy status are age-standardised for comparison.

There were 847,773 babies born in Australia in 2005–2007 counted in the NPDC whose mothers had complete age and diabetes status data. Of these, 6,222 (7 per 1,000) were fetal deaths. The rate of fetal death was highest among babies of mothers with pre-existing diabetes (21 per 1,000), followed by babies of mothers without diabetes (7 per 1,000) and babies of mothers with GDM (4 per 1,000) (Table 2.9).

Table 2.9: Birth status of babies born in Australia, by maternal diabetes in pregnancy status, 2005–2007

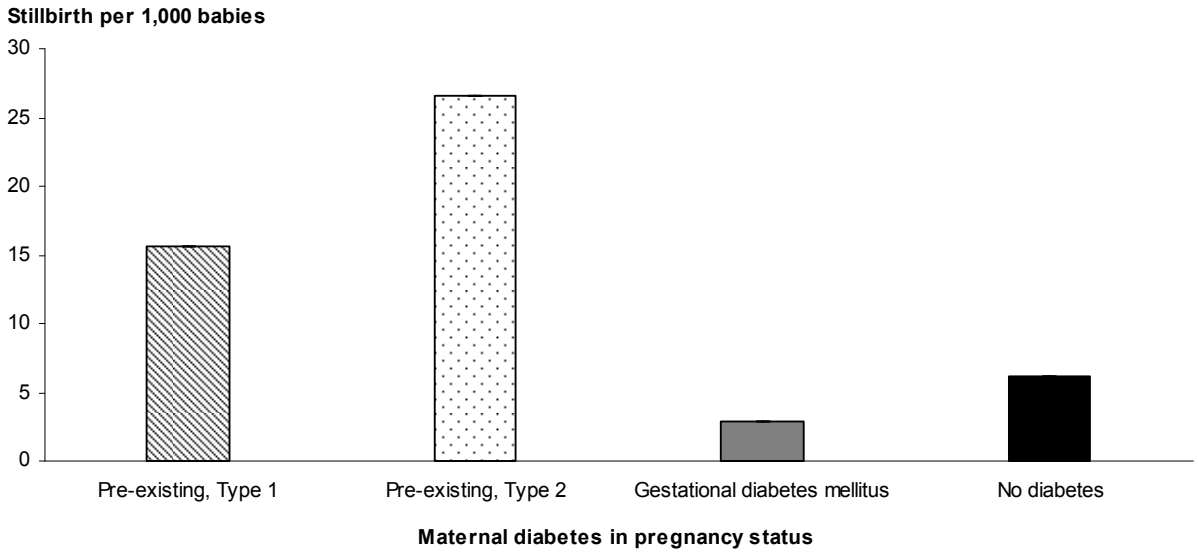
	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	**Per 1,000**	**Number**	**Per 1,000**	**Number**	**Per 1,000**
Live birth	4,947	981.0	39,976	996.3	796,628	992.6
Fetal death	96	19.0	150	3.7	5,976	7.4
Total births	**5,043**	**1,000.0**	**40,126**	**1,000.0**	**802,604**	**1,000.0**
	Age-standardised rate (per 1,000) (95% confidence interval)					
Live birth	979.3	(979.0–979.6)	996.2	(995.9–996.5)	992.6	(992.3–992.9)
Fetal death	20.7	(20.7–20.8)	3.8	(3.8–3.8)	7.4	(7.4–7.5)

Note: Directly age-standardised to the 2005–2007 population of babies of women without diabetes in pregnancy, and presented as live birth or stillbirth per 1,000 babies. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

In 2005–06 to 2007–08, there were 825,126 singleton babies born to Australian women in hospital. Of these, 5,139 (6 per 1,000) were stillborn (fetal deaths).

The highest rate of stillbirth among women who gave birth in hospital occurred among those who had a diagnosis of Type 2 diabetes complicating pregnancy (27 per 1,000) (Figure 2.9). The rate of stillbirth among babies of mothers with Type 1 diabetes in pregnancy was 16 per 1,000. Among babies of mothers with GDM it was 3 per 1,000, and among babies of mothers without diabetes, 6 per 1,000.



Notes

1. Based on a count of singleton births only.
2. Directly age-standardised to the 2005–06 to 2007–08 population of babies of women without diabetes in pregnancy who gave birth in hospital, and presented as stillbirth per 1,000 babies. For method, see 'Appendix 1 Methods'.
3. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A2.9.

Source: AIHW NHMD.

Figure 2.9: Stillbirth among singleton babies born in hospital, by maternal diabetes in pregnancy status, 2005–06 to 2007–08

No further analyses of NHMD data are presented in this section, as it is not possible to associate baby outcomes with maternal diabetes in pregnancy status. For more information see 'Section 1.4' and 'Appendix 1 Methods'.

Gestational age

A baby's gestational age is calculated at the time of birth, and is based on the number of completed weeks of gestation.

A baby is considered to be pre-term if born at less than 37 completed weeks of gestation (AIHW 2006). Pre-term babies are at higher risk of illness, disability and death, and these risks increase in severity with decreasing gestational age (Hoffman et al. 2004). Complications for the baby associated with prematurity include: respiratory distress, problems with feeding, vision problems and blindness, developmental delays, gastrointestinal problems, metabolic deficiencies (hypoglycaemia, hypocalcaemia) and deficiencies in temperature regulation (hypothermia) (Khashu et al. 2009; van Baar et al. 2005).

This section provides an overview of gestational age among live born babies of Australian women.

Between 2005 and 2007, babies of women with pre-existing diabetes in pregnancy were more likely to be pre-term (32–37 weeks gestation) and very pre-term (20–31 weeks) compared with other babies:

- 22.0% had a gestational age of 32–36 weeks, compared with 9.6% of babies born to mothers with GDM and 6.1% of babies born to mothers without diabetes
- 3.8% had a gestational age of 20–31 weeks, nearly 4 times as high as babies born to mothers with GDM (0.9%), and more than 3 times as high as babies born to mothers without diabetes (1.2%) (Table 2.10).

Table 2.10: Gestational age of live born babies, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
20–31 weeks[(a)]	185	3.7	396	1.0	9,586	1.2
32–36 weeks	1,055	21.3	3,871	9.7	48,934	6.1
≥ 37 weeks	3,707	74.9	35,709	89.3	738,032	92.6
Total[(b)]	**4,947**	**100.0**	**39,976**	**100.0**	**796,628**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
20–31 weeks[(a)]	3.8	(3.6–4.0)	0.9	(0.8–1.0)	1.2	(1.1–1.3)
32–36 weeks	22.0	(21.8–22.3)	9.6	(9.3–9.9)	6.1	(5.9–6.4)
≥ 37 weeks	74.1	(73.6–74.7)	89.5	(88.6–90.4)	92.6	(91.7–93.6)

(a) 20–31 weeks includes 5 pregnancies of less than 20 weeks gestation.

(b) Totals may not add up due to missing values.

Notes

1. Includes live born babies only.
2. Gestational age was not stated for: 78 babies of women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Birthweight

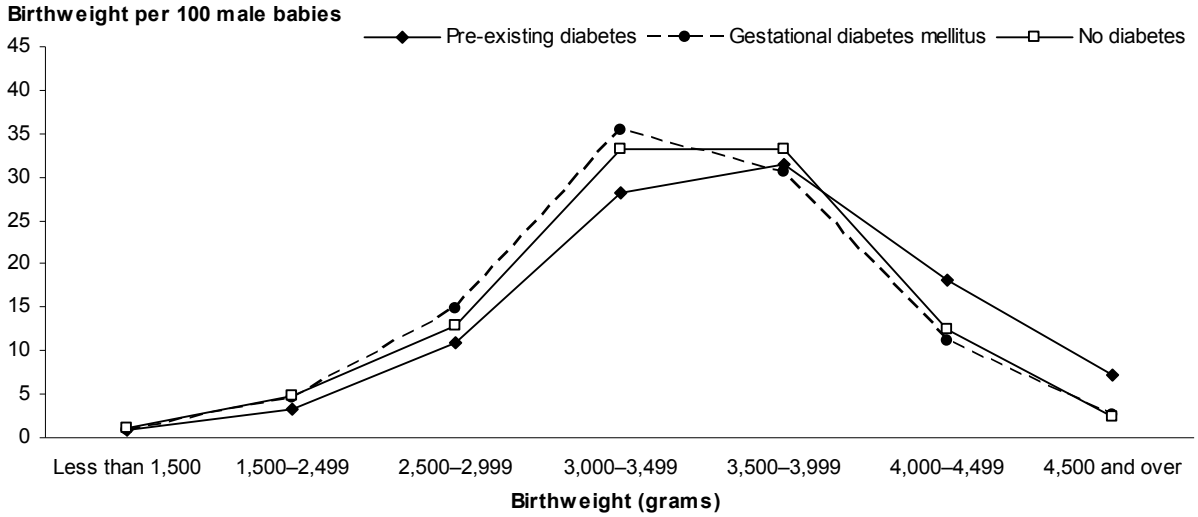
Birthweight is the measure of an infant's weight immediately after birth. Infant birthweight is an important measure of health in the newborn, and both low (less than 2,500 grams) and high (4,000 grams or more) birthweight are associated with increased illness, disability and death (Laws & Sullivan 2009).
There are many risk factors for low birthweight, including maternal: low socioeconomic status, nutrition, smoking and alcohol intake, higher pre-pregnancy body mass index (BMI) and inadequate weight gain during pregnancy, younger or older age, primiparity, ethnicity, plurality and shorter duration of pregnancy (younger infant gestational age) (Laws & Sullivan 2009; Olhsson & Shah 2008).

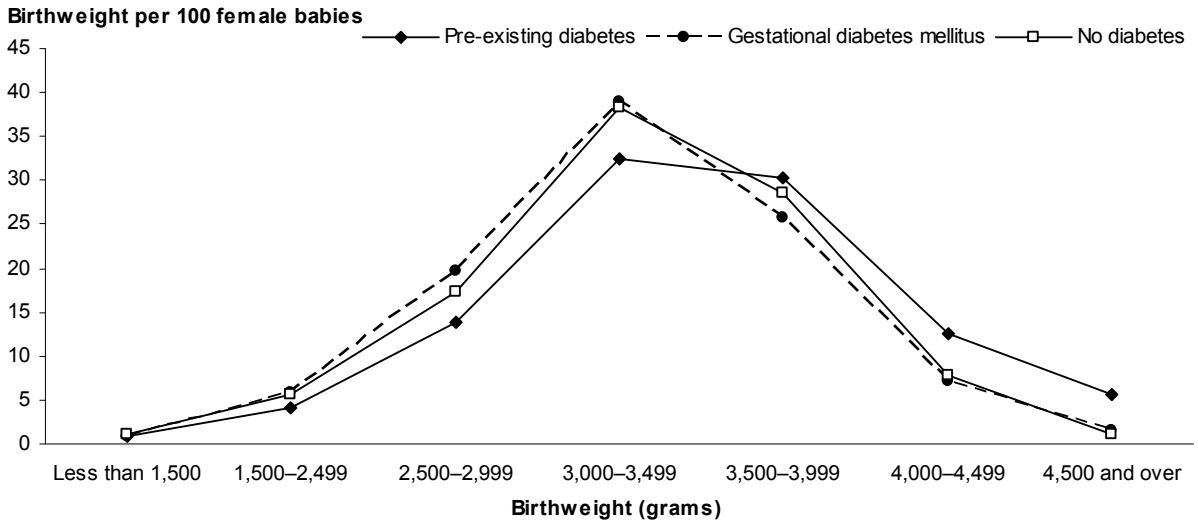
The best measure of whether an infant is above or below normal birthweight is given by calculating the infant weight adjusted for gestational age and some or all of the maternal characteristics listed above, particularly maternal ethnicity (weight-for-age analysis).

In the absence of available data to complete the weight-for-age analysis, this section provides an overview of birthweight among live born babies of women who gave birth in 2005–2007, adjusted for infant gestational age, and presented by infant sex and maternal diabetes in pregnancy status.

The distribution of birthweight by maternal diabetes in pregnancy status differed between male and female babies.

Male babies born to mothers with pre-existing diabetes were most likely to weigh 3,500–3,999 grams at birth (31%), whereas male babies born to mothers with GDM were most likely to weigh 3,000–3,499 grams (35%) (Figure 2.10). Male babies born to mothers without diabetes in pregnancy were equally likely to weigh 3,000–3,499 grams and 3,500–3,999 grams at birth (33% each). Among female babies, the most common birthweight was 3,000–3,499 grams, regardless of maternal diabetes in pregnancy status.





Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 2 male babies and 2 female babies of women with pre-existing diabetes, and 88 male babies and 148 female babies of women without diabetes in pregnancy.
3. Gestational age was not stated for: 44 male babies and 32 female babies of women without diabetes in pregnancy.
4. Directly standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy, by infant sex and gestational age. For method, see 'Appendix 1 Methods'.
5. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', table A2.10 and A2.11.

Source: AIHW analysis of NPDC data.

Figure 2.10: Birthweight of live born babies, by maternal diabetes in pregnancy status, 2005–2007

The proportion of babies with low birthweight and high birthweight also differed by maternal diabetes in pregnancy status (Table 2.11). Male babies of women with pre-existing diabetes in pregnancy were:

- less likely to have a low birthweight (4.1%) compared with babies of mothers with GDM (5.4%) and babies of mothers without diabetes (5.8%)
- more likely to have a high birthweight (25.3%) compared with babies of mothers with GDM (13.9%) and babies of mothers without diabetes (14.9%).

Female babies of women with pre-existing diabetes in pregnancy were:

- less likely to have a low birthweight (5.1%) compared with babies of mothers with GDM (6.7%) and babies of mothers without diabetes (6.7%)
- more likely to have a high birthweight (18.3%) compared with babies of mothers with GDM (8.8%) and babies of mothers without diabetes (8.9%).

There was no significant difference in the rate of low or high birthweight among male or female babies born to mothers with GDM and mothers without diabetes.

Table 2.11: Low and high birthweight of live born babies, by infant sex and maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Low birthweight						
Male	252	9.7	1,369	6.5	23,614	5.8
Female	261	11.1	1,542	8.1	26,044	6.7
High birthweight						
Male	574	22.2	2,827	13.5	60,759	14.9
Female	384	16.3	1,635	8.6	34,544	8.9
	Age-standardised rate (per cent) (95% confidence interval)					
Low birthweight						
Male	4.1	(3.9–4.4)	5.4	(5.1–5.6)	5.8	(5.5–6.0)
Female	5.1	(4.8–5.4)	6.7	(6.4–7.0)	6.7	(6.4–7.0)
High birthweight						
Male	25.3	(24.3–26.2)	13.9	(13.2–14.6)	14.9	(14.1–15.6)
Female	18.3	(17.5–19.1)	8.8	(8.3–9.4)	8.9	(8.4–9.5)

Notes

1. Includes live born babies only.
2. Low birthweight is less than 2,500 grams, and high birthweight is 4,000 grams or more.
3. Birthweight was not stated for: 2 male babies and 2 female babies of women with pre-existing diabetes, and 88 male babies and 148 female babies of women without diabetes in pregnancy.
4. Gestational age was not stated for: 44 male babies and 32 female babies of women without diabetes in pregnancy.
5. Directly standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy, by infant sex and gestational age. For method, see 'Appendix 1 Methods'.
6. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables'.

Source: AIHW analysis of NPDC data

Apgar score

The Apgar score is an assessment tool to test a baby's condition after delivery, which ranks the outcome on a scale of 0 (very poor) to 10 (perfect) (AIHW 2002). The score represents the sum of five two-point measures: heart rate, breathing, skin colour, muscle tone and reflexes (Laws & Sullivan 2009). A score of 0–6 at 5 minutes after birth indicates the presence of complications and poor outcome for the baby. A score of 7–10 is normal, with 10 being ideal.

This section provides an overview of Apgar scores (at 5 minutes) for babies born to Australian women.

The majority of babies (more than 97%) had an Apgar score of 7–10 (Table 2.12).

Babies born to women with pre-existing diabetes were significantly more likely to have an Apgar score of 0–6 (3.0%), compared with babies of mothers with GDM (1.4%) or mothers without diabetes (1.3%), and significantly less likely to have an Apgar score of 7–10.

There was no significant difference in Apgar scores of 0–6 or 7–10 between babies born to mothers with GDM and mothers without diabetes in pregnancy.

Table 2.12: Apgar score at 5 minutes of live born babies, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–6	144	2.9	540	1.4	10,497	1.3
7–10	4,798	97.0	39,396	98.5	784,817	98.5
Total[(a)]	**4,947**	**100.0**	**39,976**	**100.0**	**796,628**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–6	3.0	(2.9–3.1)	1.4	(1.3–1.5)	1.3	(1.2–1.4)
7–10	96.9	(96.2–97.5)	98.5	(97.6–99.5)	98.5	(97.6–99.5)

(a) Totals may not add up due to missing values.

Notes

1. Includes live born babies only.
2. Apgar score (at 5 minutes) was not stated for: 5 babies of women with pre-existing diabetes, 40 babies of women with gestational diabetes mellitus, and 1,314 babies of women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Resuscitation

Resuscitation measures taken in the period immediately or shortly after birth to promote normal breathing in a baby vary from no measures (baby breathing normally), through suction and oxygen (low-level), to ventilation and external cardiac massage (high-level). The level of resuscitation applied to a baby immediately after birth is an indication of a baby's health and expected outcome.

This section provides an overview of the resuscitation level for babies born to Australian women.

The majority of babies (83–92%) received low-level or no resuscitation immediately after birth (Table 2.13).

Babies born to mothers with pre-existing diabetes were almost twice as likely to receive high-level resuscitation (15.8%), compared with babies of mothers with GDM (8.7%) and babies of mothers without diabetes in pregnancy (7.2%). Babies born to mothers with GDM were more likely to receive high-level resuscitation (8.7%) compared with babies born to mothers without diabetes (7.2%).

There was no statistically significant difference in the rate of low-level or no resuscitation between babies of mothers with GDM and those without diabetes.

Table 2.13: Level of resuscitation performed at birth on live born babies, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
High level	750	15.2	3,368	8.4	57,577	7.2
Low level or none	4,150	83.9	36,434	91.1	734,509	92.2
Total	**4,947**	**100.0**	**39,976**	**100.0**	**796,628**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
High level	15.8	(15.6–16.0)	8.7	(8.4–8.9)	7.2	(7.0–7.5)
Low level or none	83.2	(82.6–83.8)	90.9	(90.0–91.9)	92.2	(91.3–93.1)

Notes

1. Includes live born babies only.
2. 'High-level resuscitation' includes: intermittent positive pressure respiration through bag and mask, endotracheal intubation and intermittent positive pressure respiration, and external cardiac massage and ventilation. It was not stated for: 5 babies of women with pre-existing diabetes, 40 babies of women with gestational diabetes mellitus, and, 1,314 babies of women without diabetes in pregnancy
3. 'Low-level or no resuscitation' includes: suction only, oxygen therapy only, or no intervention to resuscitate.
4. Other resuscitation was recorded for: 11 babies of women with pre-existing diabetes in pregnancy, 53 babies of women with gestational diabetes mellitus, and 1,090 babies of women without diabetes in pregnancy.
5. Resuscitation level was not stated for: 36 babies of women with pre-existing diabetes in pregnancy, 121 babies of women with gestational diabetes mellitus, and 3,451 babies of women without diabetes in pregnancy.
6. Directly age-standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Admission to special care nursery/neonatal intensive care unit

The special care nursery (SCN) and neonatal intensive care unit (NICU) provide more specialised care for babies than that available in the general maternity ward (Laws & Sullivan 2009). This care may be for conditions associated with prematurity, such as low birthweight, hypoglycaemia, difficulty feeding, poor regulation of body temperature, breathing difficulties and jaundice. It may also be for other complications and conditions affecting the newborn, including congenital anomalies, fractures, nerve palsy, infections and surveillance and recovery following surgery. In some cases, admission of babies to the SCN/NICU may be the result of hospital policy, and not reflective of the baby's medical condition.

This section provides an overview of SCN/NICU admission among babies born to Australian women.

More than half (58%) of all babies born to mothers with pre-existing diabetes were admitted to the SCN/NICU, compared with 32% of babies born to mothers with GDM and 14% of babies born to mothers without diabetes (Table 2.14).

Table 2.14: SCN/NICU admission of live born babies, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Admitted	2,843	57.5	12,734	31.9	110,546	13.9
Not admitted	2,104	42.5	27,237	68.1	685,907	86.1
Total[(a)]	**4,947**	**100.0**	**39,976**	**100.0**	**796,628**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Admitted	58.2	(57.7–58.7)	31.8	(31.2–32.3)	13.9	(13.5–14.2)
Not admitted	41.8	(41.4–42.2)	68.2	(67.4–69.0)	86.1	(85.2–87.0)

(a) Totals may not add up due to missing values.

Notes

1. Includes live born babies only.
2. Special care nursery/Neonatal intensive care unit (SCN/NICU) admission may be a clinical decision or the result of hospital policy.
3. SCN/NICU admission was not stated for: 5 babies of women with gestational diabetes mellitus, and 175 babies of women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Length of stay in hospital

A baby's length of stay in hospital is calculated from the day of birth until the baby is discharged to go home. Most babies are discharged at the same time as their mother, but babies who have low birthweight, were born pre-term, are admitted to the SCN/NICU, or who have difficulties feeding may be kept in hospital until they reach developmental milestones, such as those associated with feeding, breathing and regulation of body temperature (Laws & Sullivan 2009).

This section provides an overview of the length of stay among babies born to Australian women. These data include only babies who were discharged home, so these totals do not compare with totals in other sections in this chapter.

Compared with babies born to mothers without diabetes, babies born to women with pre-existing diabetes were:

- more likely to stay 7–13 days (13% compared with 5%) or 14 or more days (8% compared with 2%)
- less likely to stay 0–1 days (4% compared with 12%) or 2–6 days (74% compared with 81%) (Table 2.15).

Similarly, compared with babies born to mothers without diabetes, babies born to mothers with GDM were:

- more likely to stay 7–13 days (6% compared with 5%) or 14 or more days (3% compared with 2%)
- less likely to stay 0–1 days (8% compared with 12%).

Table 2.15: Length of stay in hospital of live born babies, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–1 day	182	4.1	2,947	7.8	89,242	12.1
2–6 days	3,293	74.8	31,154	82.5	598,774	80.9
7–13 days	581	13.2	2,398	6.3	33,355	4.5
≥ 14 days	348	7.9	1,263	3.3	18,073	2.4
Total[(a)]	**4,404**	**100.0**	**37,779**	**100.0**	**739,732**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–1 day	4.2	(4.0–4.4)	8.3	(8.0–8.5)	12.1	(11.7–12.4)
2–6 days	74.3	(73.5–75.1)	82.4	(81.5–83.2)	80.9	(80.1–81.8)
7–13 days	13.3	(12.9–13.6)	6.1	(5.8–6.3)	4.5	(4.3–4.7)
≥ 14 days	8.3	(8.0–8.5)	3.3	(3.1–3.4)	2.4	(2.3–2.6)

(a) Totals may not add up due to missing values.

Notes

1. Includes live born babies discharged home only.
2. Length of stay in hospital was not stated for: 17 babies of women with gestational diabetes mellitus, and 288 babies of women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

3 Aboriginal and Torres Strait Islander mothers and infants

Key points

- In 2005–2007, nearly 7% of Aboriginal and Torres Strait Islander mothers had diabetes in pregnancy: 1.5% had pre-existing diabetes and 5.1% had GDM (NPDC).
- In 2005–06 to 2007–08, nearly 7% of Aboriginal and Torres Strait Islander mothers had diabetes in pregnancy: 0.1% had pre-existing Type 1 diabetes, 1.5% had pre-existing Type 2 diabetes and 5.0% had GDM (NHMD).
- Indigenous mothers with pre-existing diabetes had the highest rates of pre-term birth, delivery with no labour, caesarean section, hypertension, and longer stay in hospital, compared with Indigenous mothers with GDM and those without diabetes.
- Indigenous mothers with GDM had a higher rate of induced labour compared with mothers with pre-existing diabetes and were more likely to have a pre-term birth, caesarean section, hypertension, and longer stay in hospital compared with mothers without diabetes in pregnancy.
- Indigenous mothers with Type 1 diabetes were more likely to have hypertension than those with Type 2 diabetes.
- Aboriginal and Torres Strait Islander mothers were younger compared with non-Indigenous mothers.
- Indigenous mothers had higher rates of pre-term delivery, pre-term induction, hypertension, and longer stay in hospital compared with non-Indigenous/other Australian mothers.
- Babies born to Indigenous mothers with pre-existing diabetes had the highest rates of prematurity, high-level resuscitation, admission to special care nursery/neonatal intensive care unit, low Apgar score and longer stay in hospital, compared with babies born to Indigenous mothers with GDM or without diabetes.
- Babies of Indigenous mothers without diabetes were more likely to be born with low birthweight, compared with babies of Indigenous mothers with GDM.
- Babies of Indigenous mothers had higher rates of pre-term birth, low Apgar score, high-level resuscitation and longer stay in hospital across all diabetes status groups compared with babies of non-Indigenous mothers.

Aboriginal and Torres Strait Islander women are at high risk for Type 2 diabetes and GDM, and babies born to these women are likely to experience poorer outcomes of pregnancy than babies of non-Indigenous women (DoHA 2009; O'Dea et al. 2007; Ishak & Petocz 2003). As a high-risk group, Indigenous women and their babies have been given special consideration in this report to determine whether they experience adverse effects of pregnancy, labour and delivery at a greater rate than other women and their babies.

This chapter describes the effects of pregnancy, labour and delivery on Aboriginal and Torres Strait Islander women who gave birth in Australia, and their babies. The chapter

highlights differences by maternal diabetes in pregnancy status among Indigenous mothers, and between Indigenous and non-Indigenous mothers, and their babies.

The data for these analyses are sourced primarily from the National Perinatal Data Collection (NPDC) for the years 2005–2007. The NPDC data are supplemented by data from the National Hospital Morbidity Database (NHMD) for the years 2005–06 to 2007–08, including data on additional outcomes not available in the NPDC, and data by pre-existing diabetes type (Type 1 and Type 2). Due to limitations in the collection of Indigenous status information, only hospitalisations in New South Wales, Victoria, Queensland, Western Australia, South Australia and from public hospitals in the Northern Territory have been included in the analyses of NHMD data.

Note that, where crude and age-standardised rates are presented in a table, only the age-standardised rates are discussed in the text.

3.1 Maternal characteristics

Diabetes in pregnancy status

This section provides an overview of diabetes in pregnancy status among Aboriginal and Torres Strait Islander women who gave birth.

About 30,500 mothers (3.7%) who gave birth in Australia in 2005–2007, identified as being of Aboriginal and Torres Strait Islander origin. Of these:

- 443 (1.5%) had pre-existing diabetes
- 1,562 (5.1%) were diagnosed with GDM
- 28,513 (93.4%) did not have diabetes (Table 3.1).

Table 3.1: Women who gave birth in Australia, by Indigenous status and diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes	Total
		Number		
Indigenous	443	1,562	28,513	**30,518**
Non-Indigenous	4,501	37,539	760,135	**802,175**
Not stated	38	38	971	**1,017**
Total	**4,982**	**39,139**	**789,619**	**833,710**
		Per cent		
Indigenous	1.5	5.1	93.4	**100.0**
Non-Indigenous	0.6	4.7	94.8	**100.0**
Not stated	3.7	0.8	95.5	**100.0**
Total	**0.6**	**4.7**	**94.7**	**100.0**

Source: AIHW analysis of NPDC data.

Compared with non-Indigenous women who gave birth, Aboriginal and Torres Strait Islander women who gave birth were 3.2 times as likely to have pre-existing diabetes and 1.6 times as likely to have GDM (Table 3.2).

There was no statistically significant difference in the incidence of non-diabetes pregnancies among Indigenous women compared with non-Indigenous women who gave birth.

Table 3.2: Diabetes in pregnancy status among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Pre-existing diabetes	443	137	3.2 (2.9–3.5)
Gestational diabetes mellitus	1,562	1,001	1.6 (1.5–1.6)
No diabetes	28,513	29,380	1.0 (1.0–1.0)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Indigenous status was missing or not stated for: 8 women with pre-existing diabetes, 38 women with gestational diabetes mellitus, and 971 women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 non-Indigenous population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

In 2005–06 to 2007–08, more than 29,400 (3.7%) women who gave birth in hospital in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory identified as being of Aboriginal and Torres Strait Islander origin. Of these women:

- 488 (1.7%) had pre-existing diabetes in pregnancy
  - 37 (0.1%) with pre-existing Type 1 diabetes
  - 438 (1.5%) with pre-existing Type 2 diabetes
- 1,475 (5.0%) had a diagnosis of GDM
- 27,385 (93.1%) did not have diabetes in pregnancy (Table 3.3).

Other Australian mothers (including non-Indigenous and Indigenous status not stated) accounted for 773,076 women giving birth in hospital and had a similar diabetes status distribution to all Australian mothers (see Chapter 2, Table 2.1).

Table 3.3: Women who gave birth in hospital, by Indigenous status and diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	All pre-existing diabetes[(a)]	Gestational diabetes mellitus	No diabetes	Total[(b)]
			Number			
Indigenous	37	438	488	1,475	27,385	**29,413**
Other	1,956	1,727	3,919	37,912	729,661	**773,076**
			Per cent			
Indigenous	0.1	1.5	1.7	5.0	93.1	**100.0**
Other	0.3	0.2	0.5	4.9	94.4	**100.0**

(a) All pre-existing diabetes in pregnancy includes other/unspecified diabetes.

(b) Total includes 'diabetes in pregnancy—onset unspecified'.

Notes

1. Indigenous analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.
2. 'Other' includes non-Indigenous women and women whose Indigenous status was missing or not stated.

Source: AIHW NHMD.

When compared with other Australian women who gave birth, Aboriginal and Torres Strait Islander women who gave birth from 2005–06 to 2007–08 were:

- half as likely to have pre-existing Type 1 diabetes in pregnancy
- 10.4 times as likely to have pre-existing Type 2 diabetes in pregnancy
- 4.1 times as likely to have any pre-existing diabetes in pregnancy
- 1.5 times as likely to have GDM
- equally likely to have no diabetes in pregnancy (Table 3.4).

Table 3.4: Diabetes in pregnancy status among Aboriginal and Torres Strait Islander women who gave birth in hospital compared with other Australian women who gave birth in hospital, 2005–06 to 2007–08

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
Pre-existing Type 1 diabetes	37	73	0.5 (0.3–0.7)
Pre-existing Type 2 diabetes	438	42	10.4 (9.4–11.4)
All pre-existing diabetes[c]	488	120	4.1 (3.7–4.4)
Gestational diabetes mellitus	1,475	990	1.5 (1.4–1.6)
No diabetes	27,385	28,259	1.0 (1.0–1.0)
Total[d]	**29,413**	**29,413**	**1.0 (1.0 - 1.0)**

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the other Australian maternal population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the other Australian population. For more information and interpretation, see 'Appendix 1 Methods'.

(c) All pre-existing diabetes in pregnancy includes other/unspecified diabetes.

(d) Total includes 'diabetes in pregnancy—onset unspecified'.

Notes

1. Indirectly age-standardised to the 2005–06 to 2007–08 other Australian population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
2. Analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

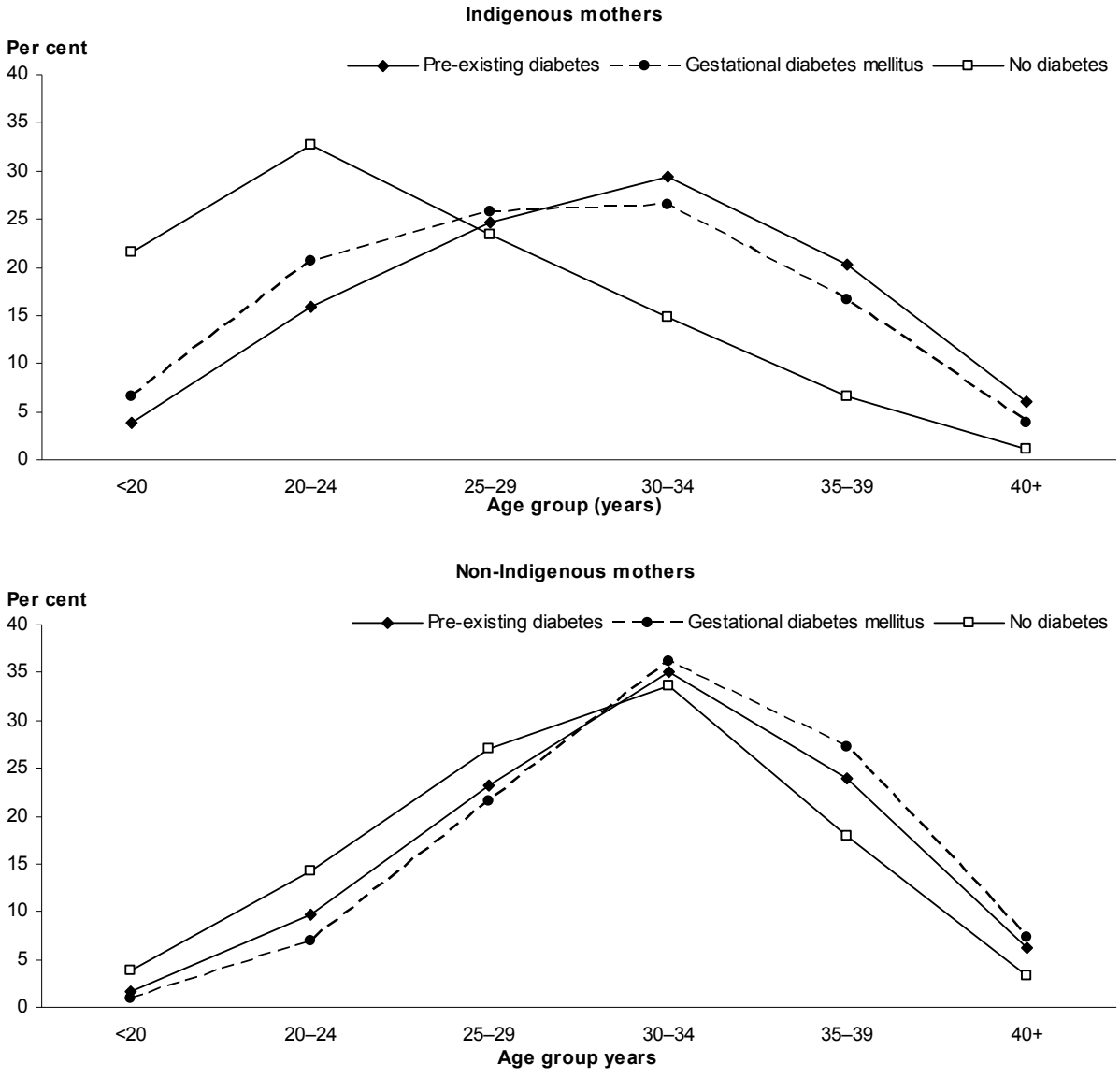
Source: AIHW NHMD.

Age distribution

This section provides an overview of the age distribution of Aboriginal and Torres Strait Islander women who gave birth by diabetes in pregnancy status.

In 2005–2007, the age distribution of Indigenous women who gave birth with pre-existing diabetes and those with GDM was similar, with 29% and 26% of mothers aged 30–34 years, respectively. By comparison, Indigenous mothers without diabetes were younger, with 33% aged 20–24 years (Figure 3.1). The difference in the age distribution between Indigenous mothers with and without diabetes was statistically significant, so all comparative analyses by diabetes status in this report have been age-standardised to adjust for this difference.

The difference between the Indigenous and non-Indigenous maternal populations was also statistically significant: Indigenous mothers were younger than non-Indigenous mothers, with 76% and 44% of mothers aged less than 30 years, respectively. The peak age of non-Indigenous mothers was 30–34 years across all diabetes in pregnancy groups (Figure 3.1). All comparative analyses by Indigenous status in this report have been age-standardised to adjust for this difference in age distribution.



Notes

1. Indigenous status was not stated for: 8 women with pre-existing diabetes, 38 women with gestational diabetes mellitus, and 971 women without diabetes in pregnancy.

2. For summary data, see 'Appendix 2 Supplementary tables', tables A3.1 and A3.2.

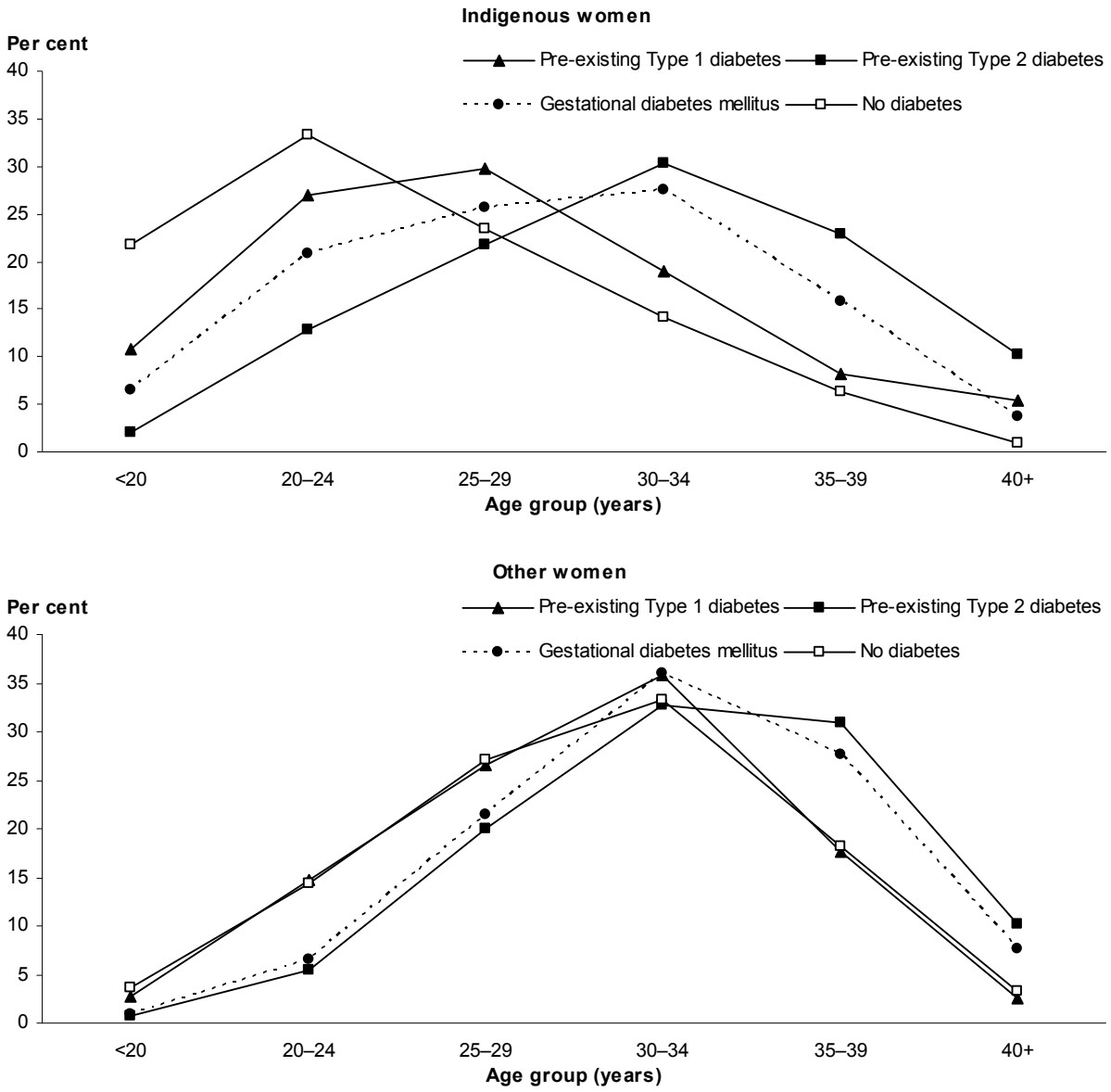
Source: AIHW analysis of NPDC data.

Figure 3.1: Age distribution among women who gave birth, by Indigenous status, by diabetes in pregnancy status, 2005–2007

Similarly to the NPDC data, there was a statistically significant difference observed in the age distribution of Aboriginal and Torres Strait Islander women giving birth in hospitals in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory in 2005–06 to 2007–08, by diabetes status and compared with other Australian women (Figure 3.2). Therefore, all analyses of Indigenous women in this report have been age-standardised, both for comparison between diabetes types among Indigenous women, and for comparison between Indigenous and other Australian women.

The peak age of Indigenous women giving birth in hospital with a diagnosis of pre-existing Type 2 diabetes or with gestational diabetes was 30–34 years (30% and 28%, respectively). For those with Type 1 diabetes the peak age was 25–29 years (30%), while for those without diabetes in pregnancy it was 20–24 years (33%).

In comparison with the population of other Australian women giving birth in hospital, Indigenous women giving birth in hospital were younger: 77% of Indigenous women compared with 44% of other Australian women were aged less than 30 years at the time of giving birth.



Notes

1. Indigenous analysis includes women who gave birth in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

2. For summary data, see 'Appendix 2 Supplementary tables', table A3.3 and A3.4.

Source: AIHW NHMD.

Figure 3.2: Age distribution among women who gave birth in hospital, by Indigenous status, by diabetes in pregnancy status, 2005–06 to 2007–08

Parity

This section provides an overview of multiparity (more than one pregnancy) among Aboriginal and Torres Strait Islander women by diabetes in pregnancy status.

Indigenous women with pre-existing diabetes (62%) were less likely to have had more than one pregnancy than Indigenous women with GDM (68%) and those without diabetes (68%) (Table 3.5).

Table 3.5: Multiparity among Aboriginal and Torres Strait Islander women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes
Number	355	1,255	19,458
Crude rate (per cent)	80.1	80.3	68.2
Age-standardised rate (per cent) (95% confidence interval)	61.7 (60.9–62.4)	68.3 (67.6–69.1)	68.2 (67.5–69.0)

Notes

1. Parity was not stated for: 4 Indigenous women with gestational diabetes mellitus, and 66 Indigenous women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Indigenous women were about 1.5 times as likely to be multiparous compared with non-Indigenous mothers, across all diabetes status groups (Table 3.6).

Table 3.6: Multiparity among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Pre-existing diabetes	355	258	1.4 (1.2–1.5)
Gestational diabetes mellitus	1,255	813	1.5 (1.5–1.6)
No diabetes	19,458	12,766	1.5 (1.5–1.5)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Parity was not stated for: 4 Indigenous women with gestational diabetes mellitus, 66 Indigenous women without diabetes in pregnancy, 10 non-Indigenous women with pre-existing diabetes, 30 non-Indigenous women with gestational diabetes mellitus, and 1,057 non-Indigenous women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Plurality

This section provides an overview of the rate of multiple births among Aboriginal and Torres Strait Islander women by diabetes in pregnancy status.

Indigenous mothers with GDM were more likely to have a multiple birth (1.7%) compared with those without diabetes in pregnancy (1.2%) (Table 3.7).

Due to small numbers, it is not possible to present data for mothers with pre-existing diabetes.

Table 3.7: Multiple births among Aboriginal and Torres Strait Islander women who gave birth, by diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus	No diabetes
Number	25	346
Crude rate (per cent)	1.6	1.2
Age-standardised rate (per cent) (95% confidence interval)	1.7 (1.6–1.8)	1.2 (1.1–1.3)

Notes

1. 'Multiple births' includes twins and higher-order multiples.
2. Pre-existing diabetes excluded from the analysis due to small numbers and unstable rates.
3. Directly age-standardised to the 2005–2007 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

The rate of multiple births was similar among Indigenous women compared with non-Indigenous women, regardless of diabetes status (Table 3.8).

Table 3.8: Multiple births among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Gestational diabetes mellitus	25	35	0.7 (0.2–1.6)
No diabetes	346	356	1.0 (0.9–1.1)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. 'Multiple births' includes twins and higher-order multiples.
2. Pre-existing diabetes excluded from the analysis due to small numbers and unstable rates.
3. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

3.2 Maternal outcomes

Duration of pregnancy

This section provides an overview of the duration of pregnancy among Aboriginal and Torres Strait Islander women who gave birth by diabetes in pregnancy status.

When the different age structures between diabetes status groups are accounted for, Indigenous mothers with pre-existing diabetes were more likely to deliver pre-term (32%), compared with Indigenous mothers with GDM (14%) and Indigenous mothers without diabetes (13%) (Table 3.9). Indigenous mothers with pre-existing diabetes (68%) were less likely to give birth at 37 weeks or more gestation compared with women with GDM (86%) or without diabetes in pregnancy (87%).

The rate of births at term was similar among Indigenous women with GDM and those without diabetes.

More information on the adverse outcomes of pre-term birth can be found in 'Section 3.3—Infant outcomes'.

Table 3.9: Duration of pregnancy among Aboriginal and Torres Strait Islander women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
20–36 weeks[(a)]	152	34.3	225	14.4	3,640	12.8
≥ 37 weeks	291	65.7	1,337	85.6	24,860	87.2
Total[(b)]	**443**	**100.0**	**1,562**	**100.0**	**28,513**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
20–36 weeks[(a)]	31.7	(31.2–32.2)	14.1	(13.7–14.5)	12.8	(12.4–13.1)
≥ 37 weeks	68.3	(67.5–69.1)	85.9	(85.0–86.8)	87.2	(86.3–88.1)

(a) Includes 5 pregnancies of less than 20 weeks duration.

(b) Totals may not add up due to missing values.

Notes

1. Duration of pregnancy was not stated for: 13 Indigenous women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Aboriginal and Torres Strait Islander women who gave birth with GDM, pre-existing diabetes in pregnancy or without diabetes were more likely to deliver pre-term compared with non-Indigenous mothers: with rates 18, 8 and 7 times as high, respectively (Table 3.10).

The rate of births at term was similar among Indigenous women compared with non-Indigenous women, regardless of diabetes in pregnancy status.

Table 3.10: Duration of pregnancy among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
20–36 weeks[c]			
Pre-existing diabetes	152	19	7.8 (6.6–9.1)
Gestational diabetes mellitus	225	13	17.7 (15.3–20.0)
No diabetes	3,640	496	7.3 (7.1–7.6)
≥ 37 weeks			
Pre-existing diabetes	291	331	0.9 (0.8–1.0)
Gestational diabetes mellitus	1,337	1,418	0.9 (0.9–1.0)
No diabetes	24,860	26,408	0.9 (0.9–1.0)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

(c) Includes 5 pregnancies of less than 20 weeks duration.

Notes

1. Duration of pregnancy was not stated for: 13 Indigenous women without diabetes in pregnancy, 1 non-Indigenous woman with pre-existing diabetes, and 94 non-Indigenous women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Labour

This section provides an overview of the onset of labour among Aboriginal and Torres Strait Islander women who gave birth by diabetes in pregnancy status.

Among Aboriginal and Torres Strait Islander women who gave birth in 2005–2007:

- the majority of mothers without diabetes had a spontaneous labour (70%), compared with 34% of mothers with pre-existing diabetes and 42% of mothers with GDM (Table 3.11)
- the highest incidence of induced labour was among mothers with GDM (38%), followed by mothers with pre-existing diabetes (36%) and mothers without diabetes in pregnancy (20%)
- the highest incidence of no labour was among mothers with pre-existing diabetes (30%), followed by mothers with GDM (21%) and mothers without diabetes in pregnancy (11%).

Table 3.11: Onset of labour among Aboriginal and Torres Strait Islander women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Spontaneous	121	27.3	606	38.8	19,770	69.3
Induced	146	33.0	580	37.1	5,620	19.7
No labour	176	39.7	376	24.1	3,118	10.9
Total[(a)]	**443**	**100.0**	**1,562**	**100.0**	**28,513**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Spontaneous	33.5	(32.9–34.1)	41.5	(40.9–42.1)	69.3	(68.5–70.1)
Induced	36.3	(35.7–36.8)	37.7	(37.2–38.3)	19.7	(19.3–20.1)
No labour	30.2	(29.7–30.7)	20.8	(20.3–21.2)	10.9	(10.6–11.2)

(a) Totals may not add up due to missing values.

Notes

1. Onset of labour was not stated for: 5 Indigenous women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

There were no significant differences in the onset of labour between Indigenous and non-Indigenous mothers with pre-existing diabetes or with GDM (Table 3.12).

A comparison of Indigenous and non-Indigenous women without diabetes in pregnancy shows that Indigenous women were:

- 10% more likely to have a spontaneous labour
- 20% less likely to have an induced labour
- 10% less likely to have no labour.

Table 3.12: Onset of labour among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Spontaneous			
Pre-existing diabetes	121	110	1.1 (0.9–1.3)
Gestational diabetes mellitus	606	593	1.0 (0.9–1.1)
No diabetes	19,770	17,740	1.1 (1.1–1.1)
Induced			
Pre-existing diabetes	146	159	0.9 (0.8–1.1)
Gestational diabetes mellitus	580	635	0.9 (0.8–1.0)
No diabetes	5,620	7,172	0.8 (0.8–0.8)
No labour			
Pre-existing diabetes	176	174	1.0 (0.9–1.2)
Gestational diabetes mellitus	376	333	1.1 (1.0–1.2)
No diabetes	3,118	3,596	0.9 (0.8–0.9)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

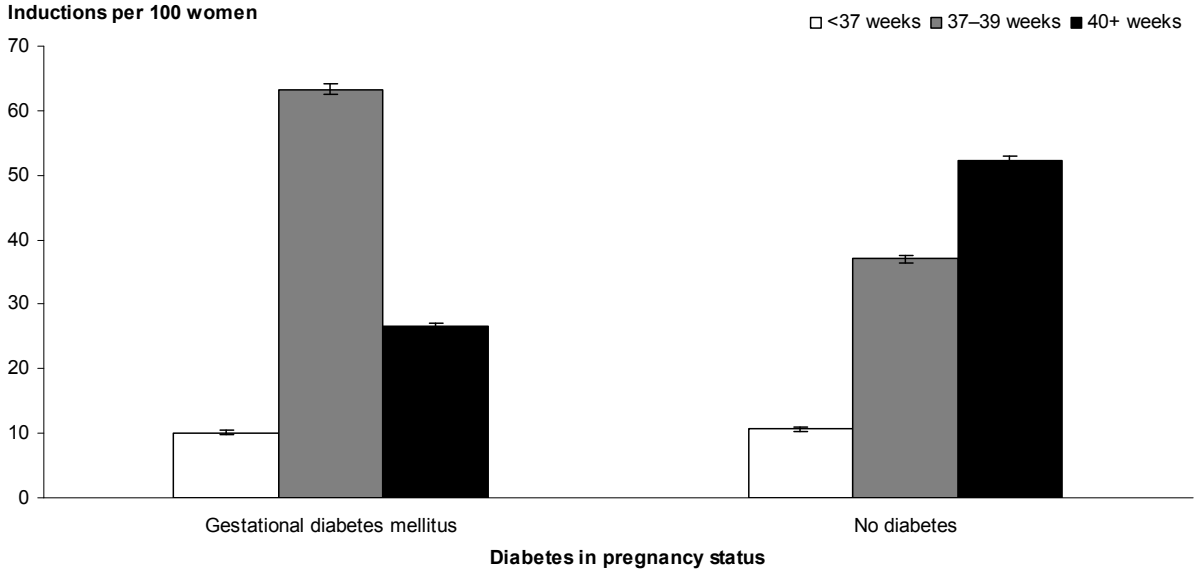
1. Onset of labour was not stated for: 5 Indigenous women without diabetes in pregnancy, 4 non-Indigenous women with pre-existing diabetes in pregnancy, 9 non-Indigenous women with gestational diabetes mellitus, and 152 non-Indigenous women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

In 2005–2007, of those Aboriginal and Torres Strait Islander women who were induced:

- the majority (63%) with GDM were induced at 37–39 weeks gestation, compared with 37% of those without diabetes in pregnancy (Figure 3.3)
- more than half (52%) of mothers without diabetes were induced at 40 weeks or more gestation, compared with 27% among mothers with GDM.

The rate of induced labour at less than 37 weeks was similar among Indigenous mothers with GDM and those without diabetes, at about 10%. Due to the small number of inductions among Indigenous women with pre-existing diabetes, it is not possible to present these by duration of pregnancy.



Notes

1. Duration of pregnancy was not stated for: 13 Indigenous women without diabetes in pregnancy.
2. Due to small numbers, data for induced labour by duration of pregnancy among Indigenous women with pre-existing diabetes is not shown.
3. Directly age-standardised to the 2005–2007 population of Indigenous women with induced labour and without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
4. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A3.5.

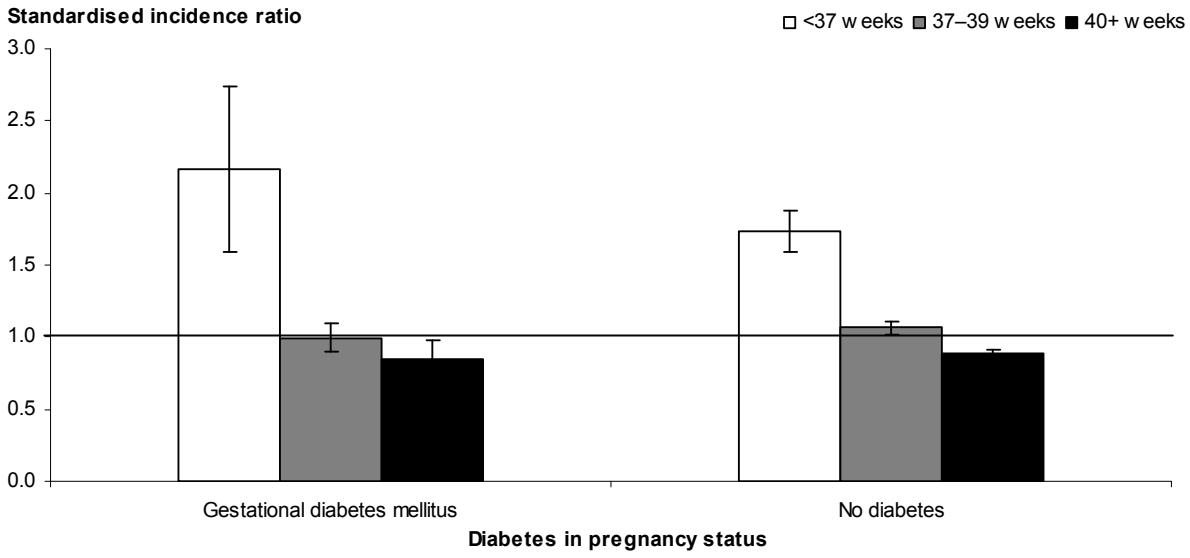
Source: AIHW analysis of NPDC data.

Figure 3.3: Induced labour among Aboriginal and Torres Strait Islander women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

When compared with non-Indigenous women who were induced, Indigenous women were:

- about twice as likely to be induced pre-term, regardless of diabetes in pregnancy status
- about 10% less likely to be induced at 40 weeks or more, for women without diabetes in pregnancy (Figure 3.4).

There was no difference in the rate of induction at 37–39 weeks duration, or among women with GDM induced at 40 weeks or more.



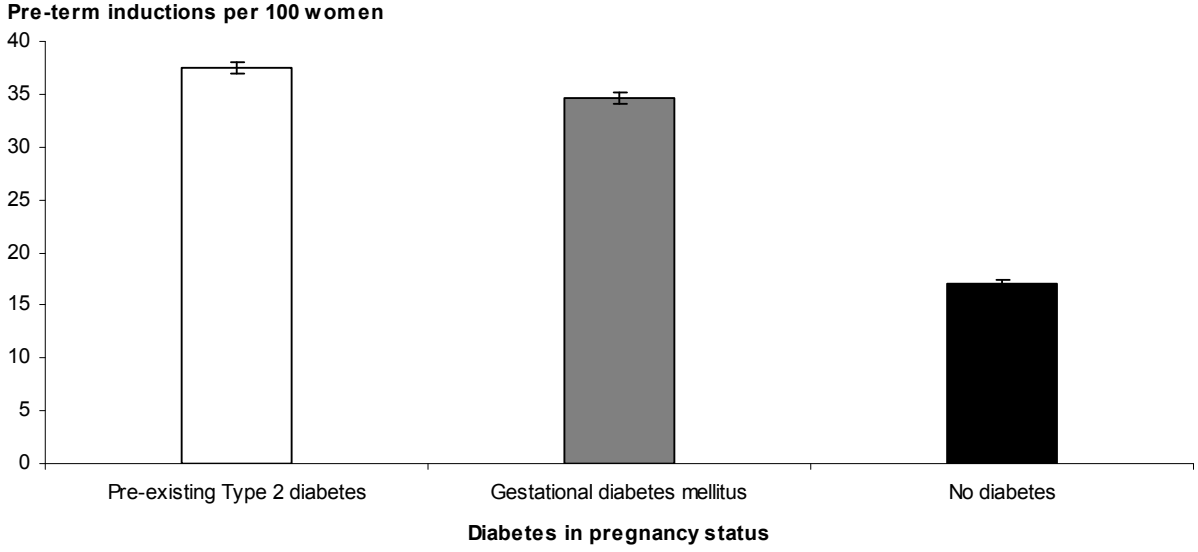
Notes

1. Duration of pregnancy was not stated for: 2 Indigenous women with induction of labour and without diabetes in pregnancy, and 45 non-Indigenous women with induction of labour and without diabetes in pregnancy.
2. Due to small numbers, data for induced labour by duration of pregnancy among Indigenous women with pre-existing diabetes are not shown.
3. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
4. The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.
5. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A3.6.

Source: AIHW analysis of NPDC data.

Figure 3.4: Induced labour among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

Between 2005–06 and 2007–08, for births in hospital in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory, the highest incidence of induced labour among Aboriginal and Torres Strait Islander women who had a pre-term birth was among mothers with pre-existing Type 2 diabetes (37%), followed by those with GDM (35%) and those without diabetes in pregnancy (17%) (Figure 3.5). There were no pre-term inductions among Indigenous women with pre-existing Type 1 diabetes, so these are not presented in the figure.



Notes

1. Directly age-standardised to the 2005–06 to 2007–08 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
2. Indigenous analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.
3. There were no pre-term induction among Indigenous women with pre-existing Type 1 diabetes.
4. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A3.7.

Source: AIHW NHMD.

Figure 3.5: Pre-term (36 weeks or less) induced labour among Aboriginal and Torres Strait Islander women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

Caesarean section

This section provides an overview of caesarean section among Aboriginal and Torres Strait Islander women.

The rate of caesarean section among Indigenous mothers in 2005–2007 was highest for those with pre-existing diabetes (59%), followed by those with GDM (41%) and those without diabetes in pregnancy (22%) (Table 3.13).

Table 3.13: Caesarean section among Aboriginal and Torres Strait Islander women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes
Number	264	653	6,376
Crude rate (per cent)	59.6	41.8	22.4
Age-standardised rate (per cent) (95% confidence interval)	59.1 (58.4–59.8)	40.7 (40.1–41.3)	22.4 (21.9–22.8)

Notes

1. Method of birth was not stated for: 13 Indigenous women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

When compared with non-Indigenous women the rate of caesarean section was:

- 10% higher among Indigenous mothers with GDM
- 10% lower among Indigenous mothers without diabetes in pregnancy
- similar for Indigenous mothers with pre-existing diabetes (Table 3.14).

Table 3.14: Caesarean section among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Pre-existing diabetes	264	260	1.0 (0.9–1.1)
Gestational diabetes mellitus	653	571	1.1 (1.1–1.2)
No diabetes	6,376	6,977	0.9 (0.9–0.9)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Method of birth was not stated for: 13 Indigenous women without diabetes in pregnancy, 4 non-Indigenous women with gestational diabetes mellitus, and 282 non-Indigenous women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
3. Analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

Source: AIHW analysis of NPDC data.

Similarly to the data from the NPDC, the highest incidence of caesarean section among Aboriginal and Torres Strait Islander women giving birth in hospital in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory in 2005–06 to 2007–08 was seen among those with pre-existing Type 1 diabetes (78%), followed by those with pre-existing Type 2 diabetes (59%), those with GDM (43%) and Indigenous women without a diagnosis of diabetes (23%) (Table 3.15).

Table 3.15: Caesarean section among Aboriginal and Torres Strait Islander women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	27	276	639	6,268
Crude rate (per cent)	73.0	63.0	43.3	22.9
Age-standardised rate (per cent) (95% confidence interval)	78.1 (77.3–79.0)	58.8 (58.0–59.5)	42.9 (42.3–43.6)	22.9 (22.4–23.3)

Notes

1. Directly age-standardised to the 2005–06 to 2007–08 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
2. Analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

Source: AIHW NHMD.

Aboriginal and Torres Strait Islander women with pre-existing Type 1 or Type 2 diabetes were 10% more likely and Indigenous women with GDM were 20% more likely to have a caesarean section, compared with other Australian women with pre-existing Type 1 or Type 2 diabetes or GDM (Table 3.16).

The rate of caesarean section was similar for Indigenous women without diabetes and other Australian women without diabetes.

Table 3.16: Caesarean section among Aboriginal and Torres Strait Islander women who gave birth in hospital compared with other Australian women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Pre-existing Type 1 diabetes	27	26	1.1 (1.1–1.1)
Pre-existing Type 2 diabetes	276	247	1.1 (1.1–1.1)
Gestational diabetes mellitus	639	546	1.2 (1.2–1.2)
No diabetes	6,268	6,712	0.9 (0.9–1.0)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the other Australian population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the other Australian population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Indirectly age-standardised to the 2005–06 to 2007–08 other Australian maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
2. Analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

Source: AIHW NHMD.

Hypertension

This section provides an overview of hypertension among Aboriginal and Torres Strait Islander women who gave birth in hospital in New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory.

In 2005–06 to 2007–08, the highest incidence of hypertension among Indigenous women who gave birth in hospital was among women with pre-existing Type 1 diabetes (34%), followed by women with pre-existing Type 2 diabetes (24%), women with GDM (15%) and those without diabetes in pregnancy (6%) (Table 3.17).

Table 3.17: Hypertension among Aboriginal and Torres Strait Islander women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	11	112	234	1,714
Crude rate (per cent)	29.7	25.6	15.9	6.3
Age-standardised rate (per cent) (95% confidence interval)	33.5 (33.0–34.0)	23.8 (23.4–24.3)	15.0 (14.7–15.4)	6.3 (6.0–6.5)

Notes

1. Directly age-standardised to the 2005–06 to 2007–08 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
2. Analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

Source: AIHW NHMD.

Indigenous women with pre-existing Type 1 or pre-existing Type 2 were 20% more likely and Indigenous women with GDM were 50% more likely to have hypertension than other Australian women. The rate of hypertension was similar for Indigenous women and other Australian women without diabetes.

Table 3.18: Hypertension among Aboriginal and Torres Strait Islander women who gave birth in hospital compared with other Australian women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
Pre-existing Type 1 diabetes	11	9	1.2 (1.2–1.2)
Pre-existing Type 2 diabetes	112	95	1.2 (1.2–1.2)
Gestational diabetes mellitus	234	155	1.5 (1.5–1.5)
No diabetes	1,714	1,789	1.0 (0.9–1.0)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the other Australian population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the other Australian population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Indirectly age-standardised to the 2005–06 to 2007–08 other Australian maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
2. Analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

Source: AIHW NHMD.

Length of stay in hospital

This section provides an overview of antenatal and postnatal length of stay in hospital among Aboriginal and Torres Strait Islander women, sourced from the NPDC.

Antenatal

The vast majority (87% or more) of Aboriginal and Torres Strait Islander women who gave birth in hospital were hospitalised for 0–6 days before giving birth (Table 3.19).

The highest rate of staying in hospital for 7 or more days before giving birth was among mothers with pre-existing diabetes (11%), followed by those with GDM (6%) and those without diabetes (1%).

Table 3.19: Antenatal length of stay in hospital among Aboriginal and Torres Strait Islander women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–6 days	375	86.2	1,461	94.5	27,070	97.5
≥ 7 days	55	12.6	80	5.2	333	1.2
Total[(a)]	**435**	**100.0**	**1,546**	**100.0**	**27,751**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–6 days	87.3	(86.4–88.2)	94.1	(93.2–95.0)	97.5	(96.6–98.5)
≥ 7 days	11.4	(11.1–11.7)	5.7	(5.5–5.9)	1.2	(1.1–1.3)

(a) Totals may not add up due to missing values.

Notes

1. Includes Indigenous women who gave birth in hospital only.
2. Antenatal length of stay was not stated for: 5 Indigenous women with pre-existing diabetes in pregnancy, 5 Indigenous women with gestational diabetes mellitus, and 348 Indigenous women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Aboriginal and Torres Strait Islander women without diabetes in pregnancy were 10% more likely to spend 0–6 days in hospital before giving birth compared with non-Indigenous mothers without diabetes (Table 3.20). There was no difference between Indigenous mothers and non-Indigenous mothers with pre-existing diabetes or for those with GDM.

Indigenous women were more likely than non-Indigenous women to be in hospital for 7 or more days before giving birth, across all diabetes types. Those with pre-existing diabetes in pregnancy were 2.9 times as likely, those with GDM were 3.4 times as likely and those without diabetes were 1.8 times as likely as non-Indigenous women (Table 3.20).

Table 3.20: Antenatal length of stay in hospital among Aboriginal and Torres Strait Islander women who gave birth in hospital compared with non-Indigenous women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
0–6 days			
Pre-existing diabetes	375	347	1.1 (1.0–1.2)
Gestational diabetes mellitus	1,461	1,360	1.1 (1.0–1.1)
No diabetes	27,070	25,127	1.1 (1.1–1.1)
≥ 7 days			
Pre-existing diabetes	55	19	2.9 (2.1–3.7)
Gestational diabetes mellitus	80	24	3.4 (2.6–4.1)
No diabetes	333	188	1.8 (1.6–2.0)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes women who gave birth in hospital only.
2. Antenatal length of stay was not stated for: 5 Indigenous women with pre-existing diabetes in pregnancy, 5 Indigenous women with gestational diabetes mellitus, 348 Indigenous women without diabetes in pregnancy, 76 non-Indigenous women with pre-existing diabetes in pregnancy, 426 non-Indigenous women with gestational diabetes mellitus, and 8,110 non-Indigenous women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Postnatal

The majority (79% or more) of Aboriginal and Torres Strait Islander women who gave birth in hospital and were discharged home, were hospitalised for 0–6 days after giving birth (Table 3.21).

The highest rate of staying in hospital for 7 or more days after giving birth was among mothers with pre-existing diabetes (21%), followed by those with GDM (10%) and those without diabetes in pregnancy (5%).

Table 3.21: Postnatal length of stay in hospital among Aboriginal and Torres Strait Islander women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
0–6 days	315	80.2	1,307	90.4	24,694	93.9
≥ 7 days	74	18.8	133	9.2	1,316	5.0
Total[(a)]	**393**	**100.0**	**1,445**	**100.0**	**26,300**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–6 days	78.5	(77.6–79.3)	90.1	(89.2–91.0)	93.9	(93.0–94.8)
≥ 7 days	20.6	(20.2–21.1)	9.6	(9.3–9.9)	5.0	(4.8–5.2)

(a) Totals may not add up due to missing values.

Notes

1. Includes Indigenous women who gave birth in hospital and were discharged home only.
2. Postnatal length of stay was not stated for: 4 Indigenous women with pre-existing diabetes in pregnancy, 5 Indigenous women with gestational diabetes mellitus, and 290 Indigenous women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of Indigenous women without diabetes in pregnancy who were discharged home. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Aboriginal and Torres Strait Islander women were more likely to spend 0–6 days in hospital after giving birth compared with non-Indigenous women, regardless of their diabetes in pregnancy status (Table 3.22). The difference in rates of postnatal length of stay of 0–6 days was 15.4 times among mothers with pre-existing diabetes, 10.5 times among mothers with GDM and 6.3 times among mothers without diabetes in pregnancy.

Indigenous women were also more likely to spend 7 or more days in hospital after giving birth compared with non-Indigenous women, regardless of their diabetes in pregnancy status (Table 3.22). The difference in rates of postnatal length of stay was 1.9 times among mothers with pre-existing diabetes, 2.5 times among mothers with GDM and 2.0 among mothers without diabetes in pregnancy.

Table 3.22: Postnatal length of stay in hospital among Aboriginal and Torres Strait Islander women who gave birth in hospital compared with non-Indigenous women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
0–6 days			
Pre-existing diabetes	315	20	15.4 (13.7–17.1)
Gestational diabetes mellitus	1,307	125	10.5 (9.9–11.0)
No diabetes	24,694	3,897	6.3 (6.3–6.4)
≥ 7 days			
Pre-existing diabetes	74	40	1.9 (1.4–2.3)
Gestational diabetes mellitus	133	54	2.5 (2.1–2.9)
No diabetes	1,316	651	2.0 (1.9–2.1)

(a) The expected number of cases if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes women who gave birth in hospital and were discharged home only.
2. Postnatal length of stay was not stated for: 4 Indigenous women with pre-existing diabetes in pregnancy, 5 Indigenous women with gestational diabetes mellitus, 290 Indigenous women without diabetes in pregnancy, 74 non-Indigenous women with pre-existing diabetes in pregnancy, 411 non-Indigenous women with gestational diabetes mellitus, and 7,598 non-Indigenous women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population who were discharged home, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

3.3 Infant outcomes

Please note that the analyses presented in this section include only live born babies. Due to very small numbers of fetal deaths, data on birth status for babies born to Aboriginal and Torres Strait Islander women are not presented.

Gestational age

This section provides an overview of gestational age among live born babies of Aboriginal and Torres Strait Islander women.

Between 2005 and 2007, the highest rate of pre-term birth was 31% among babies of Indigenous mothers with pre-existing diabetes, followed by 14% among babies born to mothers with GDM and 13% among those born to mothers without diabetes in pregnancy (Table 3.23).

The rate of births at term was similar for babies of Indigenous mothers with GDM and those without diabetes.

Table 3.23: Gestational age of live born babies of Aboriginal and Torres Strait Islander women, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
20–36 weeks[(a)]	148	34.3	231	14.6	3,580	12.6
≥ 37 weeks	284	65.7	1,347	85.4	24.921	87.4
Total[(b)]	**432**	**100.0**	**1,578**	**100.0**	**28,512**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
20–36 weeks[(a)]	31.1	(30.6–31.6)	14.3	(14.0–14.7)	12.6	(12.2–12.9)
≥ 37 weeks	68.9	(68.1–69.7)	85.7	(84.8–86.5)	87.4	(86.5–88.3)

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

(b) Total includes not stated.

Notes

1. Includes live born babies only.
2. Gestational age was not stated for: 11 babies of Indigenous women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

The rate of pre-term birth was higher among babies of Aboriginal and Torres Strait Islander mothers compared with babies of non-Indigenous mothers, and was:

- 1.4 times as high among babies of mothers with GDM and those with pre-existing diabetes
- 1.7 times as high among babies of mothers without diabetes (Table 3.24).

There was no difference in the rate of births at term between babies born to Indigenous mothers and those born to non-Indigenous mothers, regardless of maternal diabetes status.

Table 3.24: Gestational age of live born babies of Aboriginal and Torres Strait Islander women compared with live born babies of non-Indigenous women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
20–36 weeks			
Pre-existing diabetes	148	109	1.4 (1.1–1.6)
Gestational diabetes mellitus	231	161	1.4 (1.2–1.6)
No diabetes	3,580	2,082	1.7 (1.7–1.8)
≥ 37 weeks			
Pre-existing diabetes	284	323	0.9 (0.8–1.0)
Gestational diabetes mellitus	1,347	1,417	1.0 (0.9–1.0)
No diabetes	24,921	26,426	0.9 (0.9–1.0)

(a) The expected number of cases among babies if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Gestational age was not stated for: 11 babies of Indigenous women without diabetes in pregnancy, and 61 babies of non-Indigenous women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Birthweight

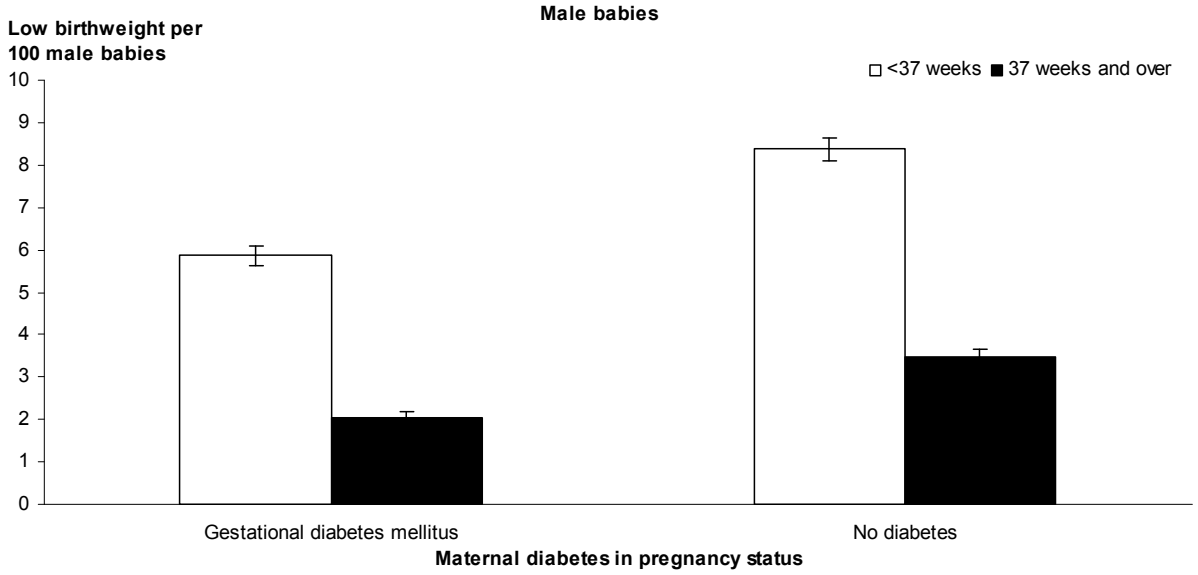
This section provides an overview of low birthweight among live born babies of Aboriginal and Torres Strait Islander women.

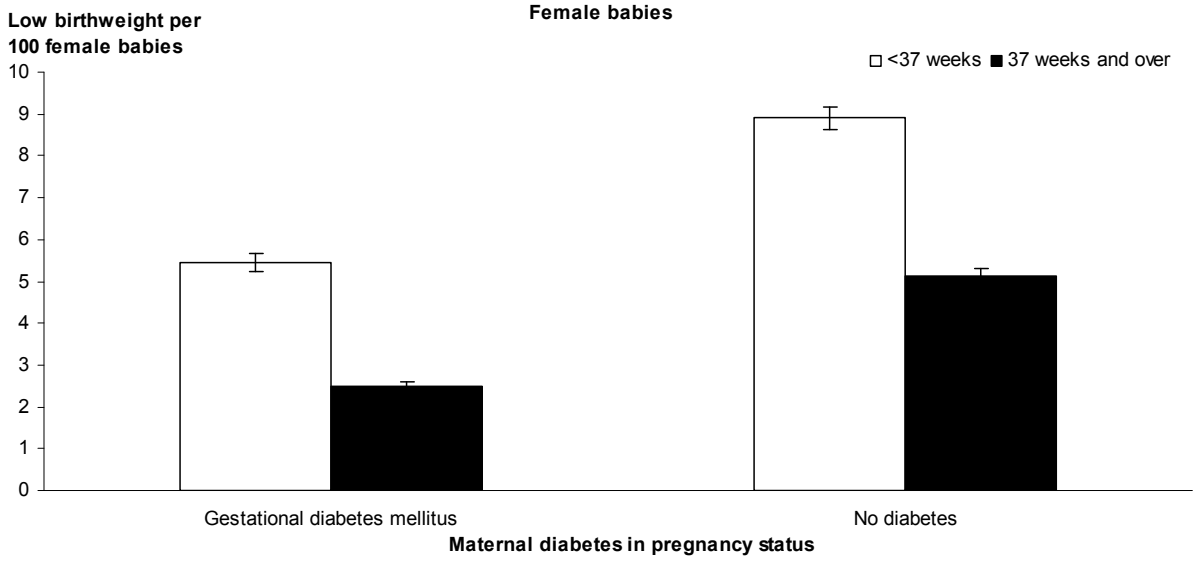
In 2005–2007, the rate of low birthweight was higher among male babies of Indigenous mothers without diabetes than in those of mothers with GDM:

- 8% compared with 6%, respectively, when born pre-term
- 4% compared with 2%, respectively, when born at term (Figure 3.6).

Similarly, the rate of low birthweight was higher among female babies of Indigenous mothers without diabetes than in those of mothers with GDM:

- 9% compared with 5%, respectively, when born pre-term
- 5% compared with 3%, respectively, when born at term.





Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 3 male babies and 5 female babies of Indigenous women without diabetes in pregnancy.
3. Gestational age was not stated for: 3 male babies and 3 female babies of Indigenous women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born babies of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
5. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', tables A3.8 and A3.9.

Source: AIHW analysis of NPDC data.

Figure 3.6: Low birthweight (less than 2,500 grams) among live born babies of Aboriginal and Torres Strait Islander women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

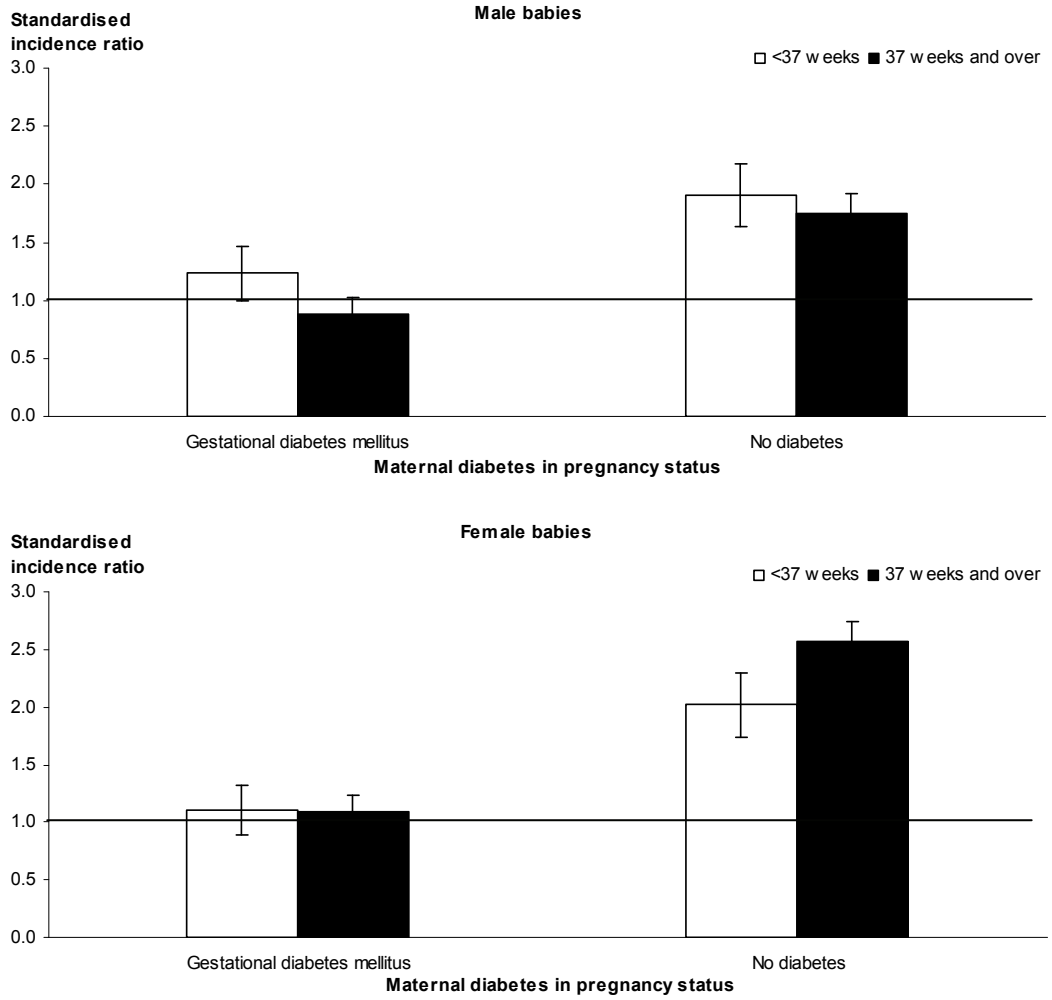
In 2005–2007, when compared with male babies born to non-Indigenous mothers without diabetes, male babies born to Aboriginal and Torres Strait Islander mothers were:

- 1.9 times as likely to have a low birthweight when born pre-term
- 1.7 times as likely to have a low birthweight when born at term (Figure 3.7).

When compared with female babies born to non-Indigenous mothers without diabetes, female babies born to Indigenous mothers were:

- twice as likely to have a low birthweight when born pre-term
- 2.6 times as likely to have a low birthweight when born at term.

There was no difference in the rate of low birthweight by maternal Indigenous status among male babies or female babies born to mothers with GDM.



Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 3 male babies and 5 female babies of Indigenous women without diabetes in pregnancy, 82 male babies and 69 female babies of non-Indigenous women without diabetes in pregnancy, and 1 female baby of a non-Indigenous woman with gestational diabetes mellitus.
3. Gestational age was not stated for: 3 male babies and 3 female babies of Indigenous women without diabetes in pregnancy, and 36 male babies and 25 female babies of non-Indigenous women without diabetes in pregnancy.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
5. The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.
6. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', tables A3.10 and A3.11.

Source: AIHW analysis of NPDC data.

Figure 3.7: Low birthweight (less than 2,500 grams) among live born babies of Aboriginal and Torres Strait Islander women compared with live born babies of non-Indigenous women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

Apgar score

This section provides an overview of Apgar scores (at 5 minutes) for babies born to Aboriginal and Torres Strait Islander mothers.

The majority of babies born to Indigenous mothers (more than 96%) had an Apgar score of 7–10, and there was no difference by maternal diabetes status group (Table 3.25).

Babies born to Indigenous mothers were more likely to have an Apgar score of 0–6 if their mother had pre-existing diabetes (3.5%), compared with those whose mothers had GDM (2.5%) or no diabetes (2.2%).

Table 3.25: Apgar score at 5 minutes among live born babies of Aboriginal and Torres Strait Islander women, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–6	18	4.2	36	2.3	619	2.2
7–10	413	95.6	1,537	97.4	27,780	97.4
Total[(a)]	**432**	**100.0**	**1,578**	**100.0**	**28,512**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–6	3.5	(3.3–3.7)	2.5	(2.4–2.7)	2.2	(2.0–2.3)
7–10	96.3	(95.3–97.2)	97.2	(96.3–98.2)	97.4	(96.5–98.4)

(a) Total includes not stated.

Notes

1. Includes live born babies only.
2. Apgar score (at 5 minutes) was not stated for: 1 baby of an Indigenous woman with pre-existing diabetes in pregnancy, 5 babies of Indigenous women with gestational diabetes mellitus, and 113 babies of Indigenous women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

In 2005–2007, babies born to Aboriginal and Torres Strait Islander mothers with no diabetes or GDM were 1.5 and 1.7 times as likely, respectively, to have a low Apgar score, compared with babies of non-Indigenous women, but there was no significant difference for babies of women with pre-existing diabetes
(Table 3.26).

Table 3.26: Apgar score at 5 minutes among live born babies of Aboriginal and Torres Strait Islander women compared with live born babies of non-Indigenous women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
0–6			
Pre-existing diabetes	18	13	1.4 (0.8–2.1)
Gestational diabetes mellitus	36	21	1.7 (1.2–2.3)
No diabetes	619	414	1.5 (1.4–1.6)
7–10			
Pre-existing diabetes	413	419	1.0 (0.9–1.1)
Gestational diabetes mellitus	1,537	1,555	1.0 (0.9–1.0)
No diabetes	27,780	28,052	1.0 (1.0–1.0)

(a) The expected number of cases among babies if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Apgar score (at 5 minutes) was not stated for: 1 baby of an Indigenous woman with pre-existing diabetes in pregnancy, 5 babies of Indigenous women with gestational diabetes mellitus, 113 babies of Indigenous women without diabetes in pregnancy, 4 babies of non-Indigenous women with pre-existing diabetes in pregnancy, 35 babies of non-Indigenous women with gestational diabetes mellitus and 1,197 babies of non-Indigenous women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Resuscitation

This section provides an overview of the level of resuscitation provided at birth to babies born to Aboriginal and Torres Strait Islander women.

Babies born to Indigenous mothers with pre-existing diabetes were more likely to have a high resuscitation level (19%), compared with babies born to mothers with GDM (13%) and mothers without diabetes (9%) (Table 3.27).

Table 3.27: Level of resuscitation performed at birth on live born babies of Aboriginal and Torres Strait Islander women, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
High level	92	21.3	189	12.0	2,650	9.3
Low level or none	336	77.8	1,378	87.3	25,602	89.8
Total[(a)]	**432**	**100.0**	**1,578**	**100.0**	**28,512**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
High level	19.1	(18.7–19.5)	12.8	(12.4–13.1)	9.3	(9.0–9.6)
Low level or none	79.7	(78.8–80.5)	86.8	(85.9–87.7)	89.8	(88.9–90.7)

(a) Total includes 'other' resuscitation and not stated resuscitation.

Notes

1. Includes live born babies only.
2. High-level resuscitation includes intermittent positive pressure respiration through bag and mask, endotracheal intubation and intermittent positive pressure respiration, and external cardiac massage and ventilation.
3. Low-level or no resuscitation includes suction only, oxygen therapy only, or no intervention to resuscitate.
4. Other resuscitation was recorded for: 1 baby of an Indigenous woman with pre-existing diabetes in pregnancy, 2 babies of Indigenous women with gestational diabetes mellitus, and 37 babies of Indigenous women without diabetes in pregnancy.
5. Resuscitation level at birth was not stated for: 3 babies of Indigenous women with pre-existing diabetes in pregnancy, 9 babies of Indigenous women with gestational diabetes mellitus, and 223 babies of Indigenous women without diabetes in pregnancy.
6. Directly age-standardised to the 2005–2007 population of live born babies of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

When compared with babies of non-Indigenous mothers, those born to Aboriginal and Torres Strait mothers were:

- 1.4 times as likely to receive high-level resuscitation if their mother had pre-existing diabetes or GDM
- 1.2 times as likely to receive high-level resuscitation if their mother did not have diabetes
- similarly likely to receive low-level or no resuscitation, regardless of their mothers' diabetes status (Table 3.28).

Table 3.28: Level of resuscitation performed at birth on live born babies of Aboriginal and Torres Strait Islander women compared with live born babies of non-Indigenous women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
High level			
Pre-existing diabetes	92	66	1.4 (1.1–1.7)
Gestational diabetes mellitus	189	137	1.4 (1.2–1.6)
No diabetes	2,650	2,187	1.2 (1.2–1.3)
Low level or none			
Pre-existing diabetes	336	362	0.9 (0.8–1.0)
Gestational diabetes mellitus	1,378	1,435	1.0 (0.9–1.0)
No diabetes	25,602	26,168	1.0 (1.0–1.0)

(a) The expected number of cases among babies if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Population total includes other resuscitation and not stated resuscitation level.
3. High-level resuscitation includes intermittent positive pressure respiration through bag and mask, endotracheal intubation and intermittent positive pressure respiration, and external cardiac massage and ventilation.
4. Low-level or no resuscitation includes suction only, oxygen therapy only, or no intervention to resuscitate.
5. Other resuscitation was recorded for: 1 baby of an Indigenous woman with pre-existing diabetes in pregnancy, 2 babies of Indigenous women with gestational diabetes mellitus, 37 babies of Indigenous women without diabetes in pregnancy, 10 babies of non-Indigenous women with pre-existing diabetes in pregnancy, 49 babies of non-Indigenous women with gestational diabetes mellitus, and 1,026 babies of non-Indigenous women without diabetes in pregnancy.
6. Resuscitation level at birth was not stated for: 3 babies of Indigenous women with pre-existing diabetes in pregnancy, 9 babies of Indigenous women with gestational diabetes mellitus, 223 babies of Indigenous women without diabetes in pregnancy, 33 babies of non-Indigenous women with pre-existing diabetes in pregnancy, 112 babies of non-Indigenous women with gestational diabetes mellitus, and 3,227 babies of non-Indigenous women without diabetes in pregnancy.
7. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Admission to special care nursery/neonatal intensive care unit

This section provides an overview of SCN/NICU admission among babies born to Aboriginal and Torres Strait Islander women.

Babies born to Indigenous mothers were more likely to be admitted to the SCN/NICU if their mother had pre-existing diabetes (63%), compared with babies born to mothers with GDM (42%) and those of mothers without diabetes in pregnancy (18%) (Table 3.29).

Table 3.29: SCN/NICU admission among live born babies of Aboriginal and Torres Strait Islander women, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Admitted	270	62.5	675	42.8	5,213	18.3
Not admitted	162	37.5	903	57.2	23,291	81.7
Total[(a)]	**432**	**100.0**	**1,578**	**100.0**	**28,512**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Admitted	63.1	(63.3–63.8)	41.5	(40.9–42.1)	18.3	(17.9–18.7)
Not admitted	36.9	(36.4–37.5)	58.5	(57.7–59.2)	81.7	(80.8–82.5)

(a) Total includes not stated.

Notes

1. Includes live born babies only.
2. Admission to the Special care nursery/Neonatal intensive care unit (SCN/NICU) may be a clinical decision or the result of hospital policy.
3. SCN/NICU admission was not stated for: 8 babies of Indigenous women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born babies of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with babies of non-Indigenous mothers, babies born to Indigenous mothers were more likely to be admitted to SCN/NICU if the mother had GDM or did not have diabetes in pregnancy (40% and 30%, respectively) (Table 3.30). Babies of mothers with pre-existing diabetes were equally likely to be admitted to SCN/NICU, regardless of the mothers' Indigenous status.

Babies of Indigenous mothers with GDM were 20% less likely not to be admitted to the SCN/NICU compared with babies of non-Indigenous mothers. Babies of mothers with pre-existing diabetes or mothers without diabetes were equally likely not to be admitted to the SCN/NICU, regardless of the mothers' Indigenous status.

Table 3.30: SCN/NICU admission among live born babies of Aboriginal and Torres Strait Islander women compared with live born babies of non-Indigenous women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
Admitted			
Pre-existing diabetes	270	250	1.1 (1.0–1.2)
Gestational diabetes mellitus	675	494	1.4 (1.3–1.5)
No diabetes	5,213	4,048	1.3 (1.3–1.3)
Not admitted			
Pre-existing diabetes	162	182	0.9 (0.8–1.0)
Gestational diabetes mellitus	903	1,084	0.8 (0.8–0.9)
No diabetes	23,291	24,457	1.0 (0.9–1.0)

(a) The expected number of cases among babies if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Admission to the Special care nursery/Neonatal intensive care unit (SCN/NICU) may be a clinical decision or the result of hospital policy.
3. SCN/NICU admission was not stated for: 8 babies of Indigenous women without diabetes in pregnancy, 4 babies of non-Indigenous women with gestational diabetes mellitus, and 164 babies of non-Indigenous women without diabetes in pregnancy.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Length of stay in hospital

This section provides an overview of the length of stay in hospital among babies born to Aboriginal and Torres Strait Islander women. These data include only babies who were discharged home, so these totals do not compare with totals in other sections in this chapter.

The majority of babies born to Indigenous mothers were in hospital for 0–6 days, but there was great variation in rates: 64% among babies born to mothers with pre-existing diabetes, 85% among babies born to mothers with GDM and 89% among those born to mothers without diabetes in pregnancy (Table 3.31).

Babies of Indigenous women with pre-existing diabetes were twice as likely to spend 7 or more days in hospital, compared with babies of mothers with GDM, and more than 3 times as likely compared with babies of mothers without diabetes.

Table 3.31: Length of stay in hospital among live born babies of Aboriginal and Torres Strait Islander women, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–6 days	215	66.6	1,179	85.0	22,662	89.3
≥ 7 days	108	33.4	208	15.0	2,715	10.7
Total[(a)]	**323**	**100.0**	**1,387**	**100.0**	**25,383**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–6 days	64.2	(63.4–65.0)	84.8	(83.9–85.7)	89.3	(88.4–90.2)
≥ 7 days	35.8	(35.2–36.4)	15.2	(14.9–15.6)	10.7	(10.4–11.0)

(a) Total includes not stated.

Notes

1. Includes live born babies discharged home only.
2. Length of stay in hospital was not stated for: 6 babies of Indigenous women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies (discharged home) of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

When compared with babies born to non-Indigenous women, babies born to Aboriginal and Torres Strait Islander mothers were almost twice as likely to stay in hospital 7 or more days, across all maternal diabetes status groups (Table 3.32).

When compared with babies born to non-Indigenous women, babies born to Indigenous mothers were 20% less likely to have a hospital stay of 0–6 days when their mother had pre-existing diabetes. There was no difference by Indigenous status in the rate of stay of 0–6 days among babies born to mothers with GDM and without diabetes in pregnancy.

Table 3.32: Length of stay in hospital among live born babies of Aboriginal and Torres Strait Islander women compared with live born babies of non-Indigenous women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
0–6 days			
Pre-existing diabetes	215	257	0.8 (0.7–0.9)
Gestational diabetes mellitus	1,179	1,263	0.9 (0.9–1.0)
No diabetes	22,662	23,787	1.0 (0.9–1.0)
≥ 7 days			
Pre-existing diabetes	108	66	1.6 (1.3–1.9)
Gestational diabetes mellitus	208	124	1.7 (1.5–1.9)
No diabetes	2,715	1,585	1.7 (1.6–1.8)

(a) The expected number of cases among babies if the Indigenous population of women had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies discharged home only.
2. Length of stay in hospital was not stated for: 6 babies of Indigenous women without diabetes in pregnancy, 16 babies of non-Indigenous women with gestational diabetes mellitus, and 271 babies of non-Indigenous women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

4 Mothers from high-diabetes-risk regions

Key points

- In 2005–2007, nearly 11% of mothers born in high-diabetes-risk regions had diabetes in pregnancy: less than 1% had pre-existing diabetes and about 10% had GDM (NPDC).
- In 2005–06 to 2007–08, more than 11% of mothers born in high-diabetes-risk regions had diabetes in pregnancy: 0.1% had pre-existing Type 1 diabetes, 0.4% had pre-existing Type 2 diabetes and nearly 11% had GDM (NHMD).
- The majority of mothers born in high-diabetes-risk regions were aged 30 years and over and were multiparous.
- Mothers born in high-diabetes-risk regions were older, had similar rates of multiparity and were less likely to have a multiple birth compared with mothers born in Australia.
- Mothers with pre-existing diabetes from high-diabetes-risk regions had higher rates of pre-term birth, induced labour, delivery with no labour, caesarean section, hypertension and longer stay in hospital, compared with mothers with GDM and those without diabetes.
- Mothers with GDM from high-diabetes-risk regions had higher rates of pre-term birth, induced labour, delivery with no labour, caesarean section, hypertension and longer stay in hospital compared with mothers without diabetes.
- Mothers born in high-diabetes-risk regions had generally lower rates of pre-term birth, induced labour, no labour, caesarean section, hypertension and longer stay in hospital, compared with mothers born in Australia, across all diabetes groups.
- Babies born to mothers with pre-existing diabetes from high-diabetes-risk regions had the highest rate of pre-term birth, low Apgar score, high-level resuscitation, admission to special care nursery/neonatal intensive care unit and longer stay in hospital, compared with babies of mothers born in high-diabetes-risk regions with GDM or those without diabetes.
- Babies born to mothers with GDM from high-diabetes-risk regions were more likely to be pre-term, have low birthweight, high-level resuscitation, admission to special care nursery/neonatal intensive care unit and longer stay in hospital, compared with babies of mothers born in high-diabetes-risk regions without diabetes in pregnancy.
- Babies born to mothers from high-diabetes-risk regions were less likely to be born pre-term, have high-level resuscitation or have a length of stay in hospital of 7 or more days, compared with babies of Australian-born mothers, regardless of maternal diabetes status.

This chapter describes the effects of pregnancy, labour and delivery on mothers who were born in regions at high risk for Type 2 diabetes and GDM, and their babies. These regions are referred to as 'high-diabetes-risk regions' and include Polynesia, Asia and the Middle East. As a high-risk group, women born in these regions, and their babies, have been given special consideration in this report to determine whether they experience adverse effects of

pregnancy, labour and delivery at a greater rate than other women and their babies. There appears to be no literature on the comparative pregnancy outcomes among women from high-diabetes-risk regions and Australian-born women. This chapter highlights differences in effects of pregnancy, labour and delivery among women born in high-diabetes-risk regions, and their babies, by maternal diabetes in pregnancy status, and presents comparisons with women born in Australia, and their babies.

Data for these analyses are primarily sourced from the National Perinatal Data Collection (NPDC) 2005–2007. The NPDC data are supplemented by data from the National Hospital Morbidity Database (NHMD) including data on additional outcomes not available in the NPDC and data by pre-existing diabetes type (Type 1 and Type 2).

Note that, where crude and age-standardised rates are presented in tables, only the age-standardised rates are discussed in the text.

4.1 Maternal characteristics

Diabetes in pregnancy status

This section provides an overview of diabetes in pregnancy status among women who gave birth, by region of birth.

About 96,800 women (12%) giving birth in Australia in the 3-year period 2005–2007 and recorded in the NPDC reported that they were born in a region that places them at high risk for Type 2 diabetes and GDM. Of these women:

- 643 (0.7%) had pre-existing diabetes
- 9,536 (9.9%) were diagnosed with GDM
- 86,626 (89.5%) did not have diabetes in pregnancy (Table 4.1).

The distribution of diabetes in pregnancy status among the 634,498 Australian-born women who gave birth is similar to that of all Australian women (see Table 2.1).

Table 4.1: Women who gave birth in Australia, by region of birth and diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes	Total
		Number		
High-diabetes-risk regions	643	9,536	86,626	**96,805**
Australia	3,754	24,736	606,008	**634,498**
Other regions	539	4,638	91,638	**96,815**
Missing/not stated/not assigned	16	229	5,347	**5,592**
Total	**4,952**	**39,139**	**789,619**	**833,710**
		Per cent		
High-diabetes-risk regions	0.7	9.9	89.5	**100.0**
Australia	0.6	3.9	95.5	**100.0**
Other regions	0.6	4.8	94.7	**100.0**
Missing/not stated/not assigned	0.3	4.1	95.6	**100.0**
Total	**0.6**	**4.7**	**94.7**	**100.0**

Source: AIHW analysis of NPDC data.

In 2005–2007, mothers born in high-diabetes-risk regions were 2.4 times as likely to have GDM and similarly likely to have pre-existing diabetes as mothers born in Australia (Table 4.2). They were 10% less likely to have a pregnancy free from diabetes.

Table 4.2: Diabetes in pregnancy status among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Pre-existing diabetes	643	597	1.1 (1.0–1.2)
Gestational diabetes mellitus	9,536	4,018	2.4 (2.3–2.4)
No diabetes	86,626	92,190	0.9 (0.9–0.9)

(a) The expected number of cases if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk born population of women is based on the age-specific rate of the Australian-born population of women. For more information and interpretation, see 'Appendix 1 Methods'.

Note: Indirectly age-standardised to the 2005–2007 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Of the 99,258 women from high-diabetes-risk regions who gave birth in hospital between 2005–06 and 2007–08:

- 495 (0.5%) had pre-existing diabetes
  - 77 (0.1%) had pre-existing Type 1 diabetes
  - 385 (0.4%) had pre-existing Type 2 diabetes
- 10,656 (10.7%) were diagnosed with GDM
- 87,841 (88.5%) did not have diabetes in pregnancy (Table 4.3).

The distribution of diabetes in pregnancy status among the 622,756 Australian-born women was similar to that of all Australian women (see Table 2.2).

Table 4.3: Women who gave birth in hospital, by region of birth and diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	All pre-existing diabetes[(a)]	Gestational diabetes mellitus	No diabetes	Total[(b)]
			Number			
High-diabetes-risk regions	77	385	495	10,656	87,841	**99,258**
Australia	1,797	1,571	3,550	24,663	593,323	**622,756**
Other regions	212	242	486	4,931	94,051	**99,666**
Missing/not stated/not assigned	33	21	72	526	16,675	**17,353**
Total	**2,119**	**2,219**	**4,603**	**40,776**	**791,890**	**839,033**
			Per cent			
High-diabetes-risk regions	0.1	0.4	0.5	10.7	88.5	**100.0**
Australia	0.3	0.3	0.6	4.0	95.3	**100.0**
Other regions	0.2	0.2	0.5	4.9	94.4	**100.0**
Missing/not stated/not assigned	0.2	0.1	0.4	3.0	96.1	**100.0**
Total	**0.3**	**0.3**	**0.5**	**4.9**	**94.4**	**100.0**

(a) All pre-existing diabetes in pregnancy includes other/unspecified diabetes.

(b) Total includes 'diabetes in pregnancy—onset unspecified'.

Source: AIHW NHMD.

Between 2005–2006 and 2007–2008, and compared with Australian-born women, women who gave birth in Australia who were born in high-diabetes-risk areas were:

- 70% less likely to have pre-existing Type 1 diabetes
- 1.4 times as likely to have pre-existing Type 2 diabetes
- 2.5 times as likely to have GDM
- 10% less likely to have no diabetes (Table 4.4).

Table 4.4: Diabetes in pregnancy status among women born in high-diabetes-risk regions who gave birth in hospital compared with Australian-born women who gave birth in hospital, 2005–06 to 2007–08

	Observed	Expected[(a)]	Standardised incidence ratio[(b)]
Pre-existing Type 1 diabetes	77	290	0.3 (0.2–0.3)
Pre-existing Type 2 diabetes	385	271	1.4 (1.3–1.6)
All pre-existing diabetes[(c)]	495	592	0.8 (0.8–0.9)
Gestational diabetes mellitus	10,656	4,194	2.5 (2.5–2.6)
No diabetes	11,417	94,265	0.9 (0.9–0.9)
Total[(d)]	**87,841**	**99,258**	**1.0 (1.0–1.0)**

(a) The expected number of cases if the high-diabetes-risk population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

(c) All pre-existing diabetes in pregnancy includes other/unspecified diabetes.

(d) Total includes 'diabetes in pregnancy—onset unspecified'.

Note: Indirectly age-standardised to the 2005–06 to 2007–08 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

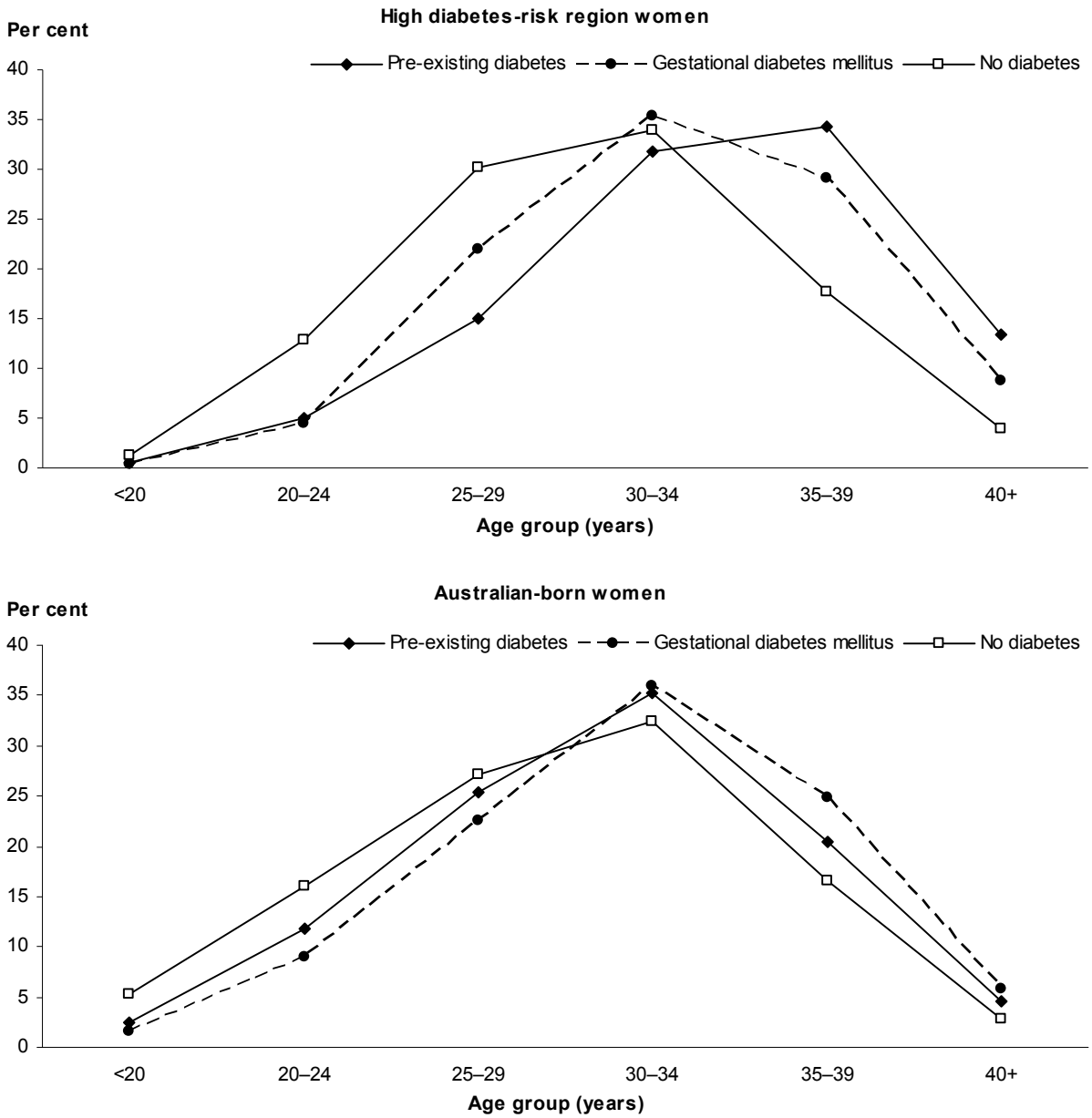
Source: AIHW NHMD.

Age distribution

This section provides an overview of the age distribution of mothers born in high-diabetes-risk areas by diabetes in pregnancy status.

Among mothers born in high-diabetes-risk regions, those with pre-existing diabetes were most likely to be aged 35–39 years when giving birth (34%), while those with GDM or without diabetes were most likely to be aged 30–34 years (35% and 34%, respectively) (Figure 4.1). Mothers born in Australia were most likely to be aged 30–34 years when giving birth, across all diabetes in pregnancy status groups, and the age distribution was similar to that of all Australian mothers (see Figure 2.1).

Compared with women born in Australia, those born in high-diabetes-risk regions who had pre-existing diabetes were significantly more likely to be aged 30 years or more when giving birth. Therefore, all subsequent comparative analyses of NPDC data by region of birth in this chapter have been age-standardised to adjust for the differences in age distribution by diabetes status groups and maternal region of birth.



Note: For summary data, see 'Appendix 2 Supplementary tables', tables A4.1 and A4.2.

Source: AIHW analysis of NPDC data.

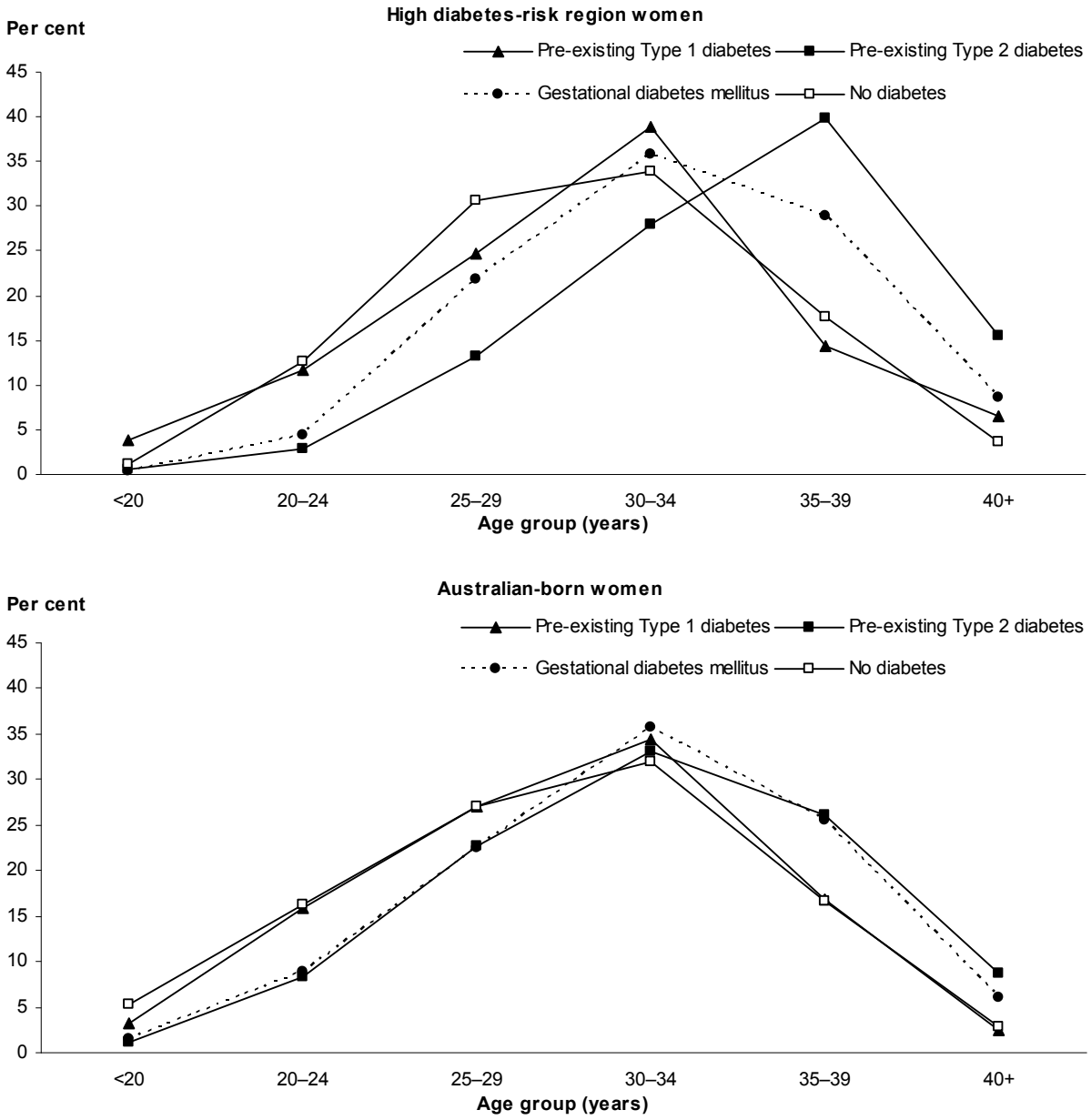
Figure 4.1: Age distribution among women who gave birth, by region of birth and diabetes in pregnancy status, 2005–2007

Similarly to the NPDC data, the age distribution of women from high-diabetes-risk regions who gave birth in hospital in 2005–06 to 2007–08 differed by diabetes in pregnancy status, and compared with Australian-born women who gave birth (Figure 4.2).

Among mothers born in high-diabetes-risk regions, those with pre-existing Type 2 diabetes were most likely to be aged 35–39 years when giving birth (40%), while those with pre-existing Type 1 diabetes, GDM and without diabetes in pregnancy were most likely to be

aged 30–34 years (39%, 36% and 34%, respectively). Mothers born in Australia were most likely to be aged 30–34 years when giving birth, across all diabetes in pregnancy status groups, and the age distribution was similar to that of all Australian mothers (see Figure 2.2).

The proportion of mothers aged 30 years and over was higher among women born in high-diabetes-risk regions compared with mothers born in Australia, across all diabetes in pregnancy status groups, most significantly those with pre-existing Type 2 diabetes (83% compared with 68%). Therefore, all subsequent comparative analyses of NHMD data by region of birth in this chapter have been age-standardised to adjust for the differences in age distribution by diabetes status groups and maternal region of birth.



Note: For summary data, see 'Appendix 2 Supplementary tables', tables A4.3 and A4.4.

Source: AIHW NHMD

Figure 4.2: Age distribution of women who gave birth in hospital, by region of birth and diabetes in pregnancy status, 2005–06 to 2007–08

Parity

This section provides an overview of parity among women from high-diabetes-risk regions.

The majority of mothers from high-diabetes-risk regions were multiparous (had at least one previous pregnancy), with the highest rate among mothers with pre-existing diabetes (63%), followed by those without diabetes in pregnancy (55%) and those with GDM (52%).

Table 4.5: Multiparity among women from high-diabetes-risk regions who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes
Number	456	5,676	47,722
Crude rate (per cent)	70.9	59.5	55.1
Age-standardised rate (per cent) (95% confidence interval)	63.0 (62.2–63.7)	52.1 (51.4–52.8)	55.1 (54.4–55.8)

Notes

1. Parity was not stated for: 2 high-diabetes-risk regions women with pre-existing diabetes in pregnancy, 15 high-diabetes-risk regions women with gestational diabetes mellitus, and 194 high-diabetes-risk regions women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Mothers born in high-diabetes-risk regions without diabetes in pregnancy were 10% less likely to be multiparous compared with Australian-born mothers without diabetes in pregnancy. There was no significant difference by region of birth among mothers with pre-existing diabetes or with GDM (Table 4.6).

Table 4.6: Multiparity among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Pre-existing diabetes	456	429	1.1 (1.0–1.2)
Gestational diabetes mellitus	5,676	6,094	0.9 (0.9–1.0)
No diabetes	47,722	52,652	0.9 (0.9–0.9)

(a) The expected number of cases if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Parity was not stated for: 2 high-diabetes-risk regions women with pre-existing diabetes in pregnancy, 15 high-diabetes-risk regions women with gestational diabetes mellitus, 194 high-diabetes-risk regions women without diabetes in pregnancy, 8 Australian-born women with pre-existing diabetes in pregnancy, 13 Australian-born women with gestational diabetes mellitus, and 826 Australian-born women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Plurality

This section provides an overview of multiple births among women born in high-diabetes-risk regions.

Multiple births were more common among women with diabetes in pregnancy from high-diabetes-risk regions compared with those without diabetes, with rates of:

- 1.7% among those with pre-existing diabetes and those with GDM
- 1.1% among those mothers who did not have diabetes in pregnancy (Table 4.7).

There was no difference in the rate of multiple births between mothers with pre-existing diabetes and those with GDM.

Table 4.7: Multiple births among women from high-diabetes-risk regions who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes
Number	10	174	992
Crude rate (per cent)	1.6	1.8	1.1
Age-standardised rate (per cent) (95% confidence interval)	1.7 (1.6–1.9)	1.7 (1.5–1.8)	1.1 (1.0–1.3)

Notes

1. Multiple births include twins and higher order multiples (triplets, quadruplets and so on).
2. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Mothers with GDM from high-diabetes-risk regions and those without diabetes in pregnancy were 30% less likely to have a multiple birth compared with Australian-born mothers. There was no difference by region of birth for those mothers with pre-existing diabetes (Table 4.8).

Table 4.8: Multiple births among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Pre-existing diabetes	10	13	0.8 (0.3–1.3)
Gestational diabetes mellitus	174	259	0.7 (0.6–0.8)
No diabetes	992	1,503	0.7 (0.6–0.7)

(a) The expected number of cases if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Note: Indirectly age-standardised to the 2005–2007 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

4.2 Maternal outcomes

Duration of pregnancy

This section provides an overview of duration of pregnancy among women from high-diabetes-risk regions who gave birth.

When the different age structures between diabetes status types is accounted for, mothers with pre-existing diabetes from high-diabetes-risk regions were more likely to deliver pre-term (14%), compared with those with GDM (8%) and those without diabetes (6%) (Table 4.9). There was no significant difference in the rate of delivery at term between mothers with GDM from high-diabetes-risk regions and those without diabetes in pregnancy.

More information on pre-term birth can be found in 'Section 4.3—Infant outcomes'.

Table 4.9: Duration of pregnancy among women from high-diabetes-risk regions who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
20–36 weeks	103	16.0	779	8.2	5,542	6.4
≥ 37 weeks	540	84.0	8,757	91.8	81,077	93.6
Total	**643**	**100.0**	**9,536**	**100.0**	**86,626**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
20–36 weeks	14.2	(13.9–14.6)	7.7	(7.4–8.0)	6.4	(6.2–6.6)
≥ 37 weeks	85.8	(84.8–86.7)	92.3	(91.3–93.3)	93.6	(92.6–94.6)

Notes

1. Duration of pregnancy was not stated for: 7 high-diabetes-risk regions women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with Australian-born mothers, mothers from high-diabetes-risk regions were less likely to have a pre-term birth across all diabetes status groups:

- 40% less likely among mothers with pre-existing diabetes
- 20% less likely among mothers with GDM
- 10% less likely among mothers without diabetes (Table 4.10).

There was no difference by regions of birth for women who gave birth at term, regardless of diabetes in pregnancy status.

Table 4.10: Duration of pregnancy for women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
20–36 weeks			
Pre-existing diabetes	103	167	0.6 (0.5–0.7)
Gestational diabetes mellitus	779	979	0.8 (0.7–0.9)
No diabetes	5,542	6,202	0.9 (0.9–0.9)
≥ 37 weeks			
Pre-existing diabetes	540	476	1.1 (1.0–1.2)
Gestational diabetes mellitus	8,757	8,557	1.0 (1.0–1.0)
No diabetes	81,077	80,415	1.0 (1.0–1.0)

(a) The expected number of cases if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Duration of pregnancy was not stated for: 7 high-diabetes-risk regions women without diabetes in pregnancy, 1 Australian-born woman with gestational diabetes mellitus, and 79 Australian-born women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Labour

This section provides an overview of the onset of labour among women from high-diabetes-risk regions.

Among mothers from high-diabetes-risk regions giving birth in 2005–2007:

- the majority of mothers without diabetes had a spontaneous labour (67%), compared with 40% of mothers with pre-existing diabetes and 49% of mothers with GDM (Table 4.11)
- the highest incidence of induced labour was 37% among mothers with pre-existing diabetes, compared with 34% among mothers with GDM and 18% among those without diabetes in pregnancy
- the highest incidence of no labour was 23% among mothers with pre-existing diabetes, followed by 17% among mothers with GDM and 15% among those without diabetes in pregnancy.

Table 4.11: Labour among women from high-diabetes-risk regions who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Spontaneous	239	37.2	4,496	47.1	58,066	67.0
Induced	234	36.4	3,060	32.1	15,706	18.1
No labour	169	26.3	1,978	20.7	12,835	14.8
Total[(a)]	**643**	**100.0**	**9,536**	**100.0**	**86,626**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Spontaneous	40.1	(39.5–40.7)	49.0	(48.3–49.6)	67.0	(66.2–67.8)
Induced	37.0	(36.4–37.6)	33.6	(33.1–34.2)	18.1	(17.7–18.6)
No labour	22.5	(22.1–23.0)	17.4	(17.0–17.8)	14.8	(14.4–15.2)

(a) Totals may not add up due to missing values.

Notes

1. Onset of labour was not stated for: 1 high-diabetes-risk regions woman with pre-existing diabetes in pregnancy, 2 high-diabetes-risk regions women with gestational diabetes mellitus, and 19 high-diabetes-risk regions women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with Australian-born mothers, mothers from high-diabetes-risk regions were between 1.2 and 1.8 times as likely to have a spontaneous labour (Table 4.12). In contrast, mothers from high-diabetes-risk regions were generally 20–40% less likely to be induced or have no labour compared with Australian-born mothers. The exception was in the rate of induced labour among mothers with pre-existing diabetes which was similar among mothers from high-diabetes-risk regions and those born in Australia.

Table 4.12: Labour among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
Spontaneous			
Pre-existing diabetes	239	136	1.8 (1.5–2.0)
Gestational diabetes mellitus	4,496	3,051	1.5 (1.4–1.5)
No diabetes	58,066	47,801	1.2 (1.2–1.2)
Induced			
Pre-existing diabetes	234	213	1.1 (1.0–1.2)
Gestational diabetes mellitus	3,060	3,825	0.8 (0.8–0.8)
No diabetes	15,706	22,403	0.7 (0.7–0.7)
No labour			
Pre-existing diabetes	169	294	0.6 (0.5–0.7)
Gestational diabetes mellitus	1,978	2,659	0.7 (0.7–0.8)
No diabetes	12,835	16,404	0.8 (0.8–0.8)

(a) The expected number of cases if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

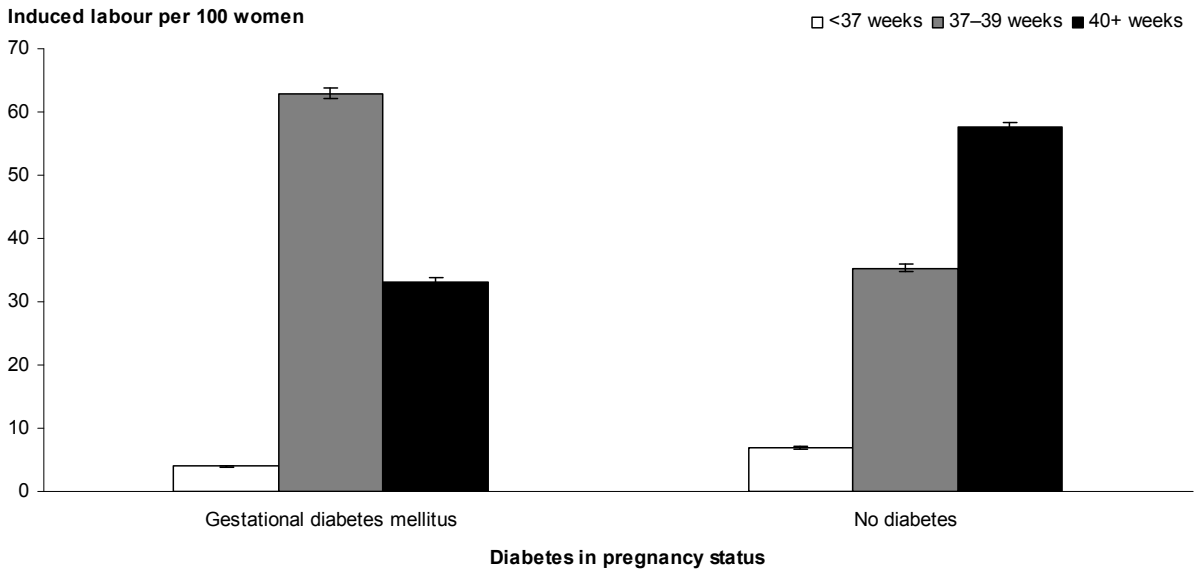
1. Onset of labour was not stated for: 1 high-diabetes-risk regions woman with pre-existing diabetes in pregnancy, 2 high-diabetes-risk regions women with gestational diabetes mellitus, 19 high-diabetes-risk regions women without diabetes in pregnancy, 3 Australian-born women with pre-existing diabetes in pregnancy, 3 Australian-born women with gestational diabetes mellitus, and 125 Australian-born women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

The duration of pregnancy at which labour was induced also differed significantly between women from high-diabetes-risk regions who gave birth with GDM and women from high-diabetes-risk regions who gave birth without diabetes in pregnancy.

More than 60% of inductions among women from high-diabetes-risk regions who gave birth with GDM were performed at 37–39 weeks gestation, while the majority of inductions among women from high-diabetes-risk regions who gave birth without diabetes in pregnancy (58%) were performed at 40 weeks or more gestation (Figure 4.3).

Due to small numbers, induced labour by duration of pregnancy could not be presented for mothers from high-diabetes-risk regions with pre-existing diabetes.



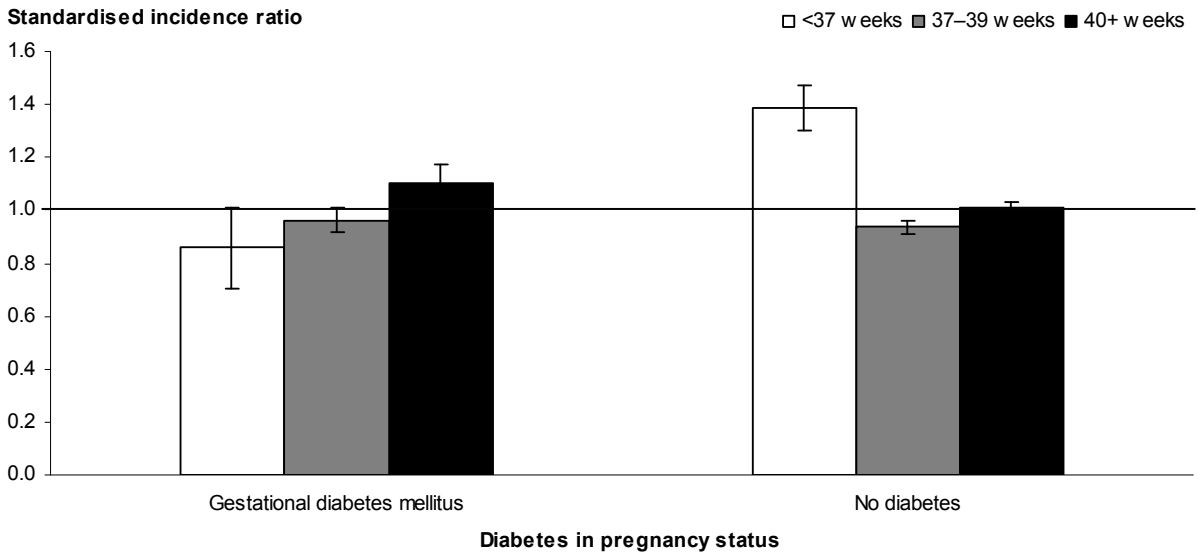
Notes

1. Onset of labour was not stated for: 2 high-diabetes-risk regions women with gestational diabetes mellitus, and 19 high-diabetes-risk regions women without diabetes in pregnancy.
2. Duration of pregnancy was not stated for: 6 high-diabetes-risk regions women without diabetes in pregnancy.
3. Due to small numbers, induced labour by duration of pregnancy is not presented for high-diabetes-risk regions mothers with pre-existing diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women with induced labour and without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
5. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A4.5.

Source: AIHW analysis of NPDC data.

Figure 4.3: Induced labour among women from high-diabetes-risk regions who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

When compared with Australian-born mothers without diabetes in pregnancy, mothers from high-diabetes-risk regions were 1.4 times as likely to have an induced labour at less than 37 weeks gestation (Figure 4.4). For all other comparisons, the rates of induction by duration of pregnancy were similar for women born in high-diabetes-risk regions and those born in Australia.



Notes

1. Onset of labour was not stated for: 2 high-diabetes-risk regions women with gestational diabetes mellitus, 19 high-diabetes-risk regions women without diabetes in pregnancy, 3 Australian-born women with gestational diabetes mellitus, and 125 Australian-born women without diabetes in pregnancy.
2. Duration of pregnancy was not stated for: 6 high-diabetes-risk regions women without diabetes in pregnancy, and 79 Australian-born women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 Australian-born maternal population with induced labour, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
4. The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.
5. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A4.6.

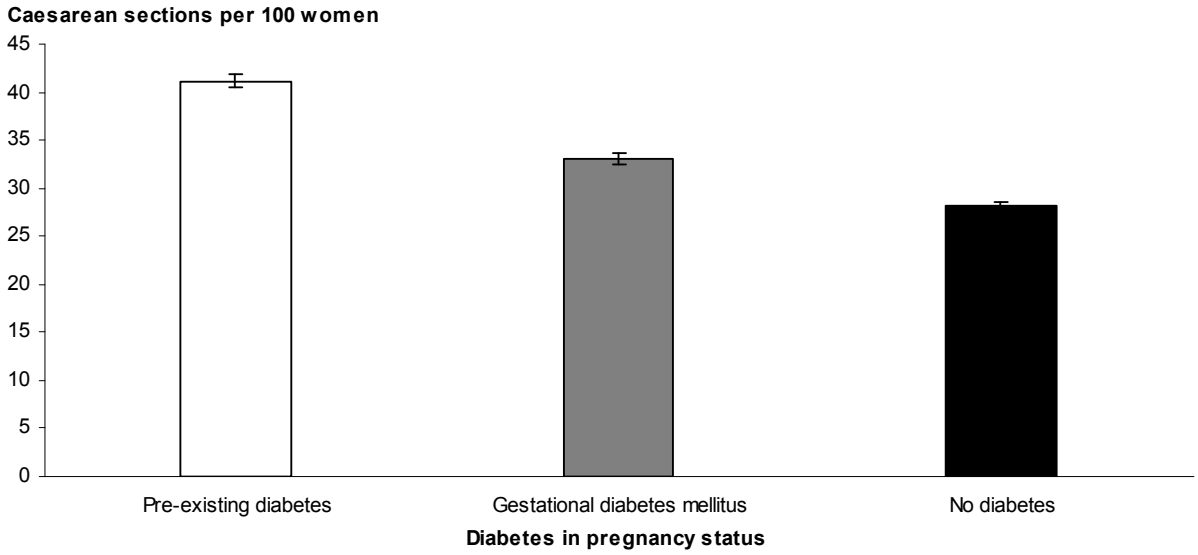
Source: AIHW analysis of NPDC data.

Figure 4.4: Induced labour among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

Caesarean section

This section presents the incidence of caesarean section, among women from high-diabetes-risk regions, sourced from the NPDC. The section also includes data on the incidence of caesarean section among mothers from high-diabetes-risk regions by pre-existing diabetes in pregnancy type, sourced from the NHMD.

The incidence of caesarean section among mothers from high-diabetes-risk regions was highest for those with pre-existing diabetes (41%), followed by those with GDM (33%) and those without diabetes in pregnancy (28%) (Figure 4.5).



Notes

1. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

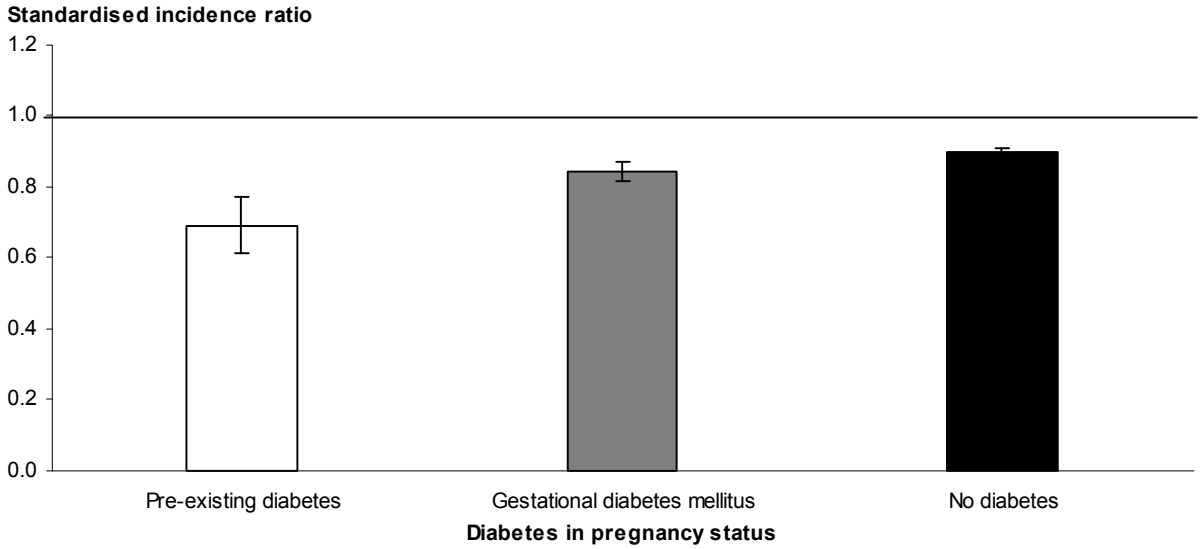
2. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A4.7.

Source: AIHW analysis of NPDC data.

Figure 4.5: Caesarean section among women from high-diabetes-risk regions who gave birth, by diabetes in pregnancy status, 2005–2007

In 2005–2007, mothers born in high-diabetes-risk regions had lower rates of caesarean section compared with Australian-born mothers:

- 30% less for those with pre-existing diabetes
- 20% less for those with GDM
- 10% less for those without diabetes in pregnancy (Figure 4.6).



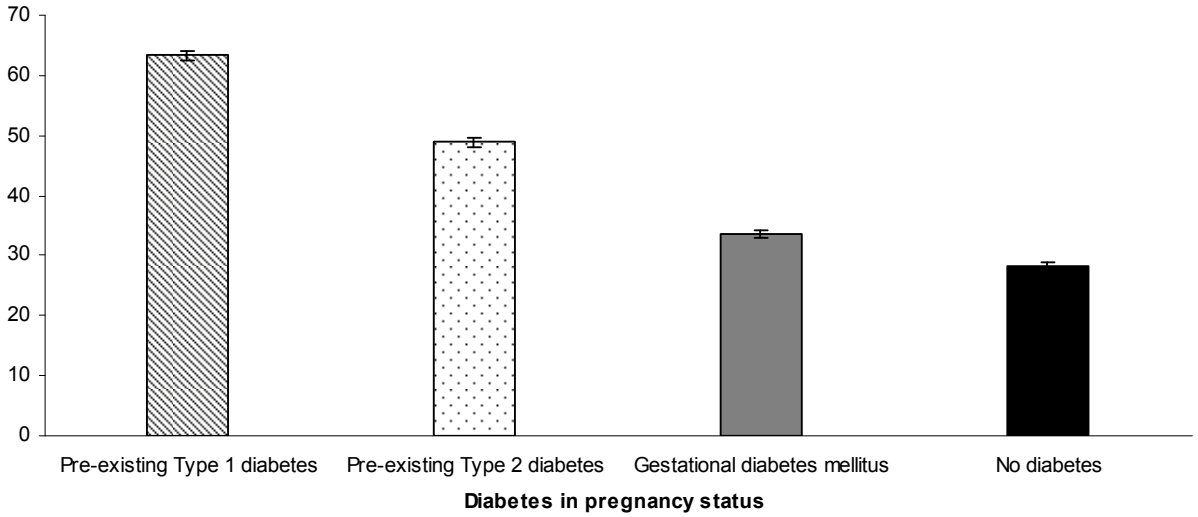
Notes

1. Indirectly age-standardised to the 2005–2007 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
2. The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.
3. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A4.8.

Source: AIHW analysis of NPDC data.

Figure 4.6: Caesarean section among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by diabetes in pregnancy status, 2005–2007

Among mothers born in high-diabetes-risk regions who gave birth in hospital in 2005–06 to 2007–08, caesarean section rates were highest for those with pre-existing Type 1 diabetes (63%), followed by those with pre-existing Type 2 diabetes (49%), GDM (34%) and mothers without diabetes in pregnancy (28%) (Figure 4.7).



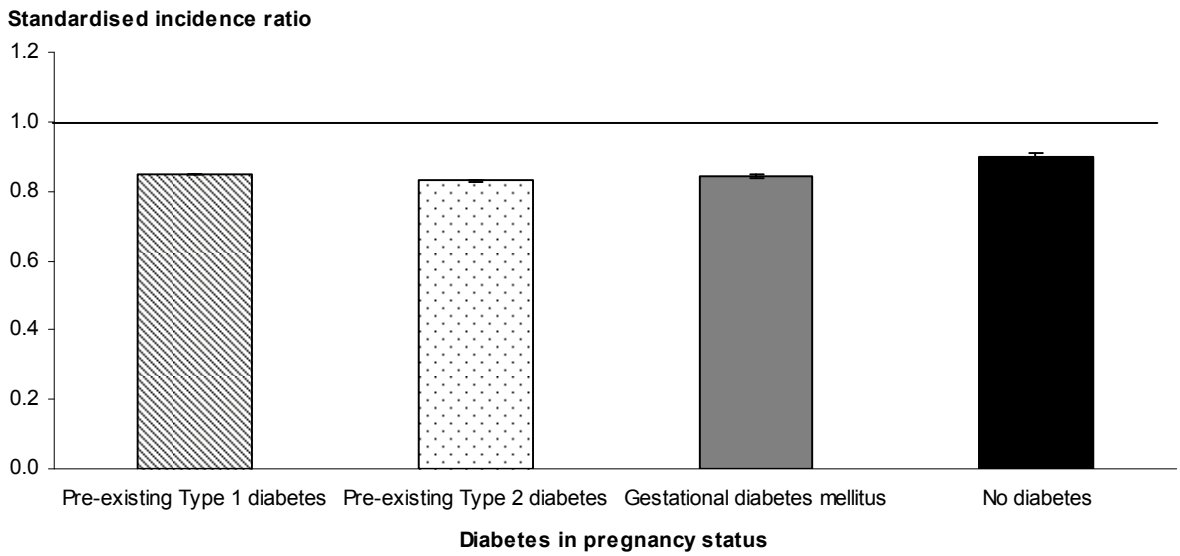
Notes

1. Directly age-standardised to the 2005–06 to 2007–08 population of high-diabetes-risks regions women without diabetes who gave birth in hospital.
2. The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.
3. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A4.9.

Source: AIHW NHMD.

Figure 4.7: Caesarean section rate among women from high-diabetes-risk regions who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

Mothers born in high-diabetes-risk regions had caesarean section rates 10–20% lower compared with mothers born in Australia, across all diabetes status groups (Figure 4.8).



Notes

1. Indirectly age-standardised to the 2005–06 to 2007–08 Australian-born maternal population who gave birth in hospital, by diabetes in pregnancy status group.
2. The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.
3. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', Table A4.10.

Source: AIHW NHMD.

Figure 4.8: Caesarean section among women from high-diabetes-risk regions who gave birth in hospital, compared with Australian-born women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

Hypertension

This section provides an overview of hypertension among women from high-diabetes-risk regions who gave birth in hospital, in 2005–06 to 2007–08.

Among mothers from high-diabetes-risk regions, the highest rate of total hypertension (including eclampsia) was seen among mothers with a diagnosis of pre-existing Type 2 diabetes (17%), compared with 6% among mothers with GDM from high-diabetes-risk regions was 6%, and 4%among those without diabetes in pregnancy (Table 4.13).

Data for women with Type 1 diabetes are not presented due to small numbers.

Table 4.13: Hypertension among women from high-diabetes-risk regions who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	69	693	3,572
Crude rate (per cent)	17.9	6.5	4.1
Age-standardised rate (per cent) (95% confidence interval)	16.7 (16.3–17.1)	6.1 (5.8–6.3)	4.1 (3.9–4.3)

Note: Directly age-standardised to the 2005–06 to 2007–08 population of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Mothers from high-diabetes-risk regions who gave birth in hospital were significantly less likely to have a diagnosis of hypertension compared with Australian-born mothers, across all diabetes in pregnancy groups:

- 20% less likely among mothers with pre-existing diabetes
- 50% less likely among mothers with GDM
- 40% less likely among mothers without diabetes in pregnancy (Table 4.14).

Table 4.14: Hypertension among women from high-diabetes-risk regions who gave birth in hospital compared with Australian-born women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
Pre-existing diabetes[c]	92	120	0.8 (0.8–0.8)
Gestational diabetes mellitus	693	1,277	0.5 (0.5–0.6)
No diabetes	3,572	5,747	0.6 (0.6–0.7)

(a) The expected number of cases if the high-diabetes-risk regions population had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

(c) Pre-existing diabetes in pregnancy includes other/unspecified diabetes.

Note: Indirectly age-standardised to the 2005–06 to 2007–08 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Length of stay in hospital

This section provides an overview of antenatal and postnatal length of stay in hospital among women from high-diabetes-risk regions who gave birth, sourced from the NPDC.

Antenatal

The majority (84–94%) of mothers from high-diabetes-risk regions who gave birth in hospital had an antenatal stay in hospital of 1 day or less (Table 4.15).

Mothers from high-diabetes-risk regions who had pre-existing diabetes (13%) were almost twice as likely to have an antenatal stay of 2 or more days compared with those with GDM (8%), and 3 times as likely as those without diabetes (4%).

Table 4.15: Antenatal length of stay in hospital among women from high-diabetes-risk regions who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–1 day	538	83.9	8,603	90.9	79,908	94.1
≥ 2 days	89	13.9	708	7.5	3,701	4.4
Total[(a)]	**641**	**100.0**	**9,463**	**100.0**	**84,928**	**100.0**
			Age-standardised rate (per cent) (95% confidence interval)			
0–1 day	84.4	(83.5–85.3)	90.7	(89.7–91.6)	94.1	(93.1–95.1)
≥ 2 days	13.0	(12.6–13.3)	7.5	(7.3–7.8)	4.4	(4.2–4.6)

(a) Totals may not add up due to missing values.

Notes

1. Includes women who gave birth in hospital only.
2. Antenatal length of stay in hospital was not stated for: 14 high-diabetes-risk regions women with pre-existing diabetes in pregnancy,152 high-diabetes-risk regions women with gestational diabetes mellitus, and 1,319 high-diabetes-risk regions women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Mothers from high-diabetes-risk regions who gave birth in hospital were 20–30% less likely to be in hospital for 2 or more days before delivery compared with Australian-born mothers, across all diabetes in pregnancy status groups (Table 4.16).

There was no difference between high-diabetes-risk born and Australian-born mothers for antenatal stay of 0–1 days.

Table 4.16: Antenatal length of stay in hospital among women born in high-diabetes-risk regions who gave birth in hospital, compared with Australian-born women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
0–1 day			
Pre-existing diabetes	538	504	1.1 (1.0–1.2)
Gestational diabetes mellitus	8,603	8,403	1.0 (1.0–1.0)
No diabetes	79,908	79,719	1.0 (1.0–1.0)
≥ 2 days			
Pre-existing diabetes	89	128	0.7 (0.5–0.8)
Gestational diabetes mellitus	708	975	0.7 (0.7–0.8)
No diabetes	3,701	4,369	0.8 (0.8–0.9)

(a) The expected number of cases if the high-diabetes-risk regions population had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes women who gave birth in hospital only.
2. Antenatal length of stay in hospital was not stated for: 14 high-diabetes-risk regions women with pre-existing diabetes in pregnancy,152 high-diabetes-risk regions women with gestational diabetes mellitus, 1,319 high-diabetes-risk regions women without diabetes in pregnancy, 59 Australian-born women with pre-existing diabetes in pregnancy, 224 Australian-born women with gestational diabetes mellitus, and 5,925 Australian-born women without diabetes in pregnancy
3. Indirectly age-standardised to the 2005–2007 Australian-born maternal population of women giving birth in hospital, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Postnatal

The vast majority (93–96%) of women from high-diabetes-risk regions who gave birth and were discharged home had a postnatal stay of less than 7 days (Table 4.17).

Mothers from high-diabetes-risk regions with pre-existing diabetes (4.4%) were more likely to have a postnatal stay of 7 days or more compared with those with GDM (3.1%) and those without diabetes in pregnancy (2.7%).

Table 4.17: Postnatal length of stay in hospital among women from high-diabetes-risk regions who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–6 days	580	91.8	8,889	94.9	79,883	95.7
≥ 7 days	38	6.0	326	3.5	2,291	2.7
Total[(a)]	**632**	**100.0**	**9,366**	**100.0**	**83,476**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–6 days	93.0	(92.1–94.0)	95.1	(94.1–96.1)	95.7	(94.7–96.7)
≥ 7 days	4.4	(4.2–4.6)	3.1	(3.0–3.3)	2.7	(2.6–2.9)

(a) Totals may not add up due to missing values.

Notes

1. Includes women who were discharged home only.
2. Postnatal length of stay in hospital was not stated for: 14 high-diabetes-risk regions women with pre-existing diabetes in pregnancy,151 high-diabetes-risk regions women with gestational diabetes mellitus, and 1,302 high-diabetes-risk regions women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 high-diabetes-risk regions population of women who gave birth in hospital without diabetes in pregnancy who were discharged home. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with Australian-born mothers who were discharged home, mothers born in high-diabetes-risk regions were less likely to have a postnatal stay of 7 or more days, regardless of their diabetes status:

- 50% less likely among mothers with pre-existing diabetes
- 30% less likely among mothers with GDM
- 20% less likely among mothers without diabetes in pregnancy (Table 4.18).

There was no difference in postnatal length of stay of 0–6 days between mothers born in high-diabetes-risk regions and mothers born in Australia.

Table 4.18: Postnatal length of stay in hospital among women born in high-diabetes-risk regions who gave birth in hospital compared with Australian-born women who gave birth in hospital, by diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
0–6 days			
Pre-existing diabetes	580	539	1.1 (1.0–1.2)
Gestational diabetes mellitus	8,889	8,808	1.0 (1.0–1.0)
No diabetes	79,883	79,766	1.0 (1.0–1.0)
≥ 7 days			
Pre-existing diabetes	38	84	0.5 (0.3–0.6)
Gestational diabetes mellitus	326	475	0.7 (0.6–0.8)
No diabetes	2,291	2,906	0.8 (0.8–0.8)

(a) The expected number of cases if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes women who were discharged home only.
2. Postnatal length of stay in hospital was not stated for: 14 high-diabetes-risk regions women with pre-existing diabetes in pregnancy, 151 high-diabetes-risk regions women with gestational diabetes mellitus, 1,302 high-diabetes-risk regions women without diabetes in pregnancy, 58 Australian-born women with pre-existing diabetes in pregnancy, 216 Australian-born women with gestational diabetes mellitus, and 5,598 Australian-born women without diabetes in pregnancy
3. Indirectly age-standardised to the 2005–2007 Australian-born maternal population of women who gave birth in hospital and were discharged home, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

4.3 Infant outcomes

Please note that the analyses presented here include only live born babies of women born in high-diabetes-risk regions.

Gestational age

This section provides an overview of gestational age among live born babies of women from high-diabetes-risk regions.

Between 2005 and 2007, babies of mothers with pre-existing diabetes from high-diabetes-risk regions were more likely to be pre-term than:

- babies born to mothers with GDM from high-diabetes-risk regions (15% compared with 8%)
- babies born to mothers without diabetes in pregnancy from high-diabetes-risk regions (15% compared with 6%) (Table 4.19).

Table 4.19: Gestational age of live born babies of women from high-diabetes-risk regions, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
20–36 weeks[(a)]	103	15.9	861	8.9	5,473	6.3
≥ 37 weeks	544	84.1	8,826	91.1	81,431	93.7
Total[(b)]	**647**	**100.0**	**9,687**	**100.0**	**86,904**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
20–36 weeks[(a)]	14.6	(14.3–15.0)	8.4	(8.1–8.7)	6.3	(6.1–6.5)
≥ 37 weeks	85.4	(84.5–86.3)	91.6	(90.7–92.6)	93.7	(92.7–94.7)

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

(b) Total includes not stated.

Notes

1. Includes live born babies only.
2. Gestational age was not stated for: 21 babies of high-diabetes-risk regions women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with babies of Australian-born women, babies of women from high-diabetes-risk regions were less likely to be pre-term across all maternal diabetes in pregnancy status groups:

- 40% less likely among mothers with pre-existing diabetes
- 20% less likely among mothers with GDM and mothers without diabetes in pregnancy (Table 4.20).

There was no difference in the rate of births at term between babies of mothers born in high-diabetes-risk regions and those born in Australia.

Table 4.20: Gestational age of live born babies of women from high-diabetes-risk regions compared with live born babies of Australian-born women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
20–36 weeks			
Pre-existing diabetes	103	168	0.6 (0.5–0.7)
Gestational diabetes mellitus	861	1,109	0.8 (0.7–0.8)
No diabetes	5,473	6,525	0.8 (0.8–0.9)
≥ 37 weeks			
Pre-existing diabetes	544	479	1.1 (1.0–1.2)
Gestational diabetes mellitus	8,826	8,578	1.0 (1.0–1.1)
No diabetes	81,431	80,378	1.0 (1.0–1.0)

(a) The expected number of cases among babies if the high-diabetes-risk regions population of mothers had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Gestational age was not stated for: 21 babies of high-diabetes-risk regions women without diabetes in pregnancy, and; 53 babies of Australian-born women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 population of live born babies of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Birthweight

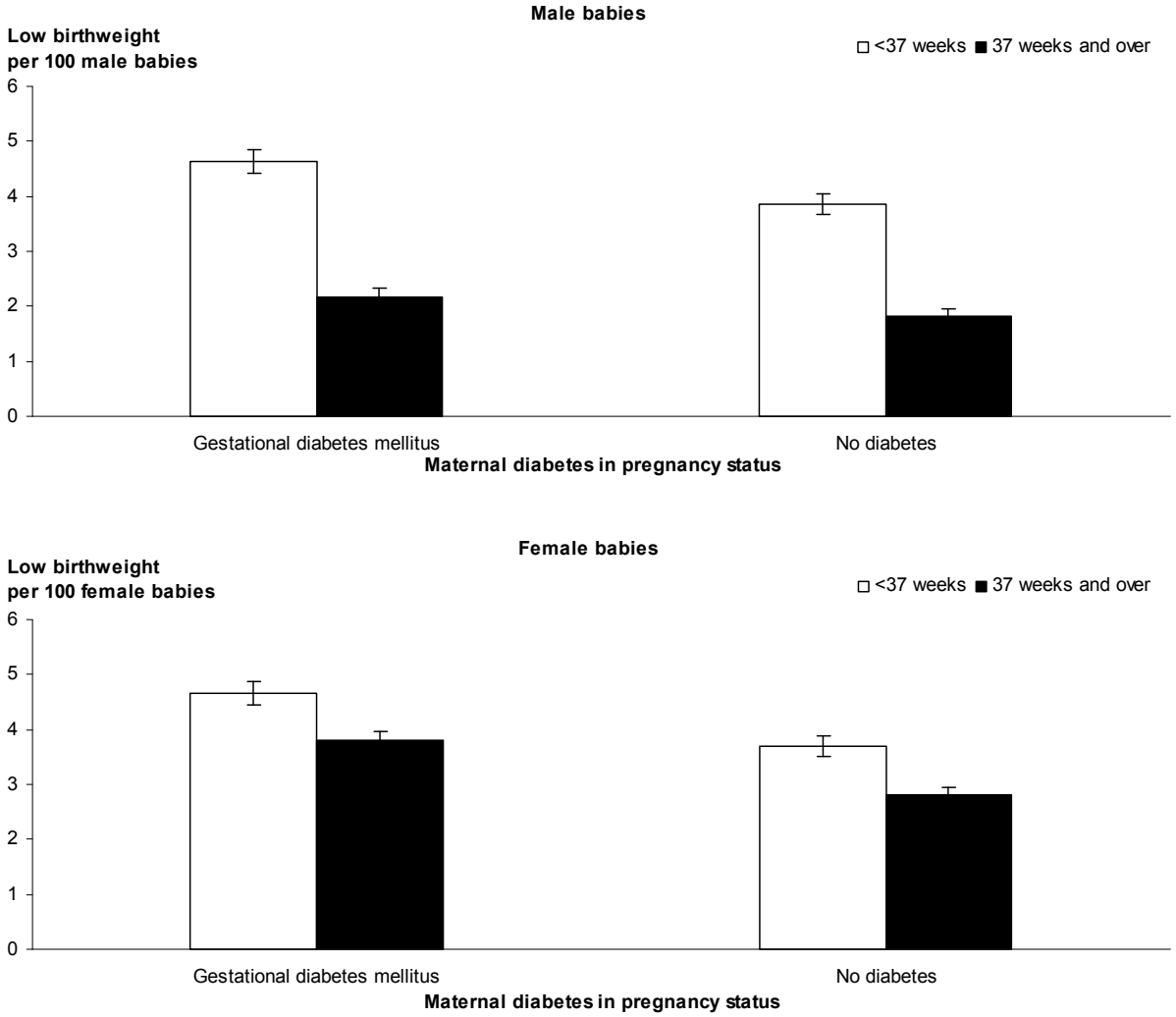
This section provides an overview of low birthweight among live born babies of women born in high-diabetes-risk regions.

In 2005–2007, male babies born pre-term to mothers born in high-diabetes-risk regions were more likely to be of low birthweight if their mother had GDM (5%) than if their mother did not have diabetes in pregnancy (4%) (Figure 4.8).

There was no difference in the rate of low birthweight by maternal diabetes in pregnancy status among male babies born at term.

Similarly, female babies born pre-term were more likely to be of low birthweight if their mother had GDM (5%) than if their mother did not have diabetes (4%). Female babies born at term were also more likely to be of low birthweight if their mother had GDM (4%) than if their mother did not have diabetes in pregnancy (3%).

Due to small numbers, the rate of low birthweight among babies born to mothers with pre-existing diabetes in pregnancy from high-diabetes-risk regions could not be shown.



Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 11 male babies of high-diabetes-risk regions women without diabetes in pregnancy, 1 female baby of a high-diabetes-risk regions woman who gave birth with GDM, and 11 female babies of high-diabetes-risk regions women without diabetes in pregnancy.
3. Gestational age was not stated for: 2 male babies of high-diabetes-risk regions women without diabetes in pregnancy, and 4 female babies of high-diabetes-risk regions women without diabetes in pregnancy.
4. Due to small numbers, low birthweight by gestational age data are not shown for babies of high-diabetes-risk regions mothers with pre-existing diabetes in pregnancy.
5. Directly age-standardised to the 2005–2007 population of live born babies of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
6. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', tables A4.11 and A4.12.

Source: AIHW analysis of NPDC data.

Figure 4.9: Low birthweight (less than 2,500 grams) among live born babies of women from high-diabetes-risk regions, by gestational age and maternal diabetes in pregnancy status, 2005–2007

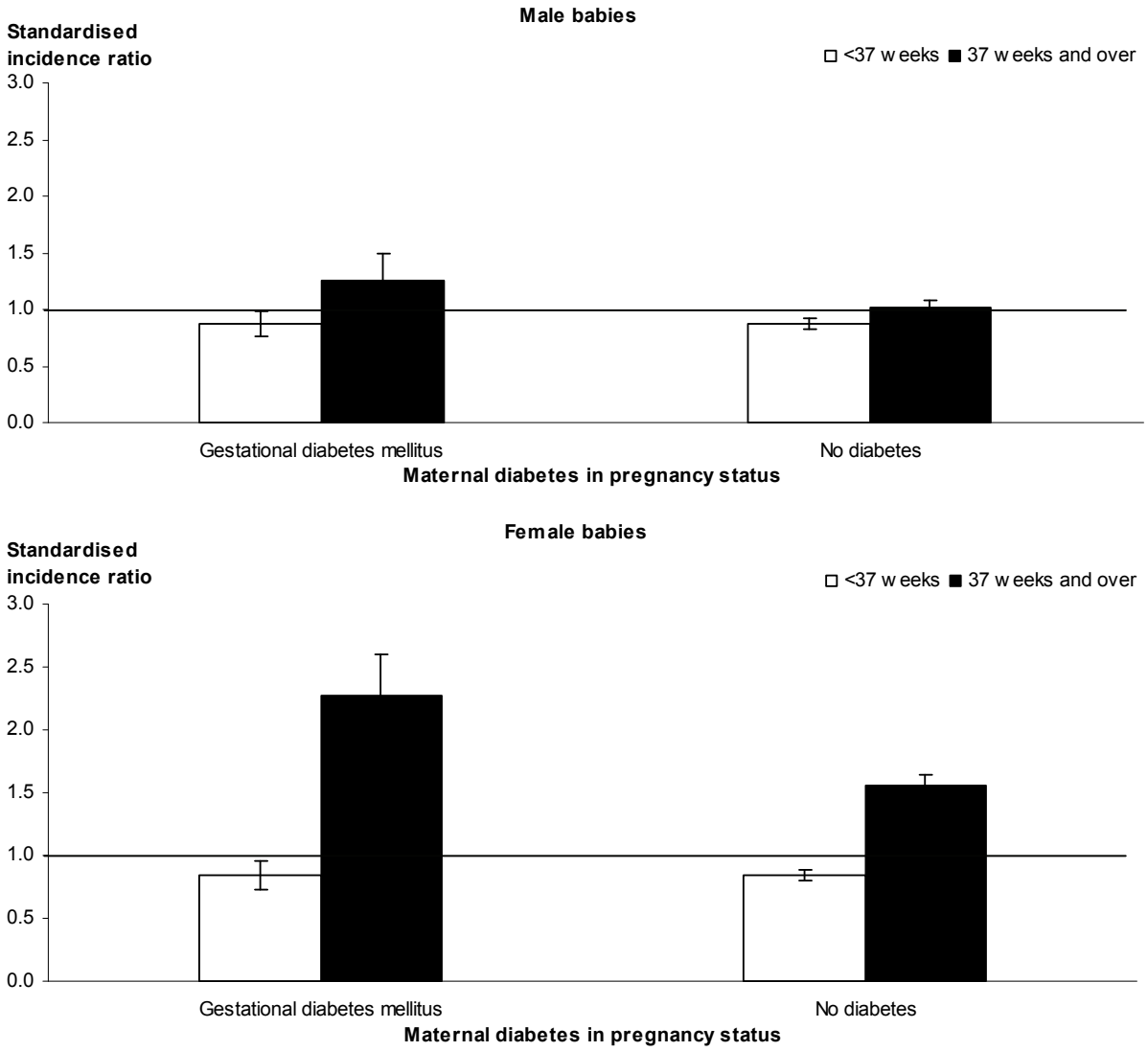
Male babies born pre-term to mothers from high-diabetes-risk regions without diabetes in pregnancy were 10% less likely to have low birthweight compared with those born to Australian-born mothers without diabetes in pregnancy (Figure 4.10).

There was no difference by maternal region of birth in the rate of low birthweight among male babies born pre-term or at term to mothers with GDM, or male babies born at term to mothers without diabetes in pregnancy.

When compared with female babies born to Australian-born women, the incidence of low birthweight among female babies born to high-diabetes-risk regions women was:

- 2.3 times as high when born at term to mothers with GDM
- 0.8 times as high when born pre-term to mothers without diabetes in pregnancy
- 1.6 times as high when born at term to mothers without diabetes in pregnancy.

There was no difference by maternal region of birth in the rate of low birthweight among female babies born pre-term to mothers with GDM.



Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 11 male babies of high-diabetes-risk regions women without diabetes in pregnancy, 1 female baby of a high-diabetes-risk woman with gestational diabetes mellitus, 11 female babies of high-diabetes-risk regions women without diabetes in pregnancy, 68 male babies of Australian-born women without diabetes in pregnancy, and 51 female babies of Australian-born women without diabetes in pregnancy.
3. Gestational age was not stated for: 2 male babies of high-diabetes-risk regions women without diabetes in pregnancy, 4 female babies of high-diabetes-risk regions women without diabetes in pregnancy, 33 male babies of Australian-born women without diabetes in pregnancy, and 20 female babies of Australian-born women without diabetes in pregnancy.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
5. The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.
6. For summary data, including 95% confidence intervals, see 'Appendix 2 Supplementary tables', tables A4.13 and A4.14.

Source: AIHW analysis of NPDC data.

Figure 4.10: Low birthweight (less than 2,500 grams) among live born babies of women from high-diabetes-risk regions compared with live born babies of Australian-born women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

Apgar score

This section provides an overview of Apgar scores (at 5 minutes) for live born babies of women born in high-diabetes-risk regions.

Babies born to mothers from high-diabetes-risk regions were more likely to have a low Apgar score (0–6) if their mother had pre-existing diabetes (3%) than if their mother had GDM (1%) or did not have diabetes in pregnancy (1%) (Table 4.21). There was no difference between the rates of low Apgar scores between mothers with GDM and without diabetes in pregnancy, or in the rates of Apgar scores of 7–10, across all diabetes status groups.

Table 4.21: Apgar score at 5 minutes among live born babies of women from high-diabetes-risk regions, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
0–6	19	2.9	118	1.2	1,068	1.2
7–10	627	96.9	9,557	98.7	85,698	98.6
Total[(a)]	**647**	**100.0**	**9,687**	**100.0**	**86,910**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–6	3.2	(3.1–3.4)	1.1	(1.0–1.2)	1.2	(1.1–1.3)
7–10	96.7	(95.7–97.7)	98.8	(97.8–99.7)	96.6	(97.6–99.6)

(a) Total includes not stated.

Notes

1. Includes live born babies only.
2. Apgar score (at 5 minutes) was not stated for: 1 baby of a high-diabetes-risk regions woman with pre-existing diabetes in pregnancy, 21 babies of high-diabetes-risk regions women with gestational diabetes mellitus, and 144 babies of high-diabetes-risk regions women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

There was no significant difference in the rates of Apgar scores of 0–6 or 7–10, by maternal region of birth or diabetes status (Table 4.22).

Table 4.22: Apgar score at 5 minutes among live born babies of women from high-diabetes-risk regions compared with live born babies of Australian-born women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
0–6			
Pre-existing diabetes	19	18	1.1 (0.6–1.6)
Gestational diabetes mellitus	118	135	0.9 (0.7–1.0)
No diabetes	1,068	1,130	0.9 (0.9–1.0)
7–10			
Pre-existing diabetes	627	629	1.0 (0.9–1.1)
Gestational diabetes mellitus	9,557	9,543	1.0 (1.0–1.0)
No diabetes	85,698	85,647	1.0 (1.0–1.0)

(a) The expected number of cases among babies if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Apgar score (at 5 minutes) was not stated for: 1 baby of a high-diabetes-risk regions woman with pre-existing diabetes in pregnancy, 21 babies of high-diabetes-risk regions women with gestational diabetes mellitus, 144 babies of high-diabetes-risk regions women without diabetes in pregnancy, 4 babies of Australian-born women with pre-existing diabetes in pregnancy, 21 babies of Australian-born women with gestational diabetes mellitus, and 947 babies of Australian-born women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 population of live born babies of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Resuscitation

This section provides an overview of the resuscitation level for live born babies of women born in high-diabetes-risk regions.

Babies of mothers from high-diabetes-risk regions were more likely to have a high resuscitation level if their mother had pre-existing diabetes (11%), than if their mother had GDM (7%) or no diabetes in pregnancy (6%) (Table 4.23). The incidence of low-level or no resuscitation was lower for babies of women with pre-existing diabetes (89%) than for those born to mothers with GDM (93%) or no diabetes (94%).

Table 4.23: Level of resuscitation performed at birth on live born babies of women from high-diabetes-risk regions, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
High level	68	10.5	704	7.3	5,230	6.0
Low level or none	575	88.9	8,951	92.4	81,367	93.6
Total[(a)]	**647**	**100.0**	**9,687**	**100.0**	**86,910**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
High level	10.7	(10.3–11.0)	7.2	(6.9–7.4)	6.0	(5.8–6.3)
Low level or none	88.6	(87.7–89.6)	92.5	(91.6–93.5)	93.6	(92.7–94.6)

(a) Total includes other resuscitation and not stated resuscitation.

Notes

1. Includes live born babies only.
2. High-level resuscitation includes intermittent positive pressure respiration through bag and mask, endotracheal intubation and intermittent positive pressure respiration, and external cardiac massage and ventilation.
3. Low-level or no resuscitation includes suction only, oxygen therapy only, or no intervention to resuscitate.
4. Other resuscitation was recorded for: 3 babies of high-diabetes-risk regions women with pre-existing diabetes in pregnancy, 18 babies of high-diabetes-risk regions women with gestational diabetes mellitus, and 130 babies of high-diabetes-risk regions women without diabetes in pregnancy.
5. Resuscitation level at birth was not stated for: 1 baby of a high-diabetes-risk regions woman with pre-existing diabetes in pregnancy, 14 babies of high-diabetes-risk regions women with gestational diabetes mellitus, and 183 babies of high-diabetes-risk regions women without diabetes in pregnancy.
6. Directly age-standardised to the 2005–2007 population of live born babies of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with babies of Australian-born mothers, babies of mothers from high-diabetes-risk regions were less likely to have high–level resuscitation, across all maternal diabetes status groups:

- 30% less among babies of mothers with pre-existing diabetes
- 20% less among babies of mothers with GDM or without diabetes (Table 4.24).

There was no significant difference in the rate of low-level or no resuscitation between babies of mothers from high-diabetes-risk regions and babies of Australian-born mothers, across all diabetes status groups.

Table 4.24: Level of resuscitation performed at birth on live born babies of women from high-diabetes-risk regions compared with that on live born babies of Australian-born women by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
High level			
Pre-existing diabetes	68	100	0.7 (0.5–0.8)
Gestational diabetes mellitus	704	851	0.8 (0.8–0.9)
No diabetes	5,230	6,378	0.8 (0.8–0.8)
Low level or none			
Pre-existing diabetes	575	542	1.1 (1.0–1.1)
Gestational diabetes mellitus	8,951	8,790	1.0 (1.0–1.0)
No diabetes	81,367	80,032	1.0 (1.0–1.0)

(a) The expected number of cases among babies if the high-diabetes-risk regions population of women who gave birth had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Population total includes other resuscitation and not stated resuscitation level.
3. High-level resuscitation includes intermittent positive pressure respiration through bag and mask, endotracheal intubation and intermittent positive pressure respiration, and external cardiac massage and ventilation.
4. Low-level or no resuscitation includes suction only, oxygen therapy only, or no intervention to resuscitate.
5. Other resuscitation was recorded for: 3 babies of high-diabetes-risk regions women with pre-existing diabetes in pregnancy, 18 babies of high-diabetes-risk regions women with gestational diabetes mellitus, 130 babies of high-diabetes-risk regions women without diabetes in pregnancy, 5 babies of Australian-born women with pre-existing diabetes in pregnancy, 23 babies of Australian-born women with gestational diabetes mellitus, and 719 babies of Australian-born women without diabetes in pregnancy.
6. Resuscitation level at birth was not stated for: 1 baby of a high-diabetes-risk regions woman with pre-existing diabetes in pregnancy, 14 babies of high-diabetes-risk regions women with gestational diabetes mellitus, 183 babies of high-diabetes-risk regions women without diabetes in pregnancy, 25 babies of Australian-born women with pre-existing diabetes in pregnancy, 92 babies of Australian-born women with gestational diabetes mellitus, and 2,817 babies of Australian-born women without diabetes in pregnancy.
7. Indirectly age-standardised to the 2005–2007 population of live born babies of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Admission to special care nursery/neonatal intensive care unit

This section provides an overview of special care nursery/neonatal intensive care unit (SCN/NICU) admission among babies born to women from high-diabetes-risk regions.

Babies of mothers from high-diabetes-risk regions were more likely to be admitted to SCN/NICU if their mother had pre-existing diabetes (51%), compared with babies of women with GDM (30%) and babies of women without diabetes in pregnancy (13%) (Table 4.25).

Table 4.25: SCN/NICU admission among live born babies of women from high-diabetes-risk regions, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Admitted	338	52.2	2,948	30.4	11,352	13.1
Not admitted	309	47.8	6,739	69.6	75,549	86.9
Total[(a)]	**647**	**100.0**	**9,687**	**100.0**	**86,910**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Admitted	50.5	(49.8–51.2)	29.6	(29.0–30.1)	13.1	(12.7–13.4)
Not admitted	49.5	(48.8–50.2)	70.4	(69.6–71.3)	86.9	(86.0–87.9)

(a) Total includes not stated.

Notes

1. Includes live born babies only.
2. Admission to the special care nursery/neonatal intensive care unit (SCN/NICU) may be a clinical decision or the result of hospital policy.
3. SCN/NICU admission was not stated for: 9 babies of high-diabetes-risk regions women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born babies of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with babies of Australian-born mothers, babies of mothers from high-diabetes-risk regions were 10% less likely to be admitted to SCN/NICU for mothers who did not have diabetes (Table 4.26).

Table 4.26: SCN/NICU admission among live born babies of women from high-diabetes-risk regions compared with live born babies of Australian-born women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[(a)]	Standardised incidence ratio[(b)] (95% confidence interval)
Admitted			
Pre-existing diabetes	338	377	0.9 (0.8–1.0)
Gestational diabetes mellitus	2,948	3,188	0.9 (0.9–1.0)
No diabetes	11,352	12,257	0.9 (0.9–0.9)
Not admitted			
Pre-existing diabetes	309	270	1.1 (1.0–1.3)
Gestational diabetes mellitus	6,739	6,497	1.0 (1.0–1.1)
No diabetes	75,549	74,632	1.0 (1.0–1.0)

(a) The expected number of cases among babies if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Admission to the special care nursery/neonatal intensive care unit (SCN/NICU) may be a clinical decision or the result of hospital policy.
3. SCN/NICU admission was not stated for: 9 babies of high-diabetes-risk regions women without diabetes in pregnancy, 4 babies of Australian-born women with gestational diabetes mellitus, and 151 babies of Australian-born women without diabetes in pregnancy.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Length of stay

This section provides an overview of the length of stay in hospital among live born babies of women born in high-diabetes-risk regions. These data include only babies who were discharged home, so these totals do not compare with totals in other sections in this chapter.

The majority of babies of mothers from high-diabetes-risk regions spent 2–6 days in hospital, with the highest rate among babies of mothers with GDM (84%), followed by babies of mothers with pre-existing diabetes (82%) and those without diabetes in pregnancy (81%) (Table 4.27).

Babies of mothers without diabetes in pregnancy were more likely to stay 0–1 days (13%) compared with babies of mothers with pre-existing diabetes (7%) or GDM (9%). Babies of mothers with pre-existing diabetes were more likely to stay 7–13 days in hospital (7%), compared with babies of mothers with GDM (5%) and those without diabetes in pregnancy (4%). A similar pattern was seen for a stay of 14 days or more, with rates of 4%, 3% and 2%, respectively.

Table 4.27: Length of stay in hospital among live born babies of women from high-diabetes-risk regions, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
0–1 day	45	7.5	794	8.5	11,106	13.4
2–6 days	483	80.0	7,829	83.4	67,034	80.6
7–13 days	48	7.9	503	5.4	3,331	4.0
≥ 14 days	28	4.6	256	2.7	1,639	2.0
Total[(a)]	**604**	**100.0**	**9,388**	**100.0**	**83,154**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
0–1 day	7.4	(7.1–7.6)	8.7	(8.4–9.0)	13.4	(13.0–13.7)
2–6 days	81.7	(80.8–82.6)	83.6	(82.7–84.6)	80.6	(79.7–81.5)
7–13 days	6.6	(6.3–6.8)	5.0	(4.8–5.2)	4.0	(3.8–4.2)
≥ 14 days	4.4	(4.2–4.6)	2.6	(2.4–2.8)	2.0	(1.8–2.1)

(a) Total includes not stated.

Notes

1. Includes live born babies discharged home only.
2. Length of stay in hospital was not stated for: 6 babies of high-diabetes-risk regions women with gestational diabetes mellitus, and 44 babies of high-diabetes-risk regions women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of live born babies (discharged home) of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Compared with babies of Australian-born women, babies of women born in high-diabetes-risk regions were more likely to have a short stay (0–1 day) in hospital across all diabetes in pregnancy status groups:

- 2.3 times as likely for babies whose mothers had pre-existing diabetes
- 1.2 times as likely for babies whose mothers had either GDM or no diabetes in pregnancy (Table 4.28).

By comparison, babies of women from high-diabetes-risk regions were 10–50% less likely to have a stay in hospital of 7–13 days or 14 days or more when compared with babies of Australian-born women, across all diabetes status groups. There was no significant difference in the rate of stay of 2–6 days among babies born to high-diabetes-risk regions mothers and those born to Australian-born mothers, across all diabetes in pregnancy groups.

Table 4.28: Length of stay in hospital among live born babies of women from high-diabetes-risk regions compared with live born babies of Australian-born women, by maternal diabetes in pregnancy status, 2005–2007

	Observed	Expected[a]	Standardised incidence ratio[b] (95% confidence interval)
0–1 day			
Pre-existing diabetes	45	19	2.3 (1.7–3.0)
Gestational diabetes mellitus	794	664	1.2 (1.1–1.3)
No diabetes	11,106	9,269	1.2 (1.2–1.2)
2–6 days			
Pre-existing diabetes	483	444	1.1 (1.0–1.2)
Gestational diabetes mellitus	7,829	7,721	1.0 (1.0–1.0)
No diabetes	67,034	67,873	1.0 (1.0–1.0)
7–13 days			
Pre-existing diabetes	48	91	0.5 (0.4–0.7)
Gestational diabetes mellitus	503	649	0.8 (0.7–0.8)
No diabetes	3,331	3,881	0.9 (0.8–0.9)
≥ 14 days			
Pre-existing diabetes	28	50	0.6 (0.4–0.8)
Gestational diabetes mellitus	256	350	0.7 (0.6–0.8)
No diabetes	1,639	2,102	0.8 (0.7–0.8)

(a) The expected number of cases among babies if the high-diabetes-risk regions population of women had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies discharged home only.
2. Length of stay in hospital was not stated for: 6 babies of high-diabetes-risk regions women with gestational diabetes mellitus, 44 babies of high-diabetes-risk regions women without diabetes in pregnancy, 10 babies of Australian-born women with gestational diabetes mellitus, and 199 babies of Australian-born women without diabetes in pregnancy.
3. Indirectly age-standardised to the 2005–2007 population of live born babies (discharged home) of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

5 Discussion and conclusions

This report seeks to provide information at the national level about key characteristics, outcomes, interventions and conditions of pregnancy, labour and delivery among mothers and their babies, by maternal diabetes in pregnancy status. The report presents current data on their occurrence among women who gave birth in Australia, and their babies. The results presented for women include: short duration of pregnancy, induced labour, caesarean section and longer stay in hospital (antenatal and postnatal), and for babies: gestational age, low and high birthweight, low Apgar score, high-level resuscitation, special care nursery and neonatal intensive care unit admission and longer stay in hospital. Aboriginal and Torres Strait Islander women and women born in Polynesian, Asian and Middle Eastern countries (high-diabetes-risk regions) were given special consideration in this report, as they are widely reported to be at higher risk of Type 2 diabetes and gestational diabetes mellitus. Aboriginal and Torres Strait Islander women have also been shown to experience poorer outcomes of pregnancy than non-Indigenous women. There appears to be no evidence to date on the pregnancy outcomes among women from high-diabetes-risk regions compared with Australian-born women.

5.1 Overall findings

All women and infants

Maternal characteristics

NPDC data show that in 2005–2007, 44,091 (5.3%) women who gave birth in Australia had a diagnosis of diabetes in pregnancy: 0.6% had pre-existing diabetes and 4.7% were diagnosed with GDM. Most (94.7%) mothers did not have diabetes.

Data from the NHMD show that from 2005–06 to 2007–08, 47,143 (5.6%) women who gave birth in Australian hospitals had a diagnosis of diabetes in pregnancy: 0.3% had pre-existing Type 1 diabetes, 0.3% had pre-existing Type 2 diabetes and 4.9% had GDM. Most (94.4%) mothers did not have diabetes.

Nearly 60% of mothers had given birth at least once before, and about 2% had a multiple-birth pregnancy. Mothers with GDM were more likely to be giving birth for the first time and were more likely to be having a multiple birth, compared with mothers with pre-existing diabetes or without diabetes in pregnancy.

The most common age of mothers when giving birth was 30–34 years. Mothers with pre-existing diabetes, particularly Type 2 diabetes, and mothers with GDM were significantly older compared with mothers without diabetes in pregnancy.

Maternal outcomes

Women giving birth in Australia who had diabetes in pregnancy were more likely to experience adverse effects of pregnancy, labour and delivery, compared with mothers who did not have a diagnosis of diabetes.

Mothers with pre-existing diabetes had higher rates of most adverse effects of pregnancy, labour and delivery studied, compared with mothers who had GDM or did not have diabetes. They were more likely to give birth to their babies pre-term, have an induced labour, have their labour induced pre-term, have a caesarean section, hypertension and stay in hospital for longer before and after giving birth.

Looking more closely at differences between types of pre-existing diabetes showed that, compared with mothers with pre-existing Type 2 diabetes, mothers with pre-existing Type 1 diabetes were more likely to have a pre-term birth, caesarean section, total hypertension and gestational hypertension.

Mothers with pre-existing Type 2 diabetes had higher rates of pre-existing hypertension, compared with mothers with pre-existing Type 1 diabetes.

Mothers with GDM had the highest rate of induced labour of all mothers, and were more likely to give birth pre-term, have a caesarean section, hypertension and longer stay in hospital than mothers without diabetes in pregnancy.

These findings highlight the risks associated with having either pre-existing diabetes (Type 1 or Type 2) or GDM during pregnancy, and support existing literature showing that these conditions are associated with high rates of adverse effects of pregnancy, labour and delivery (see Section 1.3).

Infant outcomes

In 2005–2007, of 847,773 babies born in Australia, 45,169 (5.3%) were born to mothers with diabetes in pregnancy: 0.6% to mothers with pre-existing diabetes in pregnancy and 4.7% to mothers with GDM. Most (94.7%) babies were not exposed to maternal diabetes in pregnancy.

In 2005–06 to 2007–08, of 825,126 singleton babies born in Australia, 45,985 (5.6%) were born to mothers with diabetes in pregnancy: 0.3% were born to mothers with pre-existing Type 1 diabetes, 0.3% to mothers with pre-existing Type 2 diabetes and 4.8% to mothers with GDM. Most (94.4%) babies were not exposed to maternal diabetes in pregnancy.

This report's analyses show that babies of mothers with diabetes in pregnancy are generally more adversely affected during pregnancy, labour and delivery, compared with babies of mothers without diabetes in pregnancy.

The most serious adverse outcome for infants associated with pregnancy, labour and delivery is fetal death. Data from the NPDC show that, in 2005–2007, babies born to mothers with pre-existing diabetes were more likely to be stillborn compared with other babies. Data from the NHMD show that, in 2005–06 to 2007–08, the highest rate of fetal death occurred among babies born to mothers with Type 2 diabetes, followed by those born to mothers with Type 1 diabetes.

Both data sources showed that babies born to mothers with GDM had the lowest rate of fetal death, even compared with babies born to women not affected by diabetes during their pregnancy.

Babies of mothers with pre-existing diabetes had higher rates of the majority of adverse effects of pregnancy labour and delivery, compared with babies of mothers with GDM and those of mothers without diabetes in pregnancy. They were more likely to be born pre-term or very pre-term, have a low Apgar score at 5 minutes, require high-level resuscitation at

birth, be admitted to the special care nursery/neonatal intensive care unit and stay longer in hospital.

Babies of mothers with GDM had generally higher rates of most adverse effects of pregnancy labour and delivery studied, compared with babies of mothers without diabetes, with the exception of fetal death.

These findings highlight the risks for infants associated with maternal pre-existing diabetes (Type 1 or Type 2) or GDM. These findings support existing literature showing that maternal diabetes is associated with increased rates of adverse effects of pregnancy, labour and delivery among infants (see Section 1.3). An exception is results from both the NPDC and the NHMD showing that babies born to women without diabetes in pregnancy have higher rates of fetal death, compared with babies born to women with GDM. This is a result not widely reported in the literature. Some sources suggest there is a strong association between duration of pregnancy (both longer and shorter duration) and stillbirth, and this association in relation to our finding merits further investigation (Coletta & Simpson 2010; Dudley 2007).

Aboriginal and Torres Strait Islander mothers and infants

Maternal characteristics

In 2005–2007, 30,518 (3.7%) women who gave birth in Australia identified as being of Aboriginal and Torres Strait Islander origin. Of these, nearly 7% had diabetes in pregnancy: 1.5% had pre-existing diabetes and 5.1% were diagnosed with GDM. Most (93.3%) did not have diabetes in pregnancy.

In 2005–06 to 2007–08, 29,413 (3.7%) women who gave birth in hospitals in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory identified as being of Aboriginal and Torres Strait Islander origin. Of these, nearly 7% had diabetes in pregnancy: 0.1% had pre-existing Type 1 diabetes, 1.5% had pre-existing Type 2 diabetes and 5.0% had GDM. Most (93.1%) did not have diabetes in pregnancy.

Aboriginal and Torres Strait Islander mothers were more likely to have diabetes in pregnancy compared with non-Indigenous/other Australian mothers: the rate of pre-existing Type 2 diabetes was more than 10 times as high, and the rate of GDM was about 1.5 times as high. In contrast, the rate of pre-existing Type 1 diabetes was half that among Indigenous mothers compared with other Australian mothers.

About 60–70% of Indigenous mothers had given birth at least once before and 1–2% of Indigenous mothers had a multiple-birth pregnancy.

The most common age of Indigenous mothers at the time of giving birth was 20–24 years and those with pre-existing diabetes, particularly Type 2 diabetes, and mothers with GDM were older compared with mothers without diabetes in pregnancy.

Aboriginal and Torres Strait Islander mothers were significantly younger compared with non-Indigenous/other Australian mothers, with about 1.5–2 times the rate of births to women aged less than 30 years. This is reflective of the younger age profile of the Indigenous population, and was seen across all diabetes status groups, although less markedly among those with pre-existing diabetes in pregnancy.

Maternal outcomes

Aboriginal and Torres Strait Islander women with diabetes in pregnancy had higher rates of adverse effects of pregnancy, labour and delivery compared with other Indigenous mothers. Mothers with pre-existing diabetes in pregnancy were generally most affected, followed by those with GDM, echoing the results presented above for all Australian mothers.

When compared with non-Indigenous/other Australian mothers, and regardless of diabetes in pregnancy status, Indigenous mothers were more likely to have a pre-term birth, pre-term induction, caesarean section, hypertension, longer antenatal and postnatal stay in hospital, and shorter postnatal stay in hospital. In most cases, the magnitude of the difference in rates was between 10–50%, but in some instances Indigenous mothers had twice or more times the rate of non-Indigenous mothers: Indigenous mothers were 7–18 times as likely to give birth pre-term and 6–15 times as likely to have a postnatal stay in hospital of 0–6 days.

These findings clearly show that Aboriginal and Torres Strait Islander mothers carry a greater burden of diabetes in pregnancy (Type 2 and GDM) compared with non-Indigenous/other Australian women, and are affected at a younger age. The public health implications for these findings are for pre-conception counselling, antenatal and postnatal care programs tailored to Indigenous mothers, and aimed at younger Indigenous women with diabetes, as a means of increasing awareness of the risks and reducing the incidence of adverse outcomes in this population.

Infant outcomes

In 2005–2007, 30,522 babies were born in Australia to Aboriginal and Torres Strait Islander mothers, and 2,010 (6.6%) of those were born to mothers with diabetes in pregnancy: 1.4% to mothers with pre-existing diabetes in pregnancy and 5.2% to mothers with GDM. Most (93.4%) babies were not exposed to maternal diabetes in pregnancy.

Babies of Indigenous mothers with diabetes in pregnancy had higher rates of adverse effects of pregnancy, labour and delivery compared with babies born to Indigenous mothers who were not affected by diabetes in pregnancy. Babies of Indigenous mothers with pre-existing diabetes were at highest risk, followed by those born to mothers with GDM, echoing the results presented above for babies of all Australian mothers.

Babies born to Indigenous mothers were generally at higher risk compared with babies of non-Indigenous mothers, across all maternal diabetes in pregnancy status groups.

When compared with babies born to non-Indigenous mothers, and regardless of maternal diabetes in pregnancy status, babies born to Indigenous mothers were at higher risk of pre-term birth, 5 minute Apgar score of 0–6, high-level resuscitation and longer stay in hospital.

These findings demonstrate the greater rate of adverse effects of pregnancy, labour and delivery studied, among babies born to Indigenous mothers with pre-existing diabetes compared with those born to mothers with GDM and those without diabetes in pregnancy. These findings also demonstrate that babies born to Indigenous mothers are at higher risk of most poor outcomes, regardless of maternal diabetes in pregnancy status, when compared with babies born to non-Indigenous/other Australian mothers.

Mothers born in high-diabetes-risk regions and their infants

Maternal characteristics

In 2005–2007, 96,805 (11.6%) women who gave birth in Australia identified as being born in a region at high risk for diabetes. Of these, 10.6% had diabetes in pregnancy: 0.7% had pre-existing diabetes and 9.9% had GDM. Most (89.5%) women from high-diabetes-risk regions did not have diabetes in pregnancy.

In 2005–06 to 2007–08, 99,258 (11.8%) women who gave birth in hospital in Australia identified as being born in a region at high risk for diabetes. Of these, 11.5% had diabetes in pregnancy: 0.1% had pre-existing Type 1 diabetes, 0.4% had pre-existing Type 2 diabetes and 10.7% had GDM. Most (88.5%) women from high-diabetes-risk regions did not have diabetes in pregnancy.

Compared with mothers born in Australia, those born in high-diabetes-risk regions were 70% less likely to have pre-existing Type 1 diabetes, nearly twice as likely to have pre-existing Type 2 diabetes, more than twice as likely to have GDM, and similarly or slightly less likely to have a pregnancy free from diabetes.

The majority of mothers born in high-diabetes-risk regions were multiparous, at a similar rate as that of mothers born in Australia. About 2% of women with diabetes in pregnancy born in high-diabetes-risk regions had a multiple birth, less than the rate of Australian-born women who had a multiple birth.

The majority of mothers born in high-diabetes-risk regions were aged 30 years or more when giving birth, and those with diabetes in pregnancy were older than those without diabetes.

Mothers born in high-diabetes-risk regions were older compared with mothers born in Australia across all diabetes in pregnancy status groups, most notably among those mothers with pre-existing Type 2 diabetes.

Maternal outcomes

Mothers born in high-diabetes-risk regions who had a diagnosis of diabetes in pregnancy were more likely to experience adverse effects of pregnancy, labour and delivery compared with mothers without diabetes in pregnancy. Mothers with pre-existing diabetes were at greatest risk, followed by those with GDM, echoing the results for all Australian women. Mothers born in high-diabetes-risk regions had lower rates of most of these adverse effects compared with mothers born in Australia.

Compared with mothers born in Australia, and regardless of diabetes in pregnancy status, mothers from high-diabetes-risk regions were less likely to have a pre-term birth, induced labour, no labour, caesarean section, hypertension, or longer stay in hospital.

These findings show that mothers with pre-existing diabetes in pregnancy from high-diabetes-risk regions are at greatest risk of adverse outcomes of pregnancy, labour and delivery, compared with mothers with GDM or without diabetes in pregnancy.

In contrast to findings among Indigenous mothers, mothers from high-diabetes-risk regions were generally less likely to experience the majority of the adverse effects of pregnancy, labour and delivery studied compared with mothers born in Australia, regardless of diabetes in pregnancy status. This is in contrast to literature that indicates that diabetes incidence, hospitalisation and mortality are more common among people born in South Pacific Islands, Southern Asia, the Middle East and other Asian countries (AIHW 2003).

Infant outcomes

In 2005–2007, 97,238 babies were born to mothers from high-diabetes-risk regions. Of these, 10.6% were affected by maternal diabetes in pregnancy: 0.7% by maternal pre-existing diabetes and 10.0% by maternal GDM. Most (89.4%) babies born to mothers from high-diabetes-risk regions were not exposed to maternal diabetes in pregnancy.

Babies born to mothers from high-diabetes-risk regions had higher rates of adverse effects of pregnancy, labour and delivery when their mother had pre-existing diabetes, compared with those whose mothers had GDM or did not have diabetes in pregnancy, echoing the results for babies of all Australian mothers.

There was no consistent pattern of differences when the rates of adverse effects among babies of mothers born in high-diabetes-risk regions were compared with the rates of adverse effects among babies of Australian-born mothers. Compared with babies of Australian-born women, and regardless of maternal diabetes status, babies born to women from high-diabetes-risk regions had: lower rates of pre-term birth, high-level resuscitation and longer stay in hospital, and; similar rates of low birthweight, low Apgar score and special care nursery/neonatal intensive care unit admission.

These findings show that babies of mothers born in high-diabetes-risk regions are at higher risk of the adverse effects of pregnancy, labour and delivery when exposed to maternal diabetes in pregnancy compared with those not exposed. Babies of mothers from high-diabetes-risk regions had similar or lower rates of these adverse effects compared with babies of Australian-born mothers.

5.2 Data issues

Data gaps

In this report the impact of diabetes in pregnancy on mothers and their babies are presented using two data sources: the NHMD and the NPDC. The NPDC identifies mothers with pre-existing diabetes, GDM and without diabetes in pregnancy. These groupings are sufficient to detect differences in adverse effects that may relate to the presence of diabetes at conception (pre-existing diabetes), and the implications of poorly controlled glucose during the first trimester of pregnancy, compared with the development of diabetes and glucose intolerance during the second and third trimesters (GDM).

There is, however, evidence in the literature to suggest that there is a difference by pre-existing diabetes type; that is, the incidence and the type of adverse effect may differ between mothers with Type 1 diabetes and mothers with Type 2 diabetes (Clausen et al. 2005). Therefore, data from the NHMD have been used to supplement the NPDC analyses, and highlight any differences between mothers with Type 1 and those with Type 2 diabetes in pregnancy. These data were not available for all analyses, due to limitations in diagnoses and maternal characteristics recorded on the NHMD, and due in part to very small numbers of mothers with Type 1 diabetes, particularly among Aboriginal and Torres Strait Islander mothers and mothers born in high-diabetes-risk regions.

Data on effects among infants, associated with maternal diabetes in pregnancy status, were not available from the NHMD. The infant and maternal records are not able to be linked in

this database at a national level. As a result, analyses of the impact of maternal Type 1 and Type 2 diabetes in pregnancy on babies are lacking in this report.

The NHMD was used to provide additional information on hypertension among mothers. These data were not sourced from the NPDC due to differences in definition and collection methods between the states and territories.

Sample size

Some analyses of women with pre-existing diabetes, particularly pre-existing Type 1 diabetes, revealed sample sizes too small to provide a statistically significant result. This was compounded in analyses by Indigenous status or maternal region of birth. Consequently, some of the findings in the report may downplay the impact of pre-existing diabetes or pre-existing Type 1 diabetes, or exclude it altogether. If these analyses were to be repeated in the future, combining 4 or more years of data could be considered as a means of increasing the sample size. This could, however, introduce errors related to inconsistencies in definitions and in data collection methods across those years, and these potential errors would need to be weighed against a more usable sample size.

Infant weight for gestational age

The effects presented in this report were selected for their measure of poor or good maternal and infant health. While low and high birthweight are indicative of adverse outcomes for babies, the more accurate measure is birthweight adjusted for gestational age and maternal ethnicity, among other characteristics (weight-for-age). It was not possible to accurately calculate weight-for-age from the NPDC data, as maternal pre-pregnancy height and weight (maternal body mass index) are not available in the collection. Maternal body mass index is considered necessary for the accurate calculation of weight-for-age using existing methods. Future work carried out by both the National Perinatal Statistics Unit and the NCMD on this topic may include weight-for-age analyses, derived from NPDC data, if the collection is enhanced with complete information on pre-pregnancy maternal height and weight.

Other areas of analysis

The key findings of the report, summarised in Section 5.1, raise further questions about the mechanisms by which differences in the effects of pregnancy, labour and delivery arise and whether they are wholly or partially attributable to the diabetes status of the mother. The simple cross-tabulated format of the data sourced from the NPDC, although generally sufficient for the scope and purpose of the report, limited our ability to investigate interesting findings further. Multivariate modelling, using unit record data, would enhance future reporting on this theme by identifying combinations of variables that place women and their babies at greater risk of poor perinatal outcomes.

5.3 Potential for future work

Age-specific analysis

Preliminary analyses of the NPDC data (not shown) indicated differences in the age-specific rates of some effects of pregnancy, labour and delivery, by diabetes in pregnancy status. Future work could include a more detailed investigation of these age-specific differences. The results of such analyses could be used to inform the evidence base for more focused interventions to reduce the occurrence of adverse effects of pregnancy, labour and delivery, and improve the health of both mother and baby, in the most affected age groups.

Analyses of effects by pre-existing Type 1 and Type 2 diabetes in pregnancy

Impact on mothers

Limitations resulting from small numbers of women with Type 1 diabetes recorded in the NHMD mean that it was not possible to confirm the findings of Cheung et al. (2005), Clausen et al. (2005) and de Valk et al. (2006) that women with pre-existing Type 2 diabetes are equally or more adversely affected during pregnancy, labour and delivery compared with women with pre-existing Type 1 diabetes. Future work might benefit from combining 5 or more years of data to accrue sufficient numbers of women with pre-existing Type 1 diabetes to complete more substantial data analyses showing similarities or differences with women with pre-existing Type 2 diabetes.

Impact on babies

As detailed earlier (see Section 5.2), data on Type 1 and Type 2 diabetes were only available from the NHMD. Due to the constraints of the data set, maternal characteristics (particularly diabetes in pregnancy status) and baby outcomes could not be linked at a national level and therefore analyses of the impact of maternal Type 1 and Type 2 diabetes on babies could not be performed. Systematic linkage of maternal and baby records in the NHMD at a national level would benefit work contributing to the evidence base on this theme. However, this would require examination of policy settings and resource investment at the state, territory and national level which suggests that this remains a longer-term data solution.

Analyses of NPDC data in this report have clearly shown that the adverse impact of maternal pre-existing diabetes on babies is significantly greater compared with that of GDM. Analyses by Type 1 and Type 2 diabetes would provide a valuable addition to the body of knowledge on the effect of maternal diabetes in pregnancy on babies and provide a solid base for targeted public health interventions to reduce the occurrence of these adverse effects. Due to differences in the collection of diabetes status information across the state and territory perinatal collections, these analyses are not currently possible. Data development and standardisation of the collections would see enhanced reporting at the national level in the future.

Long-term impact of diabetes in pregnancy

Data on the long-term impact of diabetes in pregnancy for both mother and baby are not currently available at a national level.

The incidence of recurrent gestational diabetes mellitus and the proportion of women with a history of GDM who develop Type 2 diabetes are long-term maternal outcomes that have not yet been studied at a national level. The NCMD have developed a retrospective longitudinal record of incidence for this purpose, using existing cumulative National Diabetes Services Scheme data. Reporting against this record is expected to commence in the near future.

The development of diabetes mellitus (Type 2 and GDM) and other chronic conditions, such as cardiovascular disease, among children and adults who were affected by maternal diabetes during gestation are long-term infant outcomes that have not yet been assessed at a national level. The capacity to report on these outcomes has been developed in Western Australia by linking hospital and perinatal records with Medicare Benefits Schedule (MBS) data, Pharmaceutical Benefits Scheme (PBS) data and death records, over time. If expanded to a national level, this work has potential to describe the longer-term health implications of maternal diabetes in pregnancy in support of the evidence base for pre-pregnancy, antenatal and postnatal care of mothers and babies affected by diabetes in pregnancy.

Nationally comparable perinatal data

The collection of comprehensive and reliable information on risk factors and complications arising in pregnancy continues to be a challenging area of data development. The development of nationally consistent collection scope, collection methods and classifications of these conditions and complications is progressing in line with the overall priorities of perinatal data development, led by the National Perinatal Statistics Unit at the University of New South Wales.

5.4 Conclusions

This report has presented national baseline data on the impact of diabetes in pregnancy on Australian women and their babies.

Data from the NPDC, supplemented and complemented by data from the NHMD, have shown that mothers with diabetes in pregnancy, and their babies, were at higher risk of adverse effects of pregnancy, labour and delivery, compared with those not affected by diabetes in pregnancy.

Among women with diabetes in pregnancy, those with pre-existing diabetes, and their babies, were at higher risk of these adverse effects compared with women with GDM, and their babies.

This pattern held true for Aboriginal and Torres Strait Islander women, and their babies, and for women born in high-diabetes-risk regions, and their babies.

Indigenous mothers, and their babies, experienced generally higher rates of the adverse effects of pregnancy, labour and delivery compared with non-Indigenous mothers, and their babies.

Mothers born in high-diabetes-risk regions, and their babies, had similar or lower rates of these adverse effects compared with Australian-born mothers, and their babies.

Appendix 1 Methods

Counting births in the NHMD

Women giving birth in hospital during 2005–06 to 2007–08 were the focus of the NHMD analysis in this report. In hospitalisation data, a single outcome of delivery code (ICD-10-AM, Z37) is entered for each pregnancy that results in the birth of one or more babies in hospital, regardless of the number of times a woman is hospitalised during that pregnancy, and provides the population count for these analyses. If a woman gives birth more than once in the 3-year period of interest, each outcome of delivery code is counted. Individual women cannot be identified in the NHMD.

Two sets of diabetes codes exist in the ICD-10-AM: diabetes 'E-codes' and diabetes in pregnancy 'O24-codes'. The matrix below, in Table A1.1, shows the method used to assign diabetes in pregnancy status to records from the NHMD, with an outcome of delivery code (Z37). The method uses a hierarchy, whereby a record with any E-code is assigned pre-existing diabetes in pregnancy status first, and the remaining records are assigned a status based on the diabetes in pregnancy O24-codes. Gestational diabetes is only assigned where an O24.4 code exists in the absence of any E-code.

Table A1.1: Assigning diabetes in pregnancy status, National Hospital Morbidity Database

		Diabetes (E-codes)			
		Type 1 (E10)	**Type 2 (E11)**	**Other/unspecified (E13, E14)**	**No E-code**
Diabetes in pregnancy (024-codes)	**Pre-existing Type 1 diabetes (O24.0)**	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Pre-existing Other/unspecified diabetes	Pre-existing Type 1 diabetes
	Pre-existing Type 2 diabetes (O24.1)	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Pre-existing Other/unspecified diabetes	Pre-existing Type 2 diabetes
	Pre-existing other/unspecified diabetes (O24.2, O24.3)	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Pre-existing Other/unspecified diabetes	Pre-existing Other/unspecified diabetes
	Gestational diabetes mellitus (O24.4)	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Pre-existing Other/unspecified diabetes	Gestational diabetes mellitus
	Diabetes in pregnancy, unspecified onset (O24.9)	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Pre-existing Other/unspecified diabetes	Diabetes in pregnancy, unspecified onset
	No O24-code	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Pre-existing Other/unspecified diabetes	No diabetes in pregnancy

The variables and codes used to count the population of women giving birth (outcome of delivery), their diabetes status and the effects of pregnancy, labour and delivery are detailed in Table A1.2.

Table A1.2: Analysis variables, National Hospital Morbidity Database

Definition	ICD-10-AM codes	Label
Outcome of delivery		
Single live birth	Z37.0	Singleton birth, live birth
Single stillbirth	Z37.1	Singleton birth, stillbirth
Twins, both live born	Z37.2	
Twins, one live born and one stillborn	Z37.3	
Twins, both stillborn	Z37.4	
Other multiple births, all live born	Z37.5	Multiple birth
Other multiple births, some live born	Z37.6	
Other multiple births, all stillborn	Z37.7	
Outcome of delivery unspecified	Z37.9	
Diabetes in pregnancy status		
Type 1 diabetes mellitus	E10	Pre-existing Type 1 diabetes
Type 2 diabetes mellitus	E11	Pre-existing Type 2 diabetes
Other specified diabetes mellitus, unspecified diabetes mellitus	E13	Pre-existing other/ unspecified diabetes
Unspecified diabetes mellitus	E14	
Pre-existing diabetes mellitus, Type 1, in pregnancy	O24.0	Pre-existing Type 1 diabetes
Pre-existing diabetes mellitus, Type 2, in pregnancy	O24.1	Pre-existing Type 2 diabetes
Pre-existing diabetes mellitus, other specified type, in pregnancy	O24.2	Pre-existing other/ unspecified diabetes
Pre-existing diabetes mellitus, unspecified, in pregnancy	O24.3	
Diabetes mellitus arising at or after 24 weeks gestation	O24.4	Gestational diabetes mellitus
Diabetes mellitus in pregnancy, unspecified onset	O24.6	Diabetes in pregnancy, unspecified
Effects: characteristics, outcomes, interventions and conditions		
Single spontaneous delivery by caesarean section Caesarean section (block number)	O82 1340	Caesarean section
Duration of pregnancy	O09	Pre-term birth
Oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium	O10–O15	Hypertension
Medical or surgical induction of labour (block number)	1334	Induced labour

Source: NCCH 2004, NCCH 2006.

Maternal country of birth was assigned using the Australian Bureau of Statistics Standard Australian Classification of Countries codes (Table A1.3). Note that the codes presented in Table A1.2 were used for both NHMD and NPDC region of birth analysis.

Table A1.3: Country groupings for high-diabetes-risk regions of birth analyses

High-diabetes-risk regions of birth	Standard Australian Classification of Countries code (1998)	Country
Polynesia	1500 to 1508; 1511; 1512; 1599	Cook Islands, Fiji, French Polynesia, Niue, Samoa, American Samoa, Tokelau, Tonga, Tuvalu and Wallis and Futuna *Hawaii is excluded*
Asia	5100 to 5105; 5200 to 5206; 6100 to 6105; 6200 to 6203; 7201 to 7208; 5000; 6000; 7000; 7100 to 7107; 7211	Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, Brunei Darussalam, Burma (Myanmar), Cambodia, China, East Timor, Georgia, Hong Kong, India, Indonesia, Japan, Kazakhstan, Korea Democratic Peoples Republic (North), Korea Republic (South), Kyrgyz Republic, Laos, Macau, Malaysia, Maldives, Mongolia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Viet Nam
Middle East	4200 to 4208; 4211 to 4217	Bahrain, Gaza Strip and West Bank, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen

Note: NPDC data received from Victoria for the period 2005–2007 was supplied as Australian Standard Classification of Countries for Social Statistics country codes and were converted to Standard Australian Classification of Countries codes according to the Australian Bureau of Statistics concordance (ABS 2008).

Source: ABS 2008.

Counting births in the NPDC

The NPDC includes records of all births (live birth and stillbirth) of at least 20 weeks gestational age or weighing 400 grams or more at birth. An extract of births occurring in 2005–2007 was made. The number of women who gave birth and had diabetes in pregnancy was ascertained where a woman who gave birth was identified as having a history of pre-existing diabetes or a pregnancy complicated by gestational diabetes. Birth records can be viewed in relation to mothers or babies. Both mothers and babies could be stratified according to the mother's diabetes status. Tables detailing maternal and baby characteristics and outcomes were provided from the NPDC, stratified by maternal age at birth and diabetes status.

A woman may give birth more than once in the 3-year period of interest, and each birth was counted as a unique pregnancy.

There is variation in the conditions each state or territory includes when reporting pre-existing diabetes. Some examples of these differences are:

- Victoria, Tasmania, New South Wales, the Northern Territory and South Australia do not report insulin-treatment status
- the Northern Territory form can record 'pre-existing diabetes mellitus' but provides no option to break down this condition into specific types of diabetes mellitus.
- the New South Wales form contains one tick-box to capture all pre-existing diabetes.

Similarly, differences exist in the recording of gestational diabetes mellitus.

These differences are documented in Tables A1.4 (GDM) and A1.5 (pre-existing diabetes).

Table A1.4: Conditions included when reporting gestational diabetes, by state and territory

	NSW[(a)]	Vic	Qld	WA	SA[(a)]	Tas	ACT	NT[(a)]
Diabetes mellitus arising during pregnancy (ICD-10-AM: O24.4)	✓	✓	✓	—	✓	✓	✓	✓
Diabetes mellitus arising during pregnancy, non-insulin treated (ICD-10-AM: O24.41)	✓	—	✓	✓	✓	—	✓	✓
Diabetes mellitus arising during pregnancy, insulin treated (ICD-10-AM: O24.42)	✓	—	✓	—	✓	—	✓	✓
Diabetes mellitus arising during pregnancy, unspecified onset (ICD-10-AM: O24.9)	✓	—	✓	✓	✓	—	✓	✓

(a) For New South Wales, South Australia and the Northern Territory, all of ticked types of gestational diabetes are captured aggregated in one tick-box. The data cannot be broken down into these categories.

Table A1.5: Conditions included when reporting pre-existing diabetes, by state and territory

	NSW[(a)]	Vic	Qld	WA	SA[(a)]	Tas	ACT	NT[(a)]
Pre-existing diabetes mellitus, Type 1, in pregnancy (ICD-10-AM: O24.0)	✓	—	✓	—	✓	✓	✓	✓
Pre-existing diabetes mellitus, Type 2, in pregnancy, non-insulin treated (ICD-10-AM: O24.11)	✓	—	✓	—	✓	—	✓	✓
Pre-existing diabetes mellitus, Type 2, in pregnancy, insulin treated (ICD-10-AM: O24.12)	✓	—	✓	—	✓	—	✓	✓
Pre-existing diabetes mellitus, other specified type, in pregnancy, non-insulin treated (ICD-10-AM: O24.21)	✓	—	✓	—	✓	—	✓	✓
Pre-existing diabetes mellitus, other specified type, in pregnancy, insulin treated (ICD-10-AM: O24.22)	✓	—	✓	—	✓	—	✓	✓
Pre-existing diabetes mellitus, unspecified, in pregnancy, non-insulin treated (ICD-10-AM: O24.31)	✓	—	✓	—	✓	—	✓	✓
Pre-existing diabetes mellitus, unspecified, in pregnancy, insulin treated (ICD-10-AM: O24.32)	✓	—	✓	—	✓	—	✓	✓
Type 2 diabetes mellitus without complication (ICD-10-AM: E11.9)	✓	—	—	—	✓	—	✓	✓
Pre-existing impaired glucose regulation, in pregnancy (ICD–10–AM: O24.5X)	✓	—	—	—	—	—	—	—
Diabetes mellitus in pregnancy, unspecified onset, non-insulin treated (ICD-10-AM: O24.91)	✓	—	✓	—	✓	✓	✓	✓
Diabetes mellitus in pregnancy, unspecified onset, unspecified (ICD-10-AM: O24.99)	✓	—	✓	—	✓	✓	✓	✓
Pre-existing diabetes mellitus, unspecified, in pregnancy (ICD-10-AM: O24.3)	—	✓	—	—	—	✓	—	—
Type 1 diabetes mellitus –Unspecified diabetes mellitus (ICD-10-AM: E10–E14)	—	—	—	—	—	—	✓	—

(a) For New South Wales, South Australia and the Northern Territory, all of ticked types of diabetes mellitus are captured aggregated in one tick-box. The data cannot be broken down into these categories.

In this report, diabetes in pregnancy status was defined by cross-tabulating two variables—gestational diabetes status and diabetes status—as shown in Table A1.6.

Table A1.6: Assigning diabetes in pregnancy status, National Perinatal Data Collection

		Gestational diabetes status		
		None	**Gestational diabetes mellitus**	**Not stated**
Diabetes status	None	No diabetes	Gestational diabetes mellitus	Exclude
	Diabetes mellitus (pre-existing)	Pre-existing diabetes	Pre-existing diabetes	Pre-existing diabetes
	Not stated	Exclude	Gestational diabetes mellitus	Exclude

The variables used in the report are detailed in Table A1.7.

Table A1.7: Analysis variables, National Perinatal Data Collection

Label	Available categories	Reported categories
	Women	
Diabetes in pregnancy status		
	Pre-existing diabetes mellitus	Pre-existing diabetes mellitus
	Gestational diabetes mellitus	Gestational diabetes mellitus
	No diabetes	No diabetes
Effects: characteristics, outcomes, interventions and conditions		
Age (years)	<20, 20–24, 25–29, 30–34, 35–39, 40+	<20, 20–24, 25–29, 30–34, 35–39, 40+
Parity	Primiparous, multiparous	Primiparous, multiparous
Plurality	Singleton, multiple	Singleton, multiple
Duration of pregnancy (weeks)	20–27, 28–31, 32–36, 37–41, 42+	20–31, 32–36, 37+
Onset of labour	Spontaneous, induced, no labour	Spontaneous, induced, no labour
Method of birth	Vaginal, caesarean section, other	Caesarean section
Length of stay in hospital		
Antenatal (days)	<1, 1, 2–6, 7–13, 14+	0–1, 2–6, 7–13, 14+
Postnatal (days)	<1, 1, 2–6, 7–13, 14+	0–1, 2–6, 7–13, 14+
	Babies	
Maternal diabetes status and characteristics		
Diabetes in pregnancy status		
	Pre-existing diabetes	Pre-existing diabetes
	Gestational diabetes mellitus	Gestational diabetes mellitus
	No diabetes	No diabetes
Age (years)	<20, 20–24, 25–29, 30–34, 35–39, 40+	<20, 20–24, 25–29, 30–34, 35–39, 40+
Effects: characteristics, outcomes, interventions and conditions		
Birth status	Live birth, stillbirth	Live birth, stillbirth
Gestational age (weeks)	20–27, 28–31, 32–36, 37–41, 42+	20–36, 37+
Birthweight (grams)	<1,000, 1,000–1,499, 1,500–1,999, 2,000–2,499, 2,500–2,999, 3,000–3,499, 3,500–3,999, 4,000–4,499, 4,500+	<1,500, 1500–2,499, 2,500–2,999, 3,000–3,499, 3,500–3,999, 4,000–4,499, 4,500+
Apgar score (5 minutes)	0–3, 4–6, 7–10	0–6, 7–10
Resuscitation level	High level, low level or none	High level, low level or none
Admission to special care nursery or neonatal intensive care unit	Admitted, not admitted	Admitted, not admitted
Length of stay in hospital (days)	<1, 1, 2–6, 7–13, 14–20, 21–27, 28+	0–1, 2–6, 7–13, 14+

Age standardisation

Two methods of age standardisation, direct and indirect, were used in this report to eliminate the effect of differences in age structures when comparing rates between diabetes in pregnancy status groups and different populations.

Both the NPDC and NHMD data show that women with pre-existing diabetes in pregnancy, women with GDM and women without diabetes have significantly different age distributions. Of all women who gave birth, those with pre-existing diabetes (mainly Type 2 diabetes) and GDM tended to be older compared with women without diabetes in pregnancy. Many complications of pregnancy, labour and delivery can be attributed to the older age of mothers. Age standardisation was used to eliminate the differences in age from the analysis, to highlight the contribution of diabetes to differences in the occurrence of effects of pregnancy, labour and delivery between diabetes in pregnancy status groups. Similarly, Aboriginal and Torres Strait Islander women who gave birth were younger compared with non-Indigenous or other Australian women who gave birth, and high-diabetes-risk regions women who gave birth were older than women born in Australia. Therefore, age standardising these groups removed the influence of older or younger maternal age, making comparisons of outcomes on the basis of Indigenous status and region of birth more valid.

Direct age standardisation

Direct age standardisation applies the age-specific proportions of a 'study population' to a 'standard population' to determine the rate that would have occurred in the standard population. This allows direct comparison of different rates applied to the same standard population.

In this report, direct age standardisation was used to compare diabetes in pregnancy status groups within a single population, using the non-diabetes maternal population as the standard population (see Table A1.8).

The method used to calculate directly age-standardised rates consists of three steps:

- Step 1: Calculate the age-specific proportion for each age group.
- Step 2: Calculate the expected number of cases in each age group by multiplying the age-specific proportion by the corresponding standard population.
- Step 3: Add the expected number of cases in each age group, divide by the total of the standard population and multiply by the determined population base (for example, 100 or 1,000).

These steps can be expressed by the formula below:

$$ASR = \Sigma N_i p_i / \Sigma N_i$$

where N_i = standard population by age group and p_i = study population age-specific proportion.

The rate ratio is calculated by dividing the study population age-standardised rate by the standard population rate as an expression of the magnitude of difference between the two standardised population rates.

Indirect age standardisation

In this report, indirect standardisation was used to compare two populations by diabetes in pregnancy status, where the study population was considerably smaller and had less stable age-specific rates compared with the standard population. This method has been used to compare the Indigenous with the non-Indigenous population (or other Australian population), and the high-diabetes-risk regions with the Australian-born population. The standard populations are detailed in Table A1.8.

Comparisons between two populations that use indirect age standardisation are presented as standardised incidence ratios, as this method of standardisation does not produce true rates. These standardised incidence ratios are calculated using the following steps:

- Step 1: Calculate age-specific proportions for the standard population.
- Step 2: Calculate the expected number of cases by multiplying the age-specific proportions in the standard population by the study population.
- Step 3: Divide the total number of actual cases by the total number of expected cases.

These steps can be expressed by the formula below:

$$\text{Ratio} = \Sigma r_i / n_i P_i$$

where r_i = study population events by age group, n_i = study population by age group, P_i = standard population age-specific proportion.

A standardised incidence ratio of 1.0 indicates that there is no real difference in the incidence rate between the population of interest and the standard population. A standardised incidence ratio of more than 1.0 indicates the population of interest has a higher incidence rate compared with the standard population, and vice versa for a standardised incidence ratio of less than 1.0.

Table A1.8: Standard populations used throughout this report

Analysis	Age standardisation method	Coverage	Population group
Standard populations for National Hospital Morbidity Database analyses (2005–06 to 2007–08)			
Single population			
Overall Australian	Direct	National	All Australian women, without diabetes in pregnancy
Indigenous	Direct	NSW, Vic, Qld, WA, SA, public hospitals in the NT	Indigenous women, without diabetes in pregnancy
High-diabetes-risk regions women	Direct	National	High-diabetes-risk regions women, without diabetes in pregnancy
Two populations			
Indigenous: Other	Indirect	Qld, WA, SA, public hospitals in the NT	Other Australian women, by diabetes in pregnancy status
Women born in high-diabetes-risk regions: Women born in Australia	Indirect	National	Australian-born women, by diabetes in pregnancy status
Standard populations for National Perinatal Data Collection analyses (2005–2007)			
Single population			
Overall Australian	Direct	National	All women, without diabetes in pregnancy
			Babies of all women, without diabetes in pregnancy
Indigenous	Direct	National	Indigenous women, without diabetes in pregnancy
			Babies of Indigenous women, without diabetes in pregnancy
High-diabetes-risk regions women	Direct	National	High-diabetes-risk regions women, without diabetes in pregnancy
			Babies of high-diabetes-risk regions women, without diabetes in pregnancy
Two populations			
Indigenous: Non-Indigenous	Indirect	National	Non-Indigenous women, by diabetes in pregnancy status
			Babies of non-Indigenous women, by diabetes in pregnancy status
Women born in high-diabetes-risk regions: Women born in Australia	Indirect	National	Australian-born women, by diabetes in pregnancy status
			Babies of Australian-born women, by diabetes in pregnancy status

Significance testing

Standard errors

Standard errors are an estimate of the amount of variation of a number, rate or rate ratio from its 'true' value. Small standard errors indicate that the observed value approximates the true value, while large standard errors indicate that there is variation in the data set and that the observed value and true value may differ.

In this report, standard errors are estimated for rates and ratios and used to calculate 95% confidence intervals, for significance testing.

Standard errors (both direct and indirect) are calculated using the following formulae:

$SE_{(ASR)} = \sqrt{[\Sigma(N_i^2 p_i / n_i)/(\Sigma N_i^2)]}$

$SE_{(SIR)} = \sqrt{[\Sigma r_i / \Sigma (n_i P_i)^2]}$

Confidence intervals

In this report, 95% confidence intervals were calculated around standardised rates, standardised rate ratios and standardised incidence ratios to determine whether differences between pairs were significant.

Confidence intervals are calculated using the following formulae:

$95\%CI_{(ASR)} = ASR \pm 1.96 * SE_{(ASR)}$

$95\%CI_{(SIR)} = SIR \pm 1.96 * SE_{(SIR)}$

A difference was deemed to be statistically significant if the 95% confidence intervals of the age-standardised rate did not overlap, or if the 95% confidence intervals of the standardised incidence ratios did not include 1.0.

Appendix 2 Supplementary tables

Chapter 2

Table A2.1: Age distribution of women who gave birth, by diabetes in pregnancy status, 2005–2007

	Age group (years)						
	<20	**20–24**	**25–29**	**30–34**	**35–39**	**40+**	**Total**
				Number			
Pre-existing diabetes	94	505	1,157	1,714	1,173	309	**4,952**
Gestational diabetes mellitus	468	2,900	8,481	14,004	10,493	2,793	**39,139**
No diabetes	34,980	118,202	212,709	260,190	137,952	25,586	**789,619**
Total	**35,542**	**121,607**	**222,347**	**275,908**	**149,618**	**28,688**	**833,710**
				Per cent			
Pre-existing diabetes	1.9	10.2	23.4	34.6	23.7	6.2	**100.0**
Gestational diabetes mellitus	1.2	7.4	21.7	35.8	26.8	7.1	**100.0**
No diabetes	4.4	15.0	26.9	33.0	17.5	3.2	**100.0**
Total	**4.3**	**14.6**	**26.7**	**33.1**	**17.9**	**3.4**	**100.0**

Source: AIHW analysis of NPDC data.

Table A2.2: Age distribution of women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Age group (years)						
	<20	**20–24**	**25–29**	**30–34**	**35–39**	**40+**	**Total[(a)]**
				Number			
Pre-existing Type 1 diabetes	64	311	564	754	370	56	**2119**
Pre-existing Type 2 diabetes	20	154	453	714	651	227	**2219**
Gestational diabetes mellitus	445	2,907	8,766	14,543	11,108	3,007	**40,776**
No diabetes	34,909	119,057	213,584	258,057	140,391	25,892	**791,890**
Total	35,460	122,587	223,787	274,791	153,077	29,331	**839,033**
				Per cent			
Pre-existing Type 1 diabetes	3.0	14.7	26.6	35.6	17.5	2.6	**100.0**
Pre-existing Type 2 diabetes	0.9	6.9	20.4	32.2	29.3	10.2	**100.0**
Gestational diabetes mellitus	1.1	7.1	21.5	35.7	27.2	7.4	**100.0**
No diabetes	4.4	15.0	27.0	32.6	17.7	3.3	**100.0**
Total	**4.2**	**14.6**	**26.7**	**32.8**	**18.2**	**3.5**	**100.0**

(a) Total includes 'diabetes in pregnancy—onset unspecified'.

Source: AIHW NHMD.

Table A2.3: Proportion of multiple births among women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	30	44	1,032	12,647
Per cent	1.4	2.0	2.5	1.6
Age-standardised rate (per cent)	1.4	1.9	2.4	1.6
(95% confidence interval)	(1.4–1.4)	(1.8–1.9)	(2.4–2.4)	(1.6–1.6)

Note: Directly age-standardised to the 2005–06 to 2007–08 population of women without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Table A2.4: Pre-term birth among women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	420	279	2,587	30,952
Per cent	19.8	12.6	6.3	3.9
Age-standardised rate (per cent)	19.8	12.8	6.4	3.9
(95% confidence interval)	(19.4–20.2)	(12.5–13.1)	(6.2–6.7)	(3.7–4.1)

Notes

1. Delivery at 37 weeks or less is considered pre-term.
2. Directly age-standardised to the 2005–06 to 2007–08 population of women without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Table A2.5: Induced labour among women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
<37 weeks	230	13.3	654	4.4	10,555	5.4
37–39 weeks	1,257	72.7	9,739	64.8	71,673	36.9
40+ weeks	242	14.0	4,625	30.8	112,182	57.7
Total[(a)]	**1,730**	**100.0**	**15,018**	**100.0**	**194,462**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
<37 weeks	13.7	(13.3–14.0)	4.5	(4.3–4.7)	5.4	(5.2–5.6)
37–39 weeks	72.7	(71.8–73.5)	64.3	(63.5–65.0)	36.9	(36.3–37.4)
40+ weeks	13.6	(13.2–14.0)	31.2	(30.7–31.7)	57.7	(57.0–58.4)

(a) Totals may not add up due to missing values.

Notes

1. Type of labour was not stated for: 4 women with pre-existing diabetes, 11 women with gestational diabetes mellitus, and 169 women without diabetes in pregnancy.
2. Duration of pregnancy was not stated for: 1 woman with pre-existing diabetes, and 52 women without diabetes in pregnancy.
3. Directly age-standardised to the 2005–2007 population of women with induced labour and without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A2.6: Caesarean section among women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes
Number	2,934	15,707	236,973
Per cent	59.2	40.1	30.0
Age-standardised rate (per cent) (95% confidence interval)	58.6 (57.9–59.3)	37.8 (37.2–38.4)	30.0 (29.5–30.5)

Note: Directly age-standardised to the 2005–2007 population of women without diabetes in pregnancy who gave birth. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A2.7: Caesarean section among women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	1,518	1,307	16,649	239,553
Per cent	71.6	58.9	40.8	30.3
Age-standardised rate (per cent) (95% confidence interval)	71.4 (70.6–72.2)	56.4 (55.6–57.1)	38.4 (37.8–39)	30.3 (29.7–30.8)

Note: Directly age-standardised to the 2005–06 to 2007–08 population of women without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Table A2.8: Hypertension among women who gave birth in hospital, by type of hypertension and diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes		Pre-existing Type 2 diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Pre-existing hypertension	88	4.2	160	7.2	557	1.4	3,390	0.4
Gestational hypertension	418	19.7	329	14.8	3,621	8.9	45,282	5.7
Total hypertension (includes eclampsia)	513	24.2	491	22.1	4,214	10.3	49,117	6.2
	Age-standardised rate (per cent) (95% confidence interval)							
Pre-existing hypertension	4.1 (3.9–4.2)		5.8 (5.6–6.0)		1.1 (1.0–1.2)		0.4 (0.4–0.5)	
Gestational hypertension	19.8 (19.4–20.2)		15.6 (15.2–15.9)		9.3 (9.0–9.5)		5.7 (5.5–5.9)	
Total hypertension (includes eclampsia)	24.2 (23.8–24.7)		21.4 (21.0–21.9)		10.5 (10.2–10.8)		6.2 (6.0–6.4)	

Note: Directly age-standardised to the 2005–06 to 2007–08 population of women without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Table A2.9: Stillbirth among singleton babies, by maternal diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	33	52	113	4,926
Per cent	15.6	23.4	2.8	6.2
Age-standardised rate (per cent) (95% confidence interval)	15.6 (15.6–15.6)	26.6 (26.5–26.6)	2.9 (2.9–2.9)	6.2 (6.2–6.2)

Notes

1. Based on a count of singleton births only.
2. Directly age-standardised to the 2005–06 to 2007–08 population of women without diabetes in pregnancy who gave birth in hospital. For method, see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Table A2.10: Birthweight among live born male babies, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Less than 1,500 grams	70	2.7	159	0.8	4,357	1.1
1,500–2,499 grams	182	7.0	1,210	5.8	19,257	4.7
2,500–2,999 grams	337	13.0	3,270	15.6	52,442	12.8
3,000–3,499 grams	700	27.0	7,257	34.7	136,097	33.3
3,500–3,999 grams	725	28.0	6,190	29.6	136,079	33.3
4,000–4,499 grams	411	15.9	2,278	10.9	51,213	12.5
4,500 grams and over	163	6.3	549	2.6	9,546	2.3
Total[(a)]	**2,589**	**100.0**	**20,913**	**100.0**	**409,079**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Less than 1,500 grams	0.9	(0.8–0.9)	0.8	(0.8–0.8)	1.1	(1.0–1.1)
1,500–2,499 grams	3.3	(3.0–3.5)	4.6	(4.3–4.8)	4.7	(4.5–5.0)
2,500–2,999 grams	11.0	(10.4–11.6)	14.9	(14.2–15.5)	12.8	(12.2–13.4)
3,000–3,499 grams	28.1	(27.1–29.1)	35.3	(34.2–36.5)	33.3	(32.2–34.3)
3,500–3,999 grams	31.4	(30.4–32.5)	30.5	(29.4–31.5)	33.3	(32.2–34.3)
4,000–4,499 grams	18.1	(17.3–18.9)	11.2	(10.6–11.9)	12.5	(11.9–13.2)
4,500 grams and over	7.2	(6.7–7.7)	2.7	(2.4–3.0)	2.3	(2.0–2.6)

(a) Totals may not add up due to missing values.

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 2 male babies of women with pre-existing diabetes, and 88 male babies of women without diabetes in pregnancy.
3. Gestational age was not stated for: 44 male babies of women without diabetes in pregnancy.
4. Directly standardised to the 2005–2007 population of live born male babies of women without diabetes in pregnancy, by gestational age. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A2.11: Birthweight among live born female babies, by maternal diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes		Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent	Number	Per cent
Less than 1,500 grams	67	2.8	143	0.8	4,048	1.0
1,500–2,499 grams	194	8.2	1,399	7.3	21,996	5.7
2,500–2,999 grams	355	15.1	3,847	20.2	67,003	17.3
3,000–3,499 grams	707	30.0	7,262	38.1	148,712	38.4
3,500–3,999 grams	651	27.6	4,770	25.0	110,922	28.6
4,000–4,499 grams	267	11.3	1,334	7.0	30,296	7.8
4,500 grams and over	117	5.0	301	1.6	4,248	1.1
Total[(a)]	**2,358**	**100.0**	**19,057**	**100.0**	**387,299**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)					
Less than 1,500 grams	0.9	(0.9–0.9)	0.8	(0.8–0.8)	1.0	(1.0–1.1)
1,500–2,499 grams	4.2	(3.9–4.5)	5.9	(5.6–6.2)	5.7	(5.4–6.0)
2,500–2,999 grams	14.0	(13.3–14.6)	19.8	(19.0–20.6)	17.3	(16.6–18.0)
3,000–3,499 grams	32.5	(31.4–33.5)	39.0	(37.8–40.1)	38.4	(37.2–39.6)
3,500–3,999 grams	30.2	(29.2–31.2)	25.8	(24.8–26.7)	28.6	(27.6–29.6)
4,000–4,499 grams	12.6	(12.0–13.3)	7.2	(6.7–7.7)	7.8	(7.3–8.3)
4,500 grams and over	5.7	(5.2–6.1)	1.6	(1.4–1.9)	1.1	(0.9–1.3)

(a) Totals may not add up due to missing values.

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 2 female babies of women with pre-existing diabetes, and 148 female babies of women without diabetes in pregnancy.
3. Gestational age was not stated for: 32 female babies of women without diabetes in pregnancy.
4. Directly standardised to the 2005–2007 population of live born babies of women without diabetes in pregnancy, by infant sex and gestational age. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Chapter 3

Table A3.1: Age distribution of Aboriginal and Torres Strait Islander women who gave birth, by diabetes in pregnancy status, 2005–2007

	Age group (years)						
	<20	20–24	25–29	30–34	35–39	40+	Total
				Number			
Pre-existing diabetes	17	70	109	130	90	27	**443**
Gestational diabetes mellitus	104	322	403	413	261	59	**1,562**
No diabetes	6,160	9,302	6,677	4,203	1,869	302	**28,513**
Total[(a)]	**6,281**	**9,694**	**7,189**	**4,746**	**2,220**	**388**	**30,518**
				Per cent			
Pre-existing diabetes	3.8	15.8	24.6	29.3	20.3	6.1	**100.0**
Gestational diabetes mellitus	6.7	20.6	25.8	26.4	16.7	3.8	**100.0**
No diabetes	21.6	32.6	23.4	14.7	6.6	1.1	**100.0**
Total	**20.6**	**31.8**	**23.6**	**15.6**	**7.3**	**1.3**	**100.0**

(a) Totals may not add up due to missing values.

Note: Indigenous status was not stated for: 8 mothers with pre-existing diabetes, 38 mothers with gestational diabetes mellitus, and 971 mothers without diabetes in pregnancy.

Source: AIHW analysis of NPDC data.

Table A3.2: Age distribution of non-Indigenous women who gave birth, by diabetes in pregnancy status, 2005–2007

	Age group (years)						
	<20	20–24	25–29	30–34	35–39	40+	Total
				Number			
Pre-existing diabetes	77	435	1,047	1,581	1,080	281	**4,501**
Gestational diabetes mellitus	364	2,573	8,070	13,574	10,227	2,731	**37,539**
No diabetes	28,771	108,789	205,820	255,666	135,853	25,236	**760,135**
Total[(a)]	**29,212**	**111,797**	**214,937**	**270,821**	**147,160**	**28,248**	**802,175**
				Per cent			
Pre-existing diabetes	1.7	9.7	23.3	35.1	24.0	6.2	**100.0**
Gestational diabetes mellitus	1.0	6.9	21.5	36.2	27.2	7.3	**100.0**
No diabetes	3.8	14.3	27.1	33.6	17.9	3.3	**100.0**
Total	**3.6**	**13.9**	**26.8**	**33.8**	**18.3**	**3.5**	**100.0**

(a) Totals may not add up due to missing values.

Note: Indigenous status was not stated for: 8 mothers with pre-existing diabetes, 38 mothers with gestational diabetes mellitus, and 971 mothers without diabetes in pregnancy.

Source: AIHW analysis of NPDC data.

Table A3.3: Age distribution of Aboriginal and Torres Strait Islander women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Age group (years)						
	<20	**20–24**	**25–29**	**30–34**	**35–39**	**40+**	**Total[(a)]**
				Number			
Pre-existing Type 1 diabetes	n.p.	10	11	7	n.p.	n.p.	**37**
Pre-existing Type 2 diabetes	9	56	95	133	100	45	**438**
Gestational diabetes mellitus	96	306	380	407	232	54	**1,475**
No diabetes	5,978	9,115	6,427	3,883	1,713	269	**27,385**
Total	**6,090**	**9,502**	**6,932**	**4,451**	**2,062**	**376**	**29,413**
				Per cent			
Pre-existing Type 1 diabetes	n.p.	27.0	29.7	18.9	n.p.	n.p.	**100.0**
Pre-existing Type 2 diabetes	2.1	12.8	21.7	30.4	22.8	10.3	**100.0**
Gestational diabetes mellitus	6.5	20.7	25.8	27.6	15.7	3.7	**100.0**
No diabetes	21.8	33.3	23.5	14.2	6.3	1.0	**100.0**
Total	**20.7**	**32.3**	**23.6**	**15.1**	**7.0**	**1.3**	**100.0**

(a) Total includes 'diabetes in pregnancy—onset unspecified'.

Notes

1. Indigenous analysis includes women who gave birth in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.
2. n.p.—not published.

Source: AIHW NHMD.

Table A3.4: Age distribution of other Australian women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Age group (years)						
	<20	**20–24**	**25–29**	**30–34**	**35–39**	**40+**	**Total[(a)]**
				Number			
Pre-existing Type 1 diabetes	55	287	519	700	344	51	**1,956**
Pre-existing Type 2 diabetes	11	94	346	566	533	177	**1,727**
Gestational diabetes mellitus	337	2,507	8,102	13,635	10,470	2,861	**37,912**
No diabetes	27,194	104,289	197,723	243,206	132,766	24,483	**729,661**
Total	**27,616**	**107,309**	**207,069**	**258,749**	**144,626**	**27,707**	**773,076**
				Per cent			
Pre-existing Type 1 diabetes	2.8	14.7	26.5	35.8	17.6	2.6	**100.0**
Pre-existing Type 2 diabetes	0.6	5.4	20.0	32.8	30.9	10.2	**100.0**
Gestational diabetes mellitus	0.9	6.6	21.4	36.0	27.6	7.5	**100.0**
No diabetes	3.7	14.3	27.1	33.3	18.2	3.4	**100.0**
Total	**3.6**	**13.9**	**26.8**	**33.5**	**18.7**	**3.6**	**100.0**

(a) Total includes 'diabetes in pregnancy—onset unspecified'.

Note: Indigenous analysis includes women who gave birth in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.

Source: AIHW NHMD.

Table A3.5: Induced labour among Aboriginal and Torres Strait Islander women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**
<37 weeks	55	9.5	599	10.7
37–39 weeks	369	63.6	2,079	37.0
40+ weeks	156	26.9	2,940	52.3
Total[(a)]	**580**	**100.0**	**5,620**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)			
<37 weeks	10.1	(9.8–10.4)	10.7	(10.4–11.0)
37–39 weeks	63.3	(62.6–64.1)	37.0	(36.4–37.6)
40+ weeks	26.5	(26.1–27.0)	52.3	(51.6–53.0)

(a) Totals may not add up due to missing values.

Notes

1. Duration of pregnancy was not stated for: 2 Indigenous women who gave birth without diabetes in pregnancy who were induced.
2. Directly age-standardised to the 2005–2007 population of Indigenous women with induced labour and without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
3. Pre-existing diabetes numbers are too small to publish and are not presented.

Source: AIHW analysis of NPDC data.

Table A3.6: Induced labour among Aboriginal and Torres Strait Islander women who gave birth compared with non-Indigenous women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus	No diabetes
	Observed	
<37 weeks	55	599
37–39 weeks	369	2,079
40 weeks and over	156	2,940
	Expected[(a)]	
<37 weeks	25	345
37–39 weeks	370	1,954
40 weeks and over	184	3,321
	Standardised incidence ratio[(b)] (95% confidence interval)	
<37 weeks	2.2 (1.6–2.7)	1.7 (1.6–1.9)
37–39 weeks	1.0 (0.9–1.1)	1.1 (1.0–1.1)
40 weeks and over	0.8 (0.7–1.0)	0.9 (0.9–0.9)

(a) The expected number of cases if the Indigenous population had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Duration of pregnancy was not stated for: 2 Indigenous women with induction of labour and without diabetes in pregnancy, and 45 non-Indigenous women with induction of labour and without diabetes in pregnancy.
2. Due to small numbers, data for induced labour by duration of pregnancy among Indigenous women with pre-existing diabetes are not shown.
3. Indirectly age-standardised to the 2005–2007 non-Indigenous maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A3.7: Pre-term (36 weeks or less) induced labour among Aboriginal and Torres Strait Islander women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	20	43	294
Per cent	25.3	30.9	17.0
Age-standardised rate (per cent) (95% confidence interval)	37.4 (36.9–38.0)	34.6 (34.0–35.2)	17.0 (16.6–17.4)

Notes

1. Directly age-standardised to the 2005–06 to 2007–08 population of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
2. Indigenous analysis includes women in New South Wales, Victoria, Queensland, Western Australia, South Australia and public hospitals in the Northern Territory only, and should not be considered representative of women giving birth in other states and territories or of the national picture.
3. There were no records for pre-term induced labour among Indigenous women with pre-existing Type 1 diabetes.

Source: AIHW NHMD.

Table A3.8: Low birthweight (less than 2,500 grams) among live born male babies of Aboriginal and Torres Strait Islander women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent
<37 weeks	50	6.1	1,215	8.4
37 weeks and over	15	1.8	506	3.5
	Age-standardised rate (per cent) (95% confidence interval)			
<37 weeks	5.9	(5.6–6.1)	8.4	(8.1–8.7)
37 weeks and over	2.0	(1.9–2.2)	3.5	(3.3–3.7)

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 3 male babies of Indigenous women without diabetes in pregnancy.
3. Gestational age was not stated for: 3 male babies of Indigenous women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born male babies of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A3.9: Low birthweight (less than 2,500 grams) among live born female babies of Aboriginal and Torres Strait Islander women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent
<37 weeks	41	5.5	1,246	8.9
37 weeks and over	17	2.3	719	5.1
	Age-standardised rate (per cent) (95% confidence interval)			
<37 weeks	5.4	(5.2–5.7)	8.9	(8.6–9.2)
37 weeks and over	2.5	(2.3–2.6)	5.1	(4.9–5.3)

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 5 female babies of Indigenous women without diabetes in pregnancy.
3. Gestational age was not stated for: 3 female babies of Indigenous women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born female babies of Indigenous women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A3.10: Low birthweight (less than 2,500 grams) among live born male babies of Aboriginal and Torres Strait Islander women compared with live born male babies of non-Indigenous women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus	No diabetes
	Observed	
<37 weeks	50	1,215
37 weeks and over	15	506
	Expected[(a)]	
<37 weeks	41	639
37 weeks and over	17	289
	Standardised incidence ratio[(b)] (95% confidence interval)	
<37 weeks	1.2 (0.9–1.6)	1.9 (1.8–2.0)
37 weeks and over	0.9 (0.4–1.3	1.7 (1.6–1.9)

(a) The expected number of cases if the Indigenous population had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 3 male babies of Indigenous women without diabetes in pregnancy, and 82 male babies of non-Indigenous women without diabetes in pregnancy.
3. Gestational age was not stated for: 3 male babies of Indigenous women without diabetes in pregnancy, and 36 male babies of non-Indigenous women without diabetes.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A3.11: Low birthweight (less than 2,500 grams) among live born female babies of Aboriginal and Torres Strait Islander women compared with live born female babies of non-Indigenous women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus	No diabetes
	Observed	
<37 weeks	41	1,246
37 weeks and over	17	719
	Expected[a]	
<37 weeks	37	617
37 weeks and over	16	279
	Standardised incidence ratio[b] (95% confidence interval)	
<37 weeks	1.1 (0.8–1.4)	2.0 (1.9–2.1)
37 weeks and over	1.1 (0.6–1.6)	2.6 (2.4–2.8)

(a) The expected number of cases if the Indigenous population had the same age distribution as the non-Indigenous population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the Indigenous population is based on the age-specific rate of the non-Indigenous population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 5 female babies of Indigenous women without diabetes in pregnancy, 1 female baby of a non-Indigenous woman with gestational diabetes mellitus, and 69 female babies of non-Indigenous women without diabetes in pregnancy.
3. Gestational age was not stated for: 3 female babies of Indigenous women without diabetes in pregnancy, and 25 female babies of non-Indigenous women without diabetes in pregnancy.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of non-Indigenous women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Chapter 4

Table A4.1: Age distribution of women from high-diabetes-risk regions who gave birth, by diabetes in pregnancy status, 2005–2007

	Age group (years)						
	<20	**20–24**	**25–29**	**30–34**	**35–39**	**40+**	**Total**
				Number			
Pre-existing diabetes	n.p.	n.p.	97	204	221	86	**643**
Gestational diabetes mellitus	29	431	2,093	3,369	2,784	830	**9,536**
No diabetes	1,150	11,109	26,207	29,424	15,382	3,354	**86,626**
Total	**1,182**	**11,572**	**28,397**	**32,997**	**18,387**	**4,270**	**96,805**
				Per cent			
Pre-existing diabetes	n.p	n.p	15.1	31.7	34.4	13.4	**100.0**
Gestational diabetes mellitus	0.3	4.5	21.9	35.3	29.2	8.7	**100.0**
No diabetes	1.3	12.8	30.3	34.0	17.8	3.9	**100.0**
Total	**1.2**	**12.0**	**29.3**	**34.1**	**19.0**	**4.4**	**100.0**

Note: n.p.— not published.

Source: AIHW analysis of NPDC data.

Table A4.2: Age distribution of Australian-born women who gave birth, by diabetes in pregnancy status, 2005–2007

	Age group (years)						
	<20	**20–24**	**25–29**	**30–34**	**35–39**	**40+**	**Total**
				Number			
Pre-existing diabetes	90	446	955	1,323	767	173	**3,754**
Gestational diabetes mellitus	412	2,241	5,592	8,878	6,162	1,451	**24,736**
No diabetes	31,516	97,047	163,928	196,755	99,870	16,892	**606,008**
Total	**32,018**	**99,734**	**170,475**	**206,956**	**106,799**	**18,516**	**634,498**
				Per cent			
Pre-existing diabetes	2.4	11.9	25.4	35.2	20.4	4.6	**100.0**
Gestational diabetes mellitus	1.7	9.1	22.6	35.9	24.9	5.9	**100.0**
No diabetes	5.2	16.0	27.1	32.5	16.5	2.8	**100.0**
Total	**5.0**	**15.7**	**26.9**	**32.6**	**16.8**	**2.9**	**100.0**

Source: AIHW analysis of NPDC data.

Table A4.3: Age distribution of women from high-diabetes-risk regions who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Age group (years)						
	<20	20–24	25–29	30–34	35–39	40+	Total[(a)]
				Number			
Pre-existing Type 1 diabetes	n.p.	9	19	30	11	n.p.	**77**
Pre-existing Type 2 diabetes	n.p.	n.p.	51	108	153	60	**385**
Gestational diabetes mellitus	36	475	2,334	3,812	3,078	921	**10,656**
No diabetes	1,086	11,156	26,990	29,835	15,499	3,275	**87,841**
Total	**1,127**	**11,664**	**29,455**	**33,889**	**18,827**	**4,296**	**99,258**
				Per cent			
Pre-existing Type 1 diabetes	n.p.	11.7	24.7	39.0	14.3	n.p.	**100.0**
Pre-existing Type 2 diabetes	n.p.	n.p.	13.2	28.1	39.7	15.6	**100.0**
Gestational diabetes mellitus	0.3	4.5	21.9	35.8	28.9	8.6	**100.0**
No diabetes	1.2	12.7	30.7	34.0	17.6	3.7	**100.0**
Total	**1.1**	**11.8**	**29.7**	**34.1**	**19.0**	**4.3**	**100.0**

(a) Total includes 'diabetes in pregnancy—onset unspecified'.

Note: n.p.—not published.

Source: AIHW NHMD.

Table A4.4: Age distribution of Australian-born women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Age group (years)						
	<20	20–24	25–29	30–34	35–39	40+	Total[(a)]
				Number			
Pre-existing Type 1 diabetes	59	286	486	619	303	44	**1,797**
Pre-existing Type 2 diabetes	18	132	356	520	409	136	**1,571**
Gestational diabetes mellitus	373	2,184	5,529	8,804	6,290	1,483	**24,663**
No diabetes	31,138	96,258	160,884	189,193	99,136	16,714	**593,323**
Total	**31,610**	**98,983**	**167,575**	**199,626**	**106,508**	**18,454**	**622,756**
				Per cent			
Pre-existing Type 1 diabetes	3.3	15.9	27.0	34.4	16.9	2.4	**100.0**
Pre-existing Type 2 diabetes	1.1	8.4	22.7	33.1	26.0	8.7	**100.0**
Gestational diabetes mellitus	1.5	8.9	22.4	35.7	25.5	6.0	**100.0**
No diabetes	5.2	16.2	27.1	31.9	16.7	2.8	**100.0**
Total	**5.1**	**15.9**	**26.9**	**32.1**	**17.1**	**3.0**	**100.0**

(a) Total includes 'diabetes in pregnancy—onset unspecified'.

Source: AIHW NHMD.

Table A4.5: Induced labour among women from high-diabetes-risk regions who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus		No diabetes	
	Number	**Per cent**	**Number**	**Per cent**
<37 weeks	117	3.8	1,098	7.0
37–39 weeks	1,943	63.5	5,548	35.3
40+ weeks	1,000	32.7	9,058	57.7
Total[(a)]	**3,060**	**100.0**	**15,706**	**100.0**
	Age-standardised rate (per cent) (95% confidence interval)			
<37 weeks	3.9	(3.7–4.1)	7.0	(6.7–7.2)
37–39 weeks	62.9	(62.1–63.7)	35.3	(34.7–35.9)
40+ weeks	33.2	(32.6–33.7)	57.7	(56.9–58.4)

(a) Totals may not add up due to missing values.

Notes

1. Duration of pregnancy was not stated for: 2 high-diabetes-risk regions women without diabetes in pregnancy.
2. Directly age-standardised to the 2005–2007 population of high-diabetes-risk regions women with induced labour and without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.
3. Pre-existing diabetes numbers are too small to publish and are not presented.

Source: AIHW analysis of NPDC data.

Table A4.6: Induced labour among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by duration of pregnancy and diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus	No diabetes
	Observed	
<37 weeks	117	1,098
37–39 weeks	1,943	5,548
40+ weeks	1,000	9,058
	Expected[(a)]	
<37 weeks	136	792
37–39 weeks	2,017	5,920
40+ weeks	907	8,994
	Standardised incidence ratio[(b)] (95% confidence interval)	
<37 weeks	0.9 (0.7–1.0)	1.4 (1.3–1.5)
37–39 weeks	1.0 (0.9–1.0)	0.9 (0.9–1.0)
40+ weeks	1.1 (1.0–1.2)	1.0 (1.0–1.0)

(a) The expected number of cases if the high-diabetes-risk regions population had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Duration of pregnancy was not stated for: 2 high-diabetes-risk regions women without diabetes in pregnancy, and 32 Australian-born women without diabetes in pregnancy.
2. Indirectly age-standardised to the 2005–2007 Australian-born maternal population with induced labour, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A4.7: Caesarean section among women from high-diabetes-risk regions who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes
Number	286	3,440	24,323
Per cent	44.5	36.1	28.1
Age-standardised rate (per cent) (95% confidence interval)	41.2 (40.5–41.8)	33.1 (32.5–33.7)	28.1 (27.6–28.6)

Note: Directly age-standardised to the 2005–2007 high-diabetes-risk region-born population of women who gave birth without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A4.8: Caesarean section among women born in high-diabetes-risk regions who gave birth compared with Australian-born women who gave birth, by diabetes in pregnancy status, 2005–2007

	Pre-existing diabetes	Gestational diabetes mellitus	No diabetes
Observed	286	3,440	24,323
Expected	413	4,081	27,106
Standardised incidence ratio (95% confidence interval)	0.7 (0.6–0.8)	0.8 (0.8–0.9)	0.9 (0.9–0.9)

Notes

1. Indirectly age-standardised to the 2005–2007 Australian-born maternal population, by diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.
2. The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions-born maternal population is based on the age-specific rate of the Australian-born maternal population. For more information see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A4.9: Caesarean section rate among women from high-diabetes-risk regions who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Number	48	202	3,908	24,831
Per cent	62.3	52.5	36.7	28.3
Age-standardised rate (per cent) (95% confidence interval)	63.3 (62.5–64.1)	48.9 (48.2–49.5)	33.6 (33.0–34.2)	28.3 (27.7–28.8)

Note: Directly age-standardised to the 2005–06 to 2007–08 population of high-diabetes-risk regions women without diabetes in pregnancy.

Source: AIHW NHMD.

Table A4.10: Caesarean section among women from high-diabetes-risk regions who gave birth in hospital, compared with Australian-born women who gave birth in hospital, by diabetes in pregnancy status, 2005–06 to 2007–08

	Pre-existing Type 1 diabetes	Pre-existing Type 2 diabetes	Gestational diabetes mellitus	No diabetes
Observed	48	202	3,908	24,831
Expected	57	244	4,632	27,657
Standardised incidence ratio (95% confidence interval)	0.8 (0.8–0.8)	0.8 (0.8–0.8)	0.8 (0.8–0.8)	0.9 (0.9–0.9)

Notes

1. Indirectly age-standardised to the 2005–06 to 2007–08 population of high-diabetes-risk regions women without diabetes in pregnancy.
2. The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions maternal population is based on the age-specific rate of the Australian-born maternal population. For more information see 'Appendix 1 Methods'.

Source: AIHW NHMD.

Table A4.11: Low birthweight (less than 2,500 grams) among live born male babies of women from high-diabetes-risk regions, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent
<37 weeks	244	4.8	1,724	3.8
37 weeks and over	111	2.2	821	1.8
	Age-standardised rate (per cent) (95% confidence interval)			
<37 weeks	4.6	(4.4–4.8)	3.8	(3.7–4.0)
37 weeks and over	2.2	(2.0–2.3)	1.8	(1.7–2.0)

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 11 male babies of high-diabetes-risk regions women without diabetes in pregnancy.
3. Gestational age was not stated for: 2 male babies of high-diabetes-risk regions women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born babies of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A4.12: Low birthweight (less than 2,500 grams) among live born female babies of women from high-diabetes-risk regions, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus		No diabetes	
	Number	Per cent	Number	Per cent
<37 weeks	218	4.7	1,558	3.7
37 weeks and over	185	4.0	1,183	2.8
	Age-standardised rate (per cent) (95% confidence interval)			
<37 weeks	4.7	(4.5–4.9)	3.7	(3.5–3.9)
37 weeks and over	3.8	(3.6–4.0)	2.8	(2.6–3.0)

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 1 female baby of a high-diabetes-risk regions woman with gestational diabetes mellitus, and 11 female babies of high-diabetes-risk regions women without diabetes in pregnancy.
3. Gestational age was not stated for: 4 female babies of high-diabetes-risk regions women without diabetes in pregnancy.
4. Directly age-standardised to the 2005–2007 population of live born babies of high-diabetes-risk regions women without diabetes in pregnancy. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A4.13: Low birthweight (less than 2,500 grams) among live born male babies of women from high-diabetes-risk regions compared with live born male babies of Australian-born women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus	No diabetes
	Observed	
<37 weeks	244	1,724
37 weeks and over	111	821
	Expected[(a)]	
<37 weeks	279	1,975
37 weeks and over	88	809
	Standardised incidence ratio[(b)] (95% confidence interval)	
<37 weeks	0.9 (0.8–1.0)	0.9 (0.9–0.9)
37 weeks and over	1.3 (1.0–1.5)	1.0 (0.9–1.1)

(a) The expected number of cases if the high-diabetes-risk regions population had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 11 male babies of high-diabetes-risk regions women without diabetes in pregnancy, and 68 male babies of Australian-born women without diabetes in pregnancy.
3. Gestational age was not stated for: 2 male babies of high-diabetes-risk regions women without diabetes in pregnancy, and 33 male babies of Australian-born women without diabetes in pregnancy.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Table A4.14: Low birthweight (less than 2,500 grams) among live born female babies of women from high-diabetes-risk regions compared with live born female babies of Australian-born women, by gestational age and maternal diabetes in pregnancy status, 2005–2007

	Gestational diabetes mellitus	No diabetes
	Observed	
<37 weeks	218	1,558
37 weeks and over	185	1,183
	Expected[a]	
<37 weeks	257	1,855
37 weeks and over	81	759
	Standardised incidence ratio[b] (95% confidence interval)	
<37 weeks	0.8 (0.7–1.0)	0.8 (0.8–0.9)
37 weeks and over	2.3 (1.9–2.6)	1.6 (1.5–1.6)

(a) The expected number of cases if the high-diabetes-risk regions population had the same age distribution as the Australian-born population.

(b) The standardised incidence ratio of actual cases divided by the expected number of cases among the high-diabetes-risk regions population is based on the age-specific rate of the Australian-born population. For more information and interpretation, see 'Appendix 1 Methods'.

Notes

1. Includes live born babies only.
2. Birthweight was not stated for: 1 female baby of a high-diabetes-risk regions woman with gestational diabetes mellitus, 11 female babies of high-diabetes-risk regions women without diabetes in pregnancy, and 51 female babies of Australian-born women without diabetes in pregnancy.
3. Gestational age was not stated for: 4 female babies of high-diabetes-risk regions women without diabetes in pregnancy, and 20 female babies of Australian-born women without diabetes in pregnancy.
4. Indirectly age-standardised to the 2005–2007 population of live born babies of Australian-born women, by maternal diabetes in pregnancy status. For method, see 'Appendix 1 Methods'.

Source: AIHW analysis of NPDC data.

Glossary

Age standardisation

A method of removing the influence of age when comparing populations with different age structures.

Apgar score

Numerical score used to indicate the baby's condition at 1 minute and 5 minutes after birth. Between 0 and 2 points are given for each of five characteristics: heart rate, breathing, colour, muscle tone and reflex irritability, for a total score of between 0 and 10.

Birthweight

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

Caesarean section

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

Complications

Secondary conditions and illness resulting directly or indirectly from another disease or condition.

Congenital malformations

Abnormalities present at birth, such as spinal defects, heart defects and cystic kidney disease.

Diabetes mellitus

A chronic condition in which the body cannot properly use its main energy source, the sugar glucose. This is due to either the pancreas not producing enough of the hormone insulin, or the body being unable to effectively use the insulin produced. Insulin 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-term and long-term effects on many of the body's systems, especially the blood vessels and nerves. See also *Type 1 diabetes*, *Type 2 diabetes* and *Gestational diabetes mellitus*.

Full-term delivery

Delivery of a baby between 37 and 41 weeks.

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 mellitus (GDM)

A form of diabetes that is defined as glucose intolerance in pregnant women not previously diagnosed with diabetes. Women who have had GDM are at increased risk of developing Type 2 diabetes later in life and GDM increases the risk of perinatal morbidity and mortality. See also *Type 1 diabetes* and *Type 2 diabetes*.

Gestational hypertension

High blood pressure that is diagnosed during pregnancy.

Glucose intolerance

Slower metabolism of glucose due to insulin deficiency or insulin resistance. See also *Insulin resistance*.

Hypertension

High blood pressure (pre-existing).

High birthweight

Birthweight of 4,000 grams or more.

High-diabetes-risk region

A measure of maternal ethnicity, based on self-reported country of birth and including mothers born in Polynesia, Southern Asia, the Middle East and other Asian countries.

Hypoglycaemia

Low blood glucose levels.

Indigenous Australians

An alternative term for a person who identifies as being of Aboriginal and/or Torres Strait Islander origin.

Induction of labour

Intervention to stimulate the onset of labour.

Insulin

A hormone produced in the pancreas that helps glucose to enter body cells for energy metabolism.

Length of stay

The number of days a mother or baby remains in hospital, which is calculated from the date of admission or birth, until the date of separation home.

Length of stay (antenatal)

The number of days a mother remains in hospital, which is calculated from the admission date of the mother to the date of birth of the baby.

Length of stay (postnatal)

The number of days a mother remains in hospital, which is calculated from the date of birth of the baby to the date of separation home.

Live birth

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

Low birthweight

Birthweight of less than 2,500 grams.

Macrosomia

A condition by which a baby is large for gestational age, or weighs 4,000 grams or more at birth. See also *High birthweight*.

Maternal age

A mother's age in completed years at the birth of her baby.

Miscarriage

Fetal death before 20 weeks gestation.

Neonatal jaundice

Yellowing of the skin and tissues of newborn as a result of high levels of bilirubin (a by-product of haemoglobin) in the blood.

Non-Indigenous Australian

A term used for a person who identified as not being of Aboriginal and/or Torres Strait Islander origin.

Operative delivery

Delivery of a baby either by forceps, vacuum extraction or caesarean section.

Other Australians

Used in hospitals data, 'Other' Australians is the term given to people who have identified as being of non-Indigenous Australian origin or whose Indigenous status is missing or not stated.

Parity

The number of previous pregnancies resulting in live births or stillbirths, excluding the current pregnancy.

Perinatal

A period starting at 20 completed weeks gestation and ending at 28 days after birth.

Post-term delivery

Delivery of a baby at 42 weeks or more.

Pre-eclampsia

A complication of pregnancy characterised by high blood pressure and protein in the urine.

Pre-existing diabetes

A grouped condition that includes Type 1 and Type 2 diabetes, as well as other forms of diabetes diagnosed before conception.

Pre-term labour

When an expectant mother enters labour at less than 37 completed weeks gestation.

Pre-term birth

Delivery of a baby at less than 37 completed weeks gestation.

Plurality

The number of babies resulting from a single pregnancy.

Respiratory distress syndrome

A breathing disorder in pre-term babies as a result of immature lungs.

Resuscitation

Active measures taken shortly after birth to help the baby's ventilation and heartbeat, or to treat depressed respiratory effort and to correct metabolic disturbances

Shoulder dystocia

Abnormal or difficult delivery in which the baby's shoulder becomes caught behind the maternal pubic bone.

Type 1 diabetes mellitus

A form of diabetes marked by a complete lack of insulin production and needing insulin replacement for survival. This form of diabetes mostly arises in childhood or in young adults, though it can occur at any age. Adults may develop a slowly progressive form of Type 1 diabetes called Latent Autoimmune Diabetes in Adults, which may be able to be treated initially without insulin injections. See also *Type 2 diabetes* and *Gestational diabetes mellitus*.

Type 2 diabetes mellitus

The most common form of diabetes, which is marked by reduced or less effective insulin. Some cases may be managed with changes to diet along with increased exercise and weight loss. Many require medicines as well—namely oral glucose-lowering medicines that work on the pancreas. Some do require insulin, either alone or in addition to other treatments. See also *Type 1 diabetes* and *Gestational diabetes mellitus*.

Venous plasma

A component of blood taken from the veins.

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