Maternal and Perinatal Mortality and Morbidity in Queensland

Queensland Maternal and Perinatal Quality Council Report 2015

Queensland Government

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Preface

This is the fourth report of the Queensland Maternal and Perinatal Quality Council since it recommenced activity in mid-2009.

The primary purpose of the Council is to provide advice and make recommendations to the Minister for Health and the Director-General of the Queensland Department of Health on matters relating to statewide and facility-specific morbidity and mortality. The Council functions as a gazetted quality assurance committee under the quality assurance provisions of sections 81–92 of the *Hospital and Health Boards Act 2011*, which enables the Council to undertake confidential enquiries into maternal and perinatal morbidity and mortality while providing members with legislative protection.

This report details the review of maternal and perinatal deaths in Queensland during the period 2012 to 2013, examines pregnancy and newborn outcomes of 124,832 women who gave birth to 126,881 babies in that period, and reviews some indicators of care. The report highlights clinical areas which may benefit from review by practitioners in maternity and newborn facilities, to the ultimate benefit of future mothers and babies.

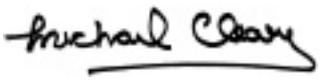
The report contains data obtained from the following sources:

- Health Statistics Branch, including Perinatal Data Collection (PDC), Statistical
- Reporting and Co-ordination, and Statistical Analysis and Linkage (SALT) Teams
- Australian Institute of Health and Welfare (AIHW)
- Registry of Births, Deaths and Marriages, Queensland
- Office of the State Coroner, Queensland.

The Council is grateful for the cooperation of the Registrar for Births, Deaths and Marriages and the Queensland State Coroner who have facilitated access to relevant data.

I would like to thank the Council members, and those who support them, for their commitment to improving maternal and perinatal outcomes. I trust that clinicians throughout Queensland will read this report carefully and give consideration to, in particular, the Council's recommendations and good practice points.

The Department of Health supports the work of the Queensland Maternal and Perinatal Quality Council with the realisation that sound health planning principles need to be based on the best available evidence including analyses of health outcomes by clinical experts such as form the contents of this report. Comments on the findings of this report are welcomed.



Dr Michael Cleary
Deputy Director-General, Clinical Excellence Division

Foreword

At the end of 2015, the Queensland Maternal and Perinatal Quality Council (the Council) will have completed its third two year term since being reconvened late in 2009. In this report, the Council reviews statewide maternity and newborn outcomes to the end of the 2013 calendar year.

The purpose of the Queensland Maternal and Perinatal Quality Council is to:

- collect and analyse clinical information regarding maternal and perinatal mortality and morbidity in Queensland to identify statewide and facility-specific trends.
- make recommendations to the Minister for Health on standards and quality indicators of maternal and perinatal clinical care to enable health providers in Queensland to improve safety and quality.
- assist with the adoption of such standards in both Public and Private sectors.

The Council functions collaboratively with the Statewide Maternity and Neonatal Clinical Network (SMNCN) and a Private Hospitals Maternity Liaison Group (supported by Private Hospitals Association of Queensland). Terms of Reference of the Queensland Maternal and Perinatal Quality Council are found at: www.health.qld.gov.au

The purpose of this report is to examine the management of pregnancies, births and newborns in Queensland, including maternal deaths and perinatal deaths and apparent risk factors for such events. This report will also attempt to identify areas of maternal and neonatal care where service providers might focus attention to prevent future deaths and adverse outcomes.

This report examines statewide maternity and neonatal data, including maternal deaths and perinatal deaths, in the period 2012 to 2013, with comparative data from the previous decade wherever those data are available. Data are provided to the Perinatal Data Collection Unit of the Health Statistics Branch, Queensland Department of Health by midwives, under the Perinatal Statistics provisions of the Public Health Act 2005 (Chapter 6, Part 1, s214–228), and have been analysed by Council and Sub-Committee members for this report. At the time of writing this report, the data available to the Council for the calendar year 2013 was a preliminary data set; as such, the data may be subject to minor change. At times, reference is made in this report to analyses by Statistical Analysis and Linkage Team (SALT), to provide readers with further detail.

I wish to acknowledge the commitment of Council members and their supporters to improve maternal and perinatal outcomes. The Council particularly acknowledges a very effective partnership with the Health Statistics Branch staff, with particular reference to the Perinatal Data Collection team (PDC) and the SALT.

Council's close and effective working relationship with the Health Statistics Branch staff is particularly vital to the Council's functionality.

I trust that all involved in the provision of care to mothers and their babies throughout Queensland will find this report helpful and give careful consideration to the Council's recommendations.

Professor Michael Humphrey
Chair, Queensland Maternal and Perinatal Quality Council

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
AMOSS	Australasian Maternity Outcomes Surveillance System
ANZSA	Australian and New Zealand Stillbirth Alliance
ARIA	Accessibility/Remoteness Index of Australia
BMI	body mass index
CA	congenital anomaly
CHD	congenital heart disease
COAG	Council of Australian Governments
EPDS	Edinburgh Postnatal Depression Score
g	gram
HELLP	Haemolysis, elevated liver enzymes, low platelet count
HLHS	Hypoplastic Left Heart Syndrome
ICD-10	International Classification of Diseases, version 10
IMPROVE	IMproving Perinatal Review and Outcomes Via Education
MMR	maternal mortality ratio
NHMRC	National Health and Medical Research Council
NICU	neonatal intensive care unit
NPDC	National Perinatal Data Collection
NPDCAT	National Perinatal Death Clinical Audit Tool
NPESU	AIHW National Perinatal Epidemiology and Statistics Unit
PA	Pulmonary Atresia
PMMRC	Perinatal Maternal Mortality Review Committee, New Zealand
PSANZ	Perinatal Society of Australia and New Zealand
PSANZ-NDC	Perinatal Society of Australia and New Zealand Neonatal Death Classification
PSANZ-PDC	Perinatal Society of Australia and New Zealand Perinatal Death Classification
QCOPMM	Queensland Council on Obstetric and Paediatric Morbidity and Mortality
QMNCPG	Queensland Maternity and Neonatal Clinical Guidelines Program
QMPQC	Queensland Maternal and Perinatal Quality Council
QHAPDC	Queensland Hospital Admitted Patient Data Collection
QPDC	Queensland Perinatal Data Collection
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RR	relative risk
SALT	Statistical Analysis and Linkage Team
SEIFA	Socio-economic Indexes for Areas
SCN	special care nursery
SMNCN	Statewide Maternity and Neonatal Clinical Network
TGA	Transposition of the Great Arteries
ToF	Tetralogy of Fallot
ToP	Termination of Pregnancy
WHO	World Health Organization

Executive summary

This report focuses primarily on the 124,832 women who gave birth to 126,881 babies in Queensland in the period 2012 to 2013, with a comparative review of maternal and perinatal death data 2009 to 2013 (five years) since the rebirth of QMPQC and the current review system being put in place, and pregnancy outcome data for the decade 2004 to 2013 depending upon data availability.

Maternal death

During 2012 and 2013 there were eight (8) maternal deaths due to causes directly or indirectly related to the pregnancy. The maternal mortality ratio in Queensland for 2012 and 2013 was 6.4 per 100,000 births. The most recently published national maternal mortality ratio was 7.1 per 100,000 births for the five years 2008 to 2012 and the Queensland maternal mortality ratio for this same period (8.5 per 100,000 births) was not statistically significantly different.

There were also four (4) maternal deaths due to incidental causes and 28 late maternal deaths. Five (5) of the 40 women who died were of Aboriginal and/or Torres Strait Islander origin; all of these deaths were late maternal deaths with causation incidental to the pregnancy. Suicide was the leading cause of death in women during pregnancy and within 365 days of the end of pregnancy.

Perinatal death

There were 1272 perinatal deaths in 2012 to 2013, giving a perinatal mortality rate of 10.0 per 1000 births (stillbirth rate 6.9 per 1000 births and neonatal mortality rate 3.2 per 1000 live births). The perinatal mortality rate, and its constituent stillbirth rate and neonatal mortality rate, have not changed significantly in Queensland over the decade 2004 to 2013. The perinatal mortality rate and the stillbirth rate in Queensland were equivalent to the most recently published Australian rate, but the neonatal mortality rate for Queensland was higher than the Australian rate.

The most common causes of perinatal death were congenital abnormality, unexplained antepartum death and spontaneous preterm birth. The most common causes of perinatal death in normally formed term infants were unexplained stillbirth and hypoxic peripartum death.

A significant proportion of the unexplained stillbirths had not been investigated in line with the Perinatal Society of Australia and New Zealand (PSANZ) recommendations, especially in relation to absence of autopsy and/or placental histopathology. QMPQC believes that the incidence of deaths being allocated to this “unknown” category would decrease significantly if perinatal deaths were correctly investigated. The group of hypoxic peripartum deaths includes deaths occurring either intrapartum or in the neonatal period without major pre-existing conditions and may benefit from closer review at both local and state level.

Aboriginal and Torres Strait Islander women continue to have higher rates of adverse pregnancy outcomes compared to non-Indigenous women. The perinatal mortality rate for babies born to Aboriginal and Torres Strait Islander mothers was approximately 50 per cent higher than the perinatal mortality rate for babies born to non- Indigenous mothers. The main contributor to this disparity relates to preterm birth.

Congenital anomalies

Congenital anomalies (one or more) were recorded in 60.7 babies per 1000 born in Queensland in 2012 and 2013. The perinatal mortality rate in the babies with congenital anomalies was more than nine times that of babies without a recorded congenital anomaly. Babies born with one or more congenital anomaly were likely to be born preterm and low birthweight. Some of these cases are related to termination of pregnancy, but these data are incompletely recorded in Queensland.

Univariate analysis of incidence related to various epidemiological factors are shown, though a more complete multivariate analysis would be needed to ensure that these relationships did not represent confounding from other factors.

Pregnancy outcomes

Over the decade 2004 to 2013 there has been little change seen in the incidence of birth at less than 37 weeks. There is a clear difference in the gestational patterns between public and private sectors with a marked preponderance for caesarean section without labour and, to a lesser degree induction of labour, in the 37 to 39 week gestation period in the private sector. A significantly higher perinatal mortality rate is shown for all gestations below 40 weeks in association with elective birth (induction of labour and caesarean section without labour).

Since 2004, the frequency of caesarean section without labour (20 per cent to 21 per cent) and induction of labour (22 per cent to 23 per cent) have remained steady with pregnancies ending in spontaneous labour in less than 60 per cent of instances. Women being cared for in the public hospital system laboured spontaneously in 61 per cent to 64 per cent of pregnancies, while women being cared for in the private hospital system laboured spontaneously in 38 per cent to 42 per cent of pregnancies.

Between 2004 and 2013 the incidence of unassisted vaginal birth has progressively fallen from 60 per cent to 56 per cent, with a concomitant rise in the incidence of caesarean section birth from 32 per cent to 34 per cent. A marked disparity is seen between management in the public and private hospital systems:

- the likelihood of a woman giving birth in the public hospital system having an unassisted vaginal birth was approximately 50 per cent higher than a woman in the private hospital system.
- almost half of the women giving birth in the private hospital system had a caesarean section birth, while less than one-third of women giving birth in the public hospital system had a caesarean section birth.

Improvements in extracorporeal techniques for assisted conception have resulted in a steady almost 50 per cent fall in the incidence of multiple pregnancy over the decade 2004 to 2013 in association with these techniques. However, it is concerning to note that the same kind of improvement has not been seen in relation to the use of ovulation induction and/or artificial insemination, with the multiple pregnancy incidence associated with their use persistently in the region of eight (8) per cent.

Smoking throughout pregnancy increases the likelihood of preterm and low birthweight birth, and is associated with a 50 per cent increase in perinatal mortality risk. Smoking throughout pregnancy is significantly more common in young women and Indigenous women.

Forty–three per cent (43 per cent) of the women who gave birth in 2009 to 2013 were overweight or obese, and women in this group were more likely to have a caesarean section birth, a baby weighing more than 4000g, and a baby who died in the perinatal period.

Women living in remote and very remote areas were more likely to give birth before 37 weeks' gestation and more likely to give birth to low birthweight babies. Perinatal mortality rates for the babies of women who live in remote and very remote areas are significantly higher than those for the babies of women living in highly accessible and accessible areas.

The perinatal mortality rate for 'normally-formed' babies born after the mother was transferred antenatally was 4.3 times greater than for 'normally-formed' babies born to women who did not require transfer. The risk of perinatal death if antenatal transfer was required was increased for all areas of maternal residence, and was higher for women transferred from metropolitan areas when compared with remote and very remote areas. Interpretation of these data is difficult. It would appear to provide some evidence that the system is providing good quality care to those women who live in rural and remote Queensland, and that there is no measurable disadvantage, at least in terms of perinatal mortality.

Indicators

A small group of care indicators, chosen for relevance by the Queensland Maternal and Perinatal Quality Council are examined in this report, with comparison hospitals being grouped in clinically relevant 'Hospital/facility' groupings. Indicator outcomes for all current public hospital maternity services are also presented in 'funnel plots' to allow facilities to benchmark against their peers.

Recommendations

The Queensland Maternal and Perinatal Quality Council recommends:

That the Private Health Regulation Team review facility registration requirements in relation to facilities providing termination of pregnancy (TOP) services, to ensure that the need for appropriate post-TOP follow-up by health practitioners is made part of the formal advice and counselling provided to their clients. *(See section 1.2.9)*
That all front line clinicians (medical officers, nursing staff and bereavement support personnel) involved in Queensland Hospital Maternity and Newborn Services attend the IMPROVE educational program to enhance optimal clinical practice around the time of a perinatal death according to the PSANZ Perinatal Mortality Guidelines. *(See section 1.3.8)*
That Queensland Health recommends that the Therapeutic Goods Administration review the conditions for authorising medical practitioners to prescribe ovulation induction agents, with particular reference to techniques designed to minimise the incidence of multiple pregnancy. *(See section 2.6)*
That RANZCOG promote education programs for its Fellows and Diplomates regarding the safe and appropriate use of ovulation induction agents. *(See section 2.6)*
That the Health Statistics Branch progress a recommendation through the appropriate mechanisms of government to COAG, to develop an indicator relating to gestation at birth (e.g. less than 37 weeks' gestation) in addition to the indicator relating to Indigenous baby birthweight. The Indigenous baby birthweight indicator may be more valuable if calculated for gestation equal to 37 or more weeks, tracking near-term intrauterine growth restriction. *(See section 2.9)*
That Queensland Health undertake a coordinated and detailed study of pregnancy outcomes for women requiring antenatal transfer during their care, to understand the reasons for and significance of the differences between outcomes for metropolitan or inner regional women and their babies when compared with rural and remote women and their babies. *(See section 2.10.6)*
That the published guidelines of the International Society of Ultrasound in Obstetrics and Gynaecology 2013 be adopted as core training for all points of care for fetal ultrasound screening in Queensland. *(See section 3.15)*

Good practice points

The Queensland Maternal and Perinatal Quality Council commends the following clinical practice improvement Good Practice Points to clinicians:

Women should be weighed regularly throughout antenatal care and have their weight gain compared to Institute of Medicine guidelines for weight gain in pregnancy. *(See section 1.2.4)*
Autopsy should be undertaken whenever possible in the event of a maternal death, even if a Coronial autopsy is not ordered, because inheritable conditions may be discovered. *(See section 1.2.7)*
Women with a history of serious mental illness (e.g. schizophrenia, bipolar affective disorder, schizoaffective disorder) should routinely be offered mental health follow-up for at least the first twelve months post-partum. The woman's GP would be the most appropriate health practitioner to undertake such follow-up in most circumstances. *(See section 1.2.9)*
Mental health screening is performed almost universally in the public sector but less so in the private sector. Use of the Edinburgh Post Natal Depression Score in the private sector may help to identify women who warrant further follow-up. *(See section 1.2.9)*
Clinicians should be wary of inadequate weight gain or weight loss during pregnancy, especially in the presence of disturbed bowel habits and/or unexpected or poorly responsive iron deficiency. Adequate diagnosis of conditions that may cause such symptoms and signs is difficult in pregnancy. *(See section 1.2.10)*
A rise in blood pressure during antenatal care needs careful evaluation and review. This is particularly important in women with Gestational Diabetes, who are at an increased risk of developing pre-eclampsia. *(See section 1.2.11)*
Hypertension in labour needs to be actively managed, even if the aetiology of the hypertension is not clearly apparent. (See section 1.2.11)
Postpartum surveillance of women with pre-eclampsia needs to be vigilant as severe deterioration can occur after delivery. *(See section 1.2.11)*
Clinicians responsible for the care of women who may refuse blood and blood products are advised to read carefully to the QMPQC document '*Considerations in the management of pregnant women who refuse blood and blood products*' which can be found at www.health.qld.gov.au **This document was developed in collaboration with senior members of the Jehovah's Witness faith.** *(See section 1.2.12)*
Post-partum thromboprophylaxis in high risk women should be continued for six weeks. *(See section 1.2.11)*
Following a perinatal death, all parents should be offered the option of an autopsy examination. *(See section 1.3.3)*
Council strongly encourages requesting placental histopathology in every case of stillbirth, neonatal death and high risk newborn according to the PSANZ Perinatal Mortality Guidelines. Placentas should be sent to pathology fresh and un-fixed. *(See section 1.3.3)*
Determining the accuracy of completion of the death certificates, and submitting amendments when required, should be a routine part of local perinatal mortality committee review of all perinatal deaths. Parents should be informed of this outcome prior to receiving a revised death certificate. *(See section 1.3.3)*

Repeat caesarean section without labour and induction of labour before 39 weeks of gestation are common, yet are associated with respiratory and other adverse neonatal outcomes. Elective intervention in pregnancy before 39 weeks of gestation should be avoided wherever possible. *(See section 2.3)*
Maternity care providers should provide clear information to women carrying multiple pregnancies regarding the risk of preterm labour, and steps that should be taken in the event that a woman carrying a multiple pregnancy suspects the onset of preterm labour. *(See section 2.5)*
Given the unchanging risks of multiple pregnancy occurring in association with the use of ovulation induction and the consequent risk of adverse perinatal outcomes due to the multiple pregnancies, the same attention to technique monitoring and quality improvement as has been seen with extracorporeal techniques is recommended to those prescribing ovulation induction. *(See section 2.6)*
The RANZCOG Statement 'C-Obs 11 Management of Breech presentation at Term' is relevant to the advice provided to women regarding the appropriate management of breech presentation: 'The Term Breech Trial has been criticised on methodological grounds thereby making its generalisability and applicability to appropriately staffed and resourced Australian and New Zealand hospitals uncertain. Accordingly, some expert groups consider that with adherence to strict criteria before and during labour, planned vaginal delivery of the singleton breech at term may be an option to offer to appropriately counselled and selected women where appropriate personnel and infrastructure to support such a birth are in place. *(See section 2.8)*
Smoking cessation programs as part of routine antenatal care reduces fetal exposure to cigarette smoke, low birthweight and preterm birth, and should form part of routine antenatal care. *(See section 2.10.5)*
Specialised programs to assist Indigenous women to stop smoking before and during pregnancy should be prioritised. *(See section 2.10.5)*
Clinicians making a diagnosis of a congenital anomaly should take particular care to record that anomaly in the medical record, including within the Discharge Summary. (See section 3)
Infants with critical congenital heart disease should be delivered at or near a tertiary paediatric cardiac hospital as previous studies have associated improved short and long term outcomes with newborn care in such facilities. *(See section 3.15)*
A major remedial factor in improving delivery planning and outcome in infants with Transposition of the Great Vessels, Tetralogy of Fallot and Pulmonary Atresia would be to improve antenatal scan detection rates. An improved fetal detection rate in these critical congenital heart disease lesions has been reported after adoption of standardised ultrasound screening views. *(See section 3.15)*
Maternity services are encouraged to be continuously aware of their own performance by monitoring against relevant indicators, and to readily make this information available to staff and to consumers of their care. *(See section 4)*

1. Maternal and perinatal mortality

1.1 Definitions

The Queensland Maternal and Perinatal Quality Council uses the following definitions.

Fetal deaths (= stillbirth): Defined by the Registration of Births, Deaths and Marriages Act as a child who has shown no sign of respiration or heartbeat, or other sign of life, after completely leaving the child's mother; and who has been gestated for 20 weeks or more; or weighs 400g or more.

Live births: Defined by the *Public Health Act 2005* as a "baby whose heart has beaten after delivery of the baby is completed". Birthweight and gestation are not included in this definition. In this report, therefore, deaths of live-born babies where both the birthweight is less than 400g and/or the gestation is less than 20 weeks, and deaths of live-born babies when the birthweight and gestational age are unknown, are included as neonatal deaths.

Neonatal deaths: Neonatal deaths are those occurring in live births within the first 28 days of life.

Mothers: Number of mothers is defined as the number of women having a pregnancy which resulted in a livebirth or a fetal death.

Maternal death: A maternal death is defined by the World Health Organisation (WHO) as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. This definition excludes deaths from accidental or incidental causes.

The definitions used by the Queensland Maternal and Perinatal Quality Council in this report include, in addition to the WHO definition, incidental deaths and deaths occurring more than 42 days after termination of the pregnancy.[1]

Classification of maternal deaths:

Direct deaths are those which result from obstetric complications of the pregnant state (pregnancy, labour and puerperium) including deaths from interventions, omissions, inappropriate treatment, or from a chain of events resulting from any of the above. They are complications of the pregnancy itself.

Indirect deaths are those which result from pre-existing disease or disease that developed during pregnancy and was not due to direct obstetric causes, but which may have been aggravated by physiological effects of pregnancy.

Incidental deaths are those due to conditions occurring during pregnancy, where the pregnancy is unlikely to have contributed significantly to the death, although it is sometimes possible to postulate a distant association. These deaths are not included in the calculation of the maternal mortality ratio.

Late maternal death is the death of a woman later than 42 days but within one year of giving birth or otherwise ending a pregnancy. These deaths are not included in the calculation of the maternal mortality ratio.

Maternal mortality ratio:

The maternal mortality ratio is defined as $\frac{\text{Number of maternal deaths}}{\text{Number of mothers}}$ X 100,000

1.2 Maternal deaths

1.2.1 Maternal mortality ratio (MMR)

In the two years 2012 and 2013 there were 8 maternal deaths (7 direct deaths and 1 indirect death), giving a maternal mortality ratio of 6.4 per 100,000 births. There were also three (3) deaths during pregnancy or one (1) death within 42 days of the end of pregnancy that were classified as incidental deaths, and 28 deaths that were late maternal deaths. One (1) further late death was identified where the birth occurred in Queensland and the death occurred in New Zealand, and three (3) late maternal deaths were recognised from 2011 that had not been previously recorded.

1 Maternal Mortality Working Party, NHMRC. Report on Maternal Deaths in Australia 1991–93. Canberra: NHMRC.

The most recent published maternal death data for Australia, using the ICD-10 / WHO definition of maternal death, shows a national maternal mortality ratio of 7.1 per 100,000 births for the five years 2008 to 2012.[2] The Queensland maternal mortality ratio for this same period using the same definition was 8.5 per 100,000 births. The difference between these two rates is not statistically significant (2008 to 2012 Queensland versus Australia risk ratio for maternal mortality: RR = 1.20, 95 per cent confidence intervals = 0.78, 1.85).

Maternal mortality, in Australia is, traditionally, reported in triennia. The most recent four triennia are shown in Table 1. The differences between the Queensland and Australian maternal mortality ratios for 2006 to 2008 and 2009 to 2011 are not statistically significant (2006 to 2008 Queensland versus Australia risk ratio for maternal mortality: RR = 1.08, 95 per cent confidence intervals = 0.59, 1.97; 2009 to 2011 Queensland versus Australia risk ratio for maternal mortality: RR = 1.25, 95 per cent confidence intervals = 0.72 2.16).

Trienium	Direct	Indirect	Number of women who gave birth in Queensland	MMR Queensland	MMR Australia
2000–2002	8	10	145,756	12.3	11.1
2003–2005	9	12	153,900	13.6	8.4
2006–2008	6	7	175,274	7.4	6.9
2009–2011	4	12	183,176	8.7	7.2

Table 1: Maternal mortality ratios (MMR), Queensland and Australia 2000 to 2011

1.2.2 Classification of cause of maternal deaths 2012 to 2013

In this section the broader QMPQC definition of maternal death is used, including incidental and late maternal deaths.

Table 2 shows the classification of the 40 deaths that occurred during pregnancy or within 365 days of the end of a pregnancy in Queensland in 2012 and 2013. Seven (7) deaths were a direct result of the pregnancy and one was an indirect death (resulted from a pre-existing condition aggravated by the physiological effects of pregnancy). Thirty–two (32) women died of incidental causes (Table 3 and 4).

Maternal death timing	Classification	Total
Deaths during pregnancy	3 Incidental deaths	**3**
Deaths within 42 days of end of pregnancy	7 Direct deaths 1 Indirect death 1 Incidental death	**9**
Deaths between 43 days and 365 days of end of pregnancy (ie. late maternal deaths)		**28**
Total		**40**

Table 2: Classification of maternal deaths in Queensland 2012 to 2013 (includes incidental and late deaths)

1.2.3 Cause of maternal death

Tables 3 and 4 show the causes of the 40 deaths that occurred during pregnancy or within 365 days of the end of a pregnancy. Suicide (8), malignancy (8) and motor vehicle trauma (6) were the most prominent causes of death.

Classification	Cause of death	Number
Direct deaths	Pulmonary embolism	2
	Hypoxic ischaemic encephalopathy; pregnancy complicated by pre-eclampsia & thyrotoxicosis	1
	Ruptured uterus with placenta accreta; refusal of blood products	1
	HELLP syndrome	1
	Severe pre-eclampsia	1
	Suicide - drug overdose in a woman in mental health care	1
Indirect deaths	Arrhythmic cardiac death	1
Incidental deaths	Motor vehicle trauma	2
	Malignancy	1
	Homicide	1

Table 3: Cause of maternal deaths in Queensland, during pregnancy or within 42 days of the end of pregnancy, 2012 to 2013

2 Humphrey MD, Bonello MR, Chughtai A, Macaldowie A, Harris K & Chambers GM 2015. Maternal deaths in Australia 2008–2012 Maternal deaths series no. 5, Cat. no. PER 61. Canberra: AIHW.

Cause of death	Number
Suicide	7
Malignancy	7
Motor vehicle trauma	4
Intracranial haemorrhage	2
Homicide	1
Diabetic keto-acidosis influenced by postpartum depression	1
Drowning	1
Community acquired pneumonia and pulmonary embolism	1
Acute pancreatitis	1
Epilepsy	1
Ventricular non-compaction	1
Self-induced starvation	1

Table 4: Cause of maternal deaths in Queensland, between 43 and 365 days of the end of pregnancy, 2012 to 2013

1.2.4 Avoidability

Six (6) of the 40 deaths (15 per cent) were found to have potentially avoidable factors when reviewed by the Maternal Mortality Sub-Committee of QMPQC (Table 5). In five (5) of those deaths the potentially avoidable factors involved sub-optimal healthcare and in three (3) the potentially avoidable factors involved matters within the responsibility of the woman.

Potentially avoidable - sub-optimal healthcare	5
Potentially avoidable - refusal of blood products	1
Potentially avoidable - poor diabetic control	1
Potentially avoidable - lack of seat belt use	1
No avoidable factors identified	32

Table 5: Avoidable factors in maternal deaths in Queensland, during pregnancy or within 365 days of the end of pregnancy, 2012 to 2013

In women who died, either through pre-eclampsia, or for other reasons, it was clear that the vast majority of women were not weighed as part of their regular antenatal care. In some instances, weight gain may have been helpful in alerting clinicians to more serious underlying pathology. Rapid weight gain may alert the clinician to conduct a careful search for features of pre-eclampsia, peripartum cardiomyopathy, fetal issues, or simply provide counselling about diet and exercise.

Given the high rate of gestational and pre-gestational diabetes, and the major public health issue of obesity in pregnancy, weight gain in pregnancy is a key issue. The Maternal Mortality Sub-Committee recommends that women should be weighed regularly throughout their antenatal care and have their weight gain compared to Institute of Medicine guidelines[3] for weight gain in pregnancy.

Good practice point:

Women should be weighed regularly throughout antenatal care and have their weight gain compared to Institute of Medicine guidelines for weight gain in pregnancy.

1.2.5 Data collection and quality

Data regarding the maternal deaths available to the Maternal Mortality Sub-Committee of the Queensland Maternal and Perinatal Quality Council were extremely variable, as noted in our previous report.

1.2.6 Reporting of maternal deaths

The Maternal Mortality Sub-Committee was unable to access all data potentially relevant to some of the maternal deaths despite requests for cooperative assistance from relevant health professionals. In all cases of death of a woman within one year of ending a pregnancy the Council chair approached the health practitioner with primary responsibility of the care of that woman. While many responded well to such requests, some responded with minimal information and some refused to co-operate at all. The Office of the State Coroner and the Queensland Forensic and Scientific Services provided excellent assistance.

3 Rasmussen K, Abrams B, Bodnar L et al. Weight Gain During Pregnancy: Reexamining the Guidelines. Institute of Medicine of the National Academies. http://iom.edu/~/media/Files/Report%20Files/2009/Weight-Gain-During-Pregnancy-Reexamining-the-Guidelines/Report%20Brief%20-%20Weight%20Gain%20During%20Pregnancy

The Sub-Committee looks forward to more complete reporting in future years associated with the changes to the Public Health Act, passed by parliament in 2013, which mandate reporting by health professionals.

1.2.7 Autopsies following maternal death

The Maternal Mortality Sub-Committee noted some instances where autopsy was not performed but where diagnosis confirmation would have been wise and where information about potential inheritable conditions may have been found (Table 6). In particular, the lack of autopsy for three (3) deaths meeting ICD-10 definition of maternal deaths was of concern.

	Deaths	Autopsies
Total deaths in the period 2012 to 2013	40	26 (65%)
Deaths meeting ICD-10 definition of maternal death	8	5 (62.5%)
Deaths not due to advanced malignancy	32	26 (81.3%)

Table 6: Incidence of autopsy being performed in maternal deaths, Queensland 2012 to 2013

Good practice point:

Autopsy should be undertaken whenever possible in the event of a maternal death, even if a Coronial autopsy is not ordered, because inheritable conditions may be discovered.

1.2.8 Deaths of Aboriginal and Torres Strait Islander women

Five (5) women of the 40 who died during pregnancy or within one year of the end of their pregnancy were Aboriginal and/or Torres Strait Islander women. The indigenous status of all 40 women who died was known.

One (1) of the women of Aboriginal and/or Torres Strait Islander ethnicity who died did so as a direct consequence of pregnancy (severe pre-eclampsia and HELLP syndrome).

The other four (4) Aboriginal and/or Torres Strait Islander women who died did so between 43 and 365 days after the end of the pregnancy. Two (2) women died as a result of motor vehicle trauma and its consequences; one (1) woman died from community-acquired pneumonia and pulmonary embolism; and one (1) woman died due to self-induced starvation.

1.2.9 Psychosocial causations of death

It is of ongoing concern to the Queensland Maternal and Perinatal Quality Council that suicide continues to be the leading cause of death in women during pregnancy and within 365 days of the end of pregnancy. One suicidal death occurred in the 42 days after the end of pregnancy, and a further seven occurred between 43 days and 365 days of the end of pregnancy. In addition, two homicides were recorded and one woman died of self-induced starvation.

In this two–year period, suicidal deaths within a year of the end of a pregnancy occurred in four (4) women who had given birth, three (3) women who had undergone a termination of pregnancy, and one (1) who had a miscarriage. The incidence of suicide in association with pregnancy cannot be calculated, due to the lack of available information regarding the number of miscarriages and terminations of pregnancy in Queensland. However, given that the majority of pregnant women are receiving care from health professionals the opportunity exists to ascertain the women with mental health issues who might benefit from appropriate care from mental health professionals.

QMPQC believes that the potential for depression and other mental health issues, in association with termination of pregnancy, needs to be better appreciated. Practitioners referring women for termination of pregnancy or undertaking termination of pregnancy should ensure adequate follow-up for such women, especially if the procedure is undertaken for mental health concerns.

In its 2013 report, this Council put the following Good Practice Point: *Practitioners referring women for Termination of Pregnancy or undertaking Termination of Pregnancy should ensure adequate follow-up for such women, especially if the procedure is undertaken for mental health concerns.* Little appears to have changed and QMPQC believes that more needs to be done.

Recommendation:

That the Private Health Regulation Team review facility registration requirements in relation to facilities providing termination of pregnancy (TOP) services, to ensure that the need for appropriate post-TOP follow-up by health practitioners is made part of the formal advice and counselling provided to their clients.

Equally, active follow-up of the women known to be at risk of depression from prenatal and postnatal screening needs to be universal and effective.

Beyondblue, in its Clinical Practice Guidelines,[4] recommends that:

- The Edinburgh Postnatal Depression Score (EPDS) should be used by health professionals as a component of the assessment of all women for symptoms of depression in the antenatal period.
- Health professionals should use the EPDS as a component of the assessment of all women in the postnatal period for symptoms of depression or co-occurring depression and anxiety.
- A score of 13 or more can be used for detecting symptoms of major depression in the postnatal period.

Good practice points:

Women with a history of serious mental illness (e.g. schizophrenia, bipolar affective disorder, schizoaffective disorder) should routinely be offered mental health follow-up for at least the first twelve months post-partum. The woman's GP would be the most appropriate health practitioner to undertake such follow-up in most circumstances.

Mental health screening is performed almost universally in the public sector but less so in the private sector. Use of the Edinburgh Post Natal Depression Score in the private sector may help to identify women who warrant further follow-up.

1.2.10 Deaths due to malignancy

Eight women died of malignancy, which was undiagnosed prior to, during and after pregnancy. It is important to note that many of the symptoms of pregnancy, such as nausea, abdominal pain or rectal bleeding can also be features of malignancy. In many of the cases of malignancy that were undiagnosed, careful assessment of the clinical notes revealed that all of these women had actually lost weight (often substantial amounts of weight) during pregnancy. This further emphasises the need to weigh women through the antenatal period, and in women who do not gain weight appropriately, for clinicians to undertake clinical history, examination and basic investigations to exclude serious disease.

Women who have any of the following symptoms warrant a thorough clinical history, examination, and appropriate investigations:

- longstanding post coital bleeding
- rectal bleeding
- abdominal pain
- fevers
- unexplained weight loss.

Most women who died of malignancy that was undiagnosed had presented to numerous providers (general practitioners, obstetricians, doctors in training, midwives), and had reported multiple symptoms that were clearly associated with their subsequently diagnosed malignancy. Often, very little evidence could be obtained of any health care provider having undertaken appropriate clinical history, examination or basic investigations to exclude serious underlying pathology. In addition, severe iron deficiency anaemia was identified in all women who subsequently died of colorectal carcinoma, but all of these women also had severe weight loss. The combination of significant weight loss, in the presence of iron deficiency anaemia probably warrants a thorough search for underlying gastrointestinal pathology (inflammatory bowel disease, coeliac disease, malignancy). Due to the increasing age of pregnant women, the increasing levels of obesity in pregnancy, and presumably other factors, malignancy is increasingly common in pregnancy, and so malignancy should be considered and excluded as part of thorough clinical care of pregnant women.

4 Austin M-P, Highet N and the Guidelines Expert Advisory Committee. (2011).“Clinical practice guidelines for depression and related disorders—anxiety, bipolar disorder and puerperal psychosis—in the perinatal period. A guideline for primary care health professionals.” Melbourne: beyondblue: the national depression initiative.

Good practice point:

Clinicians should be wary of inadequate weight gain or weight loss during pregnancy, especially in the presence of disturbed bowel habits and/or unexpected or poorly responsive iron deficiency. Adequate diagnosis of conditions that may cause such symptoms and signs is difficult in pregnancy.

1.2.11 Hypertension in pregnancy

There were three (3) direct deaths that were the consequence of pre-eclampsia and its complications. Review of these cases revealed inadequate awareness of the processes underlying pre-eclampsia and inadequate management of hypertension. The Maternal Mortality Sub-committee of QMPQC noted that antenatal surveillance needs to be thorough even in women deemed low risk as preeclampsia can occur with little warning and not necessarily in a textbook fashion (e.g. proteinuria may occur before hypertension).

Good practice points:

A rise in blood pressure during antenatal care needs careful evaluation and review. This is particularly important in women with Gestational Diabetes, who are at an increased risk of developing pre-eclampsia.

Hypertension in labour needs to be actively managed, even if the aetiology of the hypertension is not clearly apparent.

Postpartum surveillance of women with pre-eclampsia needs to be vigilant as severe deterioration can occur after delivery.

1.2.12 Other clinical issues raised by case review

A report of this type does not allow for detailed discussion of individual case management. However, the Maternal Mortality Sub-Committee noted two areas of concern requiring comment in the following good practice points:

Good practice point:

Clinicians responsible for the care of women who may refuse blood and blood products are advised to read carefully the QMPQC document '*Considerations in the management of pregnant women who refuse blood and blood products*' which can be found at www.health.qld.gov.au. This document was developed in collaboration with senior members of the Jehovah's Witness faith.

Good practice point:

Post-partum thromboprophylaxis in high risk women should be continued for six weeks.

1.2.13 Characteristics of women who died in the decade 2004 to 2013

Tables 7 and 8 provide an overview of the 53 women who died as a direct or indirect result of pregnancy over the last decade (2004 to 2013) during pregnancy or within 42 days of the end of pregnancy (ie. direct and indirect maternal deaths).

Forty–seven per cent (47 per cent) of the deaths were direct deaths. Twenty–three per cent (23 per cent) occurred during pregnancy, fifty-eight per cent (58 per cent) occurred after the birth of the baby and nineteen per cent (19 per cent) occurred after a termination of pregnancy or miscarriage (Table 7). Thirty–four percent (34 per cent) of the deaths were found to have been avoidable or potentially avoidable.

Characteristic		Number	%
Death classification	Direct	25	47.2
	Indirect	27	50.9
	Classification uncertain (sudden cardiac death)	1	1.9
Timing of death	Death occurred in trimester 1 of pregnancy	4	7.5
	Death occurred in trimester 2 of pregnancy	4	7.5
	Death occurred in trimester 3 of pregnancy	4	7.5
	Death occurred after the woman gave birth	31	58.5
	Death occurred after a miscarriage	2	3.8
	Death occurred after a termination of pregnancy	8	15.2
Autopsy	Autopsy performed	43	81.1
	Autopsy not performed	10	18.9
Avoidability	Avoidable	3	5.7
	Potentially avoidable	15	28.3
	No avoidable factors	33	62.3
	Avoidability uncertain	2	3.8

Table 7: Clinical characteristics of direct and indirect maternal deaths, Queensland 2004 to 2013

In Table 8, thirteen per cent (13.2 per cent) of the deaths occurred in Aboriginal and/or Torres Strait Islander women, though Aboriginal and/or Torres Strait Islander women only made up 5.8 per cent of the women giving birth in Queensland (Relative risk = 2.79; 95 per cent confidence intervals 1.41, 5.49). Parous women had a higher incidence of maternal death when compared to all women giving birth in Queensland, this difference was statistically significant (Relative risk = 1.31; 95 per cent confidence intervals 1.09, 1.57).

Apart from these characteristics the women who died were not significantly different to all women giving birth in Queensland. The women who died were aged between 17 and 43 years with a median age of 30 and their BMIs ranged from 14.7 to 43.1 with a median of 25.5. The remoteness of residence of the women who died was similar to that for the entire birthing cohort.

Characteristic		Maternal deaths	Queensland§
Aboriginal & Torres Strait Islander status	Aboriginal and/or Torres Strait Islander	13.2%	5.8%
	Non-Indigenous	81.1%	94.1%
	Not specified	5.7%	0.1%
Age	Average age	29.2	29.3
	Median age	30	29
	Age range	17–43	13–60
Parity	Average parity	2.3	1.1
	Median parity	2	1
	Parity range	0–8	0–16
BMI	Average BMI	27	25.6
	Median BMI	25.5	24.2
	BMI range	14.7–43.1	11.8–86.6
Remoteness of residence	Highly Accessible (0 to <0.20*)	60.4%	60.5%
	Accessible (0.20 to <2.40*)	16.9%	20.2%
	Moderately Accessible (2.40 to <5.95*)	18.9%	16.1%
	Remote (5.95 to <10.5*)	1.9%	1.7%
	Very Remote (10.5 to <15*)	1.9%	1.4%

Table 8: Characteristics of women who died (direct and indirect deaths), Queensland 2004 to 2013
§ Percentage of all women giving birth (Perinatal data collection, Queensland Health) 2009 to 2013 * ARIA+ score

1.2.14 Causes of maternal deaths in the decade 2004 to 2013

The causes of death of the 53 direct and indirect maternal deaths that occurred between 2004 and 2013 are shown in Figure 1 and Table A1. As the numbers are small on a population basis, care should be taken with interpretation.

Overall the most common group of causes were psychosocial (e.g. suicide, homicide, substance abuse), cardiovascular disease and thromboembolism. The most common causes of direct maternal deaths were thromboembolism, obstetric haemorrhage and hypertensive disorders, whilst the most common causes of indirect maternal deaths were psychosocial, cardiovascular disease and non-obstetric haemorrhage (e.g. ruptured splenic artery aneurysm, intracranial haemorrhage).

In comparison with maternal mortality reports from the 1980s and 1990s from the predecessor to QMPQC (the Queensland Council on Obstetric and Paediatric Morbidity and Mortality) and from Australian and United Kingdom maternal mortality review groups, the developing predominance of indirect causes of death (rather than direct causes of death) bears policy consideration. Training for and resourcing of obstetric medicine services and perinatal mental health services are, therefore, becoming increasingly important.

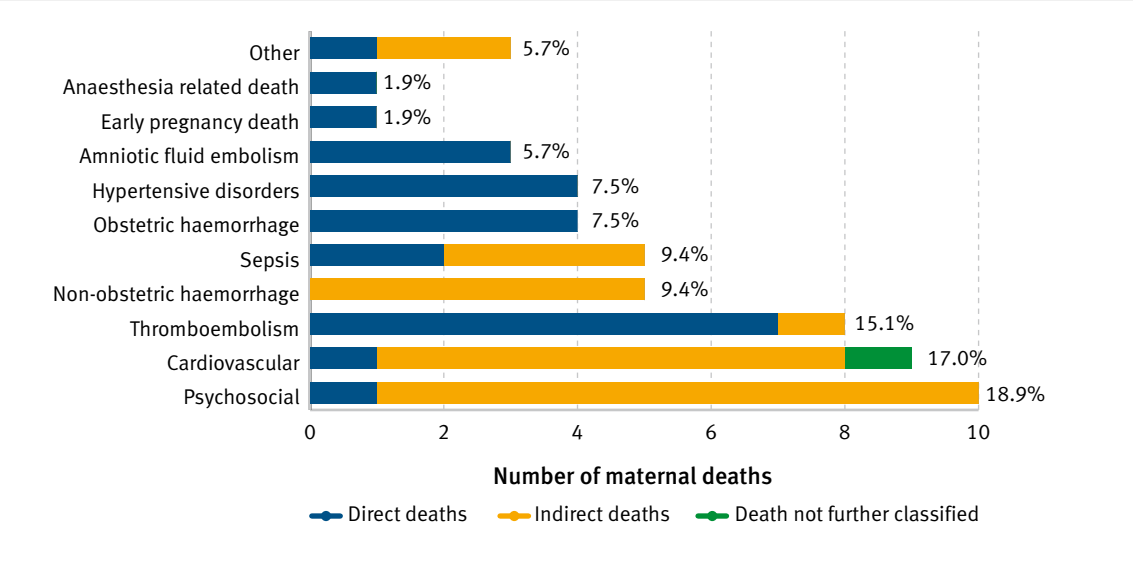


Figure 1: Causes of maternal deaths (direct and indirect deaths), Queensland 2004 to 2013

1.3 Perinatal deaths

1.3.1 Perinatal mortality review modus operandi

All perinatal deaths in Queensland are subject to a systematic review. Perinatal mortality data have been obtained from the Perinatal Data Collection Unit, Health Statistics Branch, Department of Health, the Registry of Births Deaths and Marriages, and case summaries from hospital and regional perinatal mortality committees in Queensland. A number of local perinatal mortality committees collaborate with the Council in the perinatal mortality review process, submitting confidential case summaries and classifications.

1.3.2 Clinical classification

The QMPQC has adopted the Perinatal Society of Australia and New Zealand (PSANZ) classification system including the Perinatal Death Classification (PSANZ-PDC) and, in addition for neonatal deaths, the PSANZ Neonatal Death Classification (PSANZ-NDC)[5], and all perinatal deaths in Queensland are classified accordingly. The system has been shown to perform well against other contemporary systems[6]. The purpose of classifying deaths according to the PSANZ system is to identify preventable factors associated with perinatal death, through the systematic application of clinically relevant categories to large populations.

1.3.3 Data collection and data quality

The data used to assist in classification of perinatal deaths by the Perinatal Mortality Sub-Committee are sourced from:

- Electronic extracts and paper MR63D forms, which are completed by all maternity hospitals in Queensland and forwarded to the Perinatal Data Collection Unit (Queensland Department of Health). The electronic extract and paper MR63D form (a potentially rich data source containing over 50 data fields) is used to supply information to the National Perinatal Epidemiology and Statistics Unit (NPESU) and can also be used for benchmarking and other research projects
- The Medical Certificate of Cause of Perinatal Death (Forms 9 and 9A)
- The National Perinatal Death Clinical Audit Tool (NPDCAT) summaries received and discharge summaries (where available) from hospitals
- Pathology reports including autopsy, placental pathology and cytogenetic reports.

During the course of review of perinatal deaths, the Sub-Committee's ability to classify cause of death accurately was often limited due to inadequate investigation and conflicting or lacking information in the materials provided. Low autopsy rates continue to pose a major limitation.

Placental pathology, which is an essential component of investigation protocol for stillbirths and neonatal deaths, was often not performed in cases of death where this examination may have provided the only lead to reasons for the death. Despite a presumed cause of death, placental pathology should be undertaken for all stillbirths and also for births of infants at increased risk of neonatal death. Placental histopathology remains a cornerstone investigation of perinatal death and other poor pregnancy outcomes.

The overall autopsy rate has remained relatively constant at thirty per cent (30 per cent). This rate is disappointingly low. Autopsy remains the gold standard investigation and appropriate counselling should be provided to all parents following a stillbirth or neonatal death about the option of a high quality autopsy[7]. Parents should be made aware that important information about the cause of death may be missed if an autopsy is not performed. Unfortunately, an insufficient number of pathologists with expertise in perinatal autopsy in Queensland is an impediment to quality and reporting. Delays in receiving autopsy reports of six months or more are not uncommon in Queensland.

5 Chan A, King J, Flenady V, Haslam R, Tudehope D. (2004). "Classification of perinatal deaths: development of the Australian and New Zealand Classifications." J Paediatr. Child Health. Jul; 40(7):340-7.

6 Flenady V, Frøen JF, Pinar H, Torabi R, Saastad E, Guyon G, Russell L, Charles A, Harrison C, Chauke L, Pattinson R, Koshy R, Bahrin S, Gardener G, Day K, Petersson K, Gordon A, Gilshenan K. (2009). "An evaluation of classification systems for stillbirth. BMC Pregnancy Childbirth."9:24.

7 Flenady V, King J, Charles A, et al.(2009). "Clinical practice guideline for perinatal mortality." Version 2.2 April. www.psanz.org.au Accessed August 2011

Good practice points:

Following a perinatal death, all parents should be offered the option of an autopsy examination.

Council strongly encourages requesting placental histopathology in every case of stillbirth, neonatal death and high risk newborn according to the PSANZ Perinatal Mortality Guidelines[8]. Placentas should be sent to pathology fresh and un-fixed.

The need for high quality perinatal autopsies, performed by pathologists with specialised paediatric and perinatal training and experience is emphasised. This is of particular importance at a time of potential changes in the structure and delivery of health services. The necessity for training, retaining, and supporting pathologists with expertise in perinatal autopsy procedures is also emphasised. Recognition of the need for continued investment of time and resources is required for maintenance of accessible, sustainable, tertiary level post mortem services. Perinatal post mortem services are largely restricted to the public sector. Access to perinatal post mortem services and out of pocket costs are significant barriers to bereaved parents in the private health sector seeking perinatal post mortem services.

Death certificate (DC) data are notoriously inaccurate worldwide[9] and, in Australia, it is largely attributed to the policy of completing the death certificate at the time of a perinatal death prior to full investigation and review of the death. The Perinatal Mortality Sub-Committee found that the information on death certificates was often inaccurate. Common errors included administrative aspects due to lack of knowledge of the requirements and assigned cause of death. The Perinatal Mortality Sub-Committee is undertaking a detailed review of death certificates to identify areas for clinician education to improve accuracy of this information. Following review and classification of perinatal deaths, clinicians are encouraged to submit a revised death certificate where information is found to be inaccurate for re-issuing to the parents. Parents should be contacted prior to receiving a revised death certificate to inform them of this outcome.

Good practice point:

Determining the accuracy of completion of the death certificates, and submitting amendments when required, should be a routine part of local perinatal mortality committee review of all perinatal deaths. Parents should be informed of this outcome prior to receiving a revised death certificate

1.3.4 The IMPROVE educational program

The IMPROVE program (IMproving Perinatal Review and Outcomes Via Education) has been well received across Queensland. Throughout the conduct of these workshops it has become clear that IMPROVE addresses a real gap in knowledge and expertise for many front-line clinicians when caring for parents following a perinatal death. Continuation of this program is crucially important to ensure optimal bereavement care and to illustrate and explain the advantages of a thorough investigation of every perinatal death, particularly autopsy, and to better equip clinicians with appropriate information and skills for counselling parents regarding their decision on autopsy.

Through funding made available by the Queensland Department of Health, the educational program IMPROVE (IMproving Perinatal Review and Outcomes Via Education) based on the PSANZ Perinatal Mortality Guidelines, was made available to clinicians providing maternity care in the larger Queensland maternity hospitals (www.stillbirthalliance.org.au).

Between January 2010 and December 2012 18 IMPROVE workshops were conducted in Queensland: Mater Mothers' Hospital (3), Gold Coast Hospital (2), Ipswich Hospital (2), Royal Brisbane and Women's Hospital (2), Cairns Base Hospital, Logan Hospital, Mackay Base Hospital, Roma Hospital, Rockhampton Base Hospital, The Townsville Hospital, and Toowoomba Hospital. A total of 441 participants attended these workshops (23 per cent medical staff, 63 per cent midwives, 4.2 per cent nurses, 9.8 per cent other).

In Queensland, IMPROVE can currently only be offered on a fee for service basis which may result in suboptimal coverage. Continuation of this program is crucially important to ensure high quality investigation and audit of all perinatal deaths and optimal care for women, their partners and families who experience this loss.

8 PSANZ Clinical Practice Guideline for Perinatal Mortality, Chapter 4 – Perinatal post-mortem examination. www.stillbirthalliance.org.au/guideline1.htm

9 Kirby RS. (1993). "The coding of underlying cause of death from fetal death certificates: issues and policy considerations." Am J Public Health. 83: 1088-91

1.3.5 National Perinatal Death Clinical Audit Tool (NPDCAT)

The Council is participating in pilot testing a new national form for perinatal deaths developed by the Perinatal Society of Australia and New Zealand. The over-arching purpose of the form is to improve the quality of information on perinatal deaths to enhance hospital committee review and national reporting through relevant health department committees such as QMPQC. The form has been developed over many years in collaboration with NPESU and the Perinatal Maternal Mortality Review Committee (PMMRC) in New Zealand. To enable comparisons, the form is almost identical to that used by the PMMRC.

Hospital committees are asked to submit the completed form, which can be accessed at www.health.qld.gov.au/caru/networks/docs/qmpqc_npdca_feb11.pdf following review of each perinatal death.

1.3.6 Definitions of perinatal deaths

Comparison with Australia-wide data needs to be undertaken carefully, as the Australian Institute of Health and Welfare (AIHW) uses slightly different perinatal death definitions in the National Perinatal Data Collection (NPDC) to those found in the Queensland legislation.

The AIHW Australia's Mothers and Babies series states: "In Australia, all fetal and neonatal deaths of at least 400 grams birthweight or, if birthweight is unavailable, a gestational age of at least 20 weeks should be registered." The NPDC restricts the inclusion of live births to those of at least 400g birthweight.

Queensland legislation applies different definitions (as shown in section 1.1) such that live born babies where the birthweight is less than 400g and/or the gestation is less than 20 weeks, and deaths of live-born babies when the birthweight and gestational age are unknown, are included.

1.3.7 Perinatal mortality rates and trends

Over the decade 2004 to 2013 the perinatal mortality rate, and its constituent stillbirth rate and neonatal mortality rate, have not changed significantly in Queensland (Figure 2 and Table A2).

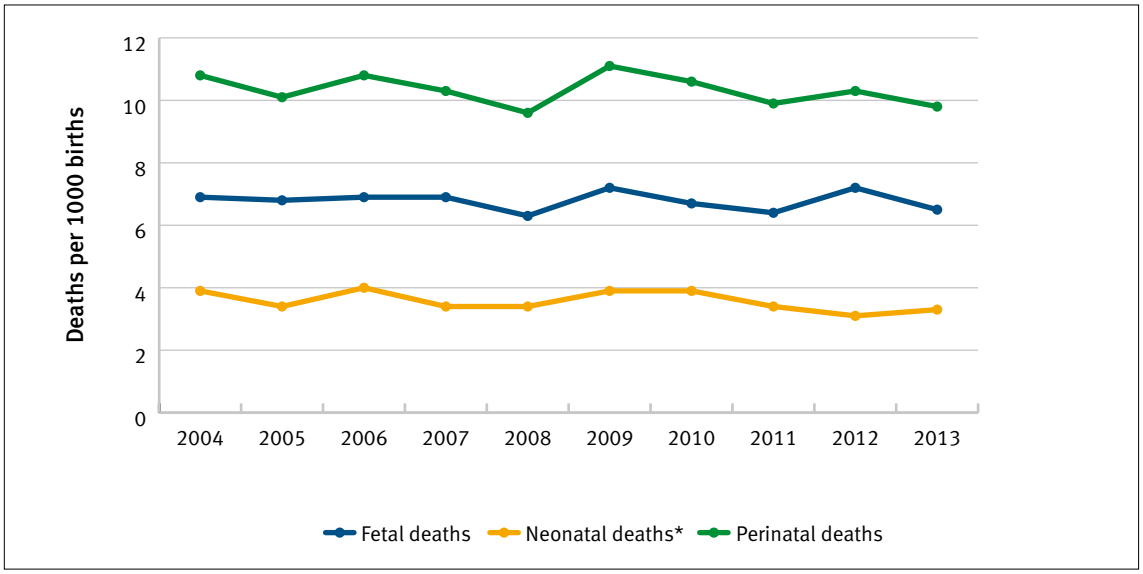


Figure 2: Perinatal mortality rates, Queensland 2004 to 2013
(*neonatal mortality rate per 1000 live births)
(see section 1.1 regarding definitions of neonatal deaths and stillbirths)

The perinatal mortality rate in Queensland for the years 2012 and 2013 was 10.0 deaths per 1000 births, with the stillbirth rate 6.9 deaths per 1000 births and the neonatal mortality rate 3.2 per 1000 live births.

For the most recent 5 years published in Australia's Mothers and Babies reports (2008 to 2012)[10,11,12,13,14] the neonatal mortality rate in Queensland was higher than the rest of Australia (Relative risk, Queensland vs Australia = 1.24; 95 per cent confidence intervals 1.16, 1.33) and the stillbirth rate in Queensland was lower than for Australia (Relative risk, Queensland vs Australia = 0.92; 95 per cent confidence intervals 0.77, 0.96). The overall perinatal mortality rate in Queensland was not significantly different to that in the rest of Australia (Relative risk, Queensland vs Australia = 1.01; 95 per cent confidence intervals 0.97, 1.05).

The perinatal mortality rates for public hospital and private hospital modes of healthcare delivery (2012–2013) are seen in Table 9. Public hospital data is now entered into the Perinatal Data Collection divided between those woman and babies being cared for in Birthing Centres (which are all attached to public hospital and health services) and those cared for in the rest of the public hospital system.

The differential in rates has multiple explanations, including differences in acuity of care needed, gestation and birth weight limits appropriate to the facilities, and maternal profile differences.

	Perinatal deaths		Stillbirths		Neonatal deaths	
	n	PNMR	n	SBR	n	NMR
Public hospital care	997	11.3	667	7.6	330	3.7
Birthing centre (public)	1	NC	1	NC	–	–
Total public hospital care	998	11.1	668	7.4	330	3.7
Private hospital care	270	7.4	201	5.5	69	1.9
Home birth	2	NC	–	–	2	NC
Care mode not stated	2	NC	2	NC	–	–
Total	**1,272**	**10**	**871**	**6.9**	**401**	**3.2**

Table 9: Perinatal mortality rates by facility type, Queensland 2012 to 2013
(PNMR = perinatal mortality rate per 1000 births, SBR = stillbirth rate per 1000 births, NMR = neonatal mortality rate per 1000 live births, NC = rate not calculated due to small numbers)

Ministerial Taskforce on Perinatal and Infant Mortality Rates in Queensland

In September 2014 a Ministerial Taskforce was appointed to examine the issue of perinatal mortality rates in Queensland, with a particular emphasis on the apparently higher rates of neonatal mortality (NMR) in Queensland. The taskforce comprised obstetricians, neonatologists, epidemiologists, statisticians and Queensland Health officials. After the first meeting the brief of the taskforce was extended to include infant mortality. The work has not yet been completed but the focus has been on differences in jurisdictional definitions, problems of classification of neonatal death and stillbirth (especially in regard to termination of pregnancy), and neonatal death rates in urban and regional centres. To date, the taskforce has not identified a clear reason, or set of reasons, to fully account for the difference in NMR between Queensland the rest of Australia but is continuing to examine data. However, it is of the view that at least part of the difference is to do with definitions, case ascertainment and classification.

1.3.8 PSANZ Perinatal Death Classification (PSANZ-PDC and PSANZ-NDC) of perinatal deaths

The overall perinatal mortality rate (PNMR) for the period 2012 to 2013 was 10.0 per 1000 births (1272 of the 126,881 babies born in this period) (Table 9). A little over two–thirds of these perinatal deaths were stillbirths (871, 68.5 per cent), and the remaining 401 babies (31.5 per cent) died in the newborn period.

Tables 10 and 11 show the classification of perinatal deaths by PSANZ-PDC and PSANZ-NDC classifications (see 1.3.2 above). Tables A3 and A4 show the classifications in greater detail.

10 Laws PJ, Li Z & Sullivan EA 2010. Australia's mothers and babies 2008. Perinatal statistics series no. 24. Cat. no. PER 50. Canberra: AIHW National Perinatal Epidemiology and Statistics Unit

11 Li Z, McNally L, Hilder L & Sullivan EA 2011. Australia's mothers and babies 2009. Perinatal statistics series no. 25. Cat. no. PER 52. Sydney: AIHW National Perinatal Epidemiology and Statistics Unit.

12 Li Z, Zeki R, Hilder L & Sullivan EA 2012. Australia's mothers and babies 2010. Perinatal statistics series no. 27. Cat. no. PER 57. Canberra: AIHW National Perinatal Epidemiology and Statistics Unit.

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

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

The principal PSANZ-PDC categories for perinatal deaths were congenital abnormality (28.8 per cent), unexplained antepartum death (22.3 per cent) and spontaneous preterm (20.9 per cent) (Figure 3).

The most frequent categories of the PSANZ-PDC for stillbirths, accounting for almost 70 per cent of these deaths, were unexplained antepartum death (32.6 per cent); congenital abnormality (27.2 per cent), and spontaneous preterm (12.1 per cent) (Figure 4).

Neonatal deaths were classified by both PSANZ-PDC and PSANZ -NDC. The main categories of the PSANZ-PDC were: spontaneous preterm (40.1 per cent) and congenital abnormality (32.2 per cent) with no obstetric antecedent found in 4.2 per cent (Figure 5). The major categories according to the PSANZ-NDC were extreme prematurity (39.9 per cent) and congenital abnormality (31.2 per cent) (Figure 6).

	Type of Perinatal Death								
	Stillbirth			Neonatal Death			Perinatal Death		
PSANZ-PDC classification	n	%	Rate[1]	n	%	Rate[2]	n	%	Rate[1]
1. Congenital abnormality	237	27.2	1.9	129	32.2	1.0	366	28.8	2.9
2. Perinatal infection	29	3.3	0.2	7	1.7	0.1	36	2.8	0.3
3. Hypertension	13	1.5	0.1	8	2.0	0.1	21	1.7	0.2
4. Antepartum haemorrhage	47	5.4	0.4	33	8.2	0.3	80	6.3	0.6
5. Maternal conditions	15	1.7	0.1	5	1.2	0.0	20	1.6	0.2
6. Specific perinatal conditions	80	9.2	0.6	13	3.2	0.1	93	7.3	0.7
7. Hypoxic peripartum deaths	18	2.1	0.1	24	6.0	0.2	42	3.3	0.3
8. Fetal growth restriction	42	4.8	0.3	4	1.0	0.0	46	3.6	0.4
9. Spontaneous preterm	105	12.1	0.8	161	40.1	1.3	266	20.9	2.1
10. Unexplained antepartum death	284	32.6	2.3				284	22.3	2.3
11. No obstetric antecedent	1	0.1	0.0	17	4.2	0.1	18	1.4	0.1
Total	**871**	**100.0**	**6.9**	**401**	**100.0**	**3.2**	**1272**	**100.0**	**10.1**

Table 10: Perinatal deaths by type and PSANZ-PDC, Queensland 2012 to 2013
(% = percentage, 1 = per 1000 births; 2 = per 1000 live births)

	Neonatal Deaths		
PSANZ–NDC classification	n	%	Rate[1]
1. Congenital abnormality	125	31.2	1.0
2. Extreme prematurity	160	39.9	1.3
3. Cardio-respiratory disorders	26	6.5	0.2
4. Infection	19	4.7	0.2
5. Neurological	47	11.7	0.4
6. Gastrointestinal	7	1.7	0.1
7. Other	17	4.2	0.1
Total	**401**	**100.0**	**3.2**

Table 11: Neonatal deaths PSANZ-NDC, Queensland 2012 to 2013
(% = percentage,1 = per 1000 live births)

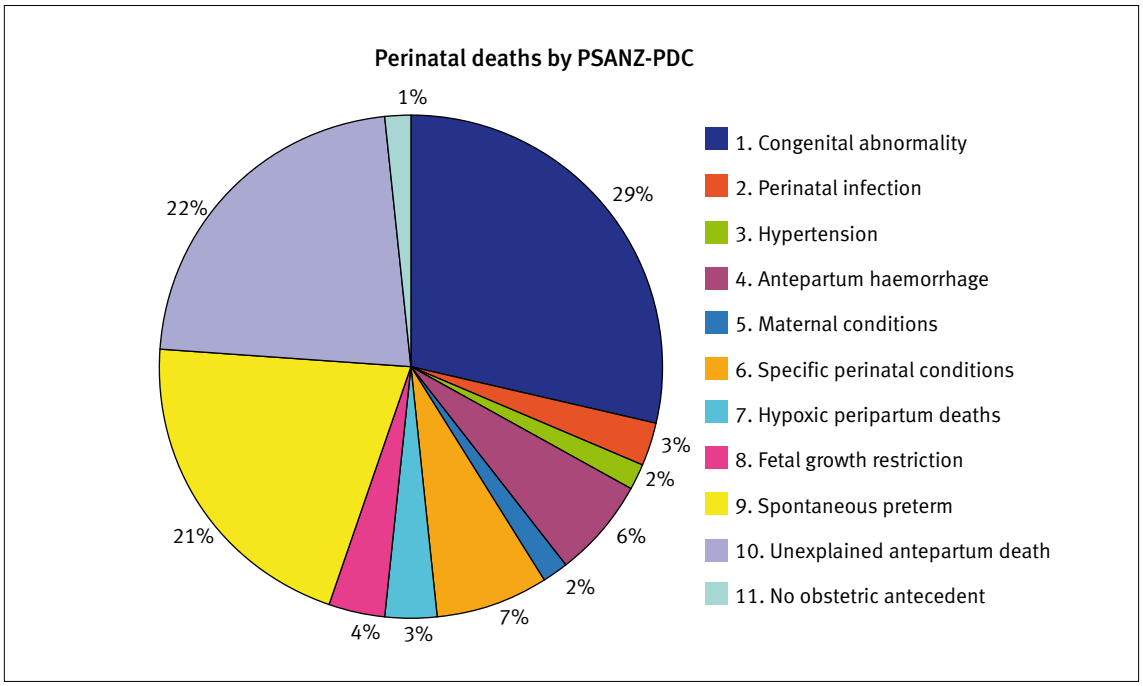


Figure 3: Perinatal deaths by PSANZ-PDC classification, Queensland 2012 to 2013

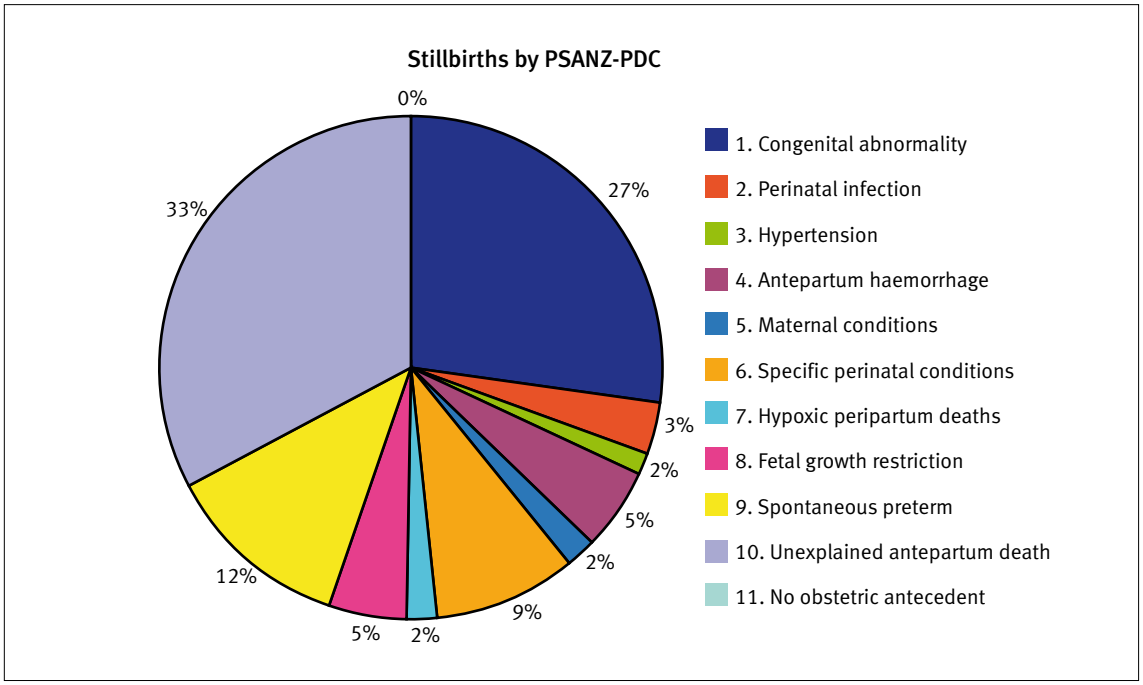


Figure 4: Stillbirths by PSANZ-PDC classification, Queensland 2012 to 2013

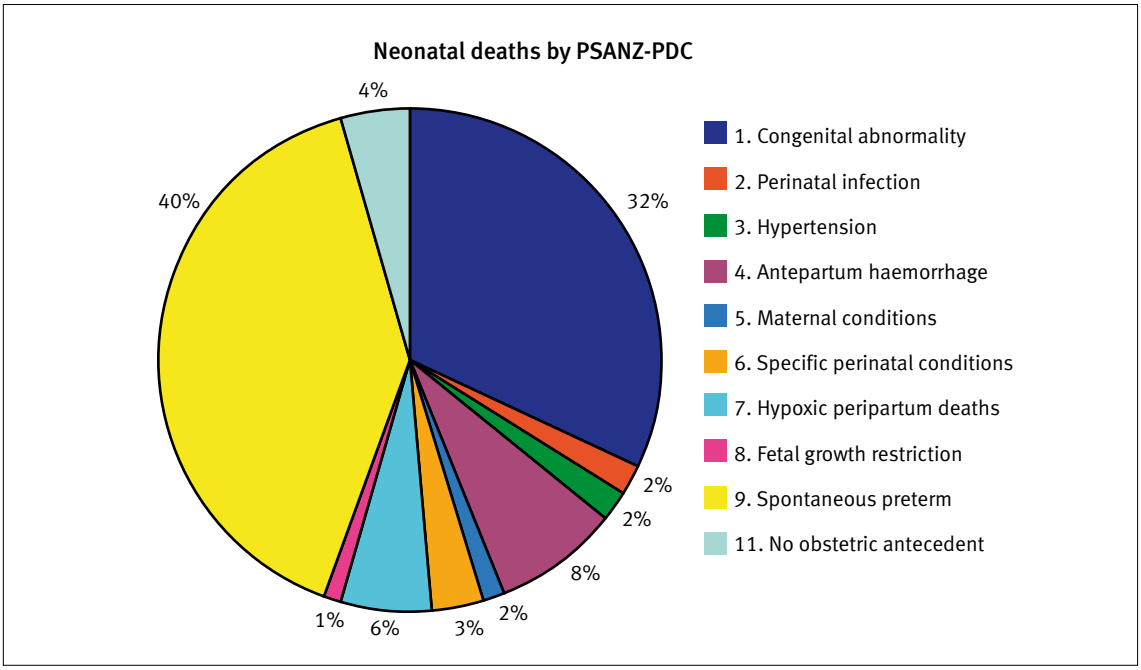


Figure 5: Neonatal deaths by PSANZ-PDC classification, Queensland 2012 to 2013

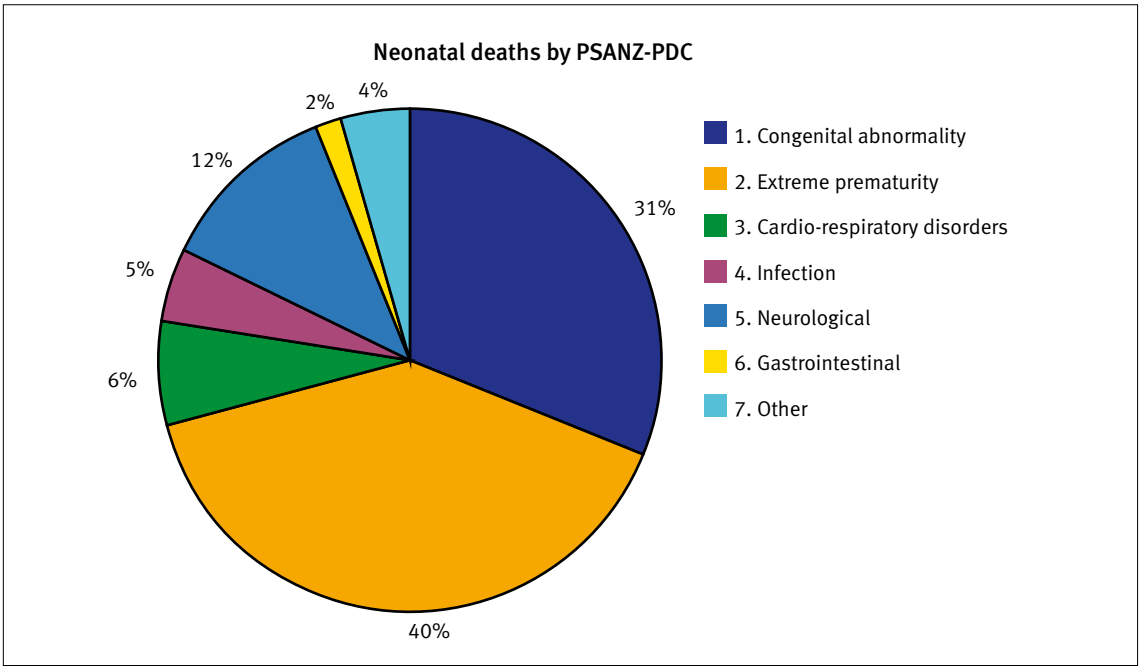


Figure 6: Neonatal deaths by PSANZ-NDC classification, Queensland 2012 to 2013

The major subcategories of the congenital abnormality category on PSANZ-PDC classification were, for stillbirths and neonatal deaths respectively: central nervous system 7.2 per cent and 6.0 per cent; chromosomal 6.2 per cent and 7.0 per cent; cardiovascular 5.1 per cent and 6.0 per cent (Table A3).

In the majority (62.8 per cent) of perinatal deaths assigned to the category of spontaneous preterm, chorioamnionitis was either clinically suspected or confirmed on histopathology of the placenta. In 21.8 per cent of these perinatal deaths, either no placental histopathology was undertaken or it was unknown whether this was performed.

Thirty–six (12.7 per cent) of the 284 unexplained stillbirths (unexplained antepartum death) were associated with significant placental insufficiency (Table A3, Category 10.1) and in some other approaches to classification internationally (Froen[15], Korteweg[16]) would be classified as a placental pathology cause of death rather than unexplained. Further, in 50 (17.6 per cent) of these apparently unexplained deaths, placental histopathology was either not performed or unknown whether it was performed.

As placental pathology is a crucially important investigation for stillbirths, it could be argued that causes in these cases should be classified as "unclassifiable" rather than "unexplained".

Removing the "unclassifiable" and the placental insufficiency groups reduces the unexplained stillbirth proportion to 18.4 per cent (rather than 22.3 per cent). Including an autopsy examination as part of the criteria for assignment of the unexplained antepartum stillbirth category may reduce this further.

Revisions to the PSANZ–PDC definition of the unexplained antepartum death category are currently being considered by the PSANZ Perinatal Mortality Group to more clearly identify the true proportion of unexplained deaths.

Further, the proportion of the unexplained stillbirth group where a placental pathology report was not available at the time of classification indicates room for improvement in standards of investigation and audit of stillbirths.

Recommendation:

That all front line clinicians (medical officers, nursing staff and bereavement support personnel) involved in Queensland Hospital Maternity and Newborn Services attend the IMPROVE educational program to enhance optimal clinical practice around the time of a perinatal death according to the PSANZ Perinatal Mortality Guidelines

15 Froen, J. F., Pinar H., Flenady V.J. et al. (2009). "Causes of death and associated conditions (Codac): a utilitarian approach to the classification of perinatal deaths." BMC Pregnancy Childbirth 9: 22.

16 Korteweg, F. J., Gordijn S. J., et al. (2006). "The Tulip classification of perinatal mortality: introduction and multidisciplinary inter-rater agreement." BJOG 113(4): 393-401.

1.3.9 Multiple pregnancy

Multiple pregnancy was associated with a perinatal mortality rate of 42.2 per 1000 births, compared with 9.0 per 1000 births for singleton pregnancies (Figures 7 and 8, Tables A5 and A6) (2012 to 2013 multiple pregnancy versus singleton pregnancy risk ratio for perinatal death: RR = 4.71, 95 per cent confidence intervals = 4.02 5.51). Caution is advised in interpreting Figures 7 and 8 due to log scale being used on the horizontal axis of each graph.

The principal conditions contributing to the excessive incidence of perinatal death in multiple pregnancy are spontaneous preterm, specific perinatal conditions (twin-twin transfusion), congenital abnormality and unexplained antepartum death (PSANZ-PDC); the principal known causes of the excessive incidence of neonatal death in multiple pregnancy are extreme prematurity, congenital abnormality, neurological and cardio-respiratory (PSANZ-NDC).

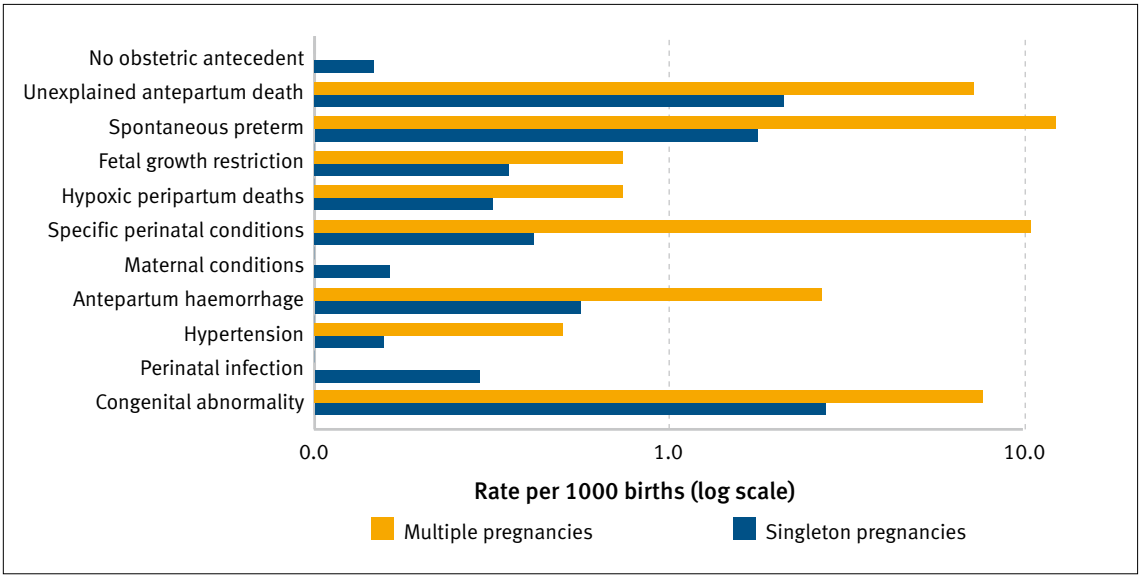


Figure 7: Perinatal deaths by plurality of pregnancy and PSANZ-PDC classification, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

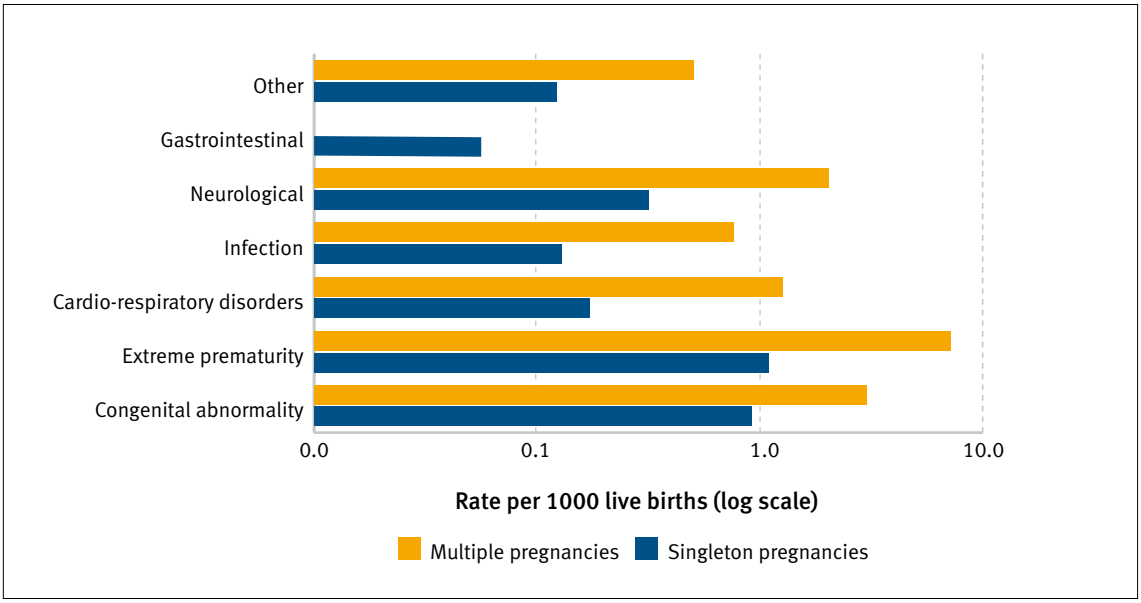


Figure 8: Perinatal deaths by plurality of pregnancy and PSANZ-NDC classification, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

1.3.10 Aboriginal and Torres Strait Islander perinatal mortality

Babies born to Aboriginal and/or Torres Strait Islander mothers were more likely to die in the perinatal period (14.7 per 1000 births) than their non-Indigenous counter parts (9.7 per 1000 births) (2012 to 2013 Aboriginal and/or Torres Strait Islander versus non-Indigenous risk ratio for perinatal death: RR = 1.51, 95 per cent confidence intervals = 1.25, 1.83) (Table A7). The incidence of both stillbirth and neonatal deaths was significantly higher for Aboriginal and/or Torres Strait Islander babies compared with non-Indigenous babies (9.0 per 1000 births versus 6.7 per 1000 births, and 5.7per 1000 live births versus 3.0 per 1000 live births respectively)(Figure 9).

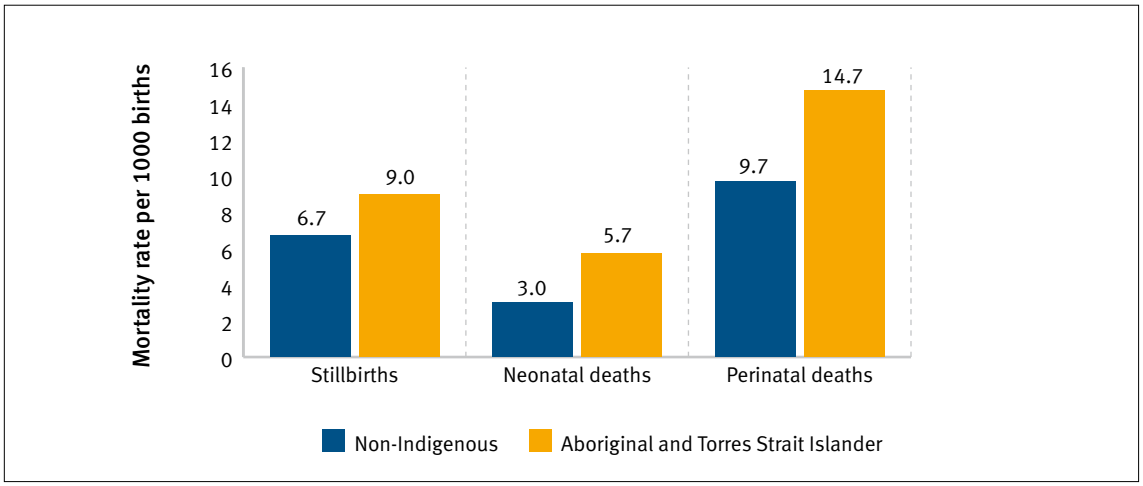


Figure 9: Perinatal deaths by Indigenous status, Queensland 2012 to 2013
(Stillbirths and perinatal deaths = per 1000 births; neonatal deaths = per 1000 live births)

PSANZ-PDC classification of perinatal deaths indicates that spontaneous preterm birth, in particular, was more likely the cause of perinatal death in Aboriginal and/or Torres Strait Islander babies (Figure 10, Table A8). PSANZ-NDC classification of neonatal deaths indicates that Aboriginal and/or Torres Strait Islander babies were more likely to die in the newborn period from extreme prematurity, when compared with non-Indigenous babies (Figure 11, Table A9). Caution is advised in interpreting Figures 10 and 11 due to log scale being used on the horizontal axis of each graph.

Readers interested in further details about the disparity in perinatal mortality between babies of Aboriginal and/or Torres Strait Islander and non-Indigenous women are referred to the Statbite Indigenous Trends in population based indicators of perinatal health in Queensland[17]. An update of this Statbite is expected to be published soon.

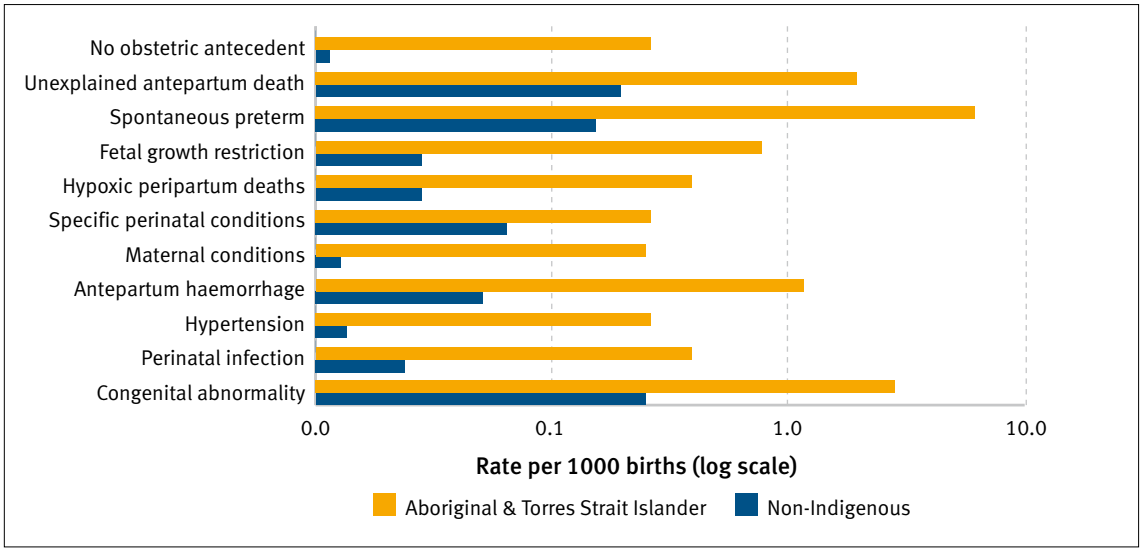


Figure 10: Perinatal deaths by PSANZ-PDC and Indigenous status, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

17 Johnston, T., Wills, R., Coory, M., 2008, Indigenous Trends in population based indicators of perinatal health in Queensland, Statbite #5, Health Statistics Centre, Queensland Health at www.health.qld.gov.au/hsu/pdf/statbite/statbite5.pdf

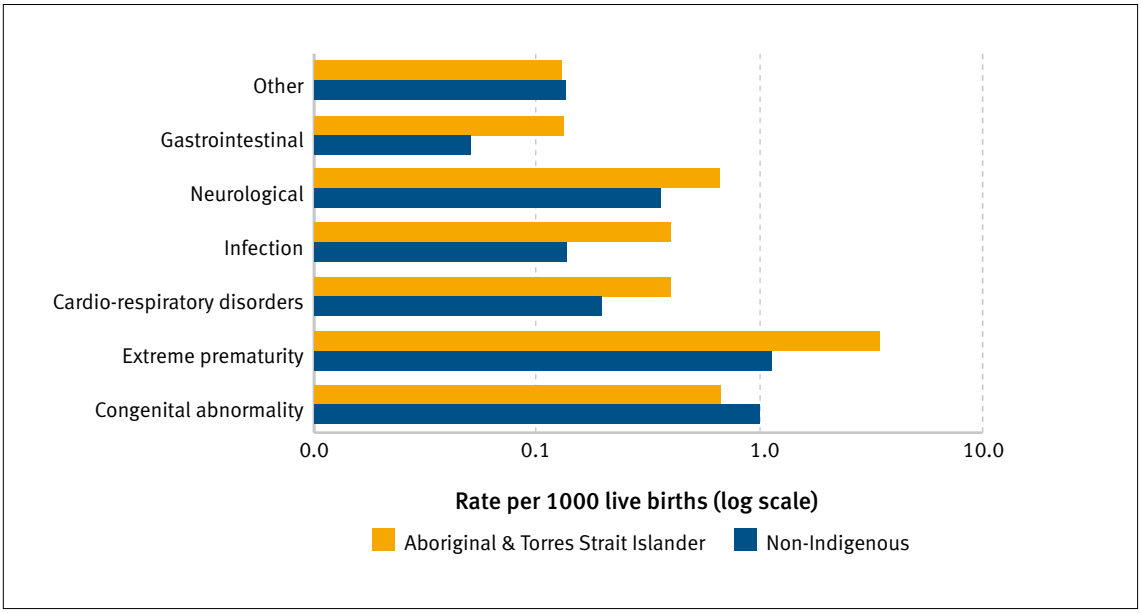


Figure 11: Perinatal deaths by PSANZ-NDC and Indigenous status, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

1.3.11 Gestation and birthweight specific perinatal mortality rates

Figure 12and Table A10 show the perinatal mortality rate for gestational groups, and indicate the continuing risk of perinatal death (the "perinatal mortality risk") to babies still in-utero at that gestation.

The gestational age-specific risk of perinatal mortality is the prospective chance of a perinatal death occurring at or above a specified gestation. This is calculated by dividing the number of perinatal deaths occurring at or above a specified gestation (numerator) by the total number of unborn babies at the start of the interval (denominator). The perinatal mortality risk is expressed as the proportion per 1000 fetuses remaining in utero. While closely related to the perinatal mortality rate as a measure of the likelihood of risk, the perinatal mortality risk examines the chance at the specified gestational point of a perinatal death occurring to a baby remaining *in utero*, rather than the total number of perinatal deaths per thousand births (the rate) that have occurred.

The risk is seen to decrease as gestation progresses throughout the second trimester of pregnancy, to be lowest early in the third trimester of pregnancy, and to increase towards and past term.

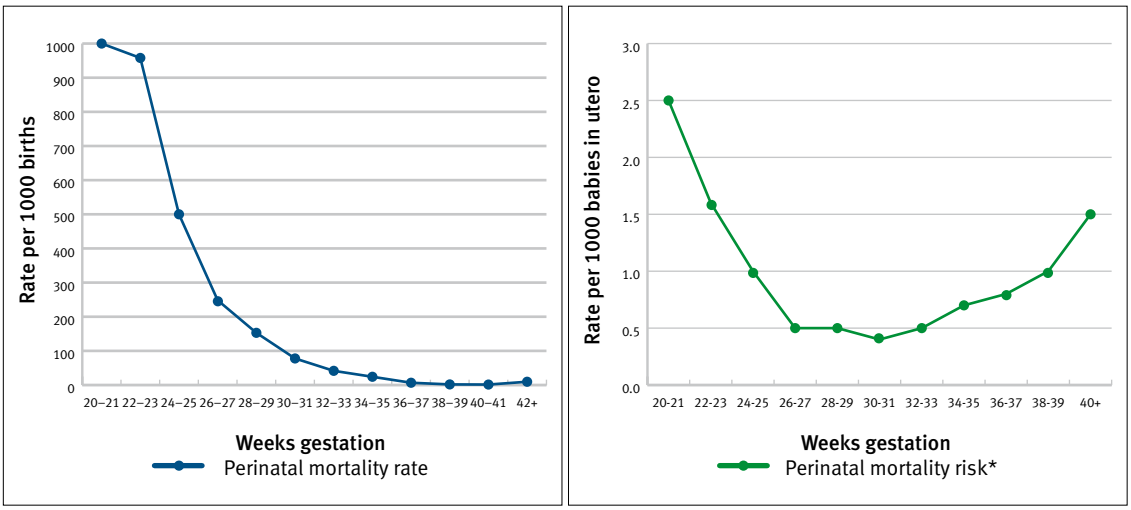


Figure 12: Perinatal mortality rate and risk*by gestation (weeks), Queensland 2012 to 2013
(* Risk = per 1000 fetuses remaining in utero)

Figure 13 and Table A11 show the PSANZ-PDC categories for perinatal deaths by gestational age groups. At term (37 weeks or more), 83.6 per cent of perinatal deaths were not due to congenital abnormality and can therefore be considered as potentially preventable. Of these normally formed term infants, 42.2 per cent were unexplained stillbirths. The next largest group accounting for 12.0 per cent of these deaths was hypoxic peripartum death which includes deaths occurring either intrapartum or in the neonatal period without major pre-existing conditions. In 4.9 per cent of these term perinatal deaths no obstetric antecedent was identified.

Babies born at gestational ages of less than 28 weeks account for more than half of all perinatal deaths (57.9 per cent). The rate of death drops as gestation increases in all PDC categories.

One hundred and eighty–eight (188) of 225 (83.5 per cent) perinatal deaths in term infants (37 weeks gestation or more) occurred in infants without major congenital abnormalities. Twenty–seven (27, 12.0 per cent) of these deaths were categorized as due to hypoxic peripartum death.

Extreme prematurity causes 39.9 per cent of neonatal deaths and congenital anomaly 31.2 per cent, as categorised by PSANZ-NDC (Figure 14 and Table A12). The incidence of deaths due to congenital anomaly is relatively constant across all gestations.

Caution is advised in interpreting Figures 13 and 14 due to log scale being used on the horizontal axis of each graph.

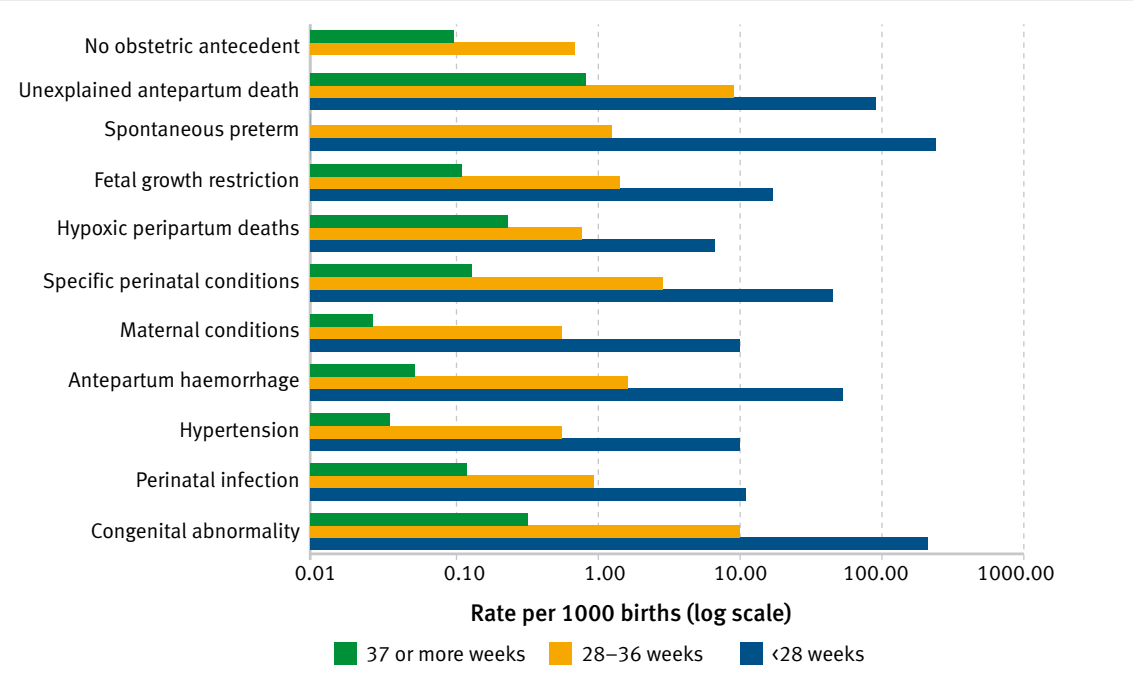


Figure 13: Perinatal deaths by PSANZ-PDC and gestational age, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

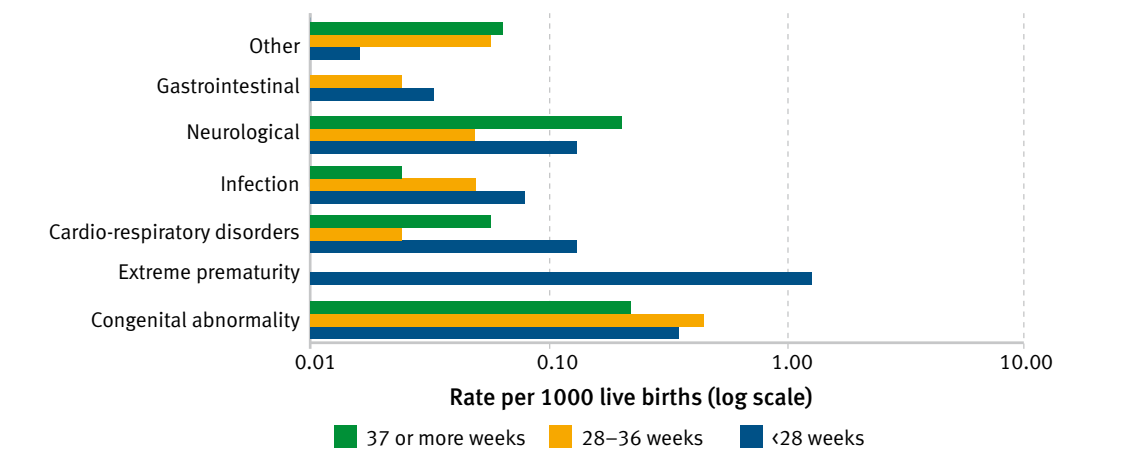


Figure 14: Neonatal deaths by PSANZ-NDC and gestational age, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

The perinatal mortality rate for different birthweight groups is shown in Figure 15 and Table A13.The perinatal mortality drops significantly over 1000g birthweight. Two thirds of perinatal deaths occur within the group of babies weighing less than 1500g. Caution is advised in interpreting Figure 15 due to log scale being used on the horizontal axis.

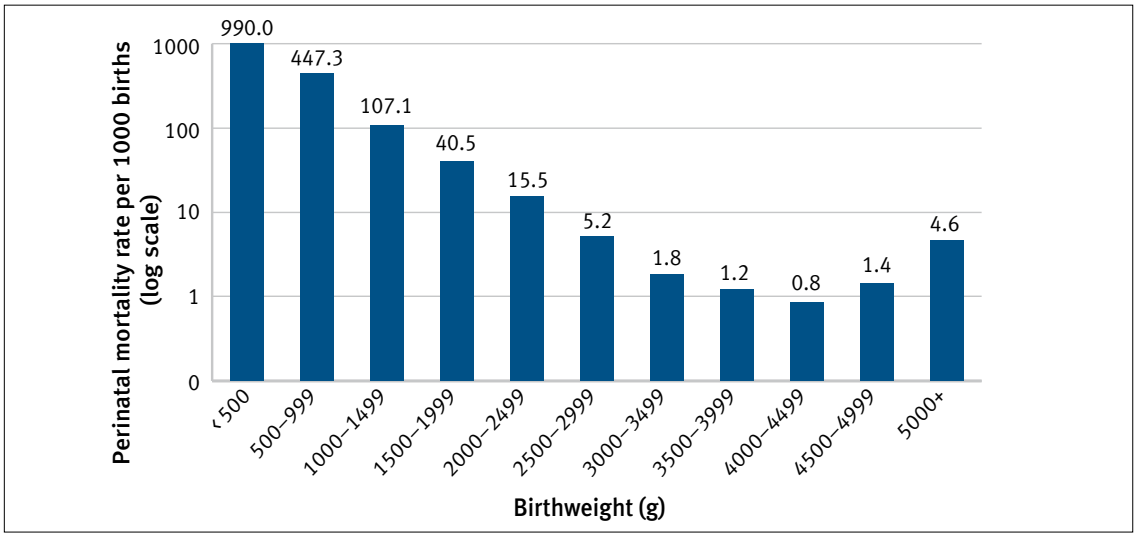


Figure 15: Perinatal mortality rate by birthweight (g), Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

For most PSANZ-PDC categories of cause of death a decrease is seen as birthweight increases, with 67.7 per cent of these babies weighing less than 1500g. However, hypoxic peripartum deaths, unexplained antepartum deaths and deaths with no obstetric antecedent do not follow this trend, with a higher proportion occurring in the 2500–3999g birthweight group. (Figure 16 and Table A14). Whilst 68.1 per cent of the neonatal deaths occurred in babies weighing less than 1500g, the pattern of PSANZ-NDC categories of cause of neonatal death was variable (Figure 17 and Table A15). Caution is advised in interpreting Figures 16 and 17 due to log scale being used on the horizontal axis of each graph.

Similar to the analysis by gestational age, 84.1 per cent (201 of 239) of perinatal deaths in non-low birthweight infants (› 2500gms) occurred in infants without major congenital abnormalities. Twenty–six (26) of these deaths were assigned to the category of hypoxic peripartum death.

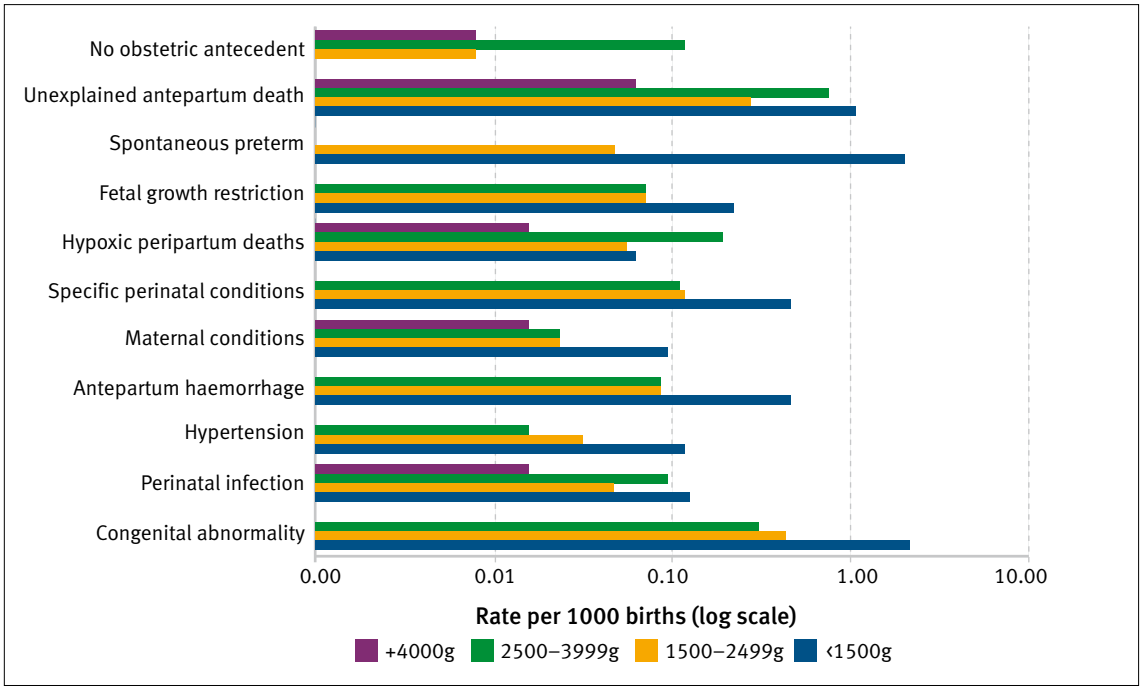


Figure 16: Perinatal deaths by PSANZ-PDC and birthweight, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

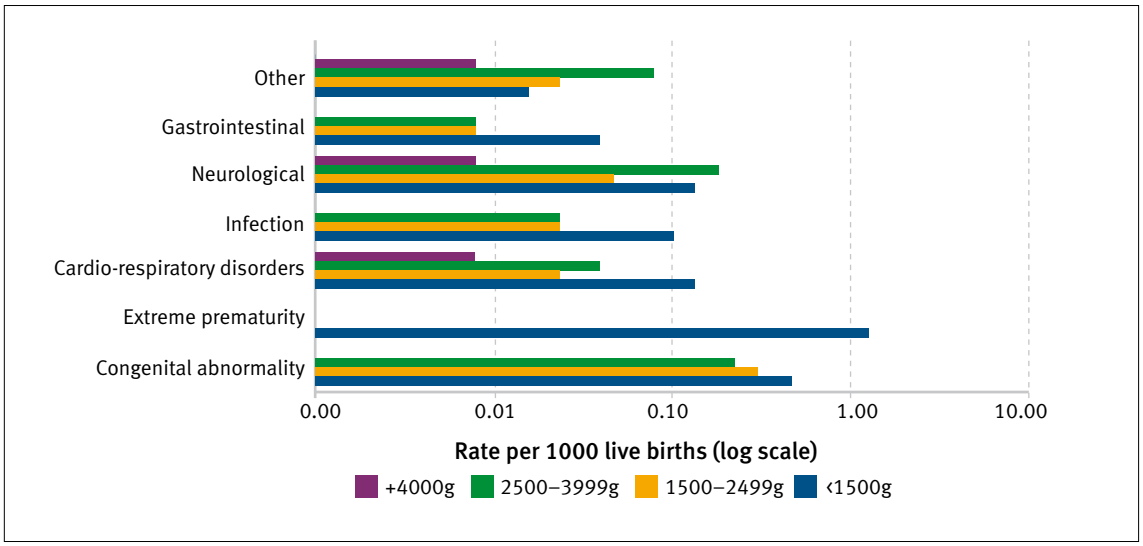


Figure 17: Neonatal deaths by PSANZ-NDC and birthweight, Queensland 2012 to 2013
Cautionary note regarding interpretation: a log scale is used on the horizontal axis of this graph.

1.3.12 Perinatal autopsies

Less than one third of babies dying in the perinatal period have an autopsy (28.7 per cent in 2004 to 2013) (Figure 18 and Table A16). The autopsy rate for stillborn babies has remained relatively constant over the last several years but has dropped from 37.4 per cent in 2009 to 31.1 per cent in 2013; 41.8 per cent of stillbirths subsequently classified as Unexplained Antepartum Deaths had an autopsy. The rate of neonatal death autopsy has declined in the period 2009 to 2013 from 27.6 per cent to 17.5 per cent.

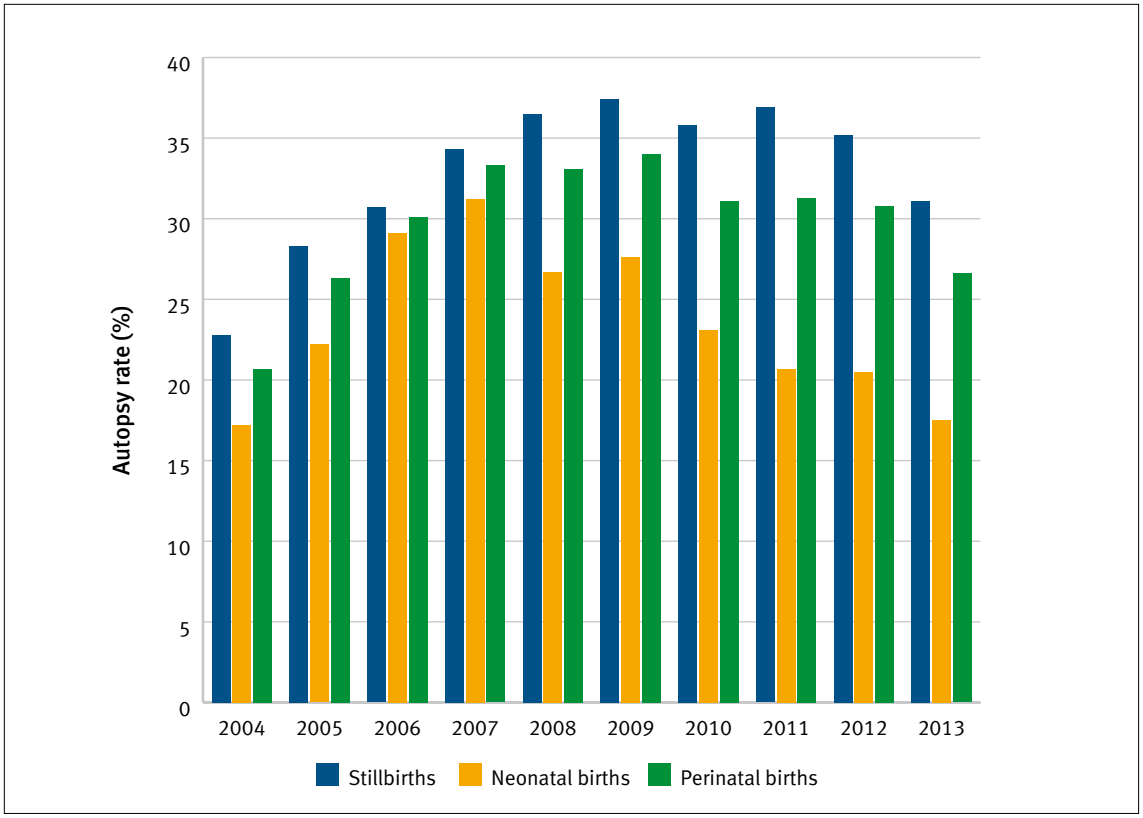


Figure 18: Perinatal autopsies by type of death, Queensland 2004 to 2013 (Table A16)

2. Pregnancy and newborn care

Over the period 2012 to 2013 in Queensland, 124,832 women gave birth to 126,881 babies and they are the primary focus of this section of the report. Where possible they are compared with the larger cohort of 587,671 women who gave birth to 597,691 babies in Queensland during the decade 2004 to 2013. Data regarding these mothers and babies is provided to the Perinatal Data Collection Unit of the Health Statistics Branch, Queensland Department of Health by midwives, under the Perinatal Statistics provisions of the *Public Health Act 2005* (Chapter 6, Part 1, s214-228). All references to public hospital care include maternity and newborn care at the Mater Mothers Public Hospital.

2.1 Mode of healthcare delivery

The number of women giving birth per year has risen from 50,051 in 2004 to 62,169 in 2013, an increase of 24.2 per cent over this 10–year period (Figure 19 and 20, and Table A17). The number of women cared for in the public hospital system has increased by 29.2 per cent and the number cared for in the private hospital system by 13.3 per cent. There has been little recent change, however, with total birth numbers decreasing marginally in 2013.

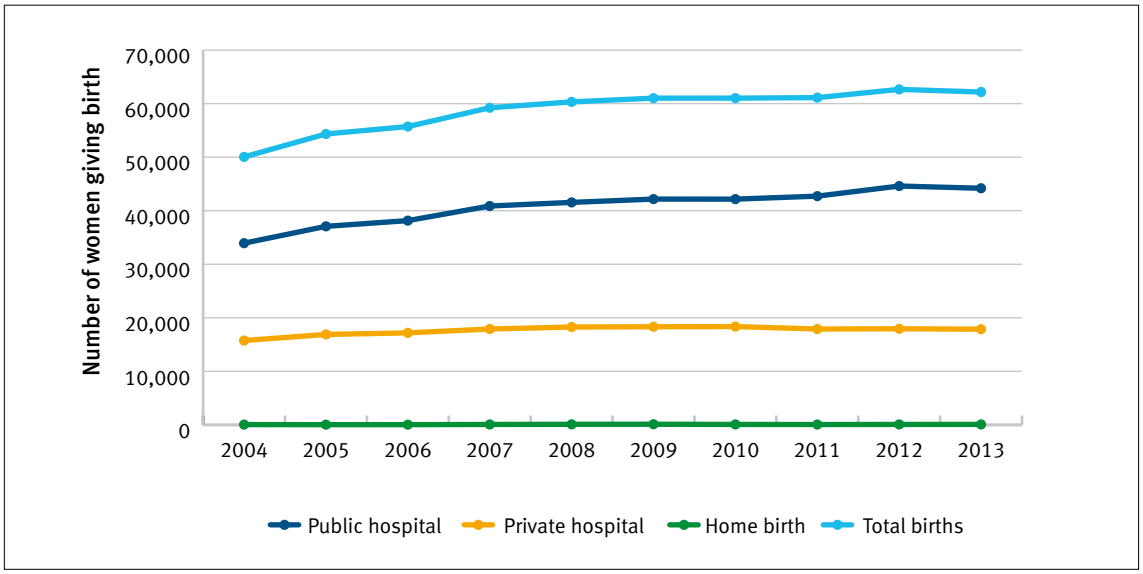


Figure 19: Number of women giving birth by mode of healthcare delivery, Queensland 2004 to2013
(Table A17)

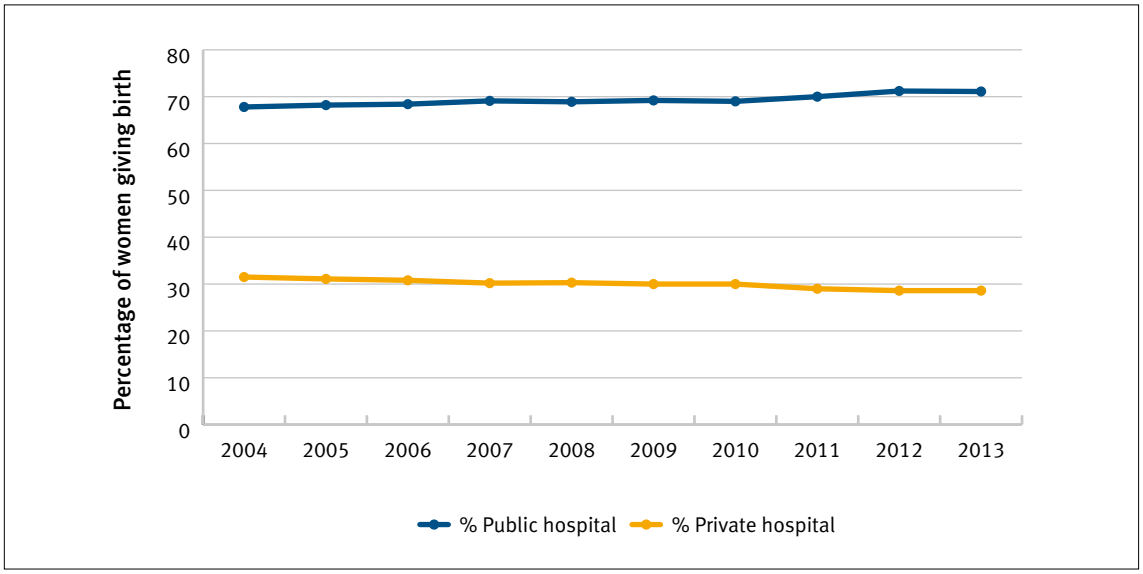


Figure 20: Percentage of women accessing Public and Private birth care, Queensland 2004 to 2013
(Table A17)

2.2 Home birth

An average of 79 women per year have planned to give birth at home and have done so (Figure 21). The age profile of these women has slowly changed, with women aged 25 to 34 years of age increasing, as a proportion, from 49.1 per cent to 61.1 per cent.

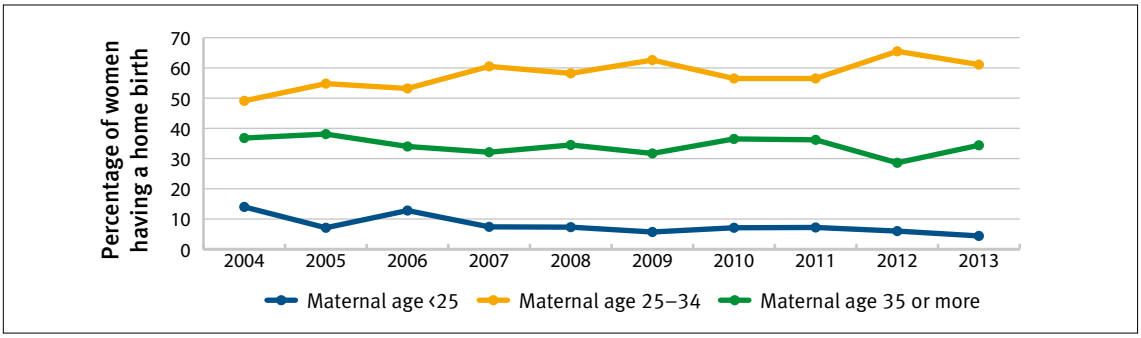


Figure 21: Percentage of home births by maternal age group, Queensland 2004 to 2013

2.3 Gestation at birth

Over the period 2004 to 2013 the incidence of birth at gestations 37 to 42 weeks has remained constant in the range 91.2 per cent to 92.2 per cent (Figure 22 and Table A18). The incidence of women giving birth at more premature gestations has equally remained constant, with birth at 33 to 36 weeks occurring in 5.8 per cent to 6.4 per cent of pregnancies, at 29 to 32 weeks in 1.0 per cent to 1.2 per cent, and 28 weeks and below in 0.9 per cent to 1.0 per cent.

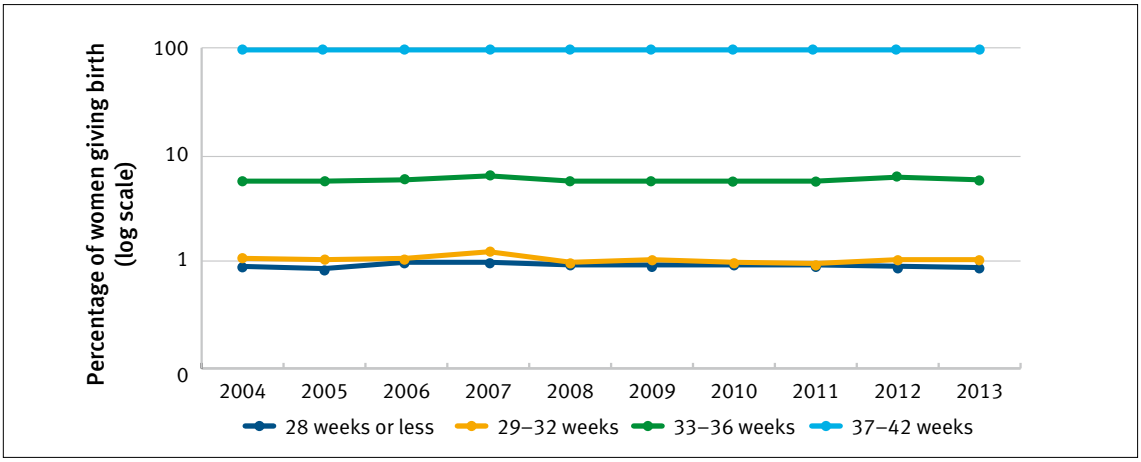


Figure 22: Percentage of women giving birth by gestation, Queensland 2004 to 2013 (Table A18)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

The changes in gestation at which the mothers gave birth are mirrored in the changes in gestation of the babies born (Figures 23 and Table A19).

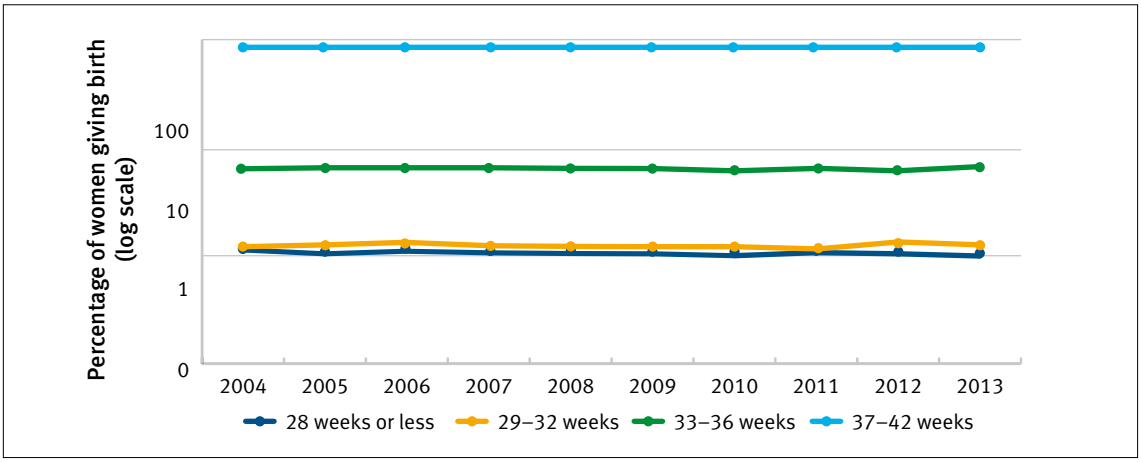


Figure 23: Percentage of babies born by gestation, Queensland 2004 to 2013 (Table A19)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

Though the overall incidence of birth at less than 37 weeks' gestation has shown little change, there has been a small but clear increase in the incidence of birth at less than 37 weeks' gestation in the private sector (Figure 24 and Table A20).

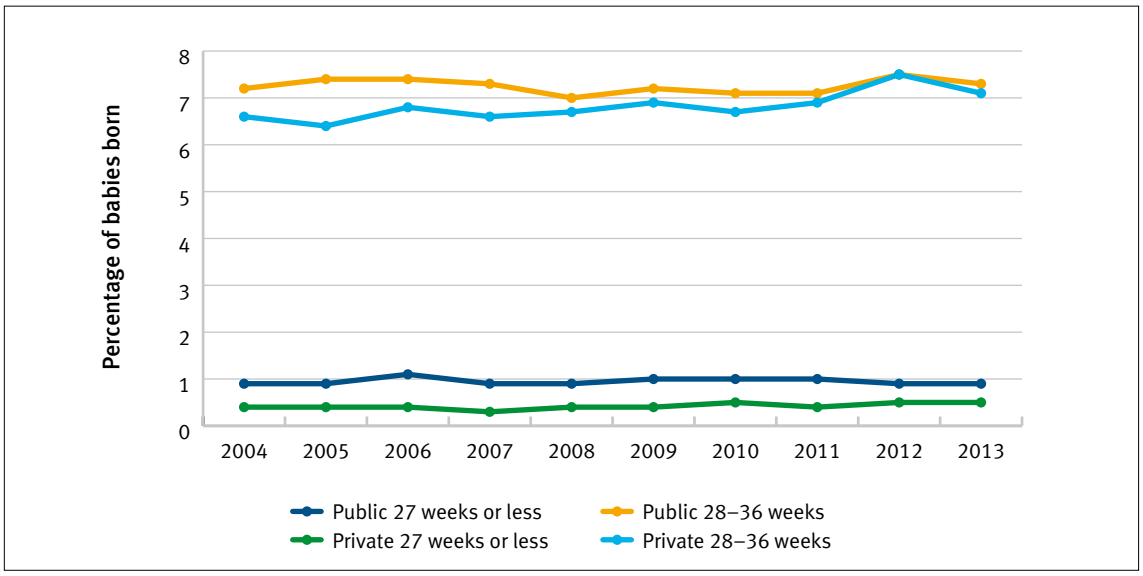


Figure 24: Number of babies born at less than 37 weeks' gestation by mode of healthcare delivery, Queensland 2004 to 2013
(Table A20)

The gestational pattern of births over 36 weeks gestation differs between public and private hospital sectors, with a clear peak of birth prior to 40 weeks in the private sector (Figure 25, Table A21).

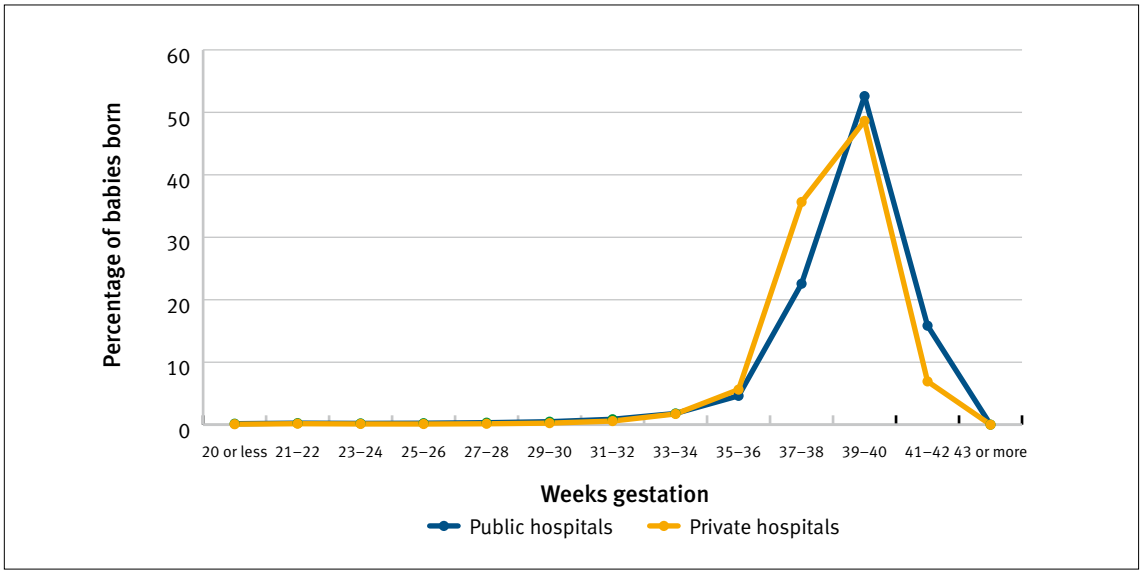
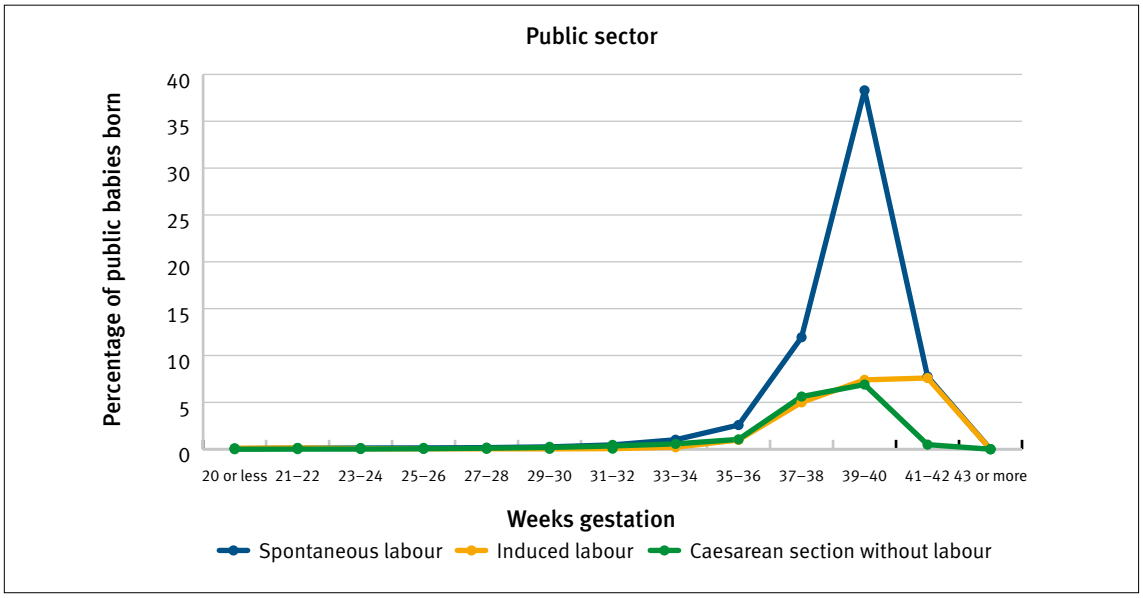
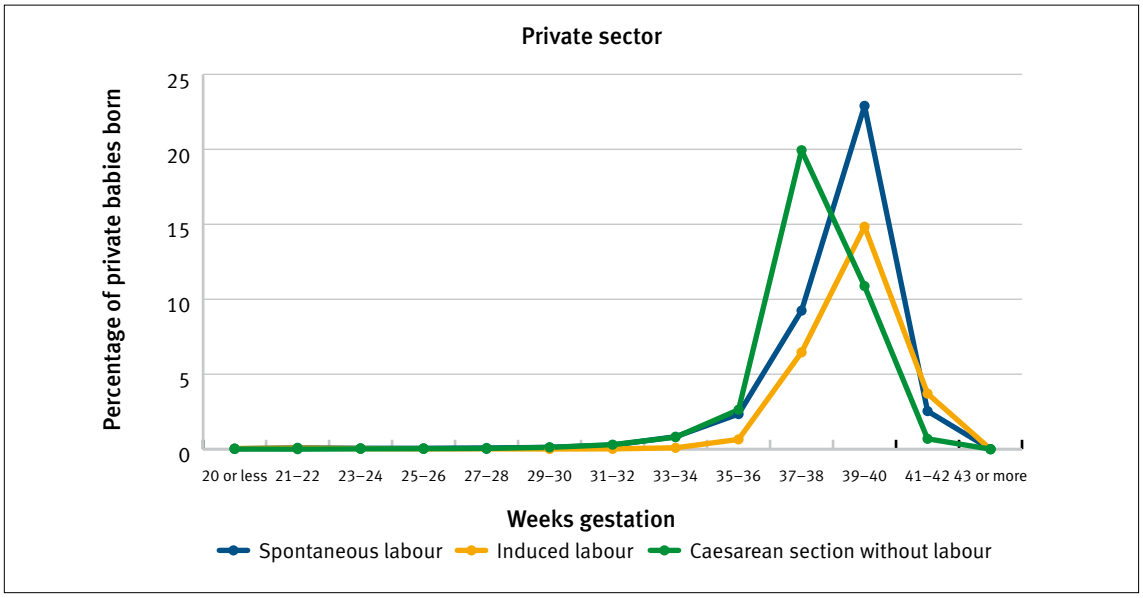


Figure 25: Percentage of babies born by mode of healthcare delivery and gestation, Queensland 2009 to 2013
(Table A21)

Figures 26a and 26b and Table A21 show that the difference in the gestational patterns between public and private sectors is a marked preponderance for caesarean section without labour and, to a lesser degree induction of labour, in the 37 to 39 week gestation period in the private sector; the public sector pattern shows a greater preponderance of spontaneous onset of labour with a peak in the 40 to 41 week gestational period.



Figures 26a: Number of women giving birth by mode of healthcare delivery, gestation, and onset of labour, Queensland 2009 to 2013
(Table A21)



Figures 26b: Number of women giving birth by mode of healthcare delivery, gestation, and onset of labour, Queensland 2009 to 2013
(Table A21)

Table 12 shows that there is a significantly higher perinatal mortality for all gestations below 40 weeks in association with elective birth (ie induction of labour or caesarean section without labour). Whilst some of this difference relates to the reasons for intervention in the elective group, the elective process itself cannot be discounted as having a relationship to the increased incidence of perinatal death.

Gestation (weeks)	Stillbirth		Neonatal death		Perinatal death	
	Spontaneous	Elective	Spontaneous	Elective	Spontaneous	Elective
24 or less	371.7	780.9	763.0	792.7	851.1	954.6
25–28	43.5	327.4	113.0	100.0	151.6	394.6
29–32	19.8	99.9	14.9	21.8	34.4	119.5
33–36	5.0	20.7	4.9	5.8	9.9	26.4
37–40	0.9	2.1	0.7	0.9	1.6	3.0
41 or more	1.3	1.3	0.7	0.7	2.0	2.0

Table 12: Perinatal mortality rate by onset of birth process, Queensland 2009 to 2013
(Elective = induction of labour and caesarean section without labour; Spontaneous = spontaneous onset of labour; Perinatal mortality rate and stillbirth rate = per 1000 births; Neonatal mortality rate = per 1000 live births)

Good practice point:

Repeat caesarean section without labour and induction of labour before 39 weeks of gestation are common, yet are associated with respiratory and other adverse neonatal outcomes. Elective intervention in pregnancy before 39 weeks of gestation should be avoided wherever possible.

2.4 Birthweight

Approximately 7 per cent of babies born are "low birthweight" (less than 2500g) as shown in Figure 27 and Table A22 and this rate has not changed significantly between 2000 and 2011.

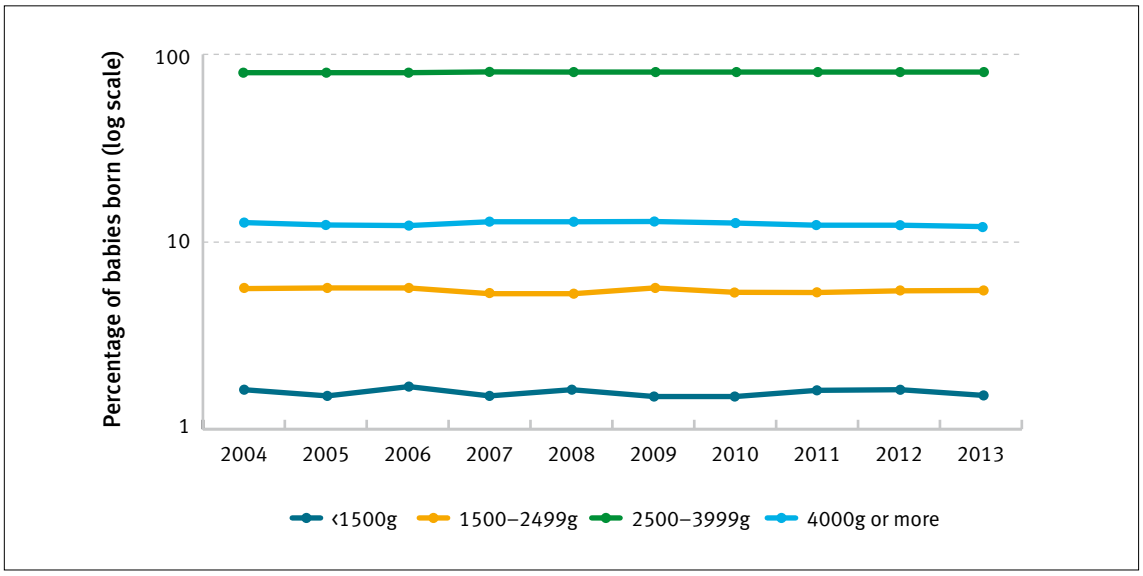


Figure 27: Birthweight distribution, Queensland 2004 to 2013
(Table A22)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

2.5 Multiple pregnancies

The overall incidence of multiple pregnancy has varied between 1.6 per cent and 1.8 per cent over the period covered by this report (Figure 28 and Table A23). The incidence of multiple pregnancy increased significantly with maternal age (maternal age 35+ versus maternal age <35 risk ratio, 2004 to 2013: RR = 1.60, 95 per cent confidence intervals = 1.53, 1.67).

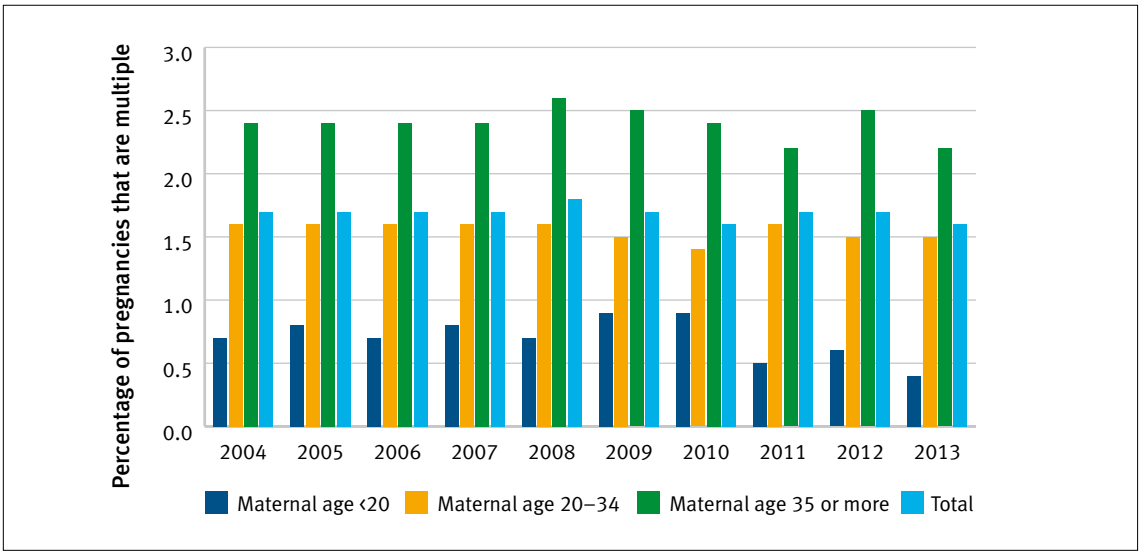


Figure 28: Percentage of multiple pregnancies by maternal age, Queensland 2004 to 2013
(Table A23)

It is clear that multiple pregnancy is a powerful predictor of preterm birth, with approximately 7 per cent of singleton pregnancies ending before 37 weeks' gestation, while between 58 per cent and 67 per cent of multiple pregnancies end before 37 weeks' gestation. There appears to be a recent trend (2012 and 2013) to an increase in the incidence of premature birth in multiple pregnancies, but the cause and relevance of this recent change is uncertain (Figure 29 and table A24).

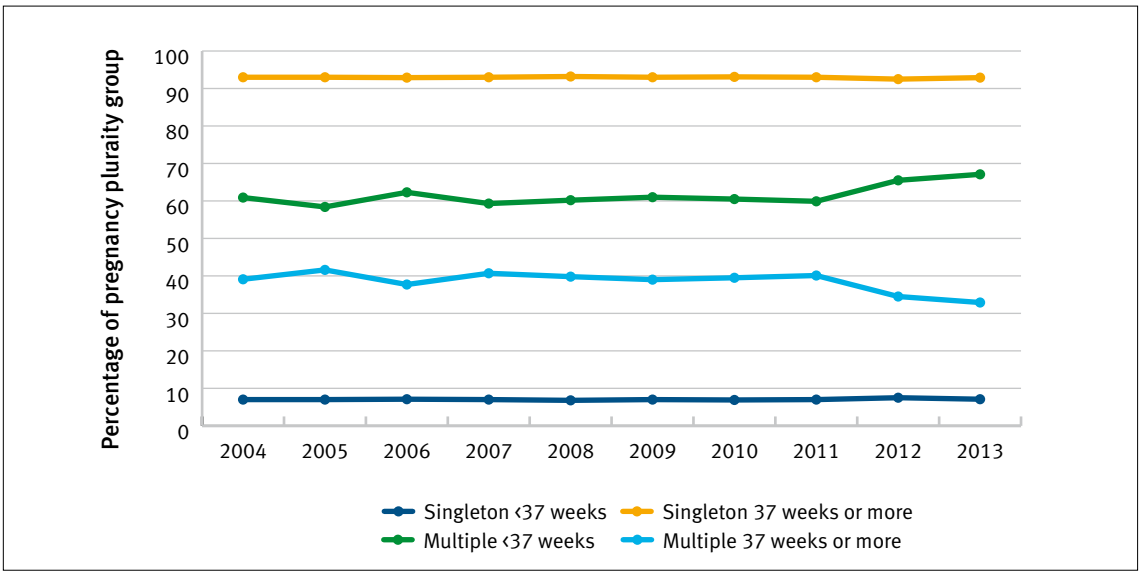


Figure 29: Percentage of multiple and singleton pregnancies by gestation at birth, Queensland 2004 to 2013
(Table A24)

Good practice point:

Maternity care providers should provide clear information to women carrying multiple pregnancies regarding the risk of preterm labour, and steps that should be taken in the event that a woman carrying a multiple pregnancy suspects the onset of preterm labour.

2.6 Assisted conception

Approximately 4 per cent of births in Queensland in 2004 to 2013 were a result of pregnancies conceived with the aid of assisted conception techniques. Less than 3.7 per cent of singleton pregnancies were conceived with the aid of assisted conception techniques, but 29.3 per cent of multiple pregnancies were conceived with their aid.

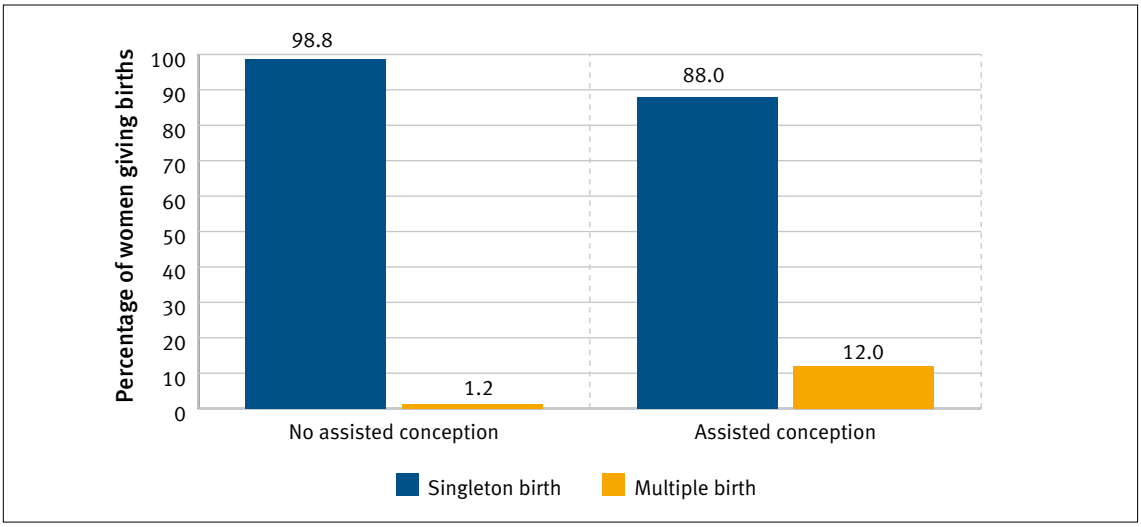


Figure 30: Influence of assisted conception techniques, Queensland 2004 to 2013
(Table A25)

The development of improved extracorporeal techniques for assisted conception (in-vitro fertilisation, gamete intra-fallopian transfer, intracytoplasmic sperm injection, embryo transfer or related techniques) has resulted in a steady almost 50 per cent fall in the incidence of multiple pregnancy over the period 2004 to 2013 in association with these techniques (20.9 per cent to 10.7 per cent) (Figure 31 and Table A25). The same type of improvement has not been seen in relation to the use of ovulation induction and/or artificial insemination, with the multiple pregnancy incidence associated with their use persistently in the region of 8 per cent.

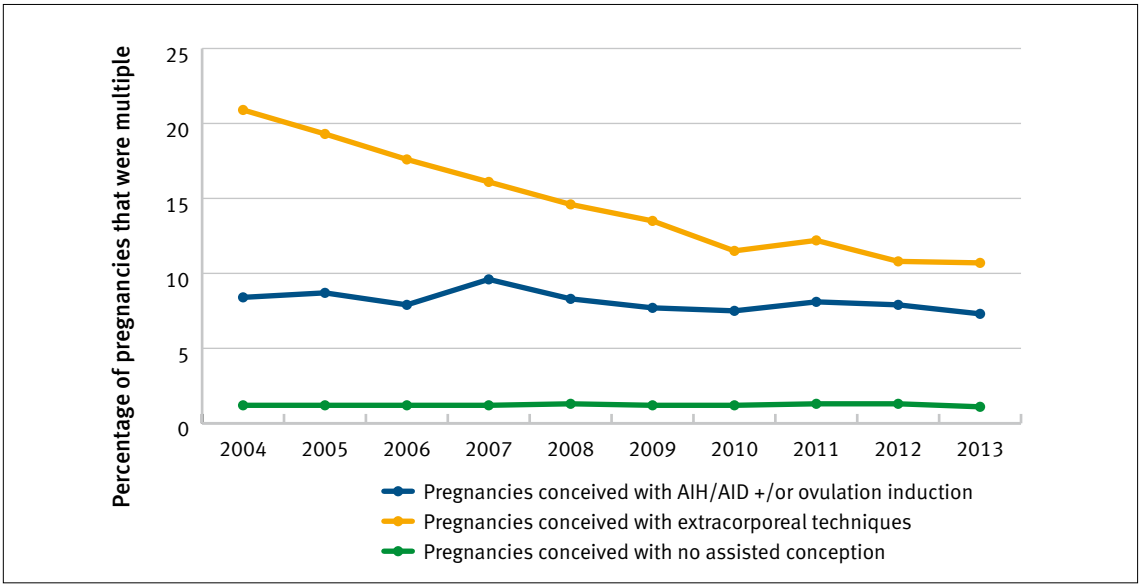


Figure 31: Percentage of multiple births in pregnancies conceived with and without the use of assisted conception techniques, Queensland 2004 to 2013
(Table A25)
[AIH/AID +/or ovulation induction = artificial insemination and/or ovulation induction processes; extracorporeal techniques = invitro fertilisation, gamete intra-fallopian transfer, intracytoplasmic sperm injection, embryo transfer or related techniques.]

Live-born babies from pregnancies conceived with assisted reproduction techniques were significantly more likely to be admitted to a neonatal intensive care unit or a special care baby unit than those conceived without such technologies (26.3 per cent versus 16.7 per cent. Relative risk = 1.58; 95 per cent confidence intervals 1.54, 1.62)(Table A26).

Babies born alive from multiple pregnancies had a 66.9 per cent likelihood of being admitted to a neonatal intensive care unit or a special care baby unit. Babies born alive from multiple pregnancies conceived with assisted reproduction techniques were slightly but significantly more likely to be admitted to a neonatal intensive care unit or a special care baby unit than those conceived without such technologies (Relative risk = 1.22; 95 per cent confidence intervals 1.11, 1.34).

Further information regarding assisted reproduction techniques and pregnancy outcomes can be found in Statbites 34 (Characteristics of women in Queensland who gave birth following conception by Assisted Reproductive Technology (ART), 1998 to 2008)[18] and 39 (Trends in caesarean section rates amongst women giving birth following conception by Assisted Reproductive Technology (ART) in Queensland, 1998 to 2008)[19].

Good practice point:

Given the unchanging risks of multiple pregnancy occurring in association with the use of ovulation induction and the consequent risk of adverse perinatal outcomes due to the multiple pregnancies, the same attention to technique monitoring and quality improvement as has been seen with extracorporeal techniques is recommended to those prescribing ovulation induction.

Recommendations:

That Queensland Health recommends that the Therapeutic Goods Administration review the conditions for authorising medical practitioners to prescribe ovulation induction agents, with particular reference to techniques designed to minimise the incidence of multiple pregnancy.

That RANZCOG promote education programs for its Fellows and Diplomates regarding the safe and appropriate use of ovulation induction agents.

18 Howell S, Johnston T, Cornes S. Characteristics of women in Queensland who gave birth following conception by Assisted Reproductive Technology (ART), 1998 to 2008. Statbite #34, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite34.pdf

19 Howell S, Johnston T, Cornes S. Trends in caesarean section rates amongst women giving birth following conception by Assisted Reproductive Technology (ART) in Queensland, 1998 to 2008. Statbite #39, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite39.pdf

2.7 Onset of labour

There has been little change since 2004, with pregnancies ending in spontaneous labour in less than 60 per cent of instances (Figure 32 and Table A27). The frequency of caesarean section without labour (20 per cent to 21 per cent) and induction of labour (22 per cent to 24 per cent) are similar to each other.

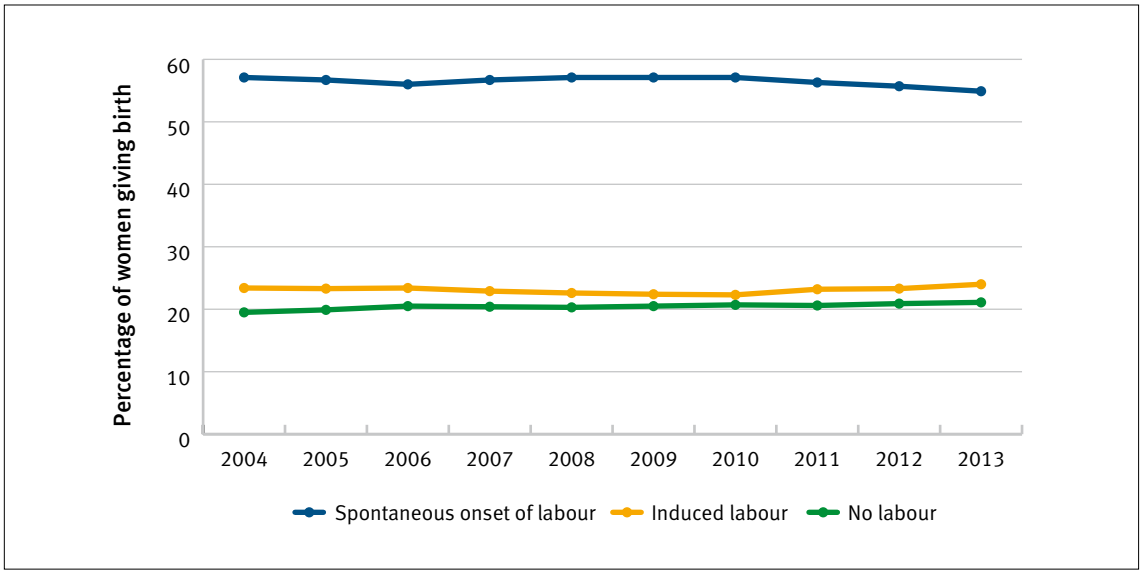


Figure 32: Onset of labour, all births, Queensland 2004 to 2013
(Table A27)

There was a statistically significant difference in the pattern of labour onset between public and private hospitals (Figures 33 to 35 and Table A28). Women being cared for in the public hospital system laboured spontaneously in 61.6 per cent to 64.8 per cent of pregnancies, while women being cared for in the private hospital system laboured spontaneously in 37.9 per cent to 41.9 per cent (private versus public risk ratio = 0.62 95 per cent confidence intervals = 0.62 0.63).

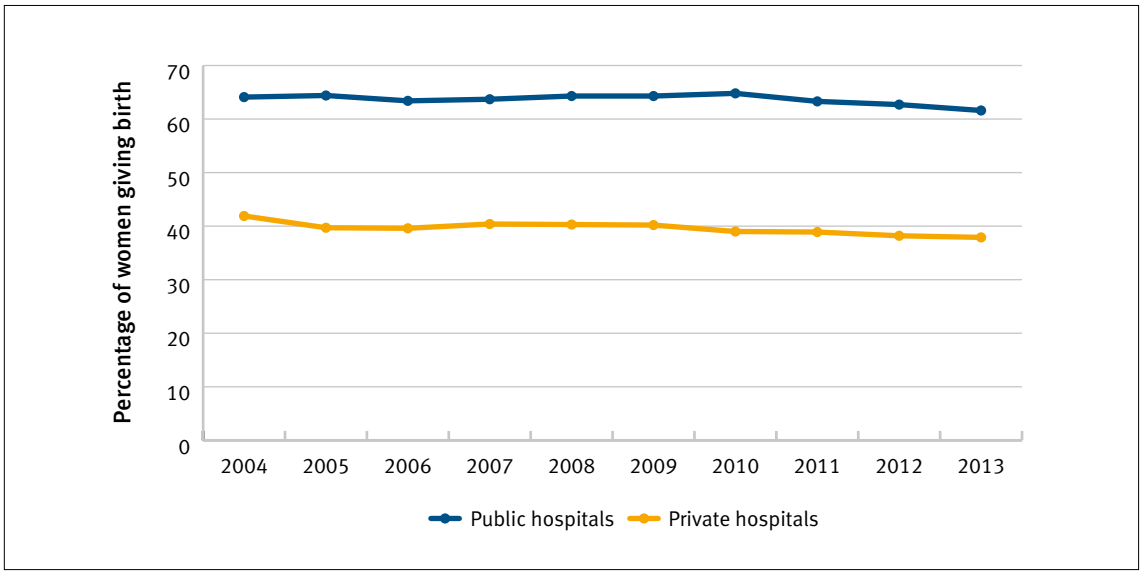


Figure 33: Spontaneous onset of labour by public and private hospitals, Queensland 2004 to 2013
(Tables A28)

This disparity between these modes of healthcare delivery is mirrored in the rate of induction of labour (private hospital care versus public hospital care risk ratio for induction of labour = 1.22 95 per cent confidence intervals = 1.20, 1.23) and the rate of caesarean section without labour (private hospital care versus public hospital care risk ratio for caesarean section without labour = 2.32 95 per cent confidence intervals = 2.30, 2.34).

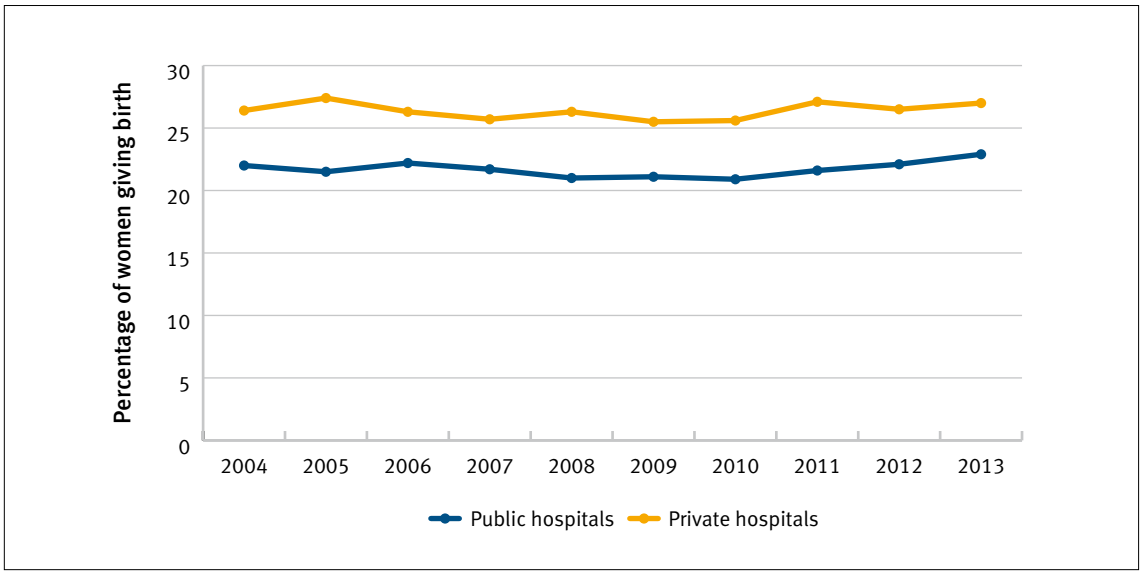


Figure 34: Induced labour by public and private hospitals, Queensland 2004 to 2013
(Tables A28)

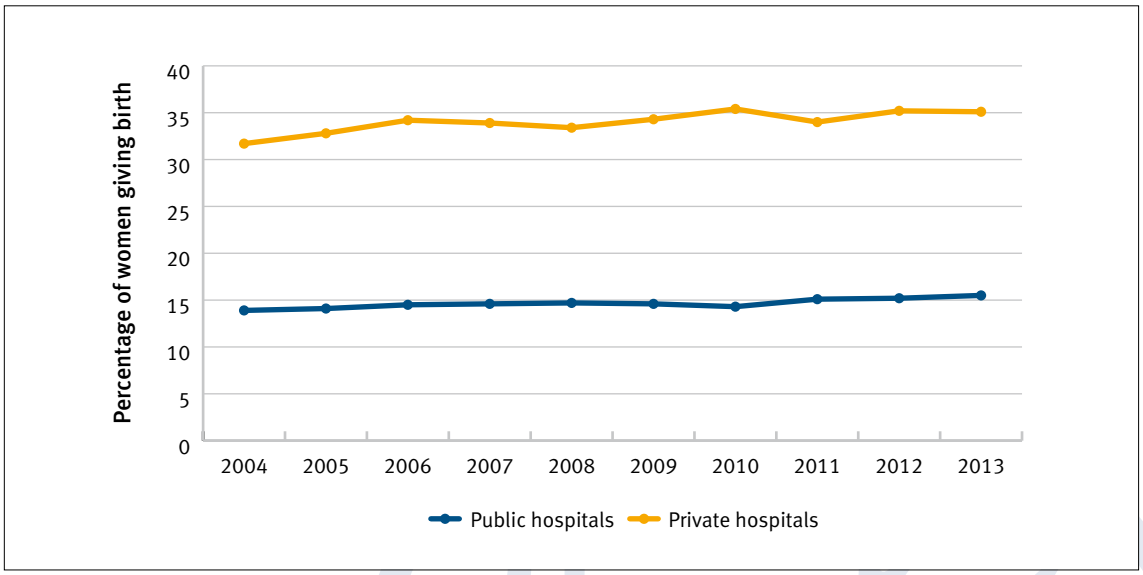


Figure 35: Caesarean section without labour by public and private hospitals, Queensland 2004 to 2013
(Tables A28)

2.8 Mode of birth

Over the period 2004 to 2013 the incidence of unassisted vaginal birth has progressively fallen from 60 per cent to 56 per cent, with a concomitant rise in the incidence of caesarean section birth from 32 per cent to 34 per cent and vacuum assisted vaginal birth from 6.0 per cent to 7.5 per cent; there has been little change in the incidence of forceps assisted vaginal birth (Figure 36 and Table A29). The rate of change appears to be slowing.

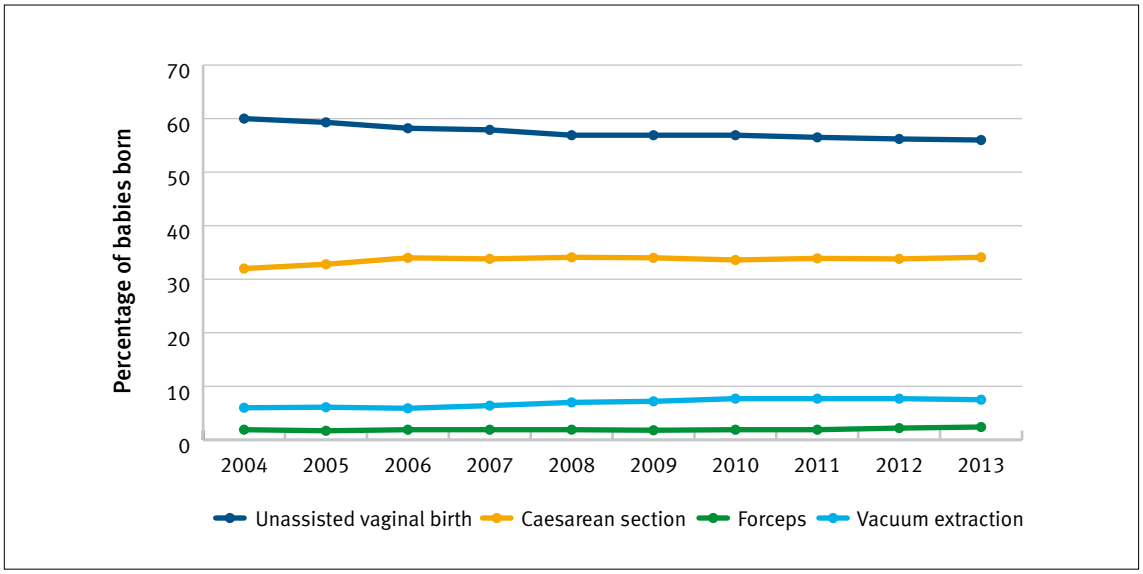


Figure 36: Mode of birth of babies, Queensland 2004 to 2013 (percentage of births)
(Tables A29)

A marked disparity is seen between care in the public and private hospital systems, with the likelihood of a woman giving birth in the public system having an unassisted vaginal birth being approximately 50 per cent higher than a woman in the private system (Figure 37 and Tables A30 and A31). Over the decade 2004 to 2013 64.8 per cent of women cared for in public hospitals had an unassisted vaginal birth, whilst only 40.2 per cent of women cared for in private hospitals had an unassisted vaginal birth. For unassisted vaginal birth, the 2012 to 2013 public versus private risk ratio = 1.35, 95 per cent confidence intervals = 1.59, 1.63.

By 2012 and 2013 almost half of the women giving birth in the private hospital system had a caesarean section birth (48.6 per cent), while less than one–third of women giving birth in the public hospital system (28 per cent) had a caesarean section birth (2012 to 2013 private versus public caesarean section risk ratio =1.75, 95 per cent confidence intervals = 1.72 1.77). Assisted vaginal birth is also more frequently employed in private hospitals when compared with public hospitals (Tables A30 and A31) (2012 to 2013 private versus public risk ratio = 1.35, 95 per cent confidence intervals = 1.31, 1.40).

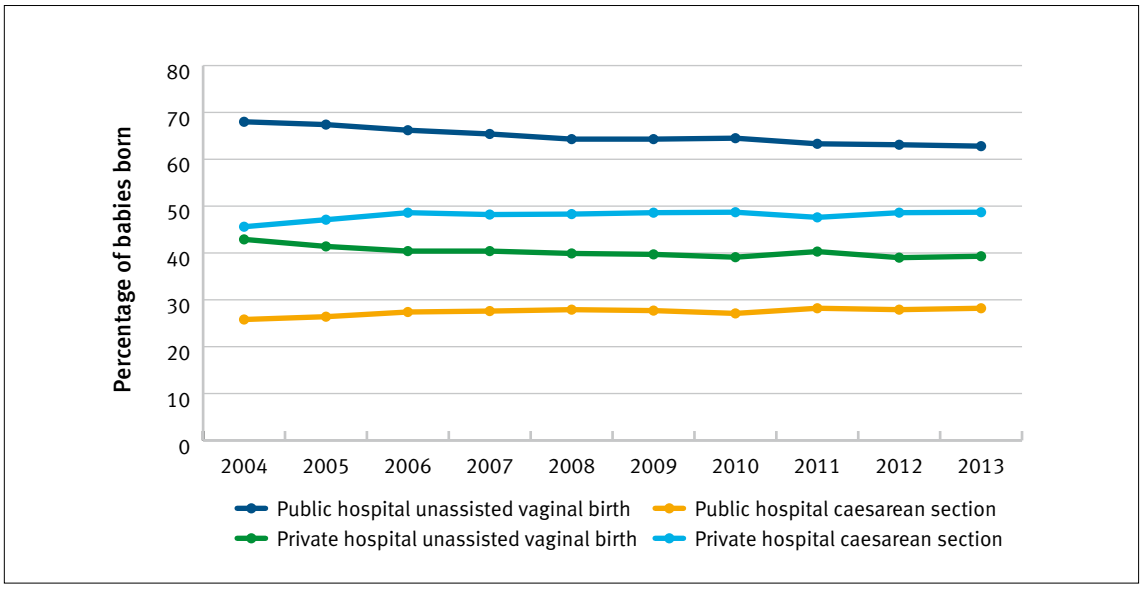


Figure 37: Incidence of unassisted vaginal birth and caesarean section birth of babies by public and private hospitals, Queensland 2004 to 2013
(Tables A30 and A31)

The difference in the incidence of caesarean section between the two hospital systems is explained almost entirely by a highly significant preponderance of caesarean section without labour in the private hospital system (Figure 38 and Table A32) (2012 to 2013 private versus public risk ratio for caesarean section without labour = 2.27, 95 per cent confidence intervals = 2.23, 2.32; 2012 to 2013 private versus public risk ratio for caesarean section with labour = 1.04, 95 per cent confidence intervals = 1.01, 1.08).

Figure 38: Incidence of caesarean section birth, before and in labour, of babies born in public and private hospitals, Queensland 2004 to 2013
(Tables A32)

Most women with breech presentations give birth by caesarean section (Figure 39 and Table A33). Over the course of 2004 to 2013, the caesarean section rate with breech presentation has reduced a little from 89.1 per cent to 86.4 per cent in public hospitals, and from 96.5 per cent to 93.4 per cent in private hospitals.

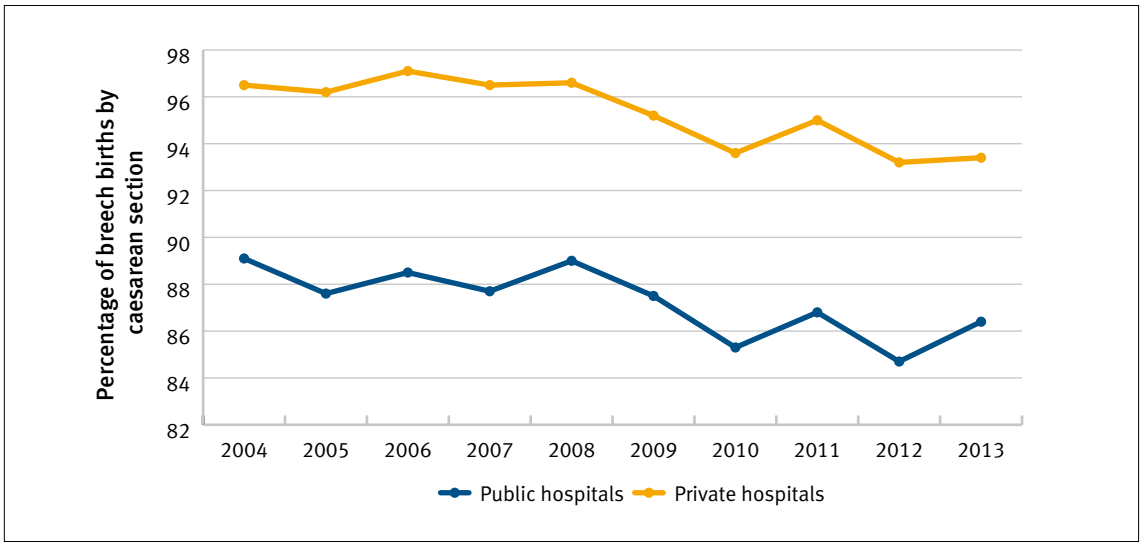


Figure 39: Incidence of caesarean section birth of babies when there is a breech presentation, in public and private hospitals, Queensland 2004 to 2013 (Table A33)

Good practice point:

The RANZCOG Statement 'C-Obs 11 Management of Breech presentation at Term' is relevant to the advice provided to women regarding the appropriate management of breech presentation:

'The Term Breech Trial has been criticised on methodological grounds thereby making its generalisability and applicability to appropriately staffed and resourced Australian and New Zealand hospitals uncertain. Accordingly, some expert groups consider that with adherence to strict criteria before and during labour, planned vaginal delivery of the singleton breech at term may be an option to offer to appropriately counselled and selected women where appropriate personnel and infrastructure to support such a birth are in place.'

Women with multiple pregnancies are most likely to give birth by caesarean section, with the incidence increasing over the period 2004 to 2013 (Figure 40 and Table A34). In public hospitals 65 to 69 per cent of multiple births were by caesarean section, whilst in private hospitals approximately 79 to 85 per cent of multiple births were by caesarean section with little overall change.

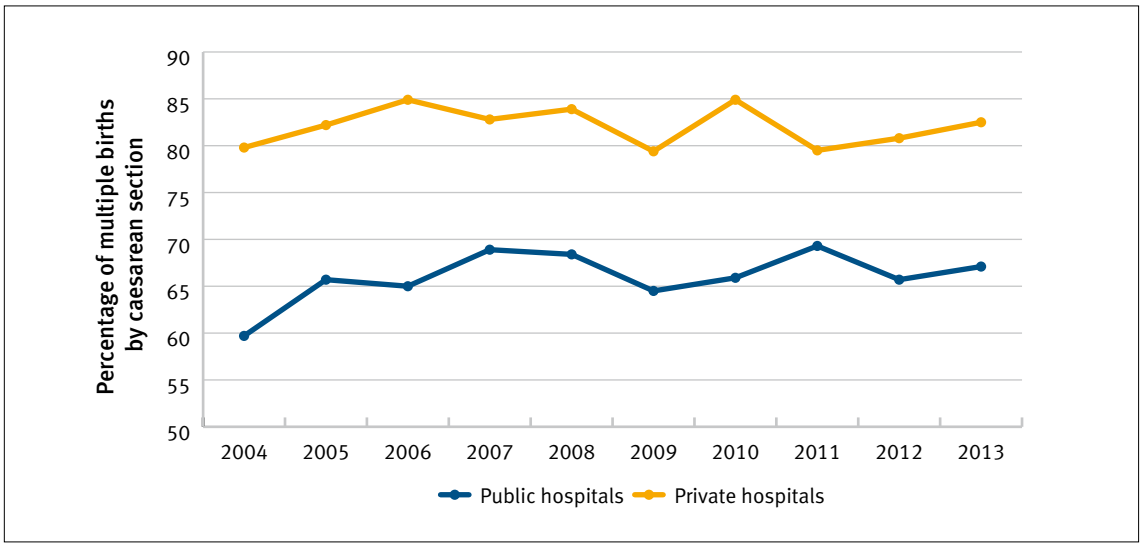


Figure 40: Incidence of caesarean section for multiple births in public and private hospitals, Queensland 2004 to 2013 (Table A34)

In the five years 2009 to 2013, 5649 women intended to give birth in a birth centre, and 4140 did give birth in a birth centre (4135 unassisted vaginal births and 5 vacuum extractions). Of the 1509 women who had intended to give birth in a birth centre but did not do so, 387 (25.6 per cent) had a caesarean section birth, 341 (22.6 per cent) had an assisted vaginal birth and 781 (51.8 per cent) had an unassisted vaginal birth (Figure 41 and Table A35).

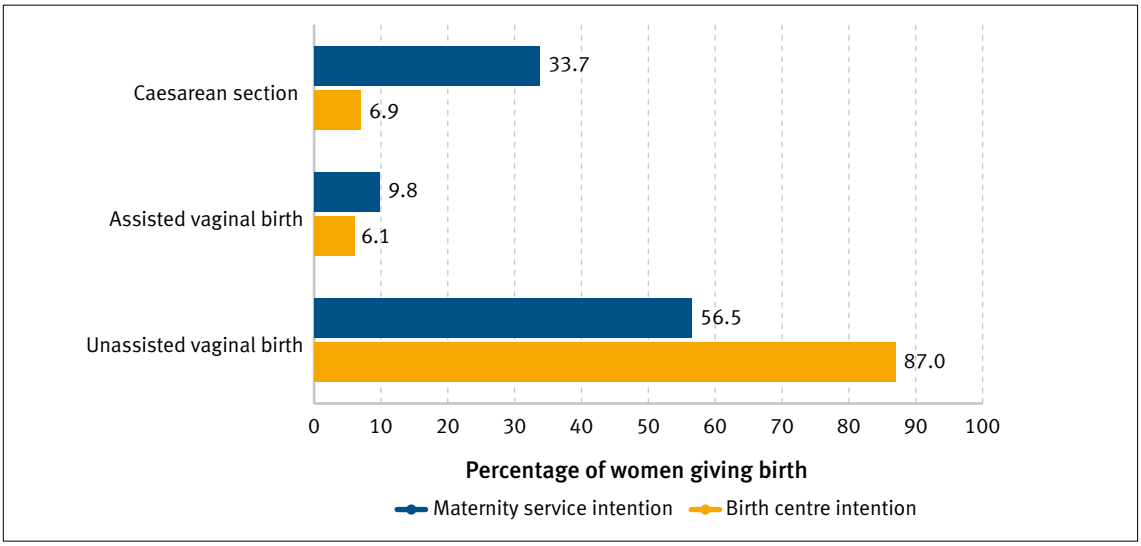


Figure 41: Mode of birth relating to women's intentions regarding birth centre birthing intention, Queensland 2009 to 2013 (Table A35)

Readers interested in further details about the determinants of caesarean section delivery are referred to Statbite 9 (Determinants of caesarean section in Queensland 1997–2006)[20].

2.9 Indigenous mothers and their babies

In the years 2012 to 2013, 7,588 Aboriginal and/or Torres Strait Islander women gave birth in Queensland (6.1 per cent of the total of 124,820 women giving birth). Indigenous status was not known for 12 women. Of these Aboriginal and/or Torres Strait Islander women, 7,442 (98.1 per cent) were cared for in the public hospital system, compared with 69.4 per cent of non-Indigenous women who accessed public hospital care (Table A36).

Just over 80 per cent of Aboriginal and/or Torres Strait Islander women giving birth are 20 or more years of age, whilst approximately 96 per cent of non-Indigenous women giving birth are 20 or more years of age (Figure 42 and Tables A37 and A38).

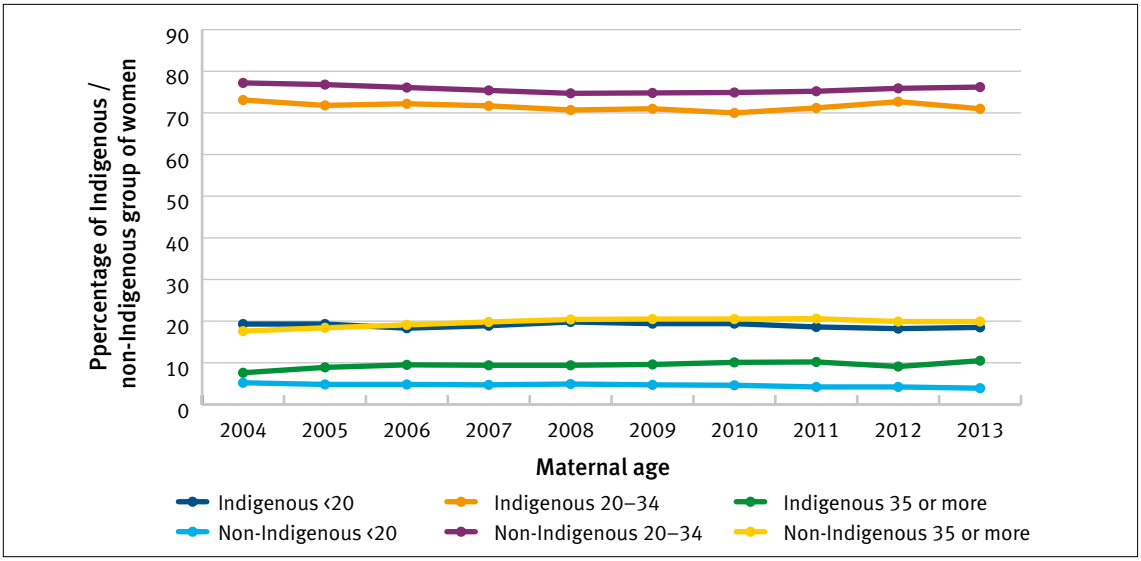


Figure 42: Incidence of maternal age groups by maternal Indigenous status, Queensland 2004 to 2013 (Tables A37 and A38)

20 Howell S, Khor S-L, Johnston T. Determinants of caesarean section in Queensland 1997-2006. Statbite #9, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite9.pdf.

As seen in Figures 43 and 44 and Table A39, Aboriginal and/or Torres Strait Islander women are more likely than non-Indigenous women to give birth at lower gestations (Aboriginal and/or Torres Strait Islander versus non-Indigenous risk ratio for birth at gestations of 36 weeks or less = 1.49, 95 per cent confidence intervals = 1.44, 1.55). This difference in gestational pattern has remained constant over the period 2004 to 2013.

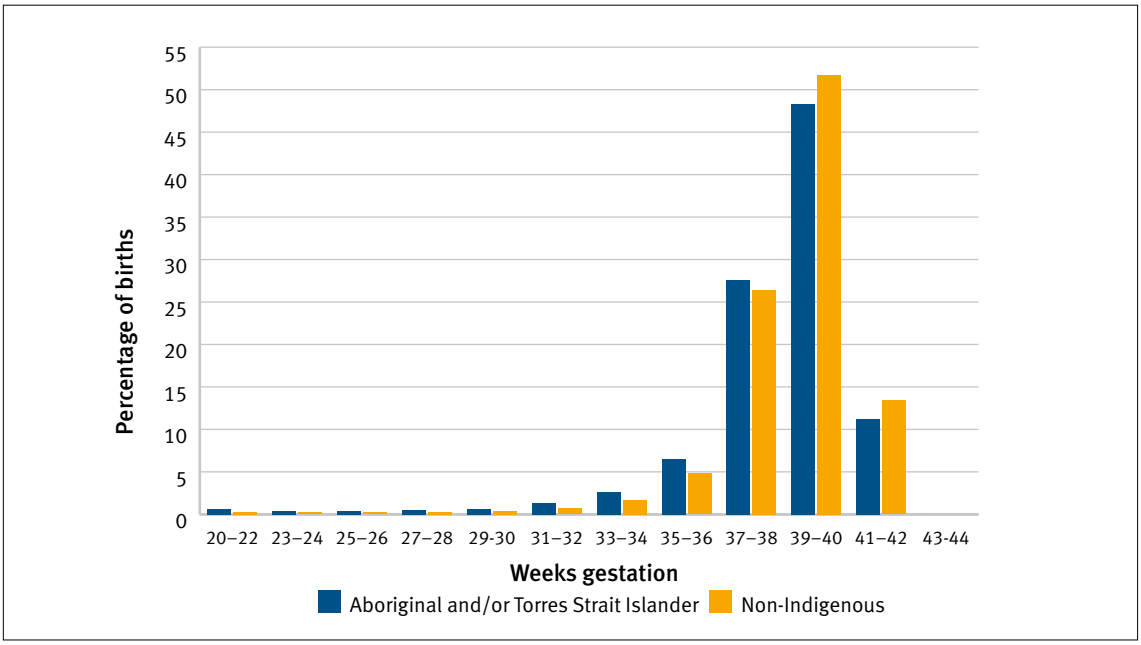


Figure 43: Percentage of women giving birth, by maternal Indigenous status and gestational age group, Queensland 2009 to 2013
(Table A39)

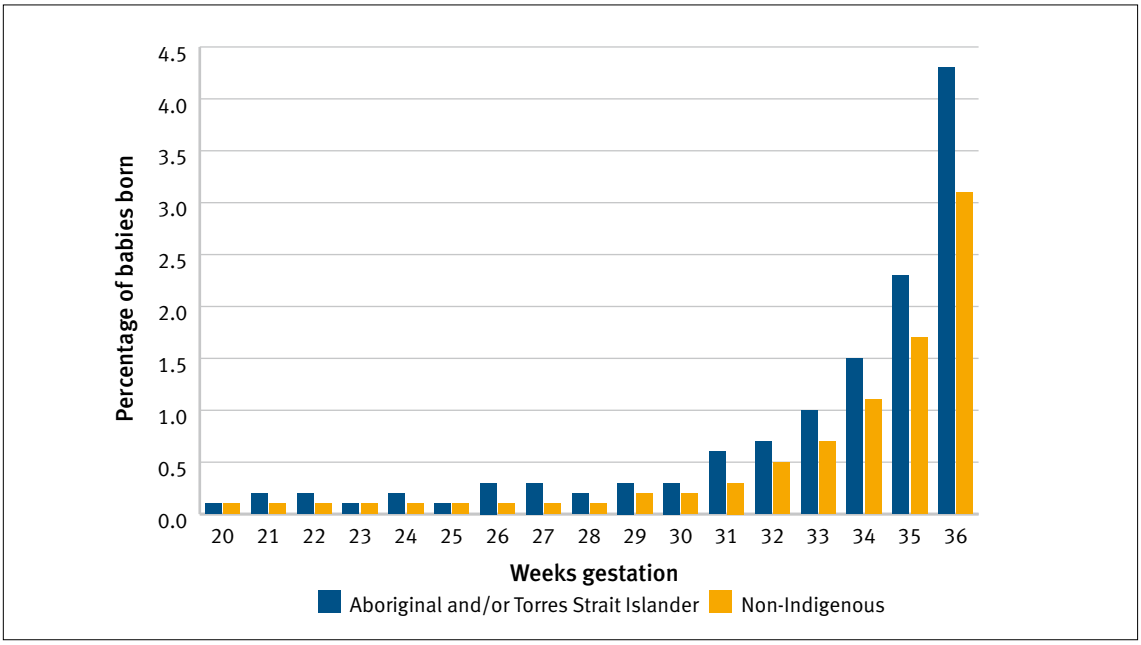


Figure 44: Percentage of women giving birth at gestations less than 37 weeks, by maternal Indigenous status and gestational age, Queensland 2009 to 2013
(Table A39)

Gestational age-specific birthweights are similar for Aboriginal and/or Torres Strait Islander and non-Indigenous babies (Figure 45 and Table A39). This does not suggest that the birthweight of babies of Aboriginal and/or Torres Strait Islander women at specific gestational ages is different from babies of non-Indigenous women.

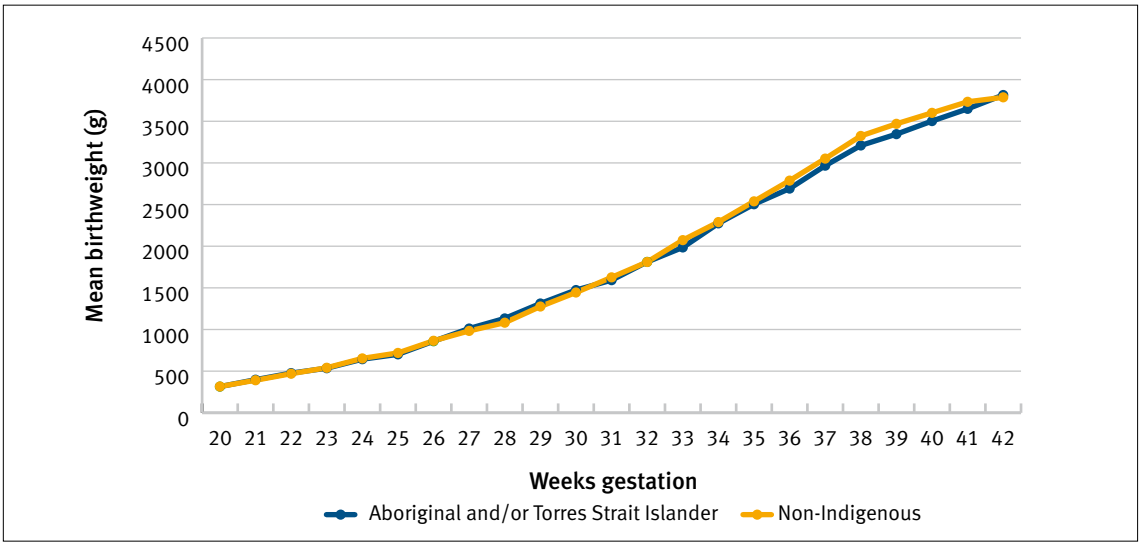


Figure 45: Mean birthweight by gestational age and maternal Indigenous status, Queensland 2009 to 2013
(TableA39)

The different gestational patterns between Aboriginal and/or Torres Strait Islander and non-Indigenous pregnancies means that the incidence of low birthweight Aboriginal and Torres Strait Islander babies being born is significantly higher than for non-Indigenous babies, due to the higher incidence of preterm birth in Aboriginal and/or Torres Strait Islander pregnancies (Figure 46 and Table A40) (Indigenous versus non-Indigenous risk ratio for birthweight less than 2500g= 1.78, 95 per cent confidence intervals = 1.71, 1.85).

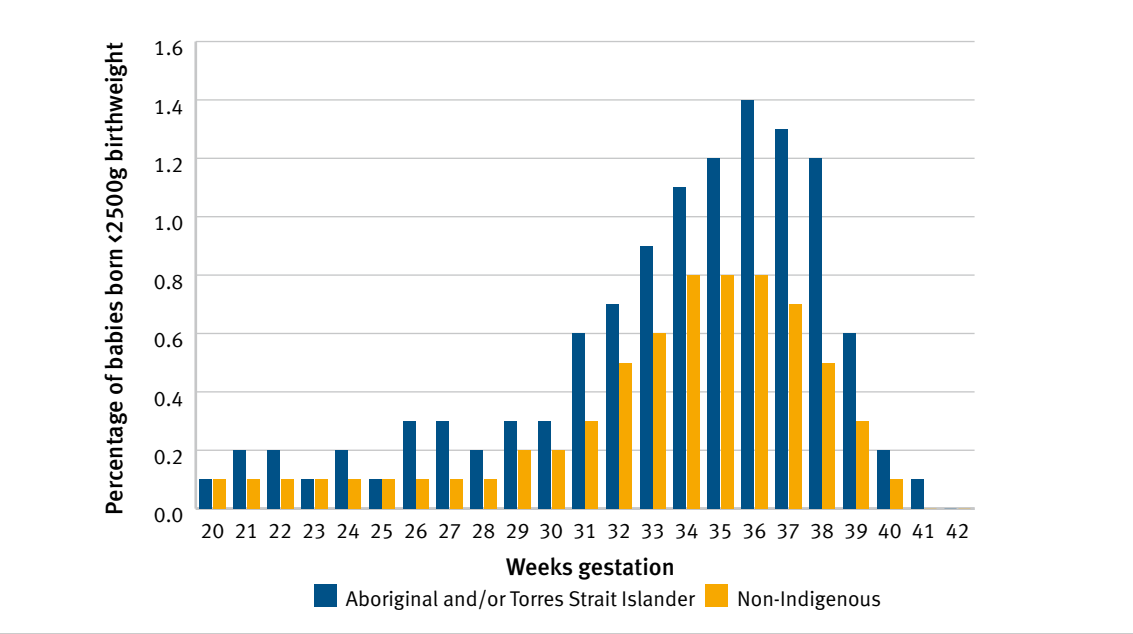


Figure 46: Percentage of babies by gestation, birthweight group and maternal Indigenous status, Queensland 2009 to 2013
(Table A40)

Given the information in Figures 43 to 46 and Tables A39 and A40, detailed in section 2.9 above ('Indigenous mothers and their babies'), it continues to be relevant that an indicator based on birthweight for gestation should be used in assessing Aboriginal and/or Torres Strait Islander pregnancy and newborn outcomes (rather than birthweight alone).

Recommendation:

That the Health Statistics Branch progress a recommendation through the appropriate mechanisms of government to COAG, to develop an indicator relating to gestation at birth (e.g. less than 37 weeks' gestation) in addition to the indicator relating to Indigenous baby birthweight. The Indigenous baby birthweight indicator may be more valuable if calculated for gestation equal to 37 or more weeks, tracking near-term intrauterine growth restriction.

A recent multivariate analysis of the disparity in perinatal outcomes between the babies of Aboriginal and/or Torres Strait Islander women and their non-Indigenous counterparts in Queensland, by the Health Statistics Branch of Queensland Health[21] examines this issue in some depth.

2.9.1 Queensland Department of Health Performance Indicators in Aboriginal and/or Torres Strait Islander Health related to maternity and newborn care

In 2007, Queensland Health committed to establish measurable accountabilities, starting with key areas of chronic disease and maternal and child health. This set of statewide indicators is drawn principally from Queensland Hospital Admitted Patient Data Collection and the Queensland Perinatal Data Collection. Four indicators, reported here, relate to maternity and newborn care in public health care.

Aboriginal and/or Torres Strait Islander women who smoked after 20 weeks' gestation: This indicator is defined as The proportion of Aboriginal and/or Torres Strait Islander women who smoked after 20 weeks' gestation.

Aboriginal and/or Torres Strait Islander women who smoked at any time during pregnancy: This indicator is defined as The proportion of Aboriginal and/or Torres Strait Islander women who smoked at any time during Pregnancy.

The 2012 to 2013 incidence of women who identified as Aboriginal and/or Torres Strait Islander smoking at less than 20 weeks' gestation during pregnancy was 47.6 per cent, and the incidence of women who identified as Aboriginal and/or Torres Strait Islander smoking after 20 weeks' gestation during pregnancy was 42.7 per cent. The relevant incidence in non-Indigenous women was 12.4 per cent and 10.1 per cent.

Aboriginal and/or Torres Strait Islander women who attended five or more antenatal visits during pregnancy: This indicator is defined as The number of Aboriginal and/or Torres Strait Islander women who attended at least five antenatal visits and gave birth at 32 weeks or more gestation to a live or stillborn baby as a proportion of Aboriginal and/or Torres Strait Islander women who gave birth at 32 weeks or more gestation resulting in at least one live born or stillborn baby.

Over the course of 2012 to 2013, 85.3 per cent of women identifying as Aboriginal and/or Torres Strait Islander attended five or more antenatal visits, which is an increase from 78.9 per cent over the period 2008 to 2011. The relevant incidence for 2012 to 2013 in non-Indigenous women was 95.6 per cent.

Low birthweight babies (weighing less than 2500 grams at birth) born to Aboriginal and/or Torres Strait Islander women: This indicator is defined as The incidence of low birthweight among live-born babies of Aboriginal and/or Torres Strait Islander mothers as a proportion of live-born babies of Aboriginal and/or Torres Strait Islander mothers. Low birthweight is defined as less than 2500 grams.

Over the course of 2012 to 2013, 11.9 per cent of babies of women identifying as Aboriginal and/or Torres Strait Islander weighed less than 2500g. The relevant incidence in the babies of non-Indigenous women was 6.7 per cent.

2.9.2 QMPQC Gestation at Birth Performance Indicator in Aboriginal and/or Torres Strait Islander Health maternity and newborn care

Given the disparity in the incidence of preterm birth shown in section 2.9, QMPQC recommends the addition of an indicator that would be defined as The incidence of preterm birth among babies of Aboriginal and/or Torres Strait Islander mothers as a proportion of all babies of Aboriginal and/or Torres Strait Islander mothers. Preterm birth is defined as birth at gestations less than 37 weeks gestation.

21 A multivariate approach to the disparity in perinatal outcomes between Indigenous and non-Indigenous women, Queensland. Utz M, Johnston T, Zarate D and Humphrey M. Health Statistics Branch, Queensland Health. 2014. www.health.qld.gov.au/hsu/peri/indigenous-peridisparity.pdf

Over the course of 2012 to 2013, 12.9 per cent of babies of women identifying as Aboriginal and/or Torres Strait Islander were born at less than 37 weeks gestation. The relevant incidence in the babies of non-Indigenous women was 8.6 per cent.

2.10 Influence of maternal risk factors

Risk assessment is an important element of care provision, matching likely care requirements to that available in different facilities. This section seeks to clarify the current evidence available in Queensland regarding the importance of a number of the known "risk factors" for all pregnant women.

2.10.1 Effect of previous pregnancy on mode of birth

Previous pregnancy (without considering the previous mode of birth) does provide a degree of prediction regarding likely mode of vaginal birth (unassisted versus assisted) but does not significantly predict the likelihood of caesarean section birth (Figure 47 and Table A41). Women who have had a previous pregnancy are more likely to have an unassisted vaginal birth than women who have not had a previous pregnancy (61.8 per cent versus 49.2 per cent) (2004 to 2013 previous pregnancy versus no previous pregnancy risk ratio for unassisted vaginal birth = 1.26, 95 per cent confidence intervals = 1.25, 1.26). The incidence of caesarean section birth is not significantly affected by whether or not the woman has had previous pregnancies. The incidence of unassisted vaginal birth has decreased over this decade.

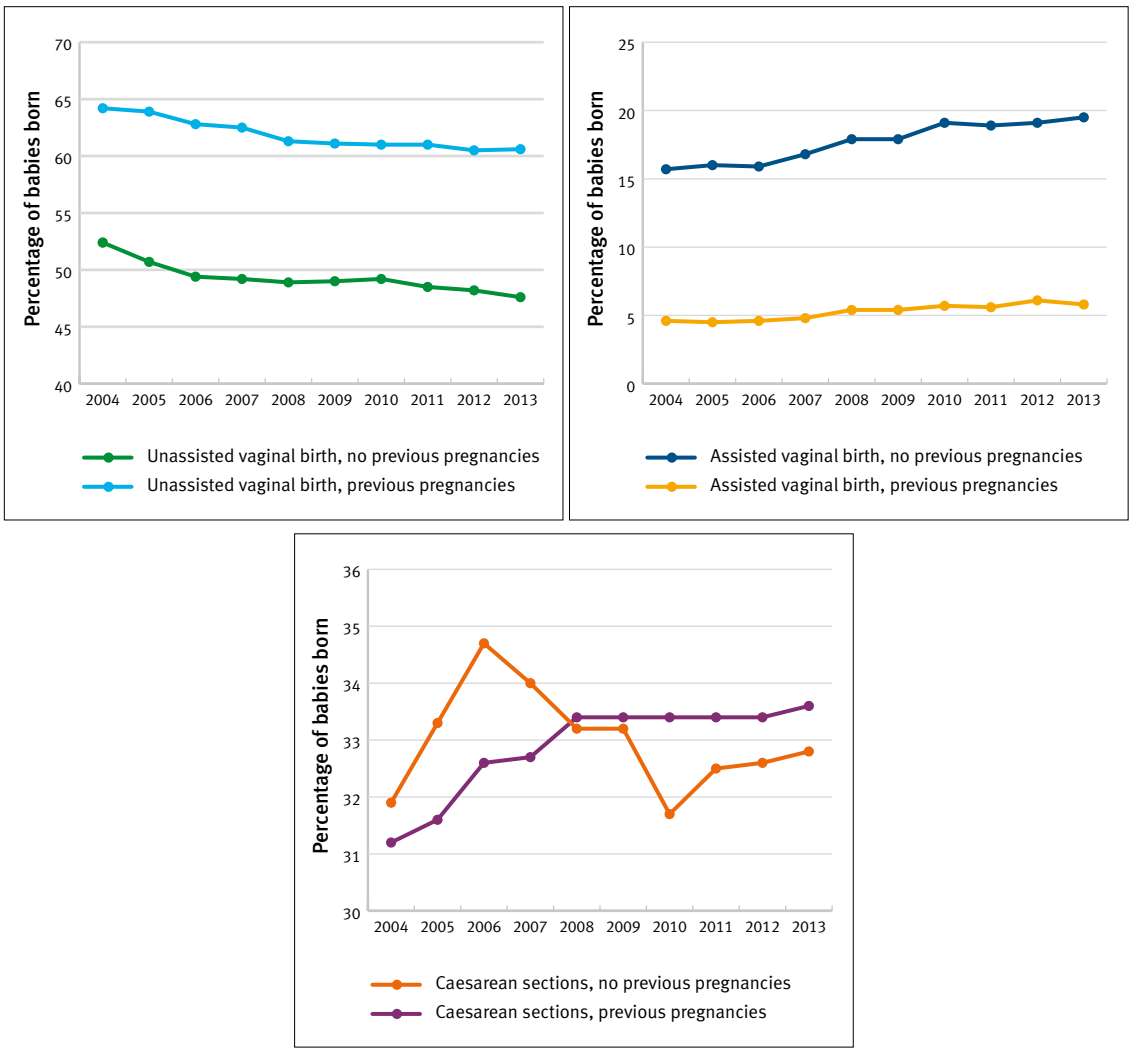


Figure 47: Incidence of mode of birth by previous pregnancy, Queensland 2004 to 2013
(Table A41)

2.10.2 Effect of previous caesarean section on mode of birth

Almost 84 per cent of women who have not had a previous caesarean section gave birth by the vaginal route (unassisted or assisted), compared with 20 per cent who have had one previous caesarean section and less than 3 per cent who have had more than one previous caesarean section (Figure 48 and Table A42) (2004 to 2013 one previous caesarean section versus no previous caesarean section risk ratio for vaginal birth = 0.24, 95 per cent confidence intervals = 0.23, 0.24). Little change has occurred over this decade.

Further information regarding the impact of a previous caesarean section on subsequent births can be found in Statbite 30 (Selected adverse maternal outcomes following a previous caesarean section in Queensland)[22]

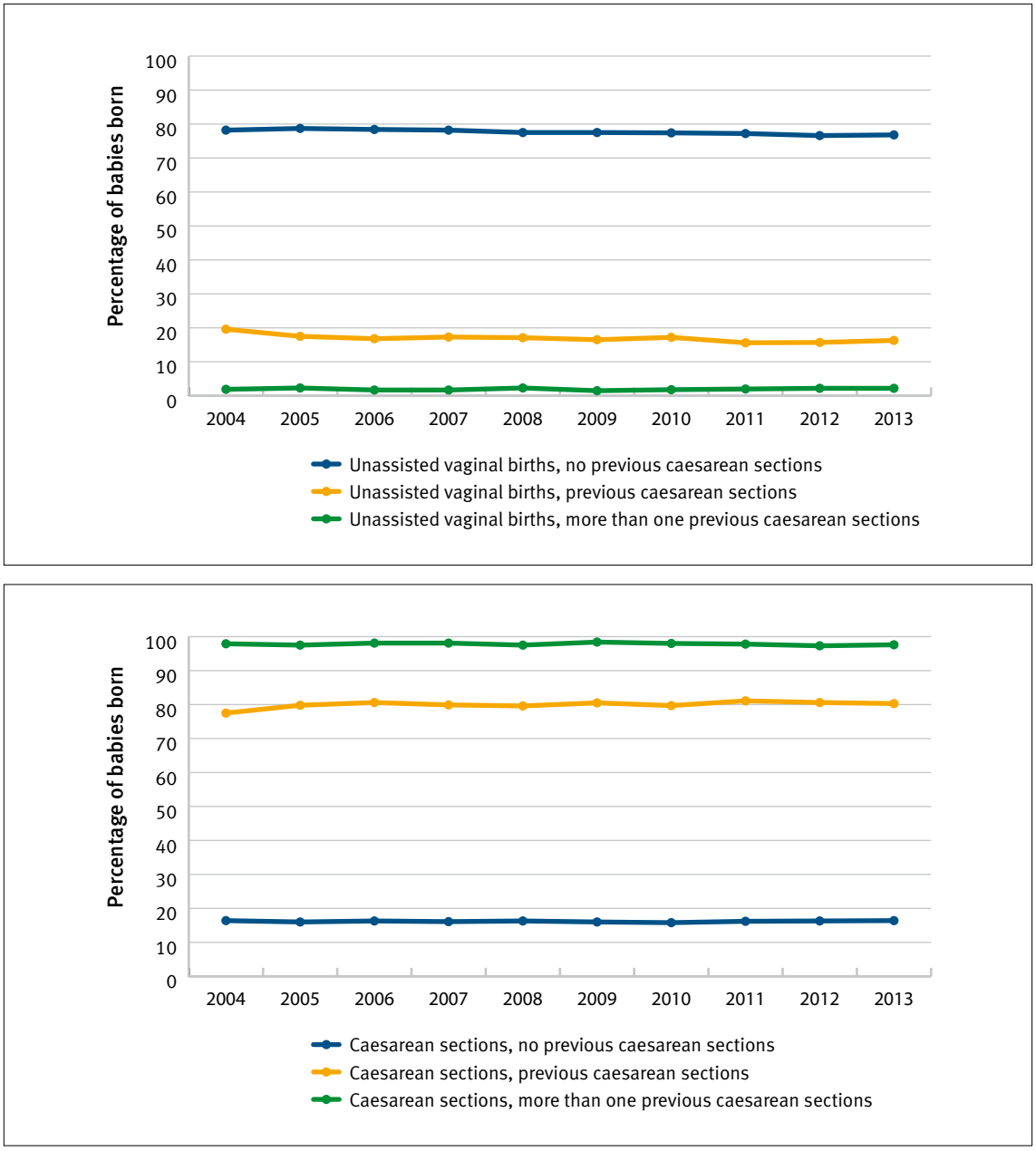


Figure 48: Incidence of mode of birth by previous caesarean sections, Queensland 2004 to 2013
(Table A42)

22 Wills R, MacLeod S-L, Johnston T. Selected adverse maternal outcomes following a previous caesarean section in Queensland. Statbite #30, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite30.pdf

2.10.3 Maternal age

Over the period 2004 to 2013 the incidence of birth to women over the age of 35 years has increased from 17 per cent to almost 20 per cent (Figure 49 and Table A43), with concomitant decreases in the incidence of birth to women in the 20 to 34 years and less than 20 years age groups. (maternal age 35 years or more versus rest, 2012/2013 versus 2004/2005 = 1.11, 95 per cent confidence intervals = 1.09, 1.12)

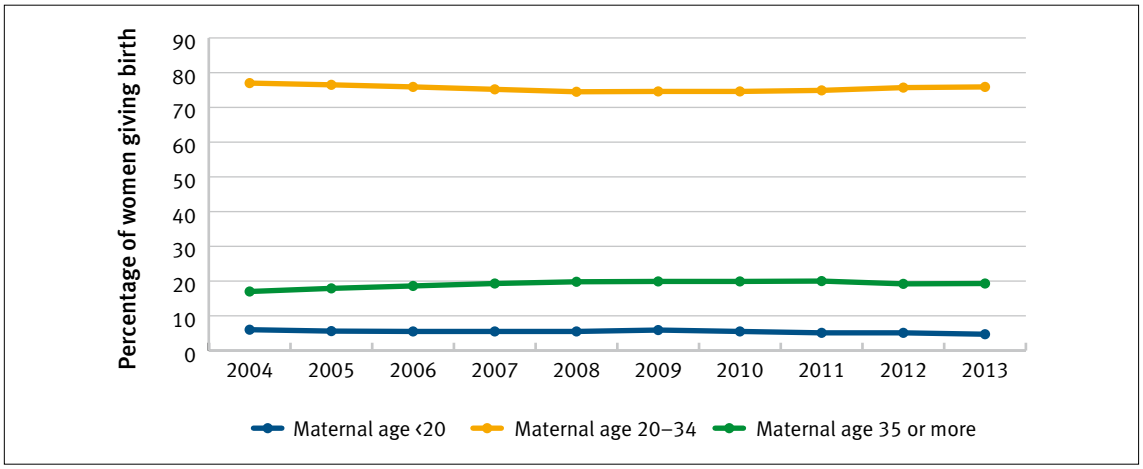


Figure 49: Percentage of births by maternal age group, Queensland 2004 to 2013 (Table A43)

Almost all women aged 20 years or less are cared for in the public hospital system, (Figure 50 and Table A44). Approximately one–quarter of women aged 20 to 34 years and almost one–half of women aged 35 years or more were cared for in the private hospital system Figures 51 and 52 and Table A44).

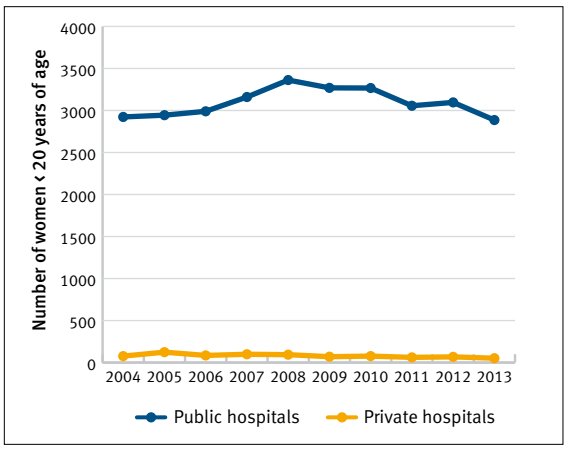


Figure 50: Number of births to women less than 20 years of age by mode of healthcare delivery, Queensland 2004 to 2013 (Table A44)

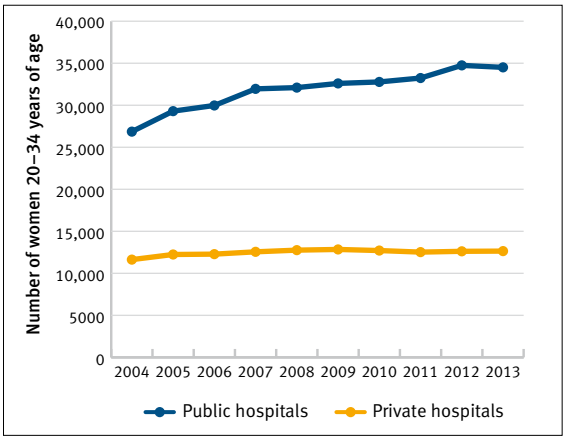


Figure 51: Number of births to women 20–34 years of age by mode of healthcare delivery, Queensland 2004 to 2013 (Table A44)

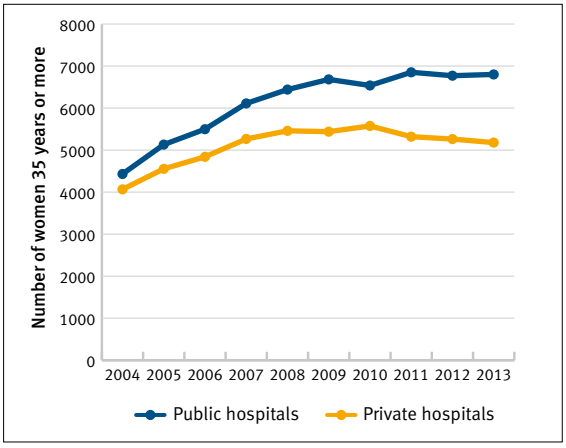


Figure 52: Number of births to women 35 or more years of age by mode of healthcare delivery, Queensland 2004 to 2013 (Table A44)

The incidence of multiple birth increased as the age of women increased, with a peak in the 31 to 35 year age group (Figure 53 and Table A45) (2009 to 2013 maternal age 31 years or more versus maternal age 30 or less risk ratio for multiple pregnancy = 1.62 95 per cent confidence intervals = 1.53, 1.71).

This difference in incidence is not seen in women who have conceived with the assistance of the use of assisted reproduction technologies (2009 to 2013 maternal age 31 years or more versus maternal age 30 or less risk ratio for multiple pregnancy = 1.08, 95 per cent confidence intervals = 0.97, 1.21), but remains present in women who have conceived without the use of assisted reproduction technologies (2009 to 2013 maternal age 31 years or more versus maternal age 30 or less risk ratio for multiple pregnancy = 1.23, 95 per cent confidence intervals = 1.15, 1.31). Hence it would appear that the age related increase in the incidence of multiple pregnancy has its origins in both a maternal age related effect and in the use of assisted reproduction technologies.

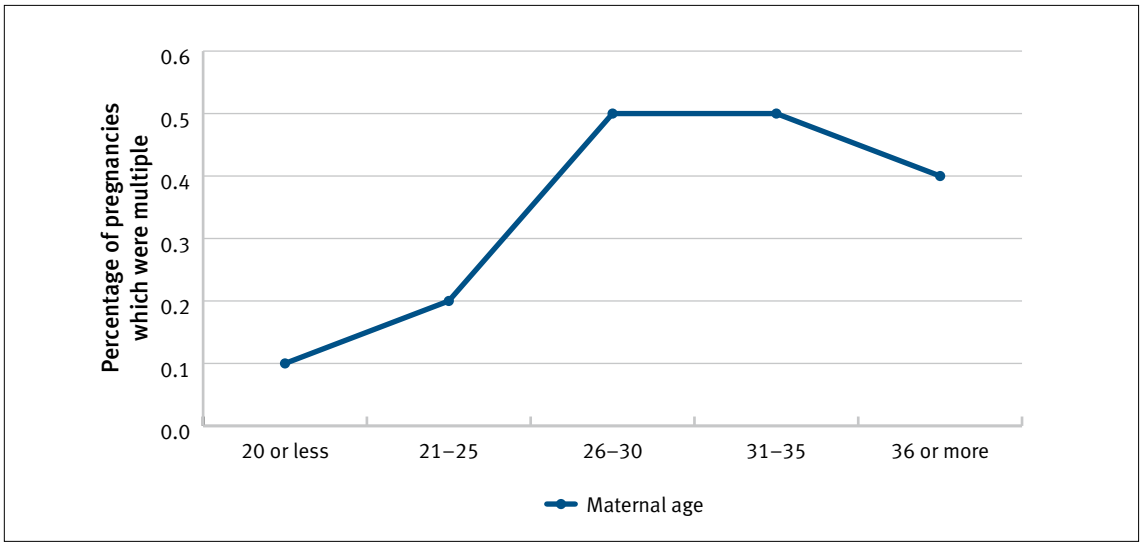


Figure 53: Incidence of multiple birth by maternal age, Queensland 2009 to 2013
(Table A45)

Older women are more likely than younger women to give birth between 33 and 38 weeks' gestation, rather than 39 weeks or more (Figure 54 and Table A46) (2009 to 2013 maternal age 31 years or more versus maternal age 30 or less risk ratio for birth between 33 and 38 weeks' gestation = 1.26, 95 per cent confidence intervals = 1.24, 1.27)

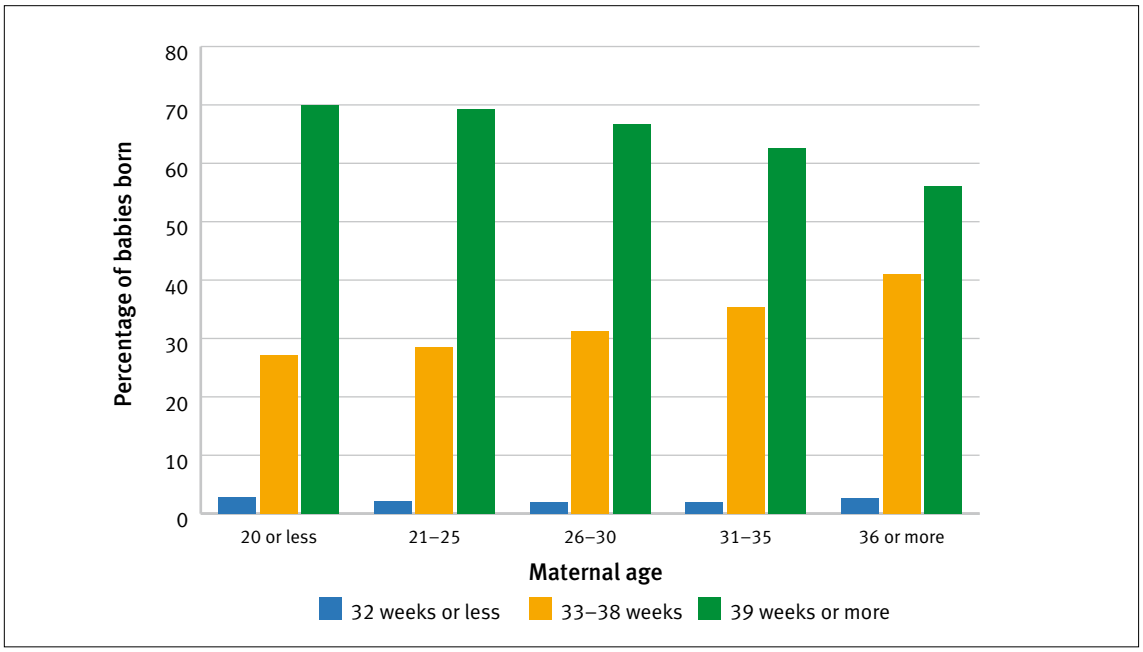


Figure 54: Percentage of babies born by maternal age and gestation, Queensland 2009 to 2013
(Table A46)

Live-born babies of women 36 or more years of age and women 20 or less years of age are most likely to need newborn care in a neonatal intensive care unit (NICU) and/or a special care nursery (SCN) (Figure 55 and Table A47) (2009 to 2013 maternal age 36 years or more versus maternal age 21–35 years risk ratio for NICU and/or SCN care = 1.19, 95 per cent confidence intervals = 1.17, 1.21; 2009 to 2013 maternal age 20 years or less versus maternal age 21–35 years risk ratio for NICU and/or SCN care = 1.16, 95 per cent confidence intervals = 1.12 1.19).

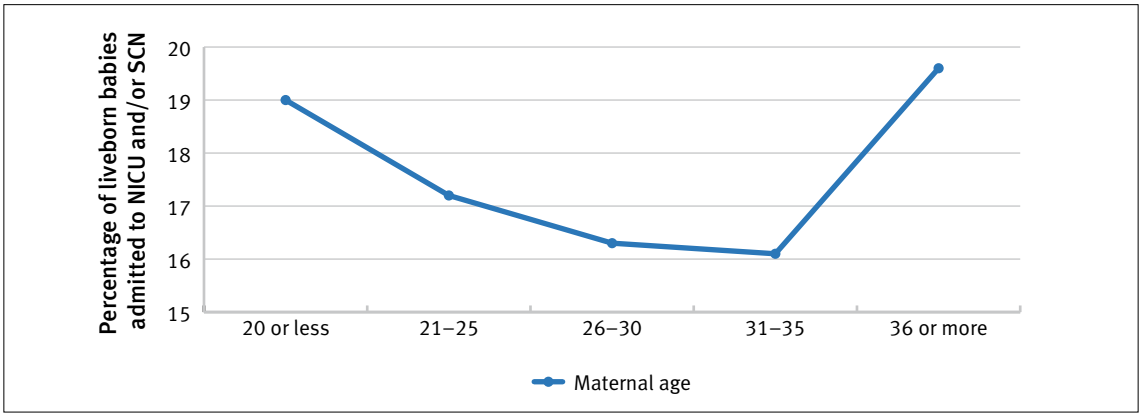


Figure 55: Percentage of live-born babies requiring admission to neonatal intensive care or special care units by maternal age, Queensland 2009 to 2013
(Table A47)

Further information regarding the impact of older maternal age can be found in Statbites 53 (Characteristics of older mothers in pregnancy)[23] and 56 (Morbidity and mortality associated with older maternal age at birth)[24]

2.10.4 Maternal obesity

Overweight and obesity are defined by body mass index (BMI; kg/m^2). Those with a BMI of 25.0–29.9 kg/m^2 are classified as overweight, while those with a BMI ≥ 30.0 kg/m^2 are classified as obese. A woman with a BMI of ‹18.5 kg/m^2 is classified as underweight.

One in five women pregnant in 2009 to 2013 (19.4 per cent) were obese, and a further 23.7 per cent were overweight. Women in the overweight and obese categories were more likely to be cared for in the public hospital system (32.3 per cent) than in the private hospital system (10.7 per cent) or homebirth (0.04 per cent). Women over the age of 20 years were more likely to be obese when compared with women less than 20 years of age (Figure 56 and Table A48).

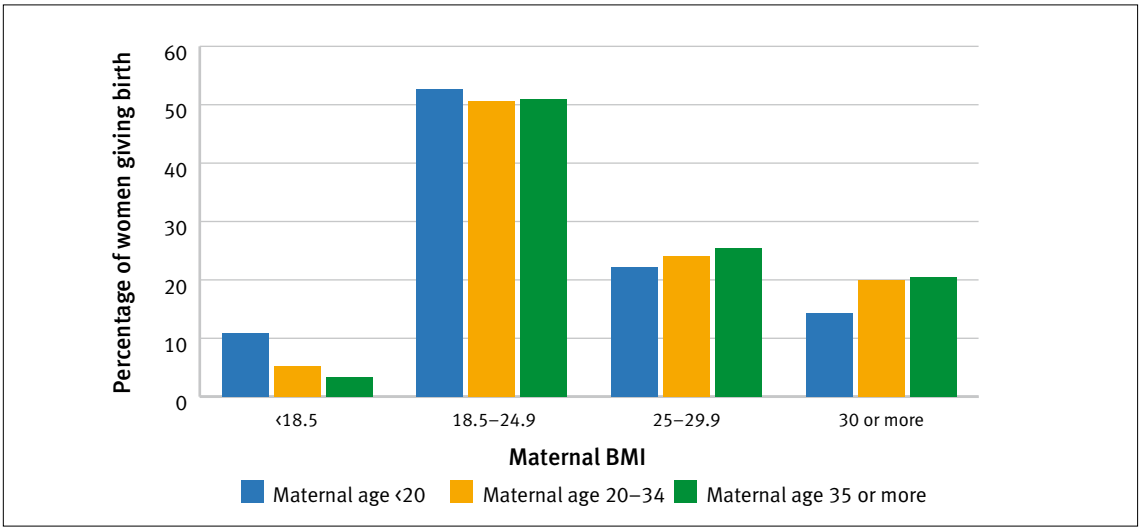


Figure 56: BMI versus maternal age, Queensland 2009 to 2013
(Table A48)

23 Wills R and Johnston T. Characteristics of older mothers in pregnancy. Statbite #53, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite53.pdf

24 Wills R and Johnston T. Morbidity and mortality associated with older maternal age at birth. Statbite #56, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite56.pdf

The likelihood of a woman having a caesarean section birth increased progressively with increasing BMI (Figure 57 and Table A49). The caesarean section rate for obese women was 40.1 per cent, compared with 30.1 per cent for women with a BMI considered to be within the normal range (2009 to 2013 BMI 30 kg/m^2 or more versus BMI 18.5 to 24.9 kg/m^2 risk ratio for caesarean section birth = 1.33, 95 per cent confidence intervals = 1.32 1.35). Both unassisted vaginal birth rate and assisted vaginal birth rate showed a concomitant progressive decrease.

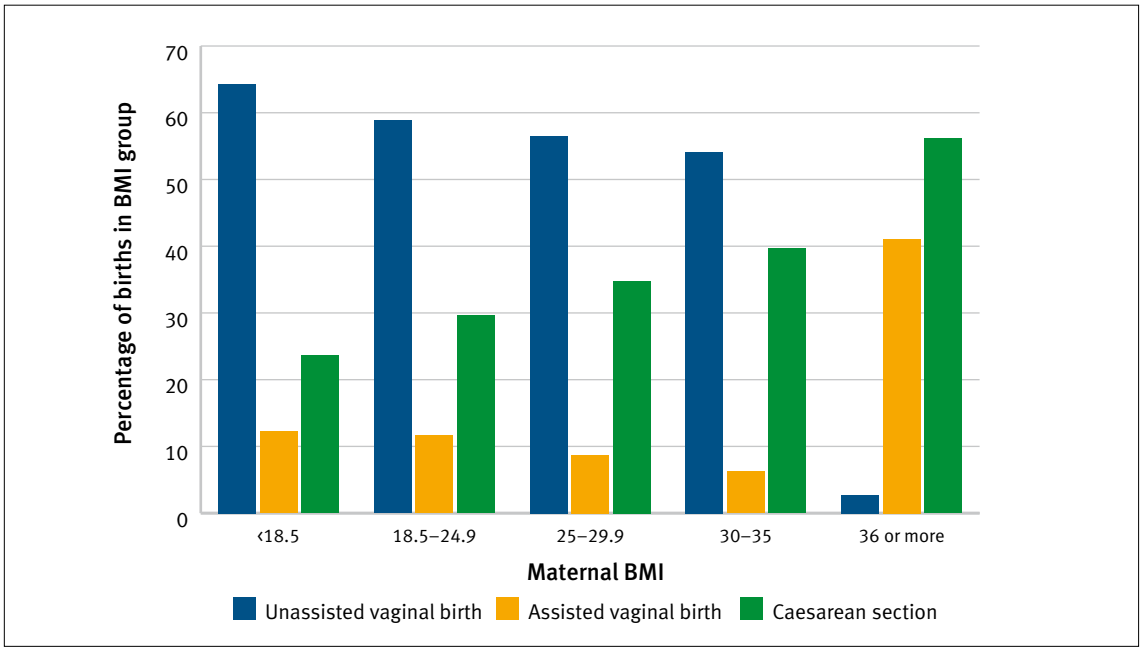


Figure 57: BMI versus mode of birth, Queensland 2009 to 2013
(Table A49)

Obesity does not appear to have any significant influence on gestation at birth (Figure 58 and Table A50). Obese women are more likely to have a baby weighing more than 4000g when compared with lighter women, and underweight women are more likely than heavier women to have a baby weighing less than 2500g (Figure 59 and Table A51).

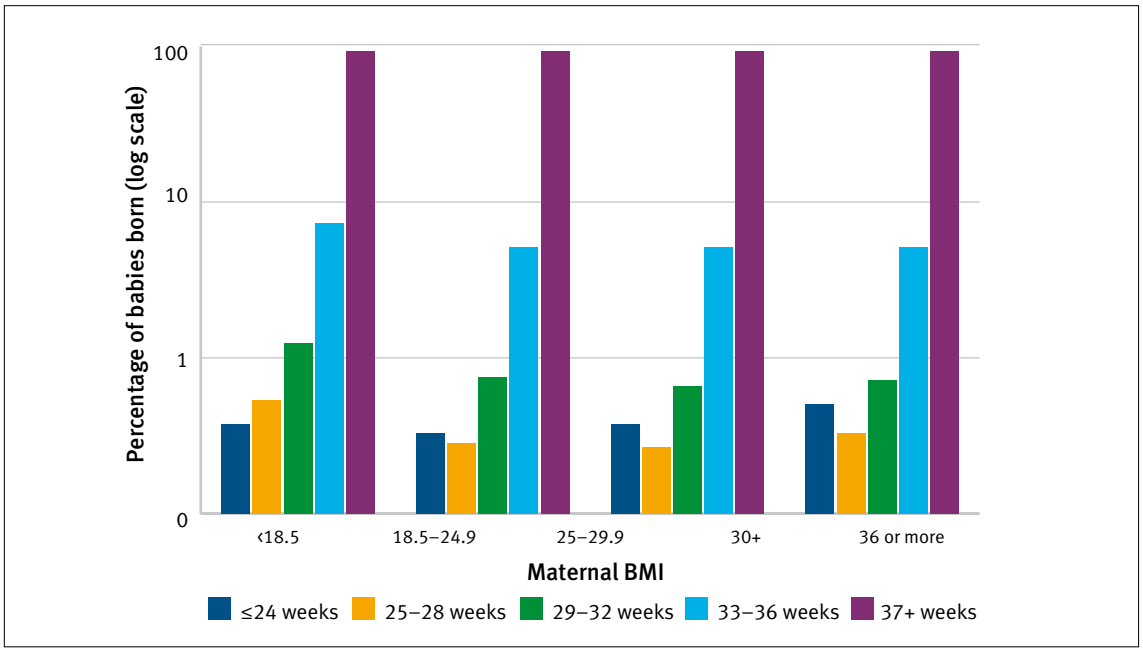


Figure 58: BMI versus gestation at birth (singleton pregnancies only), Queensland 2009 to 2013
(Table A50)

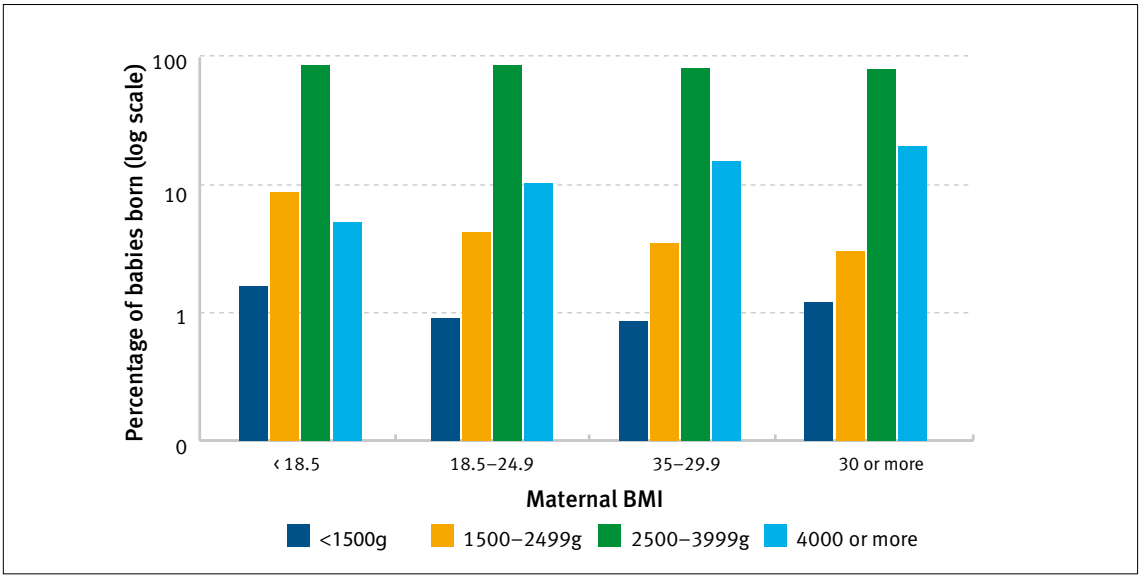


Figure 59: BMI versus birthweight (singleton pregnancies only), Queensland 2009 to 2013 (Table A51)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

Obesity (BMI 30 kg/m^2 or more) is associated with an incidence of perinatal mortality 40 per cent higher than for women with a BMI 18.5–24.9kg/m^2 (2008 to 2011 BMI 30 kg/m^2 or more versus BMI less than 18.5–24.9 kg/m^2 risk ratio for perinatal death = 1.40, 95 per cent confidence intervals = 1.27, 1.54). Both stillbirth and neonatal mortality rates are increased in this obese group (Figure 60 and Table A52).

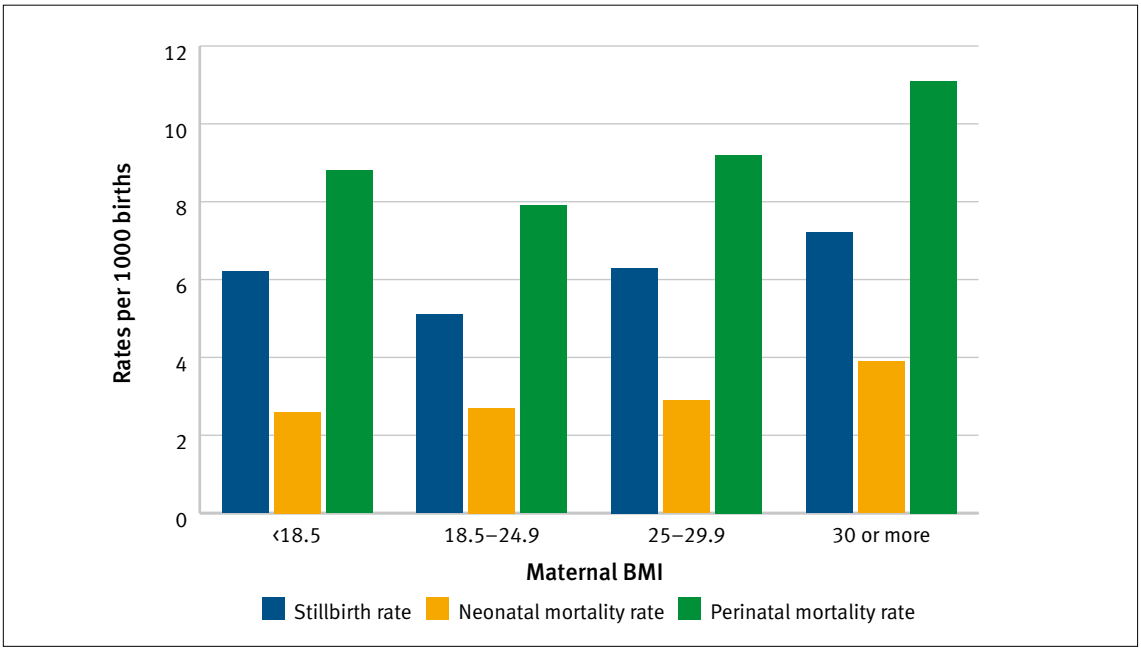


Figure 60: BMI versus perinatal mortality rates (per 1000 births), Queensland 2009 to 2013 (Table A52)

Further information regarding the impact of maternal BMI can be found in Statbites 21 (Characteristics of overweight and obese mothers in Queensland, 2008)[25], 23 (The effect of Body Mass Index on delivery method of low risk pregnancies in public and private patients, Queensland 2008)[26] and 27 (Maternal obesity and selected pregnancy risks and outcomes in nulliparous mothers in Queensland, 2008)[27].

25 Watson M and Howell S. Characteristics of overweight and obese mothers in Queensland, 2008. Statbite 21, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite21.pdf

26 Watson M, Howell S, MacLeod S-L, Cornes S. The effect of Body Mass Index on delivery method of low risk pregnancies in public and private patients, Queensland 2008. Statbite 23, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite23.pdf

27 Watson M, MacLeod S-L, Cornes S, Howell S. Maternal obesity and selected pregnancy risks and outcomes in nulliparous mothers in Queensland, 2008. Statbite 27, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite27.pdf

2.10.5 Maternal smoking

Smoking status before and after 20 weeks' gestation has been collected since mid–2009. Younger women are more likely to smoke than older women (Table A53). The incidence of smoking after 20 weeks' gestation between 2010 and 2013 was 12.9 per cent, compared with 15.5 per cent before 20 weeks' gestation.

Women who smoke are more likely to give birth preterm. Smoking after 20 weeks' gestation is associated with an incidence of preterm birth (less than 37 weeks' gestation) of 3.2 per cent, compared with 2.0 per cent for women who do not smoke after 20 weeks' gestation (2010 to 2013 smoking after 20 weeks' gestation versus not smoking after 20 weeks' gestation risk ratio for birth at gestations less than 37 weeks = 1.46, 95 per cent confidence intervals = 1.41, 1.50) (Figure 61 and Table A54).

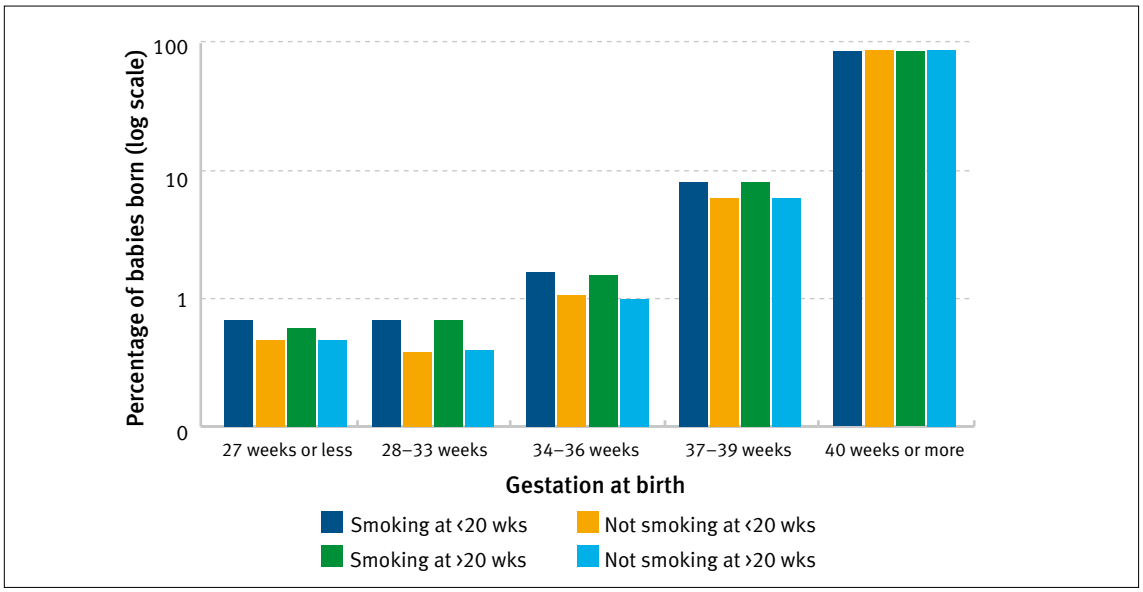


Figure 61: Smoking versus gestation, Queensland 2010 to 2013 (Table A54)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

Cigarette smoking is associated with a significantly higher incidence of birth of babies with birthweight less than 2500g, and a lower incidence of birth of babies with birthweight 4000g or more (2012 to 2013 smoking after 20 weeks' gestation versus not smoking after 20 weeks' gestation risk ratio for birthweight less than 2500g = 1.99, 95 per cent confidence intervals = 1.93, 2.06) (Figure 62 and Table A55). The birthweight distribution appears similar for women who smoke before 20 weeks and those who continue to smoke after 20 weeks' gestation.

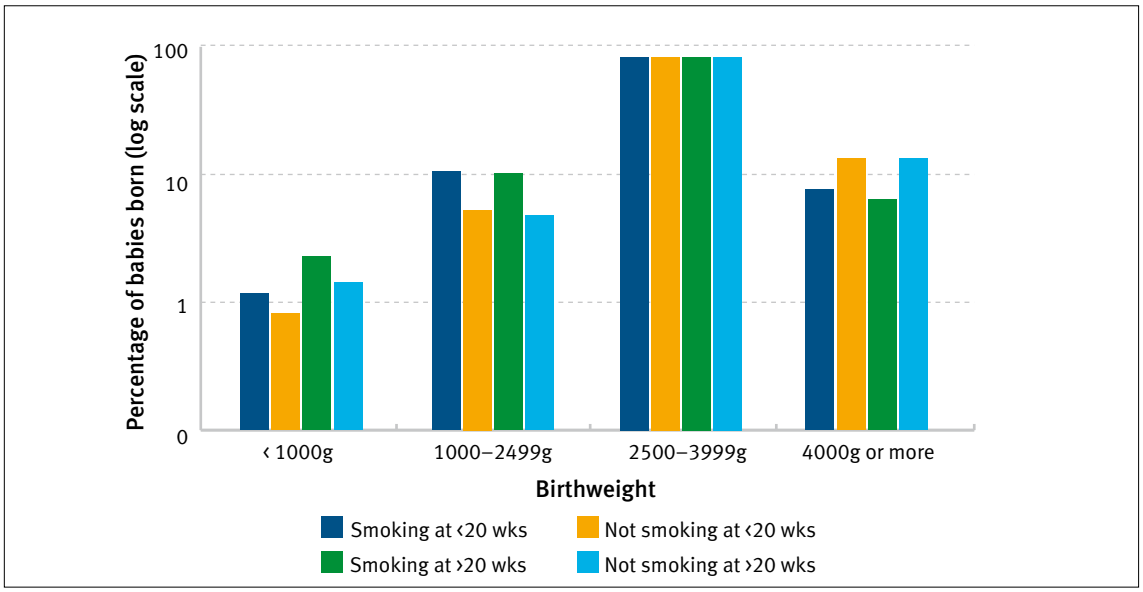


Figure 62: Smoking versus birthweight, Queensland 2010 to 2013 (Table A55)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

Smoking in pregnancy, whether before or after 20 weeks' gestation, is associated with a more than 44 per cent increase in the risk of perinatal death (Figure 63 and Table A56). Women who smoked before 20 weeks' gestation had a perinatal mortality rate of 13.3 per 1000 births, compared with 9.2 per 1000 births for women who did not smoke before 20 weeks' gestation. The risk of perinatal death was similar for women who continued to smoke after 20 weeks' gestation (2012 to 2013 smoking after 20 weeks gestation versus not smoking after 20 weeks' gestation risk ratio for perinatal death = 1.29, 95 per cent confidence intervals = 1.11, 1.51).

The recent multivariate analysis of the disparity in perinatal outcomes between the babies of Aboriginal and/or Torres Strait Islander women and their non-Indigenous counterparts in Queensland, by the Health Statistics Branch of Queensland Health[28], has found that smoking in pregnancy is one of the most significant associations with an increased risk of preterm birth, and was more prominent in this regard for the babies of Aboriginal and/or Torres Strait Islander women when compared with the babies of non-Indigenous women.

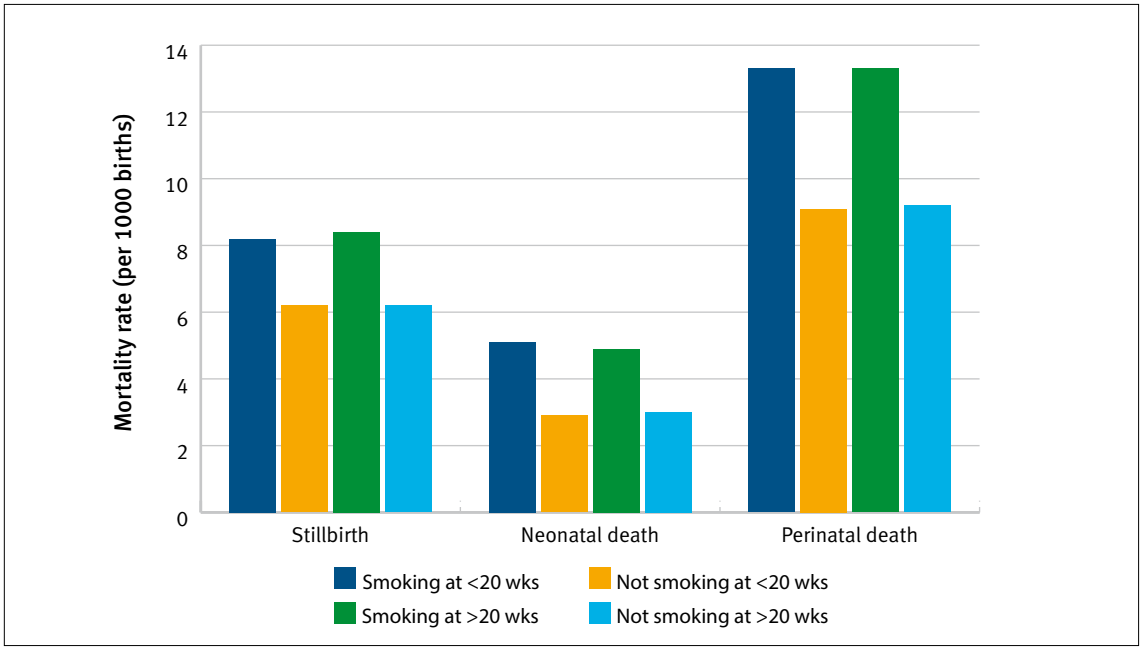


Figure 63: Smoking versus perinatal mortality rates (per 1000 births), Queensland 2010 to 2013
(Table A56)

Good practice points:

Smoking cessation programs as part of routine antenatal care reduces fetal exposure to cigarette smoke, low birthweight and preterm birth, and should form part of routine antenatal care[29].

Specialised programs to assist Indigenous women to stop smoking before and during pregnancy should be prioritised.

28 A multivariate approach to the disparity in perinatal outcomes between Indigenous and non-Indigenous women, Queensland. Utz M, Johnston T, Zarate D and Humphrey M. Health Statistics Branch, Queensland Health. 2014. www.health.qld.gov.au/hsu/peri/indigenous-peridisparity.pdf

29 Lumley J, Chamberlain C, Dowswell T, Oliver S, Oakley L, Watson L. Interventions for promoting smoking cessation during pregnancy. Cochrane Database of Systematic Reviews 2009, Issue 3.

2.10.6 Remoteness of residence

The Accessibility/Remoteness Index of Australia (ARIA+) is an index of the accessibility of places to service centres, or conversely of remoteness of places.[30] Geographical areas are given a score (continuous between 0 and15) based on the road distance to service towns of different sizes. Scores for regions are derived by averaging scores of 1 km^2 grid. This section examines the relationship between the remoteness class of the primary residence of the mothers and some outcomes. The index scores can be classified into various categories; five remoteness classes are used:

1. Highly Accessible (ARIA score 0 to ‹0.20)—relatively unrestricted accessibility to a wide range of goods and services and opportunities for social interaction.
2. Accessible (ARIA score 0.20 to ‹2.40)—some restrictions to accessibility of some goods, services and opportunities for social interaction.
3. Moderately Accessible (ARIA score 2.40 to ‹5.95)—significantly restricted accessibility of goods, services and opportunities for social interaction.
4. Remote (ARIA score 5.95 to ‹10.5)—very restricted accessibility of goods, services and opportunities for social interaction.
5. Very Remote (ARIA score 10.5 to ‹15)—very little accessibility of goods, services and opportunities for social interaction.

Women living in highly accessible and accessible areas (ARIA class 1 and 2) were more likely to give birth at or after 37 weeks' gestation (90.9 per cent) than women who live in remote and very remote areas (ARIA class 4 and 5) giving birth at or after 37 weeks' gestation (89.5 per cent) – though the difference is only 1.4 per cent it is statistically significant.(2012 to 2013 ARIA class 1 and 2 versus ARIA class 4 and 5 risk ratio for birth at or after 37 weeks = 1.02 95 per cent confidence intervals = 1.01, 1.03) (Figure 64 and Table A57).

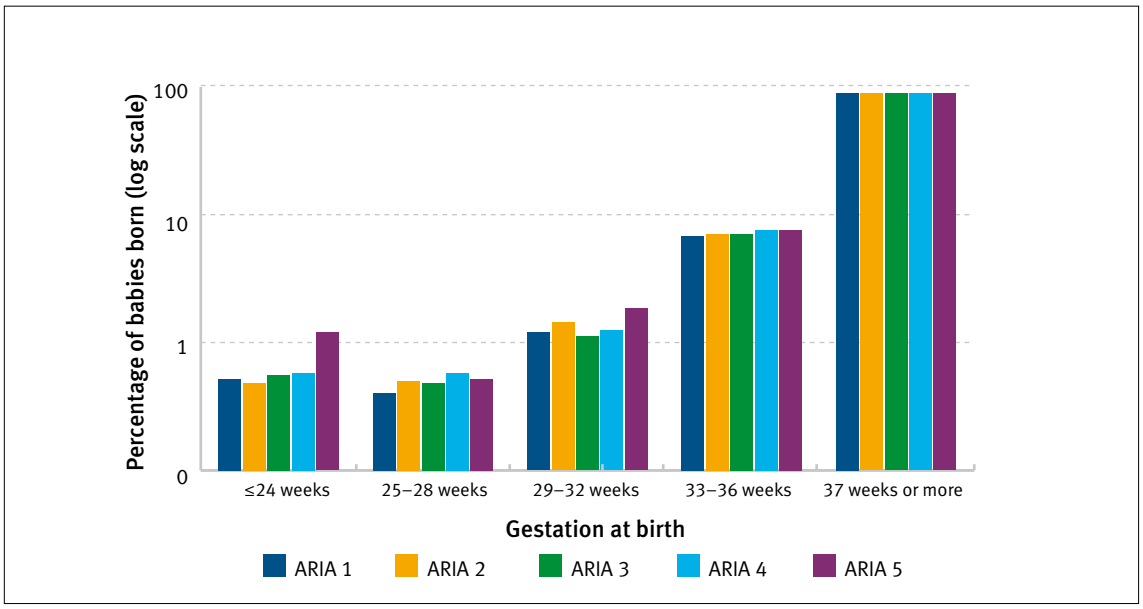


Figure 64: Remoteness of residence versus gestation at birth (percentage of babies), Queensland 2012 to 2013
(Table A57)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

30 www.oesr.qld.gov.au/about-statistics/statistical-standards/national/aria.php

Women living in highly accessible and accessible areas (ARIA Class 1 and 2) are less likely to give birth to low birthweight babies (6.8 per cent) than women who live in remote and very remote areas (8.7 per cent) (Class 4 and 5) (Figure 65 and Table A58) (2012 to 2013 class 1 and 2 versus ARIA class 4 and 5 risk ratio for birthweight ‹2500g = 0.79, 95 per cent confidence intervals = 0.71, 0.88).

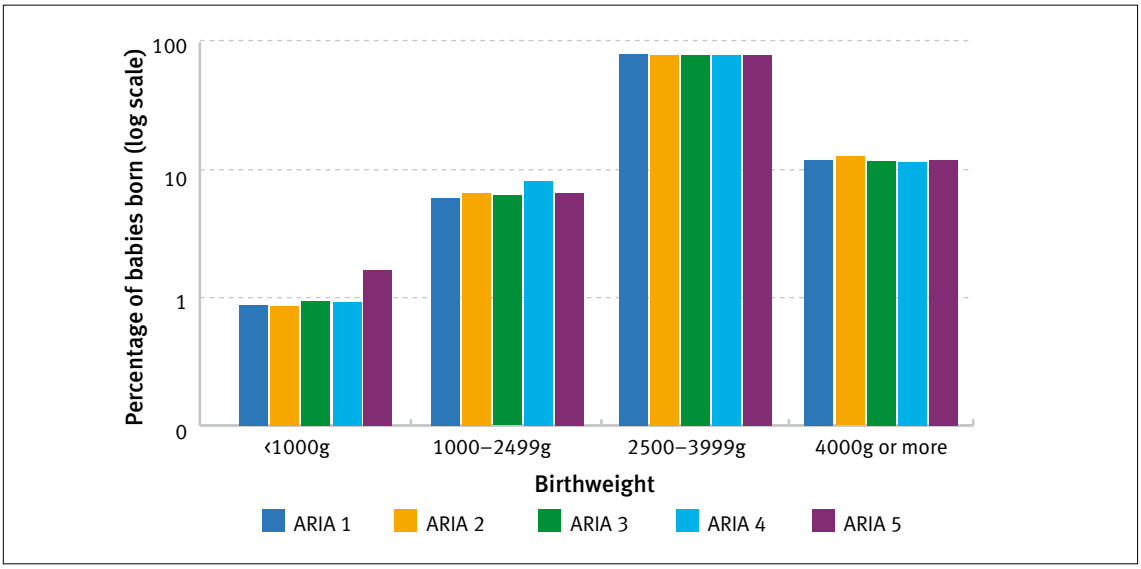


Figure 65: Remoteness of residence versus birthweight (percentage of babies), Queensland 2012 to 2013
(Table A58) Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

Perinatal mortality rates for the babies of women who live in remote and very remote areas (ARIA Class 4 and 5) are significantly higher than those for the babies of women living in highly accessible and accessible areas (Class 1 and 2) (15.5 per 1000 births versus 9.9 per 1000 births) (2012 to 2013 class 4 and 5 versus ARIA class 1 and 2 risk ratio for perinatal death = 1.59, 95 per cent confidence intervals = 1.23, 2.05). (Figure 66 and Table A59).

Stillbirth rates for the babies of women who live in remote and very remote areas (Class 4 and 5) are significantly higher than those for the babies of women living in highly accessible and accessible areas (Class 1 and 2) (11.5 per 1000 births versus 6.6 per 1000 births) (2012 to 2013 ARIA class 4 and 5 versus ARIA class 1 and 2 risk ratio for stillbirth = 1.75, 95 per cent confidence intervals = 1.29, 2.36).

Neonatal mortality rates for the babies of women who live in remote and very remote areas (Class 4 and 5) are higher than those for the babies of women living in highly accessible and accessible areas (Class 1 and 2) but the difference is not statistically significant (4.4 per 1000 live births versus 3.2 per 1000 live births) (2012 to 2013 ARIA class 4 and 5 versus ARIA class 1 and 2 risk ratio for neonatal death = 1.27, 95 per cent confidence intervals = 0.77, 2.10).

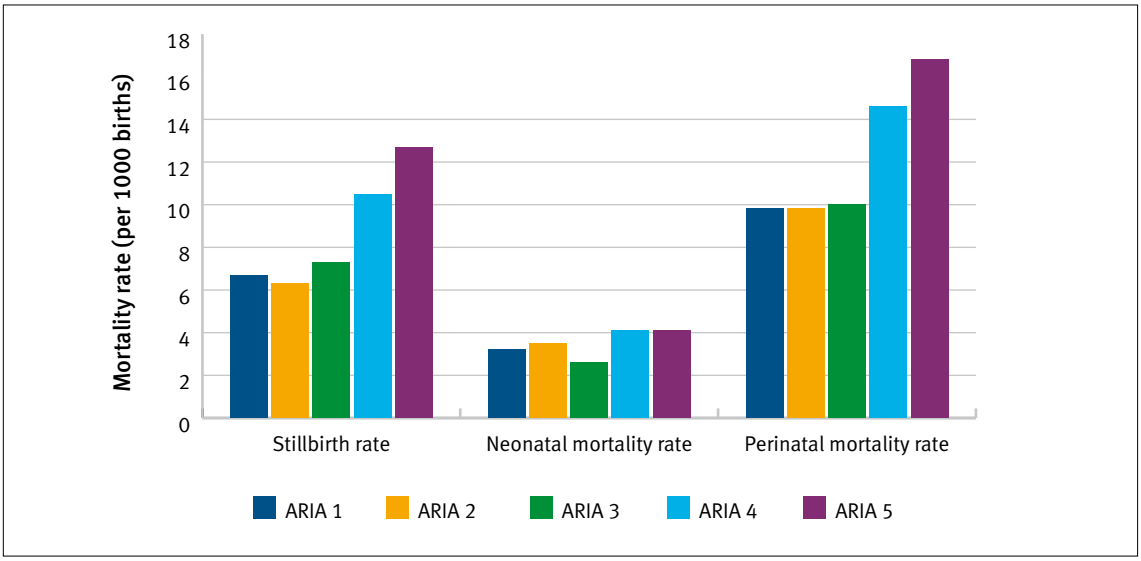


Figure 66: Remoteness of residence versus perinatal mortality rates (per 1000 births), Queensland 2012 to 2013
(Table A59)

Some women require transfer of care from one facility to another for the birth episode of care, for reasons such as need for higher level of relevant medical services (e.g. increased risk of preterm birth requiring neonatal intensive care, complications of pregnancy requiring specialised care not available locally). The need for higher level of relevant medical services requiring antenatal transfer is associated with a higher risk of perinatal death in the babies of women transferred.

Table A60 and Figures 67 to 69 depict the results of an analysis of all babies born in Queensland in 2009 to 2013, except for the 17,692 babies (5.6 per cent) recorded to have one or more congenital anomalies (i.e. for normally-formed babies).

The perinatal mortality rate for babies born after the mother was transferred antenatally was 4.3 times greater than for babies born to women who did not require transfer (26.6 deaths per 1000 births versus 6.2 deaths per 1000 births; risk ratio for perinatal death if antenatal transfer is required versus perinatal death if antenatal transfer is not required = 4.45, 95 per cent confidence intervals = 3.95, 5.00) (Figure 67 and Table A60). The risk of perinatal death if antenatal transfer was required was increased for all ARIA classes, but was higher for women transferred from ARIA 1 and 2 (perinatal mortality ratio 32.9 deaths per 1000 births if antenatal transfer was required versus 6.2 deaths per 1000 births if antenatal transfer was not required; risk ratio = 5.16; 95 per cent confidence intervals 4.44, 6.00) than for ARIA 4 and 5 (perinatal mortality ratio 16.9 deaths per 1000 births if antenatal transfer was required versus 7.3 deaths per 1000 births if antenatal transfer was not required; risk ratio = 2.28; 95 per cent confidence intervals 1.52 3.44).

Similar differences are found for stillbirth and for neonatal death (Figures 68 and 69 and Table A60).

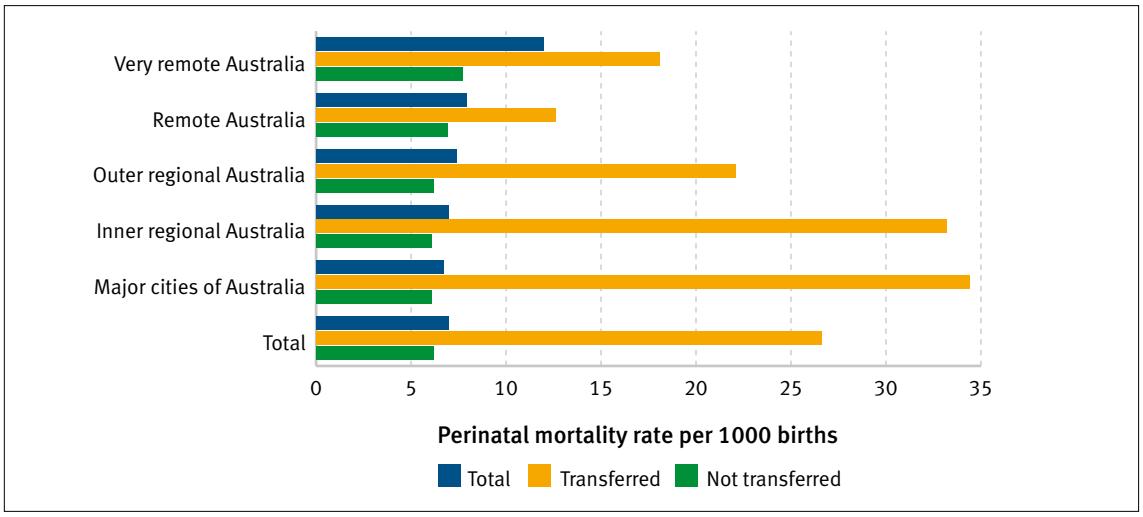


Figure 67: Correlation of antenatal transfer of care and remoteness class of women's primary residence with perinatal death, Queensland 2009 to 2013
(Rates are calculated within ARIA groups)

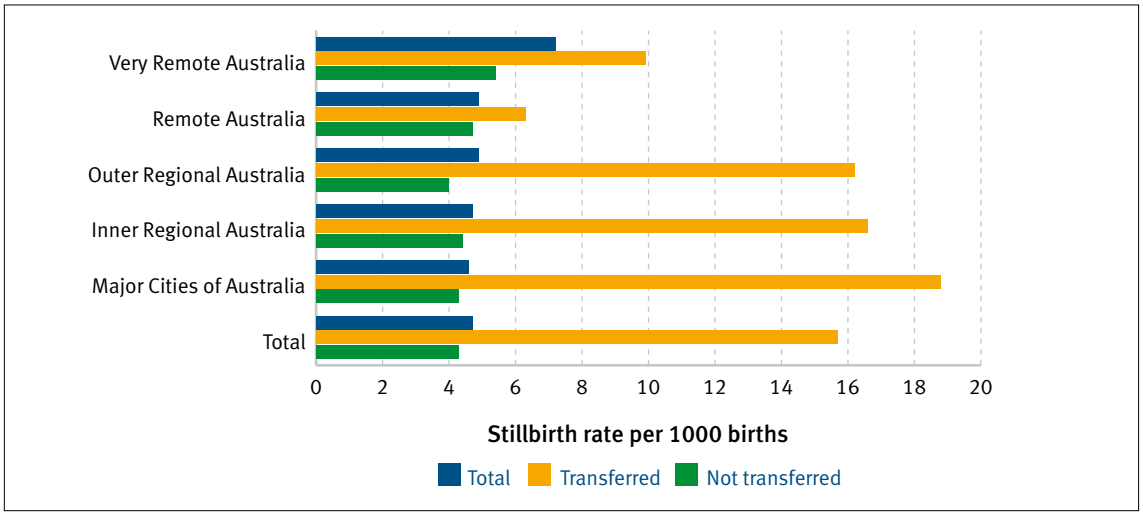


Figure 68: Correlation of antenatal transfer of care and remoteness class of women's primary residence with stillbirth, Queensland 2009 to 2013
(Rates are calculated within ARIA groups)

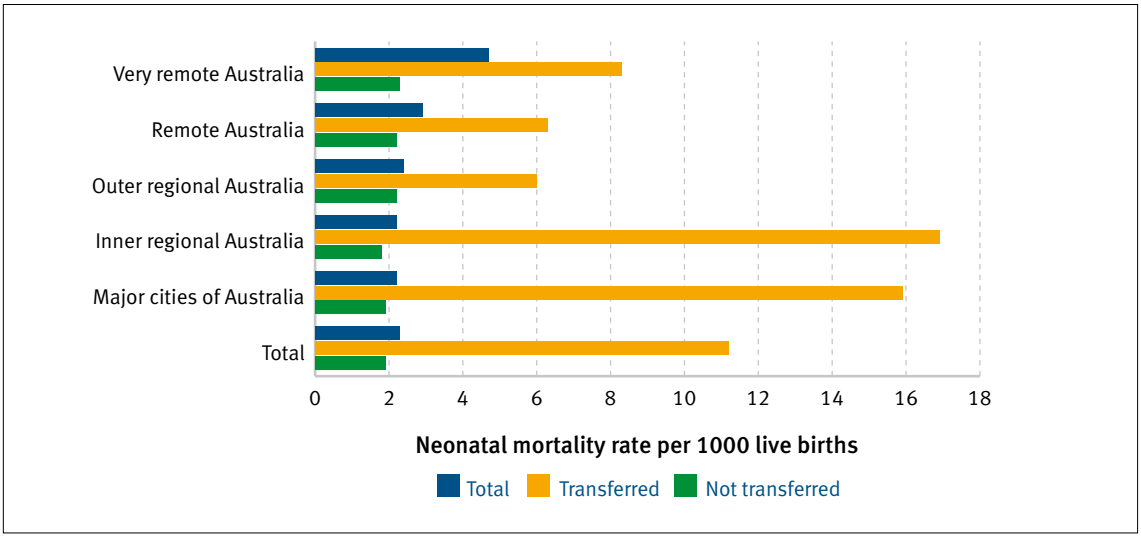


Figure 69: Correlation of antenatal transfer of care and remoteness class of women's primary residence with neonatal death, Queensland 2009 to 2013
(Rates are calculated within ARIA groups)

Interpretation of these data is difficult. It would appear to be reasonable to conclude that, for the non-transferred group across all gestations, there are no significant differences in perinatal mortality based on place of residence.

For the transferred group, the babies resulting from pregnancies where the mother required an antenatal transfer from a rural or remote setting, the outcomes are at least as good as those requiring transfer from a metropolitan or inner regional setting. It would appear to provide some evidence that the system is providing good quality care to those women who live in rural and remote Queensland, and that there is no measurable disadvantage, at least in terms of perinatal mortality.

It is hard to interpret the significantly higher perinatal mortality rates for metropolitan or inner regional settings when compared with rural and remote settings. Given the size of Queensland and the widely distributed nature of its population and the demands on specialised patient transfer systems such as Retrieval Services Queensland, this matter would appear to require in depth study.

Recommendation:

That Queensland Health undertake a coordinated and detailed study of pregnancy outcomes for women requiring antenatal transfer during their care, to understand the reasons for and significance of the differences between outcomes for metropolitan or inner regional women and their babies when compared with rural and remote women and their babies.

2.10.7 Socio-economic disadvantage

Socio-economic Indexes for Areas (SEIFA) are summary measures of a number of variables that represent different aspects of relative socio-economic disadvantage and/or advantage in a geographic area[31]. The SEIFA indexes are created by combining information collected regarding economic and social resources of people and households within an area in the five–yearly Census of Population and Housing. This section examines the Index of Relative Socio-economic Advantage and Disadvantage in relation to selected outcomes. This SEIFA index ranks different geographic areas of Australia according to a 'score' that is created for the area based on characteristics of people, families and dwellings within that area. For the purposes of this report the SEIFA index of Relative Socio-economic Advantage and Disadvantage is divided into five percentage-based groups (quintiles), producing a continuum of advantage (high values – quintiles 5 and 4) to disadvantage (low values – quintiles 1 and 2).

31 Australian Bureau of Statistics "2039.0 - Information Paper: An Introduction to Socio-Economic Indexes for Areas (SEIFA), 2006" www.abs.gov.au/ausstats/abs@.nsf/mf/2039.0/

Women who were in the more disadvantaged groups (SEIFA quintiles 1 and 2) were more likely to give birth before 37 weeks' gestation (9.8 per cent) than women who were in the more advantaged groups (8.5 per cent) (SEIFA quintiles 4 and 5) (Figure 70 and Table A61) (2012 to 2013 SEIFA quintiles 1 and 2 versus SEIFA quintiles 4 and 5 risk ratio for birth before 37 weeks: RR = 1.15, 95 per cent confidence intervals = 1.11, 1.20).

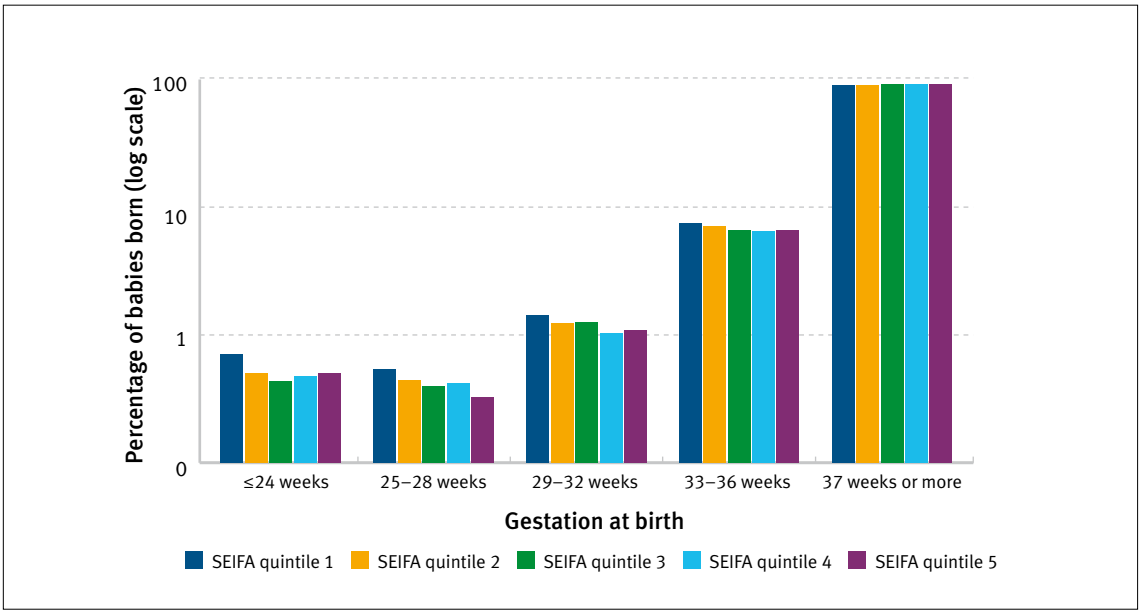


Figure 70: SEIFA quintile versus gestation, Queensland 2012 to 2013
(Table A61)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

Women who are more disadvantaged (SEIFA quintiles 1 and 2) were more likely to give birth to low birthweight babies less than 2500g (7.8 per cent) than women who were more advantaged (6.4 per cent) (SEIFA quintiles 4 and 5) (Figure 71 and Table A62) (2012 to 2013 SEIFA quintiles 1 and 2 versus SEIFA quintiles 4 and 5 risk ratio for birthweight ‹2500g = 1.20, 95 per cent confidence intervals = 1.15, 1.26).

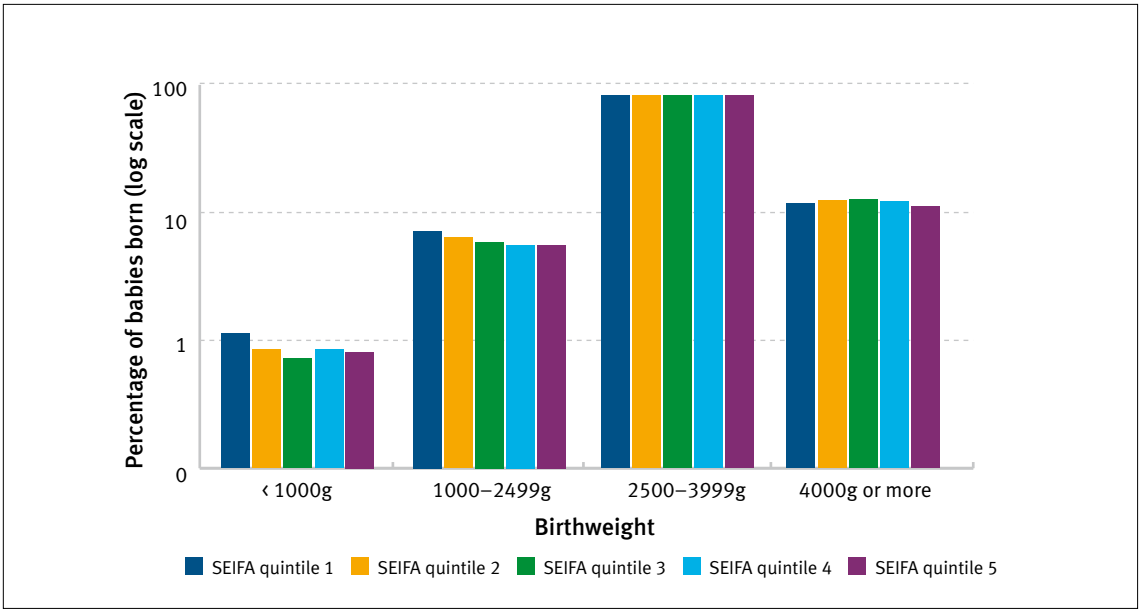


Figure 71: SEIFA quintile versus birthweight, Queensland 2012 to 2013
(Table A62)
Cautionary note regarding interpretation: a log scale is used on the vertical axis of this graph.

Disadvantage was associated with a significant increase in the risk of perinatal death. Women who are more disadvantaged (SEIFA quintiles 1 and 2) were more likely to have a perinatal death (11.0 per 1000 births) than women who were more advantaged (SEIFA quintiles 4 and 5) (9.3 per 1000 births)(2012 to 2013 SEIFA quintiles 1 and 2 versus SEIFA quintiles 4 and 5 risk ratio for perinatal death = 1.18, 95 per cent confidence intervals = 1.04, 1.33). (Figure 72 and Table A63).

Disadvantage was not associated with a significant increase in the risk of stillbirth. Women who were more disadvantaged (SEIFA quintiles 1 and 2) had a stillbirth rate of 7.1 per 1000 births, while women who were more advantaged (SEIFA quintiles 4 and 5) had a stillbirth rate of 6.8 per 1000 births (2012 to 2013 SEIFA quintiles 1 and 2 versus SEIFA quintiles 4 and 5 risk ratio for perinatal death = 1.04, 95 per cent confidence intervals = 0.90, 1.21).

Disadvantage was associated with a significant increase in the risk of neonatal death. Women who were more disadvantaged (SEIFA quintiles 1 and 2) were more likely to have a neonatal death (3.9 per 1000 live births) than women who were more advantaged (SEIFA quintiles 4 and 5) (2.5 per 1000 live births) (2012 to 2013 SEIFA quintiles 1 and 2 versus SEIFA quintiles 4 and 5 risk ratio for perinatal death = 1.54, 95 per cent confidence intervals = 1.23, 1.93).

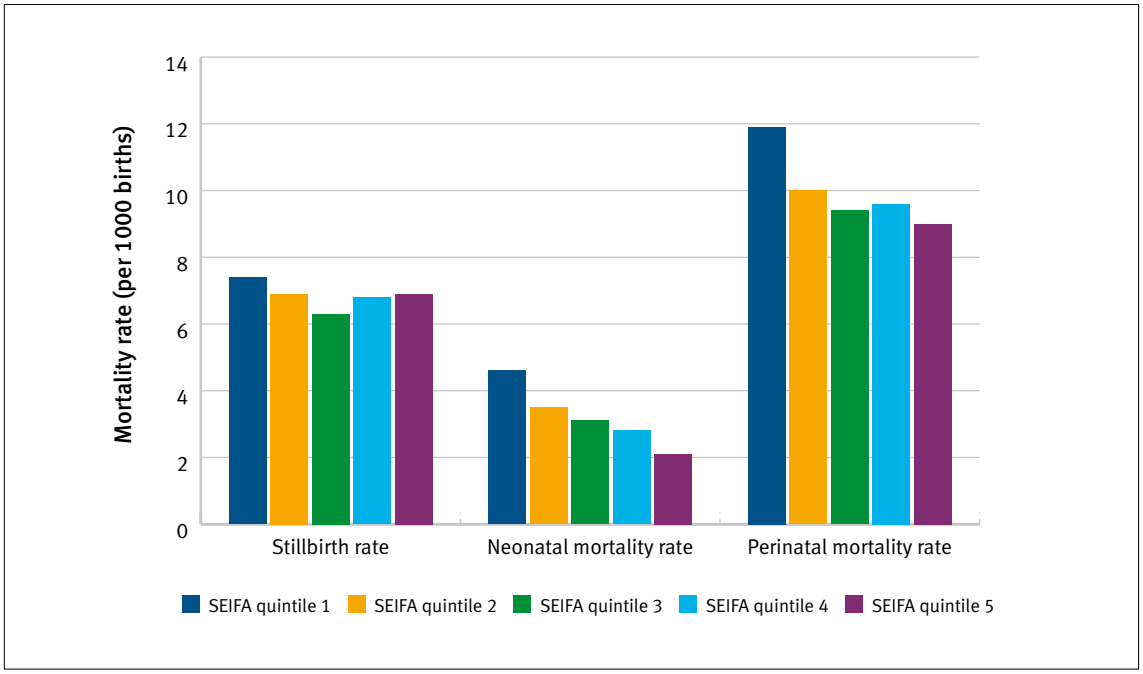


Figure 72: SEIFA quintile versus perinatal mortality rates (per 1000 births), Queensland 2012 to 2013
(Table A63)

3. Congenital anomalies

In the Queensland Perinatal Data Collection (PDC), data are collected regarding congenital anomalies only during the period of the pregnancy, birth and newborn period, up to the time of the discharge of the baby from its post-birth care period.

As the Perinatal Data Collection does not collect data regarding pregnancies ending before 20 weeks' gestation some of these data are significantly under reported here (e.g. chromosome anomalies, neural tube defects). Further information regarding the impact of reporting issues at gestations less than 20 weeks can be found in Statbite 12 (New initiatives in the surveillance of congenital anomalies in Queensland 2007 to 2008)[32] and Technical report 1 (Technical notes on QH_CONG_ANOM: Congenital anomalies in terminations of pregnancy at less than 20 weeks gestation)[33].

The Congenital Anomalies Sub-Committee of QMPQC is aware that there are discrepancies between PDC data and Queensland Hospital Admitted Patient Data Collection (QHAPDC) data in relation to the incidence of congenital anomalies, and is working with Health Statistics Branch staff to resolve these issues.

It is clear to the Congenital Anomalies Sub-Committee that some anomalies are not recorded in data collections because their diagnosis has not been clearly recorded in the medical record.

Good practice point:

Clinicians making a diagnosis of a congenital anomaly should take particular care to record that anomaly in the medical record, including in the Discharge Summary.

The recorded congenital anomalies have been divided into anomaly groups as shown in table A64.

Congenital anomalies (one or more) were recorded in 7707 babies (60.7 per 1000 babies) born in Queensland in 2012 and 2013. As a number of such anomalies are relatively minor and there is variation in their reporting, the Congenital Anomalies Sub-Committee of QMPQC determined that there was most value in reviewing major anomaly groups (Table A64). Further information regarding these issues can be found in Technical report 13 (Data quality issues to be aware of when using the Queensland Perinatal Data Collection to estimate the prevalence of congenital anomalies at birth in Queensland)[34] and Statistical analysis report 1 (Congenital Anomalies in Queensland: 1 July 2007 to 30 June 2010)[35].

32 Howell S. New initiatives in the surveillance of congenital anomalies in Queensland 2007-2008. Statbite 12 Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/pdf/statbite/statbite12.pdf

33 Howell S. Technical notes on QH_CONG_ANOM: Congenital anomalies in terminations of pregnancy at less than 20 weeks gestation. Technical report 1, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/tech_report/techreport_1.pdf

34 Endo T, Johnston T, Ellerington J. Data quality issues to be aware of when using the Queensland Perinatal Data Collection to estimate the prevalence of congenital anomalies at birth in Queensland. Technical report 13, Health Statistics Centre, Queensland Health. www.health.qld.gov.au/hsu/tech_report/techreport_13.pdf

35 Howell S, Endo T, MacLeod S-L, Cornes S. Congenital Anomalies in Queensland: 1 July 2007 to 30 June 2010. Statistical analysis report 1. www.health.qld.gov.au/hsu/tech_report/anasreport_1.pdf

The incidence of the major anomalies is seen in Figure 73 and Table A65.

Two hundred and fifty–one (251) of the 1280 babies in this category died in the perinatal period, 167 being stillborn and 84 dying in the neonatal period. This perinatal mortality rate (196.1 per 1000 births was almost 20 times that of babies without a recorded congenital anomaly (10.0 per 1000 births).

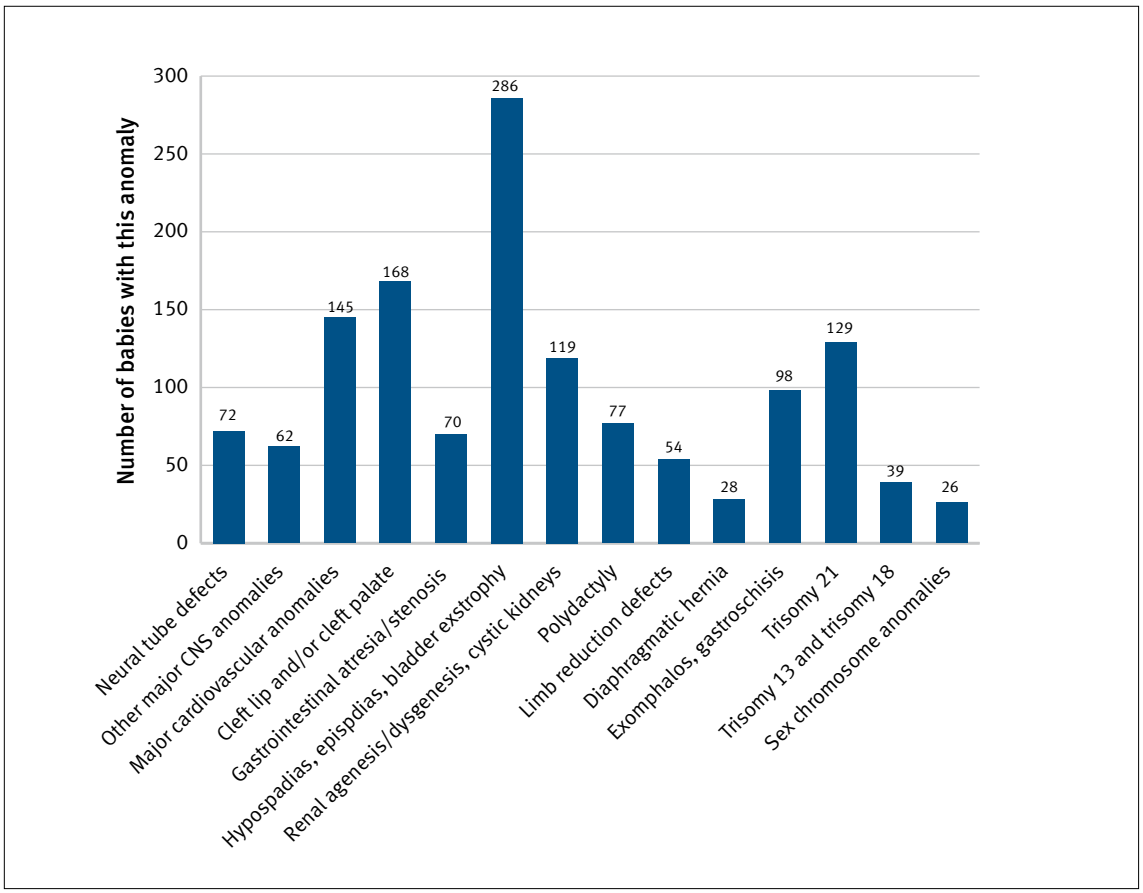


Figure 73: Number of congenital anomalies reported in the pregnancy and newborn period, Queensland 2012 to 2013 (multiple item reporting is possible for each baby; CNS = central nervous system) (Table A65)

Babies born with one or more congenital anomaly were likely to be born preterm and low birthweight, and had an increased risk of perinatal death (Figure 74 and table A66). Young women (less than 20 years of age) were more likely to have a baby with a congenital anomaly (maternal age less than 20 versus maternal age 20 or more risk ratio for congenital anomaly = 1.12 95 per cent confidence intervals = 1.02 1.23); older women (over 35 years) did not have an increased overall risk.

Figures 74 to 88 show the characteristics of the mothers and the babies associated with each of the major anomaly groups. Included are graphs of case fatality rates (i.e. the rate of death given that the baby had the congenital anomaly of interest).

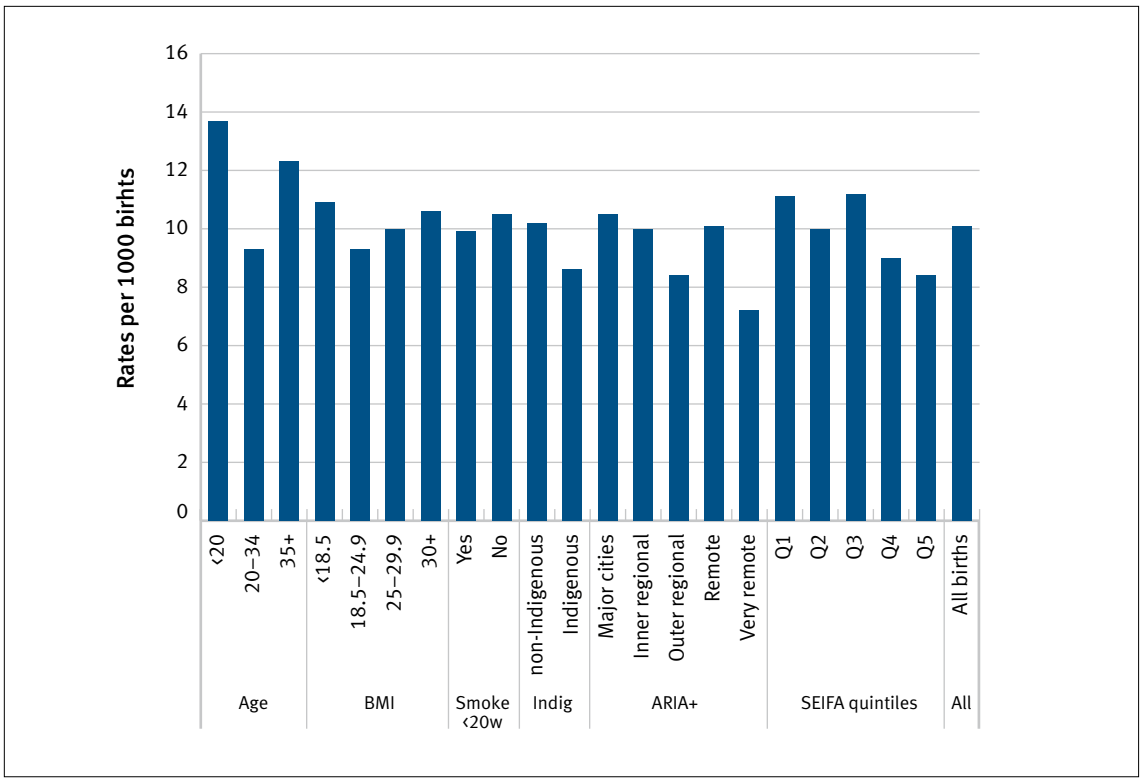


Figure 74A: Characteristics of the mothers of all babies born with one or more of the defined congenital anomalies, Queensland 2012 to 2013
(Table A65)

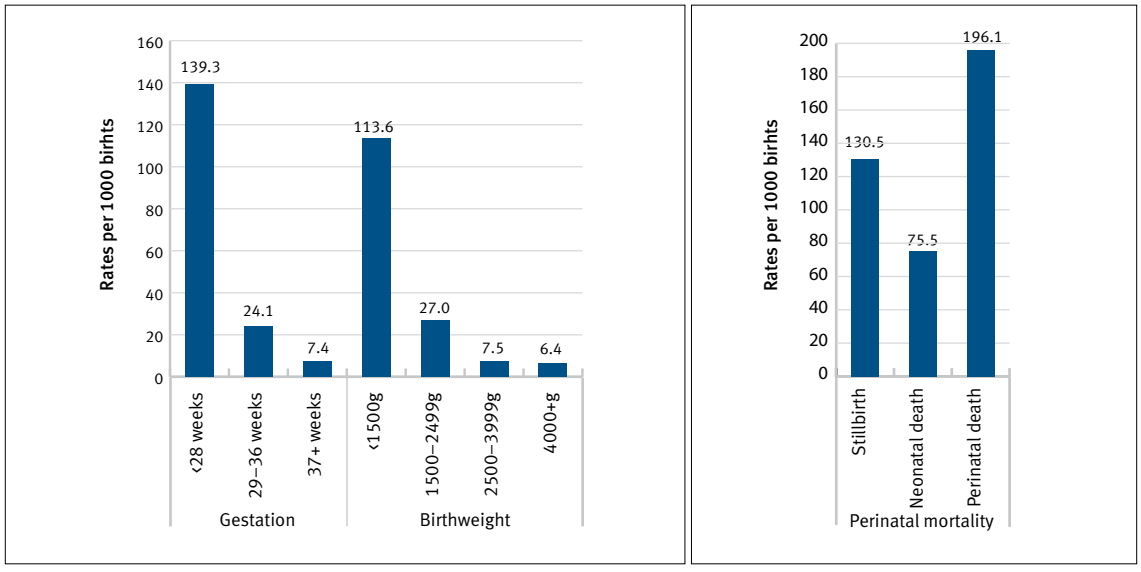


Figure 74B: Characteristics of all babies born with one or more of the defined congenital anomalies and the associated case fatality rates, Queensland 2012 to 2013
(Table A65)

Figures 75 to 88 and Table A65 show demographic characteristics associated with the main anomaly groups. Care should be taken with interpretation of these univariate analyses, as the numbers in some instances are small and possible confounding effects have not been examined by multivariate analysis (e.g. younger mothers are more likely to smoke, but older mothers may be at more risk of some anomalies).

3.1 Neural tube defects

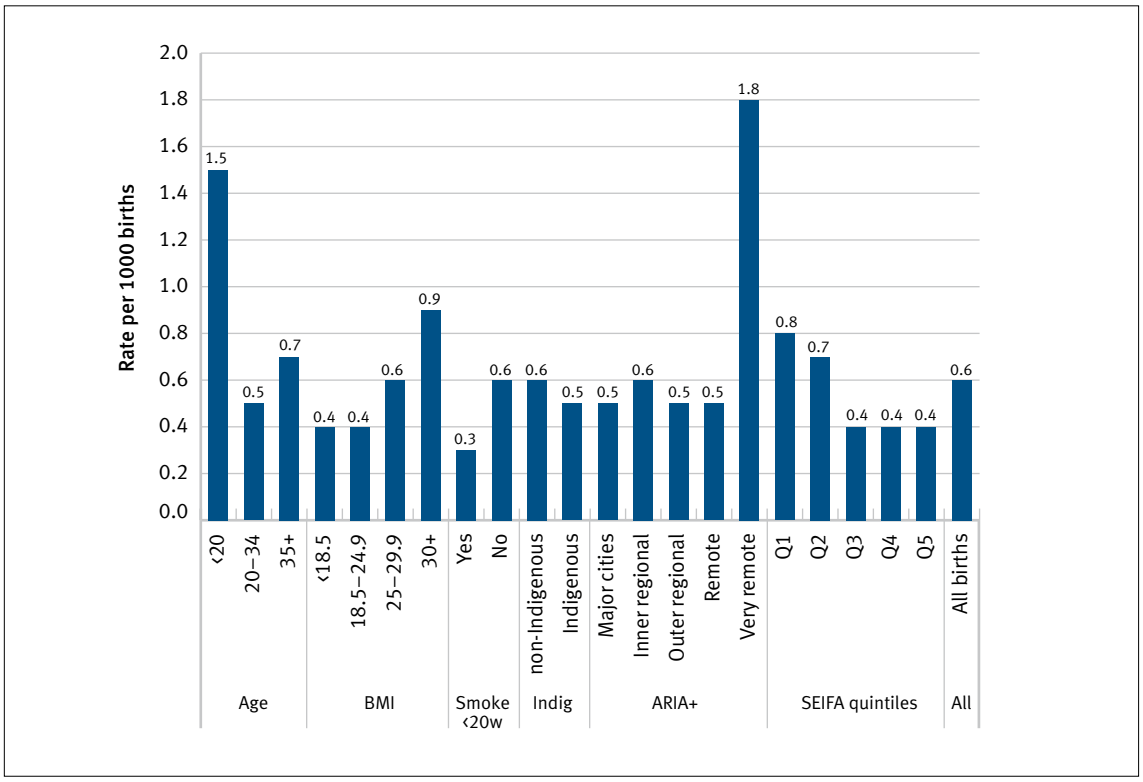


Figure 75A: Characteristics of mothers of babies born with neural tube defects, Queensland 2012 to 2013
(Table A66)

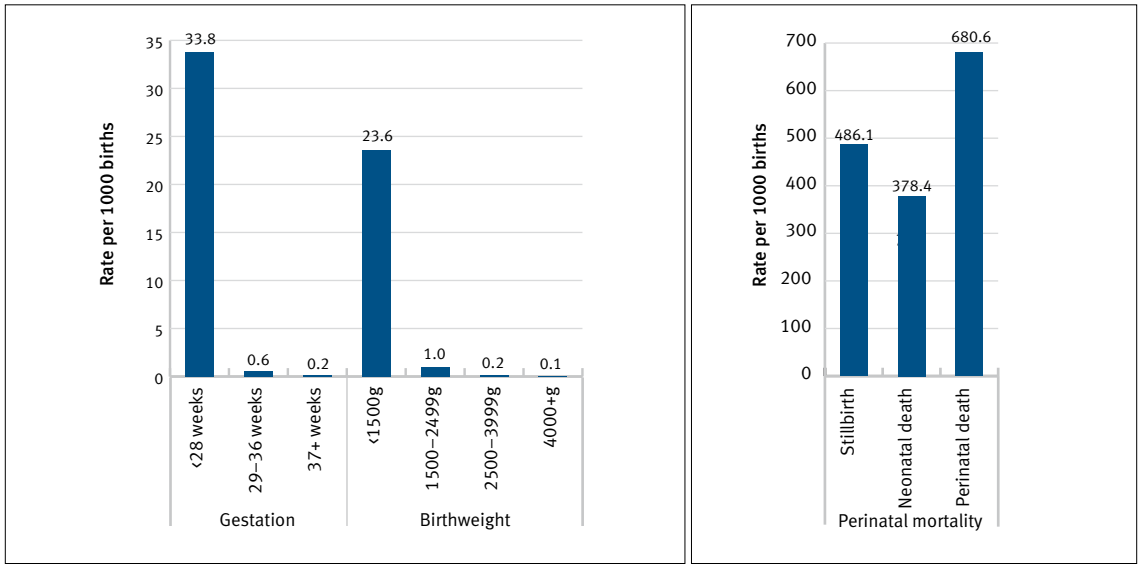


Figure 75B: Characteristics of babies born with neural tube defects and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Neural tube defects are associated with a high incidence of perinatal death, preterm birth and low birthweight birth (Figure 75). Some variations in incidence are seen in relation to maternal age, BMI, smoking, socioeconomic status (SEIFA), and usual place of residence (ARIA+).

3.2 Other major Central Nervous System anomalies

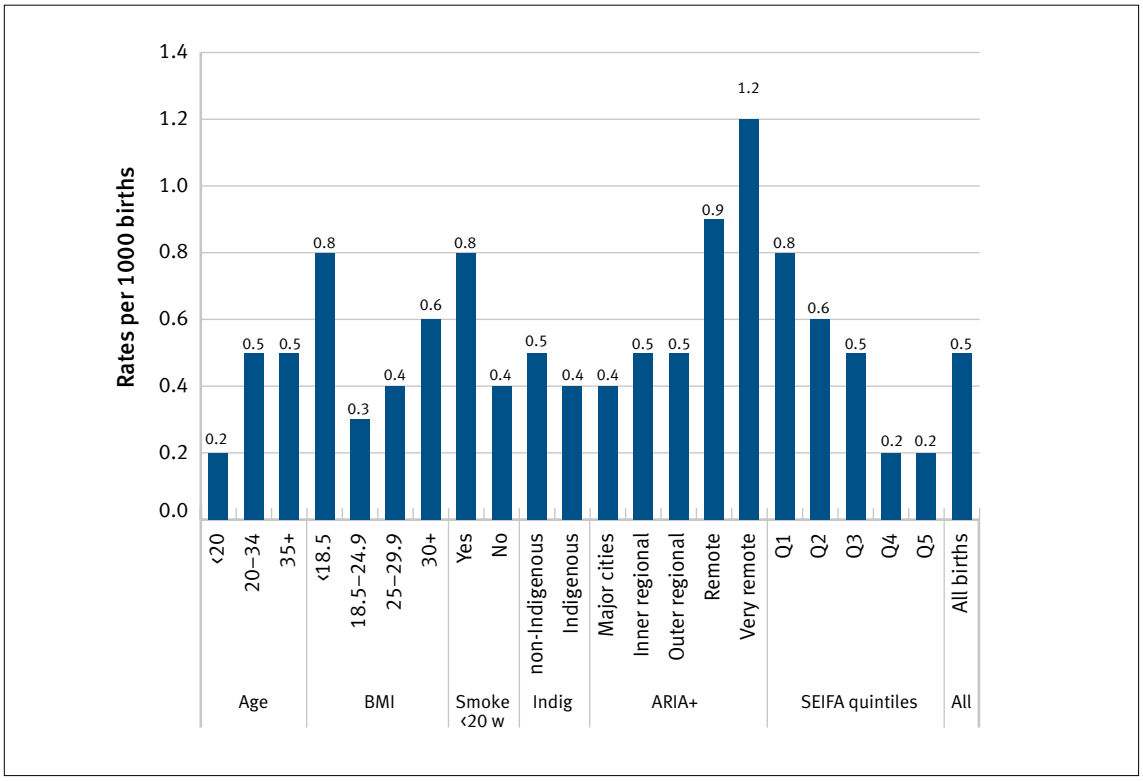


Figure 76A: Characteristics of mothers of babies born with 'other major central nervous system anomalies', Queensland 2012 to 2013
(Table A66)

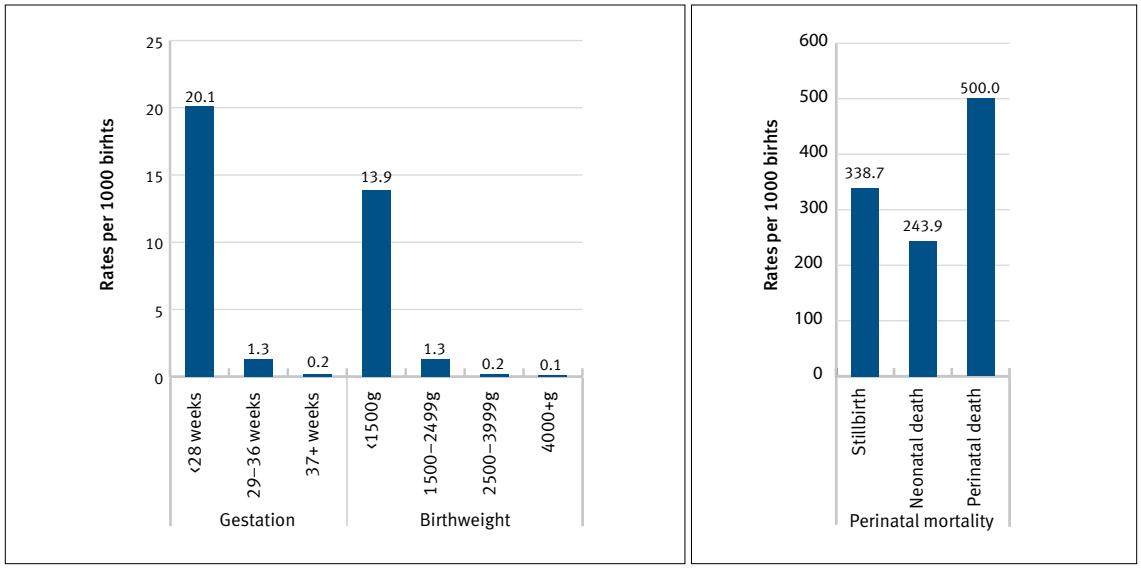


Figure 76B: Characteristics of babies born with 'other major central nervous system anomalies' and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Like neural tube defects, the other major central nervous system anomalies are associated with a high incidence of perinatal death, preterm birth and low birthweight birth (Figure 76). Variations in incidence are again seen in relation to maternal age, smoking, and ARIA+. There is a suggestion that socioeconomic disadvantage and maternal BMI are associated with a higher incidence of other major central nervous system anomalies.

3.3 Major cardiovascular anomalies

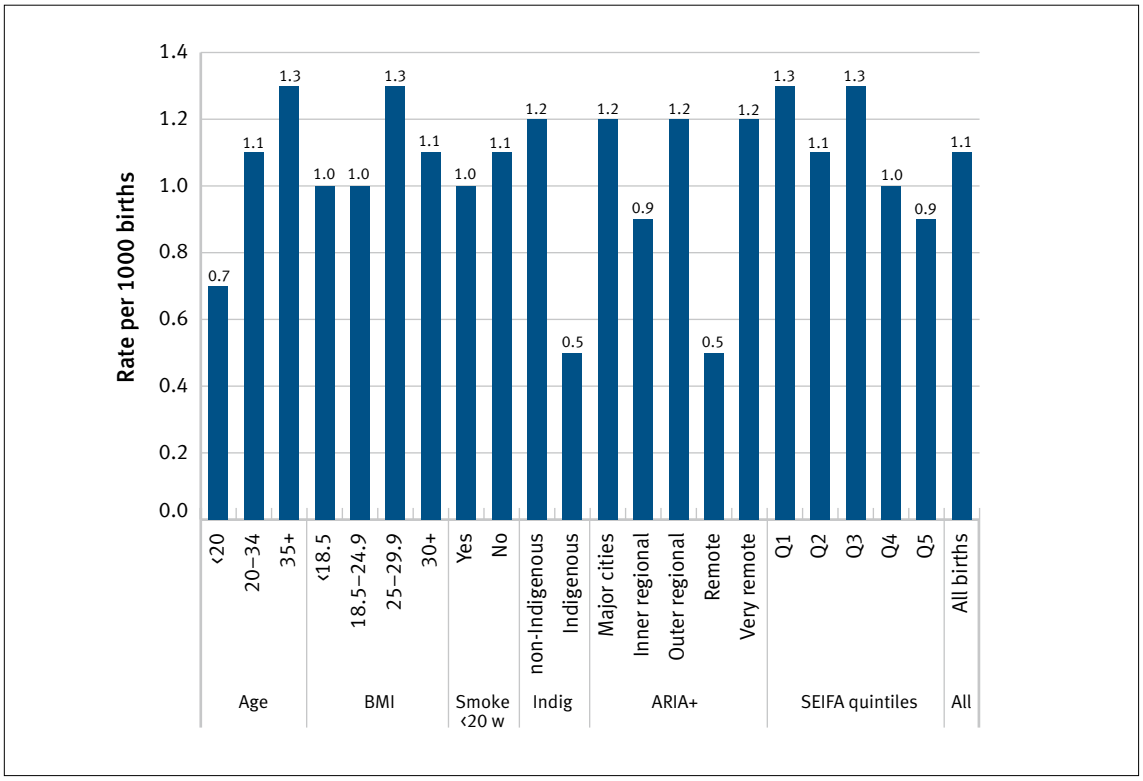


Figure 77A: Characteristics of mothers of babies born with major cardiovascular anomalies, Queensland 2012 to 2013
(Table A66)

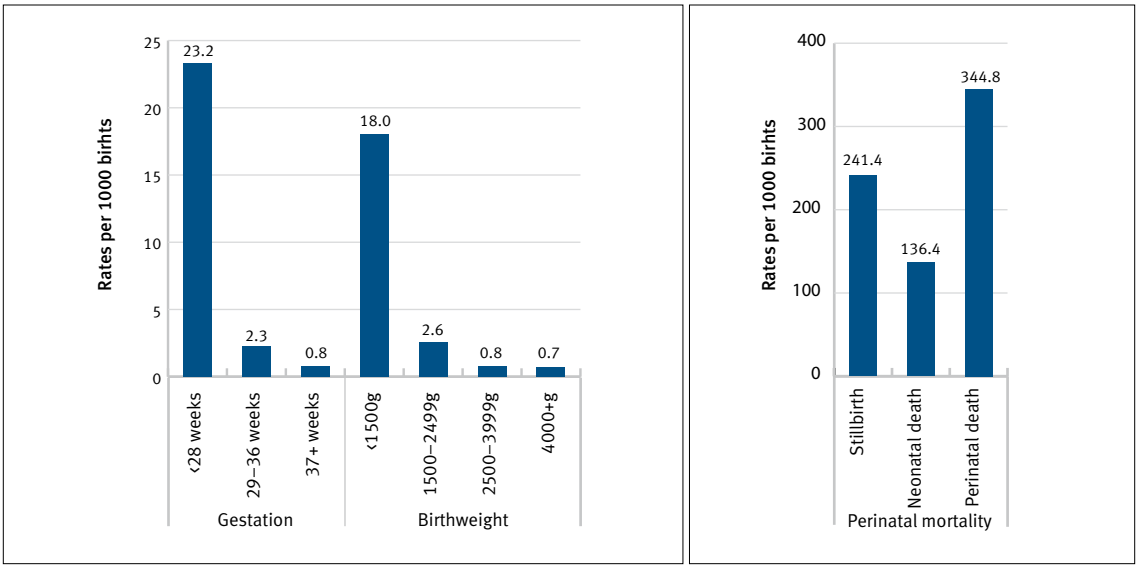


Figure 77B: Characteristics of babies born with major cardiovascular anomalies and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Major cardiovascular anomalies are associated with a high incidence of perinatal death, preterm birth and low birthweight birth (Figure 77). There is a suggestion that they are less frequent in babies born to young mothers and Aboriginal and/or Torres Strait Islander mothers.

3.4 Cleft lip and/or cleft palate

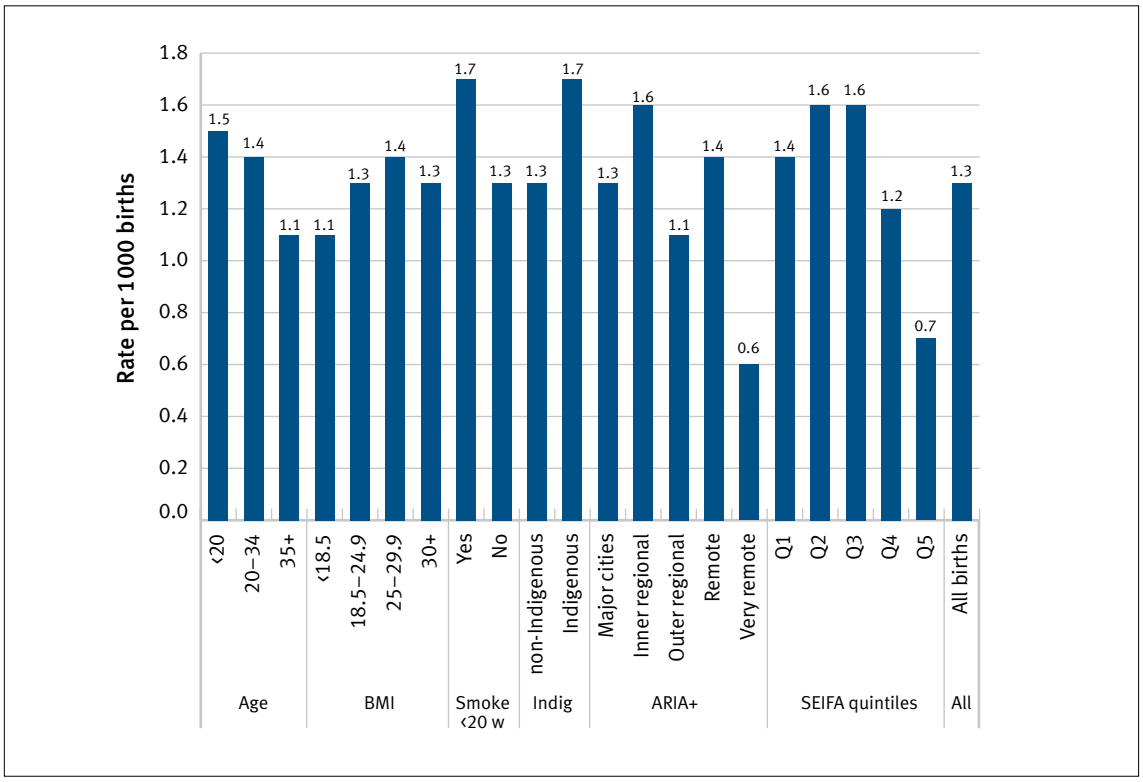


Figure 78A: Characteristics of mothers of babies born with cleft lip and/or cleft palate, Queensland 2012 to 2013
(Table A66)

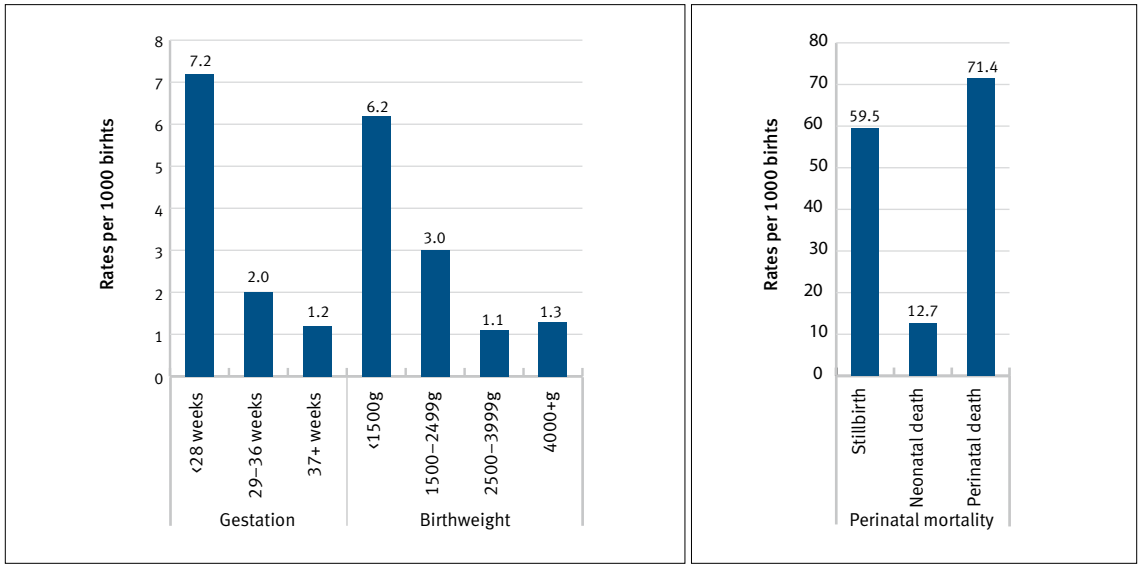


Figure 78B: Characteristics of babies born with cleft lip and/or cleft palate and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Cleft lip and palate are associated with some increased incidence of perinatal death, preterm birth and low birthweight birth (Figure 78).

3.5 Gastrointestinal atresia, stenosis

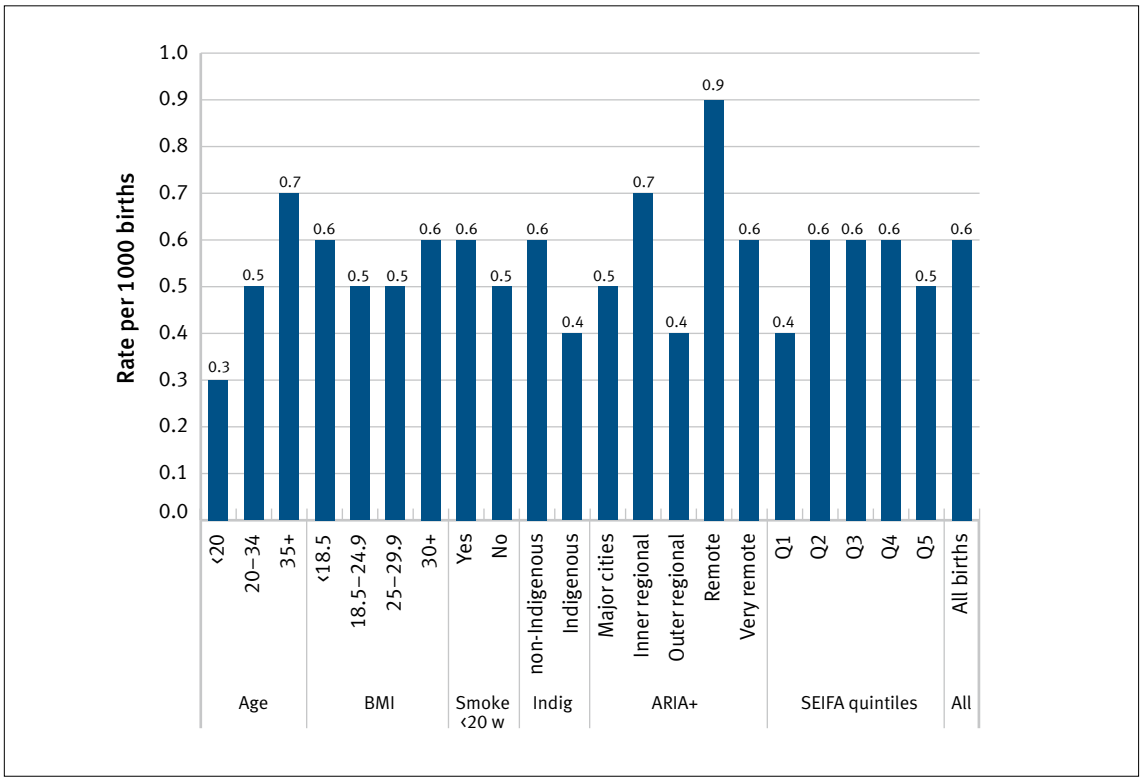


Figure 79A: Characteristics of mothers of babies born with gastrointestinal atresia/stenosis (oesophageal, small intestine, ano-rectal), Queensland 2012 to 2013
(Table A66)

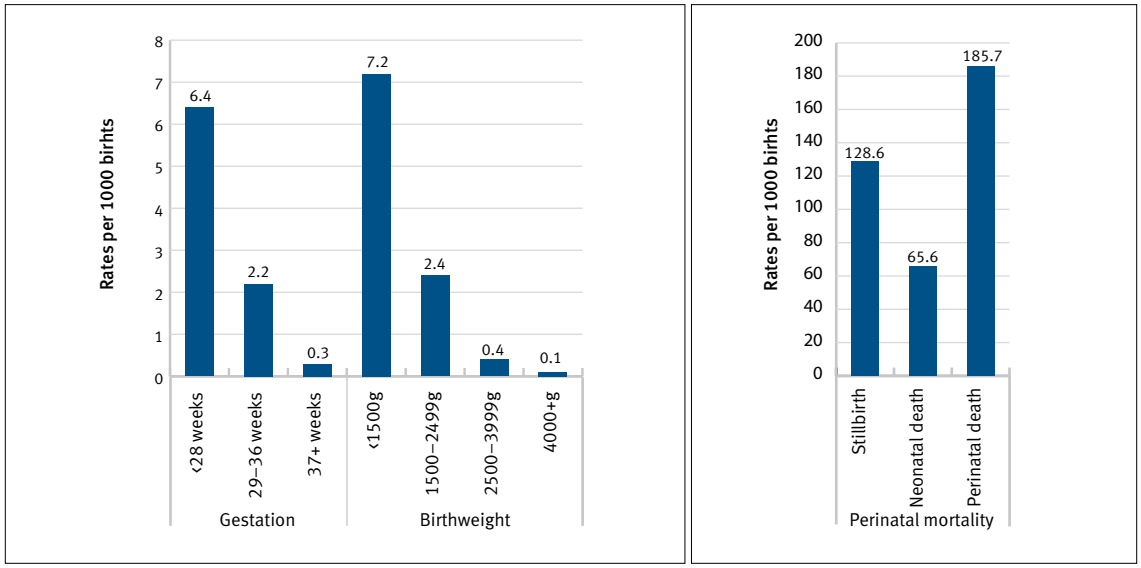


Figure 79B: Characteristics of babies born with gastrointestinal atresia/stenosis (oesophageal, small intestine, ano-rectal) and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Gastrointestinal atresia and stenosis (oesophageal, small intestine, ano-rectal) are associated with some increased incidence of perinatal death, preterm birth and low birthweight birth (Figure 79).

3.6 Hypospadias, epispadias, bladder exstrophy

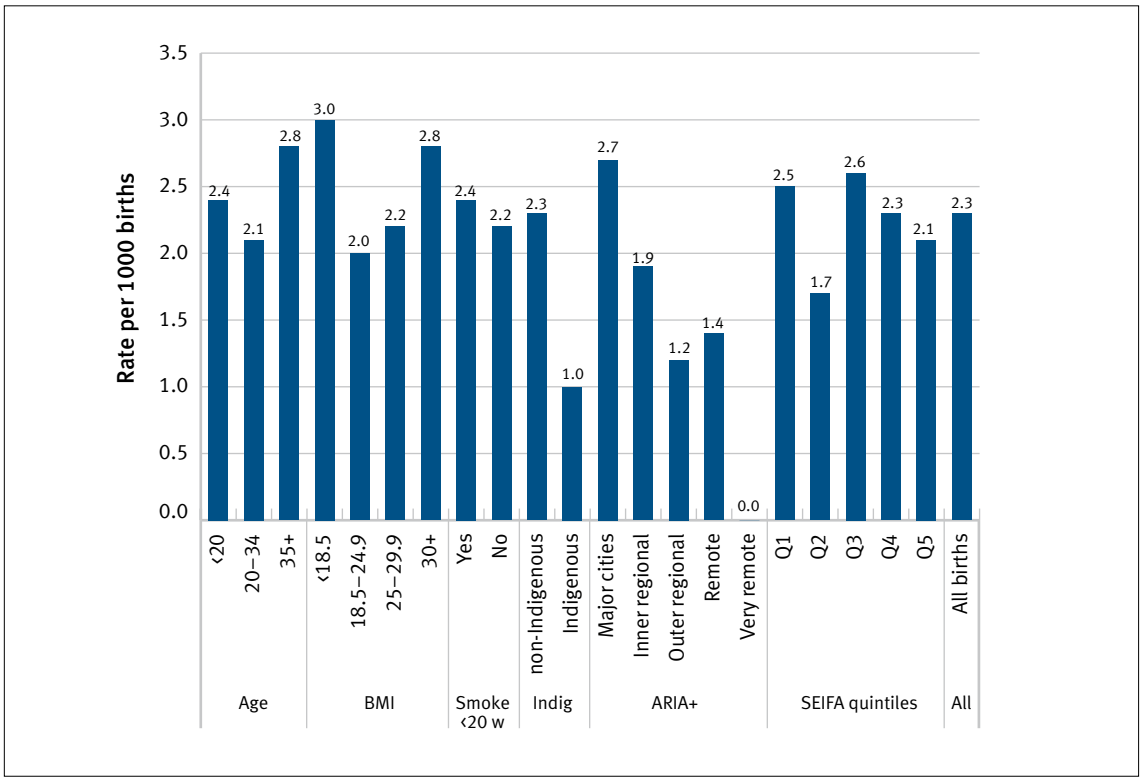


Figure 80A: Characteristics of mothers of babies born with hypospadias, epispadias and/or bladder exstrophy, Queensland 2012 to 2013
(Table A66)

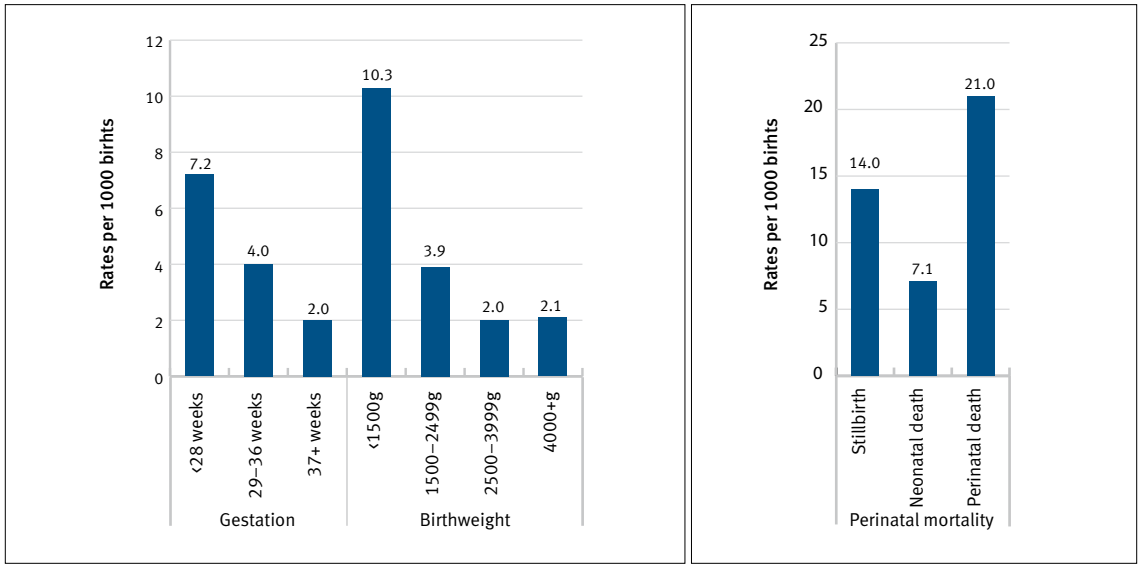


Figure 80B: Characteristics of babies born with hypospadias, epispadias and/or bladder exstrophy and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Hypospadias, epispadias and/or bladder exstrophy are associated with an increased incidence of preterm birth and low birthweight birth, though the association with perinatal death is less marked than for some other anomaly groups (Figure 80). There is a suggestion that they are less frequent in babies born to Aboriginal and/or Torres Strait Islander women than in babies born to non-Indigenous women.

3.7 Renal agenesis/dysgenesis, cystic kidneys

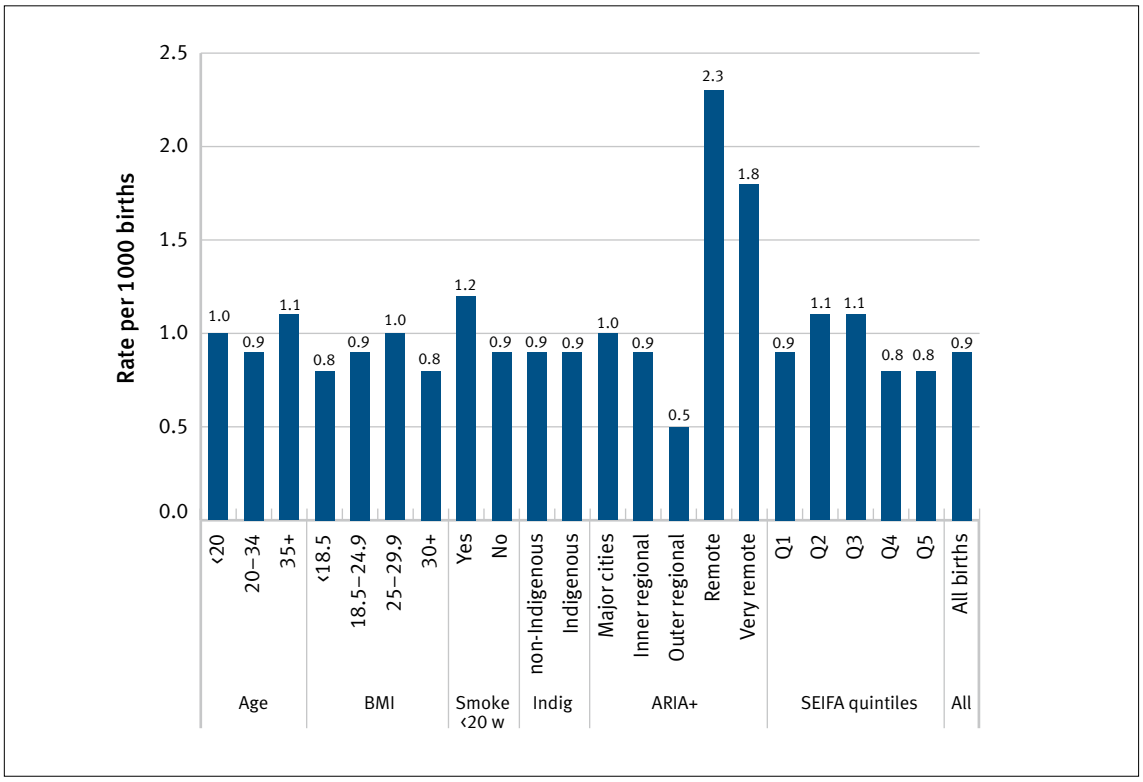


Figure 81A: Characteristics of mothers of babies born with renal agenesis/dysgenesis or cystic kidneys, Queensland 2012 to 2013
(Table A66)

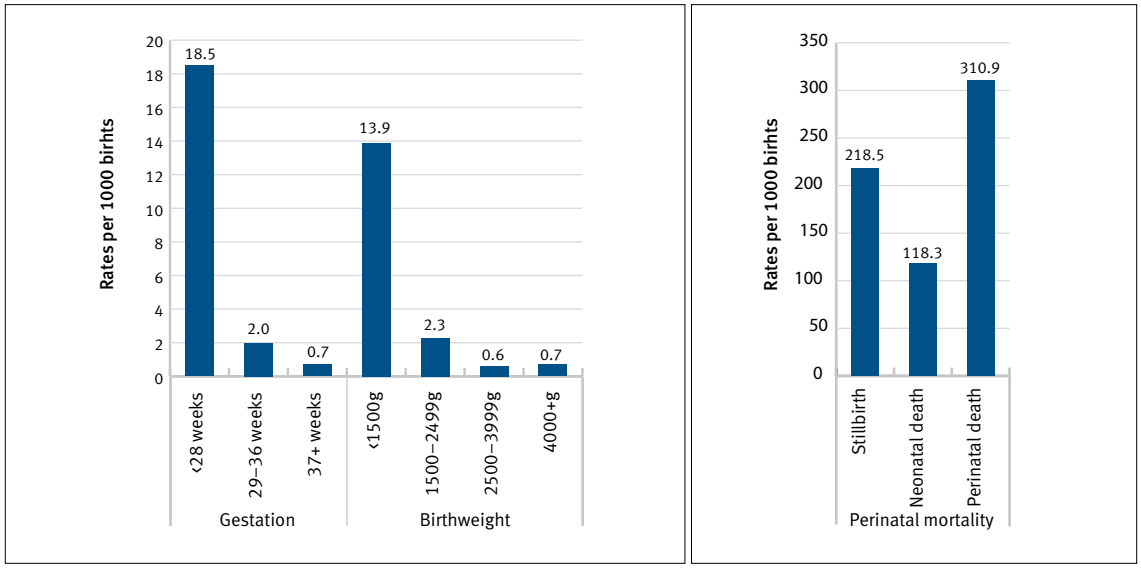


Figure 81B: Characteristics of babies born with renal agenesis/dysgenesis or cystic kidneys and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Renal agenesis/dysgenesis and cystic kidney anomalies are associated with an increased incidence of perinatal death, preterm birth and low birthweight birth (Figure 81).

3.8 Polydactyly

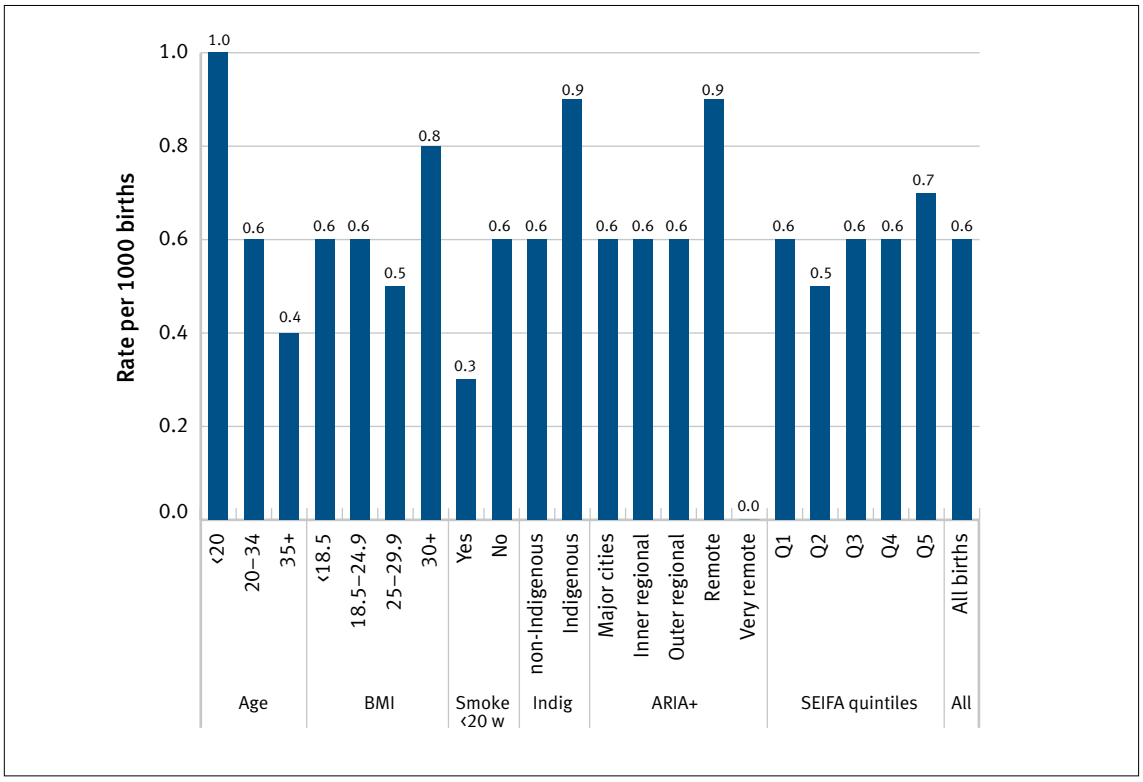


Figure 82A: Characteristics of mothers of babies born with polydactyly, Queensland 2012 to 2013
(Table A66)

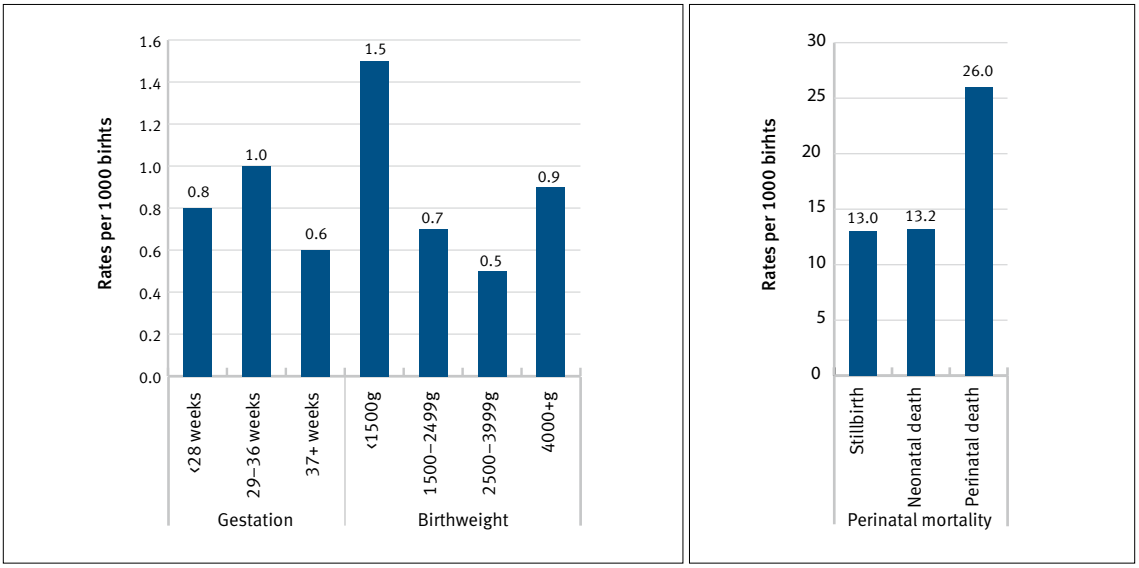


Figure 82B: Characteristics of babies born with polydactyly and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Polydactyly is associated with an increased incidence of neonatal death and low birthweight birth (Figure 82). There is a suggestion that it is less frequent in Aboriginal and/or Torres Strait Islander babies than in non-Indigenous, and more frequent in the babies of younger mothers.

3.9 Limb reduction defects

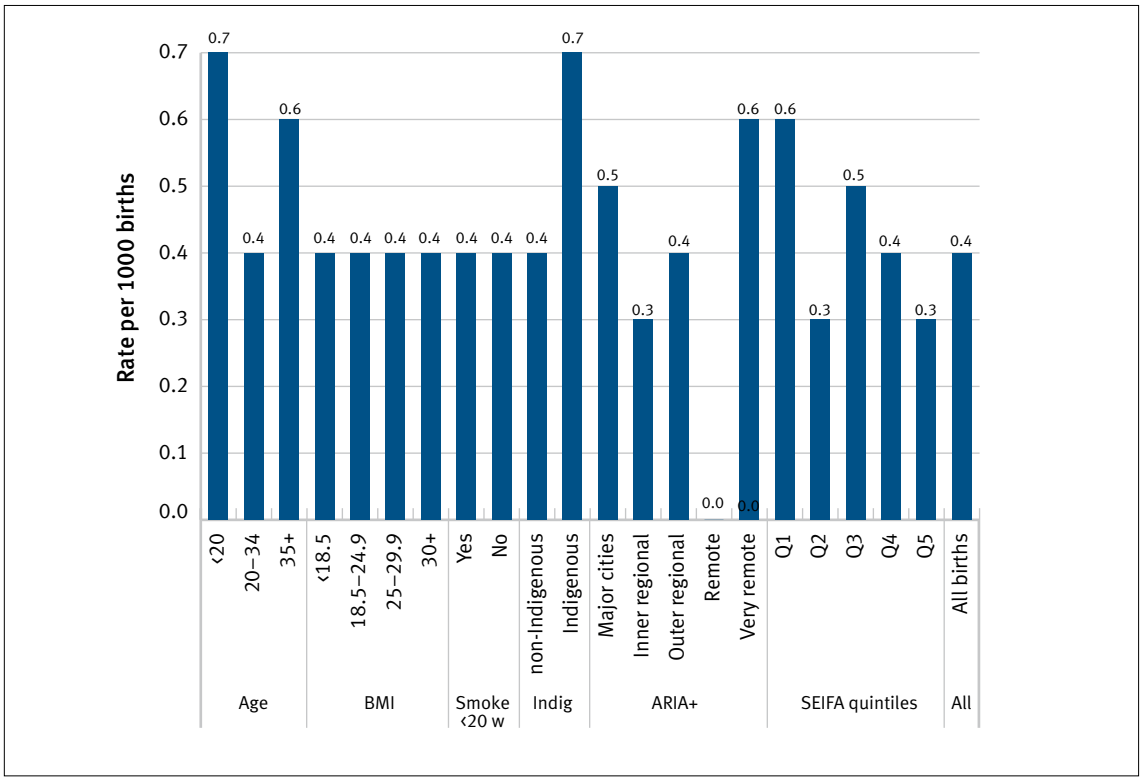


Figure 83A: Characteristics of mothers of babies born with limb reduction defects, Queensland 2012 to 2013
(Table A66)

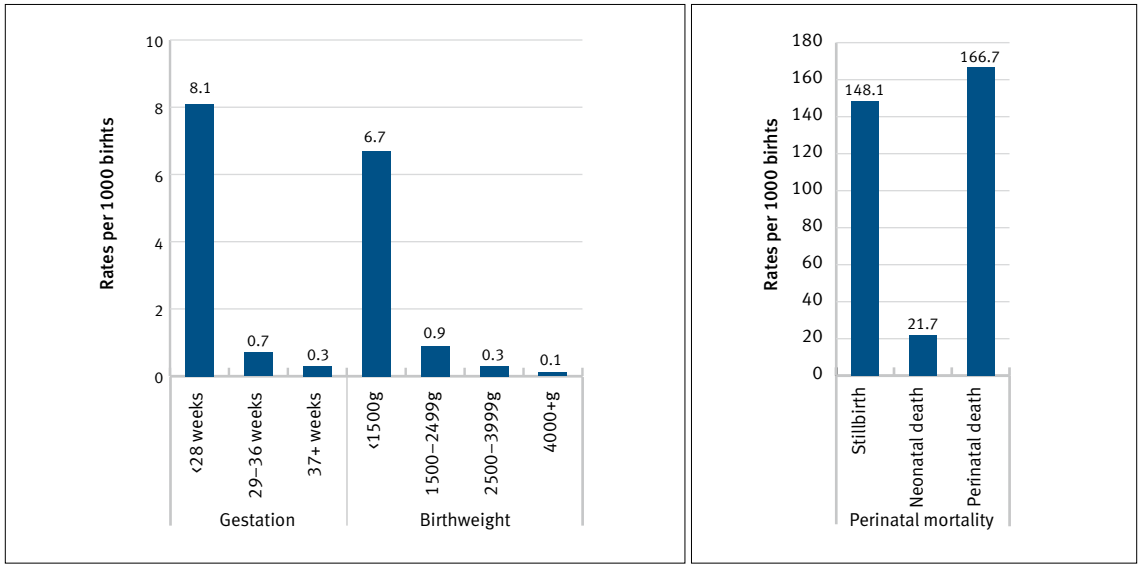


Figure 83B : Characteristics of babies born with limb reduction defects and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Limb reduction defects are associated with an increased incidence of perinatal death, preterm birth and low birthweight birth (Figure 83).

3.10 Diaphragmatic hernia

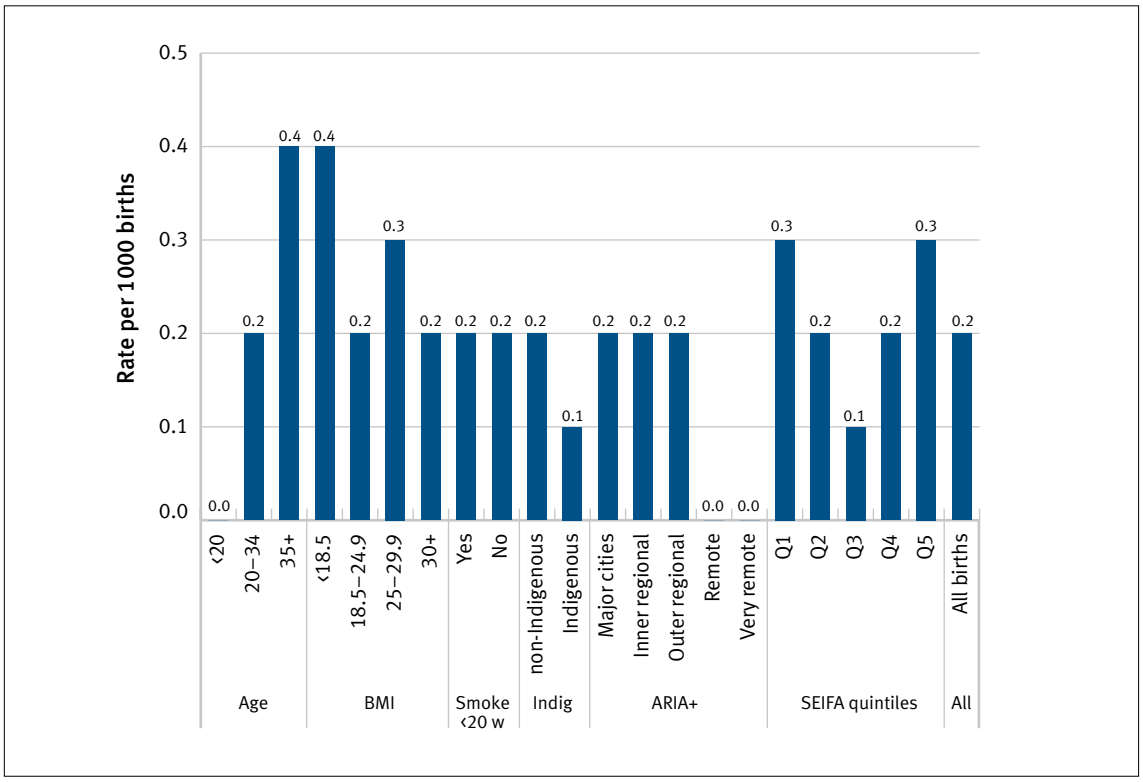


Figure 84A: Characteristics of mothers of babies born with diaphragmatic hernia, Queensland 2012 to 2013
(Table A66)

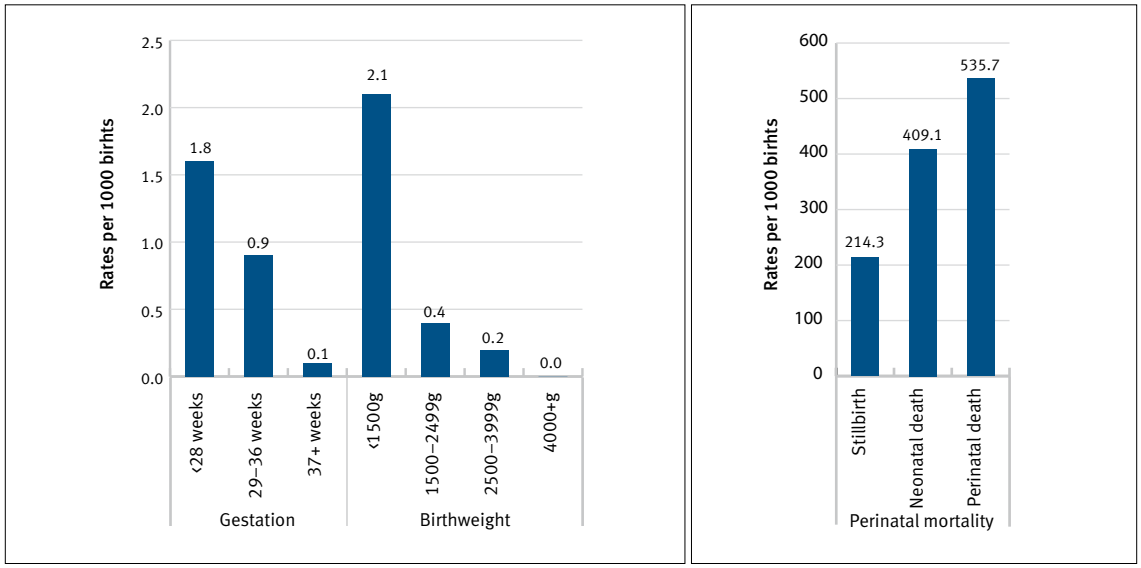


Figure 84B: Characteristics of babies born with diaphragmatic hernia and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Diaphragmatic hernias are associated with an increased incidence of perinatal death, preterm birth and low birthweight birth (Figure 84). There is a suggestion that they are less frequent in Aboriginal and/or Torres Strait Islander babies than in non-Indigenous, and more frequent in the babies of older mothers.

3.11 Exomphalos, gastroschisis

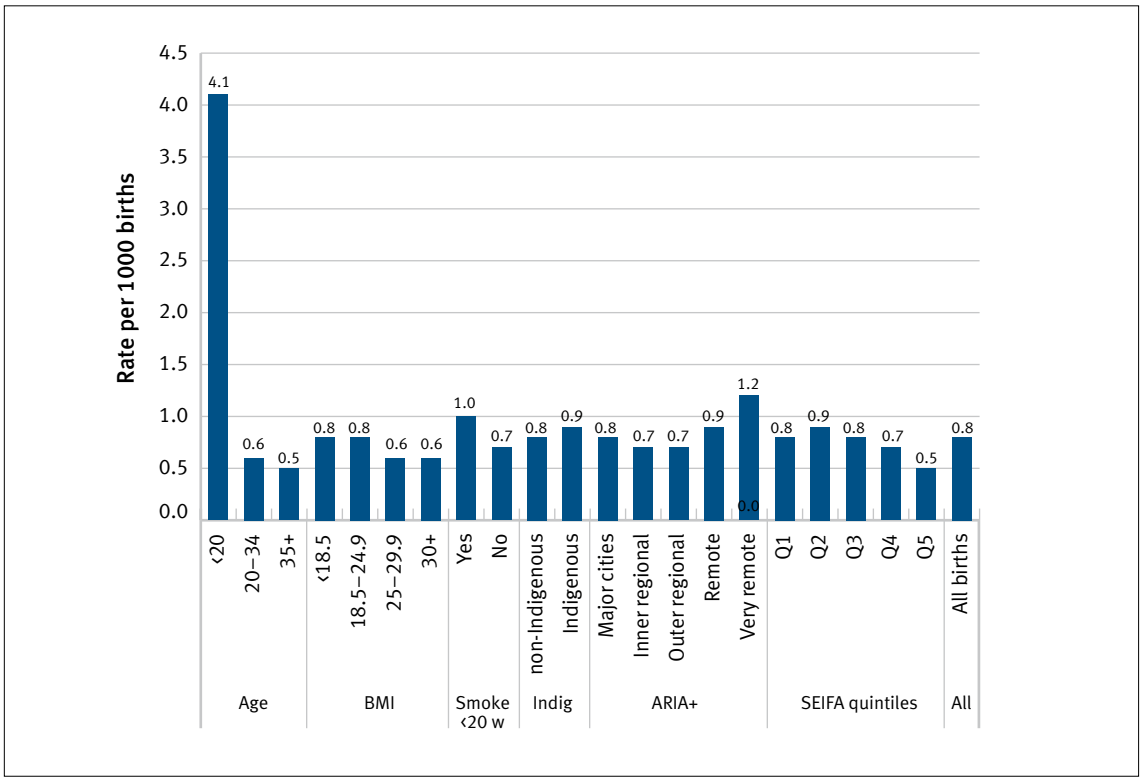


Figure 85A: Characteristics of mothers of babies born with exomphalos or gastroschisis, Queensland 2012 to 2013
(Table A66)

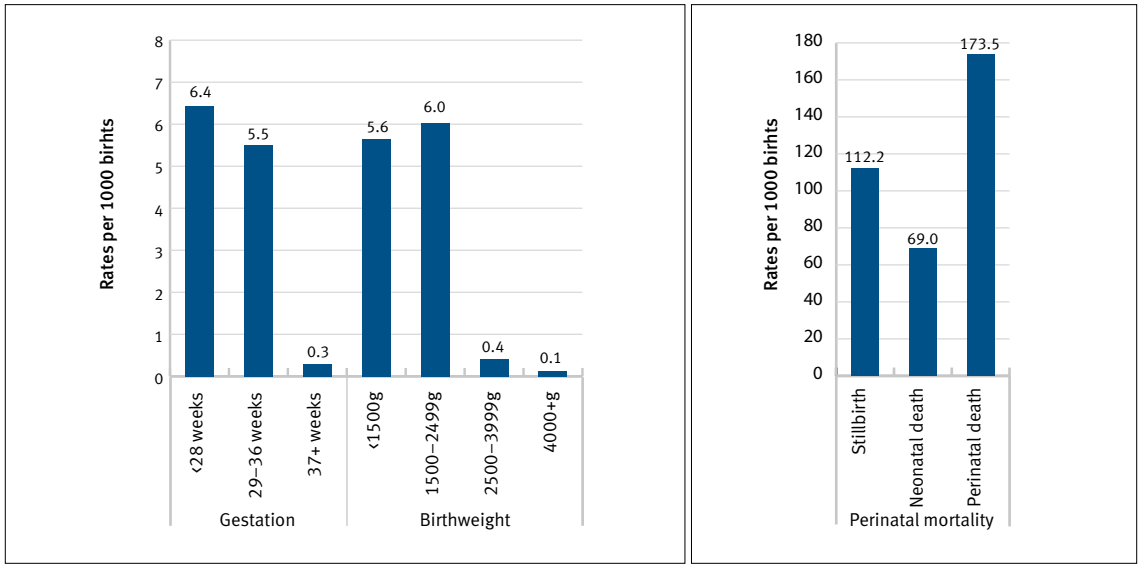


Figure 85B: Characteristics of babies born with exomphalos or gastroschisis and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Exomphalos and gastroschisis are associated with an increased incidence of perinatal death, preterm birth and low birthweight birth and they appear to be more frequent in the babies of younger women (Figure 85). A recent Statbite has noted that the incidence of this group of anomalies has increased in Queensland in the period 1998 to 2011[36].

36 GastroschisÒis in Queensland. Endo T, Johnston T, Ellerington J, Donovan T. Health Statistics Branch, Queensland Health. 2013. www.health.qld.gov.au/hsu/pdf/statbite/statbite 57.pdf

3.12 Trisomy 21

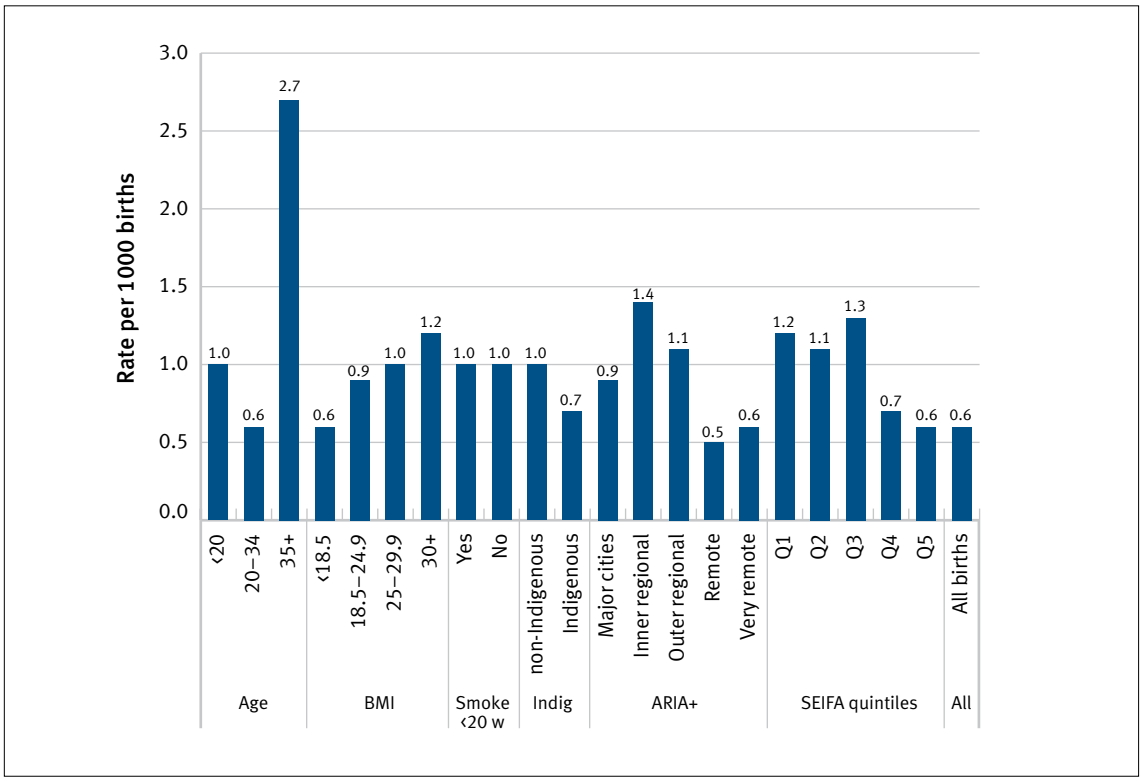


Figure 86A: Characteristics of mothers of babies born with trisomy 21, Queensland 2012 to 2013
(Table A66)

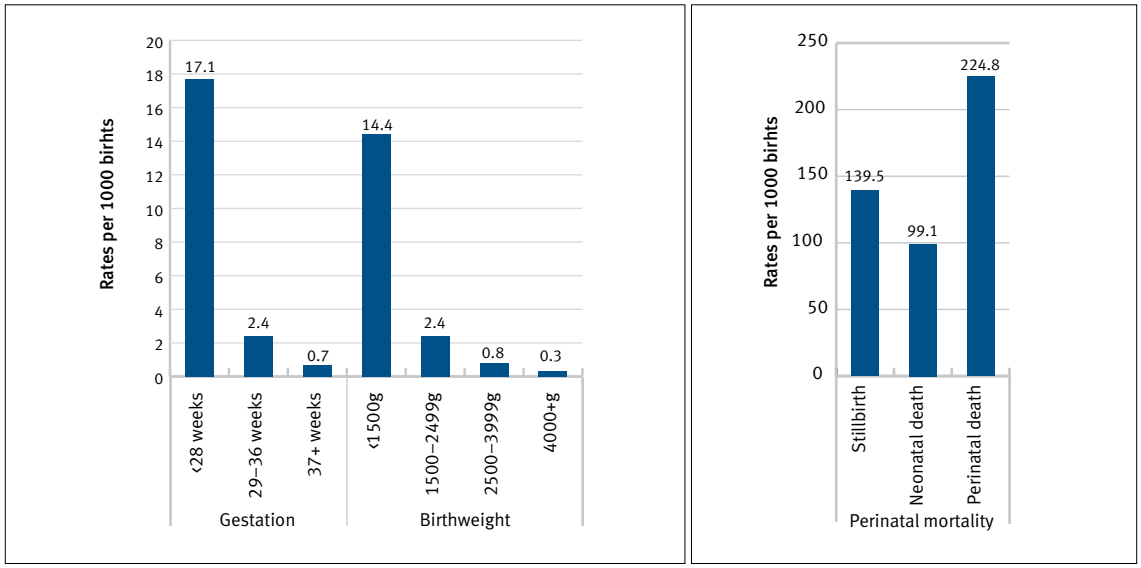


Figure 86B: Characteristics of babies born with trisomy 21 and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Trisomy 21 is associated with an increased incidence of perinatal death, preterm birth and low birthweight birth and is more frequent in the babies of older mothers (Figure 86).

3.13 Trisomy 13 and trisomy 18

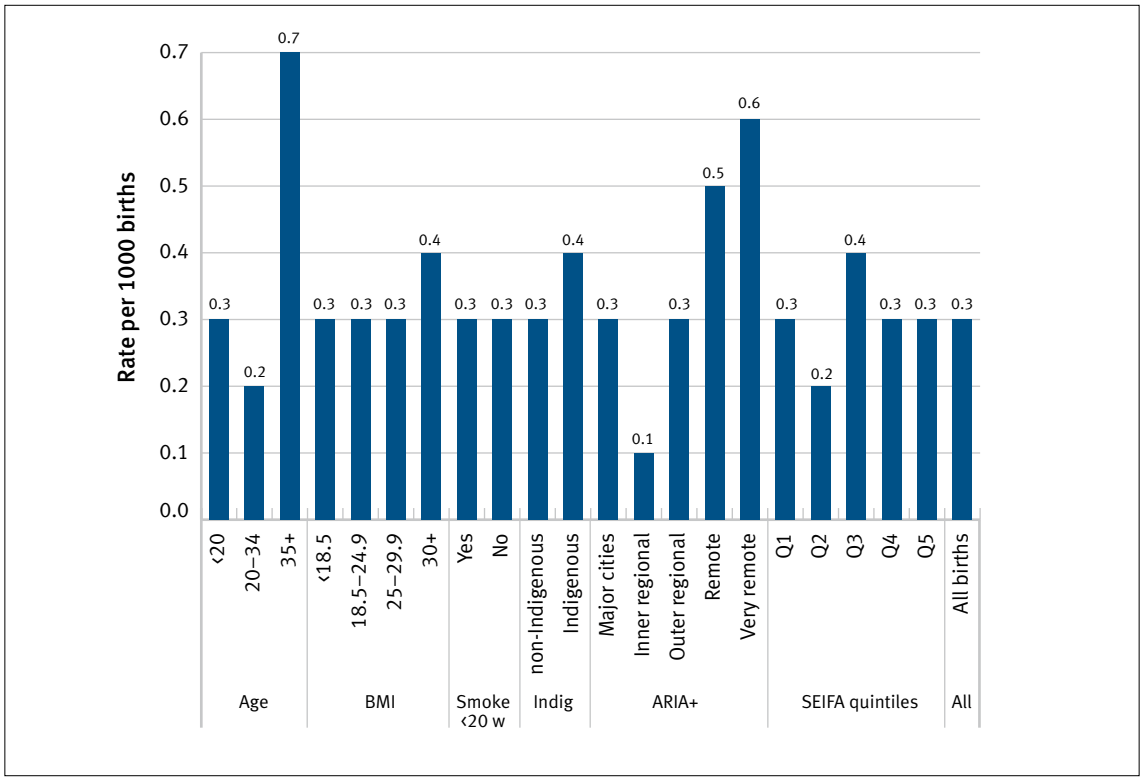


Figure 87A: Characteristics of mothers of babies born with trisomy 13 and trisomy 18, Queensland 2012 to 2013
(Table A66)

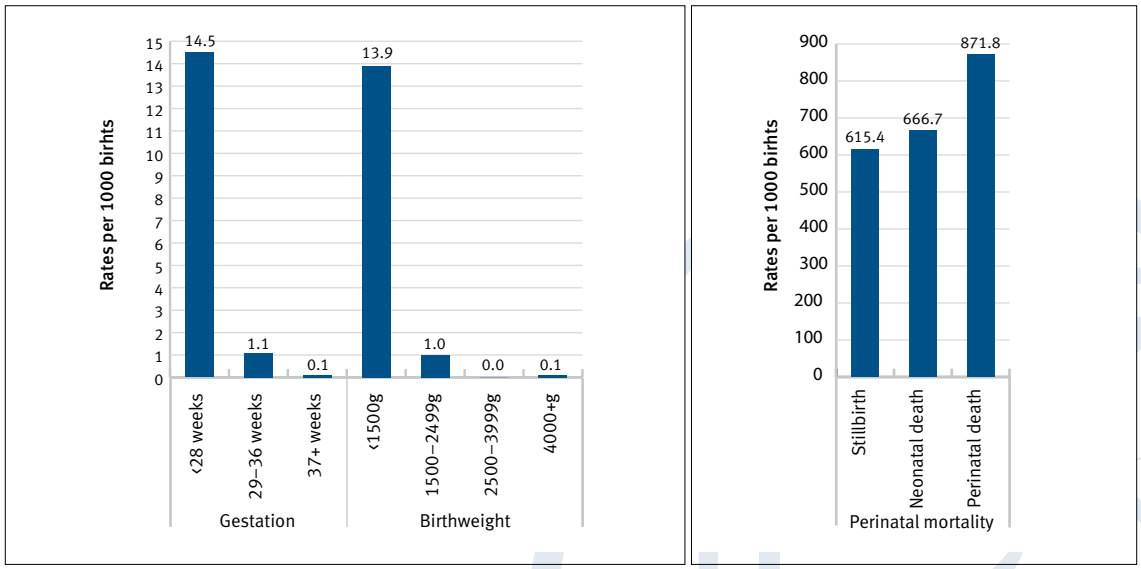


Figure 87B: Characteristics of babies born with trisomy 13 and trisomy 18 and the associated case fatality rates, Queensland 2012 to 2013
(Table A66)

Trisomy 13 and 18 are associated with an increased incidence of perinatal death, preterm birth and low birthweight birth (Figure 87). The case fatality rate for this group of anomalies is the highest of all the groups. There is a suggestion that they are more frequent in the babies of older mothers, though not to the same degree as is seen with Trisomy 21.

3.14 Sex chromosome anomalies

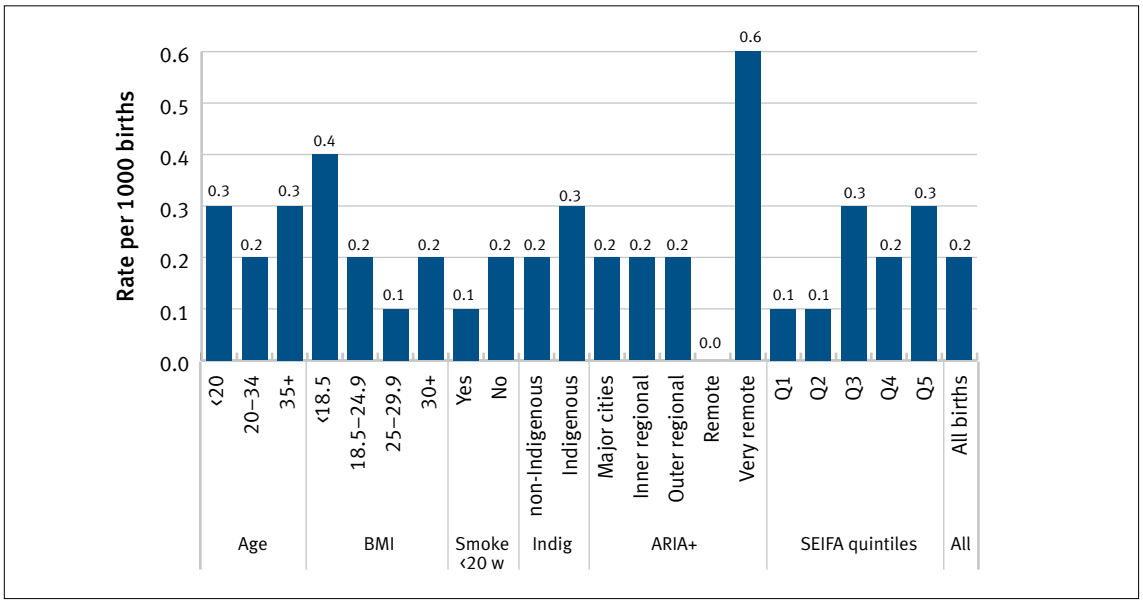


Figure 88A: Characteristics of mothers of babies born with sex chromosome anomalies, Queensland 2012 to 2013 (Table A66)

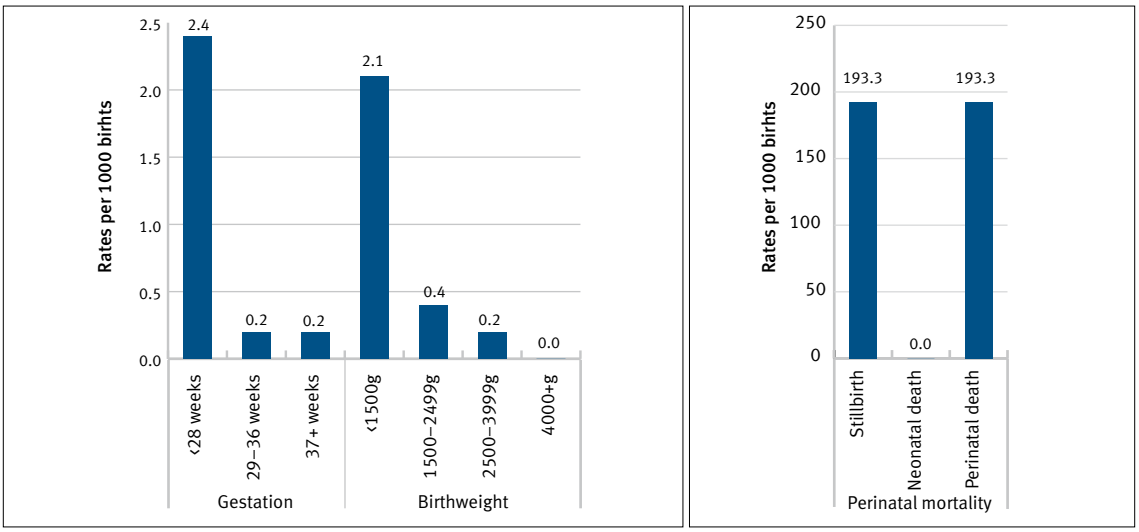


Figure 88B: Characteristics of babies born with sex chromosome anomalies and the associated case fatality rates, Queensland 2012 to 2013 (Table A66)

Anomalies of the sex chromosomes are associated with an increased incidence of stillbirth (but not neonatal death), preterm birth and low birthweight birth (Figure 88). Variations with maternal age and maternal BMI are seen.

3.15 Critical congenital heart disease: Place of birth Queensland 2007 to 2011

Congenital heart disease is found in approximately 11.4 infants per 10,000 births and is one of the commonest congenital anomalies associated with perinatal death in Queensland[37]. Infants born with critical congenital heart disease comprising Hypoplastic Left Heart Sequence, Transposition of the Great Vessels, Pulmonary Atresia and Tetralogy of Fallot represent a subgroup where initial care may be urgent and complex. Interventions that are frequently time critical and potentially lifesaving in infants with critical congenital heart disease after delivery include maintenance of ductal patency, ventilatory support, early postnatal echocardiogram and other tertiary cardiac interventions.

This report examines all births with critical congenital heart disease during the period 1 July 2007 to 30 June 2011 to mothers residing in Queensland. Infants with known chromosomal or other lethal congenital malformations were excluded.

37 "Summary statistics on congenital anomalies in Queensland 1988-2004". Timothy Roselli Epidemiology Services Unit, Health Information Centre, Reform & Development Division, Queensland Health.

	Total critical congenital heart disease births (n)	Births outside Cardiac Hospital (n)	Births outside Cardiac Hospital (%)
Tetralogy of Fallot	81	42	51.9
Hypoplastic Left Heart Sequence	78	39	50.0
Transposition of the Great Vessels	85	31	36.5
Pulmonary Atresia	43	8	18.6
Total	**287**	**120**	**41.8**

Table 13: Infants with critical congenital heart disease by Birth Hospital, Queensland 2007 to 2011

A high proportion (42 per cent) of infants with critical congenital heart disease are delivered away from the tertiary paediatric cardiology hospital (Table 13). Delivery outside the recommended cardiac facility is commonest in infants with Tetralogy of Fallot (52 per cent) and least common in infants with Pulmonary Atresia (19 per cent).

Good Practice Point:

Infants with critical congenital heart disease should be delivered at or near a tertiary paediatric cardiac hospital as previous studies have associated improved short and long term outcomes with newborn care in such facilities[38,39,40]

A confidential enquiry to the birth hospital of each infant delivered outside the recommended cardiac facility (n=120) showed that infants had different factors impacting on delivery planning with each critical congenital heart disease lesion (Table 14).

	Cases (n)	Antenatal scan <18wks (n)	(%)	Fetal Detection of critical congenital heart disease (n)	Fetal Detection Rate (%)
Hypoplastic Left Heart Sequence	39	37	95	31	84
Transposition of the Great Vessels	31	30	97	4	14
Pulmonary Atresia	8	8	100	1	13
Tetralogy of Fallot	42	42	100	2	5
Total	120	117	97	38	32

Table 14: Fetal detection of critical congenital heart disease in non-cardiac hospital births, Queensland 2007 to 2011

In Hypoplastic Left Heart Sequence infants, fetal ultrasound screening uptake was high (37 of 39), fetal detection rate was also high (84 per cent) and the high rate regional delivery was planned for palliative care in 30 of 31 detected cases. For the remaining critical congenital heart disease lesions the uptake of fetal ultrasound screening was high (more than 95 per cent) but critical congenital heart disease detection rates were poor ranging from 14 per cent in Transposition of the Great Vessels to 5 per cent in Tetralogy of Fallot.

Good Practice Point:

A major remedial factor in improving delivery planning and outcome in infants with Transposition of the Great Vessels, Tetralogy of Fallot and Pulmonary Atresia would be to improve antenatal scan detection rates. An improved fetal detection rate in these critical congenital heart disease lesions has been reported after adoption of standardised ultrasound screening views.

Recommendation:

That the published guidelines of the International Society of Ultrasound in Obstetrics and Gynaecology 2013[41] be adopted as core training for all points of care for fetal ultrasound screening in Queensland.

38 Sholler GF, Kasparian NA, Pye VE, Cole AD, Winlaw DS. "Fetal and postnatal diagnosis of major congenital heart disease: Implications for medical and psychological care in the current era." J Paediatrics and Child Health 47 (2011) 717-722

39 Anagnostou K, Messenger L, Yates R, Kelsall W. "Outcome of infants with prenatally diagnosed congenital heart disease delivered outside specialist paediatric cardiac centres." Arch Dis Child Fetal Neonatal Ed 2013; 98: F218-F221

40 Levey A, Glickstein JS, Kleinman CS et al. "The impact of prenatal diagnosis of complex congenital heart disease on neonatal outcomes." Pediatric Cardiology 2010; 31: 587-597

41 Carvalho JS, Allan LD, Chaoui R, Copel JA et al. "ISUOG practice guidelines: sonographic screening examination of the fetal heart" Ultrasound in Obstetrics and Gynaecology 2013;41 : 348-359

4. Comparisons between hospitals and their outcomes

The purpose of perinatal care indicators and measurement of outcomes of care is to improve the outcomes for mothers and babies by:

- monitoring the quality of care provision and outcomes
- allowing health care providers the ability to benchmark their care
- providing information to women and their families regarding the outcomes of various care options.

QMPQC has chosen a small group of care indicators to examine in this publication, and would be interested in dialogue regarding potential future indicators.

Tables 16 and 17 show maternal and neonatal profiles of the women and babies cared for. For reporting of group outcomes, the hospitals and other modes of healthcare delivery are grouped in clinically relevant 'Hospital/facility' groupings as per Table 15.

Mater Mothers Hospital is reported with Queensland public hospital maternity and newborn services and is included in Group A (Specialist Obstetric Service with a Maternal-Fetal Medicine Unit and a Neonatal Intensive Care Unit). Beaudesert and Cooktown health services were in the process of developing a formal maternity service during these years, but are not included as such in this report. Gold Coast University Hospital was beginning to transition to a Specialist Obstetric Service with a Maternal-Fetal Medicine Unit and a Neonatal Intensive Care Unit during these years, but is reported in Group B (Specialist Obstetric Service and Special Care Nursery; ›3000 births/year) for the purposes of this report.

The five public Birth Centres are included with the relevant hospital; it is acknowledged that the incidence of intervention in the pregnancies of women giving birth in these facilities was significantly lower than for the 'parent' hospital maternity service.

Group indicator outcomes are reported in bar graphs and statewide rates are also given. It should be clear that the statewide rate is an average rate, and does not represent an 'ideal' or evidence-based optimum rate. Data are for Queensland births 2012 to 2013.

Individual public hospital facility outcomes are reported in the form of funnel plots, which are visual tools for investigating possible bias in an analysis. A funnel plot, as used in this report, is a scatter plot of the treatment estimates (e.g. caesarean section rate) from individual facilities against each facility's birth numbers for the relevant question (e.g. selected primigravida). Individual private hospital data are not available for similar representation.

The name funnel plot arises from the fact that precision of the estimated intervention effect increases as the size of the study increases. Effect estimates from small studies will therefore scatter more widely at the bottom of the graph, with the spread narrowing among larger studies. The standard error of the intervention effect estimate is plotted on the vertical axis. Control limits are then overlaid on the scatter plot. They are the upper and lower control limits that represent the boundary between normal variation and special cause variation. The control limits represent the expected variation in rates assuming that the only source of variation is normal variation. The control limits are computed in a fashion very similar to confidence intervals and exhibit the distinctive funnel shape as a result of smaller expected variability in larger populations. The control limits represent 95 per cent and 99.7 per cent variation from the average or mean.

The indicators shown in Figures 89, 91 and 99 examine women defined as 'selected primigravida'; these are women whose age is between 20 and 34 years, who have not had previous births, who have a singleton birth in current pregnancy, who gave birth between 37 weeks + 0 days to 41 weeks + 6 days completed weeks of gestation, and whose baby presented in a standard head first flexed manner (cephalic / vertex presentation at birth). These standardised outcomes tend to allow for more valid comparisons across care groups.

Maternity / Neonatal Characteristics of Hospital/ Healthcare Groups		
Group A: Specialist Obstetric Service with Maternal-Fetal Medicine and Neonatal Intensive Care Unit		
Mater Mothers' Public	Royal Brisbane and Women's	Townsville
Group B: Specialist Obstetric Service and Special Care Nursery; >3000 births/year		
Caboolture	Cairns	Gold Coast
Ipswich	Logan	Nambour
Redland		Toowoomba
Group C: Specialist Obstetric Service and Special Care Nursery; <3000 births/year		
Bundaberg	Hervey Bay	Mackay
Mount Isa	Redcliffe	Rockhampton
Group D: Rural Generalist Obstetric Service and General nursery; >250 births/year		
Dalby	Emerald	Gladstone
Gympie	Kingaroy	Proserpine
Group E: Rural Generalist Obstetric Service or Primary Midwifery Care Model and General nursery; <250 births/year		
Atherton	Ayr	Biloela
Charleville	Chinchilla	Cunnamulla
Goondiwindi	Innisfail	Longreach
Mareeba	Roma	Stanthorpe
St George	Theodore	Thursday Island
Tully		Warwick
Group X: Public facilities without Maternity Services		
Group PRI: Private Hospital Maternity Services		
Group HB: Home Births		

Table 15: Hospital groups for outcome comparisons
(Groups B and C and groups D and E are separated as staffing levels and case acuity differs between groups)

Table 16 shows the profiles of the mothers giving birth in the various facility groups. Younger women less than 20 years of age are cared for almost entirely within the public hospital maternity services (particularly the non-specialist smaller services), whilst older women are more likely to access private care and home birth care. Obese women and women who smoke cigarettes are less likely to be cared for in public hospital birth centres, private hospitals and at home.

SEIFA indices show that women of lower socioeconomic status are unlikely to access public hospital birth centres and private hospitals. Women from accessible and highly accessible places of residence (ARIA 0 to <2.40) with relative socioeconomic advantage (SEIFA quintile 4 or 5) made up 35 per cent of the women giving birth in Queensland in 2012 to 2013, but they made up 44.3 per cent of the women giving birth in hospitals with specialist care

Women accessing private hospitals are less likely to labour spontaneously and more likely to have a caesarean section birth than women cared for in public hospital maternity services, and women being cared for in public hospital birth centres and at home almost exclusively labour spontaneously and have a spontaneous unassisted vaginal birth.

MATERNAL PROFILES	Facility Group								
	A	B	C	D	E	X	PRI	HB	Total
	Specialist obstetrics, Maternal-Fetal Medicine Unit, Neonatal intensive care unit	Specialist obstetrics, Special care nursery, ›3000 births / year	Specialist obstetrics, Special care nursery, ‹3000 births / year	Non-specialist obstetrics, Generalist neonatal care, ›250 births / year	Non-specialist obstetrics, Generalist neonatal care, ‹250 births / year	Public facilities without maternity services	Private hospital maternity and newborn services	Home births	
Number of women	24,108	42150	14,372	4,408	3,585	209	35,826	174	**124,832**
Maternal age									
Less than 20 years	4.5	6.9	8.8	8.1	9.7	14.8	0.3	1.1	**4.9**
20–34 years	77.3	78.1	78.1	79.9	78.9	71.8	70.5	67.2	**75.8**
35 or more years	18.2	15.0	13.1	12.0	11.4	13.4	29.2	31.6	**19.3**
Maternal BMI									
Underweight (‹18.5 kg/m2)	7.5	5.8	4.9	6.6	6.1	8.1	4.6	4.6	**5.7**
Normal (18.5–24.9 kg/m2)	53.3	46.5	44.3	49.7	47.6	36.8	58.8	57.5	**51.3**
Overweight (25–29.9 kg/m2)	20.5	23.3	24.8	25.2	26.9	21.1	22.3	20.7	**22.8**
Obese (30 or more kg/m2)	16.0	22.9	25.0	18.3	18.7	12.9	13.8	7.5	**18.9**
BMI not stated	2.7	1.5	1.0	0.2	0.7	21.1	0.4	9.8	**1.3**
Indigenous status									
Aboriginal or Torres Strait Is.	5.9	8.0	10.2	8.8	20.4	34.9	0.4	0.6	**6.1**
Non-Indigenous	94.1	92.0	89.8	91.2	79.6	65.1	99.6	99.4	**93.9**
Smoking									
Smoking before 20 weeks	11.5	21.7	23.3	24.9	28.8	46.9	18.8	2.3	**14.6**
Smoking after 20 weeks	9.4	17.8	20.8	21.4	24.7	44.0	12.2	2.3	**12.1**
Past births*									
No previous births	32.7	27.5	28.1	27.2	26.5	12.9	34.1	20.7	**30.1**
One or more previous births	67.3	72.5	71.9	72.8	73.5	87.1	65.9	79.3	**69.9**
No previous caesarean birth	84.7	84.8	84.3	85.6	87.3	92.8	76.6	90.8	**82.5**
One or more previous caesareans	15.3	15.2	15.7	14.4	12.7	7.2	23.4	9.2	**17.5**
Maternal SEIFA index**									
Quintile 1 (relatively most disadvantaged)	11.5	26.3	38.0	28.5	38.2	61.7	6.6	7.5	**19.6**
Quintile 2	13.8	23.7	24.4	36.1	47.0	15.8	14.6	17.2	**20.4**
Quintile 3	16.8	21.9	26.2	23.5	12.7	14.8	22.0	28.2	**21.2**
Quintile 4	28.6	22.3	5.8	11.9	0.7	3.8	26.9	25.9	**21.9**
Quintile 5 (relatively most advantaged)	29.0	5.8	5.6	0.0	0.1	1.0	29.4	21.3	**16.7**
Maternal principal residence (ARIA score)***									
Highly accessible (ARIA: 0 to ‹0.20)	76.3	70.1	23.4	0.2	0.2	3.8	69.6	73.6	**61.2**
Accessible (ARIA: 0.20 to ‹2.40)	2.3	16.7	57.3	58.7	10.5	19.6	15.8	21.3	**19.6**
Moderately accessible (ARIA: 2.40 to ‹5.95)	20.0	11.3	11.0	37.1	66.9	55.0	13.0	4.6	**16.0**
Remote (ARIA: 5.95 to ‹10.5)	0.9	0.5	7.0	3.7	6.3	14.4	0.9	0.0	**1.7**
Very remote (ARIA: 10.5 to ‹15)	0.5	1.3	1.2	0.3	15.9	4.3	0.7	0.6	**1.4**

Table 16 (continued over page): Maternal profiles by hospital group (%), Queensland 2012 to 2013

(* Births = live-birth or stillbirth;** SEIFA index of Relative Socio-economic Advantage and Disadvantage index quintiles: 1 = Lowest socioeconomic status; 5 = Highest socioeconomic status) (Birth facility not stated = 23, SEIFA = not available for 321, ARIA = overseas or not stated for 60)

MATERNAL PROFILES	Facility Group								
	A	B	C	D	E	X	PRI	HB	Total
	Specialist obstetrics, Maternal-Fetal Medicine Unit, Neonatal intensive care unit	Specialist obstetrics, Special care nursery, >3000 births / year	Specialist obstetrics, Special care nursery, <3000 births / year	Non-specialist obstetrics, Generalist neonatal care, >250 births / year	Non-specialist obstetrics, Generalist neonatal care, <250 births / year	Public facilities without maternity services	Private hospital maternity and newborn services	Home births	
Complications of pregnancy									
Antepartum haemorrhage	6.9	2.1	4.0	1.2	1.0	3.8	4.1	0.0	3.8
Pre-eclampsia / PIH****	4.9	4.0	4.3	2.9	2.7	1.9	4.6	0.6	4.3
Gestational diabetes	7.8	8.0	8.5	5.9	4.7	3.3	5.7	1.7	7.2
Multiple gestation	2.0	1.3	1.2	0.3	0.1	1.0	2.2	0.0	1.6
Onset of labour									
Spontaneous	59.2	62.7	60.2	70.7	71.0	100	38.1	100	55.3
Induced	23.5	22.7	24.0	15.9	16.3	0	26.7	0	23.7
No labour	17.2	14.6	15.8	13.4	12.7	0	35.2	0	21.0
Regional analgesia during labour									
Epidural, Spinal or Caudal	28.1	28.7	28.4	22.5	18.4	0	47.0	0	33.2
Method of birth									
Spontaneous vaginal birth	58.3	64.7	64.6	67.9	71.6	98.6	39.8	100	56.7
Vacuum extraction birth	8.2	6.7	6.7	6.2	4.9	1.4	9.4	0	7.7
Forceps birth	2.5	2.0	2.1	0.7	0.7	0	2.9	0	2.3
Caesarean section without labour	17.2	14.6	15.8	13.4	12.7	0	35.2	0	21.0
Emergency caesarean section	12.8	12.1	10.8	11.8	10.1	0	12.7	0	12.3
All caesarean section	31	26.5	26.6	25.2	22.8	0	47.9	0	33.3
Complications of labour and birth									
Cord prolapse	0.2	0.2	0.2	0.1	0.2	0	0.1	0	0.1
Fetal distress*****	14.5	10.2	7.9	5.1	4.0	3.3	9.7	0.6	10.2
Manual removal of placenta	1.2	1.1	1.2	1.4	1.4	4.3	0.7	2.9	1.1
Postpartum haemorrhage	6.8	5.8	7.0	7.4	5.1	4.8	4.8	11.5	5.9
Perineal status ******									
Intact	45.3	51.1	54.9	53.4	55.0	54.5	59.4	35.6	53.0
Grazes or 1st/2nd degree tear	40.7	38.8	34.0	39.1	39.3	43.1	27.9	61.5	35.5
3rd/4th degree tear	2.2	2.5	1.7	1.6	1.3	0.5	0.8	2.3	1.8
Episiotomy	11.8	7.6	9.4	5.9	4.4	1.9	11.9	0.6	9.7

Table 16 (continued from previous page): Maternal profiles by hospital group (%), Queensland 2012 to 2013
(***ARIA score: Accessibility/Remoteness Index of Australia; **** PIH = pregnancy-induced hypertension;
***** Fetal distress as defined by midwife completing the PDC entry, ****** Perineal status = of women having vaginal births)
(Birth facility not stated: 23)

Table 17 shows profiles of the babies born in the facility groups.

BABY PROFILES	Facility Group								
	A	B	C	D	E	X	PRI	HB	Total
	Specialist obstetrics, Maternal-Fetal Medicine Unit, Neonatal intensive care unit	Specialist obstetrics, Special care nursery, >3000 births / year	Specialist obstetrics, Special care nursery, <3000 births / year	Non-specialist obstetrics, Generalist neonatal care, >250 births / year	Non-specialist obstetrics, Generalist neonatal care, <250 births / year	Public facilities without maternity services	Private hospital maternity and newborn services	Home births	
Number of women	24,616	42686	14,543	4,423	3,589	211	36,637	174	126,881
Gestational age									
28 weeks or less	2.2	0.7	0.8	0.4	0.5	5.7	0.7	0.0	1.0
29–32 weeks	2.9	0.9	0.8	0.3	0.3	3.8	0.9	0.0	1.2
33–36 weeks	7.3	6.8	6.7	3.1	3.7	15.6	7.7	0.0	6.9
37–40 weeks	71.4	76.2	77.2	78.8	78.8	70.6	84.5	74.7	78.0
41 weeks or more	16.1	15.4	14.6	17.4	16.7	4.3	6.3	25.3	12.9
Birthweight									
Less than 1500g	3.9	1.1	1.1	0.4	0.7	6.1	1.0	0.0	1.5
1500–2499g	7.1	5.5	5.9	2.6	3.1	16.5	5.1	0.6	5.5
2500–3999g	77.1	80.2	80.5	82.7	83.2	72.6	84.0	69.8	80.9
4000g or more	11.8	13.3	12.5	14.3	13.0	4.9	9.9	29.7	12.1
5-minute Apgar score*									
0–6	3.6	2.5	2.7	1.9	1.8	8.1	1.5	1.1	2.4
7 or more	96.4	97.5	97.3	98.1	98.2	91.9	98.5	98.9	97.6
Congenital anomaly recorded**									
Present	11.4	6.1	6.4	3.4	2.7	2.4	3.0	4.6	6.1
Admission to a Neonatal Intensive Care Unit									
Yes	9.2	0.6	0.0	0.0	0.0	0.0	1.5	0.0	2.4
Admission to a Special Care Baby Unit									
Yes	20.9	20.3	23.6	0.0	0.0	0.0	13.2	0.0	17.4
Admission to a Neonatal Intensive Care Unit and/or a Special Care Baby Unit									
Yes	20.4	20.5	23.6	0.0	0.0	0.0	13.5	0.0	17.8
Birth status									
Alive (per 1000 births)	985.3	989.7	989.7	994.6	993.9	957.3	992.6	988.5	990.0
Stillborn (per 1000 births)	9.1	7.1	7.1	3.4	4.7	19.0	5.5	0.0	6.9
Neonatal death (per 1000 live births)	5.6	3.2	3.2	2.0	1.4	23.7	1.9	11.5	3.2

Table 17: Baby profiles by hospital group (%), Queensland 2012 to 2013
(* 5-minute Apgar scores of all babies; ** Diagnosed during "birth admission")

As expected by the complexity of care of many of the mothers and babies born in the Group A public hospitals, which not only provide specialist obstetric care but also the sub-specialty of maternal-fetal medicine and the specialty of neonatal intensive care, are more likely to be preterm, of low birthweight, in poor condition at birth as measured by Apgar scores, to be admitted to specialised nursery care, and to die in the perinatal period.

A significant proportion of the 165 women who gave birth in public hospitals that did not have established maternity services, presented there in preterm labour and had babies that were more likely to be low birthweight, be in poor condition at birth, and to die in the perinatal period. Support for such facilities when faced with these unusual circumstances is vital to these mothers and babies.

Good practice point:

Maternity services are encouraged to be continuously aware of their own performance by monitoring against relevant indicators, and to readily make this information available to staff and to consumers of their care.

4.1 Indicator 1- incidence of caesarean section birth in selected primigravida

Figure 89 shows the proportion of selected primigravida having a caesarean section birth. The state average caesarean section rate for this group of women is 28.3 per cent, with public facilities varying between 19.8 per cent and 25.1 per cent, and private facilities 39.3 per cent. Group A public facilities have a higher caesarean section rate than the other public facilities, in line with the greater complexity of care required for a number of the women they care for. Selected primigravida being cared for in private facilities are more than 1.6 times as likely to have a caesarean section birth as those in public hospitals (Risk ratio = 1.68, 95 per cent confidence intervals 1.62 1.74).

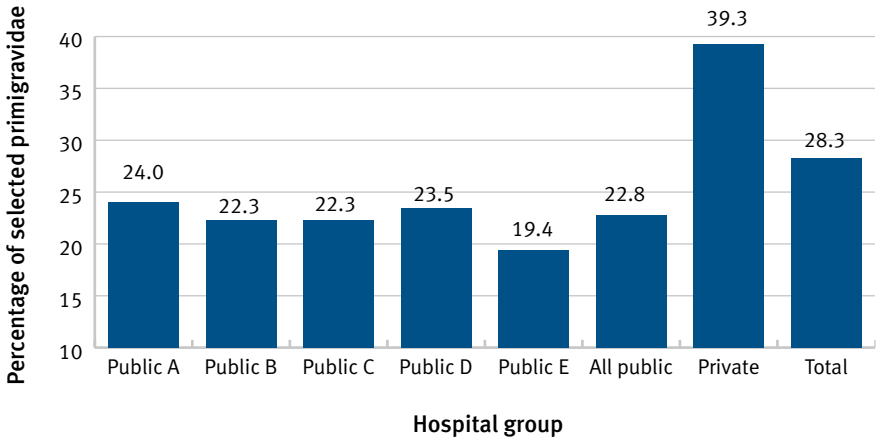


Figure 89: Proportion (%) of selected primigravida having a caesarean section birth, Queensland 2012 to 2013
(Selected primigravida = mothers age group 20–34 years, no previous births, singleton birth in current pregnancy, 37 weeks + 0 days to 40 weeks + 6 days completed weeks of gestation, cephalic / vertex presentation at birth)
(Table A67)

The funnel plot of individual public facilities is seen in figure 90.

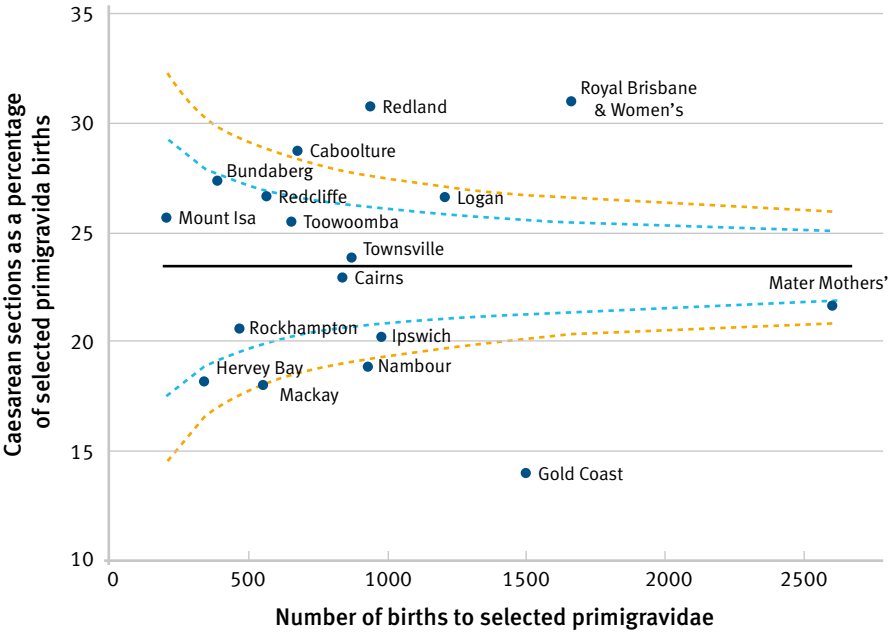


Figure 90A: Proportion (%) of selected primigravida having a caesarean section birth in public hospitals
(Specialist maternity and newborn services Groups A-C), Queensland 2012 to 2013

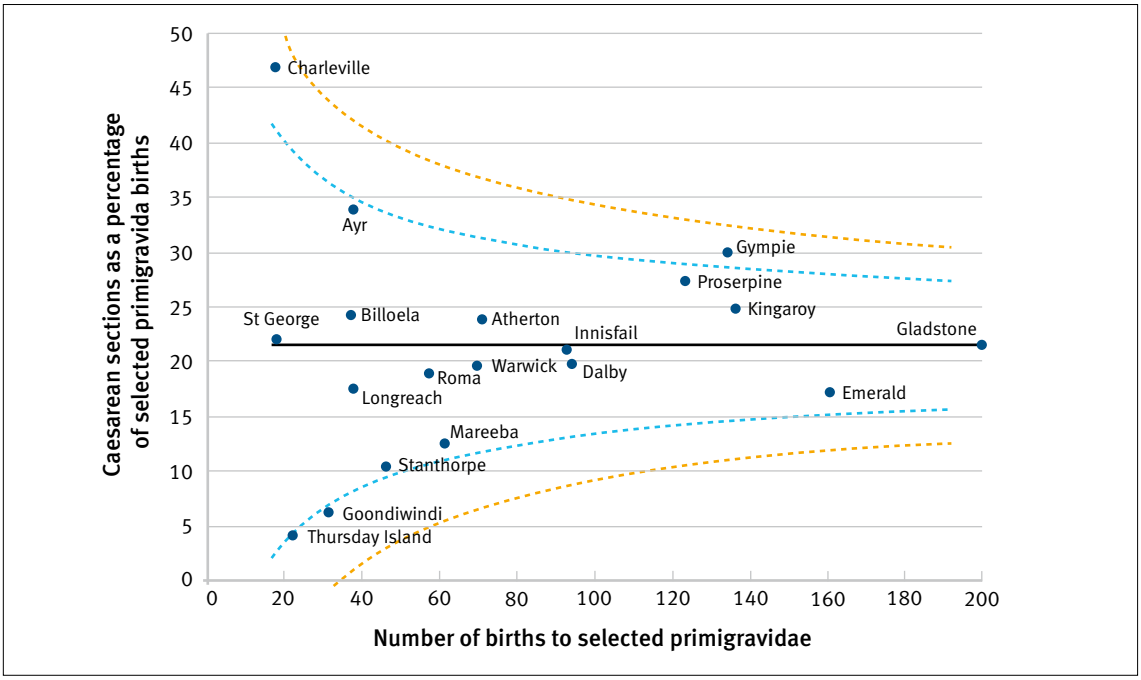


Figure 90B: Proportion (%) of selected primigravida having a caesarean section birth in public hospitals (Non-specialist maternity and newborn services Groups D-E), Queensland 2012 to 2013

4.2 Indicator 2 - incidence of unassisted vaginal birth in selected primigravida

The converse to indicator 1 is seen in Figure 91, with the likelihood of an unassisted vaginal birth being 56.5 per cent of women giving birth in public hospitals across the spectrum, and just 35.7 per cent of women giving birth in private hospitals (Risk ratio private hospitals versus public hospitals = 0.60, 95 per cent confidence intervals 0.59, 0.62).

The likelihood of an unassisted vaginal birth was virtually 100 per cent in women giving birth in public hospital birth centres (not shown separately in Figure 91). The incidence of unassisted vaginal birth in this group of women is higher in smaller non-specialist public units than in specialist public hospitals.

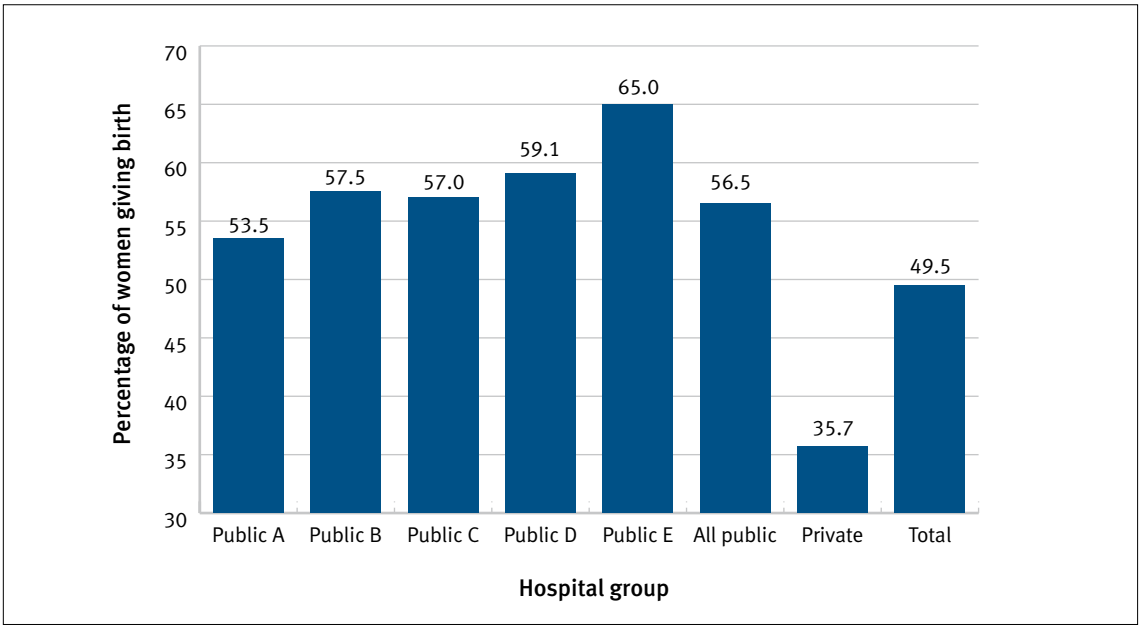


Figure 91: Proportion (%) of selected primigravida achieving unassisted vaginal birth, Queensland 2012 to 2013
(Selected primigravida = mothers age group 20–34 years, no previous births, singleton birth in current pregnancy, 37 weeks + 0 days to 40 weeks + 6 days completed weeks of gestation, cephalic / vertex presentation at birth) (Table A67)

The funnel plot of individual public facilities is seen in figure 92.

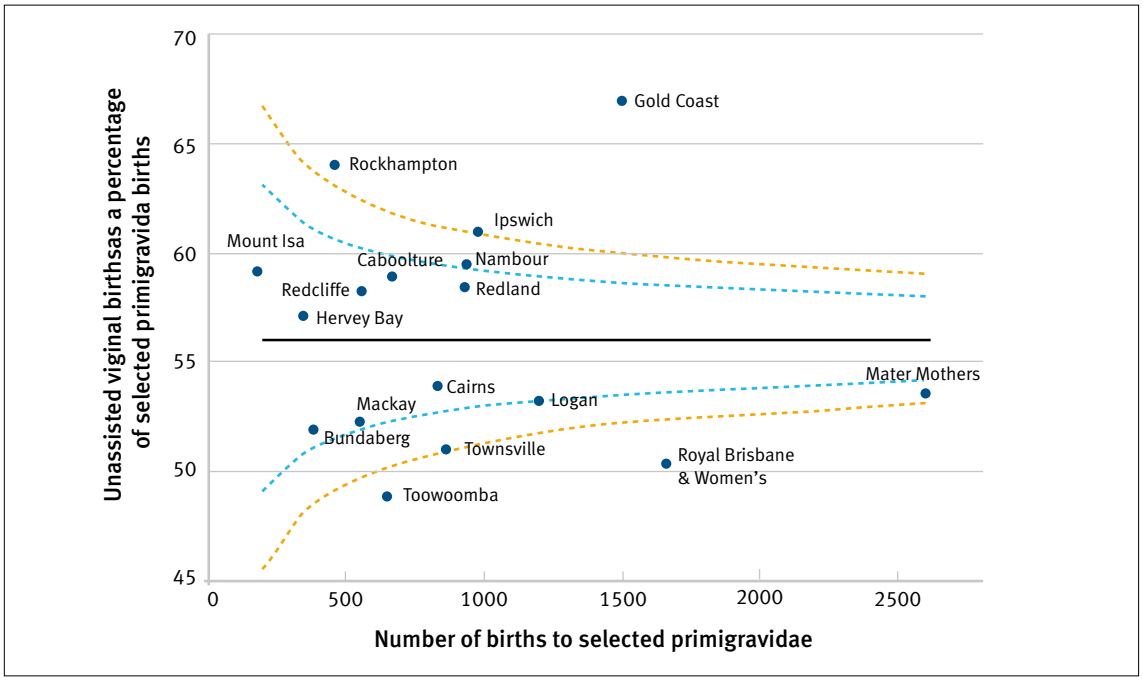


Figure 92A: Proportion (%) of selected primigravida having an unassisted vaginal birth in public hospitals (Specialist maternity and newborn services Groups A-C), Queensland 2012 to 2013

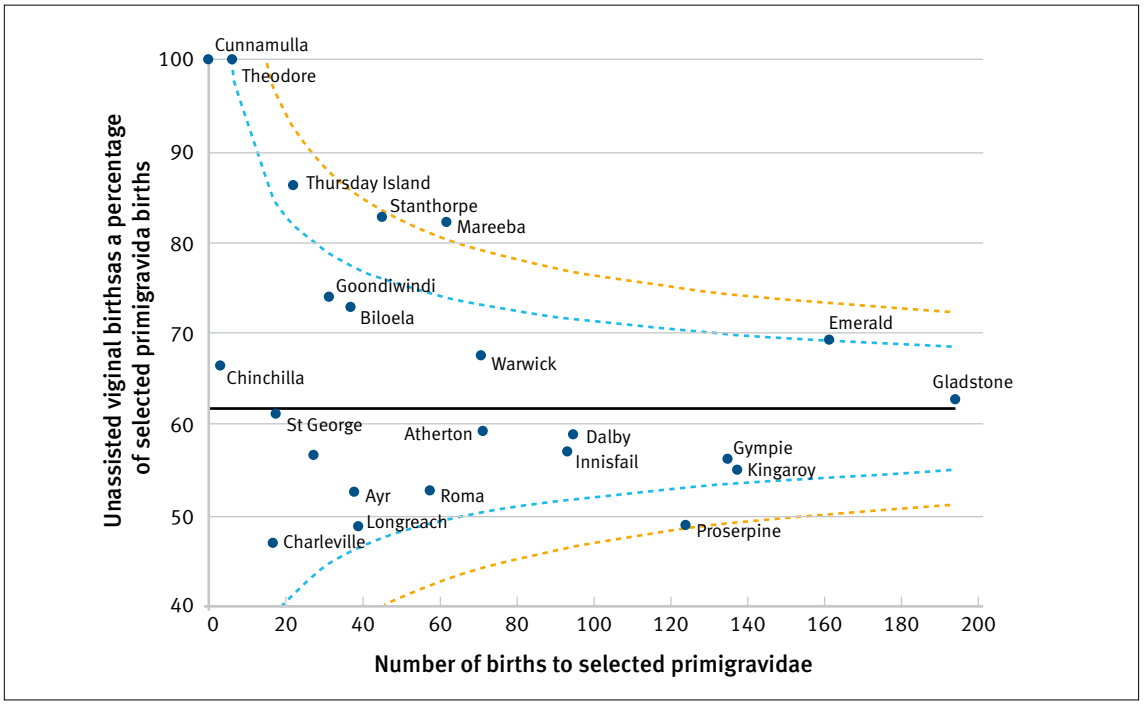


Figure 92B: Proportion (%) of selected primigravida having an unassisted vaginal birth in public hospitals (Non-specialist maternity and newborn services Groups D-E), Queensland 2012 to 2013

4.3 Indicator 3 - incidence of caesarean section without labour birth in all women

Figure 93 shows the rates of caesarean section without labour for all women giving birth in Queensland in 2012 and 2013. Similarly to the data shown in Figure 91, this indicator shows a significantly greater likelihood of women having a caesarean section birth in the private system (35.6 per cent) when compared with the public hospital system (15.8 per cent) (Risk ratio private hospitals versus public hospitals = 2.25, 95 per cent confidence intervals 2.21, 2.30).

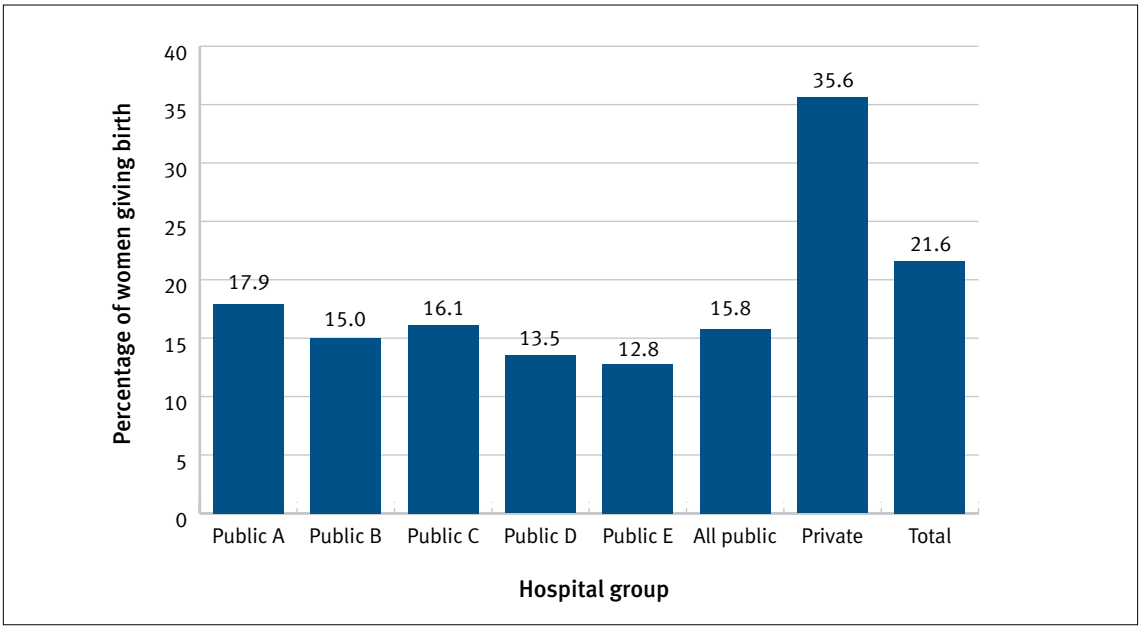


Figure 93: Proportion (%) of caesarean sections performed without labour in all women giving birth, Queensland 2012 to 2013
(Table A67)

The funnel plot of individual public facilities is seen in figure 94.

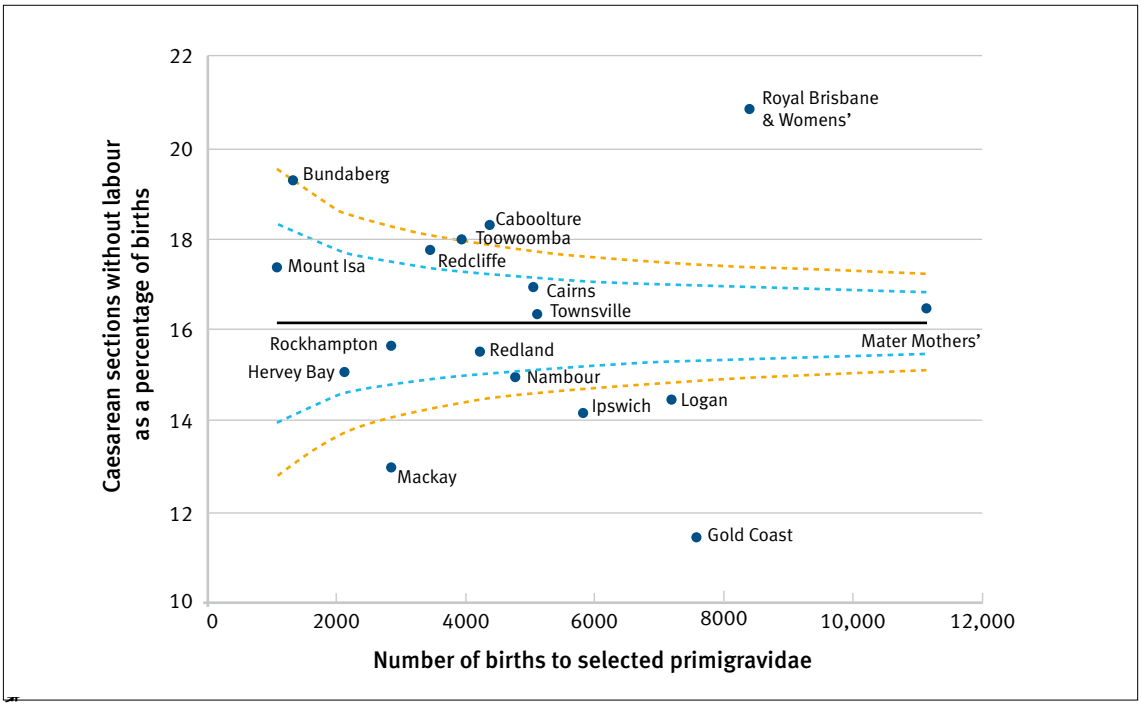


Figure 94A: Proportion (%) of all women having caesarean section without labour in public hospitals (Specialist maternity and newborn services Groups A-C), Queensland 2012 to 2013

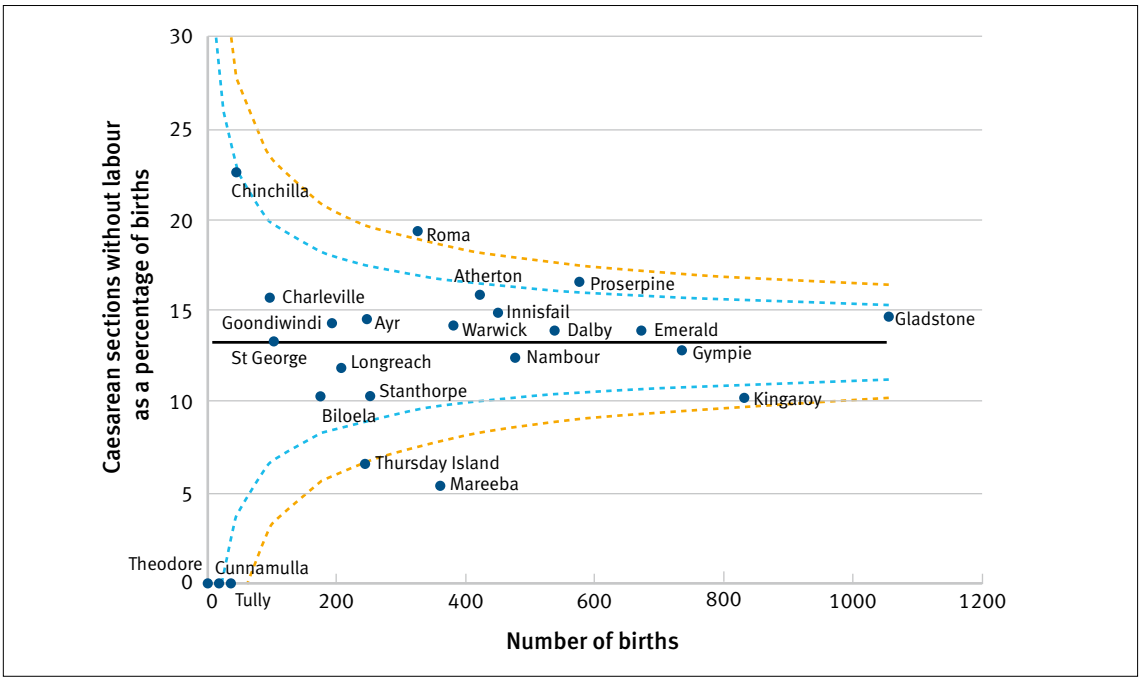


Figure 94B: Proportion (%) of all women having caesarean section without labour in public hospitals (Non-specialist maternity and newborn services Groups D-E), Queensland 2012 to 2013

4.4 Indicator 4 - incidence of elective birth prior to 38 weeks' gestation in all women

This indicator examines the issue of elective intervention in pregnancy (induction of labour and caesarean section without labour) before 38 weeks' gestation. Figure 95 shows that, overall, public hospital system women are likely to have such intervention slightly more frequently than women cared for in the private hospital system (20.0 per cent versus 18.3 per cent; risk ratio private hospitals versus public hospitals = 0.91, 95 per cent confidence intervals 0.88, 0.94).

Within the public hospital system women being cared for in smaller mostly rural facilities are much less likely to have such elective intervention prior to 38 weeks when compared with those women being cared for in specialist obstetric services; it is likely that this difference reflects appropriate risk stratification and referral.

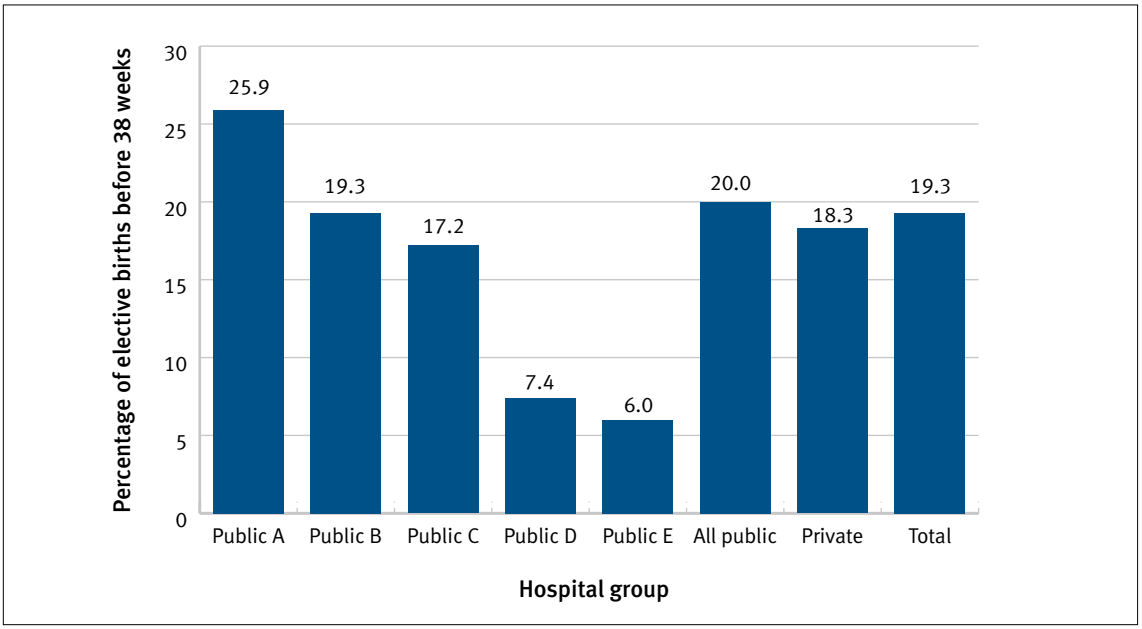


Figure 95: Proportion (%) of elective births (inductions of labour and caesarean sections without labour in all women giving birth) occurring before 38 completed weeks' gestation, Queensland 2012 to 2013 (Table A67)

The funnel plot of individual public facilities is seen in figure 96.

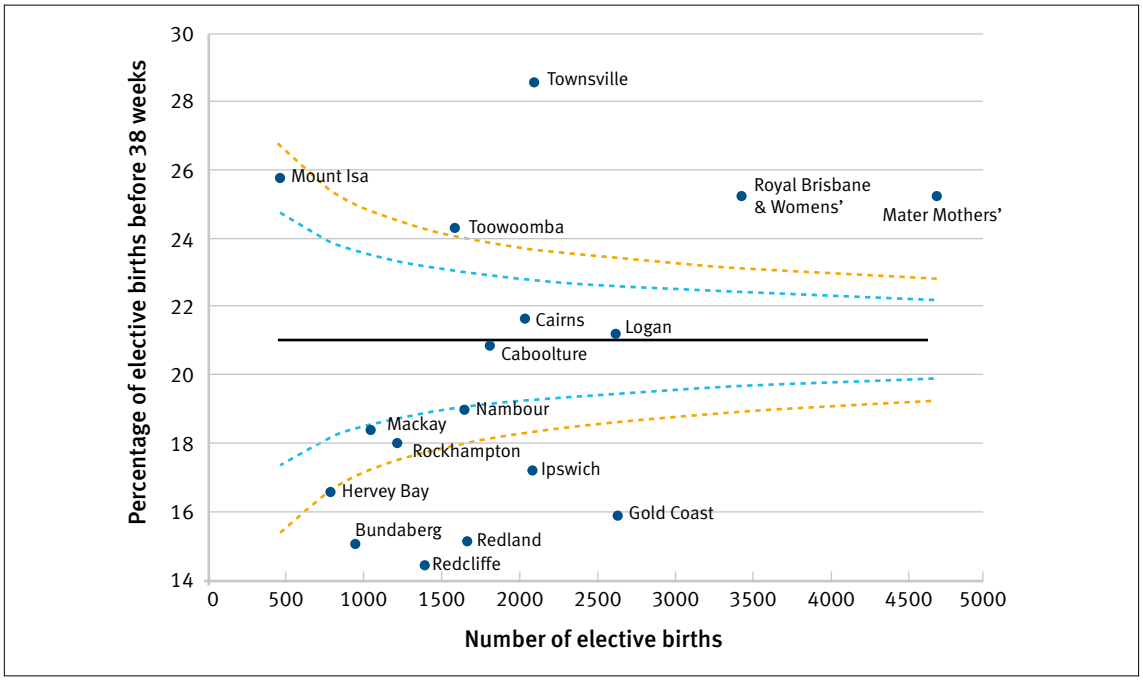


Figure 96A: Proportion (%) of all women having an elective birth (induced labour or caesarean section without labour) prior to 38 weeks' gestation in public hospitals (Specialist maternity and newborn services Groups A-C), Queensland 2012 to 2013

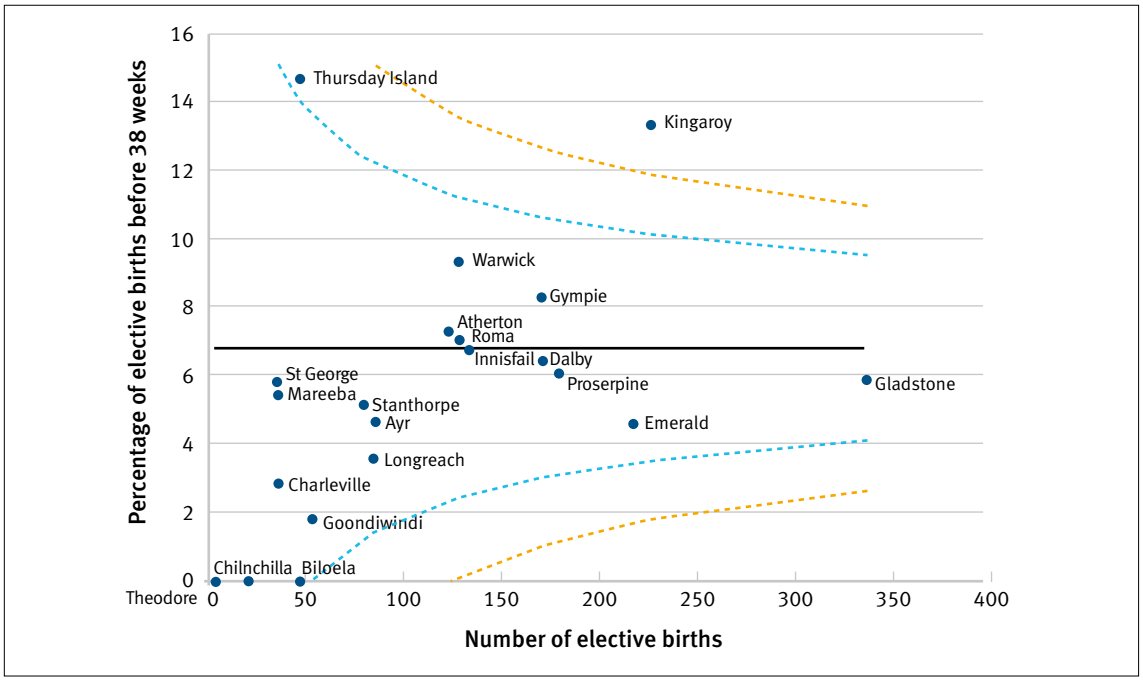


Figure 96B: Proportion (%) of all women having an elective birth (induced labour or caesarean section without labour) prior to 38 weeks' gestation in public hospitals (Non-specialist maternity and newborn services Groups D-E), Queensland 2012 to 2013

4.5 Indicator 5 - incidence of vaginal birth after caesarean section (VBAC) in the birth immediately following a first caesarean section in all women

The safety and appropriateness of vaginal birth after caesarean section (VBAC) is a vexed question, with evidence and opinion being divided. The indicator shown in Figure 97 examines successful VBAC in the birth immediately following a first caesarean section. All women in this category who gave birth in a birth centre had a successful VBAC, though the numbers are small and are not shown separately in figure 97. The incidence of VBAC in public hospitals was more than double that in private hospitals (Risk ratio public hospitals versus private hospitals = 2.47, 95 per cent confidence intervals 2.24, 2.71).

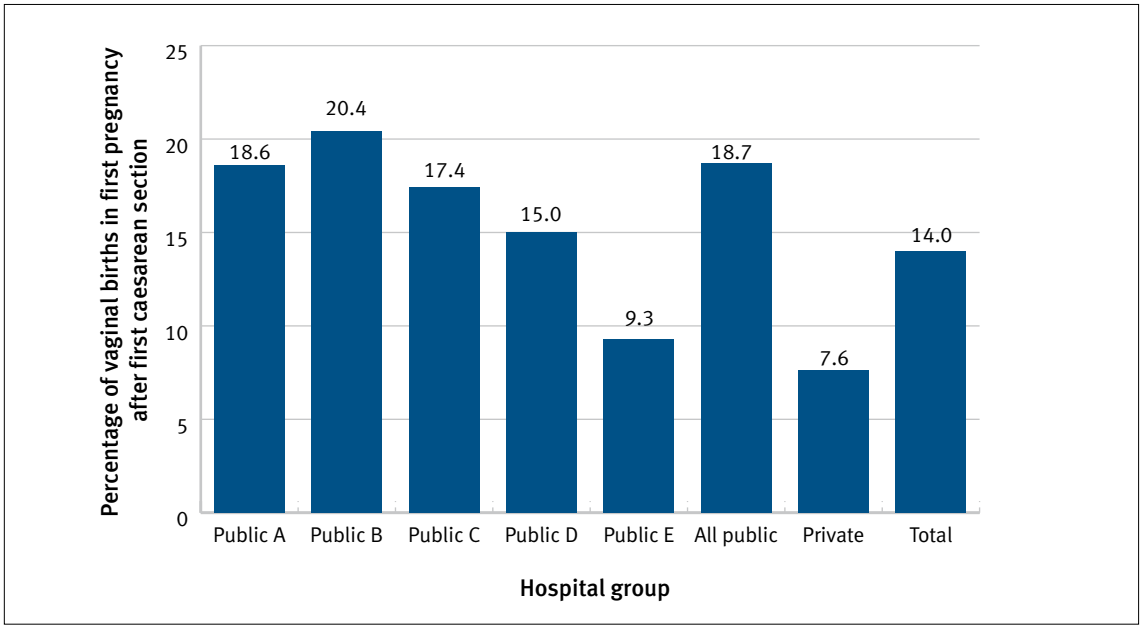


Figure 97: Proportion (%) of all women giving birth whose previous pregnancy ended in a first caesarean section and who achieved a vaginal birth (ie successful VBAC), Queensland 2012 to 2013
(Table A67)

The funnel plot of individual public facilities is seen in figure 98.

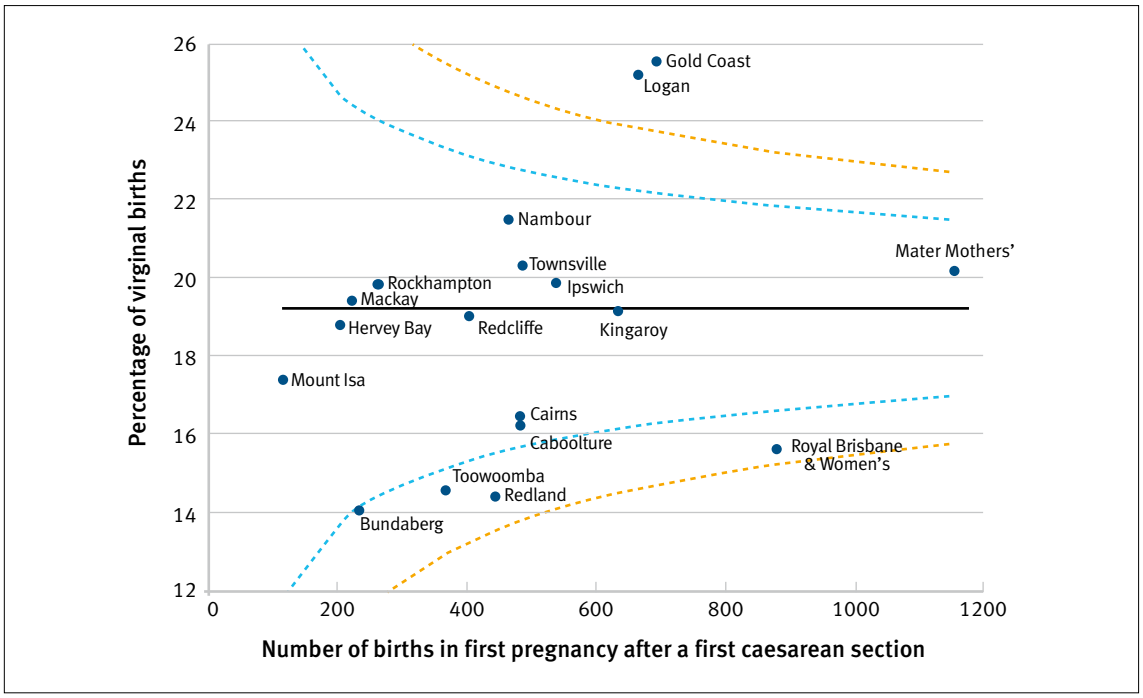


Figure 98A: Proportion (%) of all women giving birth whose previous pregnancy ended in a first caesarean section and who achieved a vaginal birth(ie successful VBAC) in public hospitals, Queensland 2012 to 2013
(Specialist maternity and newborn services Groups A-C)

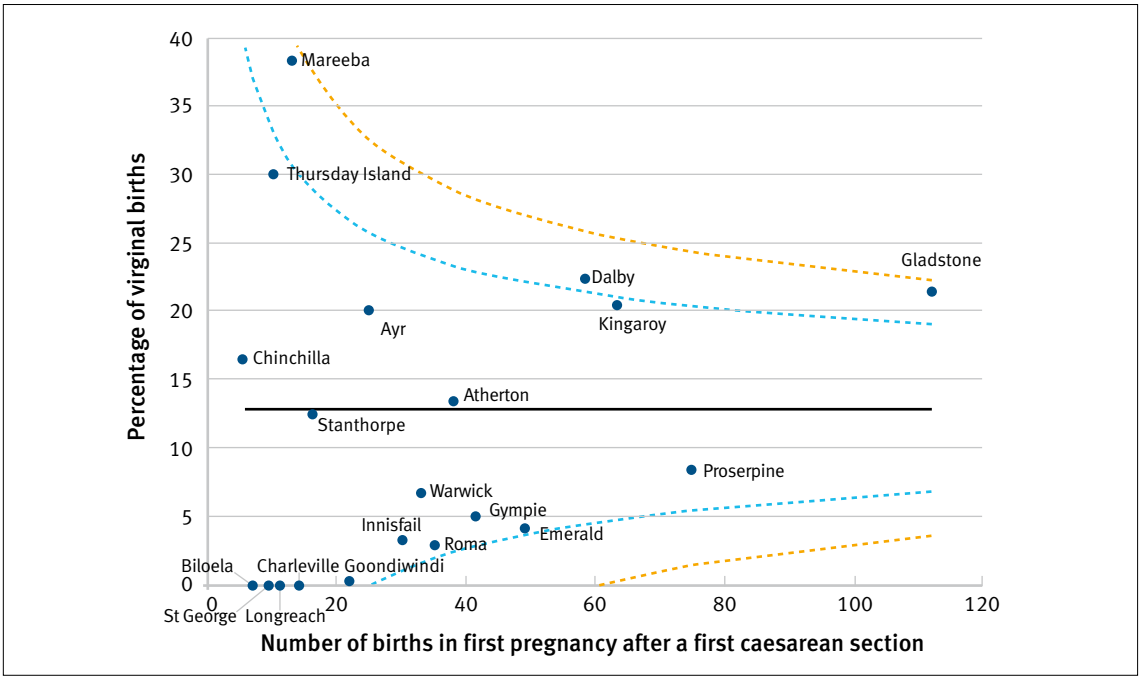


Figure 98B: Proportion (%) of all women giving birth whose previous pregnancy ended in a first caesarean section and who achieved a vaginal birth(ie successful VBAC) in public hospitals (Non-specialist maternity and newborn services Groups D-E), Queensland 2012 to 2013

4.6 Indicator 6 - proportion of selected primigravida who laboured spontaneously and achieved an unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear

Figure 99 shows the proportion of selected primigravida who laboured spontaneously and achieved an unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear (i.e. without major perineal damage).

Women cared for in the private hospital system achieved significantly lower rates than the rest of the state's selected primigravida (risk ratio for private hospital care versus the rest of the state's selected primigravida = 0.93, 95 per cent confidence intervals 0.93, 0.94)

The rate for this indicator (91.7 per cent; not shown separately in Figure 99) was higher in public hospital birth centres than all other modes of hospital healthcare delivery (risk ratio for public hospital birth centre care versus the rest of the state's selected primigravida = 1.05, 95 per cent confidence intervals 1.03, 1.06.

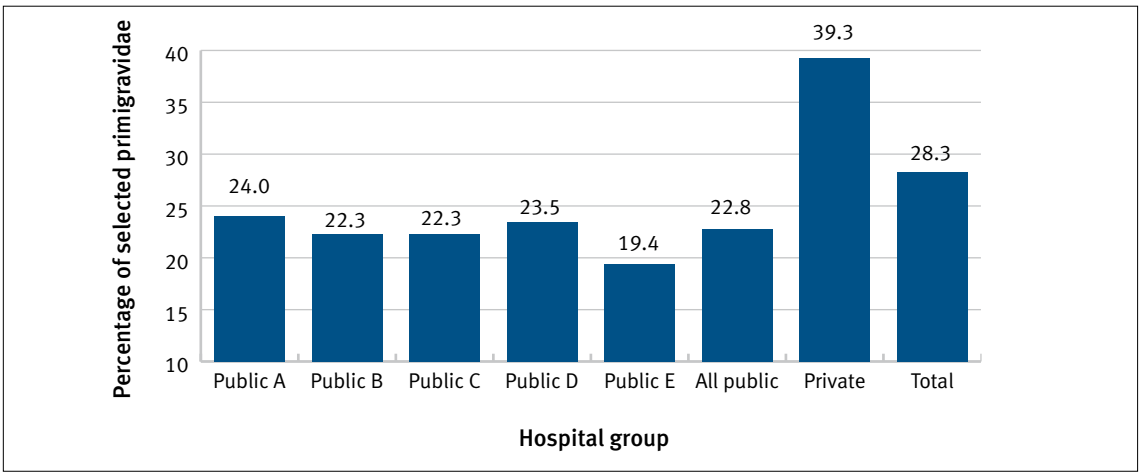


Figure 99: Proportion (%) of selected primigravida labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear, Queensland 2012 to 2013
(Selected primigravida = mothers age group 20–34 years, no previous births, singleton birth in current pregnancy, 37 weeks + 0 days to 40 weeks + 6 days completed weeks of gestation, cephalic / vertex presentation at birth)
(Table A67)

The funnel plot of individual public facilities is seen in figure 100.

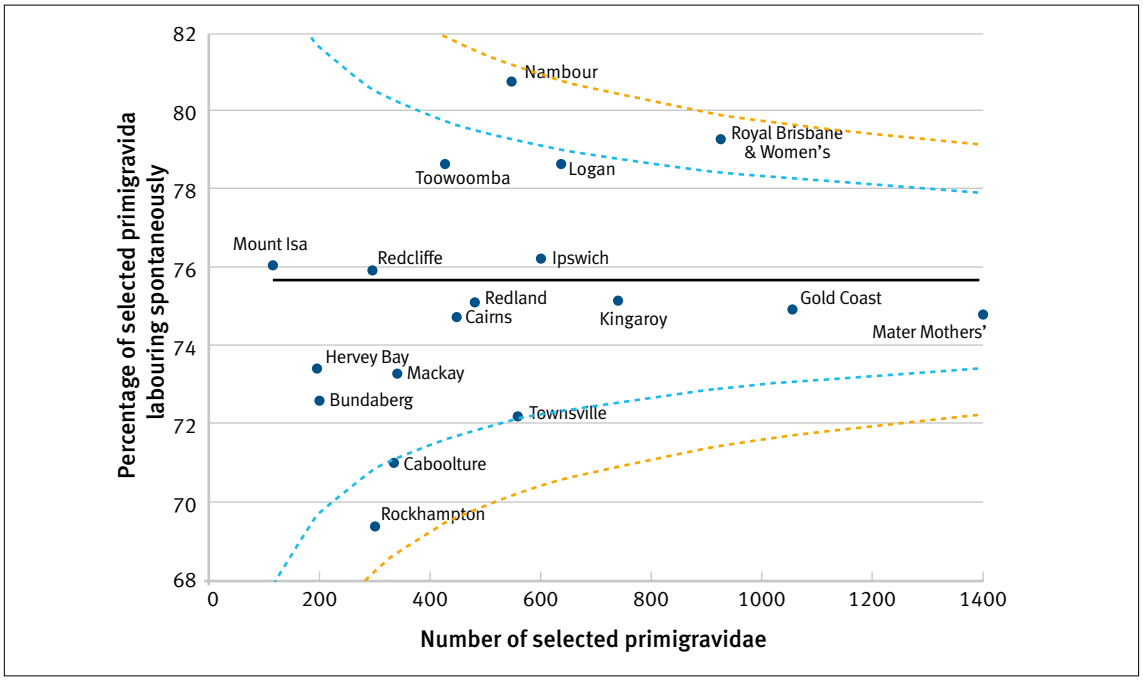


Figure 100A: Proportion (%) of selected primigravida labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear in public hospitals (Specialist maternity and newborn services Groups A-C), Queensland 2012 to 2013

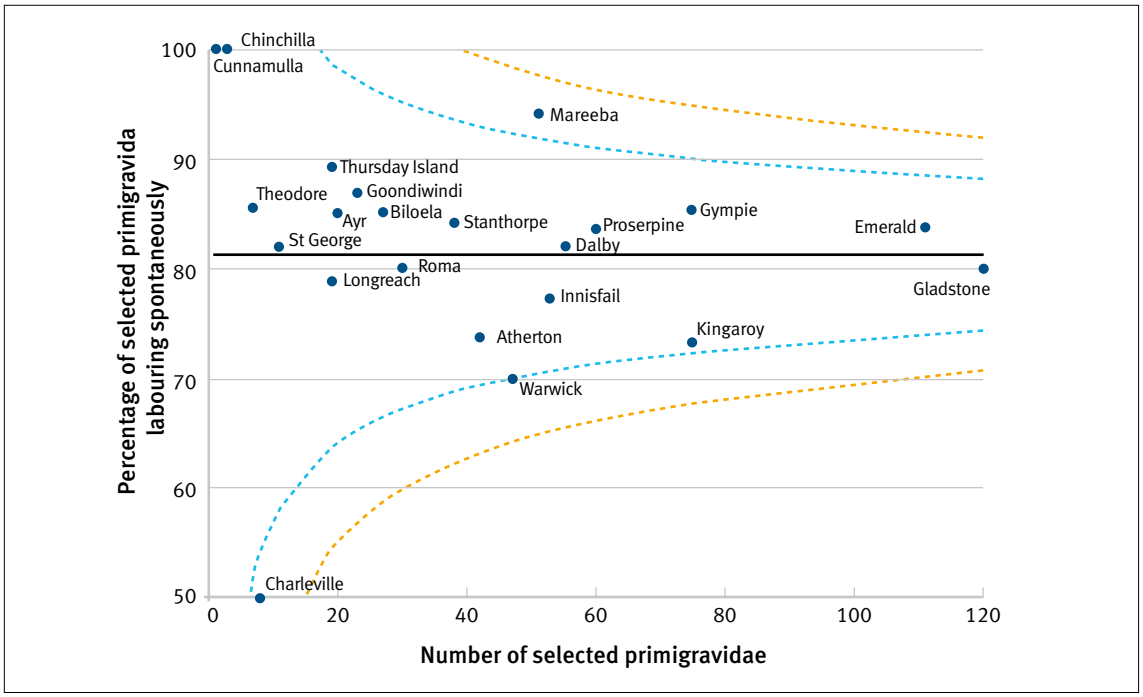


Figure 100B: Proportion (%) of selected primigravida labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear in public hospitals (Non-specialist maternity and newborn services Groups D-E), Queensland 2012 to 2013

4.7 Indicator 7- proportion of all women who laboured spontaneously and achieved an unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear

Figure 101 shows all women who laboured spontaneously and achieved an unassisted vaginal birth without major perineal damage. Similar variations to those seen in Figure 99 are found in this larger group.

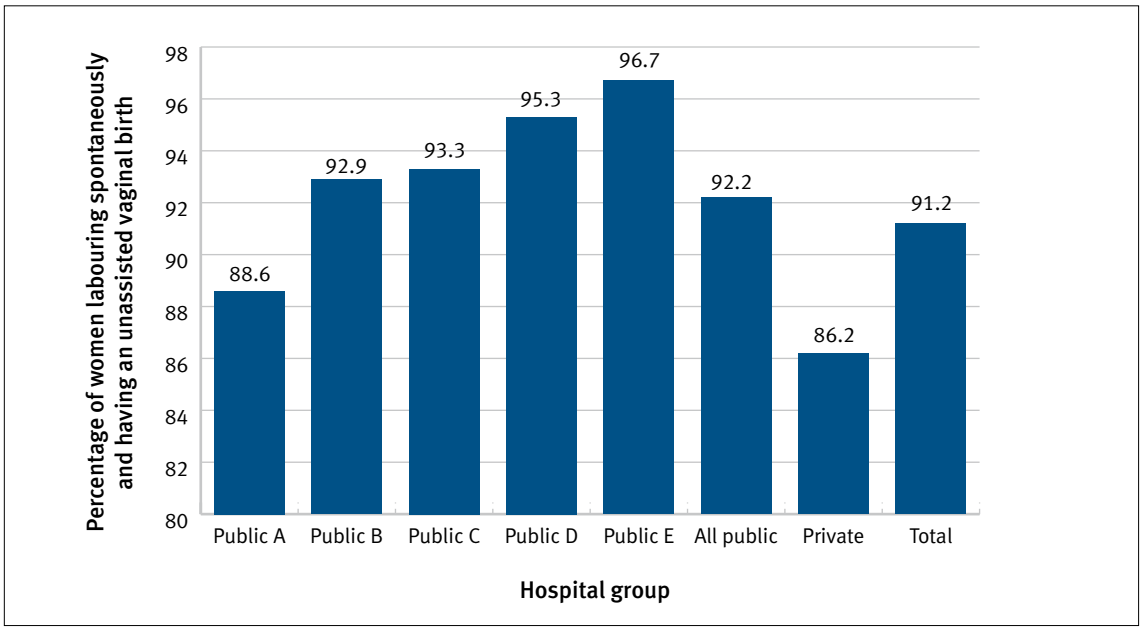


Figure 101: Proportion (%) of all women giving birth labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear, Queensland 2012 to 2013
(Table A67)

The funnel plot of individual public facilities is seen in figure 102.

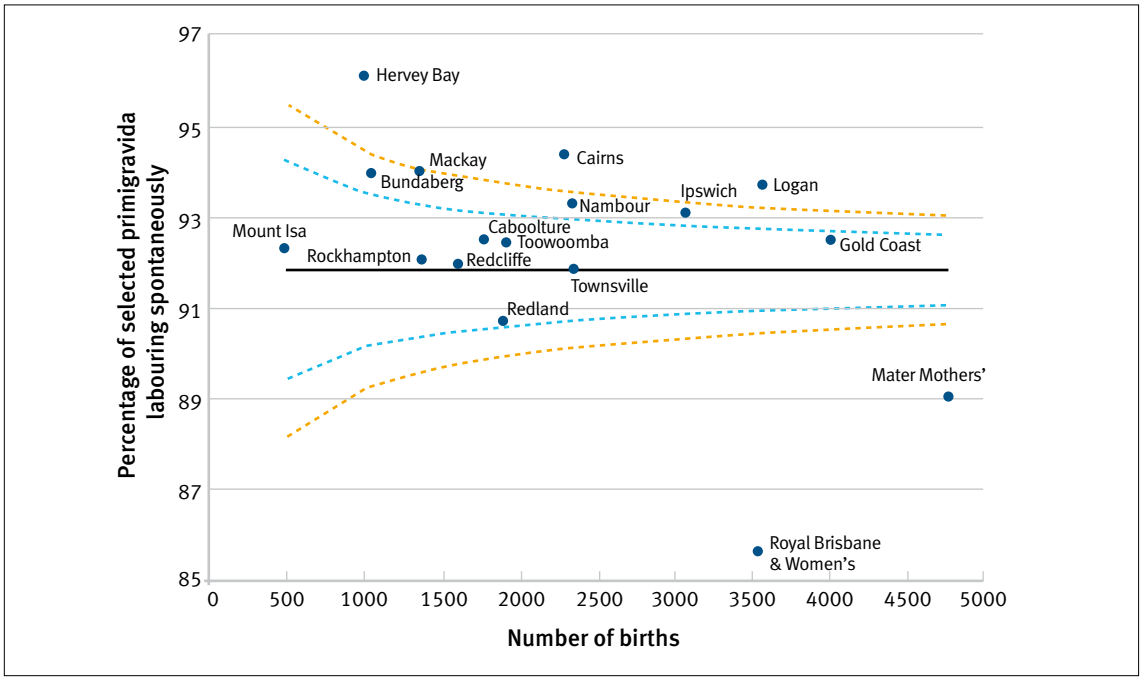


Figure 102A: Proportion (%) of all women giving birth labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear in public hospitals (Specialist maternity and newborn services Groups A-C), Queensland 2012 to 2013

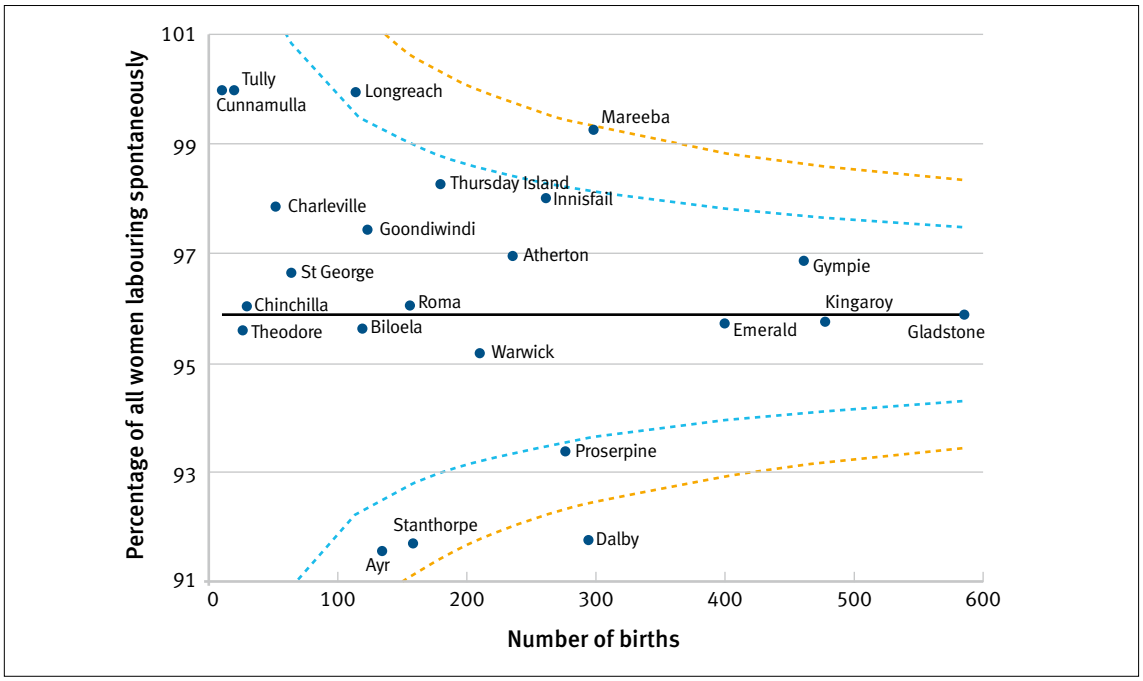


Figure 102B: Proportion (%) of all women giving birth labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear in public hospitals (Non-specialist maternity and newborn services Groups D-E), Queensland 2012 to 2013

APPENDIX A: supplementary data tables

	Direct deaths	Indirect deaths	Death not further classified	Number	%
Psychosocial	1	9	0	10	18.9
Cardiovascular	1	7	1	9	17
Thromboembolism	7	1	0	8	15.1
Non-obstetric haemorrhage	0	5	0	5	9.4
Sepsis	2	3	0	5	9.4
Obstetric haemorrhage	4	0	0	4	7.5
Hypertensive disorders	4	0	0	4	7.5
Amniotic fluid embolism	3	0	0	3	5.7
Early pregnancy death	1	0	0	1	1.9
Anaesthesia related death	1	0	0	1	1.9
Other	1	2	0	3	5.7
Total	**25**	**27**	**1**	**53**	**100**

Table A1: Causes of maternal death, Queensland 2004 to 2013

Year	Total Births	Live Births	Stillbirths		Neonatal Deaths		Perinatal Deaths	
			n	Rate (per 1000 births)	n	Rate (per 1000 live births)	n	Rate (per 1000 births)
2004	50,910	50,563	347	6.8	198	3.9	545	10.7
2005	55,281	54,906	375	6.8	185	3.4	560	10.1
2006	56,708	56,317	391	6.9	223	4.0	614	10.8
2007	60,244	59,827	417	6.9	202	3.4	619	10.3
2008	61,402	61,018	384	6.3	206	3.4	590	9.6
2009	62051	61,604	447	7.2	233	3.8	680	11.0
2010	62033	61,620	413	6.7	233	3.8	646	10.4
2011	62181	61,780	401	6.4	210	3.4	611	9.8
2012	63,723	63,263	460	7.2	195	3.1	655	10.3
2013	63,158	62747	411	6.5	206	3.3	617	9.8
Total	**597,691**	**593,645**	**4046**	**6.8**	**2091**	**3.5**	**6137**	**10.3**

Table A2: Stillbirth, neonatal and perinatal death rates, Queensland 2004 to 2013
(see section 1.1 regarding definitions of neonatal deaths and stillbirths)

PSANZ-PDC Cause of death	Perinatal deaths		Stillbirths		Neonatal deaths	
	n	%	n	%	n	%
1. Congenital abnormality (including terminations for congenital abnormalities)						
1.0 Congenital abnormality unspecified	1	0.1	1	0.1		
1.1 Central nervous system	87	6.8	63	7.2	24	6.0
1.2 Cardiovascular system	68	5.3	44	5.1	24	6.0
1.3 Urinary system	25	2.0	15	1.7	10	2.5
1.4 Gastrointestinal system	10	0.8	3	0.3	7	1.7
1.5 Chromosomal	82	6.4	54	6.2	28	7.0
1.6 Metabolic	1	0.1			1	0.2
1.7 Multiple/non chromosomal syndromes	38	3.0	28	3.2	10	2.5
1.8 Other congenital abnormality	46	3.6	22	2.5	24	6.0
1.9 Unspecified congenital abnormality	8	0.6	7	0.8	1	0.2
2. Perinatal infection						
2.1 Bacterial	3	0.2	2	0.2	1	0.2
2.11 Group B Streptococcus	6	0.5	5	0.6	1	0.2
2.12 E coli	1	0.1	1	0.1		
2.13 Listeria monocytogenes						
2.14 Spirochaetal e.g. Syphilis	1	0.1	1	0.1		
2.18 Other bacterial	2	0.2	2	0.2		
2.19 Unspecified bacterial	4	0.3	3	0.3	1	0.2
2.2 Viral						
2.21 Cytomegalovirus	10	0.8	8	0.9	2	0.5
2.22 Parvovirus	5	0.4	5	0.6		
2.23 Herpes simplex virus	1	0.1			1	0.2
2.24 Rubella virus						
2.28 Other viral						
2.29 Unspecified viral						
2.3 Protozoal e.g. Toxoplasma	1	0.1			1	0.2
2.5 Fungal						
2.8 Other specified organism						
2.9 Other unspecified organism	2	0.2	2	0.2		
3. Hypertension						
3.1 Chronic hypertension: essential	1	0.1	1	0.1		
3.2 Chronic hypertension: secondary						
3.3 Chronic hypertension: unspecified						
3.4 Gestational hypertension						
3.5 Pre-eclampsia	19	1.5	12	1.4	7	1.7
3.51 With laboratory evidence of thrombophilia						
3.6 Pre-eclampsia superimposed on chronic hypertension	1	0.1			1	0.2
3.61 With laboratory evidence of thrombophilia						
3.9 Unspecified hypertension						
4. Antepartum haemorrhage (APH)						
4.1 Placental abruption	62	4.9	35	4.0	27	6.7
4.11 With laboratory evidence of thrombophilia	3	0.2	3	0.3		
4.2 Placenta praevia	3	0.2	2	0.2	1	0.2
4.3 Vasa praevia						
4.8 Other APH	4	0.3	2	0.2	2	0.5
4.9 APH of undetermined origin	8	0.6	5	0.6	3	0.7

Table A3: Perinatal deaths by detailed PSANZ-PDC classification, Queensland 2012 to 2013

(continued over page)

PSANZ-PDC Cause of death			Perinatal deaths		Stillbirths		Neonatal deaths	
			n	%	n	%	n	%
5. Maternal conditions								
5.1	Termination of pregnancy for maternal psychosocial indications		4	0.3	2	0.2	2	0.5
5.2	Diabetes / Gestational diabetes		6	0.5	6	0.7		
5.3	Maternal injury							
	5.31	Accidental	4	0.3	3	0.3	1	0.2
	5.32	Non-accidental	1	0.1			1	0.2
5.4	Maternal sepsis		1	0.1	1	0.1		
5.5	Lupus obstetric syndrome							
5.6	Obstetric cholestasis							
5.8	Other specified maternal conditions		4	0.3	3	0.3	1	0.2
6. Specific perinatal conditions								
6.1	Twin-twin transfusion		27	2.1	25	2.9	2	0.5
6.2	Fetomaternal haemorrhage		10	0.8	10	1.1		
6.3	Antepartum cord complications		18	1.4	18	2.1		
	6.32	True knot with evidence of occlusion	2	0.2	2	0.2		
6.4	Uterine abnormalities (e.g. bicornuate uterus, cervical incompetence)		8	0.6	5	0.6	3	0.7
6.5	Birth trauma (typically infants of >24 weeks or >600g)							
6.6	Alloimmune disease							
	6.61	Rhesus	2	0.2	2	0.2		
	6.62	ABO						
	6.63	Kell						
	6.64	Alloimmune thrombocytopenia						
	6.68	Other						
	6.69	Unspecified						
6.7	Idiopathic hydrops		12	0.9	9	1.0	3	0.7
6.8	Other specific perinatal conditions		14	1.1	9	1.0	5	1.2
7. Hypoxic peripartum death								
7.1		With intrapartum complications						
	7.11	Uterine rupture	2	0.2	2	0.2		
	7.12	Cord prolapse	10	0.8	7	0.8	3	0.7
	7.13	Shoulder dystocia	1	0.1			1	0.2
	7.18	Other	8	0.6	5	0.6	3	0.7
7.2		Evidence of non-reassuring fetal status in a normally grown infant	15	1.2	3	0.3	12	3.0
7.3		No intrapartum complications and no evidence of non-reassuring fetal status	3	0.2			3	0.7
7.9		Unspecified hypoxic peripartum death	3	0.2	1	0.1	2	0.5
8. Fetal Growth Restriction (FGR)								
8.1		With evidence of reduced vascular perfusion on Doppler studies and /or placental histopathology	32	2.5	28	3.2	4	1.0
8.2		With chronic villitis	2	0.2	2	0.2		
8.3		No placental pathology	4	0.3	4	0.5		
8.4		No examination of placenta						
8.8		Other specified placental pathology	6	0.5	6	0.7		
8.9		Unspecified or not known whether and /or placental histopathology placenta examined	2	0.2	2	0.2		

Table A3: Perinatal deaths by detailed PSANZ-PDC classification, Queensland 2012 to 2013
(continued from previous page and continued over page)

PSANZ-PDC Cause of death			Perinatal deaths		Stillbirths		Neonatal deaths	
			n	%	n	%	n	%
9. Spontaneous preterm (<37 weeks' gestation)								
9.1	Spontaneous preterm with intact membranes, or membrane rupture <24 hours before delivery							
	9.11	With chorioamnionitis on placental histopathology	81	6.4	25	2.9	56	14.0
	9.12	Without chorioamnionitis on placental histopathology	31	2.4	11	1.3	20	5.0
	9.13	With clinical evidence of chorioamnionitis, no examination of placenta	3	0.2	1	0.1	2	0.5
	9.17	No clinical signs of chorioamnionitis, no examination of placenta	2	0.2			2	0.5
	9.19	Unspecified or not known whether placenta examined	36	2.8	12	1.4	24	6.0
9.2	Spontaneous preterm with membrane rupture >24 hours before delivery		1	0.1	1	0.1		
	9.21	With chorioamnionitis on placental histopathology	74	5.8	36	4.1	38	9.5
	9.22	Without chorioamnionitis on placental histopathology	12	0.9	2	0.2	10	2.5
	9.23	With clinical evidence of chorioamnionitis, no examination of placenta	2	0.2	2	0.2		
	9.27	No clinical signs of chorioamnionitis, no examination of placenta	3	0.2	2	0.2	1	0.2
	9.29	Unspecified or not known whether placenta examined	4	0.3	3	0.3	1	0.2
9.3	Spontaneous preterm with membrane rupture of unknown duration before delivery							
	9.31	With chorioamnionitis on placental histopathology	7	0.6	4	0.5	3	0.7
	9.32	Without chorioamnionitis on placental histopathology	3	0.2	2	0.2	1	0.2
	9.33	With clinical evidence of chorioamnionitis, no examination of placenta						
	9.37	No clinical signs of chorioamnionitis, no examination of placenta	2	0.2			2	0.5
	9.39	Unspecified or not known whether placenta examined	5	0.4	4	0.5	1	0.2
10. Unexplained antepartum death								
10.1		With evidence of reduced vascular perfusion on Doppler studies and / or placental histopathology	36	2.8	36	4.1		
10.2		With chronic villitis	2	0.2	2	0.2		
10.3		No placental pathology	132	10.4	132	15.2		
10.4		No examination of placenta	9	0.7	9	1.0		
10.8		Other specified placental pathology	64	5.0	64	7.3		
10.9		Unspecified or not known whether placenta examined	41	3.2	41	4.7		
11. No obstetric antecedent								
11.1	Sudden Infant Death Syndrome (SIDS)							
	11.11	SIDS Category IA: Classic features of SIDS present and completely documented						
	11.12	SIDS Category IB: Classic features of SIDS present but incompletely documented						
	11.13	SIDS Category II: Infant deaths that meet Category I except for one or more features	2	0.2			2	0.5
11.2	Postnatally acquired infection							
11.3	Accidental asphyxiation		1	0.1			1	0.2
11.4	Other accident, poisoning or violence (postnatal)							
11.8	Other specified		5	0.4	1	0.1	4	1.0
11.9	Unknown / undetermined							
	11.91	Unclassified Sudden Infant Death	2	0.2			2	0.5
	11.92	Other Unknown / undetermined	8	0.6			8	2.0
Total			**1272**	**100.0**	**871**	**100.0**	**401**	**100.0**

Table A3: Perinatal deaths by detailed PSANZ-PDC classification, Queensland 2012 to 2013
(continued from previous page and continued over page)

PSANZ-NDC Cause of death	n	%
1. Congenital abnormality (including terminations for congenital abnormalities)		
1.1 Central nervous system	23	5.7
1.2 Cardiovascular system	24	6.0
1.3 Urinary system	9	2.2
1.4 Gastrointestinal system	6	1.5
1.5 Chromosomal	27	6.7
1.6 Metabolic	1	0.2
1.7 Multiple/non chromosomal syndromes	10	2.5
1.8 Other congenital abnormality	1	0.2
1.81 Musculoskeletal	10	2.5
1.82 Respiratory	2	0.5
1.83 Diaphragmatic hernia	6	1.5
1.84 Haematological	1	0.2
1.85 Tumours	3	0.7
1.88 Other specified congenital abnormality	1	0.2
1.9 Unspecified congenital abnormality	1	0.2
2. Extreme prematurity		
2.1 Not resuscitated	145	36.2
2.2 Unsuccessful resuscitation	14	3.5
2.9 Unspecified or not known whether resuscitation attempted	1	0.2
3. Cardio-respiratory disorders		
3.1 Hyaline membrane disease / Respiratory distress syndrome (RDS)	8	2.0
3.2 Meconium aspiration syndrome	3	0.7
3.3 Primary persistent pulmonary hypertension	1	0.2
3.4 Pulmonary hypoplasia	7	1.7
3.5 Chronic neonatal lung disease (typically, bronchopulmonary dysplasia)		
3.6 Pulmonary haemorrhage		
3.7 Pneumothorax		
3.8 Other	7	1.7
4. Infection		
4.1 Bacterial		
4.11 Congenital bacterial	11	2.7
4.12 Acquired bacterial	3	0.7
4.2 Viral		
4.21 Congenital viral	2	0.5
4.22 Acquired viral		
4.3 Protozoal, e.g. Toxoplasma	1	0.2
4.4 Spirochaetal, e.g. Syphilis		
4.5 Fungal	2	0.5
4.8 Other		
4.9 Unspecified organism		
5. Neurological		
5.1 Hypoxic ischaemic encephalopathy / Perinatal asphyxia (typically infants of >24 weeks or >600g)	30	7.5
5.2 Intracranial haemorrhage	17	4.2
5.8 Other		
6. Gastrointestinal		
6.1 Necrotising enterocolitis	5	1.2
6.8 Other	2	0.5

Table A4: Neonatal deaths by detailed PSANZ-NDC classification, Queensland 2012 to 2013

(continued over page)

PSANZ-NDC Cause of death			n	%
7. Other				
7.1	Sudden Infant Death Syndrome (SIDS)			
	7.11	SIDS Category IA: Classic features of SIDS present and completely documented		
	7.12	SIDS Category IB: Classic features of SIDS present but incompletely documented		
	7.13	SIDS Category II : Infant deaths that meet category I except for one or more features	2	0.5
7.2	Multisystem failure-only if unknown primary cause or trigger event		2	0.5
7.3	Trauma			
7.8	Other specified		1	0.2
7.9	Unknown/Undetermined			
	7.91	Unclassified Sudden Infant Death	2	0.5
	7.92	Other Unknown/Undetermined	10	2.5
Total			**401**	100.0

Table A4: Neonatal deaths by detailed PSANZ-NDC classification, Queensland 2012 to 2013
(continued from previous page)

	Plurality						
	Singleton			Multiple			Relative Risk (95% CI) multiple versus singleton
PSANZ-PDC	**n**	**%**	**Rate**	**n**	**%**	**Rate**	
1. Congenital abnormality	335	30.4	2.7	31	18.1	7.6	2.80 (1.94, 4.05)†
2. Perinatal infection	36	3.3	0.3	0	–	–	Not calculated - small cell size
3. Hypertension	19	1.7	0.2	2	1.2	0.5	Not calculated - small cell size
4. Antepartum haemorrhage	69	6.3	0.6	11	6.4	2.7	4.83 (2.56, 9.12)†
5. Maternal conditions	20	1.8	0.2	0	–	–	Not calculated - small cell size
6. Specific perinatal conditions	51	4.6	0.4	42	24.6	10.4	24.95 (16.60, 37.48)†
7. Hypoxic peripartum deaths	39	3.5	0.3	3	1.8	0.7	Not calculated - small cell size
8. Fetal growth restriction	43	3.9	0.4	3	1.8	0.7	Not calculated - small cell size
9. Spontaneous preterm	216	19.6	1.8	50	29.2	12.3	7.01 (5.17, 9.52)†
10. Unexplained antepartum death	255	23.2	2.1	29	17.0	7.2	3.45 (2.35, 5.05)†
11. No obstetric antecedent	18	1.6	0.1	0	–	–	Not calculated - small cell size
Total	**1101**	**100.0**	**9.0**	**171**	**100.0**	**42.2**	**4.71 (4.02 5.51)†**

Table A5: Perinatal deaths by PSANZ-PDC and plurality, Queensland 2012 to 2013
(Rate = per 1000 births, † = statistically significant)(Total babies born 2012 to 2013 = 126,881. Total singletons born 2012 to 2013 = 12,2827. Total multiples born 2012 to 2013 = 4054)

	Plurality						
	Singleton			Multiple			Relative Risk (95% CI) multiple versus singleton
PSANZ-PDC	**n**	**%**	**Rate**	**n**	**%**	**Rate**	
1. Congenital abnormality	113	32.9	0.9	12	20.7	3.0	3.29 (1.81, 5.96)†
2. Extreme prematurity	132	38.5	1.1	28	48.3	7.1	16.57 (4.38, 9.87)†
3. Cardio-respiratory disorders	21	6.1	0.2	5	8.6	1.3	7.38 (2.78, 19.55)†
4. Infection	16	4.7	0.1	3	5.2	0.8	Not calculated - small cell size
5. Neurological	39	11.4	0.3	8	13.8	2.0	6.35 (2.97, 13.59)†
6. Gastrointestinal	7	2.0	0.1	0	–	–	Not calculated - small cell size
7. Other	15	4.4	0.1	2	3.4	0.5	Not calculated - small cell size
Total	**343**	**100.0**	**2.8**	**58**	**100.0**	**14.7**	**5.24 (3.97, 6.91)†**

Table A6: Neonatal deaths by PSANZ-NDC and plurality, Queensland 2012 to 2013
(Rate = per 1000 births, † = statistically significant) (Total live babies born 2012 to 2013 = 126,010. Total live singletons born 2012 to 2013 = 12,2069. Total live multiples born 2012 to 2013 = 3941)

	Total Births	Live Births	Stillbirths		Neonatal Deaths		Perinatal Deaths	
			n	Rate[1]	n	Rate[2]	n	Rate[1]
Aboriginal and/or Torres Strait Islander	7683	7614	69	9.0	44	5.8	113	14.7
Non-Indigenous	119,185	118,383	802	6.7	356	3.0	1158	9.7
Indigenous status not stated	13	13	0	–	1	–	1	–
Relative risk for Aboriginal and/or Torres Strait Islander (95% confidence interval)[3]				1.33 (1.04, 1.70)		1.91 (1.40, 2.61)		1.51 (1.25, 1.83)

Table A7: Perinatal deaths by Indigenous status of the mother, Queensland 2012 to 2013
(1 = per 1000 births; 2 = per 1000 live births, 3: excludes 13 births = Indigenous status not stated)

	Indigenous status						
	Aboriginal & Torres Strait Islander			Non-Indigenous			Relative Risk (95% CI) Aboriginal & Torres Strait Islander versus non-Indigenous
PSANZ-PDC	**n**	**%**	**Rate**	**n**	**%**	**Rate**	
1. Congenital abnormality	21	18.6	2.7	345	29.8	2.9	0.94 (0.61, 1.47)
2. Perinatal infection	np	np	np	33	2.8	0.3	Not calculated - small cell size
3. Hypertension	np	np	np	19	1.6	0.2	Not calculated - small cell size
4. Antepartum haemorrhage	9	8.0	1.2	71	6.1	0.6	1.97 (0.98, 3.93)
5. Maternal conditions	np	np	np	18	1.6	0.2	Not calculated - small cell size
6. Specific perinatal conditions	np	np	np	91	7.9	0.8	Not calculated - small cell size
7. Hypoxic peripartum deaths	np	np	np	39	3.4	0.3	Not calculated - small cell size
8. Fetal growth restriction	6	5.3	0.8	40	3.5	0.3	2.33 (0.99, 5.49)
9. Spontaneous preterm	48	42.5	6.2	217	18.7	1.8	3.43 (2.51, 4.69)†
10. Unexplained antepartum death	15	13.3	2.0	269	23.2	2.3	0.87 (0.51, 1.45)
11. No obstetric antecedent	np	np	np	16	1.4	0.1	Not calculated - small cell size
Total	**113**	**100.0**	**14.7**	**1158**	**100.0**	**9.7**	**1.51 (1.25, 1.83)†**

Table A8: Perinatal deaths by PSANZ-PDC and Indigenous status, Queensland 2012 to 2013
(Rate = per 1000 births, † = statistically significant, small cell size numbers are not published = np).
(Total babies born = 126,881. Total babies born to Aboriginal & Torres Strait Islander mothers = 7683.
Total babies born to non-Indigenous mothers = 119,185. Indigenous status not stated = 1).

	Indigenous status						
	Aboriginal & Torres Strait Islander			Non-Indigenous			Relative Risk (95% CI) Aboriginal & Torres Strait Islander versus non-Indigenous
PSANZ-PDC	**n**	**%**	**Rate**	**n**	**%**	**Rate**	
1. Congenital abnormality	5	11.4	0.7	120	33.7	1.0	0.65 (0.26, 1.58)
2. Extreme prematurity	26	59.1	3.4	133	37.4	1.1	3.04 (2.00, 4.62)†
3. Cardio-respiratory disorders	np	np	np	23	6.5	0.2	Not calculated - small cell size
4. Infection	np	np	np	16	4.5	0.1	Not calculated - small cell size
5. Neurological	5	11.4	0.7	42	11.8	0.4	1.85 (0.73, 4.68)
6. Gastrointestinal	np	np	np	6	1.7	0.1	Not calculated - small cell size
7. Other	np	np	np	16	4.5	0.1	Not calculated - small cell size
Total	**44**	**100**	**5.8**	**356**	**100.0**	**3.0**	**1.92 (1.41, 2.63)†**

Table A9: Neonatal deaths by PSANZ-NDC and Indigenous status, Queensland 2012 to 2013
(Rate = per 1000 births, † = statistically significant, small cell size numbers are not published = np)
(Total babies live-born = 125,997. Total babies live-born to Aboriginal & Torres Strait Islander mothers = 7614.
Total babies live-born to non-Indigenous mothers = 118,383. Indigenous status not stated = 1.)

Gestation (weeks)	Number of perinatal deaths at this gestation	Number of babies born at this gestation	Percentage of perinatal deaths	Percentage of babies born	Perinatal mortality rate	Perinatal mortality risk*
<20	31	31	2.4	–	–	–
20–21	312	312	24.5	0.2	1000.0	2.5
22–23	205	214	16.1	0.2	957.9	1.6
24–25	121	242	9.5	0.2	500.0	1.0
26–27	68	274	5.3	0.2	248.2	0.5
28–29	61	399	4.8	0.3	152.9	0.5
30–31	56	720	4.4	0.6	77.8	0.4
32–33	62	1489	4.9	1.2	41.6	0.5
34–35	90	3721	7.1	2.9	24.2	0.7
36–37	91	13,615	7.2	10.7	6.7	0.8
38–39	105	59,339	8.3	46.8	1.8	1.0
40–41	64	45,897	5.0	36.2	1.4	1.4
42+	6	627	0.5	0.5	9.6	9.6
Not stated	0	1	–	–	–	–
Total	**1272**	**126,881**	**100.0**	**100.0**	**10.0**	–

Table A10: Perinatal deaths by gestation (completed weeks), Queensland 2012 to 2013.
(* Risk = per 1000 fetuses remaining in utero. Births and perinatal deaths at less than 20 weeks' gestation not included in risk calculations)

PSANZ–PDC classification	Gestational age at birth (weeks)								
	<28			28–36			37+		
	n	%	Rate	n	%	Rate	n	%	Rate
1. Congenital abnormality	225	30.5	209.7	104	33.5	9.9	37	16.4	0.3
2. Perinatal infection	12	1.6	11.2	10	3.2	1.0	14	6.2	0.1
3. Hypertension	11	1.5	10.3	6	1.9	0.6	4	1.8	0.0
4. Antepartum haemorrhage	57	7.7	53.1	17	5.5	1.6	6	2.7	0.1
5. Maternal conditions	11	1.5	10.3	6	1.9	0.6	3	1.3	0.0
6. Specific perinatal conditions	48	6.5	44.7	30	9.7	2.9	15	6.7	0.1
7. Hypoxic peripartum deaths	7	0.9	6.5	8	2.6	0.8	27	12.0	0.2
8. Fetal growth restriction	18	2.4	16.8	15	4.8	1.4	13	5.8	0.1
9. Spontaneous preterm	253	34.3	235.8	13	4.2	1.2	0	0.0	0.0
10. Unexplained antepartum death	95	12.9	88.5	94	30.3	8.9	95	42.2	0.8
11. No obstetric antecedent	0	0.0	0.0	7	2.3	0.7	11	4.9	0.1
Total	**737**	**100.0**	**686.9**	**310**	**100.0**	**29.5**	**225**	**100.0**	**2.0**

Table A11: Perinatal deaths by PSANZ-PDC and gestational age, Queensland 2012 to 2013
(1 case excluded in the gestational age analysis due to missing gestation data; rate = per 1000 births; % = percentage of that gestational group)

PSANZ–NDC classification	Gestational age at birth (weeks)								
	<28			28–36			37+		
	n	%	Rate	n	%	Rate	n	%	Rate
1. Congenital abnormality	43	17.1	0.3	55	68.8	0.4	27	38.6	0.2
2. Extreme prematurity	160	63.7	1.3	0	–	–	0	–	–
3. Cardio-respiratory disorders	16	6.4	0.1	3	3.8	0.0	7	10.0	0.1
4. Infection	10	4.0	0.1	6	7.5	0.0	3	4.3	0.0
5. Neurological	16	6.4	0.1	6	7.5	0.0	25	35.7	0.2
6. Gastrointestinal	4	1.6	0.0	3	3.8	0.0	0	–	–
7. Other	2	0.8	0.0	7	8.8	0.1	8	11.4	0.1
Total	**251**	**100.0**	**2.0**	**80**	**100.0**	**0.6**	**70**	**100.0**	**0.6**
Overall percentage	**62.6%**			**20.0%**			**17.4%**		

Table A12: Neonatal deaths by PSANZ-NDC and gestational age, Queensland 2012 to 2013
(1 case excluded in the gestational age analysis due to missing gestation data; rate = per 1000 live births; % = percentage of that gestational group)

Birthweight (g)	Number of perinatal deaths in this birthweight group	Number of babies born in this birthweight group	Percentage of perinatal deaths	Percentage of babies born	Perinatal mortality rate
<500	493	498	38.8	0.4	990.0
500–999	280	626	22.0	0.5	447.3
1000–1499	88	822	6.9	0.6	107.1
1500–1999	71	1754	5.6	1.4	40.5
2000–2499	81	5216	6.4	4.1	15.5
2500–2999	96	18,640	7.5	14.7	5.2
3000–3499	80	44,499	6.3	35.1	1.8
3500–3999	48	39,505	3.8	31.1	1.2
4000–4499	11	12,961	0.9	10.2	0.8
4500–4999	3	2115	0.2	1.7	1.4
5000+	1	217	0.1	0.2	4.6
Not stated	20	28	1.6	0.0	–
Total	**1272**	**126,881**	**100.0**	**100.0**	**10.0**

Table A13: Perinatal deaths by birthweight, Queensland 2012 to 2013
(perinatal mortality rate = per 1000 babies born)

	Birthweight										
	<1500g			1500–2499g			2500–3999g			4000+g	
PSANZ –PDC classification	n	%	Rate	n	%	Rate	n	%	Rate	n	Rate
1. Congenital abnormality	269	31.2	2.1	55	36.2	0.4	38	17.0	0.3	–	–
2. Perinatal infection	16	1.9	0.1	6	3.9	0.0	12	5.4	0.1	2	0.02
3. Hypertension	15	1.7	0.1	4	2.6	0.0	2	0.9	0.0	–	–
4. Antepartum haemorrhage	58	6.7	0.5	11	7.2	0.1	11	4.9	0.1	–	–
5. Maternal conditions	12	1.4	0.1	3	2.0	0.0	3	1.3	0.0	2	0.02
6. Specific perinatal conditions	59	6.9	0.5	15	9.9	0.1	14	6.3	0.1	–	–
7. Hypoxic peripartum deaths	8	0.9	0.1	7	4.6	0.1	24	10.7	0.2	2	0.02
8. Fetal growth restriction	28	3.3	0.2	9	5.9	0.1	9	4.0	0.1	–	–
9. Spontaneous preterm	260	30.2	2.0	6	3.9	0.0	–	–	–	–	–
10. Unexplained antepartum death	136	15.8	1.1	35	23.0	0.3	96	42.9	0.8	8	0.06
11. No obstetric antecedent	–	–	–	1	0.7	0.0	15	6.7	0.1	1	0.01
Total	**861**	**100.0**	**6.8**	**152**	**100.0**	**1.2**	**224**	**100.0**	**1.8**	**15**	**0.1**

Table A14: Perinatal deaths by PSANZ-PDC and birthweight, Queensland 2012 to 2013
(20 cases excluded in the birthweight analysis due to missing birthweight data; rate = per 1000 births; % = percentage of that birthweight group)

	Birthweight										
	<1500g			1500–2499g			2500–3999g			4000+g	
PSANZ –PDC classification	n	%	Rate	n	%	Rate	n	%	Rate	n	Rate
1. Congenital abnormality	59	21.6	0.5	38	70.4	0.3	28	40.0	0.2	–	–
2. Extreme prematurity	160	58.6	1.3	–	–	–	–	–	–	–	–
3. Cardio-respiratory disorders	17	6.2	0.1	3	5.6	0.0	5	7.1	0.0	1	0.0
4. Infection	13	4.8	0.1	3	5.6	0.0	3	4.3	0.0	–	–
5. Neurological	17	6.2	0.1	6	11.1	0.0	23	32.9	0.2	1	0.0
6. Gastrointestinal	5	1.8	0.0	1	1.9	0.0	1	1.4	0.0	–	–
7. Other	2	0.7	0.0	3	5.6	0.0	10	14.3	0.1	1	0.0
Total	**273**	**100.0**	**2.2**	**54**	**100.0**	**0.4**	**70**	**100.0**	**0.6**	**3**	**0.0**

Table A15: Neonatal deaths by PSANZ-NDC and birthweight, Queensland 2012 to 2013
(1 case excluded in the birthweight analysis due to missing birthweight data; rate = per 1000 live births; % = percentage of that birthweight group)

	Autopsy rates (per cent performed)									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Stillbirths	22.8	28.3	30.7	34.3	36.5	37.4	35.8	36.9	35.2	31.1
Neonatal deaths	17.2	22.2	29.1	31.2	26.7	27.6	23.1	20.7	20.5	17.5
Perinatal deaths	20.7	26.3	30.1	33.3	33.1	34.0	31.1	31.3	30.8	26.6

Table A16: Perinatal autopsy rates, Queensland 2004 to 2013

Year	Public hospital				Private hospital		Home birth		Data incomplete	Total women giving birth
	n		%		n	%	n	%		
2004	34,216		68.4%		15,774	31.5%	57	0.1%	4	50,051
2005	37,374		68.8%		16,919	31.1%	42	0.1%	2	54,337
2006	38,462		69.0%		17,208	30.9%	47	0.1%	2	55,719
2007	41,222		69.6%		17,924	30.3%	81	0.1%	1	59,228
2008	41,903		69.5%		18,312	30.4%	110	0.2%	3	60,328
	Maternity Service		Birth Centre							
2009	41,944	68.7%	582	1.0%	18,351	30.1%	123	0.2%	23	61,023
2010	41,897	68.7%	674	1.1%	18,362	30.1%	85	0.1%	10	61,028
2011	42,295	69.2%	841	1.4%	17,907	29.3%	69	0.1%	13	61,125
2012	43,586	69.6%	1027	1.6%	17,951	28.6%	84	0.1%	15	62,663
2013	43,194	69.5%	1002	1.6%	17,875	28.8%	90	0.1%	8	62,169
Total	410,219		69.8%		176,583	30.0%	788	0.1%	81	587,671

Table A17: Women giving birth by mode of healthcare delivery, Queensland 2004 to 2013
(Data regarding mode of healthcare delivery included the separate definition of public birth centres from 2009)

Gestation (weeks)	24 or less		25–28		29–32		33–36		37–42		43 or more	ns	Total
Year	n	%	n	%	n	%	n	%	n	%	n	n	
2004	248	0.5	216	0.4	538	1.1	2949	5.9	46,087	92.1	6	1	50,051
2005	256	0.5	225	0.4	579	1.1	3204	5.9	50,061	92.1	8	4	54,337
2006	286	0.5	270	0.5	598	1.1	3347	6.0	51,209	91.9	3	6	55,719
2007	306	0.5	233	0.4	610	1.0	3494	5.9	54,569	92.1	5	11	59,228
2008	279	0.5	278	0.5	592	1.0	3490	5.8	55,677	92.3	7	5	60,328
2009	311	0.5	263	0.4	637	1.0	3601	5.9	56,196	92.1	9	6	61,023
2010	319	0.5	268	0.4	610	1.0	3565	5.8	56,253	92.2	7	6	61,028
2011	300	0.5	280	0.5	598	1.0	3633	5.9	56,306	92.1	2	6	61,125
2012	304	0.5	270	0.4	667	1.1	3982	6.4	57,433	91.7	6	1	62,663
2013	329	0.5	231	0.4	650	1.0	3788	6.1	57,162	91.9	9	0	62,169

Table A18: Number and percentage of women giving birth by gestation at birth, Queensland 2004 to 2013
(ns = not stated)

Gestation (weeks)	24 or less		25–28		29–32		33–36		37–42		43 or more	ns	Total
Year	n	%	n	%	n	%	n	%	n	%	n	n	
2004	270	0.5	264	0.5	621	1.2	3,326	6.5	46,416	91.2	6	7	**50,910**
2005	277	0.5	252	0.5	692	1.3	3,607	6.5	50,441	91.2	8	4	**55,281**
2006	312	0.6	318	0.6	722	1.3	3,774	6.7	51,573	90.9	3	6	**56,708**
2007	335	0.6	262	0.4	739	1.2	3,917	6.5	54,975	91.3	5	11	**60,244**
2008	305	0.5	317	0.5	694	1.1	3,976	6.5	56,098	91.4	7	5	**61,402**
2009	347	0.6	290	0.5	745	1.2	4,064	6.5	56,590	91.2	9	6	**62,051**
2010	353	0.6	300	0.5	729	1.2	3,995	6.4	56,643	91.3	7	6	**62,033**
2011	329	0.5	320	0.5	711	1.1	4,095	6.6	56,718	91.2	2	6	**62,181**
2012	329	0.5	308	0.5	793	1.3	4,491	7.1	57,795	91.3	6	1	**63,273**
2013	349	0.6	256	0.4	774	1.2	4,290	6.8	57,480	91.0	9	0	**63,158**

Table A19: Number and percentage of babies born by gestation at birth, Queensland 2004 to 2013
(ns = not stated)

	Public hospitals							Private hospitals						
Gestation (weeks)	27 or less		28–36		37+		Total	27 or less		28–36		37+		Total
Year	n	%	n	%	n	%		n	%	n	%	n	%	
2004	325	0.9	2492	7.2	31,393	90.5	34,695	71	0.4	1060	6.6	14,642	90.6	16,153
2005	352	0.9	2755	7.4	34,264	91.7	37,374	68	0.4	1089	6.4	15,762	93.2	16,919
2006	414	1.1	2852	7.4	35,191	91.5	38,462	62	0.4	1173	6.8	15,973	92.8	17,208
2007	385	0.9	3007	7.3	37,821	91.7	41,222	60	0.3	1191	6.6	16,672	93.0	17,924
2008	390	0.9	2944	7.0	38,564	92.0	41,903	75	0.4	1225	6.7	17,012	92.9	18,312
2009	412	1.0	3056	7.2	39,052	91.8	42,526	69	0.4	1270	6.9	17,012	92.7	18,351
2010	411	1.0	3027	7.1	39,128	91.9	42,571	89	0.5	1231	6.7	17,042	92.8	18,362
2011	433	1.0	3078	7.1	39,622	91.9	43,136	66	0.4	1232	6.9	16,609	92.8	17,907
2012	403	0.9	3366	7.5	40,843	91.5	44,613	93	0.5	1353	7.5	16,505	91.9	17,951
2013	395	0.9	3243	7.3	40,558	91.8	44,196	88	0.5	1269	7.1	16,518	92.4	17,875

Table A20: Number and percentage of women giving birth by gestation at birth and mode of healthcare delivery, Queensland 2004 to 2013

	Public hospitals						Private hospitals					
Gestation (weeks)	Spontaneous labour		Induced labour		Caesarean section without labour		Spontaneous labour		Induced labour		Caesarean section without labour	
	n	%	n	%	n	%	n	%	n	%	n	%
20 or less	135	38.9	211	60.8	1	0.3	25	34.7	41	56.9	6	8.3
21–22	234	42.7	299	54.6	15	2.7	80	53.0	67	44.4	4	2.6
23–24	289	61.1	142	30.0	42	8.9	60	53.1	39	34.5	14	12.4
25–26	309	57.9	110	20.6	115	21.5	51	51.0	20	20.0	29	29.0
27–28	370	52.9	80	11.4	250	35.7	72	52.6	16	11.7	49	35.8
29–30	557	52.4	91	8.6	414	39.0	108	46.8	12	5.2	111	48.1
31–32	1005	52.5	139	7.3	771	40.3	246	45.6	17	3.1	277	51.3
33–34	2233	56.4	465	11.7	1264	31.9	767	48.3	81	5.1	739	46.6
35–36	5670	55.7	2181	21.4	2320	22.8	2168	41.7	603	11.6	2432	46.7
37–38	26,302	52.9	10,997	22.1	12,379	24.9	8553	25.9	5981	18.1	18,450	55.9
39–40	84,297	72.8	16,287	14.1	15,197	13.1	21,193	47.1	13,733	30.5	10,071	22.4
41–42	17,080	49.0	16,728	48.0	1073	3.1	2347	36.6	3429	53.5	638	9.9
43 or more	17	56.7	10	33.3	3	10.0	0	–	0	–	0	–
Not stated	14	–	1	–		–		–		–		–
Total	**138,512**	**62.9**	**47,741**	**21.7**	**33,844**	**15.4**	**35,670**	**38.6**	**24,039**	**26.0**	**32,820**	**35.5**
Total	**220,097**						**92,529**					

Table A21: Number and percentage of babies born in public and private hospitals, by gestation at birth, mode of healthcare delivery and onset of labour / caesarean section, Queensland 2009 to 2013
(% = percentage at that gestation)

Year	Birthweight (number of babies)										Total
	<1000g		1000–1499g		1500–2499g		2500–3999g		4000+g		
	n	%	n	%	n	%	n	%	n	%	
2004	470	0.9	339	0.7	2835	5.6	40,913	80.4	6340	12.5	**50,910**
2005	461	0.8	367	0.7	3085	5.6	44,596	80.7	6767	12.2	**55,281**
2006	542	1.0	413	0.7	3202	5.6	45,559	80.3	6980	12.3	**56,708**
2007	512	0.8	414	0.7	3183	5.3	48,556	80.6	7561	12.6	**60,244**
2008	526	0.9	411	0.7	3209	5.2	49,418	80.5	7832	12.8	**61,402**
2009	571	0.9	387	0.6	3430	5.5	49,750	80.2	7901	12.7	**62,052**
2010	579	0.9	393	0.6	3324	5.4	49,967	80.6	7759	12.5	**62,032**
2011	559	0.9	418	0.7	3326	5.3	50,206	80.7	7663	12.3	**62,179**
2012	565	0.9	435	0.7	3518	5.5	51,358	80.6	7830	12.3	**63,723**
2013	559	0.9	387	0.6	3452	5.5	51,286	81.2	7463	11.8	**63,158**
Total	**5344**	**0.9**	**3964**	**0.7**	**32,564**	**5.4**	**481,609**	**80.6**	**74,096**	**12.4**	**597,689**

Table A22: Birthweight of babies born, Queensland 2004 to 2013 (Data incomplete for 110 babies)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Maternal age <20	0.7	0.8	0.7	0.8	0.7	0.9	0.9	0.5	0.6	0.4
Maternal age 20–34	1.6	1.6	1.6	1.6	1.6	1.5	1.4	1.6	1.5	1.5
Maternal age 35+	2.4	2.4	2.4	2.4	2.6	2.5	2.4	2.2	2.5	2.2
Total	**1.7**	**1.7**	**1.7**	**1.7**	**1.8**	**1.7**	**1.6**	**1.7**	**1.7**	**1.6**

Table A23: Percentage of mothers having multiple births by maternal age, Queensland 2004 to 2013

Year	Singleton <37		Singleton 37+		Twin <37		Twin 37+		Higher Multiple <37		Higher Multiple 37+
	n	%	n	%	n	%	n	%	n	%	n
2004	3439	7.0	45,764	93.0	497	60.2	329	39.8	15	100.0	0
2005	3727	7.0	49,687	93.0	514	57.4	382	42.6	23	100.0	0
2006	3900	7.1	50,848	92.9	577	61.3	364	38.7	24	100.0	0
2007	4052	7.0	54,168	93.0	572	58.5	406	41.5	19	100.0	0
2008	4002	6.8	55,263	93.2	621	59.6	421	40.4	16	100.0	0
2009	4197	7.0	55,812	93.0	596	60.3	392	39.7	19	95.0	1
2010	4164	6.9	55,871	93.1	579	59.9	388	40.1	18	94.7	1
2011	4196	7.0	55,894	93.0	589	58.8	412	41.2	26	100.0	0
2012	4602	7.5	57,081	92.5	665	65.1	356	34.9	16	88.9	2
2013	4350	7.1	56,853	92.9	626	66.3	318	33.7	22	100.0	0
Total	**40,629**	**7.0**	**537,241**	**93.0**	**5836**	**60.8**	**3768**	**39.2**	**198**	**98.0**	**4**

Table A24: Number and percentage of multiple and singleton births (number of mothers) by gestation, Queensland 2004 to 2013 (Data incomplete for 33 mothers)

Year	AIH/AID +/or ovulation induction				Extracorporeal techniques				No assisted conception technique identified				Total pregnancies
	Singleton		Multiple		Singleton		Multiple		Singleton		Multiple		
	n	%	n	%	n	%	n	%	n	%	n	%	n
2004	658	91.6	60	8.4	793	79.1	209	20.9	47,759	98.8	572	1.2	50,051
2005	653	91.3	62	8.7	877	80.7	210	19.3	51,888	98.8	647	1.2	54,337
2006	666	92.1	57	7.9	1136	82.4	242	17.6	52,952	98.8	666	1.2	55,719
2007	653	90.4	69	9.6	1192	83.9	229	16.1	56,386	98.8	699	1.2	59,228
2008	743	91.7	67	8.3	1335	85.4	228	14.6	57,192	98.7	763	1.3	60,328
2009	750	92.1	64	7.9	1453	86.7	223	13.3	57,812	98.8	721	1.2	61,023
2010	754	92.6	60	7.4	1688	88.5	220	11.5	57,600	98.8	706	1.2	61,028
2011	803	91.9	71	8.1	1637	87.9	226	12.1	57,658	98.7	730	1.3	61,125
2012	921	92.1	79	7.9	1650	89.2	200	10.8	59,053	98.7	760	1.3	62,663
2013	883	92.7	70	7.3	1865	89.3	223	10.7	58,455	98.9	673	1.1	62,169
Total	**7484**	**91.9**	**659**	**8.1**	**13,626**	**86.0**	**2210**	**14.0**	**556,755**	**98.8**	**6,937**	**1.2**	**587,671**

Table A25: Number and percentage of singleton and multiple births (number of mothers) in pregnancies conceived with and without the use of assisted conception techniques, Queensland 2004 to 2013
[AIH/AID +/or ovulation induction = artificial insemination and/or ovulation induction processes; extracorporeal techniques = invitro fertilisation, gamete intra-fallopian transfer, intracytoplasmic sperm injection, embryo transfer or related techniques.]

	Number of babies born alive			Percentage of babies born alive	
	SCN / NICU Admission	No SCN / NICU Admission	All babies	SCN / NICU Admission	No SCN / NICU Admission
Singleton without assisted conception	44,611	244,015	288,626	15.5	84.5
Multiple without assisted conception	4619	2425	7044	65.6	34.4
Singleton with assisted conception	2016	10,444	12460	16.2	83.8
Multiple with assisted conception	2018	866	2884	70.0	30.0
All without assisted conception	49,230	246,440	295,670	16.7	83.3
All with assisted conception	4034	11,310	15,344	26.3	73.7
All singletons	46,627	254,459	301,086	15.4	84.6
All multiples	6637	3291	9928	66.9	33.1

Table A26: Number and percentage of live-born babies by use of assisted conception techniques and need for care in a neonatal intensive care unit (NICU) or a special care nursery (SCN), Queensland 2009 to 2013

Year	Spontaneous onset of labour		Induced labour		No labour (ie. caesarean section without labour)	
	n	%	n	%	n	%
2004	28,603	57.1	11,699	23.4	9,749	19.5
2005	30,828	56.7	12,687	23.3	10,822	19.9
2006	31,230	56.0	13,048	23.4	11,439	20.5
2007	33,584	56.7	13,553	22.9	12,091	20.4
2008	34,441	57.1	13,615	22.6	12,270	20.3
2009	34,841	57.1	13,661	22.4	12,522	20.5
2010	34,840	57.1	13,579	22.3	12,608	20.7
2011	34,346	56.3	14,180	23.2	12,595	20.6
2012	34,926	55.7	14,620	23.3	13,117	20.9
2013	34,106	54.9	14,938	24.0	13,125	21.1
Total	**331,745**	**56.5**	**135,580**	**23.1**	**120,338**	**20.5**

Table A27: Number and percentage of women giving birth by onset of labour, Queensland 2004 to 2013
(Data incomplete for 8 mothers)

Year	Onset of labour - Public Hospitals						Onset of labour - Private Hospitals					
	Spontaneous		Induced		No Labour		Spontaneous		Induced		No Labour	
	n	%	n	%	n	%	n	%	n	%	n	%
2004	21,935	64.1	7531	22.0	4750	13.9	6608	41.9	4167	26.4	4999	31.7
2005	24,061	64.4	8043	21.5	5270	14.1	6723	39.7	4644	27.4	5552	32.8
2006	24,371	63.4	8528	22.2	5562	14.5	6811	39.6	4520	26.3	5877	34.2
2007	26,269	63.7	8942	21.7	6011	14.6	7234	40.4	4611	25.7	6079	33.9
2008	26,956	64.3	8795	21.0	6,52	14.7	7374	40.3	4820	26.3	6118	33.4
2009	27,325	64.3	8979	21.1	6222	14.6	7369	40.2	4682	25.5	6300	34.3
2010	27,584	64.8	8887	20.9	6100	14.3	7162	39.0	4692	25.6	6508	35.4
2011	27,301	63.3	9330	21.6	6504	15.1	6966	38.9	4850	27.1	6091	34.0
2012	27,964	62.7	9858	22.1	6791	15.2	6864	38.2	4762	26.5	6325	35.2
2013	27,231	61.6	10,119	22.9	6846	15.5	6777	37.9	4819	27.0	6279	35.1
Total	**260,997**	**63.6**	**89,012**	**21.7**	**60,208**	**14.7**	**69,888**	**39.6**	**46,567**	**26.4**	**60,128**	**34.1**

Table A28: Number of women giving birth by onset of labour in public and private hospitals, Queensland 2004 to 2013
(No labour implies caesarean section without labour)
(451 home births not included; data incomplete for 412 women)

Year	Unassisted vaginal birth		Caesarean section		Forceps		Vacuum extraction		Data incomplete	Total
	n	%	n	%	n	%	n	%		
2004	30,570	60.0	16,309	32.0	949	1.9	3055	6.0	27	**50,910**
2005	32,754	59.3	18,148	32.8	947	1.7	3391	6.1	41	**55,281**
2006	32,980	58.2	19,266	34.0	1096	1.9	3353	5.9	13	**56,708**
2007	34,852	57.9	20,368	33.8	1174	1.9	3849	6.4	1	**60,244**
2008	34,962	56.9	20,935	34.1	1184	1.9	4320	7.0	1	**61,402**
2009	35,332	56.9	21,088	34.0	1140	1.8	4492	7.2	0	**62,052**
2010	35,278	56.9	20,822	33.6	1170	1.9	4762	7.7	0	**62,032**
2011	35,157	56.5	21,088	33.9	1158	1.9	4775	7.7	1	**62,179**
2012	35,844	56.2	21,556	33.8	1392	2.2	4931	7.7	0	**63,723**
2013	35,382	56.0	21,508	34.1	1534	2.4	4721	7.5	13	**63,158**
Total	**343,111**	**57.4**	**201,088**	**33.6**	**11,744**	**2.0**	**41,649**	**7.0**	**97**	**597,689**

Table A29: Number of babies born by birth mode, Queensland 2004 to 2013

Year	Public Hospital				Private Hospital			
	Unassisted vaginal birth	Caesarean section	Forceps	Vacuum extraction	Unassisted vaginal birth	Caesarean section	Forceps	Vacuum extraction
2004	23,580	8939	429	1724	6929	7370	520	1331
2005	25,539	9993	464	1896	7171	8155	483	1495
2006	25,813	10,705	557	1940	7119	8561	539	1413
2007	27,379	11,540	648	2285	7392	8827	526	1564
2008	27,361	11,877	658	2631	7489	9058	526	1689
2009	27,751	11,953	612	2823	7458	9135	528	1669
2010	27,862	11,685	645	2995	7331	9137	525	1767
2011	27,705	12,355	649	3058	7383	8732	509	1717
2012	28,582	12,642	856	3186	7165	8913	536	1744
2013	28,093	12,603	998	3074	7191	8905	536	1647
Total	**269,665**	**114,292**	**6,516**	**25,612**	**72,628**	**86,793**	**5,228**	**16,036**

Table A30: Number of babies born by birth mode in public and private hospitals, Queensland 2004 to 2013
(451 home births and 77 with incomplete data not included)

Year	Public hospital				Private hospital			
	Unassisted vaginal birth	Caesarean section	Forceps	Vacuum extraction	Unassisted vaginal birth	Caesarean section	Forceps	Vacuum extraction
2004	68.0	25.8	1.2	5.0	42.9	45.6	3.2	8.2
2005	67.4	26.4	1.2	5.0	41.4	47.1	2.8	8.6
2006	66.2	27.4	1.4	5.0	40.4	48.6	3.1	8.0
2007	65.4	27.6	1.5	5.5	40.4	48.2	2.9	8.5
2008	64.3	27.9	1.5	6.2	39.9	48.3	2.8	9.0
2009	64.3	27.7	1.4	6.5	39.7	48.6	2.8	8.9
2010	64.5	27.1	1.5	6.9	39.1	48.7	2.8	9.4
2011	63.3	28.2	1.5	7.0	40.3	47.6	2.8	9.4
2012	63.1	27.9	1.9	7.0	39.0	48.6	2.9	9.5
2013	62.8	28.2	2.2	6.9	39.3	48.7	2.9	9.0
Total	**64.8**	**27.5**	**1.6**	**6.2**	**40.2**	**48.0**	**2.9**	**8.9**

Table A31: Percentage of babies born by birth mode in public and private hospitals, Queensland 2004 to 2013

Year	Public hospitals					Private hospitals				
	Total births	Caesarean section without labour		Caesarean section with labour		Total births	Caesarean section without labour		Caesarean section with labour	
	n	n	%	n	%	n	n	%	n	%
2004	34,695	4750	13.7	4189	12.1	16,153	4999	30.9	2371	14.7
2005	37,925	5270	13.9	4723	12.5	17,312	5552	32.1	2603	15.0
2006	39,024	5562	14.3	5143	13.2	17,635	5877	33.3	2684	15.2
2007	41,853	6011	14.4	5529	13.2	18,309	6079	33.2	2748	15.0
2008	42,527	6152	14.5	5725	13.5	18,762	6118	32.6	2940	15.7
2009	43,139	6222	14.4	5731	13.3	18,790	6300	33.5	2835	15.1
2010	43,187	6100	14.1	5585	12.9	18,760	6508	34.7	2629	14.0
2011	43,768	6504	14.9	5851	13.4	18,341	6090	33.2	2642	14.4
2012	45,266	7074	15.6	5568	12.3	18,358	6574	35.8	2339	12.7
2013	44,781	7129	15.9	5474	12.2	18,279	6555	35.9	2350	12.9
Total	**416,165**	**60,774**	**14.6**	**53,518**	**12.9**	**180,699**	**60,652**	**33.6**	**26,141**	**14.5**

Table A32: Number and percentage of babies born by caesarean section with and without labour in public and private hospitals, Queensland 2004 to 2013

Year	Public hospital breech presentation			Private hospital breech presentation			All hospital breech presentation		
	Caesarean Section Births	Total Births	% Caesarean Sections	Caesarean Section Births	Total Births	% Caesarean Sections	Caesarean Section Births	Total Births	% Caesarean Sections
2004	1264	1419	89.1	789	818	96.5	2053	2237	91.8
2005	1443	1647	87.6	844	877	96.2	2287	2524	90.6
2006	1399	1581	88.5	911	938	97.1	2310	2519	91.7
2007	1459	1664	87.7	967	1002	96.5	2426	2666	91
2008	1538	1728	89	856	886	96.6	2394	2614	91.6
2009	1488	1700	87.5	877	921	95.2	2365	2621	90.2
2010	1571	1841	85.3	976	1043	93.6	2547	2884	88.3
2011	1659	1911	86.8	1000	1053	95	2659	2964	89.7
2012	1641	1937	84.7	963	1033	93.2	2604	2970	87.7
2013	1657	1918	86.4	1034	1107	93.4	2691	3,025	89.0
Total	**15,119**	**17,346**	**87.2**	**9217**	**9678**	**95.2**	**24,336**	**27,024**	**90.1**

Table A33: Number and percentage of babies presenting by the breech born by caesarean section in public and private hospitals, Queensland 2004 to 2013

Year	Public hospital multiple pregnancies			Private hospital multiple pregnancies			All multiple pregnancies		
	Caesarean section	Total multiples	% Caesarean sections	Caesarean section	Total multiples	% Caesarean sections	Caesarean section	Total multiples	% Caesarean sections
2004	280	469	59.7	296	371	79.8	576	840	68.6
2005	353	537	65.7	314	382	82.2	667	919	72.6
2006	357	549	65	353	416	84.9	710	965	73.6
2007	427	620	68.9	312	377	82.8	739	997	74.1
2008	422	617	68.4	370	441	83.9	792	1058	74.9
2009	375	581	64.5	339	427	79.4	714	1008	70.8
2010	392	595	65.9	332	391	84.9	724	986	73.4
2011	417	602	69.3	338	425	79.5	755	1027	73.5
2012	423	644	65.7	319	395	80.8	742	1039	71.4
2013	384	572	67.1	325	394	82.5	709	966	73.4
Total	**3830**	**5786**	**66.2**	**3298**	**4019**	**82.1**	**7128**	**9805**	**72.7**

Table A34: Number and percentage of multiple births by caesarean section in public and private hospitals, Queensland 2004 to 2013

Year	Intended birth centre birth						Intended hospital maternity service birth					
	Unassisted vaginal birth		Assisted vaginal birth		Caesarean section		Unassisted vaginal birth		Assisted vaginal birth		Caesarean section	
	n	%	n	%	n	%	n	%	n	%	n	%
2009	679	88.1	38	4.9	54	7.0	34,273	57.0	5543	9.2	20,269	33.7
2010	813	87.0	52	5.6	69	7.4	34,157	57.0	5838	9.7	19,980	33.3
2011	1008	86.5	76	6.5	81	7.0	33,836	56.5	5805	9.7	20,201	33.8
2012	1208	87.9	78	5.7	89	6.5	34,278	56.1	6189	10.1	20,687	33.8
2013	1208	86.0	102	7.3	94	6.7	33,864	55.9	6114	10.1	20,649	34.1
Total	**4916**	**87.0**	**346**	**6.1**	**387**	**6.9**	**170,408**	**56.5**	**29,489**	**9.8**	**101,786**	**33.7**

Table A35: Number and percentage of mode of birth in women who intended to give birth in a Birth Centre versus women who intended hospital maternity service (public or private) birth, Queensland 2009 to 2013

Year	Aboriginal and/or Torres Strait Islander women		Non-Indigenous women		% Public care of Aboriginal and/or Torres Strait Islander women	% Public care of non-Indigenous women
	Public hospital care	Total	Public hospital care	Total		
2004	2711	2767	31,503	47,280	98.0	66.6
2005	3011	3069	34,361	51,265	98.1	67.0
2006	2885	2937	35,566	52,768	98.2	67.4
2007	3105	3170	38,078	56,018	97.9	68.0
2008	3298	3373	38,571	56,918	97.8	67.8
2009	3258	3332	39,269	57,668	97.8	68.1
2010	3452	3505	39,124	57,517	98.5	68.0
2011	3563	3649	39,570	57,460	97.6	68.9
2012	3756	3841	40,853	58,817	97.8	69.5
2013	3686	3747	40,503	58,415	98.4	69.3
Total	**32,725**	**33,390**	**377,398**	**554,126**	**98.0**	**68.1**

Table A36: Number and percentage of women giving birth by Indigenous status and mode of healthcare delivery, Queensland 2004 to 2013

	Aboriginal and/or Torres Strait Islander women				Non-Indigenous women				Incomplete data	Total
Year	<20	20–34	35+	Total	<20	20–34	35+	Total		
2004	533	2023	211	2767	2470	36,505	8305	47,280	4	50,051
2005	592	2203	274	3069	2477	39,360	9428	51,265	3	54,337
2006	537	2121	279	2937	2538	40,155	10,075	52,768	14	55,719
2007	599	2273	298	3170	2658	42,261	11,099	56,018	40	59,228
2008	669	2386	318	3373	2787	42,520	11,611	56,918	37	60,328
2009	645	2366	321	3332	2691	43,140	11,837	57,668	24	61,024
2010	698	2453	354	3505	2646	43,083	11,788	57,517	5	61,027
2011	679	2598	372	3649	2440	43,199	11,821	57,460	14	61,123
2012	700	2793	348	3841	2464	44,644	11,709	58,817	5	62,663
2013	692	2661	394	3747	2250	44,540	11,615	58,415	7	62,169
Total	**6344**	**23,877**	**3169**	**33,390**	**25,421**	**419,407**	**109,288**	**554,126**	**153**	**587,669**

Table A37: Number of women giving birth by Indigenous status and maternal age group, Queensland 2004 to 2013

	Aboriginal and/or Torres Strait Islander women			Non-Indigenous women		
Year	<20	20–34	35+	<20	20–34	35+
2004	19.3	73.1	7.6	5.2	77.2	17.6
2005	19.3	71.8	8.9	4.8	76.8	18.4
2006	18.3	72.2	9.5	4.8	76.1	19.1
2007	18.9	71.7	9.4	4.7	75.4	19.8
2008	19.8	70.7	9.4	4.9	74.7	20.4
2009	19.4	71	9.6	4.7	74.8	20.5
2010	19.4	70	10.1	4.6	74.9	20.5
2011	18.6	71.2	10.2	4.2	75.2	20.6
2012	18.2	72.7	9.1	4.2	75.9	19.9
2013	18.5	71.0	10.5	3.9	76.2	19.9
Total	**19.0**	**71.5**	**9.5**	**4.6**	**75.7**	**19.7**

Table A38: Percentage of women giving birth by Indigenous status and maternal age group, Queensland 2004 to 2013

	Gestation	20	21	22	23	24	25	26	27
Aboriginal and/or Torres Strait Islander	n	23	40	44	27	37	23	49	50
	Mean	314.4	397.5	476.7	535.1	643.5	701.5	859.2	1011.7
	SD	74.5	103.7	154.1	155.2	179.1	218.8	161.9	199.1
Non-Indigenous	n	325	353	246	222	299	282	277	325
	Mean	315.8	390.9	469.2	540.6	653.1	718.7	864.5	983.2
	SD	95.7	112.2	124.5	143.1	177.4	170.1	190.5	238.5

	Gestation	28	29	30	31	32	33	34	35
Aboriginal and/or Torres Strait Islander	n	44	52	58	113	128	188	280	419
	Mean	1133.1	1312.3	1473.8	1592.2	1811.4	1985.2	2274.1	2503.9
	SD	262.8	309.7	279.4	297.6	397.9	407.8	466.1	467.7
Non-Indigenous	n	416	504	674	847	1360	1958	3114	5031
	Mean	1081.8	1276.0	1444.3	1626.2	1810.6	2073.0	2289.9	2538.7
	SD	276.1	283.6	350.1	320.1	364.6	389.4	412.7	439.3

	Gestation	36	37	38	39	40	41	42	43
Aboriginal and/or Torres Strait Islander	n	777	1597	3447	4655	4173	1976	74	1
	Mean	2691.80	2967.05	3209.35	3345.36	3502.44	3649.14	3815.31	3340.00
	SD	459.27	497.70	498.59	460.23	448.18	462.60	583.42	.
Non-Indigenous	n	9145	20,385	57,276	77,966	74,266	37,696	1645	27
	Mean	2787.46	3051.77	3323.88	3469.45	3601.09	3733.85	3787.62	3731.04
	SD	453.39	471.61	449.21	433.52	432.51	444.02	464.30	412.74

Table A39: Birthweight (number (n), mean and standard deviation (SD)) by Indigenous status and gestation, Queensland 2009 to 2013 (Data incomplete for gestation, birthweight and/or Indigenous status in 1772 cases; 4 babies born at 44 weeks not included)

Gestation	Babies of Aboriginal and/or Torres Strait Islander mothers					Babies of non-Indigenous mothers					Total
	<1500g	1500–2499g	2500–3999g	4000+g	Total	<1500g	1500–2499g	2500–3999g	4000+g	Total	
20	0.1	0.0	0.0	0.0	**0.1**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
21	0.2	0.0	0.0	0.0	**0.2**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
22	0.2	0.0	0.0	0.0	**0.2**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
23	0.1	0.0	0.0	0.0	**0.1**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
24	0.2	0.0	0.0	0.0	**0.2**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
25	0.1	0.0	0.0	0.0	**0.1**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
26	0.3	0.0	0.0	0.0	**0.3**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
27	0.3	0.0	0.0	0.0	**0.3**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
28	0.2	0.0	0.0	0.0	**0.2**	0.1	0.0	0.0	0.0	**0.1**	**0.1**
29	0.2	0.1	0.0	0.0	**0.3**	0.1	0.0	0.0	0.0	**0.2**	**0.2**
30	0.1	0.2	0.0	0.0	**0.3**	0.1	0.1	0.0	0.0	**0.2**	**0.2**
31	0.2	0.4	0.0	0.0	**0.6**	0.1	0.2	0.0	0.0	**0.3**	**0.3**
32	0.1	0.6	0.0	0.0	**0.7**	0.1	0.4	0.0	0.0	**0.5**	**0.5**
33	0.1	0.8	0.1	0.0	**1.0**	0.0	0.5	0.1	0.0	**0.7**	**0.7**
34	0.0	1.1	0.4	0.0	**1.5**	0.0	0.7	0.3	0.0	**1.1**	**1.1**
35	0.0	1.2	1.1	0.0	**2.3**	0.0	0.8	0.9	0.0	**1.7**	**1.7**
36	0.0	1.4	2.8	0.0	**4.3**	0.0	0.8	2.3	0.0	**3.1**	**3.2**
37	0.0	1.3	7.2	0.3	**8.7**	0.0	0.7	6.0	0.2	**6.9**	**7.0**
38	0.0	1.2	16.4	1.2	**18.9**	0.0	0.5	17.6	1.3	**19.4**	**19.4**
39	0.0	0.6	22.7	2.1	**25.5**	0.0	0.3	23.3	2.9	**26.5**	**26.4**
40	0.0	0.2	19.6	3.0	**22.8**	0.0	0.1	20.7	4.4	**25.2**	**25.1**
41	0.0	0.1	8.4	2.4	**10.8**	0.0	0.0	9.3	3.4	**12.8**	**12.7**
42	0.0	0.0	0.3	0.1	**0.4**	0.0	0.0	0.4	0.2	**0.6**	**0.5**
43	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	0.0	**0.0**	**0.0**
44	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	0.0	**0.0**	**0.0**
45	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Total	**2.8**	**9.1**	**79.0**	**9.2**	**100.1**	**1.5**	**5.2**	**80.8**	**12.5**	**100.0**	**100.0**

Table A40: Percentage of babies born by Indigenous status of mother, gestation and birthweight, Queensland 2009 to 2013

	No previous pregnancies						Previous pregnancies					
	Unassisted vaginal birth		Assisted vaginal birth		Caesarean section		Unassisted vaginal birth		Assisted vaginal birth		Caesarean section	
Year	n	%	n	%	n	%	n	%	n	%	n	%
2004	7865	52.4	2348	15.7	4785	31.9	22,489	64.2	1626	4.6	10,911	31.2
2005	8169	50.7	2575	16.0	5358	33.3	24,395	63.9	1723	4.5	12,077	31.6
2006	8124	49.4	2624	15.9	5709	34.7	24,661	62.8	1791	4.6	12,797	32.6
2007	8691	49.2	2973	16.8	6012	34.0	25,963	62.5	2007	4.8	13,581	32.7
2008	8665	48.9	3163	17.9	5876	33.2	26,111	61.3	2282	5.4	14,230	33.4
2009	8888	49.0	3247	17.9	6018	33.2	26,212	61.1	2336	5.4	14,322	33.4
2010	8969	49.2	3471	19.1	5775	31.7	26,108	61.0	2421	5.7	14,283	33.4
2011	8924	48.5	3481	18.9	5982	32.5	26,106	61.0	2404	5.6	14,310	33.4
2012	9111	48.2	3616	19.1	6165	32.6	26,494	60.5	2656	6.1	14,618	33.4
2013	9072	47.6	3721	19.5	6256	32.8	26,116	60.6	2499	5.8	14,503	33.6
Total	**86,478**	**49.2**	**31,219**	**17.8**	**57,936**	**33**	**254,655**	**61.8**	**21,745**	**5.3**	**135,632**	**32.9**

Table A41: Number and percentage of women giving birth by mode of birth and previous pregnancy, Queensland 2004 to 2013 (data incomplete: n = 25)

	No previous caesarean sections						One previous caesarean section					
	Unassisted vaginal birth		Assisted vaginal birth		Caesarean section		Unassisted vaginal birth		Assisted vaginal birth		Caesarean section	
Year	n	%	n	%	n	%	n	%	n	%	n	%
2004	21,226	78.2	1461	5.4	4454	16.4	1225	19.6	182	2.9	4858	77.5
2005	23,147	78.7	1553	5.3	4703	16.0	1199	17.5	188	2.7	5465	79.8
2006	23,386	78.4	1601	5.4	4849	16.3	1223	16.8	188	2.6	5849	80.6
2007	24,565	78.2	1772	5.6	5072	16.1	1341	17.3	220	2.8	6194	79.9
2008	24,612	77.5	1987	6.3	5174	16.3	1383	17.1	268	3.3	6458	79.6
2009	24,774	77.5	2077	6.5	5126	16.0	1366	16.5	247	3.0	6648	80.5
2010	24,638	77.4	2151	6.8	5041	15.8	1395	17.2	254	3.1	6481	79.7
2011	24,692	77.2	2125	6.6	5180	16.2	1253	15.6	272	3.4	6523	81.1
2012	25,132	76.6	2334	7.1	5346	16.3	1293	15.7	306	3.7	6625	80.6
2013	24,719	76.8	2206	6.9	5269	16.4	1337	16.3	284	3.5	6602	80.3
Total	**240,891**	**77.6**	**19,267**	**6.2**	**50,214**	**16.2**	**13,015**	**16.9**	**2409**	**3.1**	**61,703**	**80.0**

	More than one previous caesarean section					
	Unassisted vaginal birth		Assisted vaginal birth		Caesarean section	
Year	n	%	n	%	n	%
2004	31	1.9	3	0.2	1599	97.9
2005	44	2.3	4	0.2	1905	97.5
2006	37	1.7	4	0.2	2091	98.1
2007	39	1.7	5	0.2	2300	98.1
2008	59	2.3	7	0.3	2556	97.5
2009	39	1.5	1	0.0	2527	98.4
2010	50	1.8	7	0.2	2744	98.0
2011	53	2.0	5	0.2	2605	97.8
2012	60	2.2	14	0.5	2641	97.3
2013	59	2.2	7	0.3	2629	97.6
Total	**471**	**2.0**	**57**	**0.2**	**23,597**	**97.8**

Table A42: Number of women giving birth by mode of birth and previous caesarean section, Queensland 2004 to 2013 (data incomplete: n = 19)

Year	Maternal age < 20		Maternal age 20–34		Maternal age 35+		Total
	n	%	n	%	n	%	
2004	3003	6.0	38,528	77.0	8520	17.0	50,051
2005	3069	5.6	41,566	76.5	9702	17.9	54,337
2006	3076	5.5	42,289	75.9	10,354	18.6	55,719
2007	3260	5.5	44,564	75.2	11,404	19.3	59,228
2008	3456	5,5	44,934	74.5	11,938	19.8	60,328
2009	3340	5.9	45,523	74.6	12,161	19.9	61,024
2010	3344	5.5	45,539	74.6	12,144	19.9	61,027
2011	3120	5.1	45,806	74.9	12,197	20.0	61,123
2012	3165	5.1	47,440	75.7	12,058	19.2	62,663
2013	2943	4.7	47,214	75.9	12,012	19.3	62,169
Total	**31,776**	**5.4**	**443,403**	**75.5**	**112,490**	**19.1**	**587,669**

Table A43: Births by maternal age, Queensland 2004 to 2013

	Maternal age <20			Maternal age 20–34			Maternal age 35+		
Year	**Public**	**Private**	**Homebirth**	**Public**	**Private**	**Homebirth**	**Public**	**Private**	**Homebirth**
2004	2923	77	np	26,861	11,631	33	4432	4066	21
2005	2944	124	np	29,299	12,241	25	5131	4554	16
2006	2990	85	np	29,974	12,283	30	5498	4840	16
2007	3160	99	np	31,951	12,559	54	6111	5266	26
2008	3362	94	np	32,100	12,759	72	6441	5459	38
2009	3269	70	np	32,598	12,842	83	6683	5439	39
2010	3267	77	np	32,775	12,710	54	6538	5575	31
2011	3056	62	np	33,239	12,524	42	6852	5320	25
2012	3096	68	np	34,746	12,620	60	6771	5263	24
2013	2886	52	np	34,509	12,644	57	6801	5179	31
Total	**30,953**	**808**	**np**	**318,052**	**124,813**	**510**	**61,258**	**50,961**	**267**
% of age group	**97.5**	**2.5**	**–**	**71.7**	**28.2**	**0.1**	**54.5**	**45.3**	**0.2**
% of care mode	**7.5**	**0.5**	**–**	**77.5**	**70.7**	**65.6**	**14.9**	**28.9**	**34.4**

Table A44: Number of women giving birth by maternal age group and mode of healthcare delivery, Queensland 2004 to 2013 (np = not published, data incomplete: n = 47)

	Pregnancy plurality					
Maternal age	**Singleton**	**Twins**	**Higher multiple**	**% Twins**	**% Higher multiple**	**% All multiple**
20 or less	23,898	175	5	0.1	0.0	0.1
21–25	58,040	659	11	0.2	0.0	0.2
26–30	92,637	1411	26	0.5	0.0	0.5
31–35	82,833	1560	40	0.5	0.0	0.5
36 or more	45,574	1116	23	0.4	0.0	0.4
Total	**302,982**	**4921**	**105**	**1.6**	**0.0**	**1.6**

Table A45: Number of women giving birth by maternal age group and plurality, Queensland 2009 to 2013

Maternal age	32 weeks or less		33–38 weeks		39 weeks or more		Total
	n	%	n	%	n	%	
20 or less	679	2.8	6607	27.2	16,973	70.0	24,259
21–25	1279	2.2	16,957	28.6	41,155	69.3	59,391
26–30	1916	2.0	29,922	31.3	63,700	66.7	95,538
31–35	1747	2.0	30,484	35.4	53,838	62.6	86,069
36 or more	1312	2.7	19,688	41.1	26,870	56.1	47,870
Total	**6933**	**2.2**	**103,658**	**33.1**	**202,536**	**64.7**	**313,127**

Table A46: Number and percentage of babies born by maternal age group and gestation at birth, Queensland 2009 to 2013 (data incomplete: n = 19)

Maternal age	Live-born babies requiring NICU/SCN admission			
	NICU/SCN		No NICU/SCN	
	n	%	n	%
20 or less	4573	19.0	19,481	81.0
21–25	10,124	17.2	48,903	82.8
26–30	15,499	16.3	79,440	83.7
31–35	13,788	16.1	71,763	83.9
36 or more	9280	19.6	38,163	80.4
Total	**53,264**	**17.1**	**257,750**	**82.9**

Table A47: Number of live-born babies born by maternal age group and need for admission to a neonatal intensive care unit (NICU) or a special care nursery (SCN), Queensland 2009 to 2013

	Maternal BMI <18.5			Maternal BMI 18.5–24.9		
Maternal age	<20	20–34	35+	<20	20–34	35+
2009	273	1,898	337	1,625	21,600	5,901
2010	283	1,992	334	1,688	21,813	5,897
2011	358	2454	405	1,587	22952	6,088
2012	376	2787	432	1,693	24,039	6,155
2013	391	2729	436	1,502	24,439	6,153
Total	**1,681**	**11,860**	**1,944**	**8,095**	**114,843**	**30,194**
% of age group	**10.9**	**5.2**	**3.3**	**52.7**	**50.6**	**50.9**
% of total	**5.1**			**50.8**		
	Maternal BMI 25–29.9			**Maternal BMI 30+**		
Maternal age	**<20**	**20–34**	**35+**	**<20**	**20–34**	**35+**
2009	772	11,254	3049	468	9108	2400
2010	765	11,275	3055	499	9350	2575
2011	650	10,809	3037	423	8875	2428
2012	640	10,790	3004	385	9210	2320
2013	569	10,578	2896	418	8874	2361
Total	**3396**	**54,706**	**15,041**	**2193**	**45,417**	**12,084**
% of age group	**22.1**	**24.1**	**25.4**	**14.3**	**20.0**	**20.4**
% of total	**24.3**			**19.8**		

Table A48: Correlation of body mass index (BMI) of women giving birth with maternal age, Queensland 2009 to 2013 (data incomplete: n = 6,554 (2.1%))

	Maternal BMI <18.5			Maternal BMI 18.5–24.9		
Birth mode	**UVB**	**AVB**	**CS**	**UVB**	**AVB**	**CS**
2009	1554	317	606	16,946	3143	8612
2010	1692	301	583	17,169	3341	8414
2011	2057	367	755	17,696	3460	8976
2012	2262	438	842	18,374	3708	9299
2013	2258	441	815	18,426	3807	9377
Total	**9823**	**1864**	**3601**	**88,611**	**17,459**	**44,678**
% of BMI group	**64.3**	**12.2**	**23.6**	**58.8**	**11.6**	**29.6**
% of total	**5.1**			**50.8**		

	Maternal BMI 25–29.9			Maternal BMI 30+		
Birth mode	**UVB**	**AVB**	**CS**	**UVB**	**AVB**	**CS**
2009	8427	1253	5105	6513	674	4588
2010	8423	1333	5125	6674	783	4760
2011	8104	1240	4905	6217	710	4585
2012	7981	1252	4956	6205	773	4735
2013	7657	1179	4966	6116	708	4653
Total	**40,592**	**6257**	**25,057**	**31,725**	**3648**	**23,321**
% of BMI group	**56.5**	**8.7**	**34.8**	**54.1**	**6.2**	**39.7**
% of total	**24.3**			**19.8**		

Table A49: Correlation of body mass index (BMI) of women giving birth with mode of birth, Queensland 2009 to 2013
(singleton births only) (UVB = unassisted vaginal birth, AVB = assisted vaginal birth, CS = caesarean section) (data incomplete: n = 6346)

	Maternal BMI <18.5					Maternal BMI 18.5–24.9				
Gestation	**≤24**	**25–28**	**29–32**	**33–36**	**37+**	**≤24**	**25–28**	**29–32**	**33–36**	**37+**
2009	7	12	27	167	2263	98	75	203	1449	26,875
2010	12	18	40	192	2314	103	79	218	1448	27,076
2011	12	12	44	243	2868	95	96	205	1524	28,212
2012	13	23	41	262	3203	95	96	273	1643	29,274
2013	14	18	39	256	3187	104	88	241	1608	29,569
Total	**58**	**83**	**191**	**1120**	**13,835**	**495**	**434**	**1140**	**7672**	**141,006**
% of BMI group	**0.4**	**0.5**	**1.2**	**7.3**	**90.5**	**0.3**	**0.3**	**0.8**	**5.1**	**93.5**
% of total	**5.2**					**50.8**				

	Maternal BMI 25–29.9					Maternal BMI 30+				
Gestation	**≤24**	**25–28**	**29–32**	**33–36**	**37+**	**≤24**	**25–28**	**29–32**	**33–36**	**37+**
2009	51	40	98	721	13,873	51	39	83	601	11,001
2010	55	38	74	761	13,952	60	36	88	592	11,440
2011	47	55	99	731	13,317	49	43	89	569	10,762
2012	59	41	110	794	13,185	68	46	81	681	10,837
2013	66	28	100	693	12,915	72	32	96	631	10,646
Total	**278**	**202**	**481**	**3700**	**67,242**	**300**	**196**	**437**	**3074**	**54,686**
% of BMI group	**0.4**	**0.3**	**0.7**	**5.1**	**93.5**	**0.5**	**0.3**	**0.7**	**5.2**	**93.2**
% of total	**24.2**					**19.8**				

Table A50: Correlation of body mass index (BMI) of women giving birth with gestation of their babies at birth (singleton births only), Queensland 2009 to 2013 (data incomplete: n = 6,560)

	Maternal BMI <18.5				Maternal BMI 18.5–24.9			
Birthweight (g)	<1500	1500–2499	2500–3999	4000 +	<1500	1500–2499	2500–3999	4000 +
2009	34	203	2098	139	254	1256	24,153	3037
2010	49	249	2146	132	275	1185	24,566	2895
2011	49	253	2747	129	276	1260	25,477	3118
2012	62	287	3024	168	302	1340	26,487	3251
2013	53	303	2967	190	279	1282	26,887	3160
Total	**247**	**1295**	**12,982**	**758**	**1386**	**6323**	**127,570**	**15,461**
% of BMI group	**1.6**	**8.5**	**84.9**	**5.0**	**0.9**	**4.2**	**84.6**	**10.3**
% of total	**5.2**				**50.8**			

	Maternal BMI 25–29.9				Maternal BMI 30+			
Birthweight (g)	<1500	1500–2499	2500–3999	4000 +	<1500	1500–2499	2500–3999	4000 +
2009	131	494	11,954	2203	128	365	9010	2272
2010	120	533	12035	2192	142	357	9317	2399
2011	145	434	11,542	2128	123	368	8802	2218
2012	144	526	11,438	2078	152	370	8929	2262
2013	132	473	11,255	1942	141	348	8892	2096
Total	**672**	**2460**	**58,224**	**10,543**	**686**	**1808**	**44,950**	**11,247**
% of BMI group	**0.9**	**3.4**	**81.0**	**14.7**	**1.2**	**3.0**	**76.6**	**19.2**
% of total	**24.2**				**19.8**			

Table A51: Correlation of body mass index (BMI) of women giving birth with birthweight of their babies (singleton births only), Queensland 2009 to 2013 (data incomplete: n = 6,369)

	Maternal BMI <18.5			Maternal BMI 18.5–24.9		
Perinatal outcome	Alive	SBR	NNMR	Alive	SBR	NNMR
2009	993.3	4.3	2.4	991.7	5.3	3.1
2010	990.2	8.3	1.5	991.7	5.2	3.2
2011	990.8	6.4	2.8	992.2	4.5	3.3
2012	990.4	6.0	3.6	991.9	5.8	2.3
2013	991.7	6.1	2.2	992.8	5.2	2.1
Total	**991.2**	**6.2**	**2.6**	**992.1**	**5.1**	**2.7**
PNMR		**8.8**			**7.9**	

	Maternal BMI 25–29.9			Maternal BMI 30+		
Perinatal outcome	Alive	SBR	NNMR	Alive	SBR	NNMR
2009	990.3	6.8	2.9	988.6	7.2	4.2
2010	991.3	5.7	3.0	988.7	6.7	4.6
2011	992.3	5.4	2.4	990.0	7.0	3.1
2012	989.4	7.8	2.9	988.9	7.5	3.6
2013	990.9	5.9	3.2	988.3	7.5	4.2
Total	**990.8**	**6.3**	**2.9**	**988.9**	**7.2**	**3.9**
PNMR		**9.2**			**11.1**	

Table A52: Correlation of body mass index (BMI) of women giving birth with perinatal outcome, Queensland 2009 to 2013
(Alive = alive per 1000 babies, SBR = stillborn per 1000 babies, NNMR = neonatal death per 1000 live-born babies, PNMR = perinatal deaths per 1000 babies) (data incomplete: n = 6,769)

	Smoking at <20 weeks			Smoking at >20 weeks		
Maternal age	Age <20	Age 20–34	Age 35+	Age <20	Age 20–34	Age 35+
2010	40.4	17.4	10.9	31.8	14.1	9.3
2011	37.1	16.0	10.7	30.4	13.3	9.1
2012	34.5	15.1	9.9	28.2	12.5	8.5
2013	35.1	13.9	9.6	28.0	11.5	8.2
Total	**36.7**	**15.5**	**10.2**	**29.5**	**12.7**	**8.7**

Table A53: Incidence (%) of cigarette smoking status of women giving birth with maternal age, Queensland 2010 to 2013 (smoking status data before and after 20 weeks has been collected since July 2009)

	Smoking at <20 weeks					Not smoking at <20 weeks				
Gestation	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+
2010	0.7	0.7	1.6	8.1	88.9	0.5	0.4	1.1	6.1	91.8
2011	0.6	0.8	1.4	8.2	89.0	0.5	0.4	1.1	6.3	91.7
2012	0.6	0.7	1.9	9.1	87.6	0.5	0.4	1.1	6.7	91.3
2013	0.7	0.4	2.0	8.9	87.9	0.5	0.4	1.1	6.4	91.6
Total	**0.7**	**0.7**	**1.7**	**8.5**	**88.5**	**0.5**	**0.4**	**1.1**	**6.3**	**91.7**

	Smoking at >20 weeks					Not smoking at >20 weeks				
Gestation	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+
2010	0.7	0.7	1.5	8.3	88.8	0.5	0.4	1.1	6.1	91.9
2011	0.5	0.8	1.4	8.2	89.1	0.5	0.4	1.1	6.3	91.7
2012	0.5	0.6	1.9	9.3	87.7	0.5	0.4	1.1	6.6	91.4
2013	0.7	0.5	1.9	9.0	88.0	0.5	0.4	1.1	6.4	91.6
Total	**0.6**	**0.7**	**1.6**	**8.7**	**88.4**	**0.5**	**0.4**	**1.1**	**6.3**	**91.7**

Table A54: Incidence (%) of cigarette smoking status of women giving birth with gestation at birth, Queensland 2010 to 2013 (smoking status data before and after 20 weeks has been collected since July 2009)

	Smoking at <20 weeks				Not smoking at <20 weeks			
Birthweight (g)	<1000	1000–2499	2500–3999	4000+	<1000	1000–2499	2500–3999	4000+
2010	1.2	9.8	81.6	7.4	0.9	5.2	80.4	13.6
2011	1.1	9.7	81.7	7.4	0.8	5.3	80.6	13.3
2012	1.2	11.0	80.2	7.5	0.8	5.3	80.7	13.2
2013	1.0	10.3	80.9	7.8	0.8	5.3	81.3	12.5
Total	**1.2**	**10.2**	**81.1**	**7.5**	**0.8**	**5.3**	**80.8**	**13.1**

	Smoking at >20 weeks				Not smoking at >20 weeks			
Birthweight (g)	<1000	1000–2499	2500–3999	4000+	<1000	1000–2499	2500–3999	4000+
2010	2.2	9.6	81.8	6.3	1.4	4.7	80.4	13.5
2011	2.1	9.5	82.2	6.2	1.4	4.7	80.6	13.3
2012	2.4	10.8	80.6	6.1	1.4	4.7	80.6	13.2
2013	2.1	10.0	81.6	6.4	1.4	4.8	81.2	12.6
Total	**2.2**	**10.0**	**81.5**	**6.2**	**1.4**	**4.7**	**80.7**	**13.1**

Table A55: Incidence (%) of cigarette smoking status of women giving birth with birthweight, Queensland 2010 to 2013 (smoking status data before and after 20 weeks has been collected since July 2009)

	Smoking at <20 weeks			Not smoking at <20 weeks		
Perinatal outcome	Alive	SBR	NNMR	Alive	SBR	NNMR
2010	985.7	8.7	5.6	990.6	6.0	3.3
2011	986.0	8.1	5.9	992.0	5.9	2.8
2012	987.6	8.1	4.4	990.4	6.9	2.7
2013	987.7	8.0	4.3	991.0	6.0	2.9
Total	**986.7**	**8.2**	**5.1**	**990.8**	**6.2**	**2.9**
PNMR		**13.3**			**9.1**	

	Smoking at >20 weeks			Not smoking at >20 weeks		
Perinatal outcome	Alive	SBR	NNMR	Alive	SBR	NNMR
2010	985.6	9.1	5.3	990.5	6.1	3.4
2011	985.5	8.9	5.6	991.2	5.8	3.0
2012	988.6	7.2	4.3	990.3	7.0	2.7
2013	987.2	8.3	4.5	991.0	6.0	2.9
Total	**986.7**	**8.4**	**4.9**	**990.8**	**6.2**	**3.0**
PNMR		**13.3**			**9.2**	

Table A56: Correlation of cigarette smoking status of women giving birth with perinatal outcome, Queensland 2010 to 2013

(Alive = alive per 1000 babies, SBR = stillborn per 1000 babies, NNMR = neonatal death per 1000 live-born babies, PNMR = perinatal deaths per 1000 babies)(smoking status data before and after 20 weeks has been collected since July 2009)

	ARIA 1: Highly accessible					ARIA 2: Accessible					ARIA 3: Moderately accessible				
Year	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+
2012	0.5	0.4	1.2	7.0	90.8	0.5	0.6	1.4	7.1	90.5	0.5	0.5	1.0	7.1	90.8
2013	0.5	0.4	1.1	6.6	91.3	0.5	0.4	1.4	7.0	90.6	0.6	0.4	1.2	7.1	90.7
Total	**0.5**	**0.4**	**1.2**	**6.8**	**91.1**	**0.5**	**0.5**	**1.4**	**7.1**	**90.5**	**0.6**	**0.5**	**1.1**	**7.1**	**90.7**

	ARIA 4: Remote					ARIA 5: Very remote				
Year	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+
2012	0.6	0.4	1.3	8.6	89.1	1.1	0.8	1.1	7.5	89.4
2013	0.6	0.7	1.2	6.4	91.1	1.3	0.2	2.6	7.7	88.2
Total	**0.6**	**0.6**	**1.2**	**7.5**	**90.1**	**1.2**	**0.5**	**1.9**	**7.6**	**88.8**

Table A57: Incidence (%) of remoteness class of women's primary residence with gestation at birth, Queensland 2012 to 2013 (Percentages are of ARIA groups)(Interstate, overseas, data incomplete: n = 62)

	ARIA 1: Highly accessible				ARIA 2: Accessible				ARIA 3: Moderately accessible			
Year	<1000g	1000–2499g	2500–3999g	4000g+	<1000g	1000–2499g	2500–3999g	4000g+	<1000g	1000–2499g	2500–3999g	4000g+
2012	0.9	6.0	81.0	12.1	0.9	6.6	79.5	13.0	0.9	6.2	80.8	12.1
2013	0.9	5.9	81.5	11.8	0.8	6.4	80.4	12.4	0.9	6.3	81.4	11.3
Total	**0.9**	**5.9**	**81.2**	**12.0**	**0.9**	**6.5**	**79.9**	**12.7**	**0.9**	**6.2**	**81.1**	**11.7**

	ARIA 4: Remote				ARIA 5: Very remote			
Year	<1000g	1000–2499g	2500–3999g	4000g+	<1000g	1000–2499g	2500–3999g	4000g+
2012	0.8	8.8	78.9	11.5	1.8	6.3	79.7	12.2
2013	1.0	7.4	80.1	11.3	1.5	6.8	80.1	11.6
Total	**0.9**	**8.1**	**79.5**	**11.4**	**1.7**	**6.5**	**79.9**	**11.9**

Table A58: Incidence (%) of remoteness class of women's primary residence with birthweight of their babies, Queensland 2012 to 2013. (Percentages are of ARIA groups) (Interstate, overseas, data incomplete: n = 88)

	ARIA 1: Highly accessible			ARIA 2: Accessible			ARIA 3: Moderately accessible		
Year	SBR	NNMR	PNMR	SBR	NNMR	PNMR	SBR	NNMR	PNMR
2012	6.9	3.0	9.4	6.9	3.7	10.5	7.6	2.3	9.9
2013	6.4	3.3	9.7	5.7	3.3	9.0	7.1	3.0	10.0
Total	**6.7**	**3.2**	**9.8**	**6.3**	**3.5**	**9.8**	**7.3**	**2.6**	**10.0**

	ARIA 4: Remote			ARIA 5: Very remote		
Year	SBR	NNMR	PNMR	SBR	NNMR	PNMR
2012	9.0	5.4	14.3	16.1	4.7	20.6
2013	12.1	2.8	14.8	9.4	3.5	12.9
Total	**10.5**	**4.1**	**14.6**	**12.7**	**4.1**	**16.8**

Table A59: Correlation of remoteness class of women's primary residence with perinatal outcome, Queensland 2012 to 2013

(Rates are calculated within ARIA groups) (SBR = stillbirth rate per 1000 babies, NNMR = neonatal mortality rate per 1000 live-born babies, PNMR = perinatal deaths per 1000 babies).

	Stillbirth	Neonatal death	Live-born babies	Total	SBR	NNMR	PNMR	RR	95%CI
Not transferred	**1213**	**541**	**282,676**	**283,889**	**4.3**	**1.9**	**6.2**	Referrent	
ARIA 1	737	323	172,084	172,821	4.3	1.9	6.1		
ARIA 2	256	103	58,500	58,756	4.4	1.8	6.1	1.00	0.89, 1.13
ARIA 3	182	97	44,961	45,143	4.0	2.2	6.2	1.01	0.89, 1.16
ARIA 4	21	10	4447	4468	4.7	2.2	6.9	1.14	0.80, 1.63
ARIA 5	14	6	2570	2584	5.4	2.3	7.7	1.27	0.82, 1.97
Transferred	**181**	**127**	**11,384**	**11,565**	**15.7**	**11.2**	**26.6**		
ARIA 1	66	55	3451	3517	18.8	15.9	34.4	5.64	4.69, 6.79
ARIA 2	32	32	1894	1926	16.6	16.9	33.2	5.45	4.25, 6.99
ARIA 3	58	21	3522	3580	16.2	6.0	22.1	3.62	2.89, 4.54
ARIA 4	5	5	788	793	6.3	6.3	12.6	2.07	1.11, 3.84
ARIA 5	17	14	1694	1711	9.9	8.3	18.1	2.97	2.09, 4.23
Total	**1394**	**668**	**294,060**	**295,454**	**4.7**	**2.3**	**7.0**		

Table A60: Correlation of transfer of care and remoteness class of women's primary residence with perinatal outcome in "normally-formed" babies, Queensland 2009 to 2013

(Rates are calculated within ARIA groups) (SBR = stillbirth rate per 1000 babies, NNMR = neonatal mortality rate per 1000 live-born babies, PNMR = perinatal deaths per 1000 babies, RR = risk ratio, 95%CI = 95% confidence intervals). This analysis includes all babies born in Queensland 2009 to 2013, except for the 17,692 babies (5.6%) recorded to have one or more congenital anomalies

	SEIFA index quintile 1					SEIFA index quintile 2					SEIFA index quintile 3				
Year	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+
2012	0.7	0.6	1.4	7.7	89.6	0.5	0.5	1.3	7.3	90.4	0.5	0.5	1.3	6.8	90.9
2013	0.8	0.5	1.5	7.5	89.8	0.5	0.4	1.2	7.0	90.8	0.4	0.4	1.2	6.5	91.5
Total	**0.7**	**0.5**	**1.4**	**7.6**	**89.7**	**0.5**	**0.5**	**1.3**	**7.2**	**90.6**	**0.4**	**0.4**	**1.3**	**6.7**	**91.2**

	SEIFA index quintile 4					SEIFA index quintile 5				
Year	≤24	25–28	29–32	33–36	37+	≤24	25–28	29–32	33–36	37+
2012	0.4	0.5	1.0	6.7	91.3	0.5	0.3	1.2	6.7	91.3
2013	0.5	0.4	1.1	6.3	91.7	0.5	0.4	1.0	6.7	91.4
Total	**0.5**	**0.4**	**1.1**	**6.5**	**91.5**	**0.5**	**0.3**	**1.1**	**6.7**	**91.3**

Table A61: Incidence (%) of socio-economic status of women giving birth with gestation at birth, Queensland 2012 to 2013

(Percentages are of SEIFA groups) (SEIFA index of Relative Socio-economic Advantage and Disadvantage: Index quintiles: 1 = Lowest socioeconomic status; 5 = Highest socioeconomic status) (Data incomplete: n = 331)

	SEIFA index quintile 1				SEIFA index quintile 2				SEIFA index quintile 3			
Year	<1000g	1000–2499g	2500–3999g	4000g+	<1000g	1000–2499g	2500–3999g	4000g+	<1000g	1000–2499g	2500–3999g	4000g+
2012	1.1	7.4	79.7	11.9	0.9	6.4	80.2	12.5	0.8	6.0	80.4	12.8
2013	1.2	7.0	80.1	11.7	0.8	6.5	80.5	12.3	0.7	5.7	81.3	12.3
Total	**1.1**	**7.2**	**79.9**	**11.8**	**0.9**	**6.4**	**80.3**	**12.4**	**0.7**	**5.9**	**80.8**	**12.6**

	SEIFA index quintile 4				SEIFA index quintile 5			
Year	<1000g	1000–2499g	2500–3999g	4000g+	<1000g	1000–2499g	2500–3999g	4000g+
2012	0.9	5.7	80.8	12.7	0.8	5.6	82.4	11.2
2013	0.9	5.5	81.9	11.7	0.9	5.7	82.4	11.1
Total	**0.9**	**5.6**	**81.3**	**12.2**	**0.8**	**5.6**	**82.4**	**11.1**

Table A62: Incidence (%) of socio-economic status of women giving birth with birthweight, Queensland 2012 to 2013

(Percentages are of SEIFA groups.) (SEIFA index of Relative Socio-economic Advantage and Disadvantage index quintiles: 1 = Lowest socioeconomic status; 5 = Highest socioeconomic status)(Data incomplete: n = 358)

	SEIFA index quintile 1			SEIFA index quintile 2			SEIFA index quintile 3		
	SBR	NNMR	PNMR	SBR	NNMR	PNMR	SBR	NNMR	PNMR
2012	7.7	4.5	12.2	7.0	3.1	10.1	6.7	3.3	10.0
2013	7.1	4.6	11.6	6.7	3.3	10.0	5.9	2.8	8.7
Total	**7.4**	**4.6**	**11.9**	**6.9**	**3.5**	**10.0**	**6.3**	**3.1**	**9.4**

	SEIFA index quintile 4			SEIFA index quintile 5		
	SBR	NNMR	PNMR	SBR	NNMR	PNMR
2012	7.5	2.6	10.1	7.2	1.7	8.8
2013	6.0	3.1	9.1	6.6	2.4	9.1
Total	**6.8**	**2.8**	**9.6**	**6.9**	**2.1**	**9.0**

Table A63: Correlation of socio-economic status of women giving birth with perinatal outcome, Queensland 2012 to 2013

(Rates are calculated within SEIFA groups). (SBR = stillbirth rate per 1000 babies, NNMR = neonatal mortality rate per 1000 live-born babies, PNMR = perinatal deaths per 1000 babies). (SEIFA index of Relative Socio-economic Advantage and Disadvantage index quintiles: 1 = Lowest socioeconomic status; 5 = Highest socioeconomic status)(Data incomplete: n = 330)

Anomaly group	ICD-10-AM codes	Description
Neural tube defects	Q00.0–Q00.2 Q05.0–Q05.9, Q01.0–Q01.2 Q01.8, Q01.9	Anencephaly and similar anomalies, Spina bifida, Encephalocoele,
Other major Central Nervous System anomalies	Q02 Q04.1, Q04.2 Q03.0, Q03.1, Q03.8, Q03.9	Microcephaly, Arhinencephaly, Holoprosencephaly, Congenital hydrocephalus
Major cardiovascular anomalies	Q20.1, Q20.3, Q20.5, Q21.3, Q23.4, Q25.1	Double outlet right ventricle, Dextrotransposition of aorta, Transposition of great vessels (complete), Discordant atrioventricular connections, Tetralogy of Fallot, Hypoplastic left heart syndrome, Coarctation of the aorta
Cleft lip and/or cleft palate	Q35.0–Q35.9, Q36.0, Q36.1, Q36.9, Q37.0–Q37.5, Q37.8, Q37.9	Cleft palate, Cleft lip, Cleft lip with cleft palate,
Gastrointestinal atresia/stenosis (oesophageal, small intestine, ano-rectal)	Q39.0–Q39.3, Q41.0–Q41.2, Q42.0–Q42.3	Atresia or stenosis or the oesophagus with or without fistula, Atresia, stenosis or absence of small intestine, Atresia, stenosis or absence of rectum or anus
Anomalies of genital organs and bladder	Q54.0–Q54.3, Q54.8, Q54.9, Q64.0, Q64.1	Hypospadias, Epispadias, Ectopia vesicae, Extrophy of urinary bladder
Renal agenesis/dysgenesis, cystic kidneys	Q60.0–Q60.6, Q61.0–Q61.5	Renal agenesis, Renal hypoplasia, Potter's syndrome, Cystic kidney disease
Polydactyly	Q69.0–Q69.2 Q69.9	Polydactyly
Limb reduction defects	Q71.0–Q71.9, Q72.0–Q72.9, Q73.0, Q73.1, Q73.8	Reduction of upper or lower limbs
Diaphragmatic hernia	Q79.0	Congenital diaphragmatic hernia
Exomphalos, gastroschisis	Q79.2 Q79.3	Exomphalos, Gastroschisis
Trisomy 21	Q90.0–Q90.2 Q90.9	Trisomy 21
Trisomy 13 and trisomy 18	Q91.4–Q91.7, Q91.0–91.3	Trisomy 13, Trisomy 18
Sex chromosome anomalies	Q96.0–Q99.1	Includes Turner syndrome, Klinefelter syndrome

Table A64: Congenital anomaly groupings used in this report

Anomaly group	Number of babies	Incidence of anomalies*
Neural tube defects	72	0.57
Other major Central Nervous System anomalies	62	0.49
Major cardiovascular anomalies	145	1.14
Cleft lip and/or cleft palate	168	1.32
Gastrointestinal atresia/stenosis (oesophageal, small intestine, ano-rectal)	70	0.55
Hypospadias, epispadias bladder extrophy	286	2.25
Renal agenesis/dysgenesis, cystic kidneys	119	0.94
Polydactyly	77	0.61
Limb reduction defects	54	0.43
Diaphragmatic hernia	28	0.22
Exomphalos, gastroschisis	98	0.77
Trisomy 21	129	1.02
Trisomy 13 and trisomy 18	39	0.31
Sex chromosome anomalies	26	0.20
One or more of the above anomalies reported	**1280**	**10.08**

Table A65: Congenital anomalies reported in the pregnancy and newborn period, Queensland 2012 to 2013
(* per 1000 births; multiple item reporting is possible for each baby)

Anomaly group	Total	Maternal age			Maternal indigenous status		Maternal BMI				
		<20	20–34	35+	Indigenous	non-Indigenous or NS	<18.5	18.5–24.9	25–29.9	30+	NS
Neural tube defects	0.57	1.47	0.48	0.69	0.57	0.52	0.41	0.35	0.55	0.88	5.25
Other major Central Nervous System anomalies	0.49	0.16	0.50	0.53	0.49	0.39	0.83	0.31	0.41	0.58	5.83
Major cardiovascular anomalies	1.14	0.65	1.13	1.30	1.18	0.52	0.97	1.02	1.31	1.13	4.08
Cleft lip and/or cleft palate	1.32	1.47	1.36	1.14	1.30	1.69	1.10	1.32	1.41	1.25	1.75
Gastrointestinal atresia/stenosis	0.55	0.33	0.52	0.73	0.56	0.39	0.55	0.54	0.48	0.63	1.17
Hypospadias, epispadias, bladder extrophy	2.25	2.44	2.11	2.76	2.33	1.04	3.04	1.97	2.24	2.80	2.33
Renal agenesis/ dysgenesis, cystic kidneys	0.94	0.98	0.89	1.10	0.94	0.91	0.83	0.91	1.00	0.79	3.50
Polydactyly	0.61	0.98	0.65	0.37	0.59	0.91	0.55	0.62	0.48	0.75	0.58
Limb reduction defects	0.43	0.65	0.37	0.57	0.41	0.65	0.41	0.43	0.38	0.38	1.75
Diaphragmatic hernia	0.22	0.00	0.19	0.41	0.23	0.13	0.41	0.18	0.28	0.21	0.00
Exomphalos, gastroschisis	0.77	4.07	0.63	0.49	0.76	0.91	0.83	0.83	0.62	0.58	3.50
Trisomy 21	1.02	0.98	0.59	2.68	1.04	0.65	0.55	0.92	1.04	1.17	4.08
Trisomy 13 and trisomy 18	0.31	0.33	0.21	0.69	0.30	0.39	0.28	0.28	0.31	0.38	0.58
Sex chromosome anomalies	0.20	0.33	0.17	0.32	0.20	0.26	0.41	0.20	0.14	0.21	0.58
One or more of the above anomalies	**10.08**	**13.68**	**9.30**	**12.25**	**10.18**	**8.59**	**10.90**	**9.26**	**10.01**	**10.65**	**31.51**

Table A66: Congenital anomaly groups by maternal and baby characteristics, Queensland 2012 to 2013
(* per 1000 births; multiple item reporting is possible for each baby)(Table continued over page)

Anomaly group	Maternal smoking before 20 weeks			Maternal smoking after 20 weeks		
	No	Yes	NS	No	Yes	NS
Neural tube defects	0.54	0.49	7.39	0.55	0.33	8.82
Other major Central Nervous System anomalies	0.42	0.76	4.43	0.41	0.78	5.88
Major cardiovascular anomalies	1.13	1.14	2.95	1.15	1.05	2.94
Cleft lip and/or cleft palate	1.28	1.63	0.00	1.28	1.70	0.00
Gastrointestinal atresia/stenosis	0.54	0.49	4.43	0.52	0.59	4.41
Hypospadias, epispadias, bladder extrophy	2.26	2.23	1.48	2.25	2.42	0.00
Renal agenesis/dysgenesis, cystic kidneys	0.92	1.09	0.00	0.91	1.18	0.00
Polydactyly	0.63	0.49	0.00	0.65	0.33	0.00
Limb reduction defects	0.44	0.38	0.00	0.43	0.39	0.00
Diaphragmatic hernia	0.23	0.16	0.00	0.23	0.20	0.00
Exomphalos, gastroschisis	0.70	1.14	2.95	0.72	1.05	2.94
Trisomy 21	0.99	1.09	2.95	1.00	1.05	2.94
Trisomy 13 and trisomy 18	0.30	0.27	2.95	0.30	0.26	2.94
Sex chromosome anomalies	0.20	0.22	0.00	0.22	0.13	0.00
One or more of the above anomalies	**9.87**	**10.77**	**26.59**	**9.92**	**10.52**	**27.94**

Anomaly group	ARIA+					SEIFA quintiles				
	Major cities	Inner regional	Outer regional	Remote	Very remote	Q1	Q2	Q3	Q4	Q5
Neural tube defects	0.54	0.57	0.55	0.46	1.79	0.83	0.72	0.39	0.44	0.39
Other major Central Nervous System anomalies	0.41	0.49	0.50	0.92	1.19	0.79	0.57	0.47	0.19	0.25
Major cardiovascular anomalies	1.19	0.94	1.20	0.46	1.19	1.29	1.09	1.30	1.04	0.89
Cleft lip and/or cleft palate	1.29	1.63	1.10	1.38	0.60	1.40	1.58	1.57	1.22	0.69
Gastrointestinal atresia/ stenosis	0.53	0.65	0.40	0.92	0.60	0.42	0.60	0.55	0.59	0.54
Hypospadias, epispadias, bladder extrophy	2.70	1.92	1.25	1.38	0.00	2.49	1.73	2.63	2.30	2.12
Renal agenesis/dysgenesis, cystic kidneys	1.00	0.90	0.55	2.30	1.79	0.91	1.09	1.10	0.78	0.79
Polydactyly	0.62	0.57	0.60	0.92	0.00	0.64	0.53	0.55	0.63	0.69
Limb reduction defects	0.47	0.29	0.45	0.00	0.60	0.64	0.26	0.47	0.37	0.35
Diaphragmatic hernia	0.21	0.25	0.20	0.00	0.00	0.30	0.19	0.08	0.19	0.30
Exomphalos, gastroschisis	0.76	0.74	0.70	0.92	1.19	0.76	0.94	0.83	0.70	0.49
Trisomy 21	0.89	1.43	1.15	0.46	0.60	1.25	1.13	1.34	0.74	0.59
Trisomy 13 and trisomy 18	0.35	0.12	0.30	0.46	0.60	0.34	0.19	0.43	0.26	0.30
Sex chromosome anomalies	0.19	0.16	0.25	0.00	0.60	0.11	0.11	0.28	0.19	0.35
One or more of the above anomalies	**10.49**	**10.05**	**8.43**	**10.13**	**7.15**	**11.11**	**9.99**	**11.24**	**9.04**	**8.44**

Table A66 (continued): Congenital anomaly groups by maternal and baby characteristics, Queensland 2012 to 2013

(* per 1000 births; SEIFA quintile Q1 = most disadvantage and Q5 = most advantage; multiple item reporting is possible for each baby)(Table continued over page)

Anomaly group	Gestation at birth (completed weeks)			Birthweight (g)				Perinatal mortality status		
	<28	29–36	37+	<1500	1500–2499	2500–3999	4000+	Perinatal mortality rate	Stillbirth rate	Neonatal mortality rate
Neural tube defects	33.82	0.58	0.21	23.64	1.00	0.18	0.07	680.6	486.1	378.4
Other major Central Nervous System anomalies	20.13	1.26	0.21	13.87	1.29	0.23	0.13	500.0	338.7	243.9
Major cardiovascular anomalies	23.35	2.32	0.80	17.99	2.58	0.79	0.65	344.8	241.4	136.4
Cleft lip and/or cleft palate	7.25	2.03	1.20	6.17	3.01	1.12	1.31	71.4	59.5	12.7
Gastrointestinal atresia/ stenosis	6.44	2.22	0.34	7.19	2.44	0.37	0.07	185.7	128.6	65.6
Anomalies of genital organs and bladder	7.25	3.96	2.05	10.28	3.87	2.02	2.09	21.0	14.0	7.1
Renal agenesis / dysgenesis/cystic kidneys	18.52	2.03	0.65	13.87	2.30	0.64	0.65	310.9	218.5	118.3
Polydactyly	0.81	0.97	0.57	1.54	0.72	0.55	0.85	26.0	13.0	13.2
Limb reduction defects	8.05	0.68	0.32	6.68	0.86	0.33	0.07	166.7	148.1	21.7
Diaphragmatic hernia	1.61	0.87	0.15	2.06	0.43	0.20	0.00	535.7	214.3	409.1
Exomphalos/gastroschisis	6.44	5.51	0.29	5.65	6.03	0.42	0.13	173.5	112.2	69.0
Trisomy 21	17.71	2.42	0.71	14.39	2.44	0.77	0.33	224.8	139.5	99.1
Trisomy 13 and trisomy 18	14.49	1.06	0.09	13.87	1.00	0.04	0.07	871.8	615.4	666.7
Sex chromosome anomalies	2.42	0.19	0.18	2.06	0.43	0.19	0.00	192.3	192.3	0.0
One or more of the above anomalies	**139.29**	**24.06**	**7.44**	**113.57**	**26.97**	**7.52**	**6.41**	**196.1**	**130.5**	**75.5**

Table A66 (continued): Congenital anomaly groups by maternal and baby characteristics, Queensland 2012 to 2013
(* per 1000 births; multiple item reporting is possible for each baby)

PERINATAL CARE INDICATORS	Facility Group							Total
	Public A	Public B	Public C	Public D	Public E	All public	Private	
	Specialist obstetrics, Feto-maternal medicine, Neonatal intensive care unit	Specialist obstetrics, Special care nursery, >3,000 births / year	Specialist obstetrics, Special care nursery, <3,000 births / year	Non-specialist obstetrics, Generalist neonatal care, >250 births / year	Non-specialist obstetrics, Generalist neonatal care, <250 births / year	All public hospital maternity and newborn services	Private hospital maternity and newborn services	
Proportion (%) of selected primigravidae having a caesarean section birth *	24.0	22.3	22.3	23.5	19.4	22.8	39.3	28.3
Proportion (%) of selected primigravidae achieving unassisted vaginal birth *	53.5	57.5	57.0	59.1	65.0	56.5	35.7	49.5
Proportion (%) of caesarean sections performed without labour in all women giving birth	17.9	15.0	16.1	13.5	12.8	15.8	35.6	21.6
Proportion (%) of elective births (inductions of labour and caesarean sections without labour in all women giving birth) occurring before 38 completed weeks' gestation	25.9	19.3	17.2	7.4	6.0	20.0	18.3	19.3
Proportion (%) of all women giving birth whose previous pregnancy ended in a first caesarean section who achieved a vaginal birth (i.e. successful VBAC)	18.6	20.4	17.4	15.0	9.3	18.7	7.6	14.0
Proportion (%) of selected primigravidae labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear *	75.3	76.3	73.0	81.3	81.2	76.0	64.3	73.3
Proportion (%) of all women giving birth labouring spontaneously and achieving unassisted vaginal birth without episiotomy and without third/fourth degree perineal tear	88.6	92.9	93.3	95.3	96.7	92.2	86.2	91.2

Table A67: Perinatal care indicators by hospital group, Queensland 2012 to 2013
(* Selected primigravida = Mothers age group 20–34 years, no previous births, singleton birth in current pregnancy, 37 weeks + 0 days to 41 weeks + 6 days completed weeks of gestation, cephalic / vertex presentation at birth) (NR = not relevant)

APPENDIX B. Data sources used in this report

Joanne Ellerington, Principal Data Collection Officer, Health Statistics Branch, Queensland Department of Health, provided major support to QMPQC over this period with regular review of the Perinatal Data Collection, particularly regarding maternal and perinatal deaths.

Pregnancy, birth and neonatal data for the 10 year period 2004 to 2013 were sourced from the Queensland Health Perinatal Data Collection and prepared by Ms Vesna Dunne, Principal Statistical Output Officer, Statistical Output and Library Services, Health Statistics Branch, Queensland Department of Health.

Congenital anomaly data were provided by Dr Trisha Johnston and Taku Endo of the Statistical Analysis and Linkage Team (SALT), Health Statistics Branch, Queensland Government.

These data were further analysed and collated by Professor Michael Humphrey, Chair, Queensland Maternal and Perinatal Quality Council.

Previous reports by the Queensland Maternal and Perinatal Quality Council and Queensland Council on Obstetric and Paediatric Morbidity and Mortality (QCOPMM) were sources of data regarding maternal and perinatal deaths from 1988 to 2003, as were Australian Institute of Health and Welfare (AIHW) reports on Maternal Deaths in Australia.

APPENDIX C:
Membership of the Queensland Maternal and Perinatal Quality Council, 2014—2015

Queensland Maternal and Perinatal Quality Council	
Professor Michael Humphrey (Chair)	Clinical Advisor, Office of Rural and Remote Health, Torres and Cape Hospital and Health Service
Michelle Barrett	Clinical Nurse Consultant, Retrieval Services Queensland, Queensland Department of Health
Professor Leonie Callaway (Deputy Chair)	Staff Specialist, Internal and Obstetric Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Cheryl Clayton	Director of Nursing & Midwifery, Mater Private Hospitals Brisbane & Redland
Professor Paul Colditz	Director, Perinatal Research Centre, The University of Queensland
Jody Currie	Director, Community Engagement, Institute for Urban Indigenous Health
Sarah Davies-Roe	Service Development Leader, Child and Youth Mental Health Service, Children's Health Queensland
Dr Tim Donovan	Neonatal Paediatrician, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Joanne Ellerington	Principal Data Collection Officer, Health Statistics Branch, Queensland Department of Health
Professor David Ellwood	Maternal-Fetal Medicine, Gold Coast University Hospital, Gold Coast Hospital and Health Service, & Griffith University
Associate Professor Vicki Flenady	Director, Translating Research Into Practice (TRIP) Centre; Program Head, Mothers' and Babies Theme. Mater Medical Research Institute
Karen Hose	Clinical Nurse Consultant, Intensive Care Nursery, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Rebecca Jenkinson	Consumer Representative
Dr Trisha Johnston	Director, Statistical Analysis and Linkage Team, Health Statistics Branch, Queensland Department of Health
Associate Professor Rebecca Kimble	Clinical Director, Obstetric Services, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Professor Sue Kildea	Director - Midwifery Research Unit, Mater Research Institute University of Queensland, The University of Queensland School of Nursing and Midwifery, Women's Health and Newborn Services (Maternity), Mater Health Service
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Melanie McKenzie	Consumer Representative
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Associate Professor Julie McGaughran	Director, Genetic Health Queensland
Amanda Ostrenski	Midwifery/Nursing Director - Womens & Childrens Health Cluster, Townsville Hospital and Health Service
Dr Diane Payton	Staff Anatomical Pathologist, Pathology Queensland
Dr Ted Weaver	Senior Medical Officer, Obstetrics and Gynaecology, Nambour Hospital, Sunshine Coast Hospital and Health Service
Dr Nikki Whelan	Obstetrician and Gynaecologist (Private Practice)

Maternal Mortality Sub-Committee	
Dr Nikki Whelan (Chair)	Obstetrician and Gynaecologist (Private Practice)
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Sarah Davies-Roe	Service Development Leader, Child and Youth Mental Health Service, Children's Health Queensland
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Dr Nathan Milne	Forensic Pathologist, Forensic and Scientific Services
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Dr Ted Weaver	Senior Medical Officer, Obstetrics and Gynaecology, Nambour Hospital, Sunshine Coast Hospital and Health Service
Dr Rebecca Williams	Forensic Pathologist, Forensic and Scientific Services

Perinatal Mortality Sub-Committee	
Associate Professor Vicki Flenady (Co-chair)	Director, Translating Research Into Practice (TRIP) Centre; Program Head, Mothers' and Babies Theme. Mater Medical Research Institute
Professor David Ellwood (Co-chair)	Maternal-Fetal Medicine, Gold Coast University Hospital, Gold Coast Hospital and Health Service, & Griffith University
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Dr Helen Liley	Senior Staff Specialist, Neonatology, Mater Health Services
Dr Rohan Lourie	Consultant Pathologist, Mater Health Services
Dr Kassam Mahomed	Senior Staff Specialist, Ipswich Hospital
Melanie McKenzie	Consumer Representative
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Dr Diane Payton	Staff Anatomical Pathologist, Pathology Queensland
Teresa Walsh	Caseload Midwife
Dr Nikki Whelan	Obstetrician and Gynaecologist (Private Practice)

Congenital Anomaly Sub-Committee	
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Dr Timothy Donovan	Neonatal Paediatrician, Royal Brisbane and Womens Hospital, Metro North Hospital and Health Service
Dr Gregory Duncombe	Staff Specialist, Maternal Fetal Medicine, Royal Brisbane and Women's Hospital, Metro North Hospital and Health Service
Joanne Ellerington	Principal Data Collections Officer, Health Statistics Branch, Queensland Department of Health
Associate Professor Julie McGaughran	Director, Genetic Health Queensland
Dr Trisha Johnston	Director, Statistical Analysis and Linkage Team, Health Statistics Branch, Queensland Department of Health
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Aboriginal and Torres Strait Islander Perinatal Health Sub-Committee (reconvened August 2014)	
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Dr Diane Payton	Staff Anatomical Pathologist, Pathology Queensland

Secretariat	
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APPENDIX D:
IMPROVE Program

Perinatal Mortaltiy Group
www.psanz.com.au

IMproving Perinatal Mortality Review & Outcomes Via Education (IMPROVE)

www.stillbirthalliance.org.au

The Perinatal Society of Australia and New Zealand (PSANZ) has developed Clinical Practice Guidelines for Perinatal Mortality to improve standards in clinical practice around the time of a perinatal death. The Australian and New Zealand Stillbirth Alliance (ANZSA) in collaboration with the PSANZ Perinatal Mortality Group has developed the IMPROVE educational program for maternity health care professionals to enhance the uptake of these guidelines. IMPROVE utilises the Structured, Clinical, Objective, Referenced, Problem-orientated, Integrated and Organised (SCORPIO) educational model designed for skills training (Ref) which involves small groups of learners rotating around six interactive learning stations that are each facilitated by an experienced educator.

IMPROVE involves: 1) a short introductory lecture; 2) six learning stations; and 3) formative assessment. Workshops are four hours in duration and are delivered by trained educators.

The learning stations:

1) Communicating with parents about perinatal autopsy
2) Autopsy and placental examination
3) Investigation of perinatal deaths
4) Examination of babies who die in the perinatal period
5) Audit and classification of perinatal deaths
6) Psychological and social aspects of perinatal bereavement

Who should attend?

The workshops are designed for health care professionals including obstetricians, midwives, neonatal nurses, neonatologists, pathologists, bereavement specialists, social workers, or those interested from a policy or public health perspective. IMPROVE workshops provide an opportunity for participants to understand the PSANZ Perinatal Mortality Guidelines in an interactive way.

IMPROVE program materials

A booklet of program materials is provided for each participant covering key aspects of the PSANZ Guidelines and other relevant documentation specific to that region. A certificate of completion is provided at the end of the IMPROVE program. This activity is endorsed with 4 MidPlus points from the Australian College of Midwives. Eligible fellows of RANZCOG can claim 3 CPD points in the PR&CRM category and 1 meeting point.

Queensland IMPROVE

To date IMPROVE has trained over 1200 health care professionals across Australia and New Zealand. In Queensland, the IMPROVE Program is overseen by the Perinatal Mortality Subcommittee of the QMPQC. For further information contact Vicki Flenady,vflenady@mmri.mater.org.au.

To arrange an IMPROVE workshop please contact the National IMPROVE Coordinator below.

IMPROVE Coordinator, ANZSA Coordinating Centre
Translating Research Into Practice Centre
Mater Medical Research Institute
Telephone: +61 7 3163 2119
Email: info@stillbirthalliance.org.au

APPENDIX E:
Statewide Maternity and Neonatal Clinical Network

The Queensland Maternal and Perinatal Quality Council has a close working relationship with the Statewide Maternity and Neonatal Clinical Network (SMNCN) and views that body as the peak clinical body in Queensland for maternity and newborn care. The Queensland Maternity and Neonatal Clinical Guidelines Program (QMNCPG) established by Queensland clinicians and working also in close partnership with both the SMNCN and the QMPQC, has an effective program of developing clinical guidelines with further work progressing on implementation and evaluation of health outcomes and healthcare research.

Guidelines may be accessed at www.health.qld.gov.au/qcg/html/publications.asp#maternity

Maternity Clinical Guideline Titles
Early pregnancy loss
Early onset Group B streptococcal disease
Hypertensive disorders of pregnancy
Induction of labour
Intrapartum fetal surveillance
Normal birth
Obesity
Perineal care
Preterm labour and birth
Primary postpartum haemorrhage
Stillbirth care
Therapeutic termination of pregnancy
Trauma in pregnancy
Vaginal birth after caesarean section (VBAC)
Venous thromboembolism (VTE) prophylaxis

Newborn Clinical Guideline Titles
Breastfeeding initiation
Hypoglycaemia - neonatal
Hypoxic ischaemic encephalopathy
Jaundice - neonatal
Neonatal abstinence syndrome
Perinatal care at the threshold of viability
Respiratory distress and the administration of CPAP
Resuscitation - neonatal
Routine newborn assessment
Seizures - neonatal
Stabilisation for retrieval - neonatal
Term small for gestational age baby

Operational Framework Titles
Maternity shared care
Non-urgent referral for antenatal care

Table E1: Clinical Practice Guidelines published by Queensland Clinical Guidelines Program as at January 2015.

APPENDIX F:
Institute of Medicine Guidelines re. Weight Gain During Pregnancy[42]

Recommended weight gain guidance is reproduced with conversion from pounds to kilograms and to nearest whole integer.

Prepregnancy BMI	BMI (kg/m2)	Total weight gain range	Rates of weight gain 2nd and 3rd trimester*
Underweight	‹18.5	12.5–18	0.45–0.6
Normal weight	18.5–24.9	11–16	0.4–0.5
Overweight	25.0–29.9	7–11.5	0.2–0.3
Obese	30+	5–9	0.2–0.25

***** Calculations assume a 0.5–2 kg weight gain in the first trimester (based on Siega-Riz et al., 1994; Abrams et al., 1995; Carmichael et al., 1997)

42 Rasmussen K, Abrams B, Bodnar L et al. Weight Gain During Pregnancy: Reexamining the Guidelines. Institute of Medicine of the National Academies. http://iom.edu/~/media/Files/Report%20Files/2009/Weight-Gain-During-Pregnancy-Reexamining-the-Guidelines/Report%20Brief%20-%20Weight%20Gain%20During%20Pregnancy

APPENDIX G: Acknowledgements

The Queensland Maternal and Perinatal Quality Council acknowledges and thanks the clinicians who have participated in hospital committee perinatal mortality review and classification.

We also thank the Perinatal Data Collection Team, in particular Joanne Ellerington and Colleen Morris, for their support in perinatal death review and reporting and in performing a major case ascertainment exercise relating to maternal deaths, Vesna Dunne and Taku Endo, Health Statistics Unit, for assistance with data retrieval, and Dr Trisha Johnston, Director Statistical Analysis and Linkage Team for advice and assistance with data interpretation.

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Cathy Urquhart, Manager, Healthcare Improvement Unit, Healthcare Innovation and Research Branch, Queensland Department of Health

Lucy Fisher, Executive Director, Private Hospitals Association of Qld Inc.

Helen Borradale and Angela Lynam, Regulatory Policy Unit, Queensland Department of Health.

The Media & Communications Unit, Queensland Department of Health.

The Queensland State Coroners, and the staff of the Office of the State Coroner.

Professor Charles Naylor, Chief Forensic Pathologist, Forensic and Scientific Services.

Samantha Mason, Executive Secretary to Chief Forensic Pathologist, Forensic and Scientific Services.

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Queensland Government