

Health Statistics Branch

Analysis prepared by the Statistical Analysis and Linkage Unit

A multivariate approach to the disparity in perinatal outcomes between Indigenous and non-Indigenous women, Queensland

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1 Background and Purpose

In Queensland, there is a long known disparity in perinatal death outcomes between Indigenous* and non-Indigenous women. In 2011, the stillbirth rate was 1.6 times higher for babies born to Indigenous women while the neonatal death rate was 2.8 times higher¹.

Several causal links relating to this disparity have been previously established. Babies of low birth weight or shorter gestation have an increased risk of perinatal death, while babies born to Indigenous women are more likely to be of lower birthweight and/or shorter gestation compared with babies born to non-Indigenous women². In turn, antenatal smoking and lack of antenatal care have been linked to increased risk of low birth weight and prematurity, with antenatal smoking and fewer antenatal care visits being more common among Indigenous women³⁻⁵.

Other relationships between risk factors and perinatal outcomes have been established, however the interplay between these predictors and Indigenous status have not been explored. Maternal overweight and obesity, older maternal age, maternal smoking, primiparity and pre-existing hypertension have been shown to increase the risk of stillbirth^{6,7}, while pre-existing diabetes is associated with increased risk of both fetal and infant death^{7,8}. Older maternal age, presence of pre-existing diabetes, hypertension and pre-eclampsia have also been shown to increase the risk of preterm birth⁹.

While previous research has investigated the causal relationships between various perinatal risk factors and outcomes, few have assessed the combined effect of these risk factors and particularly their impact by Indigenous status. This report broadly assesses known risk factors of adverse perinatal outcomes (i.e. stillbirths, neonatal deaths and preterm births) in order to:

- Identify those risk factors that best account for the disparity in perinatal outcomes between Indigenous and non-Indigenous women; and
- Identify those risk factors which contribute most strongly to perinatal outcomes.

2 Data

All singleton birth records for Queensland residents were extracted from the Queensland Perinatal Data Collection (PDC) from 2007/08 to 2011/12. Babies with a selected congenital anomaly (based on a modified list of the 'sentinel' conditions reported by the International Clearing House for Birth Defects Surveillance and Research (ICHBDSR)¹⁰) were excluded to remove potential confounding by intentional (but not identified) terminations. Identified terminations were also excluded (see section 9.2 *Definitions* for further details).

3 Statistical Methods

Stillbirths, neonatal deaths and preterm birth outcomes were individually modelled, however the same approach was taken in each case. Models were created for total mothers and also stratified by Indigenous status of the mother, in order to determine if any major differences in risk factors existed between Indigenous and non-Indigenous women. Analyses were conducted as follows:

- Relative risk ratios for all predictors of interest were estimated using Cox proportional hazards regression models with robust error variances¹¹.
- Predictors that were found to be significantly associated with the outcome at the univariate level (based on wald chi-square statistics ($p < 0.05$)) were retained in multivariate analyses.

* The term Indigenous is used through out this report when referring to Aboriginal and Torres Strait Islander people collectively.

- Multivariate analyses were performed using a nested model approach. Predictors were entered into the model in a series of ‘steps’, where each step was guided by the chronological or causal sequencing of predictors. Distal predictors such as Indigenous status and remoteness (ARIA+) were entered into the model in earlier steps, while proximate determinants such as birth weight and gestational age were entered in later steps. Such an approach allows distal predictors to be assessed before and after adjustment for more proximate determinants.
 - Level 1 predictors include underlying characteristics of the mother, in this case limited to Indigenous status*. This was only relevant to overall analyses, and not included in Indigenous/non-Indigenous specific analyses.
 - Level 2 predictors include demographic/socioeconomic (e.g. ARIA+[†], SEIFA[‡]) factors which aren’t necessarily genetic, but are likely to be present before the mother conceives.
 - Level 3 predictors include factors which arise after 20 weeks gestation, but before the actual birth.
 - Level 4 predictors include proximate factors which are determined at the end of the pregnancy.

For all analyses, relative risk ratios with 95% confidence limits are presented for relevant predictors. Additionally, directly attributable fractions (DAFs) are provided for selected predictors, which give the fraction of cases that can be exclusively attributed to the predictor of interest¹².

4 Mother Characteristics

Table 4.1 displays the distribution of all predictors/risk factors considered for analyses by the Indigenous status of the mother. The vast majority of risk factors are more prevalent among Indigenous mothers than non-Indigenous. Several noteworthy differences are evident. Compared with non-Indigenous mothers, Indigenous mothers are:

- 4.2 times more likely to be under 20 years of age (19.4% vs. 4.6%);
- 3.8 times more likely to attend less than 5 antenatal visits[§] (20.7% vs. 5.5%);
- Over 12 times more likely to live remotely/very remotely, which may influence care accessibility;
- 3.1 times more likely to be unmarried/not in a de facto relationship, which may be indicative of poor social support (36.3% vs. 11.7%); and
- 3.6 times more likely to be smoking after 20 weeks gestation (45.9% vs. 12.7%).

Additionally, babies born to Indigenous women are 1.7 times more likely to be born preterm (before 37 weeks gestation) compared with babies born to non-Indigenous women (10.8% vs. 6.4%). Records with “unknown” or unreported responses are also higher in Indigenous women. This is particularly evident for BMI, which could not be determined for 9% of Indigenous women compared with 3.5% of non-Indigenous women. Gestational hypertension was less prevalent in Indigenous women (2.5% vs. 2.9%), but this may be the result of shorter (on average) gestational periods for

* While Indigenous status is a self-identified characteristic and can change over time, this was simplified for the purpose of this analysis to be as reported at the time of a specific birth.

[†] Accessibility/Remoteness Index of Australia

[‡] Socio-Economic Indexes for Areas

[§] Antenatal visits is potentially confounded by length of gestation. That is, mothers who have longer gestations are likely to attend more antenatal visits on average.

Indigenous women (such that gestational conditions are less likely to develop) or lower rates of antenatal care attendance such that those conditions may be less likely to be diagnosed.

Table 4.1 Distribution/prevalence of predictors/risk factors by Indigenous Status*, 2007/08-2011/12, Queensland[^].

Predictor / Risk Factor		Indigenous*	Non-Indigenous*	Total
Age Category	<20	3,268 (19.4)	12,849 (4.6)	16,117 (5.5)
	20-34	12,001 (71.1)	209,274 (75.3)	221,275 (75.1)
	35-39	953 (5.6)	33,111 (11.9)	34,064 (11.6)
	40+	662 (3.9)	22,640 (8.1)	23,302 (7.9)
Anaemia	No	16,151 (95.7)	272,566 (98.1)	288,717 (98.0)
	Yes	733 (4.3)	5,308 (1.9)	6,041 (2.0)
Antenatal Visits	<2/Unknown	812 (4.8)	1,846 (0.7)	2,658 (0.9)
	2-4	2,684 (15.9)	13,455 (4.8)	16,139 (5.5)
	5+	13,388 (79.3)	262,573 (94.5)	275,961 (93.6)
Antepartum Haemorrhage	No	16,359 (96.9)	265,785 (95.6)	282,144 (95.7)
	Yes	525 (3.1)	12,089 (4.4)	12,614 (4.3)
ARIA+	Major City/Inner Regional	7,073 (41.9)	230,074 (82.8)	237,147 (80.5)
	Outer Regional	5,712 (33.8)	42,380 (15.3)	48,092 (16.3)
	Remote/Very Remote	4,099 (24.3)	5,420 (2.0)	9,519 (3.2)
BMI Category	Underweight <18.50	1,005 (6.0)	12,302 (4.4)	13,307 (4.5)
	Normal 18.50-24.99	6,164 (36.5)	135,536 (48.8)	141,700 (48.1)
	Overweight 25-29.99	3,960 (23.5)	67,415 (24.3)	71,375 (24.2)
	Obese 30+	4,233 (25.1)	52,983 (19.1)	57,216 (19.4)
	Unknown	1,522 (9.0)	9,638 (3.5)	11,160 (3.8)
Chronic Kidney Disease	No	16,875 (99.9)	277,784 (100.0)	294,659 (100.0)
	Yes	9 (0.1)	90 (0.0)	99 (0.0)
Gestational Weeks	<24 weeks	94 (0.6)	555 (0.2)	649 (0.2)
	25-27 weeks	121 (0.7)	828 (0.3)	949 (0.3)
	28-31 weeks	217 (1.3)	1,626 (0.6)	1,843 (0.6)
	32-36 weeks	1,390 (8.2)	14,712 (5.3)	16,102 (5.5)
	37-41 weeks	14,961 (88.6)	258,326 (93.0)	273,287 (92.7)
	42+ weeks	92 (0.5)	1,810 (0.7)	1,902 (0.6)
	Unknown	9 (0.1)	17 (0.0)	26 (0.0)
Gestational Diabetes	No	15,701 (93.0)	262,257 (94.4)	277,958 (94.3)
	Yes	1,183 (7.0)	15,617 (5.6)	16,800 (5.7)
Gestational Hypertension	No	16,464 (97.5)	269,801 (97.1)	286,265 (97.1)
	Yes	420 (2.5)	8,073 (2.9)	8,493 (2.9)
Lower Birth Weight 10th Percentile	No	14,354 (85.0)	254,213 (91.5)	268,567 (91.1)
	Yes	2,509 (14.9)	23,602 (8.5)	26,111 (8.9)
	Unknown	21 (0.1)	59 (0.0)	80 (0.0)
Marital Status	Married/De Facto	10,763 (63.7)	245,357 (88.3)	256,120 (86.9)
	Not Married/De Facto	6,121 (36.3)	32,517 (11.7)	38,638 (13.1)
Previous Caesarean Section	No	14,038 (83.1)	228,734 (82.3)	242,772 (82.4)
	Yes	2,845 (16.9)	49,133 (17.7)	51,978 (17.6)
	Unknown	1 (0.0)	7 (0.0)	8 (0.0)
Previous stillbirth	No	16,376 (97.0)	273,642 (98.5)	290,018 (98.4)
	Yes	508 (3.0)	4,232 (1.5)	4,740 (1.6)
Pre-existing Diabetes	No	16,670 (98.7)	276,363 (99.5)	293,033 (99.4)
	Yes	214 (1.3)	1,511 (0.5)	1,725 (0.6)
Pre-eclampsia	No	16,392 (97.1)	271,808 (97.8)	288,200 (97.8)
	Yes	492 (2.9)	6,066 (2.2)	6,558 (2.2)
Pre-existing Hypertension	No	16,739 (99.1)	276,211 (99.4)	292,950 (99.4)
	Yes	145 (0.9)	1,663 (0.6)	1,808 (0.6)
Primiparity	Not Primiparous	11,695 (69.3)	163,470 (58.8)	175,165 (59.4)
	Primiparous	5,189 (30.7)	114,404 (41.2)	119,593 (40.6)
SEIFA	1 Least Advantaged	8,538 (50.6)	53,285 (19.2)	61,823 (21.0)
	2	4,628 (27.4)	58,144 (20.9)	62,772 (21.3)
	3	1,910 (11.3)	56,713 (20.4)	58,623 (19.9)
	4	1,231 (7.3)	58,357 (21.0)	59,588 (20.2)
	5 Most Advantaged	577 (3.4)	51,375 (18.5)	51,952 (17.6)
Smoking after 20 weeks gestation	No	8,881 (52.6)	240,623 (86.6)	249,504 (84.6)
	Yes	7,750 (45.9)	35,368 (12.7)	43,118 (14.6)
	Unknown	253 (1.5)	1,883 (0.7)	2,136 (0.7)
Smoking before 20 weeks gestation (and not after) ⁺	No	9,770 (57.9)	161,783 (58.2)	171,553 (58.2)
	Yes	598 (3.5)	4,430 (1.6)	5,028 (1.7)
	Unknown	6,516 (38.6)	111,661 (40.2)	118,177 (40.1)
Urinary Tract Infection	No	16,776 (99.4)	277,380 (99.8)	294,156 (99.8)
	Yes	108 (0.6)	494 (0.2)	602 (0.2)

[^] Excludes multiple births, babies with selected congenital anomalies and identified terminations of pregnancy (see section 9.2 *Definitions* for further details).

* Based on Indigenous status recorded for the mother in each specific birth.

+ Smoking status prior to 20 weeks gestation was not available prior to 2009/10. Hence, all records from 2007/08 and 2008/09 included in 'Unknown' category.

5 Stillbirths

All in scope (see section 2 *Data*) births were included in analyses.

5.1 Univariate Analyses (Stillbirth)

Univariate relative risk ratios (RRRs) for stillbirth are displayed in Table 5.1, by Indigenous status of the mother and for total mothers. For brevity, only those predictors/risk factors that showed a significant association with stillbirth are displayed.

Table 5.1 Univariate relative risk ratios and 95% confidence intervals for significant predictors/risk factors of stillbirth, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Relative Risk Ratio (95% CI)		
		Indigenous*	Non-Indigenous*	Total
Age Category	<20	1.05 (0.67, 1.65)	1.79 (1.44, 2.22)	1.73 (1.43, 2.10)
	20-34	Referent	Referent	Referent
	35-39	1.95 (1.09, 3.48)	1.28 (1.09, 1.51)	1.29 (1.10, 1.51)
	40+	1.73 (0.84, 3.55)	1.31 (1.08, 1.58)	1.30 (1.08, 1.57)
Antenatal Visits	<2/Unknown	10.46 (6.80, 16.09)	23.12 (19.04, 28.08)	20.33 (17.09, 24.19)
	2-4	4.22 (2.83, 6.29)	11.41 (10.11, 12.89)	10.31 (9.18, 11.59)
	5+	Referent	Referent	Referent
Antepartum Haemorrhage	No	Referent	Referent	Referent
	Yes	13.51 (9.37, 19.47)	7.62 (6.71, 8.66)	7.94 (7.03, 8.96)
BMI Category	Underweight <18.50	1.70 (0.85, 3.42)	1.17 (0.86, 1.58)	1.27 (0.96, 1.67)
	Normal 18.50-24.99	Referent	Referent	Referent
	Overweight 25-29.99	0.95 (0.56, 1.61)	1.24 (1.06, 1.44)	1.22 (1.06, 1.41)
	Obese 30+	1.38 (0.86, 2.19)	1.61 (1.38, 1.87)	1.61 (1.40, 1.86)
Chronic Kidney Disease	No	n.c.	Referent	Referent
	Yes	n.c.	7.75 (2.56, 23.48)	6.72 (2.20, 20.48)
Gestational Weeks	<24 weeks	238.74 (157.64, 361.57)	602.35 (529.48, 685.25)	553.09 (488.79, 625.86)
	25-27 weeks	78.31 (45.36, 135.20)	206.19 (174.03, 244.29)	189.58 (161.21, 222.93)
	28-31 weeks	20.68 (9.94, 43.04)	79.16 (65.21, 96.10)	71.12 (58.98, 85.76)
	32-36 weeks	8.61 (5.05, 14.69)	12.21 (10.21, 14.61)	11.97 (10.10, 14.19)
	37-41 weeks	Referent	Referent	Referent
	42+ weeks	10.84 (2.63, 44.70)	1.48 (0.48, 4.62)	2.25 (0.93, 5.44)
Gestational Hypertension	No	Referent	Referent	Referent
	Yes	0.31 (0.04, 2.19)	0.62 (0.41, 0.95)	0.59 (0.39, 0.89)
Indigenous Status*	Non-Indigenous	n.a.	n.a.	Referent
	Aboriginal and Torres Strait Islander	n.a.	n.a.	1.76 (1.47, 2.11)
Lower Birth Weight 10th Percentile	No	Referent	Referent	Referent
	Yes	3.69 (2.58, 5.27)	5.22 (4.63, 5.88)	5.13 (4.57, 5.74)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	1.23 (0.86, 1.74)	1.64 (1.42, 1.90)	1.67 (1.46, 1.91)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	1.57 (0.70, 3.55)	3.33 (2.57, 4.32)	3.14 (2.45, 4.02)
Pre-existing Diabetes	No	Referent	Referent	Referent
	Yes	5.85 (3.01, 11.35)	3.40 (2.24, 5.17)	4.05 (2.84, 5.76)
Pre-eclampsia	No	Referent	Referent	Referent
	Yes	0.79 (0.25, 2.48)	2.56 (1.99, 3.28)	2.36 (1.85, 3.01)
Pre-existing Hypertention	No	Referent	Referent	Referent
	Yes	5.64 (2.53, 12.57)	3.38 (2.26, 5.05)	3.73 (2.61, 5.34)
SEIFA	1 Least Advantaged	0.88 (0.36, 2.17)	1.32 (1.09, 1.59)	1.40 (1.17, 1.67)
	2	0.97 (0.38, 2.46)	1.34 (1.11, 1.60)	1.38 (1.16, 1.65)
	3	0.73 (0.26, 2.05)	1.11 (0.92, 1.34)	1.11 (0.92, 1.34)
	4	0.75 (0.25, 2.28)	1.06 (0.87, 1.28)	1.05 (0.87, 1.27)
	5 Most Advantaged	Referent	Referent	Referent
Smoking after 20 weeks gestation	No	Referent	Referent	Referent
	Yes	1.23 (0.85, 1.76)	1.54 (1.33, 1.78)	1.58 (1.38, 1.80)

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

Shaded cells indicate non-significant predictor/risk factor.

* Based on Indigenous status recorded for the mother in each specific birth.

n.c. No Cases.

n.a. Not Applicable.

More detailed information from Table 5.1, including number of cases, number of births and wald statistics for all risk factors, is included in section 9.3 *Expanded Analyses Results*. Risk factors that were not found to be significant for Indigenous, non-Indigenous or total mothers were anaemia, ARIA+, gestational diabetes, previous caesarean section, primiparity, smoking before 20 weeks gestation (and not after) and urinary tract infection.

For Indigenous women, the risk of stillbirth was 1.8 times higher than for non-Indigenous women. Gestational hypertension was the only risk factor to display a significant protective association with stillbirth but this is likely the result of confounding by gestational age (see section 5.2).

In general, relative risk ratios did not significantly differ between Indigenous and non-Indigenous women, with the exception of antenatal visits and gestational weeks (of 31 weeks or less). These differences are partially due to higher stillbirth rates in the referent groups for Indigenous women, which in turn cause the relative risk ratios to appear lower. The relative risk of stillbirth for women with antepartum haemorrhage was also more pronounced for Indigenous women than for non-Indigenous.

Several risk factors were significant for non-Indigenous women but failed to reach significance for Indigenous women (shaded cells in Table 5.1), including maternal age, maternal BMI, gestational hypertension, marital status, having had a previous stillbirth, pre-eclampsia and smoking after 20 weeks gestation.

Despite these differences, the strongest predictors were consistent for Indigenous, non-Indigenous and total mothers, with prematurity, inadequate antenatal visits, antepartum haemorrhage, low birth weight for gestational age, pre-existing diabetes and pre-existing hypertension displaying the strongest univariate associations with stillbirth.

5.2 Multivariate Analyses (Stillbirth)

All significant predictors from Table 5.1 were retained in multivariate analyses. Predictors were entered sequentially into a nested cox (proportional hazards) regression model, with distal predictors being entered in the initial steps and more proximate determinants being entered in the later steps (see section 3 *Statistical Methods*). Models were created for total mothers and stratified by Indigenous status.

Table 5.2 displays the stepwise, adjusted relative risk ratios (aRRR) for significant univariate predictors of stillbirth. The risk of stillbirth was 1.7 times higher for babies born to Indigenous women at the univariate level (step 1), but the risk decreased when distal risk factors were taken into account (step 2) and decreased again almost to the point of non-significance in step 3. This result suggests that the disparity in stillbirths between Indigenous and non-Indigenous women is due to other distal risk factors more so than to the Indigenous status of the mother. Several other distal/non-proximate risk factors (aside from the Indigenous status of the mother) increased the risk of stillbirth, including young and old maternal age, overweight and obese maternal BMI, pre-existing diabetes, pre-existing hypertension, having had a previous stillbirth, antepartum haemorrhage, pre-eclampsia and smoking after 20 weeks gestation.

Finally, with the inclusion of proximate determinants such as gestational weeks (step 4), the Indigenous status of the mother was no longer statistically significant (along with several other risk factors which had been significant in previous steps). Pre-eclampsia, which in step 3 significantly increased the risk of stillbirth, in step 4 displayed a protective relationship. Further investigation showed that this result was due to an interaction effect between pre-eclampsia, gestational weeks and low birth weight for gestational age: when pre-eclampsia is identified in the mother, a typical course of action results in the baby being delivered preterm (and likely small for gestational age), but because of extra monitoring the baby has an increased chance of survival, and hence a protective effect is observed. Conversely, gestational hypertension, which was significantly protective in step 3, failed to reach significance in step 4. Investigation showed this to be the result of confounding by gestational age i.e. gestational hypertension is more likely to be detected in

longer pregnancies, which results in an apparent protective effect when not adjusting for gestational age.

Table 5.2 Adjusted⁺ relative risk ratios and 95% confidence intervals for selected predictors/risk factors of stillbirth 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Step 1 RRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)	Step 4 aRRR (95% CI)
Indigenous Status*	Non-Indigenous Aboriginal and Torres Strait Islander	Referent 1.68 (1.36, 2.07)	Referent 1.34 (1.07, 1.67)	Referent 1.29 (1.03, 1.62)	Referent 0.85 (0.69, 1.05)
Age Category	<20		1.37 (1.08, 1.74)	1.42 (1.12, 1.80)	1.29 (1.03, 1.60)
	20-34		Referent	Referent	Referent
	35-39		1.32 (1.10, 1.57)	1.28 (1.07, 1.52)	1.07 (0.91, 1.25)
	40+		1.32 (1.08, 1.62)	1.28 (1.04, 1.57)	1.08 (0.90, 1.29)
BMI Category	Underweight <18.50		1.21 (0.91, 1.60)	1.15 (0.87, 1.52)	0.83 (0.65, 1.06)
	Normal 18.50-24.99		Referent	Referent	Referent
	Overweight 25-29.99		1.18 (1.02, 1.37)	1.21 (1.04, 1.40)	1.25 (1.10, 1.43)
	Obese 30+		1.44 (1.24, 1.67)	1.48 (1.27, 1.72)	1.47 (1.29, 1.68)
Chronic Kidney Disease	No		Referent	Referent	Referent
	Yes		3.49 (1.14, 10.73)	1.83 (0.64, 5.21)	0.99 (0.38, 2.58)
Marital Status	Married/De Facto		Referent	Referent	Referent
	Not Married/De Facto		1.31 (1.11, 1.55)	1.20 (1.01, 1.42)	0.92 (0.79, 1.07)
Pre-existing Diabetes	No		Referent	Referent	Referent
	Yes		3.00 (2.00, 4.51)	2.84 (1.88, 4.28)	1.99 (1.30, 3.06)
Pre-existing Hypertension	No		Referent	Referent	Referent
	Yes		2.80 (1.86, 4.21)	2.62 (1.77, 3.89)	0.83 (0.60, 1.16)
Previous stillbirth	No		Referent	Referent	Referent
	Yes		2.59 (1.94, 3.47)	2.35 (1.75, 3.14)	1.15 (0.90, 1.48)
SEIFA	1 Least Advantaged		1.22 (0.99, 1.50)	1.26 (1.02, 1.55)	0.94 (0.78, 1.13)
	2		1.31 (1.08, 1.61)	1.33 (1.08, 1.62)	1.16 (0.97, 1.38)
	3		1.08 (0.88, 1.33)	1.12 (0.90, 1.38)	1.04 (0.86, 1.25)
	4		1.09 (0.89, 1.35)	1.15 (0.93, 1.42)	1.05 (0.87, 1.26)
	5 Most Advantaged		Referent	Referent	Referent
Antepartum Haemorrhage	No			Referent	Referent
	Yes			7.63 (6.65, 8.75)	1.59 (1.37, 1.84)
Gestational Hypertension	No			Referent	Referent
	Yes			0.54 (0.34, 0.86)	0.68 (0.44, 1.06)
Pre-eclampsia	No			Referent	Referent
	Yes			2.12 (1.62, 2.78)	0.63 (0.48, 0.83)
Smoking after 20 weeks gestation	No			Referent	Referent
	Yes			1.36 (1.17, 1.59)	1.02 (0.88, 1.17)
Antenatal Visits	<2/Unknown				1.39 (1.11, 1.75)
	2-4				1.38 (1.20, 1.59)
	5+				Referent
Gestational Weeks	<24 weeks				292.48 (239.42, 357.30)
	25-27 weeks				152.65 (123.68, 188.40)
	28-31 weeks				65.41 (52.07, 82.17)
	32-36 weeks				11.56 (9.63, 13.88)
	37-41 weeks				Referent
42+ weeks				1.45 (0.46, 4.51)	
Lower Birth Weight 10th Percentile	No				Referent
	Yes				3.37 (2.98, 3.82)

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Shaded cells indicate non-significant predictor/risk factor.

In the fully developed model (step 4), the strongest predictors of stillbirth were prematurity (aRRR>11.6), low birth weight for gestational age (aRRR=3.4), pre-existing diabetes (aRRR=2.0), antepartum haemorrhage (aRRR=1.6), inadequate antenatal care (aRRR=1.4) and maternal obesity (aRRR=1.5) and overweight (aRRR=1.3).

Analysis of directly attributable fractions (DAF) indicated those risk factors that accounted for the greatest proportion of stillbirths. Of the total number of stillbirths (N=1,333^a over the analysis period), 23% were exclusively attributable to prematurity, 6% were due only to low birth weight, 3% to maternal overweight and obesity and 3% to inadequate antenatal care.

Table 5.3 and Table 5.4 display the stepwise, adjusted relative risk ratios for Indigenous and non-Indigenous women respectively.

For births to Indigenous women, all three distal/non-proximate risk factors (steps 1 and 2) significantly increased the risk of stillbirth, including pre-existing diabetes, pre-existing hypertension and antepartum haemorrhage.

In the fully developed model (step 3), the strongest predictors were prematurity (aRRR>6.9), pre-existing diabetes (aRRR=4.1), low birth weight for gestational age (aRRR=3.2) and antepartum haemorrhage (aRRR=2.2). Of the total number of stillbirths (N=129^a), 18% were exclusively attributable to prematurity, 7% were due only to low birth weight and 4% to inadequate antenatal care.

Table 5.3 Adjusted* relative risk ratios and 95% confidence intervals for selected predictors/risk factors of stillbirth for Indigenous mothers*, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Step 1 aRRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)
Pre-existing Diabetes	No	Referent	Referent	Referent
	Yes	4.62 (2.05, 10.44)	4.42 (2.05, 9.53)	4.09 (1.80, 9.30)
Pre-existing Hypertension	No	Referent	Referent	Referent
	Yes	3.61 (1.34, 9.71)	3.22 (1.30, 7.93)	1.76 (0.83, 3.77)
Antepartum Haemorrhage	No		Referent	Referent
	Yes		12.81 (8.81, 18.61)	2.16 (1.37, 3.41)
Antenatal Visits	<2/Unknown			1.65 (0.99, 2.74)
	2-4			1.43 (0.94, 2.18)
	5+			Referent
Gestational Weeks	<24 weeks			113.20 (60.41, 212.12)
	25-27 weeks			48.80 (26.24, 90.77)
	28-31 weeks			13.47 (6.09, 29.79)
	32-36 weeks			6.92 (4.03, 11.89)
	37-41 weeks			Referent
42+ weeks			10.91 (2.65, 44.83)	
Lower Birth Weight 10th Percentile	No			Referent
	Yes			3.22 (2.28, 4.56)

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Shaded cells indicate non-significant predictor/risk factor.

Results for births to non-Indigenous women reflected those of total mothers: significant distal/non-proximate risk factors included young and old maternal age, overweight and obese maternal BMI, pre-existing diabetes, pre-existing hypertension, having had a previous stillbirth, antepartum haemorrhage, pre-eclampsia and smoking after 20 weeks gestation.

In the fully developed model (step 3), the strongest predictors were prematurity (aRRR>12.0), low birth weight for gestational age (aRRR=3.3), pre-existing diabetes (aRRR=1.8), antepartum haemorrhage (aRRR=1.6), inadequate antenatal care (aRRR=1.4) and maternal obesity (aRRR=1.5) and overweight (aRRR=1.3). Of the total number of stillbirths (N=1,204^a), 23% were

^a Refers to the total number of stillbirths, and is not necessarily the number used in the modelling process (due to exclusion of unknown/indeterminate data elements).

exclusively attributable to prematurity, 5% were due only to low birth weight, 3% to maternal overweight and obesity and 3% to inadequate antenatal care.

Table 5.4 Adjusted* relative risk ratios and 95% confidence intervals for selected predictors/risk factors of stillbirth for non-Indigenous mothers*, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Step 1 aRRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)
Age Category	<20	1.47 (1.13, 1.91)	1.50 (1.15, 1.94)	1.36 (1.06, 1.74)
	20-34	Referent	Referent	Referent
	35-39	1.31 (1.09, 1.57)	1.27 (1.06, 1.53)	1.05 (0.89, 1.23)
	40+	1.32 (1.07, 1.64)	1.28 (1.04, 1.58)	1.07 (0.89, 1.29)
BMI Category	Underweight <18.50	1.14 (0.84, 1.56)	1.09 (0.80, 1.48)	0.83 (0.63, 1.08)
	Normal 18.50-24.99	Referent	Referent	Referent
	Overweight 25-29.99	1.21 (1.04, 1.41)	1.24 (1.06, 1.44)	1.30 (1.13, 1.49)
	Obese 30+	1.47 (1.26, 1.72)	1.50 (1.29, 1.76)	1.46 (1.27, 1.68)
Chronic Kidney Disease	No	Referent	Referent	Referent
	Yes	4.10 (1.32, 12.75)	2.51 (0.93, 6.75)	1.22 (0.47, 3.22)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	1.34 (1.12, 1.60)	1.21 (1.01, 1.45)	0.92 (0.79, 1.08)
Pre-existing Diabetes	No	Referent	Referent	Referent
	Yes	2.72 (1.69, 4.36)	2.59 (1.62, 4.13)	1.78 (1.12, 2.85)
Pre-existing Hypertension	No	Referent	Referent	Referent
	Yes	2.60 (1.66, 4.07)	2.40 (1.54, 3.74)	0.71 (0.51, 1.00)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	2.83 (2.09, 3.83)	2.56 (1.90, 3.47)	1.27 (0.99, 1.64)
SEIFA	1 Least Advantaged	1.21 (0.98, 1.50)	1.25 (1.01, 1.54)	0.96 (0.80, 1.16)
	2	1.30 (1.06, 1.60)	1.31 (1.07, 1.61)	1.16 (0.97, 1.39)
	3	1.07 (0.87, 1.33)	1.11 (0.90, 1.38)	1.03 (0.85, 1.24)
	4	1.10 (0.89, 1.36)	1.15 (0.93, 1.42)	1.06 (0.88, 1.28)
	5 Most Advantaged	Referent	Referent	Referent
Antepartum Haemorrhage	No		Referent	Referent
	Yes		7.38 (6.39, 8.53)	1.57 (1.35, 1.83)
Gestational Hypertension	No		Referent	Referent
	Yes		0.55 (0.34, 0.89)	0.69 (0.44, 1.09)
Pre-eclampsia	No		Referent	Referent
	Yes		2.25 (1.71, 2.97)	0.64 (0.49, 0.85)
Smoking after 20 weeks gestation	No		Referent	Referent
	Yes		1.38 (1.17, 1.62)	1.02 (0.88, 1.18)
Antenatal Visits	<2/Unknown			1.36 (1.07, 1.74)
	2-4			1.35 (1.17, 1.56)
	5+			Referent
Gestational Weeks	<24 weeks			317.42 (257.77, 390.88)
	25-27 weeks			167.29 (134.39, 208.23)
	28-31 weeks			74.09 (58.62, 93.65)
	32-36 weeks			11.95 (9.86, 14.48)
	37-41 weeks			Referent
Lower Birth Weight 10th Percentile	No			Referent
	Yes			3.30 (2.90, 3.76)

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

^ Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Shaded cells indicate non-significant predictor/risk factor.

Distal/non-proximate risk factors that were significantly associated with stillbirths for Indigenous, non-Indigenous and total mothers were antepartum haemorrhage, pre-existing diabetes and pre-existing hypertension, while the most important proximate determinants were prematurity, low birth weight for gestational age and inadequate antenatal care.

6 Neonatal Deaths

Neonatal death was defined as deaths among liveborn infants within the first 28 days of life. All in scope (see section 2 *Data*) *livebirths* were included in analyses. Gestational weeks categories of '37-41 weeks' and '42+ weeks', which were separated in stillbirth analyses, were collapsed due to inadequate cases of neonatal death in the '42+' category. Similarly, SEIFA categories of '4' and '5 Most Advantaged' were collapsed for Indigenous women due to inadequate cases of neonatal death in the '5 Most Advantaged' category.

6.1 Univariate Analyses (Neonatal Death)

Univariate relative risk ratios (RRRs) for neonatal deaths are displayed in Table 6.1, by the Indigenous status of the mother and for total mothers. Only significant predictors/risk factors of neonatal death are displayed. More detailed information (number of cases, number of livebirths, wald statistics etc.) is included section 9.3 *Expanded Analyses Results*. Risk factors that were not significant for Indigenous, non-Indigenous or total mothers were anaemia, chronic kidney disease, previous caesarean section, pre-existing diabetes, pre-existing hypertension, primiparity, smoking before 20 weeks gestation (and not after) and urinary tract infection.

For babies born to Indigenous women, the risk of neonatal death was 2.7 times higher than for babies of non-Indigenous women. Gestational diabetes and gestational hypertension exhibited significant protective associations but this was again the result of confounding by gestational age (i.e. gestational conditions are more likely to be detected in longer pregnancies), and disappears after adjusting for gestational age (see section 6.2).

The statistical significance of univariate relative risk ratios differed between Indigenous and non-Indigenous women for only antenatal visits and gestational weeks (of 24 weeks or less). Similarly as was found for stillbirths, these differences are due to higher neonatal death rates in the referent groups for Indigenous women.

Significance of risk factors varied between Indigenous status of mother (cells relating to non-significant risk factors are shaded in Table 6.1). Among Indigenous women, maternal age, maternal BMI, pre-eclampsia, primiparity, SEIFA and smoking after 20 weeks gestation were not statistically significant. Low birth weight for gestational age, based on 10th percentile cut-off, was not significant for Indigenous women and as a result the cut-off was restricted to 3rd percentile. Among non-Indigenous women, ARIA+ and gestational diabetes were not significant and for total women, maternal age and primiparity were not significant.

The strongest predictors were however consistent for Indigenous, non-Indigenous and total mothers, with prematurity, inadequate antenatal care, antepartum haemorrhage, low birth weight for gestational age, having had a previous stillbirth and being unmarried/not in a de facto relationship displaying the strongest univariate associations.

6.2 Multivariate Analyses (Neonatal Death)

All significant predictors from Table 6.1 were retained in multivariate analyses. Predictors were entered sequentially into a nested cox (proportional hazards) regression model, with distal predictors being entered in the initial steps and proximate determinants being entered in the later steps (see section 3 *Statistical Methods*). Separate models were created for total women and stratified by Indigenous status.

Table 6.2 displays the stepwise, adjusted relative risk ratios for significant univariate predictors of neonatal death. The risk of neonatal death was 2.6 times higher for babies of Indigenous women at the univariate level (step 1), but the risk decreased when distal risk factors were taken into account (step 2) and decreased slightly further again in step 3. This result suggests that the disparity in neonatal deaths between Indigenous and non-Indigenous women is only slightly attributable to other (measured) distal factors; even after accounting for a variety of other risk factors, there is still a significantly higher risk of neonatal death for babies born to Indigenous women.

Table 6.1 Univariate relative risk ratios and 95% confidence intervals for significant predictors/risk factors of neonatal death, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Relative Risk Ratio (95% CI)		
		Indigenous*	Non-Indigenous*	Total
Age Category	<20	0.60 (0.32, 1.14)	1.54 (1.08, 2.20)	1.45 (1.07, 1.98)
	20-34	Referent	Referent	Referent
	35-39	0.57 (0.18, 1.80)	1.34 (1.04, 1.72)	1.20 (0.94, 1.53)
	40+	0.54 (0.13, 2.22)	1.16 (0.85, 1.59)	1.05 (0.77, 1.42)
Antenatal Visits	<2/Unknown	15.90 (9.37, 26.97)	27.87 (20.69, 37.54)	27.85 (21.72, 35.71)
	2-4	5.23 (3.12, 8.78)	13.33 (11.05, 16.08)	12.26 (10.28, 14.62)
	5+	Referent	Referent	Referent
Antepartum Haemorrhage	No	Referent	Referent	Referent
	Yes	14.43 (9.11, 22.87)	8.90 (7.34, 10.80)	9.18 (7.68, 10.98)
ARIA+	Major City/Inner Regional	0.56 (0.33, 0.96)	0.88 (0.70, 1.12)	0.74 (0.60, 0.91)
	Outer Regional	Referent	Referent	Referent
	Remote/Very Remote	1.14 (0.69, 1.89)	0.74 (0.36, 1.52)	1.50 (1.03, 2.19)
BMI Category	Underweight <18.50	1.54 (0.63, 3.76)	0.71 (0.40, 1.27)	0.91 (0.56, 1.48)
	Normal 18.50-24.99	Referent	Referent	Referent
	Overweight 25-29.99	1.23 (0.68, 2.25)	1.04 (0.81, 1.33)	1.09 (0.87, 1.37)
	Obese 30+	0.85 (0.44, 1.64)	1.56 (1.23, 1.97)	1.50 (1.20, 1.87)
Gestational Weeks	<24 weeks	878.78 (524.28, 1472.98)	1773.39 (1491.90, 2107.99)	1669.92 (1417.18, 1967.74)
	24-27 weeks	176.72 (91.61, 340.87)	341.93 (269.94, 433.13)	325.14 (260.38, 406.01)
	28-31 weeks	19.26 (6.45, 57.53)	48.99 (34.32, 69.94)	45.24 (32.25, 63.47)
	32-36 weeks	2.20 (0.64, 7.59)	5.93 (4.23, 8.30)	5.51 (3.98, 7.61)
	37+ weeks	Referent	Referent	Referent
Gestational Diabetes	No	n.c.	Referent	Referent
	Yes	n.c.	0.63 (0.39, 1.00)	0.53 (0.33, 0.84)
Gestational Hypertension	No	n.c.	Referent	Referent
	Yes	n.c.	0.40 (0.18, 0.90)	0.35 (0.16, 0.78)
Indigenous Status*	Non-Indigenous	n.a.	n.a.	Referent
	Aboriginal and Torres Strait Islander	n.a.	n.a.	2.74 (2.17, 3.45)
Lower Birth Weight 3rd Percentile	No	Referent	n.a.	n.a.
	Yes	2.51 (1.26, 5.02)	n.a.	n.a.
Lower Birth Weight 10th Percentile	No	Referent	Referent	Referent
	Yes	1.43 (0.81, 2.51)	1.76 (1.37, 2.28)	1.80 (1.42, 2.27)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	1.56 (1.02, 2.40)	1.89 (1.52, 2.35)	2.08 (1.72, 2.51)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	3.94 (1.98, 7.82)	2.57 (1.63, 4.07)	3.11 (2.13, 4.54)
Pre-eclampsia	No	Referent	Referent	Referent
	Yes	0.82 (0.20, 3.33)	2.67 (1.83, 3.91)	2.39 (1.66, 3.45)
Primiparity	Not Primiparous	Referent	Referent	Referent
	Primiparous	0.92 (0.57, 1.47)	1.23 (1.03, 1.47)	1.14 (0.97, 1.35)
SEIFA	1 Least Advantaged	3.25 (1.01, 10.43)	1.71 (1.28, 2.29)	2.04 (1.55, 2.70)
	2	3.52 (1.07, 11.59)	1.39 (1.03, 1.88)	1.62 (1.22, 2.16)
	3	2.21 (0.57, 8.52)	1.31 (0.96, 1.77)	1.37 (1.01, 1.85)
	4	Referent	1.21 (0.89, 1.64)	1.23 (0.91, 1.67)
	5 Most Advantaged	Referent	Referent	Referent
Smoking after 20 weeks gestation	No	Referent	Referent	Referent
	Yes	1.44 (0.93, 2.22)	1.63 (1.30, 2.04)	1.88 (1.55, 2.28)

[^] Excludes stillbirths, multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

Shaded cells indicate non-significant predictor/risk factor.

* Based on Indigenous status recorded for the mother in each specific birth.

n.c. No Cases.

n.a. Not Applicable.

Other distal/non-proximate risk factors of significance were maternal obesity, being unmarried/not in a de facto relationship (which may indicate poor social support), having had a previous stillbirth, antepartum haemorrhage, pre-eclampsia and smoking after 20 weeks gestation.

With the inclusion of proximate determinants such as gestational weeks (step 4), Indigenous status of the mother failed to reach statistical significance (along with several other risk factors which had been significant in previous steps).

Table 6.2 Adjusted* relative risk ratios and 95% confidence intervals for selected predictors/risk factors of neonatal death, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Step 1 RRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)	Step 4 aRRR (95% CI)
Indigenous Status*	Non-Indigenous	Referent 2.63 (2.00, 3.46)	Referent 1.89 (1.40, 2.57)	Referent 1.78 (1.31, 2.42)	Referent 0.91 (0.69, 1.20)
	Aboriginal and Torres Strait Islander				
ARIA+	Major City/Inner Regional		0.90 (0.70, 1.14)	0.86 (0.68, 1.09)	0.89 (0.72, 1.11)
	Outer Regional		Referent	Referent	Referent
	Remote/Very Remote		1.03 (0.65, 1.63)	1.04 (0.66, 1.65)	0.99 (0.68, 1.43)
BMI Category	Underweight <18.50		0.77 (0.46, 1.27)	0.71 (0.43, 1.17)	0.58 (0.39, 0.86)
	Normal 18.50-24.99		Referent	Referent	Referent
	Overweight 25-29.99		1.03 (0.82, 1.30)	1.06 (0.84, 1.34)	1.06 (0.87, 1.29)
	Obese 30+		1.34 (1.06, 1.69)	1.40 (1.11, 1.77)	1.33 (1.09, 1.61)
Marital Status	Married/De Facto		Referent	Referent	Referent
	Not Married/De Facto		1.67 (1.32, 2.11)	1.50 (1.19, 1.90)	1.05 (0.86, 1.29)
Previous stillbirth	No		Referent	Referent	Referent
	Yes		2.10 (1.27, 3.46)	1.88 (1.14, 3.09)	1.02 (0.68, 1.53)
SEIFA	1 Least Advantaged		1.52 (1.10, 2.11)	1.56 (1.12, 2.17)	1.17 (0.89, 1.54)
	2		1.17 (0.84, 1.63)	1.16 (0.83, 1.63)	1.07 (0.81, 1.43)
	3		1.26 (0.90, 1.76)	1.31 (0.93, 1.84)	1.13 (0.86, 1.49)
	4		1.08 (0.76, 1.52)	1.14 (0.81, 1.61)	0.99 (0.74, 1.33)
	5 Most Advantaged		Referent	Referent	Referent
Antepartum Haemorrhage	No			Referent	Referent
	Yes			9.12 (7.40, 11.25)	1.37 (1.13, 1.66)
Gestational Diabetes	No			Referent	Referent
	Yes			0.63 (0.39, 1.02)	1.17 (0.73, 1.85)
Gestational Hypertension	No			Referent	Referent
	Yes			0.45 (0.20, 1.01)	0.80 (0.36, 1.82)
Pre-eclampsia	No			Referent	Referent
	Yes			2.48 (1.66, 3.70)	1.05 (0.68, 1.62)
Smoking after 20 weeks gestation	No			Referent	Referent
	Yes			1.54 (1.23, 1.94)	1.10 (0.90, 1.34)
Antenatal Visits	<2/Unknown				1.19 (0.89, 1.58)
	2-4				1.37 (1.11, 1.68)
	5+				Referent
Gestational Weeks	<24 weeks				1255.65 (972.72, 1620.87)
	24-27 weeks				247.46 (183.15, 334.34)
	28-31 weeks				42.31 (28.58, 62.63)
	32-36 weeks				4.75 (3.29, 6.86)
	37+ weeks				Referent
Lower Birth Weight 10th Percentile	No				Referent
	Yes				2.00 (1.53, 2.61)

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

^ Excludes stillbirths, multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Shaded cells indicate non-significant predictor/risk factor.

As noted previously, the apparent protective (although not significant) effects of gestational diabetes and gestational hypertension evident in step 3 disappear after adjusting for gestational age (step 4). The risk of neonatal death in underweight women became significantly lower than normal weight women in step 4; this may be due to increased monitoring of babies born to underweight women.

In the fully developed model (step 4), the strongest predictors of neonatal death were prematurity (aRRR>4.8), low birth weight for gestational age (aRRR=2.0), antepartum haemorrhage (aRRR=1.4), maternal obesity (aRRR=1.3) and inadequate antenatal care (aRRR>1.2).

Analysis of directly attributable fractions (DAF) indicated those risk factors that accounted for the greatest proportion of neonatal deaths. Of the total number of neonatal deaths (N=584^a over the analysis period), 24% were exclusively attributable to prematurity, 5% were due only to inadequate antenatal care and 3% to maternal obesity.

Table 6.3 and Table 6.4 display the stepwise, adjusted relative risk ratios for neonatal death for Indigenous and non-Indigenous women respectively.

For births to Indigenous women, significant distal/non-proximate risk factors (step 1 and 2) were ARIA+, having had a previous stillbirth and antepartum haemorrhage. In the fully developed model (step 3), the strongest predictors were prematurity (aRRR>2.1) and low birth weight for gestational age (aRRR=2.9). Of the total number of neonatal deaths (N=83^a), 16% were exclusively attributable to prematurity and 4% were due to inadequate antenatal care.

Table 6.3 Adjusted⁺ relative risk ratios and 95% confidence intervals for selected predictors/risk factors of neonatal death for Indigenous women*, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Step 1 aRRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)
ARIA+	Major City/Inner Regional	0.52 (0.30, 0.91)	0.48 (0.28, 0.83)	0.96 (0.60, 1.54)
	Outer Regional	Referent	Referent	Referent
	Remote/Very Remote	1.12 (0.66, 1.88)	1.18 (0.70, 1.98)	1.39 (0.88, 2.20)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	1.58 (1.00, 2.49)	1.52 (0.98, 2.38)	0.96 (0.67, 1.39)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	3.82 (1.83, 7.95)	3.20 (1.59, 6.47)	0.67 (0.45, 0.99)
Antepartum Haemorrhage	No		Referent	Referent
	Yes		14.00 (8.66, 22.62)	1.34 (0.86, 2.09)
Antenatal Visits	<2/Unknown			1.31 (0.74, 2.33)
	2-4			1.26 (0.76, 2.09)
	5+			Referent
Gestational Weeks	<24 weeks			686.06 (359.85, 1307.97)
	24-27 weeks			150.22 (73.02, 309.05)
	28-31 weeks			17.70 (5.60, 55.96)
	32-36 weeks			2.10 (0.62, 7.17)
	37+ weeks			Referent
Lower Birth Weight 3rd Percentile	No			Referent
	Yes			2.93 (1.38, 6.22)

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

[^] Excludes stillbirths, multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Shaded cells indicate non-significant predictor/risk factor.

For births to non-Indigenous women, significant distal/non-proximate risk factors included maternal obesity, being unmarried/not in a de facto relationship (which may be indicative of poor social support), having had a previous stillbirth, primiparity, antepartum haemorrhage, pre-eclampsia and smoking after 20 weeks gestation.

In the fully developed model (step 3), the strongest predictors were prematurity (aRRR>5.2), low birth weight for gestational age (aRRR=2.0), maternal obesity (aRRR=1.4), antepartum haemorrhage (aRRR=1.4) and inadequate antenatal care (aRRR>1.2). Of the total number of neonatal deaths (N=501^a), 18% were exclusively attributable to prematurity, 4% were due to inadequate antenatal care, 3% to primiparity and 2% to maternal obesity.

^a Refers to the total number of neonatal deaths, and is not necessarily the number used in the modelling process (due to exclusion of unknown/indeterminate data elements).

Distal/non-proximate risk factors that were significantly associated with neonatal death for Indigenous, non-Indigenous and total mothers were having had a previous stillbirth, antepartum haemorrhage and being unmarried/not in a de facto relationship (which may indicate poor social support), while the most important proximate determinants were again prematurity, inadequate antenatal care and low birth weight for gestational age.

Table 6.4 Adjusted* relative risk ratios and 95% confidence intervals for selected predictors/risk factors of neonatal death for non-Indigenous women*, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Step 1 aRRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)
Age Category	<20	1.23 (0.82, 1.86)	1.26 (0.83, 1.91)	0.89 (0.63, 1.24)
	20-34	Referent	Referent	Referent
	35-39	1.49 (1.12, 1.99)	1.44 (1.08, 1.92)	1.16 (0.90, 1.50)
	40+	1.27 (0.89, 1.81)	1.21 (0.85, 1.74)	1.14 (0.83, 1.56)
BMI Category	Underweight <18.50	0.64 (0.35, 1.19)	0.60 (0.33, 1.11)	0.53 (0.32, 0.86)
	Normal 18.50-24.99	Referent	Referent	Referent
	Overweight 25-29.99	1.03 (0.80, 1.32)	1.05 (0.81, 1.35)	1.09 (0.87, 1.37)
	Obese 30+	1.50 (1.17, 1.93)	1.52 (1.19, 1.96)	1.41 (1.14, 1.75)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	1.61 (1.24, 2.10)	1.43 (1.09, 1.87)	1.11 (0.87, 1.43)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	2.08 (1.13, 3.82)	1.88 (1.02, 3.45)	1.27 (0.73, 2.20)
Primiparity	Not Primiparous	Referent	Referent	Referent
	Primiparous	1.41 (1.14, 1.75)	1.40 (1.13, 1.75)	1.09 (0.90, 1.31)
SEIFA	1 Least Advantaged	1.61 (1.15, 2.25)	1.64 (1.17, 2.31)	1.23 (0.93, 1.64)
	2	1.14 (0.80, 1.62)	1.14 (0.80, 1.62)	1.10 (0.81, 1.49)
	3	1.32 (0.94, 1.84)	1.37 (0.97, 1.92)	1.13 (0.85, 1.49)
	4	1.10 (0.78, 1.55)	1.16 (0.82, 1.64)	1.02 (0.76, 1.37)
	5 Most Advantaged	Referent	Referent	Referent
Antepartum Haemorrhage	No		Referent	Referent
	Yes		8.48 (6.77, 10.63)	1.40 (1.13, 1.72)
Gestational Hypertension	No		Referent	Referent
	Yes		0.46 (0.20, 1.04)	0.82 (0.36, 1.87)
Pre-eclampsia	No		Referent	Referent
	Yes		2.44 (1.60, 3.73)	1.04 (0.65, 1.66)
Smoking after 20 weeks gestation	No		Referent	Referent
	Yes		1.60 (1.23, 2.08)	1.05 (0.84, 1.32)
Antenatal Visits	<2/Unknown			1.18 (0.85, 1.65)
	2-4			1.35 (1.08, 1.69)
	5+			Referent
Gestational Weeks	<24 weeks			1288.78 (979.33, 1696.01)
	24-27 weeks			252.67 (182.87, 349.11)
	28-31 weeks			43.47 (28.72, 65.82)
	32-36 weeks			5.22 (3.58, 7.61)
	37+ weeks			Referent
Lower Birth Weight 10th Percentile	No			Referent
	Yes			2.04 (1.52, 2.76)

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

^ Excludes stillbirths, multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Shaded cells indicate non-significant predictor/risk factor.

7 Preterm Birth (less than 37 weeks gestation)

Given the strong association of gestational weeks with perinatal mortality outcomes, preterm birth was itself also assessed as an outcome. For simplicity, preterm birth was measured as a dichotomous outcome i.e. less than 37 weeks gestation (preterm) vs. 37 weeks gestation or more (term). Other approaches that compared varying degrees of preterm birth were considered (24-36 weeks gestation vs. 37+ weeks gestation; and 28-36 weeks gestation vs. 37+ weeks gestation) but the results of these additional analyses did not differ substantially from those based on inclusion of all births with a cut-off of 37 weeks and are therefore not included in this report. All in scope (see section 2 *Data*) births of known gestational age were included in analyses.

Because 'Antenatal Visits' is confounded by gestational weeks (i.e. the longer the duration of the pregnancy the more antenatal care visits a mother is likely to attend), a new field, 'Recommended Antenatal Visits (based on schedule)' (see section 9.2 *Definitions* for further details), was created to replace 'Antenatal Visits'. The new field indicates whether a mother attended the recommended number of antenatal care visits, based on the duration of the pregnancy; for example a mother giving birth at 28 weeks gestation would not be expected to have attended the same number of visits as a mother giving birth at 38 weeks gestation. This field was not used in earlier analyses because the effect of 'Antenatal Visits' was able to be interpreted after adjusting for gestational weeks.

Additionally, low birth weight for gestational age was not included in analyses because, by definition, the proportion of low birth weight babies is expected to be consistent in both the 'less than 37 weeks' and '37+ weeks' categories.

7.1 Univariate Analyses (Preterm Birth)

Univariate relative risk ratios (RRRs) for preterm birth are displayed in Table 7.1, by Indigenous status of the mother and for total mothers. Only significant predictors/risk factors are displayed. Additional details (including number of cases, number of births, wald statistics etc.), are included in section 9.3 *Expanded Analyses Results*. Smoking before 20 weeks gestation (and not after) was the only risk factor that was not significant for Indigenous, non-Indigenous or total mothers.

For Indigenous women, the risk of preterm birth was 1.7 times higher than for non-Indigenous women. While the general pattern of relative risk ratios was consistent between Indigenous and non-Indigenous women, some significant differences were evident. The relative risk of preterm birth in older women was higher for Indigenous women; obesity in Indigenous women exhibited a protective effect against preterm birth but this effect was not evident for non-Indigenous women; primiparity increased the risk of preterm birth for non-Indigenous women but not for Indigenous women; and the relative risk of preterm birth for women not attending recommended antenatal care was less pronounced for Indigenous women.

Significance of risk factors varied between Indigenous, non-Indigenous and total mothers (shaded cells in Table 7.1 indicate non-significant risk factors). Anaemia, gestational hypertension and primiparity were significant univariate predictors among non-Indigenous women but not for Indigenous women, while ARIA+ was significant for Indigenous women but not for non-Indigenous women. Urinary tract infection was only significant for total mothers.

However, the majority of risk factors/predictors were significant for Indigenous, non-Indigenous and total mothers, with older maternal age, antepartum haemorrhage, underweight maternal BMI, chronic kidney disease, gestational diabetes, being unmarried/not in de facto relationship, having had a previous caesarean section, having had a previous stillbirth, pre-existing diabetes, pre-existing hypertension, pre-eclampsia, not having recommended antenatal visits, least advantaged socioeconomic status and smoking after 20 weeks gestation all increasing the risk of preterm birth.

Table 7.1 Univariate relative risk ratios and 95% confidence intervals for significant predictors/risk factors of preterm birth, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Relative Risk Ratio (95% CI)		
		Indigenous*	Non-Indigenous*	Total
Age Category	<20	1.04 (0.92, 1.16)	1.26 (1.18, 1.34)	1.30 (1.23, 1.37)
	20-34	Referent	Referent	Referent
	35-39	1.52 (1.30, 1.78)	1.12 (1.07, 1.16)	1.11 (1.07, 1.16)
	40+	1.73 (1.46, 2.06)	1.13 (1.07, 1.19)	1.14 (1.08, 1.19)
Anaemia	No	Referent	Referent	Referent
	Yes	1.02 (0.83, 1.26)	1.24 (1.13, 1.36)	1.25 (1.15, 1.36)
Antepartum Haemorrhage	No	Referent	Referent	Referent
	Yes	4.06 (3.62, 4.55)	4.23 (4.08, 4.38)	4.16 (4.03, 4.31)
ARIA+	Major City/Inner Regional	0.87 (0.78, 0.96)	1.02 (0.98, 1.06)	0.95 (0.92, 0.99)
	Outer Regional	Referent	Referent	Referent
	Remote/Very Remote	1.14 (1.03, 1.28)	0.97 (0.87, 1.09)	1.30 (1.21, 1.40)
BMI Category	Underweight <18.50	1.55 (1.32, 1.82)	1.44 (1.35, 1.53)	1.49 (1.40, 1.58)
	Normal 18.50-24.99	Referent	Referent	Referent
	Overweight 25-29.99	0.88 (0.78, 1.00)	0.98 (0.94, 1.01)	0.98 (0.94, 1.01)
	Obese 30+	0.76 (0.67, 0.87)	1.03 (0.99, 1.07)	1.02 (0.98, 1.06)
Chronic Kidney Disease	No	Referent	Referent	Referent
	Yes	7.24 (5.10, 10.29)	7.35 (5.89, 9.17)	7.51 (6.15, 9.16)
Gestational Diabetes	No	Referent	Referent	Referent
	Yes	1.26 (1.08, 1.47)	1.30 (1.23, 1.37)	1.31 (1.24, 1.38)
Gestational Hypertension	No	Referent	Referent	Referent
	Yes	1.04 (0.79, 1.36)	1.10 (1.01, 1.19)	1.09 (1.00, 1.17)
Indigenous Status*	Non-Indigenous	n.a.	n.a.	Referent
	Aboriginal and Torres Strait Islander	n.a.	n.a.	1.69 (1.62, 1.77)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	1.27 (1.16, 1.39)	1.45 (1.40, 1.51)	1.51 (1.46, 1.56)
Previous Caesarean Section	No	Referent	Referent	Referent
	Yes	1.48 (1.34, 1.64)	1.25 (1.21, 1.29)	1.27 (1.23, 1.31)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	2.18 (1.85, 2.58)	2.14 (1.98, 2.31)	2.21 (2.06, 2.38)
Pre-existing Diabetes	No	Referent	Referent	Referent
	Yes	3.48 (2.90, 4.18)	4.40 (4.05, 4.78)	4.41 (4.09, 4.75)
Pre-eclampsia	No	Referent	Referent	Referent
	Yes	3.32 (2.91, 3.79)	4.89 (4.68, 5.10)	4.75 (4.56, 4.95)
Pre-existing Hypertension	No	Referent	Referent	Referent
	Yes	3.12 (2.47, 3.95)	2.68 (2.40, 2.98)	2.77 (2.51, 3.06)
Primiparity	Not Primiparous	Referent	Referent	Referent
	Primiparous	0.92 (0.84, 1.01)	1.15 (1.11, 1.18)	1.11 (1.08, 1.14)
Recommended Antenatal Visits (based on schedule)	No	1.87 (1.71, 2.05)	2.33 (2.23, 2.43)	2.37 (2.28, 2.47)
	Yes	Referent	Referent	Referent
SEIFA	1 Least Advantaged	1.29 (0.99, 1.68)	1.19 (1.13, 1.24)	1.29 (1.24, 1.35)
	2	1.11 (0.85, 1.46)	1.15 (1.10, 1.20)	1.18 (1.13, 1.24)
	3	0.96 (0.71, 1.29)	1.04 (0.99, 1.09)	1.05 (1.00, 1.10)
	4	1.03 (0.75, 1.40)	1.05 (1.00, 1.10)	1.05 (1.01, 1.10)
	5 Most Advantaged	Referent	Referent	Referent
Smoking after 20 weeks gestation	No	Referent	Referent	Referent
	Yes	1.40 (1.28, 1.53)	1.52 (1.46, 1.57)	1.59 (1.54, 1.65)
Urinary Tract Infection	No	Referent	Referent	Referent
	Yes	1.29 (0.80, 2.07)	1.30 (0.97, 1.75)	1.41 (1.10, 1.81)

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

Shaded cells indicate non-significant predictor/risk factor.

* Based on Indigenous status recorded for the mother in each specific birth.

n.a. Not Applicable.

7.2 Multivariate Analyses (Preterm birth)

All significant predictors from Table 7.1 were retained in multivariate analyses. Predictors were entered sequentially into a nested cox (proportional hazards) regression model, with distal predictors being entered in the initial steps and proximate determinants being entered in the later steps (see section 3 *Statistical Methods*). Separate models were created for total women and stratified by Indigenous status.

Table 7.2 displays the stepwise, adjusted relative risk ratios for significant univariate predictors of preterm birth. The risk of preterm birth was 1.6 times higher for Indigenous women at the univariate level (step 1), but the risk significantly decreased when distal risk factors were taken into account (step 2) and decreased slightly further again in steps 3 and 4. However, even after inclusion of all risk factors (step 4), the risk of preterm birth remained significantly higher for Indigenous women.

Table 7.2 Adjusted* relative risk ratios and 95% confidence intervals for selected predictors/risk factors of preterm birth, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Step 1 RRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)	Step 4 aRRR (95% CI)
Indigenous Status*	Non-Indigenous	Referent	Referent	Referent	Referent
	Aboriginal and Torres Strait Islander	1.60 (1.53, 1.69)	1.43 (1.35, 1.51)	1.30 (1.23, 1.37)	1.20 (1.13, 1.27)
Age Category	<20		0.97 (0.91, 1.04)	0.98 (0.92, 1.04)	0.95 (0.89, 1.01)
	20-34		Referent	Referent	Referent
	35-39		1.15 (1.10, 1.20)	1.12 (1.07, 1.17)	1.13 (1.08, 1.18)
	40+		1.16 (1.10, 1.22)	1.11 (1.06, 1.17)	1.12 (1.07, 1.18)
ARIA+	Major City/Inner Regional		1.05 (1.01, 1.09)	1.03 (0.99, 1.07)	1.03 (0.99, 1.07)
	Outer Regional		Referent	Referent	Referent
	Remote/Very Remote		1.04 (0.96, 1.13)	1.01 (0.93, 1.10)	1.03 (0.95, 1.12)
BMI Category	Underweight <18.50		1.45 (1.37, 1.54)	1.43 (1.35, 1.51)	1.43 (1.35, 1.51)
	Normal 18.50-24.99		Referent	Referent	Referent
	Overweight 25-29.99		0.94 (0.91, 0.98)	0.91 (0.88, 0.95)	0.91 (0.88, 0.94)
	Obese 30+		0.92 (0.89, 0.96)	0.84 (0.81, 0.87)	0.84 (0.81, 0.87)
Chronic Kidney Disease	No		Referent	Referent	Referent
	Yes		2.87 (2.13, 3.86)	1.45 (0.96, 2.20)	1.41 (0.96, 2.09)
Marital Status	Married/De Facto		Referent	Referent	Referent
	Not Married/De Facto		1.32 (1.27, 1.38)	1.22 (1.17, 1.27)	1.18 (1.13, 1.23)
Pre-existing Diabetes	No		Referent	Referent	Referent
	Yes		3.69 (3.38, 4.02)	3.19 (2.92, 3.48)	3.28 (3.00, 3.58)
Pre-existing Hypertension	No		Referent	Referent	Referent
	Yes		2.19 (1.95, 2.45)	2.42 (2.17, 2.70)	2.45 (2.20, 2.74)
Previous Caesarean Section	No		Referent	Referent	Referent
	Yes		1.42 (1.37, 1.48)	1.39 (1.34, 1.45)	1.42 (1.36, 1.47)
Previous stillbirth	No		Referent	Referent	Referent
	Yes		2.13 (1.96, 2.30)	1.94 (1.79, 2.10)	1.94 (1.79, 2.10)
Primiparity	Not Primiparous		Referent	Referent	Referent
	Primiparous		1.33 (1.29, 1.38)	1.24 (1.20, 1.28)	1.29 (1.24, 1.33)
SEIFA	1 Least Advantaged		1.20 (1.14, 1.26)	1.16 (1.10, 1.22)	1.13 (1.07, 1.18)
	2		1.17 (1.12, 1.23)	1.13 (1.07, 1.18)	1.11 (1.06, 1.16)
	3		1.06 (1.01, 1.11)	1.05 (1.00, 1.10)	1.04 (0.99, 1.09)
	4		1.07 (1.02, 1.12)	1.08 (1.03, 1.13)	1.07 (1.02, 1.12)
	5 Most Advantaged		Referent	Referent	Referent
Urinary Tract Infection	No		Referent	Referent	Referent
	Yes		1.30 (1.00, 1.68)	1.11 (0.85, 1.45)	1.10 (0.85, 1.43)
Anaemia	No			Referent	Referent
	Yes			0.85 (0.77, 0.94)	0.86 (0.78, 0.95)
Antepartum Haemorrhage	No			Referent	Referent
	Yes			3.85 (3.71, 4.00)	3.84 (3.70, 4.00)
Gestational Diabetes	No			Referent	Referent
	Yes			1.32 (1.25, 1.40)	1.37 (1.30, 1.45)
Gestational Hypertension	No			Referent	Referent
	Yes			1.27 (1.17, 1.37)	1.29 (1.19, 1.40)
Pre-eclampsia	No			Referent	Referent
	Yes			4.62 (4.41, 4.84)	4.63 (4.42, 4.84)
Smoking after 20 weeks gestation	No			Referent	Referent
	Yes			1.48 (1.43, 1.54)	1.38 (1.33, 1.43)
Recommended Antenatal Visits (based on schedule)	No				2.13 (2.03, 2.23)
	Yes				Referent

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

^ Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth. Shaded cells indicate non-significant predictor/risk factor.

Anaemia was the only risk factor that displayed a protective effect (steps 2-4), but this seems to be due to the exclusion of records of unknown BMI, which suggests a data integrity issue rather than clinical relevance.

Significance of risk factors was largely consistent between steps. In the fully developed model (step 4), the strongest predictors of preterm birth were pre-eclampsia (aRRR=4.6), antepartum haemorrhage (aRRR=3.8), pre-existing diabetes (aRRR=3.3), pre-existing hypertension (aRRR=2.5) and not attending recommended antenatal care visits (aRRR=2.1), although mother being Indigenous, older maternal age, maternal underweight, being unmarried/not in a de facto relationship, having had a previous caesarean section, having had a previous stillbirth, primiparity, living in lower socioeconomic areas, gestational diabetes, gestational hypertension and smoking after 20 weeks gestation were all associated with increased risk of preterm birth.

Analysis of directly attributable fractions (DAF) indicated which risk factors accounted for the greatest proportion of preterm births. Of the total number of preterm births (N=19,543^a over the analysis period) 7% were exclusively attributable to antepartum haemorrhage, 6% were due only to primiparity, 5% to pre-eclampsia, 4% to having had a previous caesarean section, 3% to not attending recommended antenatal care visits, 3% to smoking after 20 weeks gestation and 3% to living in lower socioeconomic areas. The increased risk for Indigenous women, while statistically significant, only accounted for a maximum of 1.5% of preterm births.

Table 7.3 and Table 7.4 display the stepwise, adjusted relative risk ratios for preterm birth for Indigenous and non-Indigenous women respectively.

For births to Indigenous women, in the fully developed model (step 3), the strongest predictors were antepartum haemorrhage (aRRR=3.7), pre-eclampsia (aRRR=3.6), pre-existing diabetes (aRRR=2.6) and pre-existing hypertension (aRRR=2.3), although older maternal age, remoteness, maternal underweight, being unmarried/not in a de facto relationship, having had a previous caesarean section, having had a previous stillbirth, gestational diabetes, smoking after 20 weeks gestation and not attending recommended antenatal care visits were also significant predictors of preterm birth. Of the total number of preterm births (N=1,822^a), 6% were exclusively due to smoking after 20 weeks gestation, 6% were due only to not attending recommended antenatal care visits, 4% to antepartum haemorrhage, 4% to pre-eclampsia, 4% to being unmarried/not in a de facto relationship, 2% to having had a previous caesarean section and 2% to maternal underweight.

Results for non-Indigenous women closely resembled those for total mothers. While all risk factors included in the modelling process were statistically significant, the strongest predictors were pre-eclampsia (aRRR=4.7), antepartum haemorrhage (aRRR=3.9), pre-existing diabetes (aRRR=3.4), pre-existing hypertension (aRRR=2.5) and not attending recommended antenatal care visits (aRRR=2.2). Of the total number of preterm births (N=17,721^a), 7% were exclusively attributable to antepartum haemorrhage, 7% were due only to primiparity, 5% to pre-eclampsia, 4% to having had a previous caesarean section, 3% to not attending recommended antenatal care visits, 3% to smoking after 20 weeks gestation and 2% to living in lower socioeconomic areas.

Differences in risk factor prominence between Indigenous and non-Indigenous women are important to note. Particularly, smoking after 20 weeks gestation and not attending recommended antenatal care rank most highly among Indigenous women (but are less prominent among non-Indigenous) and both risk factors would be appropriate targets for service improvement for reduction in preterm births.

^a Refers to the total number of preterm births, and is not necessarily the number used in the modelling process (due to exclusion of unknown/indeterminate data elements).

Table 7.3 Adjusted⁺ relative risk ratios and 95% confidence intervals for selected predictors/risk factors of preterm birth for Indigenous women*, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Step 1 aRRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)
Age Category	<20	0.95 (0.83, 1.09)	0.96 (0.84, 1.10)	0.96 (0.84, 1.10)
	20-34	Referent	Referent	Referent
	35-39	1.36 (1.14, 1.64)	1.31 (1.09, 1.56)	1.27 (1.06, 1.52)
	40+	1.68 (1.38, 2.04)	1.60 (1.32, 1.95)	1.61 (1.32, 1.95)
ARIA+	Major City/Inner Regional	0.91 (0.81, 1.02)	0.90 (0.80, 1.00)	0.91 (0.81, 1.02)
	Outer Regional	Referent	Referent	Referent
	Remote/Very Remote	1.06 (0.93, 1.20)	1.04 (0.92, 1.18)	1.07 (0.94, 1.21)
BMI Category	Underweight <18.50	1.53 (1.30, 1.80)	1.49 (1.27, 1.75)	1.53 (1.31, 1.79)
	Normal 18.50-24.99	Referent	Referent	Referent
	Overweight 25-29.99	0.81 (0.72, 0.92)	0.80 (0.71, 0.91)	0.81 (0.72, 0.91)
	Obese 30+	0.67 (0.58, 0.76)	0.66 (0.58, 0.75)	0.67 (0.59, 0.76)
Chronic Kidney Disease	No	Referent	Referent	Referent
	Yes	5.08 (2.85, 9.03)	1.11 (0.42, 2.97)	1.04 (0.41, 2.65)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	1.29 (1.17, 1.43)	1.26 (1.14, 1.39)	1.23 (1.12, 1.36)
Pre-existing Diabetes	No	Referent	Referent	Referent
	Yes	2.73 (2.15, 3.45)	2.46 (1.90, 3.17)	2.56 (1.97, 3.33)
Pre-existing Hypertension	No	Referent	Referent	Referent
	Yes	2.07 (1.53, 2.80)	2.29 (1.68, 3.11)	2.31 (1.69, 3.16)
Previous Caesarean Section	No	Referent	Referent	Referent
	Yes	1.40 (1.24, 1.57)	1.34 (1.20, 1.51)	1.34 (1.20, 1.51)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	1.86 (1.53, 2.26)	1.73 (1.43, 2.10)	1.68 (1.38, 2.04)
SEIFA	1 Least Advantaged	1.28 (0.95, 1.73)	1.19 (0.89, 1.58)	1.17 (0.88, 1.57)
	2	1.18 (0.87, 1.60)	1.09 (0.81, 1.46)	1.05 (0.78, 1.40)
	3	1.08 (0.78, 1.50)	0.99 (0.72, 1.36)	1.00 (0.73, 1.37)
	4	1.09 (0.77, 1.54)	1.08 (0.77, 1.51)	1.07 (0.76, 1.50)
	5 Most Advantaged	Referent	Referent	Referent
Antepartum Haemorrhage	No		Referent	Referent
	Yes		3.81 (3.31, 4.39)	3.72 (3.22, 4.30)
Gestational Diabetes	No		Referent	Referent
	Yes		1.32 (1.11, 1.57)	1.43 (1.20, 1.70)
Pre-eclampsia	No		Referent	Referent
	Yes		3.53 (3.00, 4.15)	3.58 (3.04, 4.21)
Smoking after 20 weeks gestation	No		Referent	Referent
	Yes		1.38 (1.25, 1.52)	1.27 (1.15, 1.41)
Recommended Antenatal Visits (based on schedule)	No			1.78 (1.59, 1.98)
	Yes			Referent

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Shaded cells indicate non-significant predictor/risk factor.

Table 7.4 Adjusted⁺ relative risk ratios and 95% confidence intervals for selected predictors/risk factors of preterm birth for non-Indigenous women*, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Step 1 aRRR (95% CI)	Step 2 aRRR (95% CI)	Step 3 aRRR (95% CI)
Age Category	<20	1.01 (0.94, 1.08)	1.00 (0.93, 1.07)	0.97 (0.90, 1.04)
	20-34	Referent	Referent	Referent
	35-39	1.14 (1.09, 1.20)	1.11 (1.06, 1.16)	1.12 (1.07, 1.18)
	40+	1.14 (1.08, 1.20)	1.09 (1.04, 1.15)	1.11 (1.05, 1.17)
BMI Category	Underweight <18.50	1.43 (1.35, 1.53)	1.41 (1.33, 1.50)	1.40 (1.32, 1.49)
	Normal 18.50-24.99	Referent	Referent	Referent
	Overweight 25-29.99	0.95 (0.92, 0.99)	0.92 (0.89, 0.96)	0.92 (0.89, 0.95)
	Obese 30+	0.95 (0.91, 0.99)	0.86 (0.82, 0.90)	0.86 (0.82, 0.89)
Chronic Kidney Disease	No	Referent	Referent	Referent
	Yes	2.67 (1.92, 3.72)	1.70 (1.18, 2.44)	1.65 (1.15, 2.36)
Marital Status	Married/De Facto	Referent	Referent	Referent
	Not Married/De Facto	2.33 (1.28, 1.39)	1.22 (1.17, 1.28)	1.17 (1.12, 1.22)
Pre-existing Diabetes	No	Referent	Referent	Referent
	Yes	3.87 (3.53, 4.24)	3.33 (3.04, 3.66)	3.43 (3.12, 3.76)
Pre-existing Hypertension	No	Referent	Referent	Referent
	Yes	2.22 (1.96, 2.50)	2.40 (2.13, 2.71)	2.45 (2.17, 2.76)
Previous Caesarean Section	No	Referent	Referent	Referent
	Yes	1.43 (1.37, 1.49)	1.40 (1.34, 1.46)	1.42 (1.37, 1.48)
Previous stillbirth	No	Referent	Referent	Referent
	Yes	2.15 (1.97, 2.35)	1.96 (1.80, 2.13)	1.97 (1.81, 2.15)
Primiparity	Not Primiparous	Referent	Referent	Referent
	Primiparous	1.35 (1.31, 1.40)	1.26 (1.21, 1.30)	1.30 (1.26, 1.35)
SEIFA	1 Least Advantaged	1.16 (1.11, 1.23)	1.13 (1.08, 1.19)	1.10 (1.04, 1.15)
	2	1.16 (1.10, 1.22)	1.12 (1.07, 1.18)	1.10 (1.05, 1.16)
	3	1.05 (1.00, 1.10)	1.05 (1.00, 1.10)	1.04 (0.99, 1.09)
	4	1.06 (1.01, 1.12)	1.08 (1.03, 1.13)	1.07 (1.02, 1.12)
	5 Most Advantaged	Referent	Referent	Referent
Anaemia	No		Referent	Referent
	Yes		0.88 (0.79, 0.98)	0.88 (0.80, 0.98)
Antepartum Haemorrhage	No		Referent	Referent
	Yes		3.86 (3.71, 4.02)	3.86 (3.71, 4.02)
Gestational Diabetes	No		Referent	Referent
	Yes		1.32 (1.25, 1.40)	1.36 (1.29, 1.44)
Gestational Hypertension	No		Referent	Referent
	Yes		1.26 (1.16, 1.37)	1.29 (1.19, 1.40)
Pre-eclampsia	No		Referent	Referent
	Yes		4.74 (4.52, 4.97)	4.74 (4.52, 4.97)
Smoking after 20 weeks gestation	No		Referent	Referent
	Yes		1.49 (1.43, 1.55)	1.39 (1.34, 1.45)
Recommended Antenatal Visits (based on schedule)	No			2.21 (2.10, 2.32)
	Yes			Referent

+ Each risk factor is adjusted for all other factors that are included in that step. For example, in step 3, all Level 1, Level 2 and Level 3 risk factors are included in the model and thereby adjusted for each other.

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

8 Conclusions/Recommendations

This analysis showed that key risk factors are more prevalent amongst Indigenous women, and sought to identify those risk factors which best account for the disparity in perinatal outcomes between Indigenous and non-Indigenous women.

For stillbirths, the importance of Indigenous status of the mother was reduced almost to the point of non-significance once other key distal/non-proximate risk factors were taken into account.

Analyses showed that the distal factors of young and old maternal age, overweight/obese maternal BMI, pre-existing diabetes, pre-existing hypertension, having had a previous stillbirth and the more proximate risk factors of antepartum haemorrhage, pre-eclampsia and smoking after 20 weeks were more strongly associated with stillbirth than Indigenous status itself. Risk factors of greatest prominence were mostly consistent between Indigenous and non-Indigenous women, with shorter gestation, low birth weight for gestational age, inadequate antenatal care, antepartum haemorrhage and pre-existing diabetes ranking highly for both. Maternal overweight and obesity also ranked highly for non-Indigenous women but was not statistically significant for Indigenous women.

For neonatal deaths, Indigenous status of the mother remained a significant risk factor until proximate risk factors of gestational weeks, low birth weight for gestational age and adequate antenatal care were accounted for. That is, distal/non-proximate risk factors did not well account for the disparity in neonatal deaths, and adjusting for these did not much affect the increased risk attributed to Indigenous status. Prominent predictors of neonatal death were mostly consistent between Indigenous and non-Indigenous women, where shorter gestation, inadequate antenatal care, antepartum haemorrhage and low birth weight for gestational age were strong predictors. ARIA+, however, was a significant predictor (up to the final step) in Indigenous women while maternal obesity was a significant predictor in non-Indigenous women.

For preterm births, even after inclusion of all assessed risk factors, the risk of preterm birth remained significantly higher for Indigenous women. Remaining disparity between Indigenous and non-Indigenous women may be due to other risk factors that are not collected in the perinatal data collection (e.g. poor nutrition, alcohol use etc.). Predictors of preterm birth that ranked highly in both Indigenous and non-Indigenous women were antepartum haemorrhage, pre-eclampsia, having had a previous caesarean section, inadequate antenatal care and smoking after 20 weeks gestation. However, smoking and antenatal care were highest ranked for Indigenous women but were less prominent for non-Indigenous women. Additionally, being unmarried/not in a de facto relationship (which may be an indication of poor social support) and being of older maternal age ranked higher for Indigenous women.

Prominence of risk factors in Indigenous women, such as smoking during pregnancy, poor social support, pre-existing diabetes and lower attendance at antenatal care, highlights risk groups where reductions in adverse perinatal outcomes can be achieved. Key strategies to reduce prevalence of risk factors include increased targeting of these at risk groups and promotion of and improved access to antenatal care programs.

9 Appendix

9.1 Abbreviations

Mnemonic	Definition
PDC	Queensland Perinatal Data Collection
ARIA+	Accessibility/Remoteness Index of Australia
SEIFA	Socio-Economic Indexes for Areas

9.2 Definitions

Terminations

Terminations were excluded from analyses and were identified as:

1. Any record that contained an ICD-10-AM code of O04.x (*Medical abortion*); or
2. Any birth that was induced before 23 weeks gestation, where the baby's heart beat ceased during labour or after delivery.

Congenital Anomalies

The following congenital anomalies were excluded from analyses:

Q0000, Q0001, Q0003, Q001, Q0020, Q011, Q012, Q019, Q02, Q030, Q0301, Q031, Q038, Q0389, Q039, Q041, Q042, Q0500, Q0510, Q0520, Q0521, Q0522, Q0530, Q0540, Q0550, Q0560, Q0562, Q0570, Q0571, Q0572, Q0580, Q0581, Q0590, Q0591, Q111, Q112, Q172, Q201, Q203, Q2030, Q2031, Q2039, Q205, Q2050, Q2051, Q2059, Q213, Q234, Q251, Q2510, Q2511, Q2513, Q2519, Q378, Q379, Q390, Q3910, Q3911, Q3912, Q3913, Q3915, Q3919, Q3921, Q410, Q4101, Q4102, Q411, Q4111, Q4112, Q412, Q4121, Q4200, Q4202, Q421, Q4220, Q4222, Q4229, Q423, Q4310, Q4311, Q4319, Q600, Q601, Q602, Q603, Q604, Q606, Q610, Q611, Q613, Q6140, Q6141, Q6142, Q6143, Q6144, Q6419, Q710, Q712, Q7131, Q7132, Q7133, Q714, Q7141, Q715, Q716, Q718, Q7181, Q7182, Q7183, Q7184, Q7189, Q719, Q7212, Q7231, Q7233, Q724, Q725, Q726, Q728, Q7281, Q7283, Q7289, Q729, Q7380, Q7389, Q790, Q792, Q793, Q900, Q901, Q902, Q909, Q910, Q911, Q912, Q913, Q914, Q915, Q916, Q917

Risk Factors

Risk Factor	ICD-10-AM
Anaemia	D50-D64, O990
Antepartum haemorrhage	O209, O441, O45, O46
Chronic Kidney Disease	N18, N19, I120, I131, I132, O102, O103
Gestational Diabetes	O244, O249
Gestational Hypertension	O13, O16
Pre-existing Diabetes	E10, E11, E12, E13, E14, O240, O241, O242, O243, O245
Pre-eclampsia	O14
Pre-existing Hypertention	O10, O11
Urinary Tract Infection	N390

Recommended Antenatal Visits (based on schedule)

Gestation	Recommended Antenatal Visits
32 weeks or more	5+ antenatal visits
20 to 31 weeks	2+ antenatal visits
Less than 20 weeks	1+ antenatal visit

Low Birth Weight 10th/3rd Percentiles

Low birth weight 10th/3rd percentile was defined from the Australian national birthweight percentiles by sex and gestational age, 1998-2007¹³.

9.3 Expanded Analyses Results

Table 9.1 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of stillbirth, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	115	16,117	1.73 (1.43, 2.10)	<.0001
	20-34	912	221,275	Referent	
	35-39	181	34,064	1.29 (1.10, 1.51)	
	40+	125	23,302	1.30 (1.08, 1.57)	
Anaemia	No	1,303	288,717	Referent	0.6035
	Yes	30	6,041	1.10 (0.77, 1.58)	
Antenatal Visits	<2/Unknown	145	2,658	20.33 (17.09, 24.19)	<.0001
	2-4	447	16,139	10.31 (9.18, 11.59)	
	5+	741	275,961	Referent	
Antepartum Haemorrhage	No	984	282,144	Referent	<.0001
	Yes	349	12,614	7.94 (7.03, 8.96)	
ARIA+	Major City/Inner Regional	1,047	237,147	0.91 (0.79, 1.05)	0.1335
	Outer Regional	233	48,092	Referent	
	Remote/Very Remote	53	9,519	1.15 (0.85, 1.55)	
BMI Category	Underweight <18.50	56	13,307	1.27 (0.96, 1.67)	<.0001
	Normal 18.50-24.99	471	141,700	Referent	
	Overweight 25-29.99	290	71,375	1.22 (1.06, 1.41)	
	Obese 30+	307	57,216	1.61 (1.40, 1.86)	
Chronic Kidney Disease	No	1,330	294,659	Referent	0.0008
	Yes	3	99	6.72 (2.20, 20.48)	
Gestational Weeks	<24 weeks	419	649	553.09 (488.79, 625.86)	<.0001
	25-27 weeks	210	949	189.58 (161.21, 222.93)	
	28-31 weeks	153	1,843	71.12 (58.98, 85.76)	
	32-36 weeks	225	16,102	11.97 (10.10, 14.19)	
	37-41 weeks	319	273,287	Referent	
	42+ weeks	5	1,902	2.25 (0.93, 5.44)	
Gestational Diabetes	No	1,260	277,958	Referent	0.7294
	Yes	73	16,800	0.96 (0.76, 1.21)	
Gestational Hypertension	No	1,310	286,265	Referent	0.0125
	Yes	23	8,493	0.59 (0.39, 0.89)	
Indigenous Status*	Non-Indigenous	1,204	277,874	Referent	<.0001
	Aboriginal and Torres Strait Islander	129	16,884	1.76 (1.47, 2.11)	
Lower Birth Weight 10th Percentile	No	879	268,567	Referent	<.0001
	Yes	438	26,111	5.13 (4.57, 5.74)	
Marital Status	Married/De Facto	1,065	256,120	Referent	<.0001
	Not Married/De Facto	268	38,638	1.67 (1.46, 1.91)	
Previous Caesarean Section	No	1,099	242,772	Referent	0.7997
	Yes	231	51,978	0.98 (0.85, 1.13)	
Previous stillbirth	No	1,268	290,018	Referent	<.0001
	Yes	65	4,740	3.14 (2.45, 4.02)	
Pre-existing Diabetes	No	1,302	293,033	Referent	<.0001
	Yes	31	1,725	4.05 (2.84, 5.76)	
Pre-eclampsia	No	1,265	288,200	Referent	<.0001
	Yes	68	6,558	2.36 (1.85, 3.01)	
Pre-existing Hypertension	No	1,303	292,950	Referent	<.0001
	Yes	30	1,808	3.73 (2.61, 5.34)	
Primiparity	Not Primiparous	770	175,165	Referent	0.2127
	Primiparous	563	119,593	1.07 (0.96, 1.19)	
SEIFA	1 Least Advantaged	326	61,823	1.40 (1.17, 1.67)	<.0001
	2	328	62,772	1.38 (1.16, 1.65)	
	3	246	58,623	1.11 (0.92, 1.34)	
	4	237	59,588	1.05 (0.87, 1.27)	
	5 Most Advantaged	196	51,952	Referent	
Smoking after 20 weeks gestation	No	1,013	249,504	Referent	<.0001
	Yes	276	43,118	1.58 (1.38, 1.80)	
Smoking before 20 weeks gestation (and not after)	No	760	171,553	Referent	0.8775
	Yes	23	5,028	1.03 (0.68, 1.56)	
Sexually Transmitted Infection	No	1,329	293,044	Referent	0.1841
	Yes	4	1,714	0.51 (0.19, 1.37)	
Urinary Tract Infection	No	1,327	294,156	Referent	0.0501
	Yes	6	602	2.22 (1.00, 4.91)	

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 Definitions for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Table 9.2 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of stillbirth, Indigenous women*, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	24	3,268	1.05 (0.67, 1.65)	0.0803
	20-34	84	12,001	Referent	
	35-39	13	953	1.95 (1.09, 3.48)	
	40+	8	662	1.73 (0.84, 3.55)	
Anaemia	No	122	16,151	Referent	0.5437
	Yes	7	733	1.26 (0.59, 2.70)	
Antenatal Visits	<2/Unknown	33	812	10.46 (6.80, 16.09)	<.0001
	2-4	44	2,684	4.22 (2.83, 6.29)	
	5+	52	13,388	Referent	
Antepartum Haemorrhage	No	90	16,359	Referent	<.0001
	Yes	39	525	13.51 (9.37, 19.47)	
ARIA+	Major City/Inner Regional	52	7,073	0.98 (0.65, 1.46)	0.8528
	Outer Regional	43	5,712	Referent	
	Remote/Very Remote	34	4,099	1.10 (0.70, 1.72)	
BMI Category	Underweight <18.50	10	1,005	1.70 (0.85, 3.42)	0.2453
	Normal 18.50-24.99	36	6,164	Referent	
	Overweight 25-29.99	22	3,960	0.95 (0.56, 1.61)	
	Obese 30+	34	4,233	1.38 (0.86, 2.19)	
Chronic Kidney Disease	No	129	16,875	n.c.	n.c.
	Yes	0	9	n.c.	
Gestational Weeks	<24 weeks	45	94	238.74 (157.64, 361.57)	<.0001
	25-27 weeks	19	121	78.31 (45.36, 135.20)	
	28-31 weeks	9	217	20.68 (9.94, 43.04)	
	32-36 weeks	24	1,390	8.61 (5.05, 14.69)	
	37-41 weeks	30	14,961	Referent	
	42+ weeks	2	92	10.84 (2.63, 44.70)	
Gestational Diabetes	No	123	15,701	Referent	0.2971
	Yes	6	1,183	0.65 (0.29, 1.47)	
Gestational Hypertension	No	128	16,464	Referent	0.2379
	Yes	1	420	0.31 (0.04, 2.19)	
Lower Birth Weight 10th Percentile	No	76	14,354	Referent	<.0001
	Yes	49	2,509	3.69 (2.58, 5.27)	
Marital Status	Married/De Facto	76	10,763	Referent	0.2525
	Not Married/De Facto	53	6,121	1.23 (0.86, 1.74)	
Previous Caesarean Section	No	99	14,038	Referent	0.0524
	Yes	30	2,845	1.50 (1.00, 2.25)	
Previous stillbirth	No	123	16,376	Referent	0.2761
	Yes	6	508	1.57 (0.70, 3.55)	
Pre-existing Diabetes	No	120	16,670	Referent	<.0001
	Yes	9	214	5.85 (3.01, 11.35)	
Pre-eclampsia	No	126	16,392	Referent	0.6911
	Yes	3	492	0.79 (0.25, 2.48)	
Pre-existing Hypertension	No	123	16,739	Referent	<.0001
	Yes	6	145	5.64 (2.53, 12.57)	
Primiparity	Not Primiparous	83	11,695	Referent	0.2243
	Primiparous	46	5,189	1.25 (0.87, 1.79)	
SEIFA	1 Least Advantaged	65	8,538	0.88 (0.36, 2.17)	0.8897
	2	39	4,628	0.97 (0.38, 2.46)	
	3	12	1,910	0.73 (0.26, 2.05)	
	4	8	1,231	0.75 (0.25, 2.28)	
	5 Most Advantaged	5	577	Referent	
Smoking after 20 weeks gestation	No	56	8,881	Referent	0.2677
	Yes	60	7,750	1.23 (0.85, 1.76)	
Smoking before 20 weeks gestation (and not after)	No	69	9,770	Referent	0.9175
	Yes	4	598	0.95 (0.35, 2.59)	
Sexually Transmitted Infection	No	127	16,706	Referent	0.5814
	Yes	2	178	1.48 (0.37, 5.93)	
Urinary Tract Infection	No	127	16,776	Referent	0.2052
	Yes	2	108	2.22 (1.00, 4.91)	

^ Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

n.c. No Cases.

Table 9.3 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of stillbirth, non-Indigenous women*, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	91	12,849	1.79 (1.44, 2.22)	<.0001
	20-34	828	209,274	Referent	
	35-39	168	33,111	1.28 (1.09, 1.51)	
	40+	117	22,640	1.31 (1.08, 1.58)	
Anaemia	No	1,181	272,566	Referent	1
	Yes	23	5,308	1.00 (0.66, 1.51)	
Antenatal Visits	<2/Unknown	112	1,846	23.12 (19.04, 28.08)	<.0001
	2-4	403	13,455	11.41 (10.11, 12.89)	
	5+	689	262,573	Referent	
Antepartum Haemorrhage	No	894	265,785	Referent	<.0001
	Yes	310	12,089	7.62 (6.71, 8.66)	
ARIA+	Major City/Inner Regional	995	230,074	0.96 (0.83, 1.13)	0.5827
	Outer Regional	190	42,380	Referent	
	Remote/Very Remote	19	5,420	0.78 (0.49, 1.25)	
BMI Category	Underweight <18.50	46	12,302	1.17 (0.86, 1.58)	<.0001
	Normal 18.50-24.99	435	135,536	Referent	
	Overweight 25-29.99	268	67,415	1.24 (1.06, 1.44)	
	Obese 30+	273	52,983	1.61 (1.38, 1.87)	
Chronic Kidney Disease	No	1,201	277,784	Referent	0.0003
	Yes	3	90	7.75 (2.56, 23.48)	
Gestational Weeks	<24 weeks	374	555	602.35 (529.48, 685.25)	<.0001
	25-27 weeks	191	828	206.19 (174.03, 244.29)	
	28-31 weeks	144	1,626	79.16 (65.21, 96.10)	
	32-36 weeks	201	14,712	12.21 (10.21, 14.61)	
	37-41 weeks	289	258,326	Referent	
	42+ weeks	3	1,810	1.48 (0.48, 4.62)	
Gestational Diabetes	No	1,137	262,257	Referent	0.9337
	Yes	67	15,617	0.99 (0.77, 1.27)	
Gestational Hypertension	No	1,182	269,801	Referent	0.0271
	Yes	22	8,073	0.62 (0.41, 0.95)	
Lower Birth Weight 10th Percentile	No	803	254,213	Referent	<.0001
	Yes	389	23,602	5.22 (4.63, 5.88)	
Marital Status	Married/De Facto	989	245,357	Referent	<.0001
	Not Married/De Facto	215	32,517	1.64 (1.42, 1.90)	
Previous Caesarean Section	No	1,000	228,734	Referent	0.3892
	Yes	201	49,133	0.94 (0.80, 1.09)	
Previous stillbirth	No	1,145	273,642	Referent	<.0001
	Yes	59	4,232	3.33 (2.57, 4.32)	
Pre-existing Diabetes	No	1,182	276,363	Referent	<.0001
	Yes	22	1,511	3.40 (2.24, 5.17)	
Pre-eclampsia	No	1,139	271,808	Referent	<.0001
	Yes	65	6,066	2.56 (1.99, 3.28)	
Pre-existing Hypertension	No	1,180	276,211	Referent	<.0001
	Yes	24	1,663	3.38 (2.26, 5.05)	
Primiparity	Not Primiparous	687	163,470	Referent	0.2086
	Primiparous	517	114,404	1.08 (0.96, 1.21)	
SEIFA	1 Least Advantaged	261	53,285	1.32 (1.09, 1.59)	0.0022
	2	289	58,144	1.34 (1.11, 1.60)	
	3	234	56,713	1.11 (0.92, 1.34)	
	4	229	58,357	1.06 (0.87, 1.28)	
	5 Most Advantaged	191	51,375	Referent	
Smoking after 20 weeks gestation	No	957	240,623	Referent	<.0001
	Yes	216	35,368	1.54 (1.33, 1.78)	
Smoking before 20 weeks gestation (and not after)	No	691	161,783	Referent	0.9857
	Yes	19	4,430	1.00 (0.64, 1.58)	
Sexually Transmitted Infection	No	1,202	276,338	Referent	0.0878
	Yes	2	1,536	0.30 (0.08, 1.19)	
Urinary Tract Infection	No	1,200	277,380	Referent	0.2084
	Yes	2	108	2.22 (1.00, 4.91)	

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Table 9.4 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of neonatal death, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	44	16,002	1.45 (1.07, 1.98)	0.0701
	20-34	417	220,363	Referent	
	35-39	77	33,883	1.20 (0.94, 1.53)	
	40+	46	23,177	1.05 (0.77, 1.42)	
Anaemia	No	567	287,414	Referent	0.1428
	Yes	17	6,011	1.43 (0.89, 2.32)	
Antenatal Visits	<2/Unknown	76	2,513	27.85 (21.72, 35.71)	<.0001
	2-4	209	15,692	12.26 (10.28, 14.62)	
	5+	299	275,220	Referent	
Antepartum Haemorrhage	No	417	281,160	Referent	<.0001
	Yes	167	12,265	9.18 (7.68, 10.98)	
ARIA+	Major City/Inner Regional	431	236,100	0.74 (0.60, 0.91)	<.0001
	Outer Regional	118	47,859	Referent	
	Remote/Very Remote	35	9,466	1.50 (1.03, 2.19)	
BMI Category	Underweight <18.50	18	13,251	0.91 (0.56, 1.48)	0.0024
	Normal 18.50-24.99	210	141,229	Referent	
	Overweight 25-29.99	115	71,085	1.09 (0.87, 1.37)	
	Obese 30+	127	56,909	1.50 (1.20, 1.87)	
Chronic Kidney Disease	No	583	293,329	Referent	0.0954
	Yes	1	96	5.25 (0.75, 36.84)	
Gestational Weeks	<24 weeks	211	230	1669.92 (1417.18, 1967.74)	<.0001
	24-27 weeks	132	739	325.14 (260.38, 406.01)	
	28-31 weeks	42	1,690	45.24 (32.25, 63.47)	
	32-36 weeks	48	15,877	5.51 (3.98, 7.61)	
	37+ weeks	151	274,865	Referent	
Gestational Diabetes	No	566	276,698	Referent	0.0073
	Yes	18	16,727	0.53 (0.33, 0.84)	
Gestational Hypertension	No	578	284,955	Referent	0.0103
	Yes	6	8,470	0.35 (0.16, 0.78)	
Indigenous Status*	Non-Indigenous	501	276,670	Referent	<.0001
	Aboriginal and Torres Strait Islander	83	16,755	2.74 (2.17, 3.45)	
Lower Birth Weight 10th Percentile	No	482	267,688	Referent	<.0001
	Yes	83	25,673	1.80 (1.42, 2.27)	
Marital Status	Married/De Facto	445	255,055	Referent	<.0001
	Not Married/De Facto	139	38,370	2.08 (1.72, 2.51)	
Previous Caesarean Section	No	479	241,673	Referent	0.8971
	Yes	104	51,747	1.01 (0.82, 1.25)	
Previous stillbirth	No	556	288,750	Referent	<.0001
	Yes	28	4,675	3.11 (2.13, 4.54)	
Pre-existing Diabetes	No	580	291,731	Referent	0.7312
	Yes	4	1,694	1.19 (0.44, 3.17)	
Pre-eclampsia	No	554	286,935	Referent	<.0001
	Yes	30	6,490	2.39 (1.66, 3.45)	
Pre-existing Hypertension	No	577	291,647	Referent	0.0693
	Yes	7	1,778	1.99 (0.95, 4.19)	
Primiparity	Not Primiparous	328	174,395	Referent	0.1075
	Primiparous	256	119,030	1.14 (0.97, 1.35)	
SEIFA	1 Least Advantaged	170	61,497	2.04 (1.55, 2.70)	<.0001
	2	137	62,444	1.62 (1.22, 2.16)	
	3	108	58,377	1.37 (1.01, 1.85)	
	4	99	59,351	1.23 (0.91, 1.67)	
	5 Most Advantaged	70	51,756	Referent	
Smoking after 20 weeks gestation	No	426	248,491	Referent	<.0001
	Yes	138	42,842	1.88 (1.55, 2.28)	
Smoking before 20 weeks gestation (and not after)	No	327	170,793	Referent	0.0892
	Yes	15	5,005	1.57 (0.93, 2.62)	
Sexually Transmitted Infection	No	576	291,715	Referent	0.0151
	Yes	8	1,710	2.37 (1.18, 4.75)	
Urinary Tract Infection	No	581	292,829	Referent	0.1068
	Yes	3	596	2.54 (0.82, 7.87)	

[^] Excludes stillbirths, multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Table 9.5 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of neonatal death, Indigenous women*, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	11	3,244	0.60 (0.32, 1.14)	0.3002
	20-34	67	11,917	Referent	
	35-39	3	940	0.57 (0.18, 1.80)	
	40+	2	654	0.54 (0.13, 2.22)	
Anaemia	No	79	16,029	Referent	0.8274
	Yes	4	726	1.12 (0.41, 3.04)	
Antenatal Visits	<2/Unknown	26	779	15.90 (9.37, 26.97)	<.0001
	2-4	29	2,640	5.23 (3.12, 8.78)	
	5+	28	13,336	Referent	
Antepartum Haemorrhage	No	58	16,269	Referent	<.0001
	Yes	25	486	14.43 (9.11, 22.87)	
ARIA+	Major City/Inner Regional	23	7,021	0.56 (0.33, 0.96)	0.0307
	Outer Regional	33	5,669	Referent	
	Remote/Very Remote	27	4,065	1.14 (0.69, 1.89)	
BMI Category	Underweight <18.50	6	995	1.54 (0.63, 3.76)	0.5676
	Normal 18.50-24.99	24	6,128	Referent	
	Overweight 25-29.99	19	3,938	1.23 (0.68, 2.25)	
	Obese 30+	14	4,199	0.85 (0.44, 1.64)	
Chronic Kidney Disease	No	83	16,746	n.c.	n.c.
	Yes	0	9	n.c.	
Gestational Weeks	<24 weeks	43	49	878.78 (524.28, 1472.98)	<.0001
	24-27 weeks	18	102	176.72 (91.61, 340.87)	
	28-31 weeks	4	208	19.26 (6.45, 57.53)	
	32-36 weeks	3	1,366	2.20 (0.64, 7.59)	
	37+ weeks	15	15,021	Referent	
Gestational Diabetes	No	83	15,578	n.c.	n.c.
	Yes	0	1,177	n.c.	
Gestational Hypertension	No	83	16,336	n.c.	n.c.
	Yes	0	419	n.c.	
Lower Birth Weight 3rd Percentile	No	67	15,888	Referent	0.0092
	Yes	9	850	2.51 (1.26, 5.02)	
Lower Birth Weight 10th Percentile	No	61	14,278	Referent	0.2148
	Yes	15	2,460	1.43 (0.81, 2.51)	
Marital Status	Married/De Facto	44	10,687	Referent	0.0423
	Not Married/De Facto	39	6,068	1.56 (1.02, 2.40)	
Previous Caesarean Section	No	67	13,939	Referent	0.5457
	Yes	16	2,815	1.18 (0.69, 2.04)	
Previous stillbirth	No	74	16,253	Referent	<.0001
	Yes	9	502	3.94 (1.98, 7.82)	
Pre-existing Diabetes	No	81	16,550	Referent	0.3321
	Yes	2	205	1.99 (0.49, 8.05)	
Pre-eclampsia	No	81	16,266	Referent	0.783
	Yes	2	489	0.82 (0.20, 3.33)	
Pre-existing Hypertension	No	82	16,616	Referent	0.7069
	Yes	1	139	1.46 (0.20, 10.40)	
Primiparity	Not Primiparous	59	11,612	Referent	0.7246
	Primiparous	24	5,143	0.92 (0.57, 1.47)	
SEIFA	1 Least Advantaged	46	8,473	3.25 (1.01, 10.43)	0.1578
	2	27	4,589	3.52 (1.07, 11.59)	
	3	7	1,898	2.21 (0.57, 8.52)	
	4/5 Most Advantaged	3	1,795	Referent	
Smoking after 20 weeks gestation	No	36	8,825	Referent	0.1052
	Yes	45	7,690	1.44 (0.93, 2.22)	
Smoking before 20 weeks gestation (and not after)	No	47	9,701	Referent	0.0884
	Yes	6	594	2.09 (0.90, 4.86)	
Sexually Transmitted Infection	No	81	16,579	Referent	0.2356
	Yes	2	176	2.33 (0.58, 9.39)	
Urinary Tract Infection	No	81	16,649	Referent	0.0559
	Yes	2	106	3.88 (0.97, 15.57)	

^ Excludes stillbirths, multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 Definitions for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

n.c. No Cases.

Table 9.6 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of neonatal death, non-Indigenous women*, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	33	12,758	1.54 (1.08, 2.20)	0.0198
	20-34	350	208,446	Referent	
	35-39	74	32,943	1.34 (1.04, 1.72)	
	40+	44	22,523	1.16 (0.85, 1.59)	
Anaemia	No	488	271,385	Referent	0.2618
	Yes	13	5,285	1.37 (0.79, 2.37)	
Antenatal Visits	<2/Unknown	50	1,734	27.87 (20.69, 37.54)	<.0001
	2-4	180	13,052	13.33 (11.05, 16.08)	
	5+	271	261,884	Referent	
Antepartum Haemorrhage	No	359	264,891	Referent	<.0001
	Yes	142	11,779	8.90 (7.34, 10.80)	
ARIA+	Major City/Inner Regional	408	229,079	0.88 (0.70, 1.12)	0.4956
	Outer Regional	85	42,190	Referent	
	Remote/Very Remote	8	5,401	0.74 (0.36, 1.52)	
BMI Category	Underweight <18.50	12	12,256	0.71 (0.40, 1.27)	0.0005
	Normal 18.50-24.99	186	135,101	Referent	
	Overweight 25-29.99	96	67,147	1.04 (0.81, 1.33)	
	Obese 30+	113	52,710	1.56 (1.23, 1.97)	
Chronic Kidney Disease	No	500	276,583	Referent	0.063
	Yes	1	87	6.36 (0.90, 44.71)	
Gestational Weeks	<24 weeks	168	181	1773.39 (1491.90, 2107.99)	<.0001
	24-27 weeks	114	637	341.93 (269.94, 433.13)	
	28-31 weeks	38	1,482	48.99 (34.32, 69.94)	
	32-36 weeks	45	14,511	5.93 (4.23, 8.30)	
	37+ weeks	136	259,844	Referent	
Gestational Diabetes	No	483	261,120	Referent	0.0507
	Yes	18	15,550	0.63 (0.39, 1.00)	
Gestational Hypertension	No	495	268,619	Referent	0.0275
	Yes	6	8,051	0.40 (0.18, 0.90)	
Lower Birth Weight 10th Percentile	No	421	253,410	Referent	<.0001
	Yes	68	23,213	1.76 (1.37, 2.28)	
Marital Status	Married/De Facto	401	244,368	Referent	<.0001
	Not Married/De Facto	100	32,302	1.89 (1.52, 2.35)	
Previous Caesarean Section	No	479	241,673	Referent	0.8971
	Yes	104	51,747	1.01 (0.82, 1.25)	
Previous stillbirth	No	482	272,497	Referent	<.0001
	Yes	19	4,173	2.57 (1.63, 4.07)	
Pre-existing Diabetes	No	499	275,181	Referent	0.6722
	Yes	2	1,489	0.74 (0.19, 2.97)	
Pre-eclampsia	No	473	270,669	Referent	<.0001
	Yes	28	6,001	2.67 (1.83, 3.91)	
Pre-existing Hypertension	No	495	275,031	Referent	0.0826
	Yes	6	1,639	2.04 (0.91, 4.54)	
Primiparity	Not Primiparous	269	162,783	Referent	0.0194
	Primiparous	232	113,887	1.23 (1.03, 1.47)	
SEIFA	1 Least Advantaged	124	53,024	1.71 (1.28, 2.29)	0.0055
	2	110	57,855	1.39 (1.03, 1.88)	
	3	101	56,479	1.31 (0.96, 1.77)	
	4	96	58,128	1.21 (0.89, 1.64)	
	5 Most Advantaged	70	51,184	Referent	
Smoking after 20 weeks gestation	No	390	239,666	Referent	<.0001
	Yes	93	35,152	1.63 (1.30, 2.04)	
Smoking before 20 weeks gestation (and not after)	No	280	161,092	Referent	0.6354
	Yes	9	4,411	1.17 (0.60, 2.28)	
Sexually Transmitted Infection	No	495	275,136	Referent	0.057
	Yes	6	1,534	2.18 (0.98, 4.86)	
Urinary Tract Infection	No	500	276,180	Referent	0.898
	Yes	1	490	1.14 (0.16, 7.95)	

[^] Excludes stillbirths, multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Table 9.7 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of preterm birth, 2007/08-2011/12, Queensland[^].

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	1,336	16,114	1.30 (1.23, 1.37)	<.0001
	20-34	14,099	221,259	Referent	
	35-39	2,420	34,062	1.11 (1.07, 1.16)	
	40+	1,688	23,297	1.14 (1.08, 1.19)	
Anaemia	No	19,044	288,692	Referent	<.0001
	Yes	499	6,040	1.25 (1.15, 1.36)	
Antepartum Haemorrhage	No	16,475	282,118	Referent	<.0001
	Yes	3,068	12,614	4.16 (4.03, 4.31)	
ARIA+	Major City/Inner Regional	15,406	237,129	0.95 (0.92, 0.99)	<.0001
	Outer Regional	3,289	48,086	Referent	
	Remote/Very Remote	848	9,517	1.30 (1.21, 1.40)	
BMI Category	Underweight <18.50	1,205	13,306	1.49 (1.40, 1.58)	<.0001
	Normal 18.50-24.99	8,630	141,698	Referent	
	Overweight 25-29.99	4,243	71,371	0.98 (0.94, 1.01)	
	Obese 30+	3,546	57,213	1.02 (0.98, 1.06)	
Chronic Kidney Disease	No	19,494	294,633	Referent	<.0001
	Yes	49	99	7.51 (6.15, 9.16)	
Gestational Diabetes	No	18,111	277,932	Referent	<.0001
	Yes	1,432	16,800	1.31 (1.24, 1.38)	
Gestational Hypertension	No	18,933	286,239	Referent	0.0376
	Yes	610	8,493	1.09 (1.00, 1.17)	
Indigenous Status*	Non-Indigenous	17,721	277,857	Referent	<.0001
	Aboriginal and Torres Strait Islander	1,822	16,875	1.69 (1.62, 1.77)	
Marital Status	Married/De Facto	15,920	256,103	Referent	<.0001
	Not Married/De Facto	3,623	38,629	1.51 (1.46, 1.56)	
Previous Caesarean Section	No	15,372	242,750	Referent	<.0001
	Yes	4,169	51,975	1.27 (1.23, 1.31)	
Previous stillbirth	No	18,862	289,994	Referent	<.0001
	Yes	681	4,738	2.21 (2.06, 2.38)	
Pre-existing Diabetes	No	19,049	293,007	Referent	<.0001
	Yes	494	1,725	4.41 (4.09, 4.75)	
Pre-eclampsia	No	17,636	288,175	Referent	<.0001
	Yes	1,907	6,557	4.75 (4.56, 4.95)	
Pre-existing hypertension	No	19,214	292,924	Referent	<.0001
	Yes	329	1,808	2.77 (2.51, 3.06)	
Primiparity	Not Primiparous	11,130	175,142	Referent	<.0001
	Primiparous	8,413	119,590	1.11 (1.08, 1.14)	
Recommended Antenatal Visits (based on schedule)	No	2,543	17,495	2.37 (2.28, 2.47)	<.0001
	Yes	17,000	277,237	Referent	
SEIFA	1 Least Advantaged	4,725	61,813	1.29 (1.24, 1.35)	<.0001
	2	4,395	62,764	1.18 (1.13, 1.24)	
	3	3,637	58,617	1.05 (1.00, 1.10)	
	4	3,713	59,588	1.05 (1.01, 1.10)	
	5 Most Advantaged	3,073	51,950	Referent	
Smoking after 20 weeks gestation	No	15,098	249,493	Referent	<.0001
	Yes	4,159	43,108	1.59 (1.54, 1.65)	
Smoking before 20 weeks gestation (and not after)	No	11,412	171,543	Referent	0.4286
	Yes	320	5,028	0.96 (0.86, 1.07)	
Sexually Transmitted Infection	No	19,424	293,018	Referent	0.5932
	Yes	119	1,714	1.05 (0.88, 1.25)	
Urinary Tract Infection	No	19,487	294,130	Referent	0.0073
	Yes	56	602	1.41 (1.10, 1.81)	

[^] Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Table 9.8 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of preterm birth, Indigenous women*, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	343	3,266	1.04 (0.92, 1.16)	<.0001
	20-34	1,216	11,996	Referent	
	35-39	147	952	1.52 (1.30, 1.78)	
	40+	116	661	1.73 (1.46, 2.06)	
Anaemia	No	1,741	16,142	Referent	0.8189
	Yes	81	733	1.02 (0.83, 1.26)	
Antepartum Haemorrhage	No	1,612	16,350	Referent	<.0001
	Yes	210	525	4.06 (3.62, 4.55)	
ARIA+	Major City/Inner Regional	675	7,069	0.87 (0.78, 0.96)	<.0001
	Outer Regional	630	5,709	Referent	
	Remote/Very Remote	517	4,097	1.14 (1.03, 1.28)	
BMI Category	Underweight <18.50	160	1,004	1.55 (1.32, 1.82)	<.0001
	Normal 18.50-24.99	635	6,164	Referent	
	Overweight 25-29.99	359	3,959	0.88 (0.78, 1.00)	
	Obese 30+	333	4,233	0.76 (0.67, 0.87)	
Chronic Kidney Disease	No	1,815	16,866	Referent	<.0001
	Yes	7	9	7.24 (5.10, 10.29)	
Gestational Diabetes	No	1,664	15,692	Referent	0.0029
	Yes	158	1,183	1.26 (1.08, 1.47)	
Gestational Hypertension	No	1,775	16,455	Referent	0.7883
	Yes	47	420	1.04 (0.79, 1.36)	
Marital Status	Married/De Facto	1,058	10,756	Referent	<.0001
	Not Married/De Facto	764	6,119	1.27 (1.16, 1.39)	
Previous Caesarean Section	No	1,402	14,029	Referent	<.0001
	Yes	420	2,845	1.48 (1.34, 1.64)	
Previous stillbirth	No	1,707	16,369	Referent	<.0001
	Yes	115	506	2.18 (1.85, 2.58)	
Pre-existing Diabetes	No	1,744	16,661	Referent	<.0001
	Yes	78	214	3.48 (2.90, 4.18)	
Pre-eclampsia	No	1,657	16,384	Referent	<.0001
	Yes	165	491	3.32 (2.91, 3.79)	
Pre-existing Hypertension	No	1,774	16,730	Referent	<.0001
	Yes	48	145	3.12 (2.47, 3.95)	
Primiparity	Not Primiparous	1,293	11,686	Referent	0.0936
	Primiparous	529	5,189	0.92 (0.84, 1.01)	
Recommended Antenatal Visits (based on schedule)	No	573	3,322	1.87 (1.71, 2.05)	<.0001
	Yes	1,249	13,553	Referent	
SEIFA	1 Least Advantaged	1,013	8,534	1.29 (0.99, 1.68)	0.0001
	2	472	4,625	1.11 (0.85, 1.46)	
	3	168	1,908	0.96 (0.71, 1.29)	
	4	116	1,231	1.03 (0.75, 1.40)	
	5 Most Advantaged	53	577	Referent	
Smoking after 20 weeks gestation	No	795	8,878	Referent	<.0001
	Yes	973	7,746	1.40 (1.28, 1.53)	
Smoking before 20 weeks gestation (and not after)	No	1,060	9,766	Referent	0.6188
	Yes	61	598	0.94 (0.74, 1.20)	
Sexually Transmitted Infection	No	1,800	16,697	Referent	0.4959
	Yes	22	178	1.15 (0.77, 1.70)	
Urinary Tract Infection	No	1,807	16,767	Referent	0.2904
	Yes	15	108	1.29 (0.80, 2.07)	

^ Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

Table 9.9 Univariate relative risk ratios and 95% confidence intervals, wald statistics, counts and totals for predictors/risk factors of preterm birth, non-Indigenous women*, 2007/08-2011/12, Queensland^.

Predictor/Risk Factor		Count	Total	Relative Risk Ratio (95%CI)	p-value (wald)
Age Category	<20	993	12,848	1.26 (1.18, 1.34)	<.0001
	20-34	12,883	209,263	Referent	
	35-39	2,273	33,110	1.12 (1.07, 1.16)	
	40+	1,572	22,636	1.13 (1.07, 1.19)	
Anaemia	No	17,303	272,550	Referent	<.0001
	Yes	418	5,307	1.24 (1.13, 1.36)	
Antepartum Haemorrhage	No	14,863	265,768	Referent	<.0001
	Yes	2,858	12,089	4.23 (4.08, 4.38)	
ARIA+	Major City/Inner Regional	14,731	230,060	1.02 (0.98, 1.06)	0.4433
	Outer Regional	2,659	42,377	Referent	
	Remote/Very Remote	331	5,420	0.97 (0.87, 1.09)	
BMI Category	Underweight <18.50	1,045	12,302	1.44 (1.35, 1.53)	<.0001
	Normal 18.50-24.99	7,995	135,534	Referent	
	Overweight 25-29.99	3,884	67,412	0.98 (0.94, 1.01)	
	Obese 30+	3,213	52,980	1.03 (0.99, 1.07)	
Chronic Kidney Disease	No	17,679	277,767	Referent	<.0001
	Yes	42	90	7.35 (5.89, 9.17)	
Gestational Diabetes	No	16,447	262,240	Referent	<.0001
	Yes	1,274	15,617	1.30 (1.23, 1.37)	
Gestational Hypertension	No	17,158	269,784	Referent	0.0257
	Yes	563	8,073	1.10 (1.01, 1.19)	
Marital Status	Married/De Facto	14,862	245,347	Referent	<.0001
	Not Married/De Facto	2,859	32,510	1.45 (1.40, 1.51)	
Previous Caesarean Section	No	13,970	228,721	Referent	<.0001
	Yes	3,749	49,130	1.25 (1.21, 1.29)	
Previous stillbirth	No	17,155	273,625	Referent	<.0001
	Yes	566	4,232	2.14 (1.98, 2.31)	
Pre-existing Diabetes	No	17,305	276,346	Referent	<.0001
	Yes	416	1,511	4.40 (4.05, 4.78)	
Pre-eclampsia	No	15,979	271,791	Referent	<.0001
	Yes	1,742	6,066	4.89 (4.68, 5.10)	
Pre-existing Hypertension	No	17,440	276,194	Referent	<.0001
	Yes	281	1,663	2.68 (2.40, 2.98)	
Primiparity	Not Primiparous	9,837	163,456	Referent	<.0001
	Primiparous	7,884	114,401	1.15 (1.11, 1.18)	
Recommended Antenatal Visits (based on schedule)	No	1,970	14,173	2.33 (2.23, 2.43)	<.0001
	Yes	15,751	263,684	Referent	
SEIFA	1 Least Advantaged	3,712	53,279	1.19 (1.13, 1.24)	<.0001
	2	3,923	58,139	1.15 (1.10, 1.20)	
	3	3,469	56,709	1.04 (0.99, 1.09)	
	4	3,597	58,357	1.05 (1.00, 1.10)	
	5 Most Advantaged	3,020	51,373	Referent	
Smoking after 20 weeks gestation	No	14,303	240,615	Referent	<.0001
	Yes	3,186	35,362	1.52 (1.46, 1.57)	
Smoking before 20 weeks gestation (and not after)	No	10,352	161,777	Referent	0.1391
	Yes	259	4,430	0.91 (0.81, 1.03)	
Sexually Transmitted Infection	No	17,624	276,321	Referent	0.9202
	Yes	97	1,536	0.99 (0.82, 1.20)	
Urinary Tract Infection	No	17,680	277,363	Referent	0.0769
	Yes	41	494	1.30 (0.97, 1.75)	

^ Excludes multiple births, babies with selected congenital anomalies, identified terminations of pregnancy (see section 9.2 *Definitions* for further details) and records where relevant data elements are unknown/indeterminate.

* Based on Indigenous status recorded for the mother in each specific birth.

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