

Mothers who live in remote areas and their babies

9

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Key findings

In 2019, 2.3% (6,661) of women who gave birth in that calendar year lived in remote areas of Australia (see Box 9.2: Article definitions, scope and methods). Women who live remotely have less access to health care, including maternity care, which can be detrimental to their health and the health of their babies. Compared with women who lived in regional areas and *Major cities*, mothers who lived in remote areas in 2019 were more likely to:

- be aged under 20 (7.2%, compared with 3.3% in regional areas and 1.3% in *Major cities*)
- identify as Aboriginal and/or Torres Strait Islander (respectfully referred to hereafter as Indigenous mothers) (39%, compared with 9.2% in regional areas and 2.3% in *Major cities*)
- live in the lowest socioeconomic areas (36%, compared with 28% in regional areas and 17% in *Major cities*).

Women who lived in remote areas in 2019 had higher rates of behavioural risk factors, with 26% smoking at any time during pregnancy (compared with 16% in regional areas and 6.8% in *Major cities*) and 7.8% drinking alcohol at any time during pregnancy (compared with 3.0% and 2.0%, respectively).

Access to maternity care was identified as a potential issue as women who lived in remote areas were more likely to have their first antenatal visit after 20 weeks' gestation (16%, compared with 8.4% for non-remote areas).

Women who lived in remote areas had slightly fewer interventions, such as induced labour (32%), instrumental vaginal birth (8.7%) and caesarean section birth (33%) than women who lived in regional areas (34%, 10% and 34%, respectively) and *Major cities* (35%, 14% and 37%, respectively). They were also more likely to have an intact perineum (35 per 100 women giving birth vaginally, compared with 27 and 20 per 100 in regional areas and *Major cities*, respectively).

Similar patterns in access to the first antenatal visit and in time to the nearest birthing facility were seen for Indigenous mothers who lived in remote areas and Indigenous mothers who lived in regional areas and *Major cities*.

The majority of women who live in remote areas of Australia have uncomplicated pregnancies and healthy babies; however, when differences between mothers are explored based on the remoteness area in which they live, it is clear that women who live in remote areas face additional challenges to mothers who live in non-remote areas.

The health of mothers and their babies is affected by a range of complex and interrelated factors. These include the social determinants of health (see Box 9.1: Social determinants of health), behavioural risk factors, a woman's underlying health status, and access to health services (AIHW 2020b).

Box 9.1: Social determinants of health

The concept of 'social determinants of health' recognises the potent and complex effects of the social environment on health outcomes.

The World Health Organization (WHO) considers the circumstances in which people are born, live and work as being the most important determinants of health. These include income, power, education and social support.

The social determinants of health shape the immediate determinants of health, including biomedical factors and health behaviours. This means that a person's health advantage or disadvantage is determined by broader social and economic conditions under which they live (for more information, see 'Social determinants of health' <https://www.aihw.gov.au/reports/australias-health/social-determinants-of-health>).

One of the key social determinants of health are the circumstances – including the geographical location – in which a person lives, with women who live in remote areas often experiencing compounding disadvantage in relation to education, employment, housing and income (AIHW 2019a, 2020b).

Additionally, women who live in remote areas have higher rates of behavioural risk factors, such as smoking, and are more likely to be living with a chronic disease (AIHW 2019a; Rolfe et al. 2017).

While robust health systems play a vital role in ameliorating the factors that lead to poorer health, multiple challenges affect the delivery of health care in remote areas of Australia. These include lack of transport; closure of maternity services; and the distribution of services, staff and resources across large distances (AIHW 2020a; Barclay et al. 2016).

Previous research on maternal and perinatal health indicates that, besides having higher rates of behavioural risk factors, mothers who live in remote areas have higher rates of chronic health conditions and may also experience difficulty in accessing appropriate maternity care (AIHW 2017, 2021b).

This article examines the outcomes of pregnancy and birth, and birth outcomes, for mothers who lived in remote areas of Australia, and their babies. It also outlines the differences in outcomes compared with mothers who lived in non-remote areas, and their babies.

As almost half of all people living in remote areas identify as being Aboriginal and/or Torres Strait Islander people, this article includes a section that concentrates on Indigenous mothers and their babies.

Specifically, this article focuses on women who gave birth in 2019 in regard to:

- demographics, behavioural risk factors and health conditions
- access to antenatal care and public birthing facilities
- labour and birth outcomes for mothers and babies
- outcomes for Indigenous mothers and Indigenous babies.

In acknowledgement of the unique challenges faced by women who live in rural and remote areas and Indigenous women, these groups of women have been identified as a priority population in the *National Women's Health Strategy 2020–2023* (Department of Health 2019).

Box 9.2: Article definitions, scope and methods

The data in this article are based on the National Perinatal Data Collection (NPDC), which is a national population-based cross-sectional collection of data on pregnancy and childbirth. Analysis of NPDC data can show associations only – they are not suitable for determining causation. Consideration of the potential drivers of differences in health status between mothers who live in remote areas and mothers who live in regional areas and *Major cities* – such as policy, clinical guidelines and health service performance – is an area for future research.

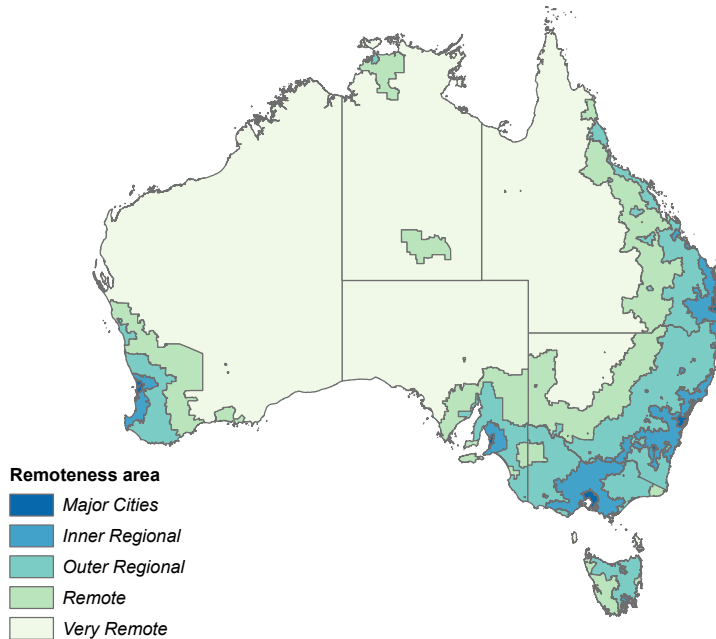
In this article, mothers are defined as women who gave birth in the 2019 calendar year, and mothers in remote areas as women whose usual residence was in a *Remote* or *Very Remote* area. Remoteness is determined according to the Australian Bureau of Statistics (ABS) Accessibility/Remoteness Index of Australia, which is a measure of relative access to services based upon population and distance to services (ABS 2018). The Australian Statistical Geography Standard (ASGS) Remoteness Structure, 2016 divides Australia into 5 classes of remoteness: *Major cities*, *Inner regional*, *Outer regional*, *Remote* and *Very remote* (ABS 2018). Remoteness data used in this article are derived by applying this classification to the mother's usual area of residence in the NPDC. Remoteness area was calculated where geographic area of usual residence was provided.

The comparison groups used in this article are mothers whose usual residence was in a regional area (*Inner regional* and *Outer regional* areas combined) or *Major cities*. Where applicable, these are collectively referred to as non-remote areas (regional areas and *Major cities*) or all remoteness areas (remote areas, regional areas and *Major cities*) (see Figure 9.1).

(continued)

Box 9.2 (continued): Article definitions, scope and methods

Figure 9.1: Remoteness areas of Australia



Source: AIHW.

Time trend analysis in this article compares trends for women who gave birth by remoteness area in 2019 and 2012; 2012 is used as the comparison year as this is the earliest reference period that can be analysed, due to differences in reporting practices in earlier years.

To better understand the context for Indigenous Australians, this article reports within-group comparative analysis of Indigenous mothers who lived in remote and non-remote areas. While comparing the outcomes of Indigenous and non-Indigenous populations is important in determining national priorities and informing research, exclusively focusing on differences can contribute to a narrative of deficit about the health of Indigenous Australians and act as a barrier to improvements (Fogarty et al. 2018).

The measures of socioeconomic disadvantage used in this article are based on the 2016 Socio-Economic Indexes for Areas Index of Relative Socioeconomic Disadvantage (SEIFA IRSD) developed by the ABS for use at Statistical Area Level 2 (SA2). SEIFA IRSD is a measure of average disadvantage of all people living in a geographic area and cannot be presumed to apply to all individuals living in the area.

This article reports crude proportions. Although age is a known confounding variable across a number of reported data items, and mothers who lived in remote areas were younger than mothers living in non-remote areas, patterns remained consistent even after the effect of age was removed (age-standardised).

For more information on data sources and methods, see the report on 'Australia's mothers and babies' <http://www.aihw.gov.au/reports/mothers-babies/australias-mothers-babies/contents/technical-notes/data-sources>.

Maternal demographics

Most of the Australian landmass is classified as remote (Figure 9.1), and 1.9% of the 2019 ERP lived in *Remote* or *Very remote* areas (ABS 2021). In 2019, however, only 2.3% (6,661) of women who gave birth lived in these areas. Of these, 32% lived in Western Australia, 28% in Queensland and 21% in the Northern Territory.

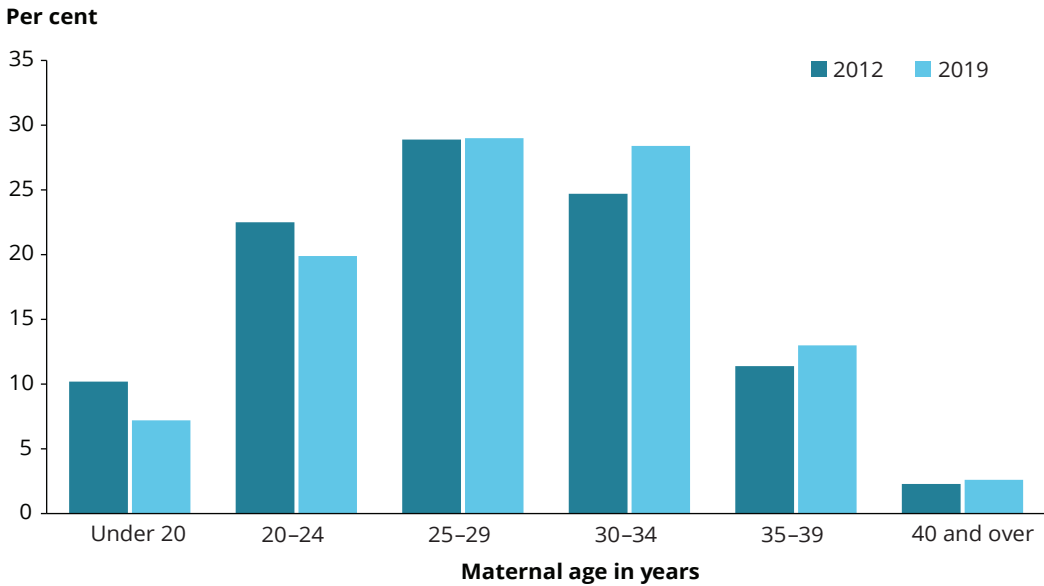
The characteristics of mothers have important implications for their experience of pregnancy and birth. For example, younger mothers (aged under 20), older mothers (aged over 40) and women who gave birth and identified as Indigenous have an increased risk of complications and adverse pregnancy outcomes (for more information, see the section in this chapter on 'Indigenous mothers who live in remote areas and their babies') (AIHW 2021b).

In 2019, mothers who lived in remote areas were more likely to be:

- Indigenous (39%, compared with 9.2% in regional areas and 2.3% in *Major cities*)
- born in Australia (86%, compared with 85.6% in regional areas and 57% in *Major cities*)
- younger, with higher proportions of mothers aged under 20 and 20–24 (7.2% and 20%, respectively, compared with 3.3% and 17% in regional areas and 1.3% and 8.7% in *Major cities*).

Over time, the age of mothers who lived in remote areas has increased (Figure 9.2) in line with overall national increases in maternal age (AIHW 2021b).

Figure 9.2: Proportion of women who gave birth and lived in remote areas, by maternal age, 2012 and 2019



Source: AIHW National Perinatal Data Collection.

Socioeconomic position is viewed as a key social determinant of health and more than one-third (36%) of mothers from remote areas lived in the lowest socioeconomic areas (first quintile). This is compared with 28% of mothers who lived in regional areas and 17% of mothers in *Major cities*. The proportion of mothers from remote areas who lived in the lowest socioeconomic areas has, however, fallen over time – down from 43% in 2012.

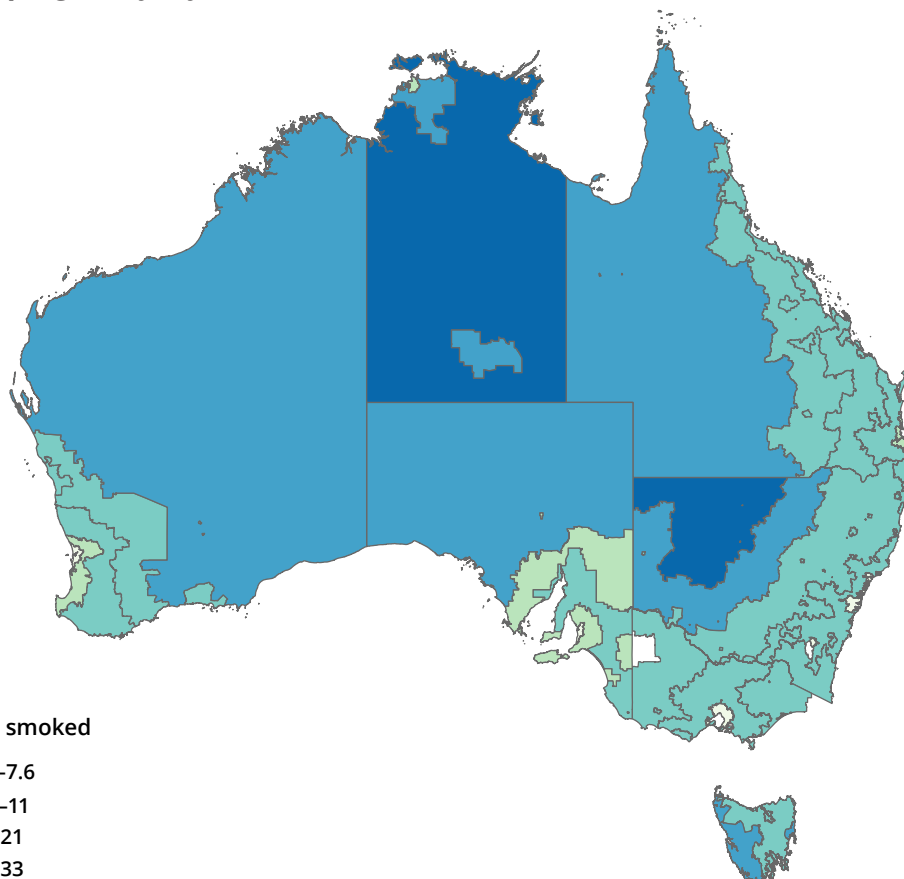
Smoking and alcohol consumption

Smoking during pregnancy is a common behavioural risk factor and is associated with low birthweight, being small for gestational age, pre-term birth and perinatal death (AIHW 2021b). Alcohol consumption is another important behavioural risk factor which, in some instances, can have considerable effects on fetal development, including fetal alcohol spectrum disorder (AIHW 2021b).

Support to stop smoking, and drinking alcohol, is widely available through antenatal care clinics (AIHW 2021b). However, this support may be less accessible for mothers who live in remote areas due to the challenges involved in accessing care, including antenatal care clinics (Barclay et al. 2016).

In 2019, mothers who lived in remote areas were more likely to smoke at any time during pregnancy (26%) than mothers living in regional areas (16%) and *Major cities* (6.8%) (Figure 9.4). Rates of smoking during pregnancy have been consistently higher in remote areas than in non-remote areas over time; however, the proportion of mothers who live in remote areas and smoked during pregnancy has declined (down from 29% in 2012). Figure 9.3 shows the proportion of women who smoked at any time in pregnancy within each remoteness area (see Figure 9.1), overlaid on a map of Australia.

Figure 9.3: Proportion of women who gave birth and smoked at any time during pregnancy, by remoteness area, 2019



Per cent smoked

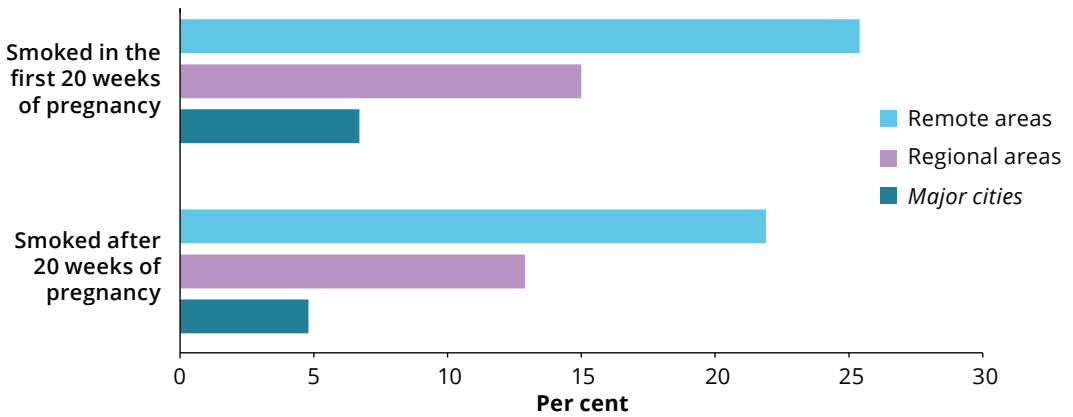
- 4.7-7.6
- 7.7-11
- 12-21
- 22-33
- 34-46

Notes

1. Mother's tobacco smoking status during pregnancy is self-reported.
2. Percentage was calculated after excluding records with smoking status of 'Not stated'. Care must be taken when interpreting percentages.
3. Data are by state/territory of mother's usual residence.
4. For WA, 'Smoked' includes occasional smoking. 'Did not smoke' includes 'Not determined' average number of tobacco cigarettes smoked per day in first 20 weeks of pregnancy and after 20 weeks of pregnancy. For WA, smoking status was determined at multiple locations and times and is therefore difficult to report accurately at time of birth.
5. White areas on the map represent areas where analysis by remoteness area resulted in nil records.

Source: AIHW National Perinatal Data Collection.

Figure 9.4: Proportion of women who gave birth, by smoking status and remoteness area, 2019



Notes

1. Mother's tobacco smoking status during pregnancy is self-reported.
2. Percentage calculated after excluding records with 'Not stated' values. Care must be taken when interpreting percentages.

Source: AIHW National Perinatal Data Collection.

Mothers who lived in remote areas were also more likely to drink alcohol during pregnancy (7.8%) than mothers living in regional areas (3.0%) and *Major cities* (2.0%). The proportion of mothers who lived in remote areas who reported drinking alcohol during the first 20 weeks of pregnancy was 7.3%, compared with 3.0% in the last 20 weeks of pregnancy.

Data on maternal consumption of alcohol during pregnancy were available for the first time in 2019. The analysis in this article excludes data for New South Wales and South Australia.

Healthy body weight

Obesity (a body mass index, or BMI, greater than 30) in pregnancy puts women at increased risk of conditions such as pre-eclampsia, and their babies have higher rates of congenital anomaly, stillbirth and neonatal death (AMB 2021b).

In 2019, mothers who lived in remote areas and regional areas had similar proportions of obesity (28% and 27%, respectively) and being overweight (BMI between 25 and 29.9) (both 27%) compared with 19% obese and 26% overweight for mothers who lived in *Major cities*.

Mothers who lived in remote areas were more likely to be underweight (BMI under 18.5) (4.5%) than mothers in regional areas (3.5%) and *Major cities* (3.7%).

Box 9.3: Body mass index

BMI is calculated by dividing a person's weight in kilograms by the square of their height in metres.

BMI does not necessarily reflect body fat distribution or describe the same degree of fatness in different individuals. At a population level, however, it is a practical and useful measure to identify overweight and obesity (AIHW 2020c).

In the NPDC, BMI refers to pre-pregnancy BMI. However, source data and methods used for data collection are not uniform nationally. For example, BMI can be calculated based on self-reported height and weight or on those measured at the first antenatal visit.

Maternal health conditions

The maternal health conditions of diabetes and hypertension are associated with increased risk of maternal illness and death, and of babies being born pre-term, small for gestational age, being admitted to a special care nursery, and perinatal death (AIHW 2019b; Queensland Clinical Guidelines 2021).

In 2019, mothers who lived in remote areas had higher rates of pre-existing diabetes (2.5%) than mothers living in regional areas (1.3%) and *Major cities* (0.7%). The rate of pre-existing hypertension for mothers who lived in remote areas was also higher (1.0%, compared with 0.8% for regional areas and 0.6% for *Major cities*). This reflects previous findings that people who live in remote areas have higher rates of chronic health conditions (AIHW 2019a).

The rate of gestational diabetes was similar or the same across all remoteness areas (11% for remote and regional areas and 12% for *Major cities*), while the proportion of women who developed gestational hypertension was slightly lower in remote areas (2.2%) than in regional areas (2.9%) and *Major cities* (2.3%).

Previous pregnancies

Parity is the number of previous pregnancies resulting in live births or stillbirths, excluding the current pregnancy. First-time mothers and mothers with a higher parity – particularly a parity of 4 or greater than 5 – may be at increased risk of adverse birth outcomes, including pre-term birth (ACM 2021; Koullali et al. 2020).

In 2019, mothers who lived in remote areas were less likely to be a first-time mother (37%, compared with 39% in regional areas and 44% in *Major cities*); however, a higher proportion of mothers who lived in remote areas had a parity of 4 or more (6.0%), than mothers who lived in non-remote areas (4.7% in regional areas and 2.8% in *Major cities*) (Table 9.1).

Table 9.1: Proportion of women who gave birth, by parity and remoteness area, 2019

Parity	Remoteness area			Total
	Remote areas	Regional areas	<i>Major cities</i>	
		Per cent		
None	37.3	38.8	43.9	42.5
1	31.3	33.4	35.9	35.2
2	17.6	16.6	13.2	14.1
3	7.7	6.5	4.2	4.8
4 or more	6.0	4.7	2.8	3.3
Not stated	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0

Note: The percentages may not sum to 100% due to rounding.

Source: AIHW National Perinatal Data Collection.

Antenatal care visits

The time from conception to birth is known as the antenatal period. Antenatal care visits are designed to assess and improve the health of mothers and their babies during pregnancy. Antenatal care visits include assessing and monitoring maternal and fetal health, identifying and managing risk factors, providing advice, and encouraging health behaviours (Department of Health 2020).

The availability and accessibility of services impact the use of antenatal care services (AIHW 2017). Mothers living in remote areas of Australia may face challenges in accessing appropriate antenatal care due to geographic isolation and limitations in workforce availability (Department of Health 2020).

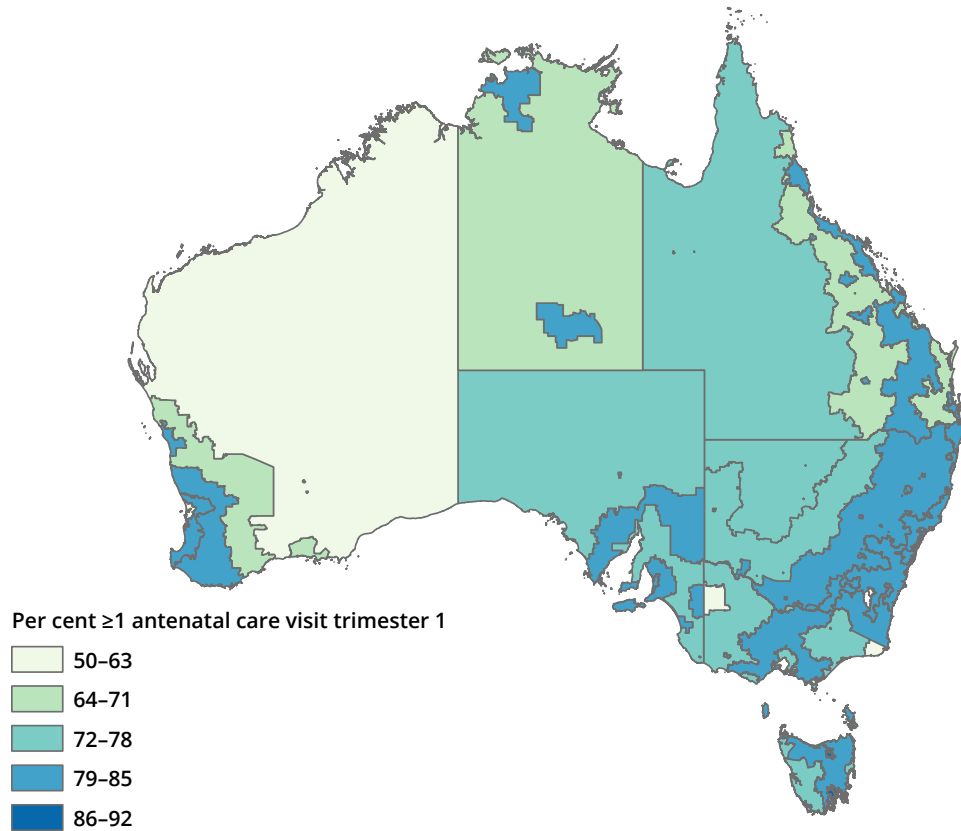
As well as these challenges, the Council of Australian Governments (COAG) Health Council publication *Women-centred care: strategic directions for Australian maternity services* acknowledges that restricted options for maternity care can cause family and work life disruptions – and safety issues – for women who live in rural and remote communities (COAG Health Council 2019).

In 2019, mothers living in remote areas were less likely to attend their first antenatal care visit in the first trimester (less than 14 weeks' gestation) (72%, compared with 78% for regional areas and 76% for *Major cities*). Importantly, these women were also nearly twice as likely to attend their first antenatal visit at a gestation greater than 20 weeks (15%, compared with 8.4% for non-remote areas).

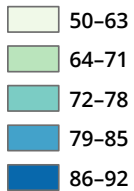
Over time, however, the proportion of mothers who lived in remote areas attending their first antenatal care visit within the first trimester has improved, up from 63% in 2012.

Figure 9.5 shows the proportion of women who had at least one antenatal visit in the first trimester within each remoteness area (see Figure 9.1), overlaid on a map of Australia.

Figure 9.5: Proportion of women who gave birth and had at least one antenatal care visit in the first trimester, by remoteness area, 2019



Per cent ≥ 1 antenatal care visit trimester 1



Notes

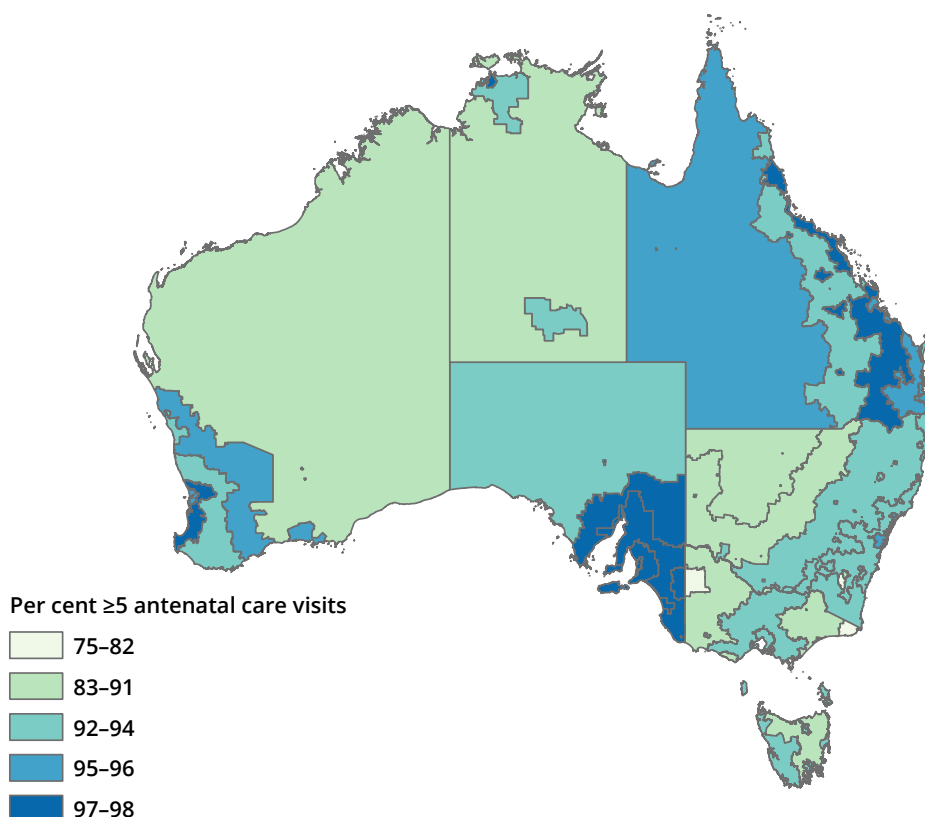
1. Percentage calculated after excluding records with duration of pregnancy at first antenatal visit of 'Not stated'. Care must be taken when interpreting percentages.
2. Data are by state/territory of mother's usual residence.
3. For Western Australia, gestational age at first antenatal visit is reported by birth hospital; therefore, data may not be available for women who attend their first antenatal visit outside the birth hospital. This particularly affects hospitals without antenatal care services onsite.
4. For the Australian Capital Territory, the first antenatal visit is often the first hospital antenatal clinic visit. In many cases, earlier antenatal care provided by the woman's general practitioner is not reported.
5. White areas on the map represent areas where analysis by remoteness area resulted in nil records.

Source: AIHW National Perinatal Data Collection.

In 2019, 94% of mothers who lived in remote and regional areas had 5 or more antenatal care visits, compared with 95% for *Major cities*. However, mothers who lived in remote areas were more likely to have no antenatal care during pregnancy (0.4%, compared with 0.1% for non-remote areas).

Figure 9.6 shows the proportion of women who had 5 or more antenatal care visits in the first trimester within each remoteness area (see Figure 9.1), overlaid on a map of Australia.

Figure 9.6: Proportion of women who gave birth and had 5 or more antenatal care visits, by remoteness area, 2019



Notes

1. Number of antenatal visits are based on women who gave birth at 32 weeks or more gestation (excluding unknown gestation).
2. Percentage calculated after excluding records with number of antenatal visits of 'Not stated'. Care must be taken when interpreting percentages.
3. Data are by state/territory of mother's usual residence.
4. For the Australian Capital Territory, in many cases, early antenatal care provided by the woman's general practitioner is not reported.
5. For the Northern Territory, 'Not stated' includes antenatal care where attendance is evident by the availability of antenatal screening results, but the total number of antenatal visits is unknown.

Source: AIHW National Perinatal Data Collection.

Drive time to public birthing facilities

This section uses drive time as a measure to explore access to birthing services for women across Australia. This analysis calculates the drive time in minutes from residential addresses to a public birthing facility, weighted for the population of females aged 15–44 (women of reproductive age) living within a statistical area. Public birthing facilities were selected as these are accessible to all women. The facilities included in this analysis were based on those in scope for the AIHW's Maternity Models of Care data collection and limited to public hospitals that provided intrapartum care.

Research indicates that increased travel time to birthing services may be associated with increased risk of post-partum haemorrhage, being born before arrival and perinatal mortality (Malouf et al 2020).

In this section, access is measured in terms of physical or spatial access, although it is acknowledged that other factors – such as cost, workforce availability and cultural appropriateness – affect the accessibility of care (AIHW 2017). The measure of interest in this section is weighted average drive time – a measure of drive time for women aged 15–44 which is modified to reflect the population distribution in an area. This is an average measure, so women within an SA2 are likely to have a drive time higher or lower than the area value, but the weighting ensures that the measure best reflects the experience of most women of reproductive age.

In 2016, an estimated 91,684 women of reproductive age (between ages of 15 and 44) lived in remote areas, representing 1.8% of the total ERP. Of these, 40% had a drive time of less than 30 minutes to a public birthing facility and 38% had a drive time of more than 2 hours (Table 9.2).

Table 9.2: Women of reproductive age, by drive time to access a public birthing facility and remoteness area, 2016

Remoteness area	Drive time				Total
	Less than 30 minutes	Between 30 and 60 minutes	More than 1 hour to 2 hours	More than 2 hours	
	Number				
Major cities	3,761,803	15,391	0	0	3,777,194
Regional areas	930,577	157,092	27,329	2,166	1,117,164
Remote areas	36,384	5,990	14,465	34,845	91,684
Total	4,728,764	178,473	41,794	37,011	4,986,042
	Per cent				
Major cities	99.6	0.4	0.0	0.0	100.0
Regional areas	83.3	14.1	2.4	0.2	100.0
Remote areas	39.7	6.5	15.8	38.0	100.0
Total	94.8	3.6	0.8	0.7	100.0

Notes

1. Weighted average drive time was calculated based on population data for the 2016 Statistical Area Level 1 (SA1) and SA2 ERP for females aged 15–44.
2. Where an SA2 spanned more than one remoteness area, the ERP with a remoteness area having a ratio of greater than or equal to 0.5 was counted.

Analysis based on statistical area, rather than population size, presents a different picture (Figure 9.7). In 2016, SA2s in remote areas made up only 4.2% of SA2s overall. Of these, 25% had a drive time of less than 30 minutes to access a public birthing facility, and nearly half (48%) had a drive time of more than 2 hours. In contrast, most SA2s in regional areas had a drive time of an hour or less (76% had a drive time of less than 30 minutes and 19% had a drive time between 30 and 60 minutes). The vast majority (99%) of SA2s in *Major cities* had a drive time of less than 30 minutes (Table 9.3).

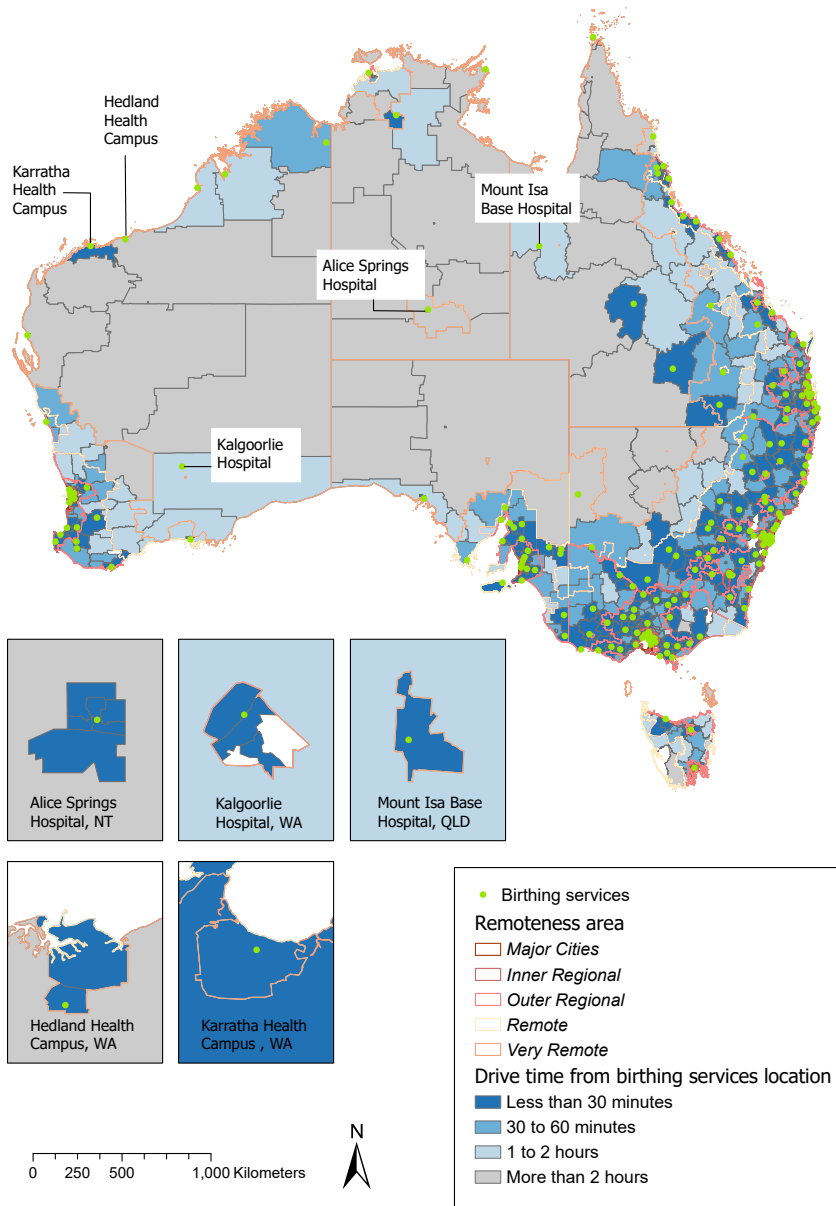
Table 9.3: SA2s, by population drive time to access a public birthing facility and remoteness area, 2016

Remoteness area	Drive time				Total
	Less than 30 minutes	Between 30 and 60 minutes	More than 1 hour to 2 hours	More than 2 hours	
	Number				
Major cities	1,308	10	0	0	1,318
Regional areas	610	155	37	2	804
Remote areas	23	5	21	45	94
Total	1,941	170	58	47	2,216
	Per cent				
Major cities	99.2	0.8	0.0	0.0	100.0
Regional areas	75.9	19.3	4.6	0.2	100.0
Remote areas	24.5	5.3	22.3	47.9	100.0
Total	87.6	7.7	2.6	2.1	100.0

Notes

1. Weighted average drive time was calculated based on population data for the 2016 SA1 and SA2 ERP for females aged 15-44.
2. Where an SA2 spanned more than one remoteness area, the ERP with a remoteness area having a ratio of greater than or equal to 0.5 was counted.
3. Percentages may not sum to 100% due to rounding.

Figure 9.7: Drive time of women of reproductive age to a public birthing facility, and public birthing facility location, by SA2, 2016



Notes

1. Public birthing facility data are based on facilities in scope for the AIHW's Maternity Models of Care data collection in 2021.
2. Weighted average drive time was calculated based on population data for the 2016 SA1 and SA2 ERP for females aged 15–44.
3. Hospital locations chosen for pop-out windows in this figure were selected based on a remoteness area of *Remote* or *Very remote* and ERP density, with preference given to populations with a higher density. Due to spacing limitations, not all hospitals in remote population centres could be shown.
4. White areas on the map represent areas where there were no population data.

Source: AIHW.

Onset of labour

Labour can occur spontaneously or it may be induced through surgical or medical intervention. If there is no labour, a caesarean section is performed (AIHW 2021b).

Labour may be induced if there is concern for the health of the mother or her baby. Compared with spontaneous labour, induction increases the risks of adverse pregnancy outcomes, such as an increased risk of emergency caesarean section, infection and bleeding, and a less positive experience of birth for women (Coates et al. 2020; Grivell et al. 2012).

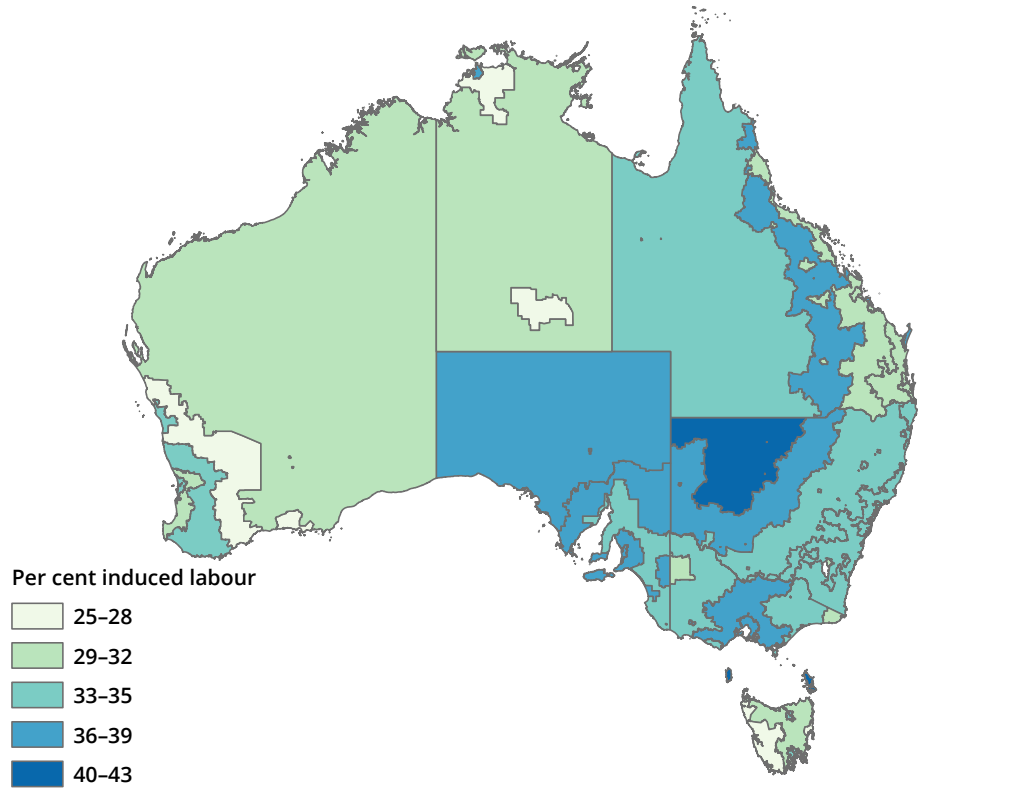
In 2019, mothers who lived in remote areas had slightly higher rates of spontaneous labour (48%) than in regional areas (45%) and *Major cities* (42%). They also had slightly lower rates of:

- induced labour (32%) than for mothers who lived in regional areas (34%) and *Major cities* (35%)
- no labour (20%) than for mothers who lived in regional areas (21%) and *Major cities* (24%).

Since 2012, the proportion of mothers living in remote areas who had spontaneous labour has decreased (down from 56%) and the proportion having induced or no labour has increased (up from 27% and 17%, respectively).

Figure 9.8 shows the proportion of women who had an induced labour within each remoteness area (see Figure 9.1), overlaid on a map of Australia.

Figure 9.8: Proportion of women who gave birth and had an induced labour, by remoteness area, 2019



Notes

1. 'Induced' may include cases where induction of labour was attempted but labour did not result.
2. Data are by state/territory of mother's usual residence.
3. White areas on the map represent areas where analysis by remoteness area resulted in nil records.

Source: AIHW National Perinatal Data Collection.

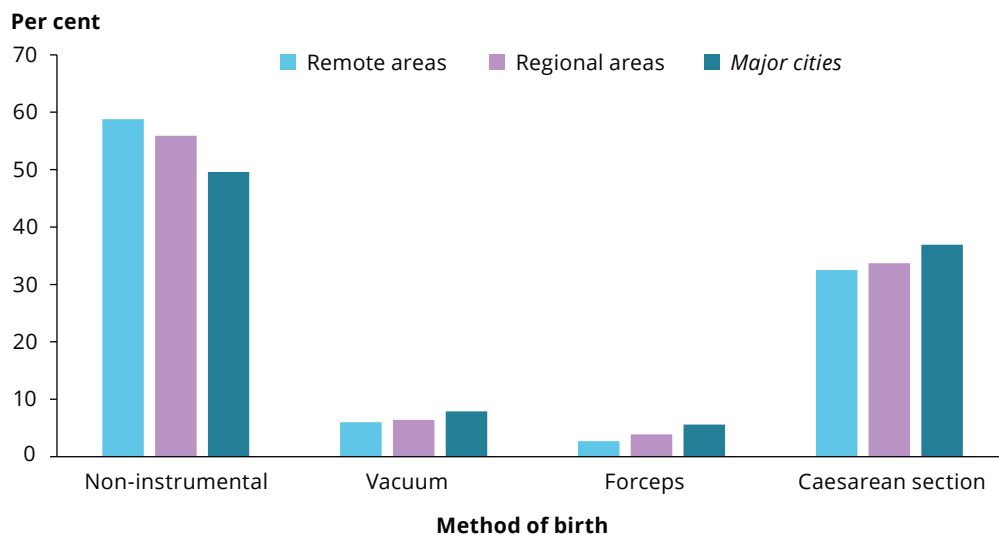
Method of birth

Method of birth refers to how the baby was born, which may be vaginally or by caesarean section. Compared with non-instrumental vaginal births, instrumental vaginal births (assisted by vacuum or forceps) and caesarean section births can carry additional risks for mothers and babies, such as infection and physical trauma. Although each method carries risks, women and their health care providers choose them to avoid complications and increase the likelihood of positive pregnancy outcomes (Victorian Department of Health 2017).

In 2019, 59% of mothers who lived in remote areas had a non-instrumental vaginal birth (compared with 56% for regional areas and 50% for *Major cities*) and 8.7% had an instrumental vaginal birth (compared with 10% for regional areas and 14% for *Major cities*).

The proportion of mothers who had a caesarean section birth was similar for remote areas (33%) and regional areas (34%); these proportions compare with 37% for *Major cities* (Figure 9.9).

Figure 9.9: Proportion of women who gave birth, by method of birth and remoteness area, 2019



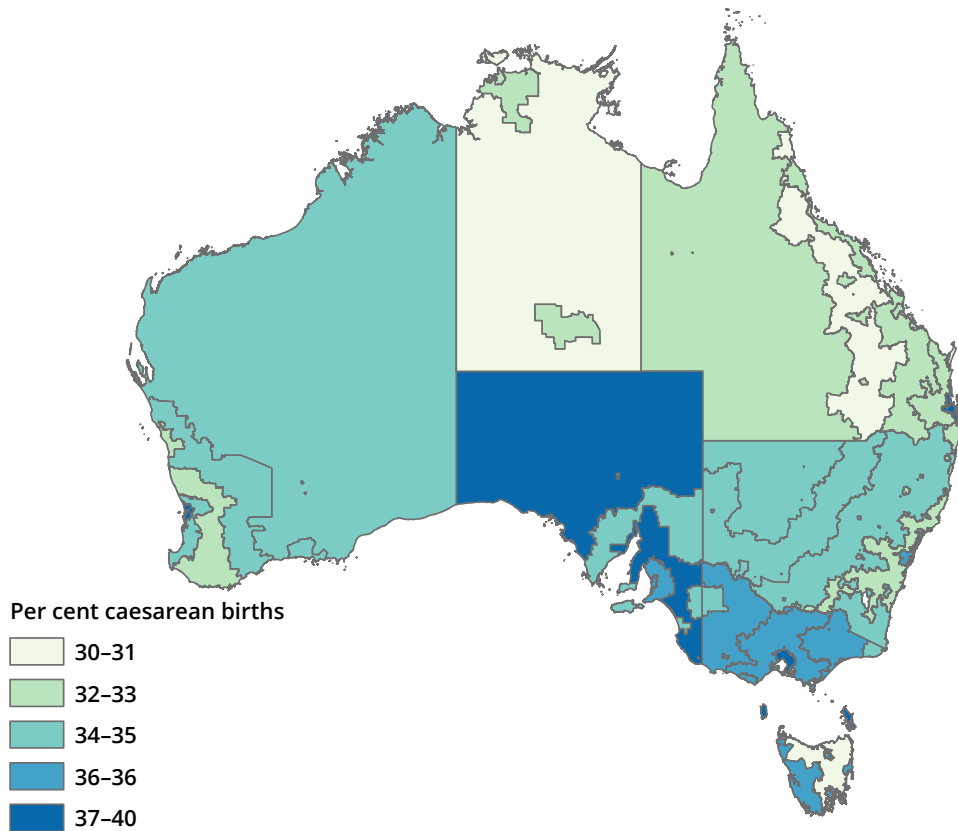
Note: For multiple births, the method of birth of the first-born baby is used.

Source: AIHW National Perinatal Data Collection.

Since 2012, rates of non-instrumental vaginal birth have fallen (down from 62%) for mothers who lived in remote areas, while rates of instrumental vaginal and caesarean section births have increased (up from 8.0% and 30%, respectively).

Figure 9.10 shows the proportion of women who had a caesarean section birth within each remoteness area (see Figure 9.1), overlaid on a map of Australia.

Figure 9.10: Proportion of women who had a caesarean section birth, by remoteness area, 2019



Per cent caesarean births

- 30-31
- 32-33
- 34-35
- 36-36
- 37-40

Notes

1. For multiple births, the method of birth of the first-born baby is used.
 2. Data are by state/territory of mother's usual residence.
 3. White areas on the map represent areas where analysis by remoteness area resulted in nil records.
- Source: AIHW National Perinatal Data Collection.

Perineal status

Perineal status refers to the state of the perineum following a vaginal birth.

An episiotomy is an incision of the perineum and vagina to enlarge the vulval orifice (AIHW 2021b). Data are specific to women who gave birth vaginally. Note that women can be recorded as having both an episiotomy and some degree of laceration.

Many women who give birth vaginally experience perineal tears, which are classified from first- to fourth-degree tears depending on their severity. Third and fourth-degree tears are considered to be severe and can have lifelong impacts if not repaired immediately after the birth (Homer and Wilson 2018). Episiotomies are usually performed when there is a medical indication and can vary in severity (NCT 2018).

In 2019, mothers who lived in remote areas were more likely to have an intact perineum (35 per 100 women giving birth vaginally, compared with 27 and 20 in regional areas and *Major cities*, respectively) and were less likely to have an episiotomy (14 per 100, compared with 18 and 27 per 100 in regional areas and *Major cities*, respectively). Rates of episiotomy for mothers who lived in remote areas has increased over time (from 11 per 100 in 2014 to 14 in 2019).

Rates of third- or fourth-degree lacerations were similar or the same across all remoteness areas (2.7 per 100 for both remote and regional areas, and 2.9 for *Major cities*).

Maternal length of stay in hospital

Women who live in remote areas of Australia often relocate before giving birth. Practices vary across jurisdictions; generally, however, women who relocate and have low-risk pregnancies travel a few weeks before their due date and stay close to a birthing facility. Women who have higher risk pregnancies may be asked to travel much earlier in the pregnancy, and stay in hospital, spending many weeks away from their home and family (AIHW 2017; Barclay 2016). This means that mothers who live in remote areas may face a lack of practical and emotional support as well as isolation and increased financial costs (Department of Health 2020).

Overall, the antenatal length of stay was similar across all remoteness areas. The median length of stay was 0 days for all remoteness areas, with the average length of stay being 0.7 days for women who lived in remote areas and 0.6 days for both regional areas and *Major cities*. More than half of the women who lived in remote areas had an antenatal hospital stay of less than 1 day (57%, compared with 61% for women who lived in regional areas and 65% for *Major cities*) (Table 9.4).

The postnatal length of stay was also similar across remoteness areas, with a median length of stay of 2 days for women who lived in remote and regional areas and 3 days for *Major cities*. The average length of stay was 2.6 days for women who lived in remote areas and regional areas, and 2.8 days for *Major cities*. Three-quarters of women who lived in remote areas had a postnatal hospital stay of 3 days or less (75%, compared with 77% of mothers who lived in regional areas and 69% in *Major cities*) (Table 9.4).

Table 9.4: Proportion of women who gave birth, by length of stay in hospital and remoteness area, 2019

Length of stay	Remoteness area			Total
	Remote areas	Regional areas	<i>Major cities</i>	
Antenatal^(a)	Per cent			
Less than 1 day	57.3	61.0	64.5	63.5
1 day	33.2	30.8	28.3	29.0
2 days	5.4	5.1	4.7	4.8
3 days	1.5	1.3	1.1	1.1
4 days	0.6	0.5	0.4	0.4
5 days	0.4	0.3	0.2	0.2
6 days	0.3	0.2	0.2	0.2
7–13 days	0.9	0.5	0.4	0.4
14 or more days	0.4	0.3	0.3	0.3
Total	100.0	100.0	100.0	100.0
Postnatal^{(a)(b)}	Per cent			
Less than 1 day	4.7	4.9	3.7	4.0
1 day	20.0	20.2	16.9	17.8
2 days	26.7	28.3	27.1	27.4
3 days	23.9	24.0	20.9	21.7
4 days	13.4	13.3	17.6	16.4
5 days	6.2	6.3	10.6	9.4
6 days	2.3	1.7	2.0	1.9
7–13 days	2.6	1.2	1.2	1.2
14 days or more	0.2	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0

(a) Excludes women who gave birth in birth centres attached to hospitals.

(b) Includes women who were discharged home. For multiple births, the length of stay after the birth of the first-born baby was used.

Note: Percentages may not sum to 100% due to rounding.

Source: AIHW National Perinatal Data Collection.

Over time, the postnatal length of stay for women who lived in remote areas has become shorter, with an increase in the proportion of stays of 3 days or less (for example, stays of less than 1 day increased from 2.8% in 2012 to 4.7% in 2019) with a corresponding drop in the proportion of stays of 4 days or more (for example, stays of 4 days fell from 18% in 2012 to 13% in 2019).

This trend towards shorter postnatal lengths of stay was also seen in non-remote areas (where stays of less than 1 day increased from 4.0% in 2012 to 4.9% in 2019 for regional areas and from 3.3% in 2012 to 3.7% in 2019 for *Major cities*). The antenatal length of stay for mothers across all remoteness areas remained relatively consistent during this period.

Gestational age

Gestational age is the duration of pregnancy in completed weeks and is reported in 3 categories: pre-term (less than 37 weeks' gestation), term (37 to 41 weeks) and post-term (42 weeks and over).

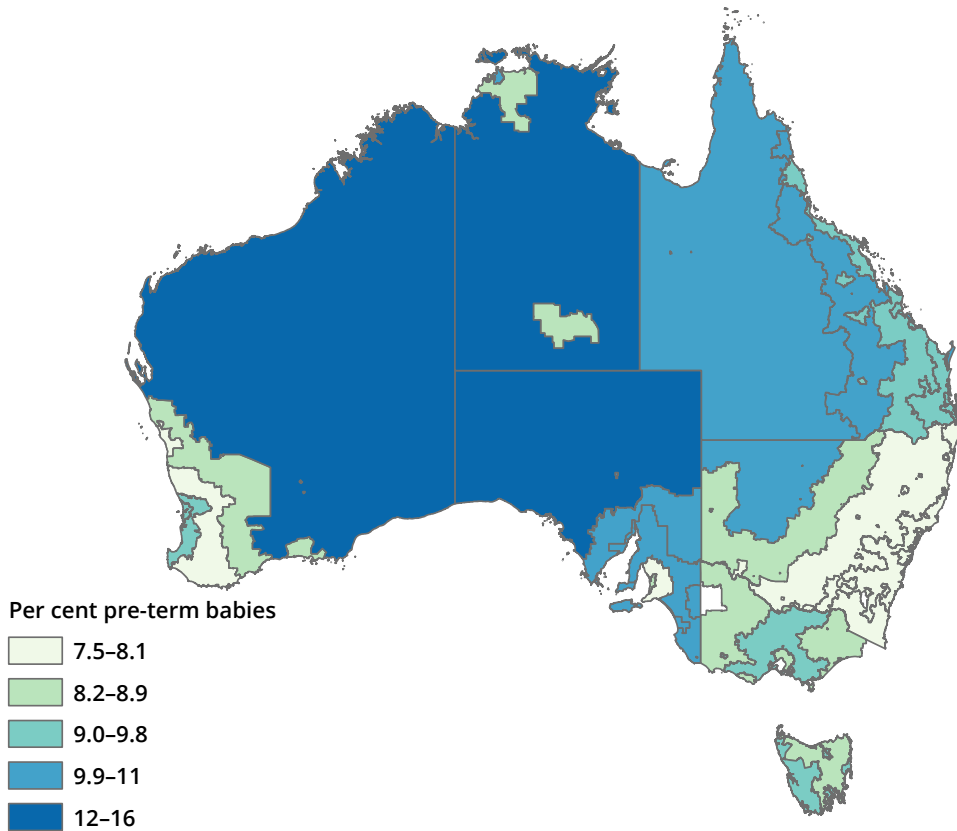
The gestational age of a baby has important implications for their health, as babies born pre-term may have breathing problems, feeding difficulties, and physical and developmental delay (CDC 2020).

In 2019, babies born to mothers who lived in remote areas were slightly more likely to be born pre-term (11%) than babies in regional areas (8.9%) and *Major cities* (8.4%) Babies born to mothers who lived in remote areas were slightly less likely to be born at term (81%) or post-term (7.9%) than babies born in regional areas (82% and 9.5%, respectively) or *Major cities* (83% and 8.6%, respectively).

Over time, the proportion of pre-term babies born to mothers who lived in remote areas has remained relatively unchanged (10% in 2012).

Figure 9.11 shows the proportion of babies born pre-term within each remoteness area (see Figure 9.1), overlaid on a map of Australia.

Figure 9.11: Proportion of babies born pre-term, by remoteness area, 2019



Notes

1. Pre-term births may include a small number of births of less than 20 weeks' gestation.
2. Data are by state/territory of mother's usual residence.
3. White areas on the map represent areas where analysis by remoteness area resulted in nil records.

Source: AIHW National Perinatal Data Collection.

Birthweight

Birthweight is an important indicator of a baby's health. Birthweight is grouped into 3 categories: low birthweight (less than 2,500 grams), normal birthweight (2,500 to 4,499 grams) and high birthweight (4,500 grams or more).

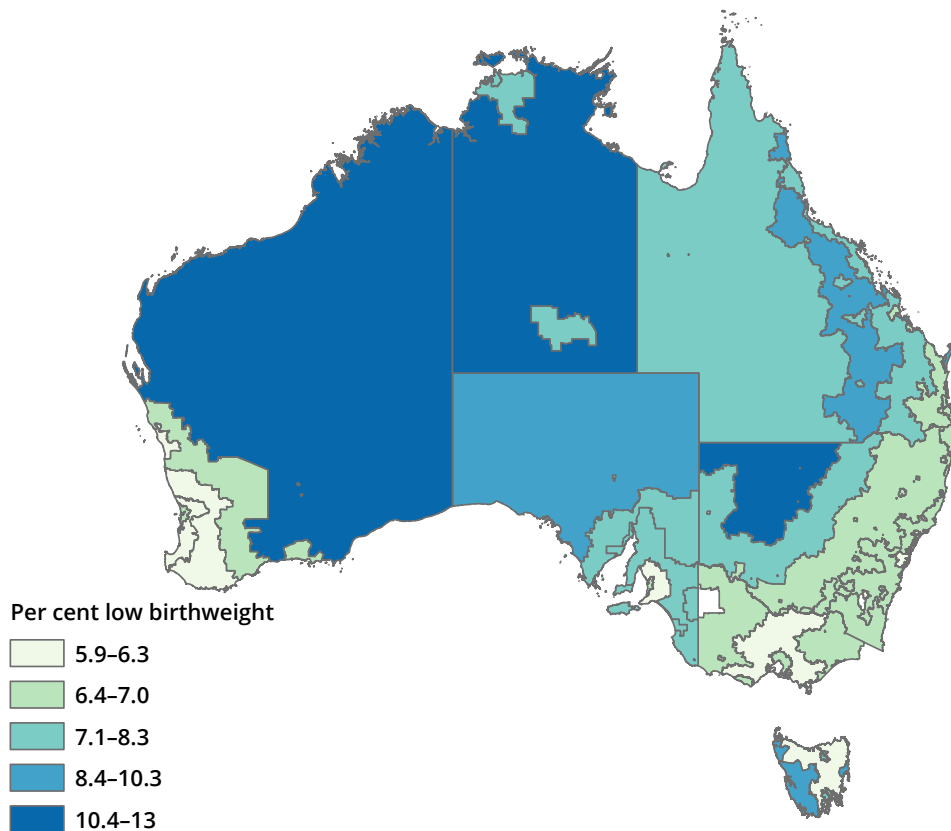
Low-birthweight babies are at a higher risk of disability and death during infancy, with long term health effects including poor cognitive development and increased risk of chronic diseases (AIHW 2020a). Low birthweight is closely associated with pre-term birth. Data on birthweight are limited to liveborn babies.

In 2019, babies born to mothers who lived in remote areas were slightly more likely to be born with a low birthweight (8.9%) than babies born in regional areas (6.7%) and in *Major cities* (6.5%). Babies born to mothers who lived in remote areas were slightly less likely to be born with a normal birthweight (90%) than babies in regional areas and *Major cities* (both 92%).

Over time, the proportion of babies of low birthweight born to mothers living in remote areas has increased (up from 8.0% in 2012).

Figure 9.12 shows the proportion of liveborn babies of low birthweight within each remoteness area (see Figure 9.1), overlaid on a map of Australia.

Figure 9.12: Proportion of liveborn low birthweight babies, by remoteness area, 2019



Notes

1. Includes liveborn babies only.
2. Data are by state/territory of mother's usual residence.
3. White areas on the map represent areas where analysis by remoteness area resulted in nil records.

Source: AIHW National Perinatal Data Collection.

Admission to special care nursery or neonatal intensive care unit

Babies are admitted to a special care nursery (SCN) or neonatal intensive care unit (NICU) if they require more specialised care and treatment than is available on the postnatal ward. Pre-term babies and low birthweight babies are more likely to be admitted to an SCN or NICU (AIHW 2021b). Data on admission to an SCN/NICU are limited to liveborn babies and exclude data for New South Wales and Western Australia.

In 2019, 22% of babies born to mothers who lived in remote areas were admitted to an SCN/NICU compared with 20% of babies born to mothers in regional areas and 17% in *Major cities*.

Stillbirths and neonatal deaths

Perinatal deaths are those occurring before or during labour and/or birth (stillbirth) or up to 28 days after birth (neonatal death), where the baby is of 20 or more completed weeks of gestation or with a birthweight of at least 400 grams.

Multiple maternal and baby factors have been associated with increased risk of perinatal death; for example, medical and obstetric conditions and pre-term birth. Some groups have also been identified as having higher rates of perinatal death, including women living in *Remote* and *Very remote* areas (AIHW 2021c).

In 2019, the perinatal mortality rate for babies born to mothers in remote areas was 13 per 1,000 births (compared with 9.6 per 1,000 births in regional areas and 9.2 in *Major cities*):

- The stillbirth rate was 9.6 per 1,000 births (compared with 7.2 per 1,000 births in both regional areas and *Major cities*).
- The neonatal mortality rate was 3.6 per 1,000 live births (compared with 2.6 per 1,000 live births in regional areas and 2.2 in *Major cities*).

Due to an update in methods, perinatal deaths data by remoteness area may not match previously reported data. Methods will be standardised in future reporting.

Indigenous mothers who live in remote areas and their babies

Accessing appropriate and culturally safe care poses a considerable challenge to Indigenous mothers in remote areas; stressors they may face include separation from country and family, language barriers, culturally inappropriate or unsafe birthing conditions, and navigating an unfamiliar health system (AIHW 2017, 2021a).

Providing appropriate and culturally safe antenatal care and birthing services – while working in partnership with Indigenous women – will improve the likelihood of their having a positive pregnancy experience and a healthy baby (AIHW 2017).

'Birthing on Country' was recognised in the Australian National Maternity Services Plan as a key approach to improve maternity services for Indigenous women and their babies. Birthing on Country is best practice maternity care for Indigenous women and may include the following elements:

- is community-based and governed
- incorporates traditional practice
- involves connection with land and country
- values both Indigenous and non-Indigenous knowledge and learning
- is culturally competent
- is developed by or with Indigenous people (Kildea et al. 2016).

To improve access to Birthing on Country programs for Indigenous women living in remote areas, wider barriers to delivering maternity care in geographically isolated areas need to be resolved, including limited workforce availability and resources, and access to facilities providing intrapartum care (Department of Health 2020; Kildea et al. 2016).

It is important to note that, despite improvements over time, Indigenous mothers and babies experience poorer health outcomes than non-Indigenous mothers and babies in some areas, and that there are complex interactions between maternal and perinatal health outcomes and the determinants of health, including both social determinants and health risk factors (AIHW 2021a).

Indigenous mothers

In 2019, 39% of women who gave birth and lived in remote areas identified as Indigenous. Although Indigenous women account for a higher proportion of the population of mothers in remote areas, overall, the proportion of Indigenous mothers who live in *Major cities* (36%) and regional areas (46%) is higher than that in remote areas (18%).

Indigenous mothers who lived in remote areas in 2019 were more likely to:

- be aged under 20 (15%, compared with 11% of Indigenous mothers in regional areas and 10% in *Major cities*)
- live in the lowest socioeconomic areas (66%, compared with 47% of Indigenous mothers in regional areas and 31% of Indigenous mothers in *Major cities*)
- have lower rates of first antenatal care visit in the first trimester (64%, compared with 70% of Indigenous mothers in regional areas and 68% in *Major cities*)
- smoke at any time during pregnancy (52%, compared with 46% of Indigenous mothers in regional areas and 37% of Indigenous mothers in *Major cities*)
- consume alcohol at any time during pregnancy (13%, compared with 5.6% of Indigenous mothers in regional areas and 5.5% of Indigenous mothers in *Major cities*).

The majority of Indigenous mothers who lived in remote areas had 5 or more antenatal visits (89%, compared with 90% of Indigenous mothers in regional areas and 88% in *Major cities*) and were:

- more likely to have an intact perineum after a vaginal birth (43 per 100 women who gave birth vaginally, compared with 36 Indigenous women in both regional areas and *Major cities*)
- less likely to have an episiotomy (10 per 100 women, compared with 11 in regional areas and 15 in *Major cities*).

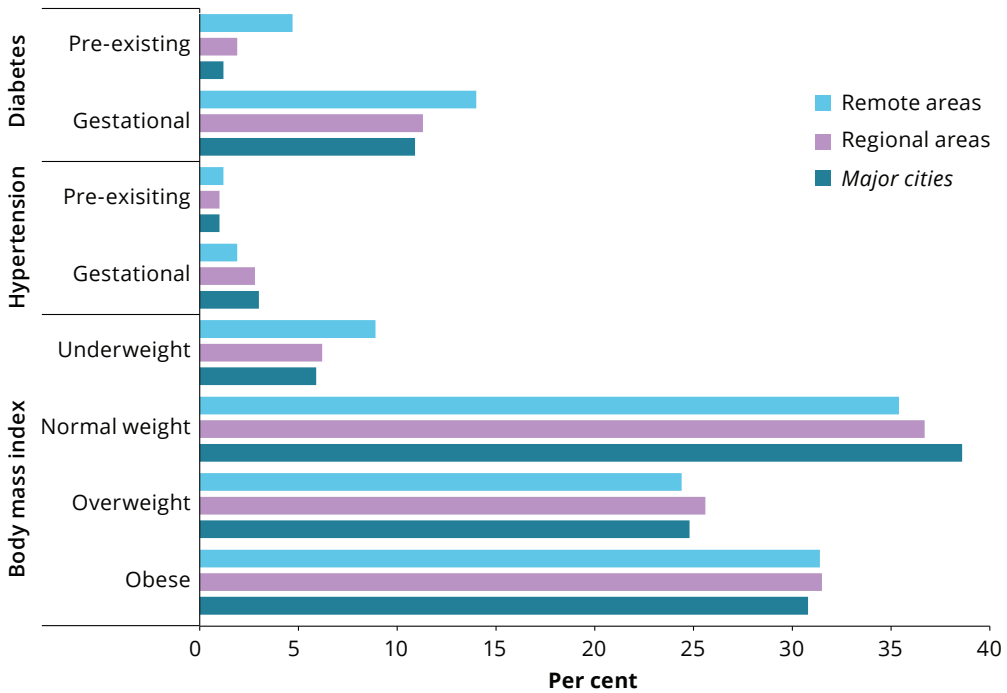
As well, since 2012, the proportion of Indigenous mothers aged under 20 declined (21% down to 15%) as did their living in the lowest socioeconomic areas (75% down to 66%), while first antenatal visit attendance in the first trimester increased (53% up to 64%).

Indigenous mothers who lived in remote areas had higher rates of pre-existing diabetes (4.7%) or gestational diabetes (14%) than Indigenous mothers who lived in regional areas (1.9% and 11%, respectively) or in *Major cities* (1.2% and 11%, respectively).

Indigenous mothers who lived in remote areas had similar rates of pre-existing hypertension (1.2%, compared with 1.0% for Indigenous mothers in non-remote areas) and were less likely to have gestational hypertension (1.9%, compared with 2.8% for Indigenous mothers in regional areas and 3.0% in *Major cities*).

Indigenous mothers who lived in remote areas were more likely to be underweight (8.9%) than Indigenous mothers in regional areas (6.2%) and *Major cities* (5.9%). Rates of obesity were the same across all remoteness areas (31%) (Figure 9.13).

Figure 9.13: Proportion of Indigenous women who gave birth, by BMI, maternal health conditions and remoteness area, 2019

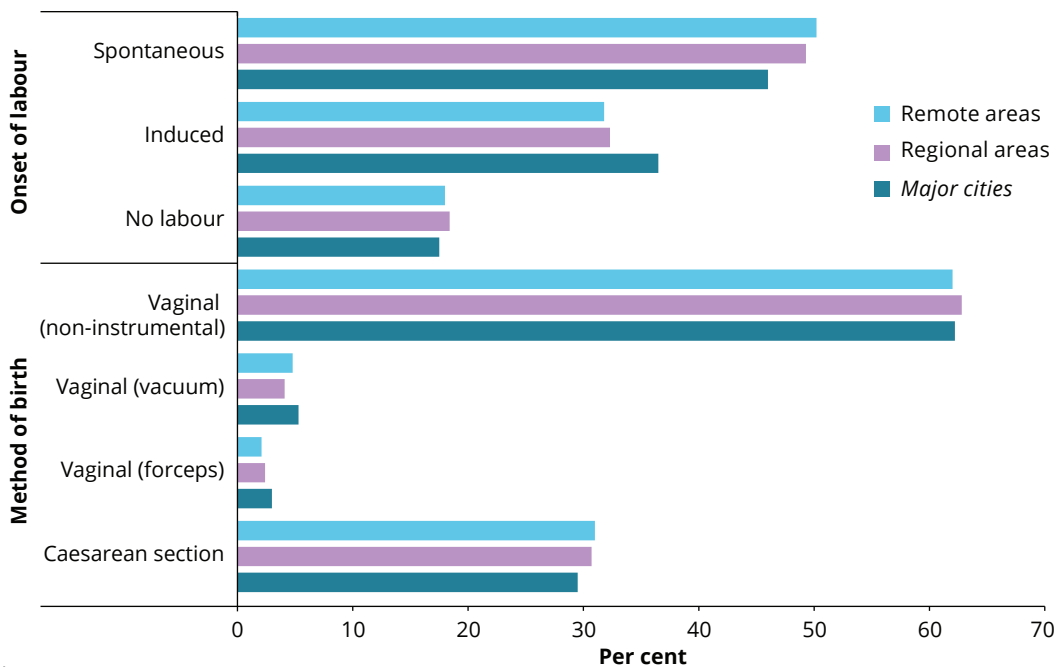


Note: BMI data exclude records where BMI was 'Not stated'.

Source: AIHW National Perinatal Data Collection.

Indigenous mothers who lived in remote areas had a slightly higher rate of spontaneous labour (50%) than Indigenous mothers who lived in regional areas (49%) or *Major cities* (46%). Indigenous mothers who lived in remote areas and regional areas were less likely to have an induced labour (both 32%) than Indigenous mothers in *Major cities* (37%) (Figure 9.14).

Figure 9.14: Proportion of Indigenous women who gave birth, by onset of labour and method of birth and remoteness area, 2019



Notes

1. 'Induced' may include cases where induction of labour was attempted but labour did not result.
2. For multiple births, the method of birth of the first-born baby is used.

Source: AIHW National Perinatal Data Collection.

Over time, the proportion of Indigenous mothers who lived in remote areas who had spontaneous labour fell (down from 63% in 2012) and induced labour rose (up from 22% in 2012).

Non-instrumental vaginal birth has decreased for Indigenous mothers who live in remote areas (from 67% in 2012 to 62% in 2019) and the rate of caesarean section births has increased (from 28% in 2012 to 31% in 2019).

Indigenous babies

In 2019, 2,594 babies were born to Indigenous mothers who lived in remote areas, accounting for 18% of all *babies born to Indigenous mothers* (based on the Indigenous status of the mother).

There were also 2,809 *Indigenous babies* born to mothers who lived in remote areas and who identified as either Indigenous or non-Indigenous, accounting for 16% of all *Indigenous babies* (based on the Indigenous status of the baby). Note that these 2 groups (*babies born to Indigenous mothers* and *Indigenous babies*) are not mutually exclusive.

As more than one-quarter (26%) of *Indigenous babies* were born to non-Indigenous mothers in 2019, it is important to consider the outcomes for babies based on the Indigenous status of both the mother and the baby, otherwise the birth outcomes of a substantial proportion of the Indigenous birth cohort would not be considered (AIHW 2021b). As previously acknowledged, Indigenous mothers may face poorer health outcomes and unique challenges in their experience of pregnancy, and whether the mother identifies as Indigenous or non-Indigenous may have important implications for the health of their baby.

While the outcomes for *Indigenous babies* whose mothers lived in remote areas, and *babies born to Indigenous mothers* who lived in remote areas are very similar, there were some differences. For example, *babies born to Indigenous mothers* who lived in remote areas were slightly more likely to be born pre-term, of low birthweight, admitted to an SCN/NICU and to stay in hospital for 4 days or more than *Indigenous babies* born to mothers who lived in remote areas.

Compared with both *Indigenous babies* and *babies born to Indigenous mothers* who lived in regional areas or *Major cities*, both *Indigenous babies* and *babies born to Indigenous mothers* who lived in remote areas were more likely to:

- be born pre-term
- be of low birthweight
- be admitted to an SCN/NICU
- have a longer length of stay in hospital.

More detail on the differences between these groups is provided in Table 9.5.

In 2019, the perinatal mortality rate for *Indigenous babies* whose mothers lived in remote areas was 20 per 1,000 births (compared with 12 per 1,000 births in regional areas and 10 in *Major cities*). The stillbirth rate was 14 per 1,000 births (compared with 8.4 per births in regional areas and 8.6 in *Major cities*) and the neonatal mortality rate was 6.0 per 1,000 live births (compared with 4.0 per 1,000 live births in regional areas and 2.2 in *Major cities*).

Mortality rates were also higher for *babies born to Indigenous mothers* who lived in remote areas than for *babies born to Indigenous mothers* who lived in other remoteness areas:

- The perinatal mortality rate was 20 per 1,000 births (compared with 14 per 1,000 births in regional areas and 13 in *Major cities*).
- The stillbirth rate was 14 per 1,000 births (compared with 9.6 per 1,000 births in regional areas and 9.8 in *Major cities*).
- The neonatal mortality rate was 6.0 per 1,000 live births (compared with 4.8 per 1,000 live births in regional areas and 3.2 in *Major cities*).

Table 9.5: Baby outcomes, by Indigenous status of the mother and Indigenous status of the baby and remoteness area, 2019

	Proportion of babies of Indigenous mothers ^(a) (%)			Proportion of Indigenous babies ^(b) (%)		
	Remoteness area			Remoteness area		
	Remote areas	Regional areas	Major cities	Remote areas	Regional areas	Major cities
						Total
Gestational age						
Pre-term ^(c)	15.5	12.4	13.0	14.8	11.6	11.8
Term	79.5	80.1	78.9	79.9	80.4	79.4
Birthweight^(d)						
Low birthweight	13.9	11.5	10.5	13.1	10.6	9.5
Normal birthweight	84.9	87.4	88.2	85.7	88.2	89.3
Apgar score^(d)						
Less than 7	3.1	2.5	2.5	3.1	2.6	2.2
7 or more	96.3	97.0	97.1	96.3	97.0	97.4
Admission to SCN/ NICU^{(e)(f)}						
Admitted	28.9	26.1	23.8	28.1	25.3	22.1
Not admitted	71.1	73.9	76.2	71.9	74.7	77.9
Length of stay^{(d)(f)}						
3 days or less	65.8	78.3	76.6	66.7	78.9	77.1
4 days or more	34.2	21.7	23.2	33.3	21.0	22.8

(a) Based on Indigenous status of the mother; excludes records where Indigenous status was 'Not stated'.

(b) Based on Indigenous status of the baby; excludes records where Indigenous status was 'Not stated'.

(c) Pre-term births may include a small number of births of less than 20 weeks' gestation.

(d) Includes liveborn babies only.

(e) Excludes data for New South Wales and Western Australia.

(f) Babies born in hospital and discharged home. Excludes data for Western Australia.

Conclusion

The majority of mothers who lived in remote areas in 2019 had uncomplicated pregnancies and healthy babies. However, exploring the differences in maternal and perinatal outcomes across remoteness areas makes it clear that mothers who live in remote areas face additional challenges compared with mothers who live in non-remote areas.

These challenges are reflected in the dimensions that affect the health of mothers and their babies: the social determinants of health, behavioural risk factors, health status of the individual, and access to health services.

Despite improvements over time – such as lower rates of smoking during pregnancy – this article found that mothers in remote areas were more likely to face socioeconomic disadvantage, have higher rates of behavioural risk factors and pre-existing maternal health conditions, and have babies who experienced poorer outcomes.

The findings also suggest that mothers who lived in remote areas faced considerable issues in accessing health services, as evidenced by lower rates of antenatal care attendance, antenatal care at a later stage of pregnancy, and increased drive time to a public birthing facility. Access to care is particularly important when considering the pivotal role maternity care plays in managing risk factors, encouraging healthy behaviours and improving maternal and perinatal health.

Many of the trends described in this article for mothers who lived in remote areas and their babies were also seen when comparing Indigenous mothers who lived in remote areas with Indigenous mothers living in non-remote areas. This suggests that the patterns seen are indeed a function of geographic location, as well as complex societal and cultural factors.

Upcoming work by the AIHW will explore the topic of access to maternity care in greater depth, based on analysis of the NPDC and the Maternity Care Classification System.

Further reading

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