Australian Government
Australian Institute of Health and Welfare

Maternal deaths in Australia

2018–2020

AIHW

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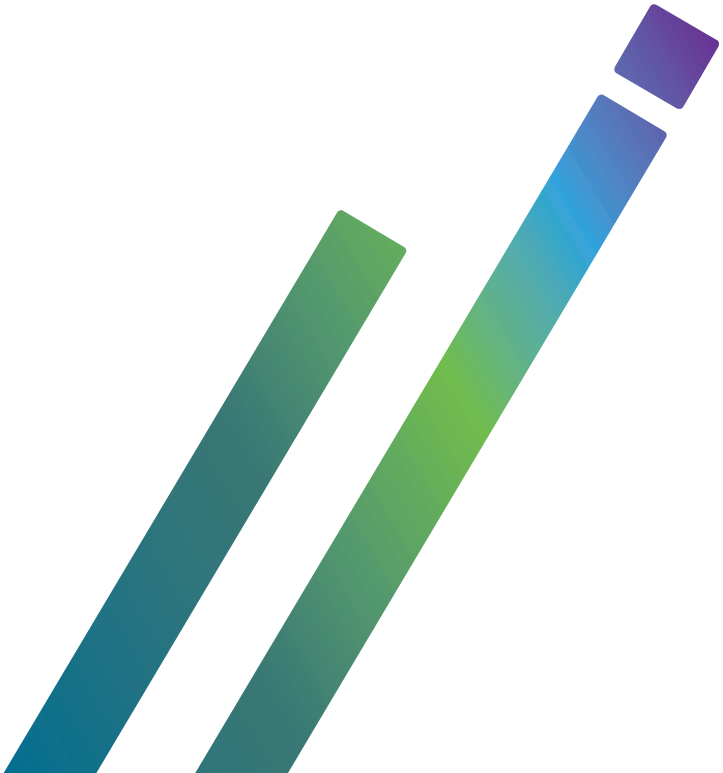

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Please note that there is the potential for minor revisions of data in this report.

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Contents

This content contains information some readers may find distressing as it relates to maternal deaths, suicide and self-harm, alcohol and drug use, and pregnancy loss.

If you or someone you know needs help, contact:

- Lifeline on 13 11 14 (lifeline.org.au)
- Griefline on 1300 845 745 (griefline.org.au)
- Perinatal Anxiety and Depression Australia (PANDA) on 1300 726 306 (panda.org.au)
- Suicide Call Back Service on 1300 659 467 (suicidecallbackservice.org.au)
- National Alcohol and Other Drug Hotline on 1800 250 015
- SANDS miscarriage, stillbirth and newborn death support 1300 308 307 (sands.org.au)

Summary

In Australia, most women have healthy pregnancies. However, while it is rare, sadly some women die during pregnancy or in the postpartum period. All these deaths are reviewed by health professionals to determine the likely cause and whether the pregnancy contributed to the death.

This report focuses on the women who died during pregnancy or within 42 days of the end of pregnancy, regardless of duration, from any cause related to or aggravated by the pregnancy or its management. These are called 'maternal deaths'. Maternal deaths do not include deaths by accident or other incidental causes.

It is important to understand how often and why maternal deaths happen. Data on maternal deaths can help policymakers and healthcare providers better understand what can be done to help ensure mothers stay healthy through pregnancy and beyond.

As maternal deaths are very rare in Australia, this report combines data over a 3-year period (1 January 2018 to 31 December 2020) to allow for more detailed reporting and analysis of maternal characteristics. Care should be taken when interpreting these data due to the very small numbers.

The maternal mortality ratio has more than halved since the 1970s

Between 2018 and 2020, about 889,000 women gave birth and there were 63 deaths. Of these, 50 were considered maternal deaths (that is, related to the pregnancy) and 13 were considered coincidental to the pregnancy. This is a maternal mortality ratio (MMR) of 5.6 deaths per 100,000 women giving birth in 2018–2020 and is the lowest MMR recorded since comparable definitions were introduced in 1973–1975, when the rate was 12.7 per 100,000.

Cardiovascular conditions are one of the leading causes of maternal death

The most common causes of maternal deaths in 2018–2020 were cardiovascular conditions, thromboembolism (blood clots in the veins) and sepsis (8 deaths each).

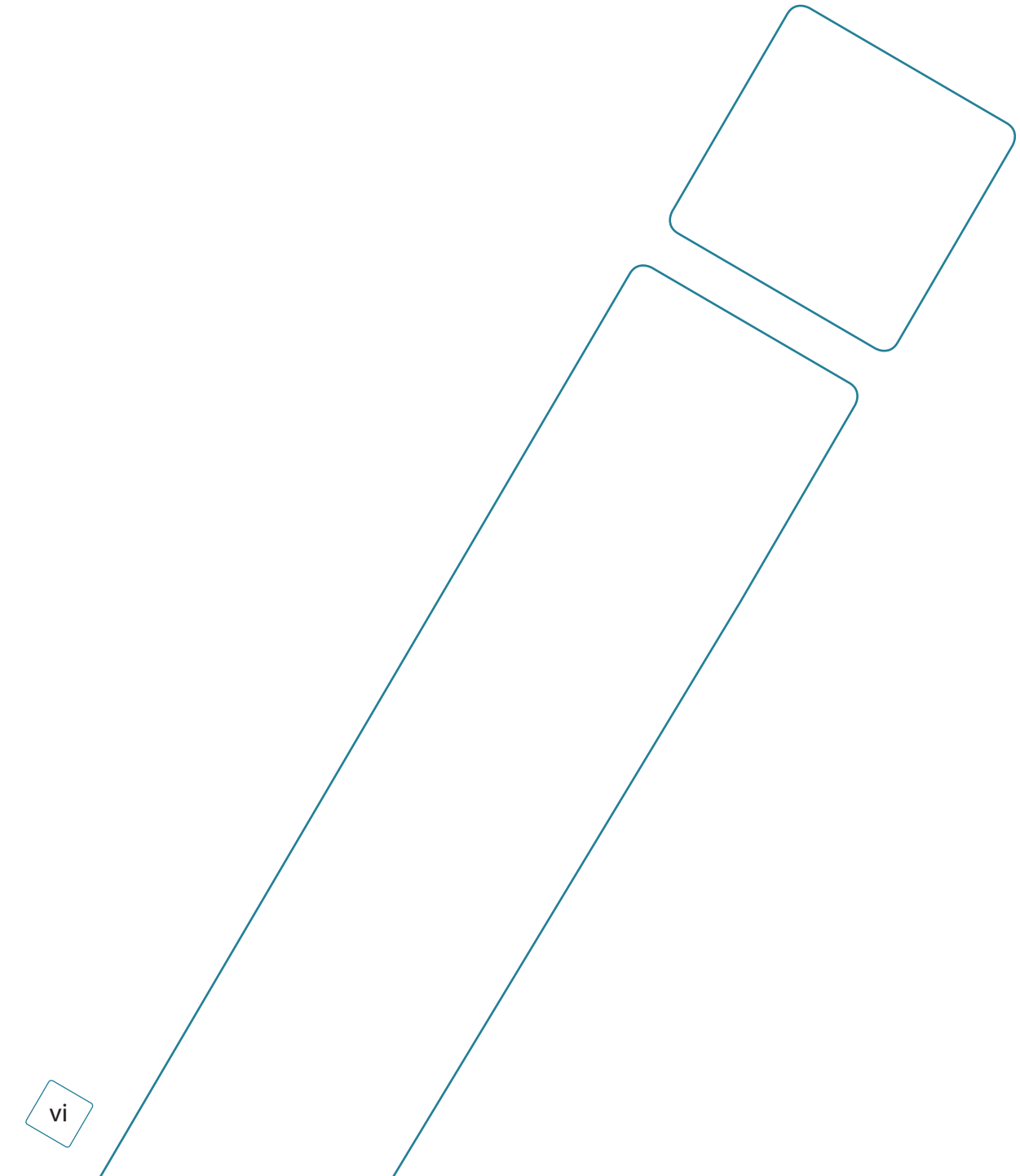
In 22 of the 50 maternal deaths, factors contributing to the death were identified. The most common factors were grouped as professional care (such as inadequate staffing, failure or delay in emergency response, failure to offer or follow recommended best practice) (12 deaths) and factors relating to the individual, family or social circumstances (for example insufficient or no antenatal care, substance abuse and family violence) (10 deaths).

SARS-COV-2 (COVID-19) infection was not reported as the cause of death for any maternal deaths during 2018–2020.

Some women are at greater risk

The MMR is higher among some groups of women. These include women who:

- have given birth 4 or more times (an MMR of 23.9 per 100,000 women giving birth, or 7 deaths)
- are aged 35 and over (an MMR of 11.7, or 26 deaths)
- smoked in the first 20 weeks of their pregnancy (an MMR of 12.5, or 10 deaths)
- identify as Aboriginal and Torres Strait Islander (an MMR of 9.4, or 4 deaths).



1 Introduction

Maternal deaths are rare in Australia but do still occur. Understanding why helps inform maternity service policy and practice.

All maternal deaths require structured professional scrutiny to identify possible substandard care and ineffective provision of health care and community support. Analysis of contributory factors to maternal deaths suggests that up to one-third may be avoidable (CCOPMM 2022; Farquhar et al. 2011; Humphrey 2016).

Confidential inquiries are conducted into maternal deaths in all Australian states and territories. Deaths of women during pregnancy or within 42 days of the end of pregnancy are reviewed by health professionals to determine the likely cause and whether the pregnancy contributed to the death. State and territory health authorities and other responsible jurisdictional bodies receive clinical data on the women who died from patient administrative and clinical records, as well as from the state and territory maternal mortality committees where death reviews are undertaken ('Appendix A').

Reporting of maternal deaths in Australia commenced for the 1964–1966 triennium (NHMRC 1966) and now documents 56 years of continuous maternal mortality monitoring in Australia. This is the 19th published report on maternal deaths in Australia and the 7th in the AIHW maternal deaths series.

What is included in this report?

In Australia, about 889,000 women gave birth between 1 January 2018 and 31 December 2020. This report focuses on the 50 maternal deaths that occurred during this period, and presents key trends in maternal mortality, maternal and clinical characteristics of the women who died and information on causes of death. Due to the rarity of maternal deaths in Australia, most reporting is grouped by periods of 3 years to allow for more detailed analysis.

This report aims to:

- provide an overview of maternal mortality in Australia
- provide an evidence base to help inform policy development
- provide information to health and community service providers that might be used to prevent avoidable deaths
- inform national processes for the classification of maternal deaths, providing a basis for consensus in the review of maternal deaths by state and territory maternal mortality review committees.

In this report the incidence of maternal death is expressed as the maternal mortality ratio (MMR). The MMR is calculated using direct, indirect and maternal deaths not further classified, and expressed per 100,000 women giving birth. Coincidental deaths and deaths awaiting classification are not included in the MMR. Please see 'Appendix A' for information on data sources and methodology used in this report.

What are maternal deaths?

A maternal death is the death of a woman while pregnant or within 42 days of the end of the pregnancy, irrespective of the duration and outcome of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

Maternal deaths are classified as either 'direct', 'indirect' or 'not further classified' (WHO 2023a).

Direct maternal deaths: Those resulting from obstetric complications of the pregnant state (pregnancy, labour and puerperium). These deaths may be due to interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above.

Indirect maternal deaths: Those resulting from previous existing diseases or diseases that developed during pregnancy, and which were not due to a direct obstetric cause but were aggravated by the physiologic effects of pregnancy.

Maternal death not further classified: Deaths considered to be related to the pregnancy or its management but could not be further classified as either 'direct' or 'indirect'.

Other deaths that occur during pregnancy or the postpartum period are considered 'coincidental deaths' (for example, a death of a pregnant woman due to a road accident is not considered a maternal death). These are outside the scope of this report.

It is also important to note that deaths do occur beyond the 6-week postpartum period. Deaths that occur 43–365 days after the end of pregnancy are known as 'late maternal deaths'. Currently, there are no consistent nationwide data available on late maternal deaths and they are not included in this report.

2 Overview of maternal deaths

In the 2018–2020 triennium, of the nearly 889,000 women who gave birth in Australia, 63 died during or within 42 days of the end of pregnancy. The state and territory maternal mortality review committees reviewed these deaths and found that 50 had occurred as a direct or indirect result of pregnancy (5.6 deaths per 100,000 women giving birth). All maternal deaths were able to be classified in this triennium.

The remaining 13 deaths were classified as coincidental deaths not included in the count of maternal deaths (Table 2.1).

Table 2.1: Maternal deaths, Australia, 2018–2020

		Direct maternal deaths		Indirect maternal deaths		Total maternal deaths		Coincidental deaths
Year	Number of women who gave birth	Number	MMR	Number	MMR	Number	MMR	Number
2018	298,630	11	3.7	5	1.7	16	5.4	3
2019	298,567	11	3.7	7	2.3	18	6.0	4
2020	291,712	9	3.1	7	2.4	16	5.5	6
Total	**888,909**	**31**	**3.5**	**19**	**2.1**	**50**	**5.6**	**13**

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Total maternal deaths do not include coincidental deaths and late deaths (deaths occurring from 43–365 days postpartum).
2. The maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 women who gave birth.
3. Variations in MMR between years should be interpreted with caution due to the small numbers of deaths.
4. Coincidental deaths are not included in MMR calculations.
5. Number of women who gave birth includes women who gave birth to at least 1 baby (either a live birth or a stillbirth) of 20 or more completed weeks' gestation, or with a birthweight of 400 grams or more.

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection.

Trends in maternal deaths

Factors influencing maternal death rates

The reduction in maternal death rates in Australia during the period covered by this report is multifactorial, including the improved general health of the population and the availability of better health care options. These include: the availability of more effective antibiotics; the introduction of antibiotic prophylaxis regimes in at-risk situations; blood transfusion; active management of the third stage of labour in association with the use of oxytocic drugs; safer anesthesia; and effective diagnostic imaging (Humphrey 2016).

In a number of areas, the availability of evidence-based guidelines and expert group recommendations for care have been effective drivers for improvement.

The MMR for 2018–2020, 5.6 per 100,000 women giving birth, was the lowest MMR reported in any triennium for Australia since reporting, using the current definitions, began in 1973–1975 (Figure 2.1). Though maternal deaths in Australia have been reviewed since 1964, this report only includes deaths from 1973 onwards as the same classification system has been applied.

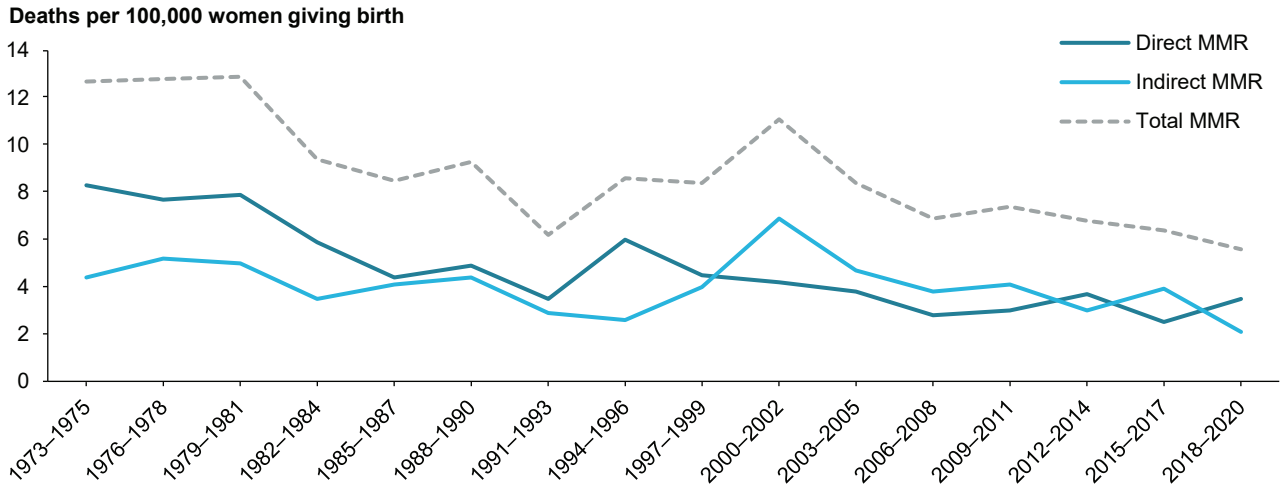
Since 1973 there have been:

- 1,091 maternal deaths
- 583 direct deaths
- 502 indirect deaths
- 6 deaths that were not able to be further classified by the relevant maternal mortality committee and
- 338 coincidental deaths (Supplementary Table 1, Figure 2.1).

The incidence of direct maternal deaths decreased by more than 50% between 1973–1975 and 2018–2020 (MMR 8.3 and 3.5 respectively). The MMR for indirect maternal death has also reduced over this period (MMR 4.4 in 1973–1975 to MMR 2.1 in 2018–2020), although the trend is less pronounced.

Age-standardised maternal death rates (standardised to the Australian female population aged 15–44 at 30 June 2001, and expressed per 100,000 female population) are available in Supplementary tables 2 and 3.

Figure 2.1: Maternal mortality ratio (MMR), by classification of death and triennium, Australia, 1973–1975 to 2018–2020



Notes

1. Includes maternal deaths classified as direct or indirect and deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. Caution should be used when interpreting differences over time. Data sources, supply and quality varied considerably by state and territory. For periods prior to 2006, data are sourced from historical reports as published in *Maternal deaths in Australia 2012–2014* (for more information see the Data Quality Statement).

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 1.

State or territory of maternal death

Maternal deaths varied by state and territory (Table 2.2). Maternal deaths are reviewed by the maternal mortality review committee in the jurisdiction in which the birth occurred, or the pregnancy ended. Due to the small numbers of maternal deaths, differences between states and territories should be interpreted with caution.

Table 2.2: Maternal deaths, by state or territory of death, 2018–2020

State or territory	Maternal deaths	Number of women who gave birth	MMR
New South Wales and Australian Capital Territory	16	297,295	5.4
Victoria	16	232,166	6.9
Queensland	8	177,884	4.5
Western Australia	5	97,626	5.1
South Australia	5	56,384	8.9
Tasmania	0	16,647	0.0
Nothern Territory	0	10,907	0.0
Total	**50**	**888,909**	**5.6**

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. State or territory refers to the jurisdiction in which the birth occurred or, in the event that a birth did not occur (for example, where the woman had an early pregnancy loss or died undelivered) where the pregnancy ended.
3. Variations in the number of maternal deaths between states and territories should be interpreted with caution, due to the small numbers of deaths.
4. The maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 women giving birth.

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection.

International perspective

The World Health Organization (WHO) estimated that, worldwide, 287,000 women died in 2020 from complications of pregnancy and childbirth (WHO 2023b).

Australia is a signatory to the Sustainable Development Goals (SDGs). One of these goals is to ensure healthy lives and promote well-being for all at all ages. This includes reducing the global maternal mortality ratio (MMR) (defined as maternal deaths per 100,000 live births) to less than 70 per 100,000 live births by 2030 (SDG target 3.1) (UN 2023). International reporting against the SDGs includes statistical modelling used to ensure MMR estimation is consistent across countries. The MMRs are reported with 80% uncertainty intervals (UIs), meaning there is an 80% chance that the true value lies within the UI (WHO 2023b).

The global MMR dropped by 34% between 2000 and 2020, from 339 to 223 deaths per 100,000 live births (WHO 2023b).

In 2020, Australia and New Zealand had the lowest MMR across the SDG regions at 4 (UI 3 to 4) per 100,000 live births. Sub-Saharan Africa accounted for 48% of global maternal deaths followed by Central and Southern Asia (37%) (Supplementary Table 4).

In individual countries, the MMR for 2020 was reported as:

- 3 (UI 2–4) in Australia
- 7 (UI 5–9) in New Zealand
- 10 (UI 8–12) in the United Kingdom
- 21 (UI 16–27) in the United States of America
- 122 (UI 75–197) in the Solomon Islands
- 192 (UI 126–293) in Papua New Guinea
- 204 (UI 147–283) in Timor Leste
- 545 (UI 477–654) in sub-Saharan Africa, more than 50 times as high as that found in developed regions (WHO 2023b).

For international comparison, the maternal mortality ratio is based on the number of maternal deaths during a given time period, per 100,000 live births during the same time period (WHO 2023b). This definition differs from the standard definition used for MMR in Australia (and this report) which is the number of maternal deaths during a given time period, per 100,000 women giving birth during the same time period. The World Health Organization (WHO) specifies that the number of live births or the total number of births (live births plus fetal deaths) can be used as the denominator, and where both denominators are available, both calculations are made (WHO 2023b).

3 Maternal characteristics

Understanding the characteristics of the women who die, such as age, parity and place of residence can assist in identifying women at higher risk of maternal death in Australia and inform medical care and service planning.

While these characteristics are more commonly found in women who died during pregnancy, it is not implied that they are the cause of maternal deaths.

Trend data are presented in this section (where available) based on when collection of the data item began.

Table 3.1: Maternal deaths, by selected maternal characteristics and classification of death, Australia, 2018–2020

	Direct maternal deaths		Indirect maternal deaths		Total maternal deaths	
	Number	MMR	Number	MMR	Number	MMR
Total	**31**	**3.5**	**19**	**2.1**	**50**	**5.6**
Age at death						
Under 20	0	0.0	1	5.9	1	5.9
20–24	2	2.1	0	0.0	2	2.1
25–29	5	2.2	3	1.3	8	3.5
30–34	8	2.5	5	1.5	13	4.0
35–39	11	6.1	9	5.0	20	11.0
40 and over	5	12.6	1	2.5	6	15.1
Not stated	0	. .	0	. .	0	
Indigenous status						
Indigenous	3	7.1	1	2.4	4	9.4
Non-Indigenous	27	3.2	16	1.9	43	5.1
Not stated	1	. .	2	. .	3	
Remoteness of usual residence						
Major cities	17	3.0	10	1.7	27	4.7
Inner regional	5	3.9	3	2.2	8	6.1
Outer regional	3	4.4	1	1.6	4	6.0
Remote and very remote	1	7.3	1	7.3	2	14.7
Not stated/unable to be assigned	2	. .	2	. .	4	
Socioeconomic area						
Q1 (most disadvantaged)	10	6.1	4	2.5	14	8.6
Q2	3	2.0	1	0.7	4	2.7
Q3	7	4.2	6	3.6	13	7.7
Q4	4	2.5	3	1.9	7	4.4
Q5 (least disadvantaged)	2	1.4	1	0.7	3	2.2
Not stated/unable to be assigned	2	. .	2	. .	4	
Country of birth						
Australia (includes external territories)	20	3.5	11	1.9	31	5.4
Born overseas	11	3.5	6	1.9	17	5.4
Not stated	0	. .	2	. .	2	

(continued)

Table 3.1 (continued): Maternal deaths, by selected maternal characteristics and classification of death, Australia, 2018–2020

	Direct maternal deaths		Indirect maternal deaths		Total maternal deaths	
	Number	MMR	Number	MMR	Number	MMR
Parity						
0	13	3.4	4	1.0	17	4.5
1	4	1.3	7	2.2	11	3.5
2	6	4.8	4	3.2	10	8.1
3	1	2.3	2	4.7	3	7.0
4 or more	6	20.5	1	3.4	7	23.9
Not stated	1	. .	1	. .	2	
Body mass index						
Less than 18.5	0	0.0	1	3.2	1	3.2
18.5–24.9	5	1.2	4	0.9	9	2.1
25.0–29.9	8	3.5	4	1.7	12	5.2
30.0–39.9	6	3.9	7	4.5	13	8.4
40.0 or more	4	14.3	1	3.6	5	17.9
Not stated	8	. .	2	. .	10	
Smoking status						
Smoked during first 20 week of pregnancy	5	6.3	5	6.3	10	12.5
Did not smoke during first 20 weeks of pregnancy	20	2.5	9	1.1	29	3.6
Not stated	6	. .	5	. .	11	

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. The maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 women giving birth.
3. Data for remoteness of residence and socio-economic area were not available for Western Australia for all years. No remoteness data were available for two deaths in Victoria, one in 2019 and one in 2020.
4. Remoteness area derived by applying the Australian Bureau of Statistics (ABS) 2016 Australian Statistical Geography Standard (ASGS) to the area of the mother's usual residence. Remoteness area only calculated where geographic area of usual residence was provided (ABS 2016a). See 'Appendix A'.
5. Socioeconomic area derived by applying the Australian Bureau of Statistics (ABS) 2016 Socio-Economic Indexes for Areas Index of Relative Socio-Economic Disadvantage (SEIFA IRSD) to area of the mother's usual residence. Excludes mothers not usually resident in Australia and those whose state or territory of usual residence was 'Not stated' (ABS 2016b). See 'Appendix A'.
6. More information regarding the calculation of remoteness area and socioeconomic area can be found in 'Appendix A'.
7. Body mass index (BMI) is a ratio of height and weight and is calculated by dividing a person's weight in kilograms by the square of their height in metres (kg/m^2). BMI was not available for 20% of maternal deaths, and smoking status was not available for 22% of maternal deaths. As a result, caution should be used when interpreting these data.
8. Mother's tobacco smoking status during pregnancy is self-reported.
9. Further breakdowns of country of birth can be found in Table 3.2.

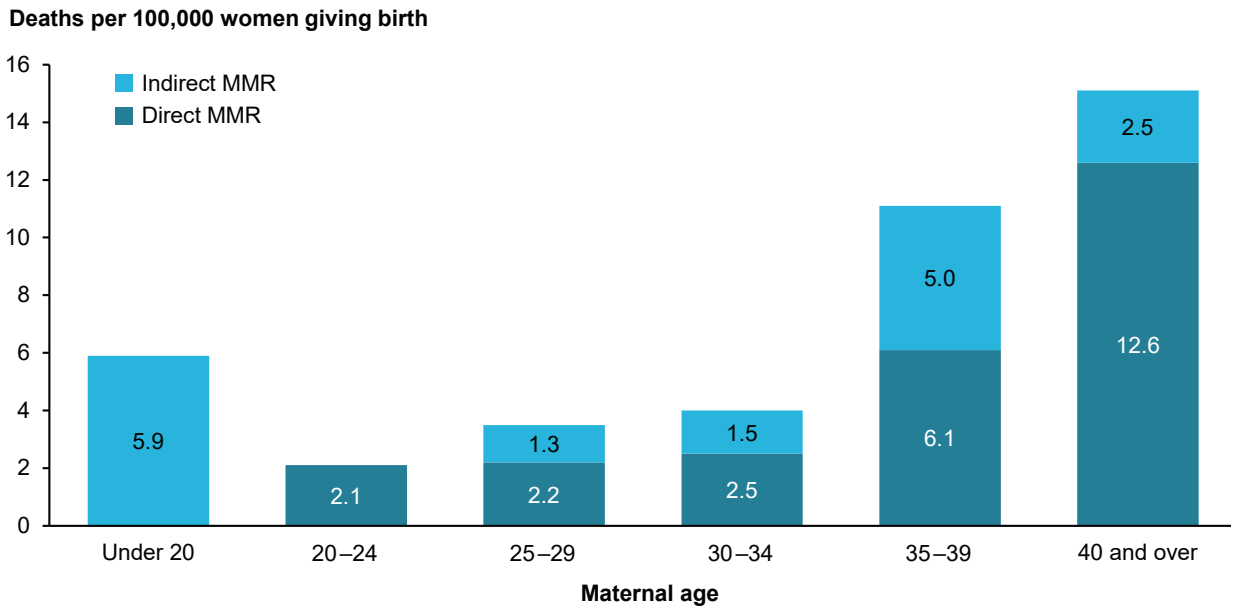
Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection.

Maternal age at death

In 2018–2020, the incidence of maternal death was higher for older mothers (aged 35 years and over) (MMR 11.7, 26 deaths), with half (52%) of all maternal deaths during this period occurring among women in this age group. The MMR was lowest among women aged 20–34 (MMR 3.5, 23 deaths) (Figure 3.1, Supplementary Table 5).

The MMR for women aged under 20 was 5.9 (one death). These numbers should be interpreted with caution, due to the single death recorded in women aged less than 20 who gave birth in the 2018–2020 triennium (Supplementary Table 5).

Figure 3.1: Maternal mortality ratio (MMR), by age at death and classification, Australia, 2018–2020



Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 5.

Aboriginal and Torres Strait Islander women

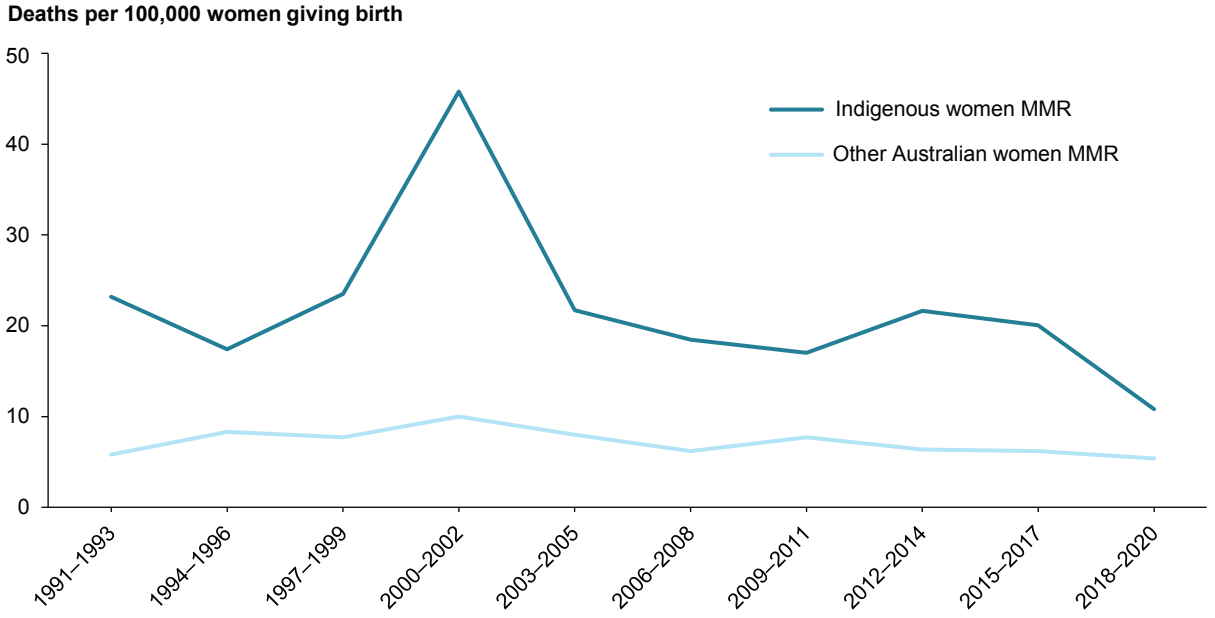
In 2018–2020, there were 4 maternal deaths of Aboriginal and Torres Strait Islander women (respectfully hereafter referred to as Indigenous women) with an MMR of 9.4 (Table 3.1) (3 direct deaths and one indirect death).

The MMR for Indigenous women fell from 20.1 (7 deaths) in 2015–2017 to 10.8 (4 deaths) in 2018–2020, excluding Western Australia. For comparison of the MMR over time WA is excluded from the analysis from 2006 onwards. This is because WA did not provide data on Indigenous status for all years. The Indigenous MMR in 2018–2020 including WA was 9.4.

Caution should be taken when interpreting the MMR for Indigenous women. This is due to the relatively small number of Indigenous women giving birth annually and variation in definitions and data quality over time (see 'Appendix A' for more information).

More information on the Indigenous women who died is available in the 'Causes of death by Indigenous status' section.

Figure 3.2: Maternal mortality ratios (MMR) by maternal Indigenous status, Australia, 1991–1993 to 2018–2020



Notes

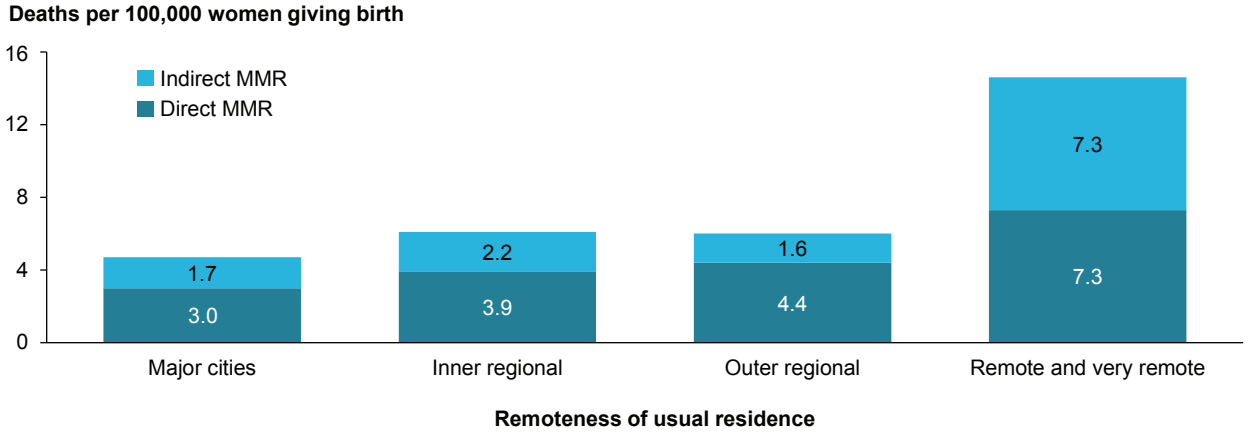
1. Trends need to be interpreted with caution due to the small number of deaths and the inconsistencies and lack of completeness of Indigenous identification over time. Reporting of Indigenous-specific MMR commenced with the 1991–1993 triennium. This was the first triennium where denominator data were available from the National Perinatal Data Collection.
2. Indigenous status data were not available from Western Australia for all years and have been excluded from calculations from 2006 onwards.
3. Prior to 2006, reports on maternal deaths grouped non-Indigenous women and women with no reported Indigenous status together as 'Other Australian women'. Therefore, for comparable reporting of maternal deaths by Indigenous status over time, data are presented for Indigenous women and 'Other women'. This differs from reporting of maternal deaths for the current triennium, where data are presented for Indigenous and non-Indigenous women.

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 9.

Remoteness of usual residence

The MMR increased with increasing remoteness of women's usual residence - from 4.7 in *Major cities* to 14.7 in *Remote and very remote* areas. Almost two thirds (66%) of women who died lived in *Major cities* and had the lowest MMR (MMR 4.7, 27 deaths). Women who lived in *Inner regional* areas had an MMR of 6.1 (8 deaths) and those who lived in *Outer regional* areas had an MMR of 6.0 (4 deaths). Women who lived in *Remote and very remote* areas had an MMR of 14.7; however, this number should be treated with caution as it is based on small numbers (2 deaths in 2018–2020) (Figure 3.3, Supplementary Table 10).

Figure 3.3: Maternal mortality ratio (MMR) by remoteness of usual residence and classification of death, Australia, 2018–2020



Notes

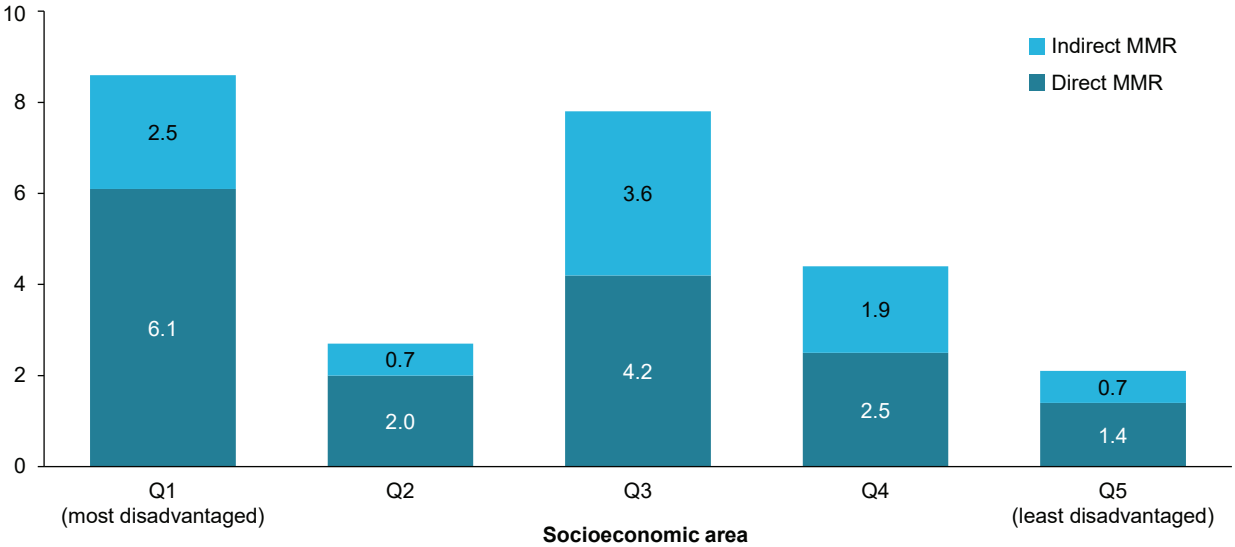
1. Remoteness area is derived by applying the Australian Bureau of Statistics (ABS) 2016 Australia Statistical Geography Standard (ASGS) to the area of the mother's usual residence. Remoteness area is only calculated when geographic area of usual residence is provided (ABS 2016a).
2. Data on remoteness were not available for two deaths in Victoria in 2019 and 2020 and from Western Australia for all years. Data from Western Australia have been excluded from the denominator.
3. The MMR in *Remote and very remote* areas of Australia should be treated with caution due to the small numbers of women giving birth there.

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 10.

Socioeconomic area

There was no clear pattern regarding the distribution of maternal deaths across socioeconomic areas. However, the MMR in the most disadvantaged areas was the highest (MMR 8.6, 14 deaths) and the lowest MMR was in the least disadvantaged areas (MMR 2.2, 3 deaths) (Figure 3.4, Supplementary Table 11).

Figure 3.4: Maternal mortality ratio (MMR) by socioeconomic area and classification of death, Australia, 2018–2020



Notes

1. Data on socioeconomic area were not available from Western Australia for all years and have been excluded from the denominator.
2. Socioeconomic area was derived by applying the Australian Bureau of Statistics (ABS) 2016 Socio-Economic Indexes for Areas Index of Relative Socio-Economic Disadvantage (SEIFA IRSD) to area of the mother's usual residence (ABS 2016b). Excludes mothers not usually resident in Australia and those whose state or territory of usual residence was 'Not stated'.

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 11.

Country of birth

In 2018–2020, almost two-thirds of the women who died (62%, 31 deaths) were born in Australia. Most mothers born overseas were from South-East Asia (12%, 6 deaths) (Table 3.2). Where country of birth was stated, the MMR for women born in Australia and those who reported being born in another country was the same, 5.4 for both groups (Table 3.1).

Table 3.2: Maternal deaths, by woman's country of birth, 2018–2020

	Maternal deaths	
Country of birth	**Number**	**%**
Australia (includes External Territories)	31	62.0
New Zealand and Oceania	2	4.0
Europe[(a)]	2	4.0
Africa and Middle East[(b)]	4	8.0
South-East Asia	6	12.0
North-East Asia	0	0.0
Southern and Central Asia	2	4.0
Central and Southern Americas	0	0.0
Northern Americas	1	2.0
Unknown/Not stated	2	4.0
Total	**50**	**100.0**

(a) Includes North-West Europe and Southern and Eastern Europe.

(b) Includes Sub-Saharan Africa and North Africa.

Note: Maternal deaths include maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).

Source: AIHW analysis of the National Maternal Mortality Data Collection.

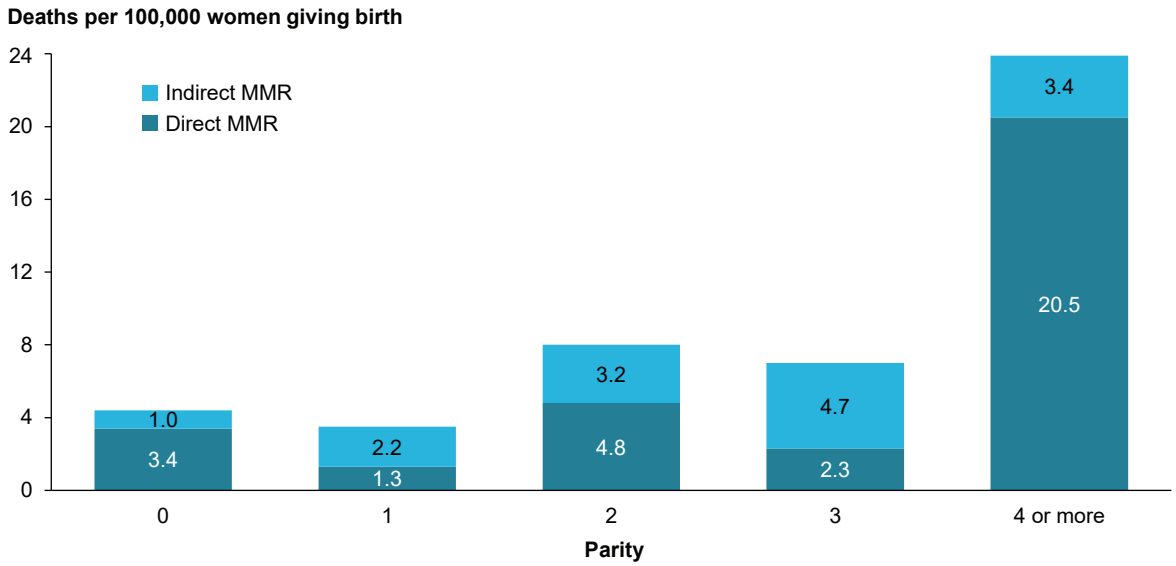
Parity

Parity refers to a woman's number of previous pregnancies carried to a viable gestational age (usually 20 weeks), resulting in live births or stillbirths and excluding the current pregnancy.

The MMR was lowest in women with a parity of zero (MMR 4.5, 17 deaths) or one (MMR 3.5, 11 deaths). Women with a parity of 4 or more (MMR 23.9, 7 deaths), were 4 times more likely to die than women with a parity between zero and 3 (MMR 4.8, 41 deaths) (Figure 3.5, Supplementary Table 6).

The highest MMR in indirect maternal deaths occurred for women with a parity of 3 (MMR 4.7, 2 deaths) while the highest MMR in direct maternal deaths occurred for women with a parity of 4 or more (MMR 20.5, 6 deaths).

Figure 3.5: Maternal mortality ratio (MMR) by parity and classification of death, Australia, 2018–2020

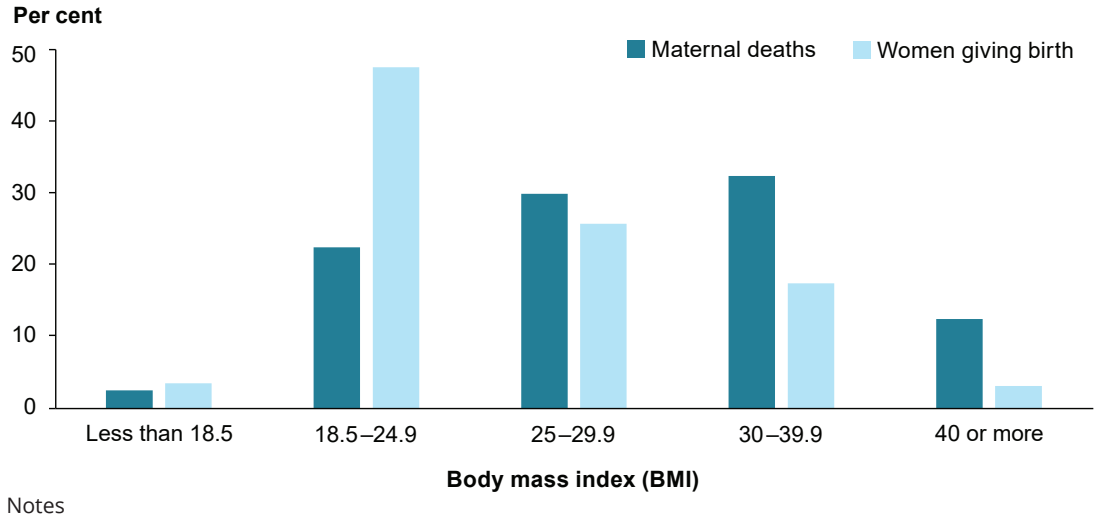


Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 6.

Body mass index

Of the 40 women whose body mass index (BMI) was reported, 12 (30%) were overweight (BMI of 25.0–29.9), and 18 (45%) were obese (BMI of 30.0 or more). Greater proportions of women who died were overweight or obese than for all women who gave birth in this period (26% overweight and 21% obese) (AIHW 2022) (Figure 3.6, Supplementary Table 7). The MMR for direct maternal deaths increased with BMI (Table 3.1). As the number of maternal deaths with a recorded BMI is limited, 25% not stated, caution should be taken when interpreting these data.

Figure 3.6: Maternal deaths by body mass index and classification, Australia, 2018–2020



Notes

1. Body mass index (BMI) is a ratio of height and weight and is calculated by dividing a person's weight in kilograms by the square of their height in metres (kg/m^2).
2. Figure does not include those women for whom BMI data were not reported.
3. Women giving birth includes women who gave birth to at least one baby (either a live birth or a stillbirth) of 20 or more completed weeks' gestation or with a birthweight of 400 grams or more.

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 7.

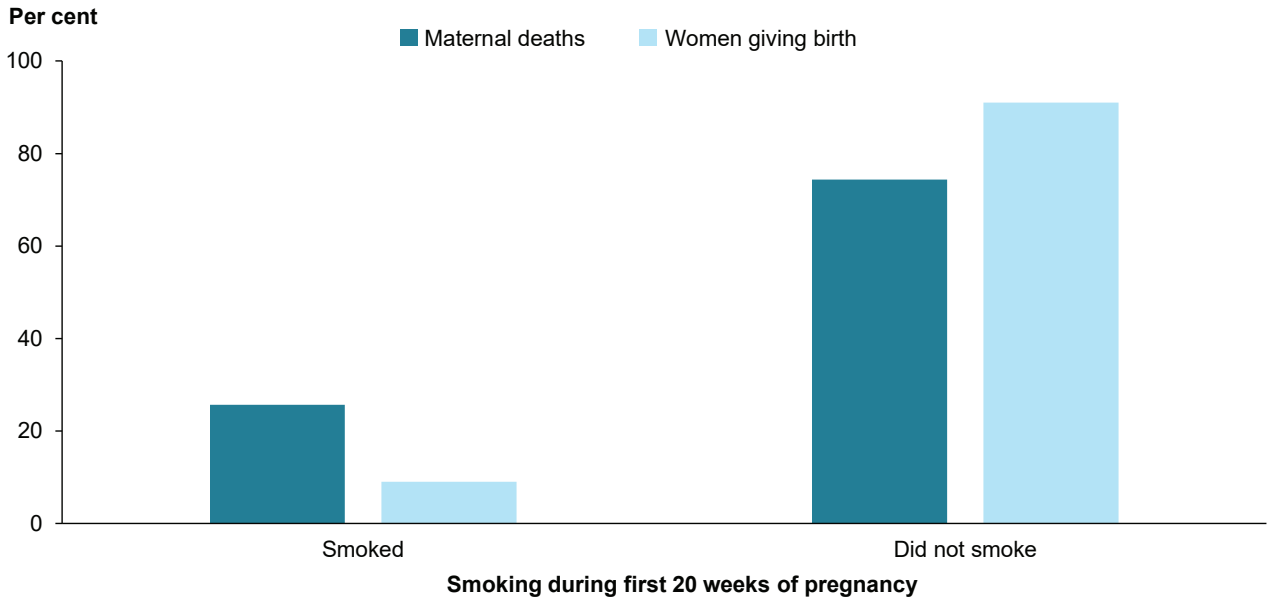
Smoking during pregnancy

There were 39 maternal deaths for which information on smoking status was available in 2018–2020. Of these, 10 (26%) smoked during the first 20 weeks of pregnancy. In comparison only 9.0% of all women who gave birth smoked during the first 20 weeks of pregnancy (Figure 3.7, Table 3.1).

Maternal deaths were more common in those who smoked in the first 20 weeks of pregnancy than in those who did not smoke (MMR 12.5 and 3.6 respectively).

Caution should be taken when interpreting these data, due to the small number of maternal deaths with a recorded smoking status (22% not stated).

Figure 3.7: Maternal deaths, by maternal smoking status during the first 20 weeks of pregnancy, Australia, 2018–2020



Notes

1. Mother's tobacco smoking status during pregnancy is self-reported.
2. Percentages calculated after excluding records with 'Not stated' values. Care must be taken when interpreting percentages.
3. Women giving birth includes women who gave birth to at least one baby (either a live birth or a stillbirth) of 20 or more completed weeks' gestation or with a birthweight of 400 grams or more.

Source: AIHW analysis of the National Maternal Mortality Data Collection and the National Perinatal Data Collection. Supplementary Table 8.

4 Clinical characteristics & investigations

Antenatal care

In 2018–2020, 43 (86%) of the maternal deaths were among women whose pregnancy extended beyond 20 weeks' gestation. Of these, 13 (30%) attended 0–4 antenatal visits during their pregnancy, and 25 women (58%) attended 5 or more (Table 4.1).

Data on the 7 women whose pregnancy ended before 20 weeks' gestation were either not available or not applicable as the pregnancy ended prior to the first antenatal visit or before routine antenatal care was indicated or had commenced. This group includes women who died in early pregnancy and women who had miscarried or had an ectopic pregnancy at time of death.

Table 4.1: Maternal deaths, by antenatal care and type of death, Australia, 2018–2020

	Direct maternal deaths	Indirect maternal deaths	Total maternal deaths
Antenatal care			
0–4 antenatal visits	6	7	13
5 or more antenatal visits	19	6	25
Not stated	2	3	5
Pregnancy ended before 20 weeks' gestation[(a)]	4	3	7
Total	**31**	**19**	**50**

(a) Includes maternal deaths before 20 weeks' gestation or where pregnancy status at time of death was 'Miscarried' or 'Ectopic pregnancy'.

Note: Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).

Source: AIHW analysis of National Maternal Mortality Data Collection.

Complicating conditions during pregnancy

Of the 50 maternal deaths in 2018–2020, 30 (60%) women had one or more pre-existing health conditions, and 33 (66%) had new health conditions, or significant exacerbations of existing complicating conditions, that arose during pregnancy (Table 4.2).

The pre-existing health conditions and complicating conditions arising during pregnancy are noted as being present and do not necessarily have a causative role in the death.

Table 4.2: Maternal deaths, by conditions complicating pregnancy, Australia, 2018–2020

New and pre-existing conditions complicating this pregnancy	Maternal deaths
Pre-existing health conditions (more than 1 can be identified per pregnancy)	
Mental health conditions	8
Cardiovascular disease	7
Hypertension	4
Respiratory disease	3
Diabetes mellitus	3
Thromboembolic disease	1
Epilepsy	1
Systemic lupus erythematosus	1
Chronic viral hepatitis C	1
Thrombophilia - heterozygous Factor V Leiden	1
Hypothyroidism	1
No specific pre-existing health condition recorded	14
Complicating conditions arising during pregnancy (more than 1 can be identified per pregnancy)	
Gestational diabetes	6
Postpartum haemorrhage	5
Uterine rupture	3
Mental health conditions	3
Placenta accreta/percreta	2
Amniotic fluid embolism	2
Pre-eclampsia	2
Gestational hypertension	2
Multiple pregnancy	2
Ectopic pregnancy	2
Placenta praevia	1
Placental abruption	1
Acute liver failure	1
Acute fatty liver of pregnancy	1
Toxic shock secondary to beta-haemolytic Strep cellulitis	1
Ruptured splenic artery aneurysm	1
Bacterial meningitis	1
Pneumococcal sepsis and meningoencephalitis	1
Pulmonary embolism and deep vein thrombosis	1
Anaemia	1
Viral hepatitis	1
Severe pneumococcal	1

Notes

1. Maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. The pre-existing health conditions and complicating conditions arising during pregnancy are noted as being present and do not necessarily have a causative role in the death.
3. More than 1 condition or complication may be recorded for a pregnancy.
4. Data regarding conditions complicating pregnancy were not available for Western Australia deaths.
5. Pre-existing health conditions and complicating conditions arising during pregnancy were 'not stated' for 10 maternal deaths. These are not included in this table.
6. Cardiovascular disease includes pre-existing conditions-cardiac disease and pre-existing conditions-pulmonary hypertension.

Source: AIHW analysis of the National Maternal Mortality Data Collection.

Onset of labour

Onset of labour data were provided for 35 women who died and for whom birth occurred in 2018–2020. Among these 35 women, 13 (37%) had a caesarean section without labour, 11 (31%) had spontaneous labour and 11 (31%) had induced labour (Table 4.3).

A greater proportion of women who died had caesarean sections without labour than for all women giving birth in Australia during the same period: caesarean section without labour 23%, spontaneous labour 42% and induced labour 35% (AIHW 2022). The higher proportion of caesarean section without labour among the women who died could be reflecting, in some cases, emergency caesarean sections performed because the life of the mother or baby was at risk. Of the 13 maternal deaths where a caesarean section without labour was performed, information on the urgency with which these caesareans were performed was reported for 7 deaths. For 4 of these 7 deaths, the urgency category of the caesarean section was reported as immediate threat to the life of mother or baby. However, these statistics need to be interpreted with caution due to the small number of maternal deaths.

Table 4.3: Maternal deaths, by onset of labour and type of death, Australia, 2018–2020

Onset of labour	Direct maternal deaths	Indirect maternal deaths	Total maternal deaths
Pregnancies where birth occurred	24	11	35
Spontaneous labour[(a)]	7	4	11
Induced labour[(a)]	8	3	11
Caesarean section without labour	9	4	13
Not applicable – no birth	7	8	15
Total	**31**	**19**	**50**

(a) Spontaneous labour and induced labour include births by caesarean section.

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. 'No birth' includes deaths where the pregnancy ended before 20 weeks' gestation, or where the baby remained in utero at the time of maternal death.

Source: AIHW analysis of the National Maternal Mortality Data Collection.

Birth method

Of the 50 maternal deaths, 35 (70%) women gave birth (13 vaginally and 22 by caesarean section). Where birth occurred, two-thirds (63%, 15 deaths) of the direct deaths and more than half of the indirect deaths (64%, 7 deaths) were associated with a caesarean section birth (Table 4.4). Five caesarean sections were performed in the perimortem period; perimortem caesarean sections are performed when a woman is close to death to try to resuscitate the mother and/or save the life of the baby. A total of 15 (30%) women had not given birth when they died, which includes where the pregnancy ended before 20 weeks' gestation due to termination or miscarriage or where the baby remained in utero at the time of maternal death.

Table 4.4: Maternal deaths, by method of birth and type of death, Australia, 2018–2020

Method of birth	Direct maternal deaths	Indirect maternal deaths	Total maternal deaths
Unassisted vaginal birth	7	1	8
Assisted vaginal birth[(a)]	2	3	5
Caesarean section birth	10	7	17
Perimortem caesarean section birth[(b)]	5	0	5
No birth – baby remained in-utero at maternal death	2	7	9
No birth – pregnancy ended before 20 weeks' gestation	5	1	6
Total	**31**	**19**	**50**

(a) Assisted vaginal birth includes forceps or vacuum extraction-assisted vaginal births.

(b) Perimortem caesarean sections are performed when a woman is close to death to try to resuscitate the mother and/or save the life of the baby.

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. For multiple births, the method of birth of the first-born baby was used.

Source: AIHW analysis of the National Maternal Mortality Data Collection.

Timing of maternal death

Due to small numbers in some categories, this section refers to a 15-year period between 2006 and 2020. Numbers exclude maternal deaths where pregnancy status at the time of death was 'termination of pregnancy' (11 deaths) or 'miscarried' (6 deaths) as the timing of death was not adequately reported for these cases.

Between 2006 and 2020, the timing of maternal death was known for 238 (91%) of the 262 maternal deaths (Table 4.5). Of those:

- 1 in 3 (84, 35%) occurred during pregnancy
- nearly 1 in 5 (45, 19%) occurred during the birth process or within 24 hours of a birth
- almost half (109, 46%) occurred after the day of birth.

For women who died during pregnancy:

- 32 (38%) occurred in the first trimester
- 30 (36%) occurred in the second trimester
- 22 (26%) occurred in the third trimester.

Table 4.5: Timing of maternal deaths, by type of death, Australia, 2006–2020

	Direct maternal deaths	Indirect maternal deaths	Unclassified maternal deaths	Total maternal deaths
Timing of maternal death				
During pregnancy	26	55	3	84
Trimester 1 (0–13 weeks)	14	17	1	32
Trimester 2 (14–28 weeks)	6	24	0	30
Trimester 3 (29+ weeks)	6	14	2	22
During or within 24 hours of birth	36	9	0	45
After birth	55	53	1	109
1–6 days	20	18	0	38
7–13 days	14	13	0	27
14–20 days	10	9	0	19
21–27 days	5	6	0	11
28–34 days	4	4	1	9
35–42 days	2	3	0	5
Total	**117**	**117**	**4**	**238**

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. Data on timing of maternal death were not available from Western Australia for all years and for the Northern Territory for 2006–2014.
3. Excludes maternal deaths where timing was unknown.
4. Excludes maternal deaths where pregnancy status at time of death was 'Termination of pregnancy' (11 deaths) or 'Miscarried' (6 deaths) as the timing of death was not adequately reported for these cases.
5. There was insufficient information for 4 maternal deaths for them to be classified as either direct or indirect. These deaths are categorised as not further classified deaths of women during pregnancy and the puerperium.

Source: AIHW analysis of the National Maternal Mortality Data Collection.

Location of death

In 2018–2020, of the 49 women whose location of death was notified, 39 (80%) were hospital inpatients at the time of their death, 7 died at home and 3 died elsewhere (Table 4.6).

Where the site of the hospital death is known (32 deaths):

- 20 (63%) of the women died in an intensive care unit
- 4 (13%) died in an operating theatre
- 5 (16%) died in an emergency department
- 2 (6.3%) died in a maternity setting.

Table 4.6: Maternal deaths, by location and type of death, Australia, 2018–2020

Location of death	Direct maternal deaths	Indirect maternal deaths	Total maternal deaths
Hospital	27	12	39
Intensive care unit[a]	10	10	20
Operating theatre	4	0	4
Emergency department	4	1	5
Maternity setting[b]	1	1	2
Other hospital setting[c]	1	0	1
Location in hospital not stated	7	0	7
Home	3	4	7
Birth centre	0	0	0
Other	1	2	3
Not stated	0	1	1
Total	**31**	**19**	**50**

(a) Includes deaths in intensive care, dependency, and coronary care units.

(b) Includes deaths in birth suites and maternity wards.

(c) Includes deaths in psychiatric or palliative care units.

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. Location of death indicates where a death occurred. It does not imply that birth occurred in that setting (for example, a birth might occur in hospital, and death might subsequently occur at home).

Source: AIHW analysis of the National Maternal Mortality Data Collection.

Baby outcomes in maternal deaths

Of the 50 women who died in 2018–2020, 36 (72%) gave birth. Of these, 34 gave birth to a live born baby and 2 gave birth to a stillborn baby (Table 4.7). For multiple births, the birth outcome of the first-born baby is reported. There was no birth in 13 pregnancies, and information was unavailable on the baby outcome in one pregnancy.

Table 4.7: Maternal deaths, by baby outcome at birth and type of death, Australia, 2018–2020

Baby outcome	Direct maternal deaths	Indirect maternal deaths	Total maternal deaths
Live birth	22	12	34
Stillbirth	2	0	2
No birth	7	6	13
Not stated	0	1	1
Total	**31**	**19**	**50**

Notes

1. Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).
2. No birth consists of those deaths where the pregnancy ended before 20 weeks' gestation, or where the baby remained in utero at the time of maternal death.
3. For multiple births, maternal deaths are reported by the birth outcome of the first-born baby. Of the 50 women who died, 36 gave birth to 37 babies (35 live born and 2 stillborn).
4. A stillbirth is a fetal death prior to the birth of a baby of 20 or more completed weeks of gestation or of 400 grams or more birthweight.
5. Three of the 34 live births in 2018–2020 were neonatal deaths (death of a live born baby of 20 or more completed weeks of gestation or of 400 grams or more birthweight within 28 days of birth).

Source: AIHW analysis of the National Maternal Mortality Data Collection.

Incidence of autopsy

Cause of death was confirmed by autopsy in almost three-quarters of maternal deaths (73%, 36 deaths) (Table 4.8). Autopsy was not performed for 13 deaths (27%).

The National Maternal and Perinatal Mortality Clinical Expert Group (NMPMCEG) continues to advocate for autopsy in all cases of maternal death, as clinical appearances are not always confirmed by autopsy findings.

Table 4.8: Maternal deaths, by performance of autopsy and type of death, Australia, 2018–2020

Autopsy	Direct maternal deaths	Indirect maternal deaths	Total maternal deaths
Autopsy performed	23	13	36
Autopsy not performed	8	5	13
Not stated	0	1	1
Total	**31**	**19**	**50**

Note: Total maternal deaths includes maternal deaths classified as direct, indirect, and those not further classified. In 2018–2020 there were no maternal deaths not further classified. Does not include coincidental deaths, deaths awaiting classification, and late maternal deaths (deaths occurring from 43–365 days postpartum).

Source: AIHW analysis of the National Maternal Mortality Data Collection.

Contributing factors in maternal deaths

State and territory maternal mortality review committees (STMMCs) assess the circumstances surrounding a maternal death to establish whether systemic factors might have contributed to the death. Contributing factors identified might not have directly caused the death or influenced the outcome. Review of a maternal death may reveal more than one contributing factor.

A maternal mortality committee finding that there were contributing factors does not imply negligence. A review of contributing factors seeks to identify lessons that can be learned to improve future outcomes through potential upgrades to health services, support processes and medical care.

Contributing factors are grouped into the 3 main categories:

- professional care (such as inadequate numbers and/or seniority of staff, failure or delay in emergency response, failure to offer and/or follow recommended best practice)
- delayed, or lack of, access to care (such as geographical isolation from appropriate services, socioeconomic situation affecting access to appropriate care)
- mother/family/social situation (such as infrequent or late attendance at or absence of antenatal care, substance abuse, family violence, socio-economic deprivation, language barriers).

STMMCs identified 32 contributing factors relating to 22 deaths – in 8 of these cases more than one factor was identified (Table 4.9). The majority of the contributing factors related to:

- professional care of the women (38%, 12 deaths)
- the woman/her family/social situation (31%, 10 deaths), and
- access to care (22%, 7 deaths).

Measures of deaths reviewed for contributing factors provide information on whether the sub-optimal care factors identified by the state/territory perinatal mortality review committee had relevance to the outcome (significant/possible/not stated).

Table 4.9: Contributing factors to maternal deaths, Australia, 2018–2020

Deaths reviewed for contributing factor(s)	Total
Number of deaths reviewed	35
Contributing factor(s) identified likely to have contributed to outcome (significant)	8
Contributing factor(s) identified might have contributed to outcome (possible)	8
Contributing factor(s) identified, but unlikely to have contributed to outcome (insignificant)	6
Contributing factor(s) identified, but significance of contributing care factor(s) not stated	0
No contributing factors identified	7
Contributing factors not stated [(a)]	6
Contributing factor assessment not undertaken	15
Total	**50**

Contributing factors identified (more than 1 factor can be identified per case)	Total
Contributing factor(s) related to the woman/her family/social situation	10
Contributing factor(s) related to professional care	12
Contributing factor(s) related to access to care	7
Other contributing factors identified	3
Total	**32**

(a) Includes where contributing factors identified or relevance of contributing factors identified was 'Not stated'. Contributing factors identified and significance of contributing factors data were not available for Western Australia for all years.

Note: Contributing factors were found in 22 cases. In 8 of these cases more than one factor was identified.

Source: AIHW analysis of the National Maternal Mortality Data Collection.

5 Causes of maternal deaths

In this report, deaths have been categorised according to their primary cause, as assessed by the state and territory maternal mortality review committees (STMMCs), after consideration of all available information. Autopsy, coronial, and other information is often only available after the healthcare facility admission and discharge coding process is completed. As a result, the cause of death allocated by the STMMC, and reported to the National Maternal Mortality Data Collection (NMMDC), might not be the same as the initial ICD-10 coding used by the ABS.

Box 5.1: Primary causes of maternal deaths definitions

Amniotic fluid embolism: deaths related to the effects of significant amounts of amniotic fluid and fetal cells entering the maternal circulation.

Anaesthetic-related: deaths where the cause was related to anaesthesia and/or a surgical procedure.

Cancer: deaths from a disease in which abnormal cells divide uncontrollably and destroy body tissue.

Cardiovascular: deaths due to a disease process (usually pre-existing) affecting the heart and/or major blood vessels.

Ectopic pregnancy: deaths due to the development of a fertilised egg at a site other than within the uterus, most commonly in the fallopian tube.

Epilepsy: deaths due to a disturbance of brain function marked by recurrent fits and loss of consciousness.

Homicide: deaths resulting from the killing of a person by another.

Hypertensive disorders: deaths related to the effects of pre-eclampsia and eclampsia and other disorders of high blood pressure in pregnancy.

Non-obstetric haemorrhage: deaths due to haemorrhage (bleeding from damaged blood vessels) from vessels other than those in the genital tract, most commonly haemorrhage from a ruptured blood vessel in the brain or in the abdomen (the splenic artery).

Obstetric haemorrhage: deaths related to haemorrhage from the genital tract, and usually being from the placenta.

Sepsis: deaths originating from an infection.

Substance use complications: deaths resulting from the consumption of alcohol and other drugs.

Suicide: deaths caused by the mother deliberately ending her own life.

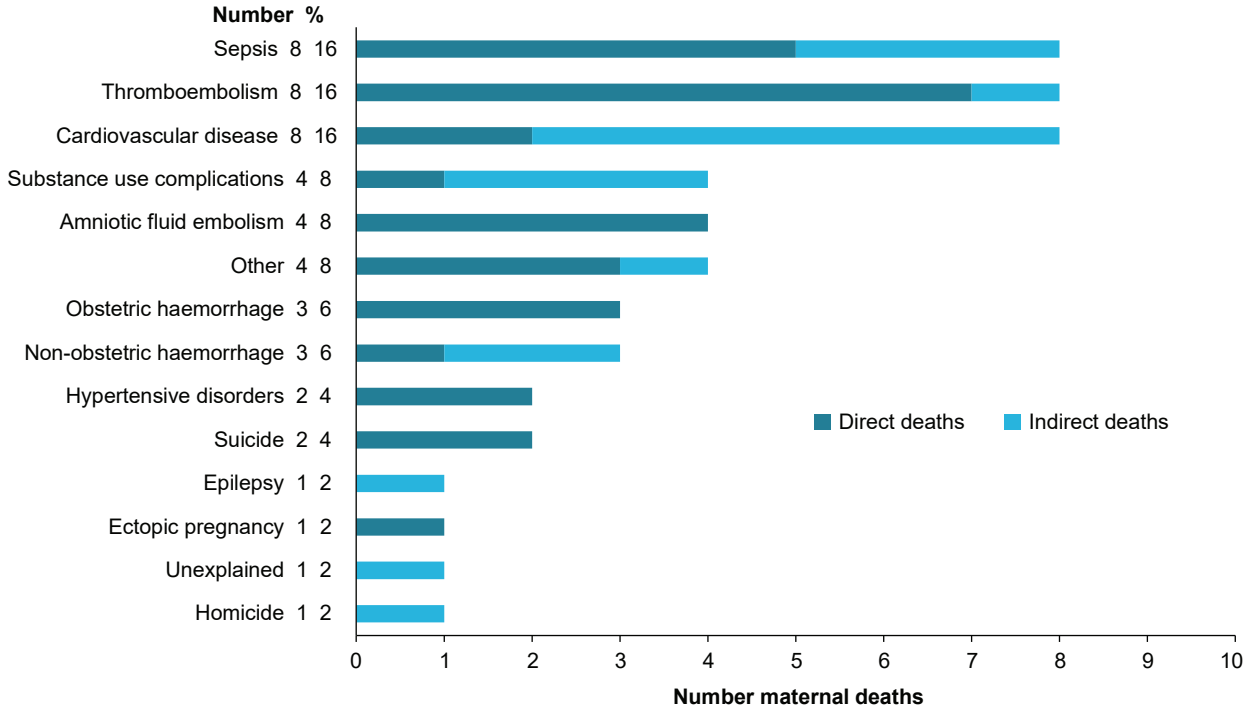
Thromboembolism: deaths due to obstruction of a blood vessel (most frequently the pulmonary blood vessels) by a blood clot that has become dislodged from another site in the circulation.

Other: deaths that do not fall into any of these categories.

Unclassified: deaths that the STMMC has been unable to classify due to insufficient information being available about the cause.

In 2018–2020, almost half (48%) of maternal deaths, were due to three causes – cardiovascular disease, sepsis, and thromboembolism (Figure 5.1, Supplementary Table 14). The majority of deaths due to cardiovascular disease were indirect deaths, while most deaths due to thromboembolism were direct deaths. Suicide was less prominent as a cause of death (4%, 2 deaths) than it was in the 2015–2017 triennium (17%, 10 deaths). For more specific breakdowns of cause of death see Supplementary tables 15 and 16.

Figure 5.1: Causes of maternal deaths by classification of death, Australia, 2018–2020



Source: AIHW analysis of the National Maternal Mortality Data Collection. Supplementary Table 14.

Direct maternal deaths

In 2018–2020, the most common causes of direct maternal death were:

- thromboembolism (7 deaths), 6 of which were due to pulmonary thromboembolism
- sepsis (5 deaths)
- amniotic fluid embolism (4 deaths) (Supplementary Table 14).

Indirect maternal deaths

In 2018–2020, the most common causes of indirect maternal deaths were:

- cardiovascular disease (6 deaths), 3 of which were related to ischaemic heart disease
- sepsis (3 deaths)
- substance use complications (3 deaths) (Supplementary Table 14).

Causes of maternal deaths by maternal characteristics

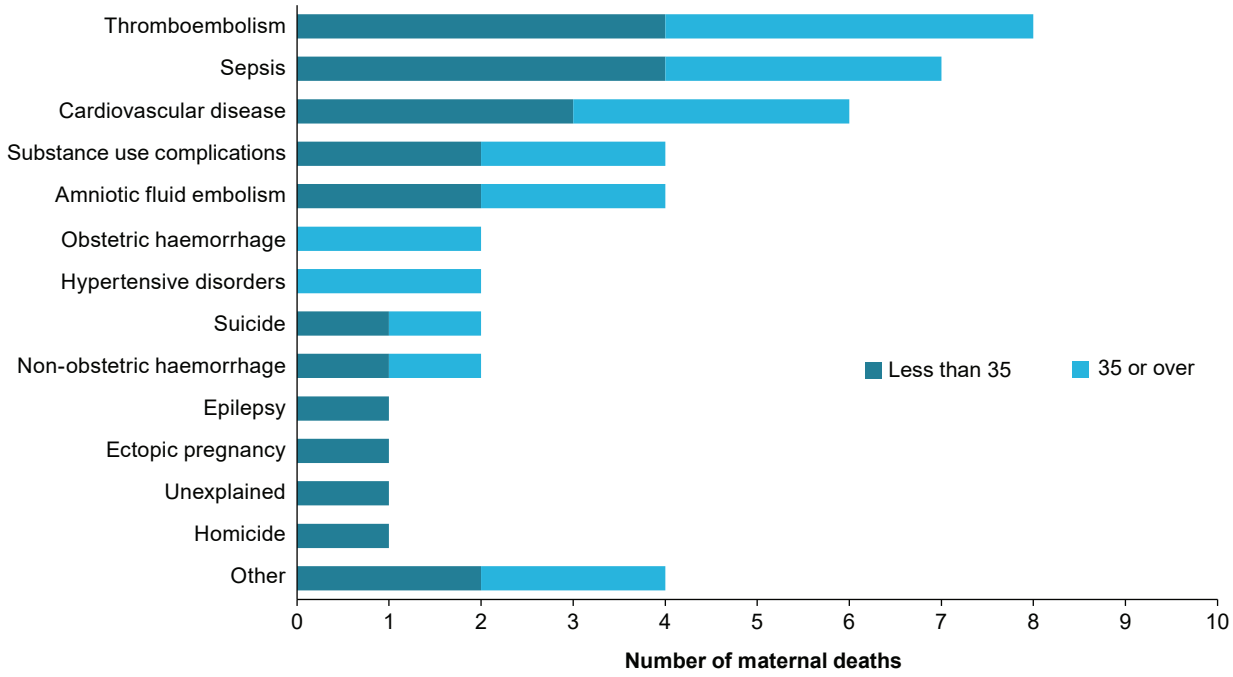
Causes of death by maternal age

In 2018–2020, more than half of the women who died (52%, 26 deaths) were aged 35 or more, though this group of women only made up 25% of all women giving birth (Supplementary Table 5). The most common causes of death for women aged 35 of more were thromboembolism (4 deaths), cardiovascular disease and sepsis (3 deaths each).

There was one death of a woman aged less than 20, and 23 (46%) were aged between 20 and 34 years. It is not possible to identify the most common cause of death for women aged less than 20, due to the small number of women of this age giving birth.

The most common causes of death in women aged 20 to 34 were sepsis and thromboembolism (4 deaths each) and cardiovascular disease (3 deaths) (Figure 5.2, Supplementary Table 17).

Figure 5.2: Causes of maternal deaths, by maternal age, Australia, 2018–2020



Notes

1. Includes maternal deaths classified as direct or indirect and maternal deaths not further classified. There were no maternal deaths not further classified in 2018–2020.
2. Excludes Western Australia as cause of death data by maternal age were not provided.

Source: AIHW analysis of the National Maternal Mortality Data Collection. Supplementary Table 17.

Causes of death by parity

In 2018–2020, parity was stated for 48 of the women who died. Of those:

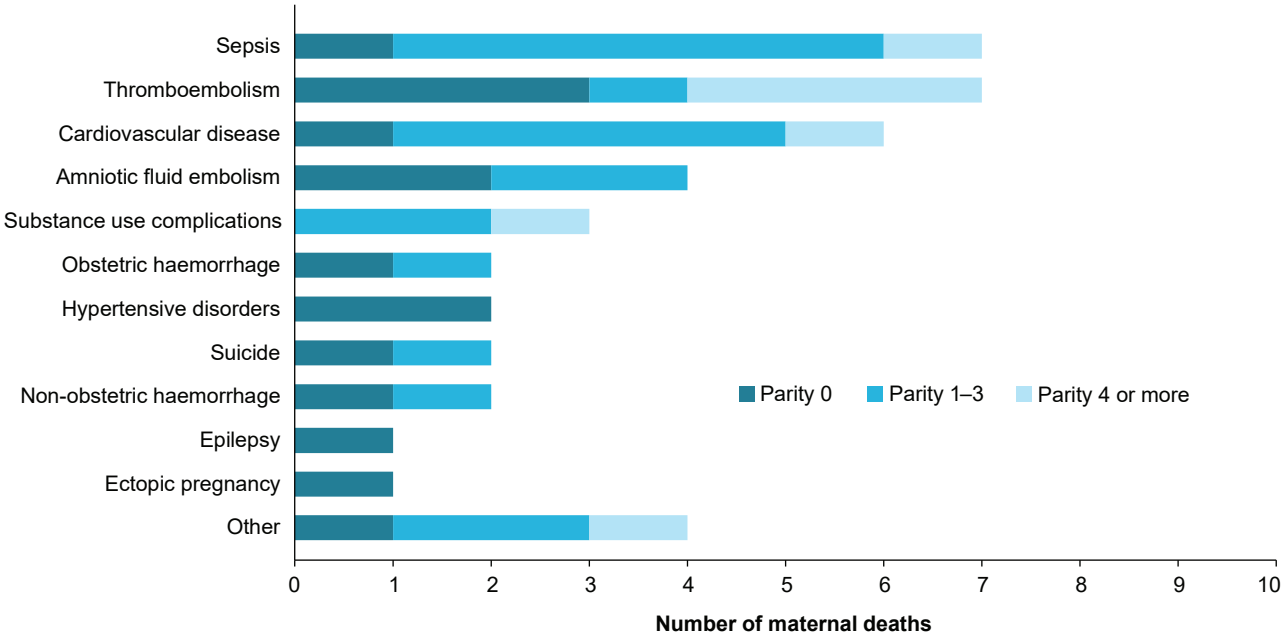
- 17 (35%) occurred in women with a parity of zero
- 24 (50%) occurred in women with a parity of 1–3
- 7 (15%) occurred in women with a parity of 4 or more (Supplementary Table 6).

The most common causes of death by parity were:

- thromboembolism (3 deaths), amniotic fluid embolism (2 deaths) and hypertensive disorders (2 deaths) in women with a parity of zero

- sepsis (5 deaths) and cardiovascular disease (4 deaths) in women with a parity between 1 and 3
- thromboembolism (3 deaths) in women with a parity of 4 or more (Figure 5.3, Supplementary Table 17).

Figure 5.3: Causes of maternal deaths, by parity, Australia, 2018–2020



Notes

1. Includes maternal deaths classified as direct or indirect and maternal deaths not further classified. There were no maternal deaths not further classified in 2018–2020.
2. Excludes 4 deaths. See Supplementary Table 17.
3. Excludes Western Australia as parity data by cause of death were not available.

Source: AIHW analysis of the National Maternal Mortality Data Collection. Supplementary Table 17.

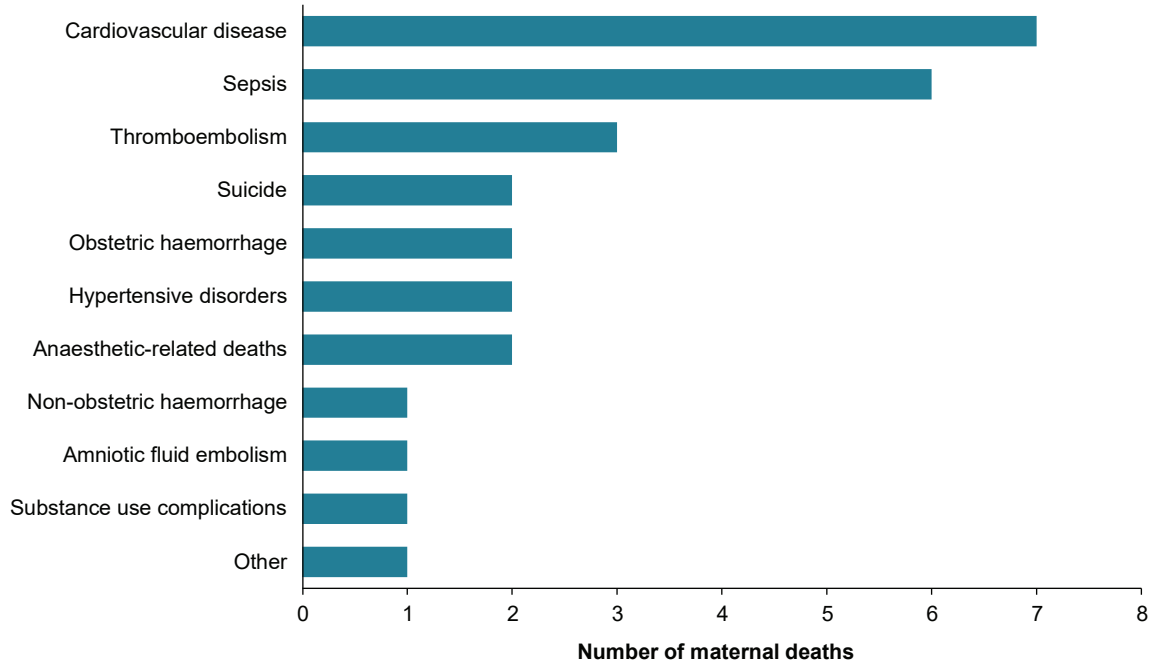
Causes of death by Indigenous status

Due to the relatively small number of Indigenous women in the NMMDC, data for 2006–2020 are presented in this section.

In 2006–2020, there were 28 maternal deaths of Indigenous women (Figure 5.4, Supplementary Table 18). The most common causes of death for Indigenous women were cardiovascular disease (25%, 7 deaths) and sepsis (21%, 6 deaths).

For data on the MMR for Indigenous women over time, please see the 'Aboriginal and Torres Strait Islander women' section in 'Maternal characteristics'.

Figure 5.4: Causes of maternal deaths, Aboriginal and Torres Strait Islander women, Australia, 2006–2020



Notes
1. Includes maternal deaths classified as direct or indirect and maternal deaths not further classified.
2. Data not available for Western Australia for all years and excluded from figure.
3. Anaesthetic-related deaths were not classified separately before 2012.
4. Data for non-Indigenous women available in Supplementary Table 18.

Source: AIHW analysis of the National Maternal Mortality Data Collection. Supplementary Table 18.

Causes of coincidental deaths

Coincidental maternal deaths are those that occur in pregnancy or within 42 days of the end of a pregnancy from causes unrelated to the pregnancy.

Internationally, cases of coincidental (incidental) deaths are included in maternal mortality reporting, although only direct, indirect, and unclassified deaths are included in MMR calculations.

In addition to the 50 maternal deaths reported in 2018–2020, there were 13 coincidental deaths recorded (Supplementary Table 21).

In 2018–2020, the leading causes of coincidental maternal deaths were:

- motor vehicle trauma (4 deaths)
- homicide (3 deaths)
- complications of substance use (2 deaths).

Trends in causes of maternal deaths

The major causes of maternal death in 1973–1975 were sepsis, cardiovascular disease, hypertensive disorders, obstetric haemorrhage, and thromboembolism.

The MMR for most of these conditions (obstetric haemorrhage, sepsis, cardiovascular conditions and hypertensive disorders) has been falling over time. This is consistent with the overall decrease in MMR in Australia (12.7 in 1973–1975 to 5.6 in 2018–2020).

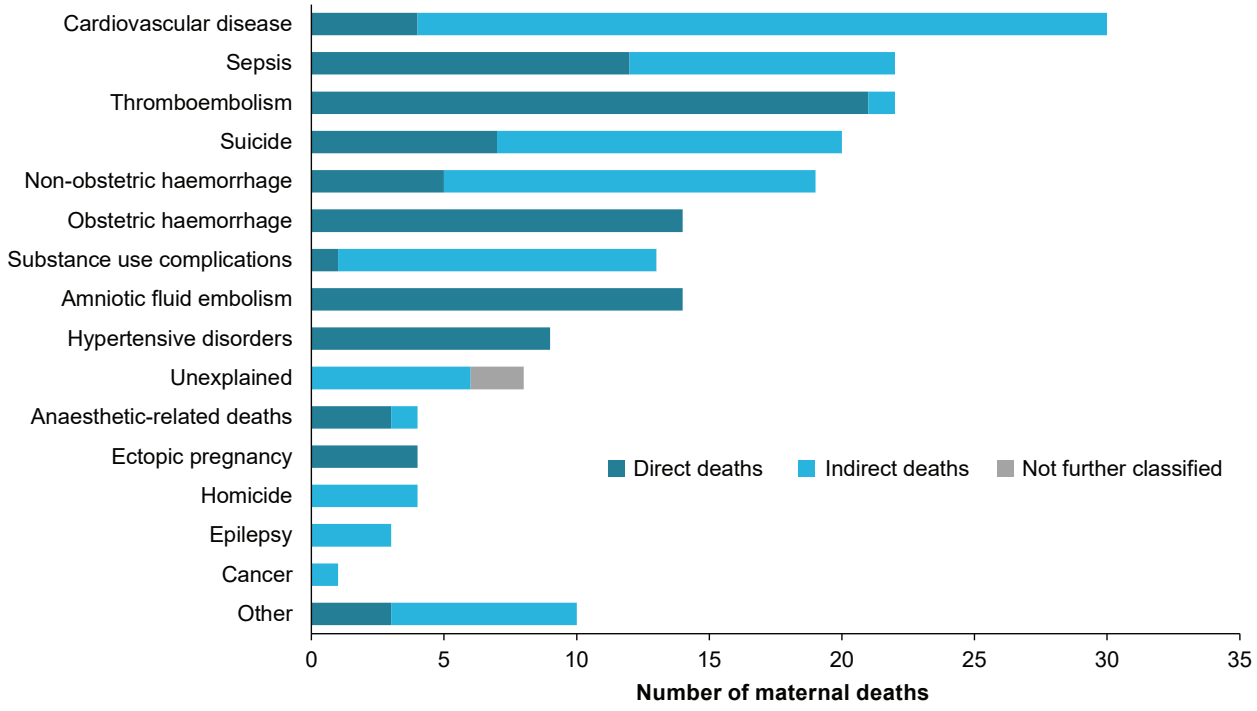
Caution should be taken when interpreting these data over time due to the small number of maternal deaths in each causal group per triennium.

Due to the relatively small number of maternal deaths in each causal group, some data are presented as aggregated over a decade, 2011–2020, in this section.

In the decade from 2011–2020, there were 197 maternal deaths. The most common cause of maternal death in this period was cardiovascular disease, followed by sepsis and thromboembolism (Figure 5.5, Supplementary Table 20).

- The most common cause of direct maternal death over the decade was thromboembolism, followed by obstetric haemorrhage, amniotic fluid embolism and sepsis.
- The most common cause of indirect maternal death over the decade was cardiovascular disease, followed by non-obstetric haemorrhage, suicide and substance use complications.

Figure 5.5: Causes of maternal deaths by classification of death, Australia, 2011–2020



Source: AIHW analysis of the National Maternal Mortality Data Collection. Supplementary Table 20

Thromboembolism

Deaths caused by thromboembolism result from blood clots obstructing major blood vessels. The most common example is pulmonary thromboembolism with obstruction of the major pulmonary arteries. The MMR for maternal deaths caused by thromboembolisms has decreased from 1.5 in 1973–1975 to 0.9 in 2018–2020 (Supplementary Table 19).

In 2018–2020:

- 8 mothers died due to thromboembolism, an MMR of 0.9 (Supplementary tables 14 and 19).
- 7 of these deaths were classified as direct, and one as indirect.
- 6 of these deaths were due to pulmonary thromboembolism, one was related to thrombosis in a dural sinus and one was related to thrombosis of the A/V fistula (Supplementary tables 15 and 16).

In most cases, information was not available about the use of preventive measures, such as thromboprophylaxis and/or thrombolysis.

In the decade 2011–2020, 22 women (11%) died from thromboembolism, making it the second most frequent cause of maternal death for this period.

Cardiovascular disease

Deaths caused by cardiovascular disease commonly originate from either new or existing disease processes in the heart or major blood vessels. New disease processes include cardiomyopathy of pregnancy (inflammation of the heart muscle). Existing disease processes include congenital heart malformations and rheumatic heart valve lesions.

Cardiovascular disease is one of the most common causes of death during pregnancy in industrialised countries. Pregnancy might reveal or exacerbate previously undiagnosed cardiovascular disease, due to the physiological changes that occur. Older mothers are at increased risk of heart disease, especially when obesity, smoking, diabetes, and hyperlipidaemia (high blood lipid levels) coexist with advanced maternal age. The MMR for maternal deaths caused by cardiovascular disease has decreased from 2.2 in 1973–1975 to 0.9 in 2018–2020 (Supplementary Table 19).

In 2018–2020:

- 8 mothers died from cardiovascular disease, an MMR of 0.9 (Supplementary tables 14 and 19).
- Cardiovascular disease was the most common cause of indirect maternal death for this period (Supplementary Table 14).
- 2 of these deaths were due to cardiomyopathy (inflammation of the heart muscle), 2 due to acute myocardial infarction, one due to ischaemic heart disease, and one was due to pulmonary hypertension secondary to substance abuse. Additional information on the remaining 2 deaths due to cardiovascular disease was not provided to the NMMDC.

In the decade 2011–2020, 30 women (15%) died from cardiovascular disease, making it the most frequent cause of maternal death for this period.

Sepsis

Deaths caused by sepsis begin with infection. Infection might arise from complications of the pregnancy, such as retained products of conception after an early pregnancy loss, chorioamnionitis in late pregnancy, or infection elsewhere in the mother's body. The MMR for maternal deaths caused by sepsis has decreased from 3.2 in 1973–1975 to 0.9 in 2018–2020 (Supplementary Table 19).

In 2018–2020:

- 8 mothers died from sepsis, an MMR of 0.9 (Supplementary tables 14 and 19).
- Two of these septic deaths were related to urinary tract infections, two were related to infections in the brain (one each of meningitis and meningo-encephalitis), one was related to postpartum pelvic sepsis, one was acute on chronic endomyometritis and one was due to septicaemia of unknown cause. Additional information about the remaining one death due to sepsis was not provided to the NMMDC.

In the decade 2011–2020, 22 women (11%) died from sepsis.

Amniotic fluid embolism

Deaths caused by amniotic fluid embolism start with the effects of amniotic fluid and the fetal cells that it contains entering the maternal circulation, leading to severe shock, obstructed pulmonary blood flow, poor oxygen exchange, and severe clotting failure. Diagnosis is usually possible only by microscopic demonstration at autopsy of fetal cells and other debris within the mother's major blood vessels. There has been little change in the MMR for maternal deaths caused by amniotic fluid embolism from 1973–1975 to 2018–2020 (MMR 0.7 and 0.4 respectively) (Supplementary Table 19).

In 2018–2020, 4 mothers died from amniotic fluid embolism, an MMR of 0.4 (Supplementary tables 14 and 19).

In the decade 2011–2020, 14 women (7.1%) died from amniotic fluid embolism.

Substance use complications

Deaths caused by complications arising from substance use are associated with the effects of alcohol or other drug use, as determined by toxicology or pathology reports.

Some deaths due to substance use complications may be classified as coincidental to pregnancy, so are not counted as maternal deaths. But if the available information suggests that pregnancy might have been influential in the death, it may be classified as an indirect maternal death. Substance use complications have not been reported consistently since 1973 and this prevents a comparison between trienniums from 1973–1975 to 2018–2020 (Supplementary Table 19).

In 2018–2020:

- 4 mothers died due to substance use complications, an MMR of 0.4 (Supplementary Table 14).
- Deaths were related to the use of a variety of substances, including heroin, fentanyl and amphetamines.

In the decade 2011–2020, 13 women (6.6%) died from substance use complications.

Suicide

Deaths categorised as suicide are those where the available evidence suggested that the woman died as a result of an action intended to deliberately end their own life.

Maternal deaths by suicide are classified as direct maternal deaths where maternal mental health issues that first presented during pregnancy were identified before the suicide. Maternal deaths by suicide are classified as indirect maternal deaths where a mental health condition was identified before the pregnancy. This approach to classification, developed by the National Maternal and Perinatal Mortality Clinical Expert Group in 2017, differs from the WHO classification, which recommends that all deaths by suicide be classified as direct deaths (Pattinson et al. 2009). There has been little change in the MMR for maternal deaths by suicide from 1973–1975 to 2018–2020 (MMR 0.7 and 0.2 respectively) (Supplementary Table 19).

In 2018–2020, there were 2 maternal deaths by suicide, an MMR of 0.2 (Supplementary tables 14 and 19).

In the decade 2011–2020, there were 20 maternal deaths (10%) by suicide recorded.

Non-obstetric haemorrhage

Deaths caused by non-obstetric haemorrhage start with bleeding arising from maternal blood vessels that are not within the genital tract. Most maternal deaths that fall into this category are related to intracerebral haemorrhage or rupture of an aneurysm of the splenic artery.

Intracerebral haemorrhage occurs when a blood vessel within the brain bursts, allowing blood to leak into the brain. The cause of splenic artery aneurysm, and the strong association of aneurysmal rupture with pregnancy, is unclear (Sadat et al. 2008). Pregnancy hormones and increased cardiac output have been suggested as increasing the likelihood of aneurysm formation and/or rupture during pregnancy, by respectively weakening the arterial wall and increasing the blood pressure. There is no clear trend in the MMR for maternal deaths caused by non-obstetric haemorrhage over time (1.0 in 1973–1975 to 0.3 in 2018–2020 (Supplementary Table 19)).

In 2018–2020:

- 3 mothers died due to non-obstetric haemorrhage, an MMR of 0.3 (Supplementary Table 14).
- One of these three deaths was caused by a ruptured splenic artery aneurysm and the other by an intracerebral haemorrhage. Information on the specific cause of death was not available for the third death (Supplementary tables 15 and 16).

In the decade 2011–2020, 19 women (9.6%) died from non-obstetric haemorrhage.

Hypertensive disorders

Deaths caused by hypertensive disorders start with the effects of raised blood pressure. The most common deaths in this category relate to pre-eclampsia and its complications, such as Hemolysis, Elevated Liver enzymes and Low Platelets (HELLP) syndrome and intracerebral (within the brain) haemorrhage. The MMR for maternal deaths caused by hypertensive disorders has decreased from 2.0 in 1973–1975 to 0.2 in 2018–2020 (Supplementary Table 19).

In 2018–2020:

- 2 mothers died due to hypertensive disorders, an MMR of 0.2 (Supplementary tables 14 and 19).
- One death was caused by severe pre-eclampsia and likely an unwitnessed eclamptic event and the other was related to collapse due to hypertensive disease with severe haemorrhage during a perimortem caesarean section.

In the decade 2011–2020, 9 women (4.6%) died from hypertensive disorders.

Obstetric haemorrhage

Deaths caused by obstetric haemorrhage start with bleeding from the genital tract including the uterus, either during pregnancy or following birth.

Deaths due to obstetric haemorrhage have been declining fairly steadily in Australia over the past 30 years. In 1973–1975, the MMR for deaths due to obstetric haemorrhage was 1.7, falling to 0.3 in 2018–2020 (Supplementary Table 19). The advent of oxytocic drugs over the last 3 decades has contributed to the reduction in this pregnancy complication.

In 2018–2020:

- 3 mothers died due to obstetric haemorrhage, an MMR of 0.3 (Supplementary tables 14 and 19).
- One death was related to uterine rupture and the other was caused by a placental abruption related to substance use.

In the decade 2011–2020, 14 women (7.1%) died from obstetric haemorrhage.

Ectopic pregnancy

An ectopic pregnancy is where a fertilised egg implants at a site other than in the uterus, most commonly in the uterine tube. If not treated, ectopic pregnancies can rupture, causing internal bleeding, infection, and potentially death.

In 2018–2020, one mother died due to an ectopic pregnancy, an MMR of 0.1 (Supplementary Table 14).

In the decade 2011–2020, 4 women (2%) died from ectopic pregnancy.

The denominator for the calculation of MMR is the number of women who gave birth, rather than the number of women who had a pregnancy. This is because the number of non progressing early pregnancies, miscarriages, pregnancy terminations and ectopic pregnancies occurring before 20 weeks is unknown.

Homicide

Deaths included in this category are those where the available evidence suggested that the woman was killed by another person. Deaths due to homicide are often classified as coincidental to pregnancy, so are not classified as maternal deaths. But if the available information suggests that pregnancy might have been influential in the death, it may be classified as an indirect maternal death.

In 2018–2020, one mother died from homicide, an MMR of 0.1 (Supplementary Table 14). This death was related to domestic violence.

In the decade 2011–2020, 4 women (2.0%) died from homicide. All of these deaths were classified as indirectly related to pregnancy.

Other causes of maternal deaths

Supplementary tables 14, 15, and 16 provide information about the causes of death, with 3 direct maternal deaths being from *Other* causes in 2018–2020 (acute fatty liver of pregnancy, 2 deaths, and morbid obesity, one death) and 3 indirect maternal deaths (from asthma, epilepsy and sudden unexplained death) in 2018–2020.

SARS-CoV-2 (COVID-19) was not reported as a cause of death for any 2018–2020 maternal deaths in Australia.

Appendix A: Data sources and method

The National Maternal Mortality Data Collection

This report is compiled from data held in the National Maternal Mortality Data Collection (NMMDC). The NMMDC was established by the Australian Institute of Health and Welfare (AIHW) and collates data from state and territory sources on women reported to have died while pregnant or within 42 days of the end of pregnancy between 2006 and 2020.

The AIHW receives jurisdictional data only, and does not source, validate or review maternal deaths independently. The state and territory health authorities and other relevant jurisdictional bodies receive clinical data on the women who died from patient administrative and clinical records. The data also go to the state and territory maternal mortality committees (STMMCs) where death reviews are undertaken.

A confidential enquiry into each of the maternal deaths that occurred in 2018–2020 was done by 8 separate STMMCs.

The committees operate under legal privilege and are provided with clinical information and the results of autopsy investigations, where available. The confidential enquiry process seeks to identify and understand the individual circumstances surrounding each death. Subsequently, the STMMC agrees on the causes of each death, and assigns the death to a maternal death category.

There is no standardised method of identifying and collecting data on maternal deaths, and no nationally agreed process of reporting or investigation. The organisational and governance arrangements – including relevant legislation, policy, and process for maternal death data collection – varies by state and territory. The NMMDC reflects these variations. In all cases, the best available information was used to form the NMMDC.

Data from the NMMDC included in this report were extracted from the collection on or before 01 May 2023.

Data for this publication on the number of women giving birth were sourced from the National Perinatal Data Collection. The collection includes the number of women in Australia who gave birth to at least one baby (either a live birth or a stillbirth) of at least 20 weeks' completed gestation or at least 400 grams birthweight.

For more information on these collections, see:

- NMMDC Data Quality Statement at https://meteor.aihw.gov.au/content/767677
- National Perinatal Data Collection Data Quality Statement at https://meteor.aihw.gov.au/content/761030.

Advisory groups

The AIHW routinely engages with the following committees regarding maternal and perinatal reporting:

- the National Maternal and Perinatal Mortality Clinical Expert Group (NMPMCEG) – for expert clinical advice regarding all components of the National Maternal and Perinatal Mortality Data Collections
- the National Perinatal Data Development Committee (NPDDC) – for expert technical advice on maternal and perinatal data and statistics, and
- the National Maternity Data Development Project Advisory Group (NMDDP AG) – for expert clinical, technical, research and statistical advice.

Measuring maternal mortality

Maternal mortality is an internationally accepted measure of maternal health. The following measures have been defined by United Nations agencies (WHO, UNICEF and UNFPA) (WHO 2023b).

The *maternal mortality rate* (also known as the maternal death rate) is the number of maternal deaths in a given period per 100,000 women of reproductive age during the same period. It reflects the frequency with which women are exposed to risk of death through fertility.

The *maternal mortality ratio* (MMR) is the number of maternal deaths during a given period per 100,000 women giving birth during the same period. Coincidental and deaths not yet classified are excluded from the calculation of the MMR. This is a measure of the risk of death once a woman has become pregnant. This measure is most commonly used and has been predominantly used in this report.

Although the most appropriate denominator for estimating maternal mortality would be the number of women at risk (the number of pregnant or recently pregnant women), this number is not available in Australia. This is because the number of pregnancies ending before 20 weeks' gestation is unknown.

In Australia, accurate population data are available in the AIHW's National Perinatal Data Collection for the number of women who gave birth to at least one baby (either a live birth or a stillbirth) of at least 20 weeks' completed gestation or at least 400 grams birthweight. This is the denominator used when calculating the MMR in this report.

Calculation of MMR

$$\text{MMR} = \frac{\text{Number of maternal deaths (direct + indirect + maternal deaths not further classified)}^{(a)}}{\text{Number of women who gave birth}^{(a)}} \times 100{,}000$$

(a) For a defined place and time.

Reporting maternal deaths

Maternal mortality in Australia has been reported nationally since 1964. Reports were triennial until the 2003–2005 period, followed by overlapping quinquennial reports for the periods 2006–2010 and 2008–2012 (AIHW 2014, 2015). Triennial reports recommenced with the period 2012–2014 (AIHW 2017).

Some maternal deaths data are also reported annually on the AIHW website at https://www.aihw.gov.au/reports/mothers-babies/maternal-deaths-australia.

Past *Maternal deaths in Australia* reports were the source of data in this report for years before 2006. Data elements, such as maternal place of residence (and hence remoteness of residence and socioeconomic area), could not be presented with the necessary degree of accuracy for this report due to differing legislative frameworks governing the ability of STMMCs and health departments to share information about maternal deaths and their jurisdictional review.

In some earlier *Maternal deaths in Australia* reports, illustrative vignettes were developed from deidentified case information designed to protect anonymity. But jurisdictional health privacy legislation, and its interpretation, has progressively changed over time, and sufficient clinical detail is no longer available to enable case vignettes to be published.

Unit record data on maternal deaths in Western Australia were not supplied to the NMMDC. Due to health privacy legislation in Western Australia, only limited aggregate maternal deaths data are provided to the AIHW for inclusion in the report.

This report uses the terms 'woman' and 'women' to mean 'female' when referring to data collected in the National Maternal Mortality Data Collection (NMMDC) and the National Perinatal Data Collection (NPDC) as these data sources are based on sex. Information on gender is not recorded in these data collections. 'Woman' and 'women' typically refers to groups of people aged 18 years and over, however in this report people who were pregnant or gave birth aged less than 18 are included.

The terms 'mother' and 'mothers' refer to females who were pregnant and within the scope of these data collections (for more scope information see 'Appendix A': National Maternal Mortality Data Collection).

It is acknowledged that this report includes people who do not identify as women or mothers, and that individual parents and families may use different words to those used in this report. This may include women, transgender men, intersex people, non-binary and gender diverse people.

The Australian maternity context

Maternity services in Australia are provided by 8 state and territory health departments and private providers. Each state and territory has differing care provision systems and care available to pregnant women and their babies.

A national review of maternity services was carried out in Australia in 2008. This resulted in a report that aimed to identify key gaps in maternity care (DoHAC 2009), and informed development of the first National Maternity Services Plan in 2010 (COAG Health Council 2019). The plan aimed to maintain Australia's high standard of maternity and perinatal care, while seeking to improve women's access to services and choice in care.

Under the auspices of the Council of Australian Government (COAG) Health Council, a new national strategic approach to maternity services was released in 2019 (COAG Health Council 2019). This document indicates that 3 areas inform shared decision-making between the woman and maternity service providers. These are:

- a woman's preference
- evidence as it applies to the woman
- the context of care provision.

A requirement for women to be provided with access to evidence about their care is clear throughout that document, and one of the key outcomes quoted is reducing the incidence of maternal mortality. The AIHW is specifically referenced as one of the agencies that can help provide such evidence for women and their families.

Identifying Aboriginal and Torres Strait Islander women

An Aboriginal and Torres Strait Islander woman is defined, for Australian health data collections, as a woman of Aboriginal and/or Torres Strait Islander descent, who identifies herself as such. Information on the Indigenous status of the women who died is collected as part of the NMMDC and is presented in this report.

In maternal death notifications, Indigenous status has been collected for cases categorised as: direct maternal deaths since 1970; and for indirect and incidental deaths since 1991.

Maternal deaths in Australia reporting prior to 2006 included women where Indigenous status was not stated grouped with women reported as non-Indigenous. These women are collectively referred to as 'other Australian women'. This grouping has been maintained for reporting trend data from 2006 onwards for comparability over time. Data for the current triennium are reported as Indigenous and non-Indigenous.

From 2006 onwards, the proportion of maternal deaths where Indigenous status was not stated has decreased from 20% in 2006–2008 to 6% in 2018–2020.

Deaths by suicide

In 2011 and 2012, the WHO recommended classifying all maternal suicidal deaths as direct maternal deaths (Pattinson et al. 2009).

However, in 2012, the National Maternal and Perinatal Mortality Clinical Expert Group, with advice from the Royal Australian and New Zealand College of Psychiatrists, concluded that puerperal psychosis, which may be related to 'a dramatic change in hormone levels after the end of pregnancy' is extremely rare.

The committee further concluded that:

- deaths in situations with clear evidence of a pre-existing mental health disorder were to be classified as indirect deaths
- suicidal deaths of women with previously undiagnosed severe mental health illness and no pre-existing condition were to be classified as direct deaths.

Remoteness area

This report uses the Australian Statistical Geography Standard (ASGS) Remoteness Structure, which groups geographic areas into six classes of Remoteness Area based on their relative access to services using the Accessibility/Remoteness Index of Australia.

The six classes are: *Major cities*, *Inner regional*, *Outer regional*, *Remote*, *Very remote* and *Migratory*, see the *Australian Statistical Geography Standard (ASGS): Volume 5 – Remoteness Structure, July 2016* (ABS 2016a).

This was calculated using Statistical Area Level 2 (SA2) of usual residence and postcode when SA2 was not valid or not provided. The ASGS is updated every 5 years. For this report:

- 2011 ASGS classifications were used for years less than or equal to 2016.
- 2016 ASGS classifications were used for years 2017 onwards.

In calculating the remoteness of the area of usual residence for maternal deaths covered by this report, where an SA2 or postcode included areas in more than one remoteness area category, that category was assigned a decimal value to reflect the proportion of the postcode/SA2 in that remoteness category. For example, if 75% of a postcode was in the *Inner regional* category and 25% was in the *Outer regional* category, those categories would be assigned a value of 0.75 and 0.25, respectively. The number of women giving birth in each remoteness category is the sum of these values, rounded to the nearest 1. Where an SA2 or postcode was located entirely within one remoteness area category, that category was assigned a value of 1.

Socioeconomic area

The Socio-Economic Indexes for Areas (SEIFA) are measures of socioeconomic status (SES) that summarise a range of socioeconomic variables associated with disadvantage. Socioeconomic disadvantage is typically associated with low income, high unemployment and low levels of education.

The SEIFA index used in this report is the 2016 SEIFA Index of Relative Socioeconomic Disadvantage (IRSD) developed by the Australian Bureau of Statistics for use at Statistical Area Level 2 (SA2).

Since the IRSD summarises only variables that indicate disadvantage, a low score indicates that an area has many low-income families, many people with little training and many people working in unskilled occupations; hence, this area may be considered disadvantaged relative to other areas. A high score implies that the area has few families with low incomes and few people with little or no training and working in unskilled occupations. These areas with high index scores may be considered less disadvantaged relative to other areas. It is important to understand that a high score reflects a relative lack of disadvantage rather than advantage and that the IRSD relates to the average disadvantage of all people living in a geographic area. It cannot be presumed to apply to all individuals living within the area.

Population-based Australian cut-offs for SEIFA quintiles have been used in this report. This method ranks the SEIFA scores for a particular geography from lowest to highest, and the geographical areas are divided into 5 groups, such that approximately 20% of the population are in each group.

In this report, SEIFA quintiles of the area of usual residence have been derived by applying the relevant SEIFA scores to the area of mother's usual residence, indicated by SA2 or postcode if SA2 was not valid or not provided. This was only calculated where the state and SA2 or postcode of usual residence was provided.

The most disadvantaged group is referred to as the Lowest socioeconomic status (SES) areas and the least disadvantaged group is referred to as the Highest SES areas. See the Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016 (ABS 2016b) for further information on SEIFA.

Appendix B: Further reading

This report, *Maternal deaths in Australia 2018–2020*, is part of a series. The earlier editions and any published subsequently can be downloaded for free from the AIHW website at www.aihw.gov.au/publications/. The website also includes information on ordering printed copies.

The *Australia's Mothers and Babies* series are also available for download for free from the AIHW website at www.aihw.gov.au/publications/.

The following publications might also be of interest:

- WHO 2019: Trends in Maternal Mortality 2000 to 2017: Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Viewed November 2020.
- PMMRC 2021: Fourteenth Annual Report of the Perinatal and Maternal Mortality Review Committee: Reporting mortality and morbidity 2018. Wellington: Health Quality & Safety Commission. New Zealand.
- Knight M, Bunch K, Tuffnell D et al on behalf of MBRRACE-UK. Saving Lives, Improving Mothers' Care – Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2017–2019. Oxford: National Perinatal Epidemiology Unit, University of Oxford 2021.

Prominent examples guiding care in Australia include:

- Management of obstetric haemorrhage:
  - Begley C, Gyte GM, Devane D et al. 2019;
  - Mavrides M, Allard S, Chandraharan E et al. 2016.
- Thromboembolism:
  - Clinical practice guideline for the prevention of venous thromboembolism, NHMRC 2009;
  - Nelson-Piercy C, MacCallum P, Mackillop L for the RCOG, 2015;
  - Thomson AJ, Greer IA for the RCOG, 2015.
- Cardiovascular disorders:
  - Regitz-Zagrosek V, Roos-Hesselink JW, Bauersachs J, et al. 2018.
- Hypertensive disorders:
  - Lowe SA, Bowyer L, Lust K et al. 2015; NICE guideline ng133. 2019.
- Sepsis:
  - Smaill FM and Grivell RM 2014; RCOG Green top guidelines 64a and 64b, RCOG 2012a and 2012b.
- Non-obstetric haemorrhage:
  - Chu J, Johnston TA, Geoghegan J. 2020.
- Ectopic pregnancy:
  - Sivalingam VN, Duncan WC, Kirk E, 2011;
  - Hajenius PJ, Mol F, Mol BWJ. 2007
- Anaesthetic-related deaths:
  - Joint RANZCOG/ANZCA position statement WPI-14, 2020.

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The AIHW would like to acknowledge the families and loved ones whose losses are documented in this report and express their sincere condolences to them. Every maternal death is a tragedy and the aim of investigating and reporting maternal deaths is to assist in finding answers for those who experience such loss personally and for the healthcare professionals involved.

Abbreviations

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
BMI	body mass index
ICD	World Health Organisation International Statistical Classification of Diseases and Related Health Problems
MMR	Maternal mortality ratio
NMDDP	National Maternity Data Development Project
NMMDC	National Maternal Mortality Data Collection
NMPMAG	National Maternal and Perinatal Mortality Advisory Group
NSW	New South Wales
NT	Northern Territory
PMMRC	Perinatal and Maternal Mortality Review Committee, New Zealand
Qld	Queensland
RA	Remoteness Areas
SA	South Australia
SDGs	Sustainable Development Goals
SEIFA	Socio-Economic Indexes for Areas
STMMCs	State and territory maternal mortality committees
Tas	Tasmania
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
Vic	Victoria
WA	Western Australia
WHO	World Health Organization

Symbols

n.a.	not available, not applicable
n.p.	not publishable because of small numbers, confidentiality or other concerns about the quality of the data
. .	no data/insufficient data

Glossary

acute: Coming on sharply and often brief, intense and severe.

age-standardisation: A method of removing the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure, and then the disease rates that would have occurred with that structure are calculated and compared.

amniotic fluid embolism (AFE): A rare obstetric emergency in which it is postulated that amniotic fluid, fetal cells, hair or other debris enter the maternal circulation, causing cardiorespiratory collapse.

anaesthetic-related death: deaths where the cause was related to anaesthesia (usually in association with a surgical procedure).

aneurysm: A localised swelling of the wall of an artery.

antenatal: The period covering conception up to the time of birth. Synonymous with **prenatal**.

assisted vaginal birth (AVB): A method of birth in which instruments (forceps or vacuum extraction) are used to assist the woman to give birth to her baby via the vagina.

autopsy: A post-mortem examination to discover the cause of death or the extent of disease.

blood pressure: The force exerted by the blood on the walls of the arteries as it is pumped around the body by the heart. It is written, for example, as 134/70 mmHg, where the upper number is the systolic pressure (the maximum force against the arteries as the heart muscle contracts to pump the blood out) and the lower number is the diastolic pressure (the minimum force against the arteries as the heart relaxes and fills again with blood). Levels of blood pressure can vary greatly from person to person and from moment to moment in the same person.

body mass index (BMI): The most commonly used method of assessing whether a person is normal weight, underweight, overweight or obese (see **obesity**). It is calculated by dividing the person's weight (in kilograms) by their height (in metres) squared; that is, kg ÷ m^2. For both men and women, underweight is a BMI below 18.5, acceptable weight is from 18.5 to less than 25, overweight is from 25 to less than 30, and obese is 30 and over. Sometimes overweight and obese is combined, and is defined as a BMI of 25 and over.

caesarean section (CS): A method of birth in which a surgical incision is made into the mother's womb via the abdomen to directly remove the baby.

cardiovascular: The heart and/or major blood vessels.

coincidental maternal death: Deaths from unrelated causes that happen to occur in pregnancy or the puerperium.

diabetes (diabetes mellitus): A chronic condition in which the body cannot properly use its main energy source: the sugar glucose. This is due to a relative or absolute deficiency in insulin: a hormone that is produced by the pancreas and helps glucose enter the body's cells from the bloodstream and then be processed by them. Diabetes is marked by an abnormal build-up of glucose in the blood, and it can have serious short- and long-term effects.

direct maternal death: Those resulting from obstetric complications of the pregnant state (pregnancy, labour and puerperium) from interventions, omissions, incorrect treatment or from a chain of events resulting from any of the above.

early pregnancy: The first 13 weeks of pregnancy; the first trimester of pregnancy.

ectopic pregnancy: The development of a fetus at a site other than in the uterus. This may happen if the fertilised egg cell remains in the ovary or in the tube leading from near the ovary to the uterus (the Fallopian tube), or if it lodges in the free abdominal cavity.

embolism: The condition in which an embolus becomes lodged in an artery and obstructs its blood flow. The most common form of embolism is **pulmonary embolism**, in which a blood clot is carried in the circulation to lodge in the pulmonary artery.

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

gestational age: The duration of pregnancy in completed weeks calculated from the date of the first day of a woman's last menstrual period and her baby's date of birth, or via ultrasound, or derived from clinical assessment during pregnancy or from examination of the baby after birth.

gestational diabetes: A form of diabetes that is first diagnosed during pregnancy (gestation). It may disappear after pregnancy but signals a high risk of diabetes occurring later on.

haemorrhage (bleeding): The escape of blood from a ruptured blood vessel, externally or internally.

hypertension in pregnancy: Defined by the Society of Obstetric Medicine of Australia and New Zealand (SOMANZ) as systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg. **Severe hypertension** is defined as a systolic blood pressure greater than or equal to 170 mmHg with or without diastolic blood pressure greater than or equal to110 mmHg.

hypertensive disease: Occurs when high blood pressure (hypertension) is severe or prolonged enough to cause damage to the heart, brain or kidneys.

Indigenous: A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander.

indirect maternal death: deaths resulting from previous existing diseases or diseases that developed during pregnancy, and which were not due to a direct obstetric cause, but were aggravated by the physiologic effects of pregnancy.

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

intracerebral: Within the brain substance.

in-utero: In a woman's uterus; before birth.

ischaemic heart disease: Also heart attack and angina (chest pain). Also known as 'coronary heart disease'.

live birth: The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered live born (WHO definition).

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

maternal death: The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

maternal deaths, not further classified: deaths considered to be related to the pregnancy or its management, but could not be further classified as either 'direct' or 'indirect'.

maternal mortality ratio (MMR): the incidence of maternal death for a defined place and time, using direct and indirect deaths combined (excluding coincidental deaths), over the number of women who gave birth.

morbidity: Refers to ill health in an individual and to levels of ill health in a population or group.

mortality: Death.

myocardial infarction: Term still commonly used to mean a heart attack, but more correctly refers only to those heart attacks that have caused some death of heart muscle.

non-Indigenous: People who have declared they are not of Aboriginal and/or Torres Strait Islander descent.

non-obstetric haemorrhage: Haemorrhage in pregnancy from blood vessels other than those in the genital tract; most commonly haemorrhage from a ruptured blood vessel in the brain or in the abdomen (the Splenic Artery).

obesity: Marked degree of overweight, defined for population studies as a **body mass index** of 30 or over.

obstetric haemorrhage: Haemorrhage from the female genital tract associated with pregnancy and birth.

other Australians: People who have declared they are not of Aboriginal or Torres Strait Islander descent, and those for whom their Indigenous status is unknown. Compare with **Indigenous**.

oxytocic drugs: drugs containing synthetic oxytocin. These are used to stimulate rhythmic contractions in induction and augmentation of labour and to prevent or treat postpartum haemorrhage.

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

perimortem: At or near the time of death.

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

placenta accreta: A placenta that invades the uterine muscle making separation from the muscle difficult. Note the term '**placenta accreta**' is widely used to refer to all cases of placenta accreta/increta/percreta (unless specified).

placenta praevia: A condition of pregnancy in which the placenta is implanted abnormally in the uterus so that it impinges on, or covers, the internal opening of the uterine cervix.

plurality: Number of births resulting from a pregnancy.

postnatal: Occurring after birth, with reference to the newborn.

postpartum: Occurring after childbirth, with reference to the mother.

pre-eclampsia: A condition that complicates pregnancy, is characterised by the presence of high blood pressure, fluid retention and protein in the urine. The placental function may be compromised.

puerperium: The period of up to about 6 weeks after childbirth, during which the uterus returns to its normal size.

pulmonary: Relating to the lungs.

quinquennial: Five-yearly.

rate: A number (the numerator) divided by another number (the denominator). The numerator is commonly the number of events in a specified time. The denominator is the population 'at risk' of the event. Rates (crude, age-specific and age-standardised) are generally multiplied by a number such as 100,000 to create whole numbers.

sepsis: Refers to a bacterial or viral infection in the bloodstream or body tissues. This is a very broad term covering the presence of many types of microscopic disease-causing organisms.

Sustainable Development Goals (SDGs): Global commitments made by the United Nations Member States in 2000, which came into force on 1 January 2016 for the 15-year period until 31 December 2030; these SDGs extended the Millennium Development Goals (MDGs), which covered the period until 2015.

socioeconomic status: An indication of how 'well off' a person or group is. In this report, socioeconomic status is mostly reported using the **Socio-Economic Indexes for Areas**, typically for 5 groups, from the most disadvantaged (worst off) to the least disadvantaged (best off).

Socio-Economic Indexes for Areas (SEIFA): A set of indexes, created from Census data that aim to represent the socioeconomic status of Australian communities and identify areas of advantage and disadvantage. The index value reflects the overall or average level of disadvantage of the population of an area; it does not show how individuals living in the same area differ from each other in their socioeconomic status. This report uses the **Index of Relative Socioeconomic Disadvantage (IRSD)**.

state and territory maternal mortality committees (STMMCs): Committees in each state and territory of Australia that review maternal deaths in that jurisdiction.

stillbirth (fetal death): Death before the complete expulsion or extraction from its mother of a product of conception of 20 or more completed weeks of gestation or of 400 grams or more birthweight. Death is indicated by the fact that after such separation, the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles.

suicide: An action intended to deliberately end one's own life.

termination of pregnancy (abortion): The deliberate ending of a pregnancy with the intention or expectation that the baby or fetus will not survive; such pregnancy termination may be by surgical or medical means.

thromboembolism: Obstruction of a blood vessel (most frequently the pulmonary blood vessels) by a blood clot that has become dislodged from another site in the circulation.

triennial: Three-yearly.

trimester: Three monthly divisions of the duration of pregnancy.

unassisted vaginal birth: a non-instrumental (unassisted) vaginal birth is one in which the baby is born through the vagina without the assistance of instruments (vacuum or forceps).

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In Australia, where childbirth is safe for most women, maternal death is rare. This in-depth triennial report will provide data on maternal deaths in Australia by causes of death, timing of death and selected characteristics of the women who died. The maternal mortality ratio in Australia in 2018–2020 was 5.6 deaths per 100,000 women giving birth, which is the lowest ratio recorded since 1973–1975 and is among the lowest ratios in the world. The most common causes of maternal death were cardiovascular disease, thromboembolism and sepsis.

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