

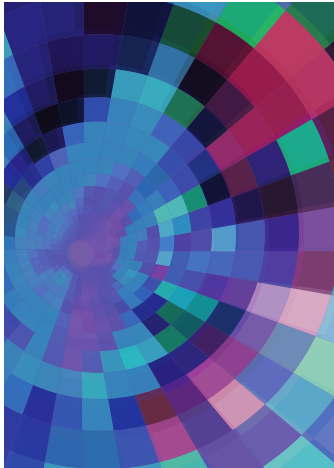
Consultative Council on
Obstetric and Paediatric
Mortality and Morbidity

Victoria's Mothers, Babies and Children

2018

SCV
Safer Care
Victoria

57th
survey of deaths
in Victoria



ABOUT THE COVER IMAGE

The 'radar' on the front cover and in the report signifies the multifaceted and interconnected factors collected and explored by the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM). These lead to a central focus point or learning. The layers symbolise the depth of analysis and review, leading to the identification of underlying circumstances. The central point of the radar represents a focus for performance improvement for individual care and the broader health system like a lens in a camera focuses clearly on its subject.

The many colours represent the diversity within the Victorian community, which CCOPMM serves. They also symbolise the different speciality subcommittees of CCOPMM and the diverse expertise contained within them.

Safer Care Victoria, which provides secretariat and project support to CCOPMM, works with health services to monitor and improve the quality and safety of care delivered across our health system, with the goal of achieving zero avoidable patient harm. This is symbolised by the central 'focus' on system improvement. Council-held data is used in 'radar graphs' to capture related health service performance measures, contributing a new focus on the use of information for performance improvement.

The colour scheme was selected for its universality and because CCOPMM aims to serve all Victorian mothers, babies and children.

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Message from the Chair

It is often quoted that Victoria is one of the safest places in the world for women to give birth and for our children to grow into adults. This is indeed something for us all to be proud of. Our challenge, as a consultative council and as a wider sector, is to ensure that it remains one of the safest places, through detailed review, reflection and commitment to improvement.

This report is the first report of the 2018–2021 Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) and marks the end of our first year. It is an amalgamation of the wide-ranging work of the CCOPMM, its subcommittees, our healthcare professionals, researchers and consumers. This report will look slightly different to prior reports, as a direct result of stakeholder feedback. It does, however, have a strong connection to the 2017 report published in April, particularly in the themes articulated, the recommendations made, and in the good practice points highlighted. These are all still relevant as we release the 2018 report. We will continue to adapt and improve this report to ensure it meets the sector's needs and genuinely contributes to reducing preventable harm for Victoria's women, babies, children and families.

In this report we have made a concerted effort to highlight the impact vulnerabilities have on the health and wellbeing of our community. This is an area we must focus on. We must provide more continuity of care than ever before across our acute, primary and community sectors. Vulnerabilities and their consequences are complicated, and system changes are required. We cannot just say it's too hard; we must unpack these difficulties and overcome them.

Women, children and families place their trust in us, and they expect that not only we will provide timely and appropriate care but that we will provide it in a way that will meet their unique needs. We might be experts in care, but they are the experts in their own lives. They know what matters most to them and we need to listen. We must never lose sight of the women, their partners, parents and families who go home without their babies or their children, or women who die during pregnancy or in the year following birth. We must always ask ourselves: 'If care or the situation was different, would the outcome have been different?' This approach does take courage but will assist us in strengthening our complex healthcare system, as well as provide better outcomes and experiences for those in our care and those providing care.

The health and human services system is complex. We all need to understand where we fit, and how we contribute as an individual, a team and a service. It is important that the work of the CCOPMM is connected into the work that is occurring across the Victorian health system and beyond. We must continue contributing to policies and projects that are relevant to our work and ensure our specific expertise is utilised to its full extent, in partnership with clinicians, women and their families.

I commend this report to you on behalf of the 2018–2021 CCOPMM, and I look forward to leading the CCOPMM into its next year, ensuring our work meets the needs of those who matter most.

Adjunct Professor Tanya Farrell

Chair, Consultative Council on Obstetric and Paediatric Mortality and Morbidity

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This report was developed by CCOPMM with support from the following team members of the Consultative Councils Unit at Safer Care Victoria:

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Looking after yourself

This report contains information and data on the death and morbidity of women, babies, children, and adolescents. While it is important to share the findings from our reviews it can be confronting to read.

We encourage all readers, consumers, patients and clinicians to look after themselves, and to reach out to their own support networks and their relevant employee assistance program for support and guidance when needed. Additional resources available to help are included here.

SANDS

<https://www.sands.org.au>

Red Nose

<https://rednosegriefandloss.org.au>

Headspace: 1800 650 890

<https://headspace.org.au>

Beyond Blue

<https://www.beyondblue.org.au/>

Lifeline 13 11 14

<https://www.lifeline.org.au>

Kids Helpline: 1800 551 800

<https://kidshelpline.com.au/>

Using this report

- Where the term 'Aboriginal' is used it refers to both Aboriginal and Torres Strait Islander people.
- Detailed 2018 data for all chapters are included separately in the supplementary tables of this report, which can be found on CCOPMM's website <https://www.bettersafecare.vic.gov.au/about-us/about-scv/councils/ccopmm/reports>.
- Consumer resources provide additional information for women, parents and families.
- In the mortality sections (maternal, perinatal and child and adolescent), data may refer to deaths that occurred over a period of three or more years (for example, the triennium 2016–2018) due to the low numbers of deaths.
- Maternal or perinatal death cases in which there are potential contributing factors undergo a review by one of three CCOPMM expert subcommittees – the Stillbirth Subcommittee, the Neonatal Mortality Subcommittee and/or the Maternal Mortality and Morbidity Subcommittee. Where identified, the contributing factors are graded as (according to the Perinatal Society of Australia and New Zealand (PSANZ) classification):
 - unlikely to have contributed to the outcome (insignificant)
 - might have contributed to the outcome (possible)
 - likely to have contributed to the outcome (significant).
- Information provided in the 'Collecting and reviewing information' section and in Appendix 1 under 'Definitions' and 'Abbreviations' should be used to fully interpret this report.
- The statistical flowcharts (Appendix 3) outline the scope of the data collections and the case inclusions and exclusions used for reporting.

Executive summary

Victoria's mothers, babies and children 2018 presents data and trends on births and deaths, recommendations, themes and good practice points for clinicians, health and community services and the Victorian health system. It highlights areas of improvement for clinical practice, health and community policy development and service planning for women, babies, children and adolescents in Victoria. Consumer resources are also included to provide further information for women, parents and families when making decisions regarding care. The themes, good practice points and recommendations have been formulated after considering the data and maternal, perinatal, child and adolescent morbidity and mortality reviewed by the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM).

BIRTHS IN VICTORIA

In 2018, 77,356 women gave birth to 78,521 babies (excluding terminations of pregnancy) – a reduction of 1.5 per cent births from 2017. 77.3 per cent were admitted to a public hospital (59,784) and 22.4 per cent were admitted to a private hospital (17,359).

Of the women giving birth in 2018, 60.4 per cent were born in Australia and 39.4 per cent were born outside Australia. The most frequent place of birth for women born in non-English-speaking countries were Southern and Central Asia (12.6 per cent) and South-East Asia (6.7 per cent).

The proportion of women giving birth by caesarean section continues to increase from 31.6 per cent in 2010 to 34.9 per cent in 2017 and 35.9 per cent in 2018.

There were 322 homebirths (0.4 per cent) in Victoria in 2018. 235 (73 per cent) of these were planned private homebirths. 87 were planned public homebirths – an increase of 60 per cent, from 54 in 2017.

In 2018, 5,914 babies (7.6 per cent) were born before 37 weeks.

MATERNAL MORTALITY AND MORBIDITY

There were 14 maternal deaths in 2018 and 39 deaths for the 2016–18 triennia. The Victorian maternal mortality ratio for the three years between 2016 and 2018 was 10.2 per 100,000 women who gave birth.

Suicide was the most common cause of direct and indirect maternal deaths. There were 12 suicides in the 2016–2018 triennium (30.8 per cent.)

CCOPMM uses intensive care unit admissions to identify severe acute maternal morbidity cases in Victoria, with reporting commencing on 1 July 2017. There were 239 maternal intensive care admissions reported to CCOPMM in 2018.

Areas of focus include the recognition and management of Ogilvie's syndrome and the prevention and management of postpartum haemorrhage. Both featured in the cases of concern in 2018.

PERINATAL MORTALITY

In this section terminations of pregnancy for maternal psychosocial indications are excluded for all births and deaths, and all subsequent rates and figures are reported as 'adjusted'.

In 2018, 78,700 babies were born with a gestation greater than or equal to 20 weeks (or, if gestation unknown, greater than or equal to 400 g birthweight), [adjusted total births].

There were 675 adjusted perinatal deaths; 473 stillbirths and 202 neonatal deaths.

Victoria's adjusted perinatal mortality rate was 8.6 per 1,000 births, which was lower than 2017 (8.8 per 1,000 births). The stillbirth mortality rate was 6.0 per 1,000 births and the neonatal mortality rate was 2.6 per 1,000 births.

The leading cause of adjusted stillbirth (excluding terminations for congenital anomalies) was unexplained antepartum fetal death (14.4 per cent), where a definitive cause could not be established.

Spontaneous preterm birth (33.2 per cent) and congenital anomalies (22.3 per cent) were the most common causes of neonatal deaths (excluding terminations for congenital anomalies).

In 2018, 137 perinatal deaths (27.6 per cent) of the 496 deaths reviewed (not from termination of pregnancy for maternal psychosocial indication or congenital anomaly) had contributing factors identified.

The perinatal mortality rate in women who smoked at all during pregnancy was higher (9.9 per 1,000 births) than those who did not smoke while pregnant (6.0 per 1,000 births).

Areas of focus include the relationship between smoking and perinatal mortality, preterm birth and perinatal mortality, the importance of perinatal autopsies to assist in understanding causes of death and the need for accurate recognition and timely management of decreased fetal movements and fetal growth restriction.

ABORIGINAL BIRTHS, MORTALITY AND MORBIDITY

Where the term 'Aboriginal' is used it refers to both Aboriginal and Torres Strait Islander people.

The proportion of all women giving birth in Victoria who identify as Aboriginal increased from 1.2 per cent in 2010 to 1.5 per cent in 2018. Aboriginal women and babies continue to have poorer outcomes than non-Aboriginal women and babies.

For the 2016–2018 triennium, the perinatal mortality rate for babies born to Aboriginal women was higher than that for non-Aboriginal women (11.5 and 8.7 per 1,000 births respectively). The stillbirth rate for Aboriginal women is higher than that of non-Aboriginal women (7.1 per 1,000 births compared with 6.2 per 1,000 births).

The stillbirth rate in Aboriginal women in 2016–2018 was higher than the previous triennia (7.1 per 1,000 births in 2016–18 and 5.9 per 1,000 in 2015–2017).

As the numbers of Aboriginal women and babies are small there is a high degree of variability from year to year, further analysis of this data is important to understand these outcomes and prioritise areas where improvements are required.

Aboriginal women were more likely to smoke compared with non-Aboriginal women (40.2 per cent compared with 7.5 per cent respectively). Babies of Aboriginal women were more likely to be born with a birthweight less than 2,500 g than non-Aboriginal women (12.1 per cent compared with 6.9 per cent respectively) and be born prematurely (12.4 per cent compared with 8.5 per cent respectively). As smoking is linked with stillbirth, preterm birth and low birth weight this is an area that requires significant attention.

Highlighted is the discrepancy in smoking rates between Aboriginal and non-Aboriginal women and the importance of effective smoking cessation programs – a recommendation from the 2017 report.

INFANT, CHILD AND ADOLESCENT MORTALITY

In 2018, 181 deaths of Victorian residents aged 28 days – 17 years who died in Victoria were reported to CCOPMM. In 2017 and 2016 there were 205 and 206 respectively. This is 24 fewer deaths than in 2017. This section includes all deaths from post-neonatal infants (28 days old) to adolescents (17 years and 364 days old).

In 2018 Victoria's infant and under-five-year mortality rates were 3.0 per 1,000 live births and 3.4 per 1,000 live births respectively.

There were 63 deaths in infants aged 28–364 days (post-neonatal infants). The main causes of death were congenital anomaly (38.1 per cent) and sudden infant death syndrome (SIDS) (23.8 per cent).

There were 33 deaths in children aged one to four years. The main causes of death were congenital anomaly (24.2 per cent) and malignancy and undetermined cause of death (both 18.2 per cent).

There were 18 deaths in children aged five to nine years of age. The main causes of death were malignancy (27.8 per cent) and congenital anomaly and other acquired disease (both 16.7 per cent).

There were 27 deaths in children aged 10–14 years of age. The main causes of death were congenital anomaly and motor vehicle accidents (both 25.9 per cent) and malignancy (14.8 per cent).

There were 40 deaths in adolescents aged 15–17 years. The main causes of death were intentional self-harm (including suicide) (40.0 per cent), congenital anomaly (20.0 per cent) and malignancy (17.5 per cent).

Areas of focus include, improving the safety of children in cars, safety of e-cigarettes and triaging of children in mixed emergency departments and urgent care centres.

1 Introduction

Victoria's mothers, babies and children 2018 presents data and trends on births and deaths reported to and reviewed by the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) and its subcommittees for 2018. The report contains key recommendations and specific good practice points for clinicians, health and human services, community services and the Victorian health system. Consumer resources are also included to provide further information for women, parents and families when making decisions regarding care.

The report highlights opportunities for improvement for clinical practice, health and community policy development and service planning. In addition, the report contains data to support the maternal and child health research agenda by highlighting areas that require further analysis or enquiry.

Key to improving care and prioritizing areas for improvement is vigilant multidisciplinary and at times multiagency review of all maternal, perinatal and child and adolescent deaths and significant morbidity to determine contributing factors. All health services must have a multidisciplinary mortality and morbidity review committee to conduct these reviews. Health services should ensure that this clinical governance process is in place and that this system is multidisciplinary, has clearly defined process for case investigation and that contributing factors are identified, recommendations are formulated, documented and actioned in a timely manner and any findings are shared to facilitate learnings.

The report includes specific sections focusing on:

- women and babies
- maternal mortality and morbidity
- Aboriginal women and babies
- perinatal mortality
- child and adolescent mortality.

In Victoria, the dissemination and implementation of good practice points and recommendations made by CCOPMM is facilitated through close collaboration with Safer Care Victoria (SCV), the Department of Health and Human Services (the department), the Maternity and Newborn Clinical Network, the Victorian Paediatric Clinical Network, the Coroners Court of Victoria, and the Victorian Managed Insurance Authority.

While Victoria and Australia experience some of the lowest maternal, perinatal and child mortality rates internationally, identifying preventable mortality and contributing factors and sharing lessons learnt is vital if we are to continuously improve the safety and quality of our health and human services for women, babies, children and families. The review, reporting and research functions of CCOPMM are legislated in the *Public Health and Wellbeing Act 2008*. CCOPMM provides a service to the Victorian Government and its community that includes providing independent advice, assisting in monitoring safety and quality, providing information in which improvement activities can be prioritised, contributing to developing policies and guidelines and providing feedback to the Victorian health and human services system.

Vulnerability matters

Vulnerability continues to be a consistent theme in the cases reviewed by CCOPMM. Analysis of outcome data where areas of significant disparities are seen continue to be of concern. Timely recognition and appropriate responses for women, babies, children and families who are vulnerable must be a priority moving forward.

Vulnerabilities are not always easy to recognise or define and often require an individualised response. Vulnerabilities may manifest as physical, social or emotional and can impact health and wellbeing outcomes in a variety of ways. Some examples include difficulty accessing care, inequitable service provision, lack of attention to individualised care, and reduced capacity to connect, and to remain connected, to the health care system, particularly for those with chronic or long-standing challenges.

In Victoria, poorer outcomes and over representation of vulnerabilities in our death reviews are seen amongst the medically complex, socially and economically vulnerable populations, Aboriginal women and children, those who live in rural locations, and refugees, immigrants or others from non-English speaking backgrounds. Women, children and families living with mental health conditions, those who experience or are exposed to family violence, social isolation, those with chronic medical conditions and substance use are also vulnerable.

Whilst definitions of vulnerability, factors and causes may vary, the outcome is the same. Vulnerable women, babies and children have poorer health outcomes. In order to provide appropriate and timely care, health services, the community sector, organisations and clinicians need to recognise and respond with the understanding that vulnerabilities impact on an individual's life journey and health and wellbeing outcomes.

2 2018 recommendations

After reviewing the deaths and morbidity for 2018, CCOPMM makes the following recommendations.

Develop and implement a system-wide improvement program to prevent postpartum haemorrhage

Develop a guideline for the recognition and management of Ogilvie's syndrome

Undertake education for all relevant clinicians in recognising and managing:

(a) fetal growth restriction

(b) decreased fetal movements

Ensure the provision of clear information and support for families on the safest way for every child to travel in cars at all times

Strengthen the regulation and education on e-cigarettes and liquid nicotine

Ensure the care provided in a mixed emergency department and urgent care centres meets the specific needs of children.

2.1 2017 RECOMMENDATIONS

The 2017 CCOPMM report, published in April 2019, provided recommendations and good practice points, many of which remain relevant. They are included in this report along with an update on the work that has already begun to address and respond to the 2017 recommendations. In some cases, work against the 2017 recommendations has not yet begun. CCOPMM will continue to work with health and community services and the Victorian health system to ensure the uptake and monitoring of both the 2017 and 2018 recommendations.

More detailed information on the 2017 recommendations is available in the *Victoria's mothers, babies and children report 2017* <<https://www.bettersaferecare.vic.gov.au/reports-and-publications/victorias-mothers-babies-and-children-report-2017>>.

Through the review of deaths for 2017, CCOPMM recommended:

1. Training and assessment is undertaken for all relevant clinicians in the areas of:
 - fetal surveillance
 - neonatal resuscitation.
2. Establish and implement a 24/7 formalised escalation process for relevant organisations in the areas of:
 - fetal surveillance
 - neonatal resuscitation.
3. Improve access to continuity of care models for pregnant women.
4. Develop and implement models of care that meet the specific needs of vulnerable women, children and families.
5. Increase the effectiveness of smoking cessation programs and breastfeeding support services for Aboriginal women.
6. Ensure safe sleeping of infants is enhanced by:
 - having a portable safe sleep space available for families that meets Australian Standards – this could then be provided to vulnerable families
 - mandatory labelling on nursery products, specifically sleeping furniture, surfaces and accessories that meet Australian Standards
 - providing infant safe sleeping guidelines to women and families in the first 12 weeks of pregnancy.
7. Develop a bereavement care education package to support primary health clinicians caring for families who have experienced the death of an infant, child or adolescent.
8. Any infant, child or adolescent who presents to hospital on three occasions during a single acute illness is admitted and further investigations are undertaken.
9. All health services providing paediatric care implement an organisation-wide approach to detect and respond to any clinical deterioration that includes parent or caregiver escalation.
10. Optimise suicide prevention measures for adolescents by:
 - implementing routine screening of emotional health and wellbeing
 - improving access to age-appropriate mental health, drug and alcohol services
 - increasing access to and follow-up of age-appropriate mental health professionals close to home.

2.2 PROGRESS ON 2017 RECOMMENDATIONS

Earlier this year, the 2017 report was presented and discussed with the Minister for Health and SCV, who supported the 2017 recommendations alongside the department.

As a result of the 2017 recommendations and good practice points, improvement in the care provided for women, their babies, children and families has commenced. However, more work is required by all stakeholders to respond, implement and monitor outcomes of all recommendations.

The following is a list of responses to the 2017 recommendations that CCOPMM is aware of to date:

Recommendation 1: Training and assessment is undertaken for all relevant clinicians in the areas of fetal surveillance and neonatal resuscitation

In the 2018–19 financial year, 86 per cent (39/45) of Victorian public hospitals who offer a planned birthing service were able to demonstrate they trained more than 80 per cent of their birth suite clinical staff in the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) Fetal Surveillance Education Program (FSEP). These clinicians all achieved a Practitioner Level 2 score of achievement or higher.

In the 2018–19 financial year, 86 per cent (39/45) of Victorian public hospitals who offer a planned birthing service were able to demonstrate they trained more than 80 per cent of their birth suite clinical staff in a newborn resuscitation program.

Recommendation 6: Ensure safe sleeping of infants is enhanced

To further enhance safe sleeping of infants, SCV's Neonatal eHandbook Expert Working Group is working in collaboration with the department's Maternal and Child Health Branch to produce an infant safe sleeping guideline. This will become a clinical practice guideline for use by clinicians and is due for publication in early 2020.

Recommendation 8: Any infant, child or adolescent who presents to hospital on three occasions during a single acute illness is admitted and further investigations are undertaken.

Recommendation 9: All health services providing paediatric care implement an organisation-wide approach to detect and respond to any clinical deterioration that includes parent or caregiver escalation.

Recommendations 8 and 9 were highlighted by the SCV Paediatric Clinical Network and communicated specifically to all directors of paediatric services across Victoria.

Recommendation 10: Optimise suicide prevention measures for adolescents

The Victorian Government has announced a strategy that will see more than 190 qualified mental health professionals including psychologists, mental health nurses and social workers employed in secondary schools across Victoria. The intention of this strategy is to identify mental health issues, offer counselling and early interventions, help prevent suicides in young Victorians and link those requiring support with broader allied community and health services. The program will start in 33 secondary schools in Melbourne's south-eastern suburbs in Term 3 in 2019 and will scale up to a further 21 secondary schools in the south-western suburbs in Term 4 in 2020.

Figure 1: Recommendations



● ● ● 2018 Recommendations
● 2017 Recommendations

3 Mothers and babies

Victoria continues to be a very safe place to give birth. However, we still see disparities in health outcomes between different groups of women based on a variety of factors.

Vulnerability matters for women and their babies

The increasing complexity of women's needs poses a significant challenge for clinicians in both the acute and primary health sectors. Women are facing issues such as substance use, mental health disorders, family violence and social isolation that, in conjunction with pregnancy and in early parenting, can further increase the challenge of providing them appropriate individualised and timely care. It is important for these issues to be identified and addressed to ensure that women giving birth in Victoria, wherever and wherever they are, receive the right care in the right place, at the right time, by the most appropriate clinical team, and that they are fully informed and actively involved in their care.

Aboriginal women, immigrant women, women of low socio-economic status, older women, very young women continue to have less favourable outcomes than others.

Information about maternal characteristics, medical conditions and complications of pregnancy, as well as details about the labour, birth, neonatal and postnatal stay in hospital, are reported to CCOPMM via the Victorian Perinatal Data Collection (VPDC) for every birth in Victoria. This includes babies born in public and private hospitals and at home. This information is used to monitor and report on the safety and quality of care, to inform areas in which to focus improvement programs, to plan and conduct research activities and for

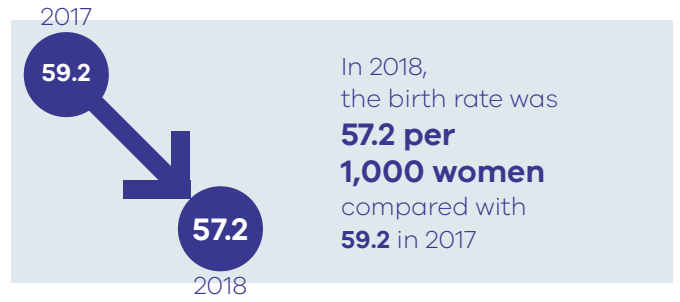
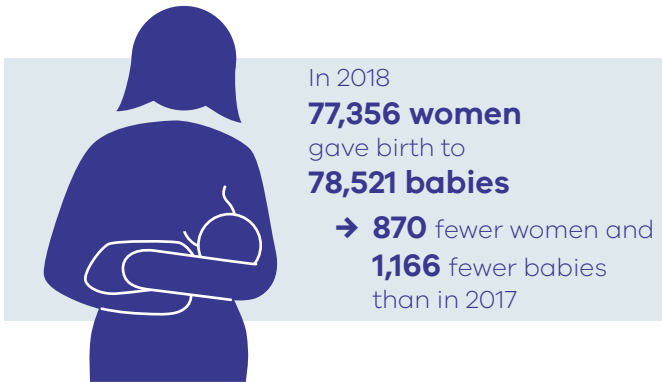
policy and planning decisions across the state. This database is also used to support the production of the Perinatal Services Performance Indicator (PSPI) report, an annual report which benchmarks and provides transparency of outcomes across public and private maternity services. It is used by services to prioritise area of focus for the ongoing improvement of outcomes for Victorian women and their babies.

Snapshot

- In 2018, 77,356 women gave birth to 78,521 babies – 870 fewer women and 886 fewer babies than in 2017.¹
- The average age of women giving birth was 31 years old.
- Almost half of all women were overweight (26.8 per cent) or obese (20.6 per cent).
- 8.0 per cent (6,192) of women smoked at some time during their pregnancy. This is a reduction from 8.6 per cent of women in 2017.
- Victoria continues to see a trend of increasing caesarean rates (27,773 births, 35.9 per cent) and decreasing unassisted vaginal birth rates (37,492 births, 48.5 per cent).
- 39.4 per cent of women giving birth were born outside of Australia.
- 1,138 Aboriginal women gave birth to 1,152 babies (1.5 per cent of all women and 1.5 per cent of all babies born in Victoria).

For trends and comparisons specifically related to Aboriginal women and babies please refer to the section on Aboriginal births, mortality and morbidity.

¹ Births included in this section of the report and supplementary tables exclude all terminations of pregnancy for congenital anomaly or maternal psychosocial indications. Therefore, the total may differ from those used in the perinatal section, which often excludes terminations only for maternal psychosocial indications. More information about all tables and figures can be found in the supplementary tables.



3.1 TRENDS AND COMPARISONS

Maternal characteristics

Figure 2: Number of women giving birth in 2018 born in non-English-speaking countries – 10 most common countries

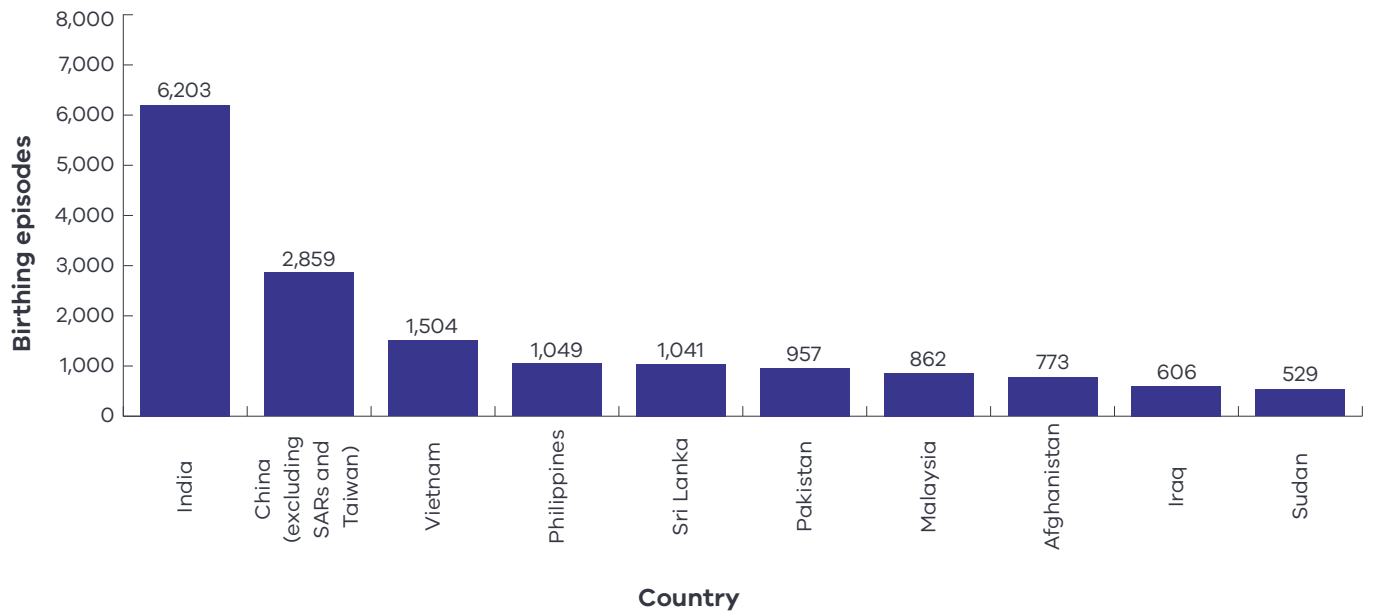


Figure 3: Maternal body mass index at booking, birthing episodes, 2018

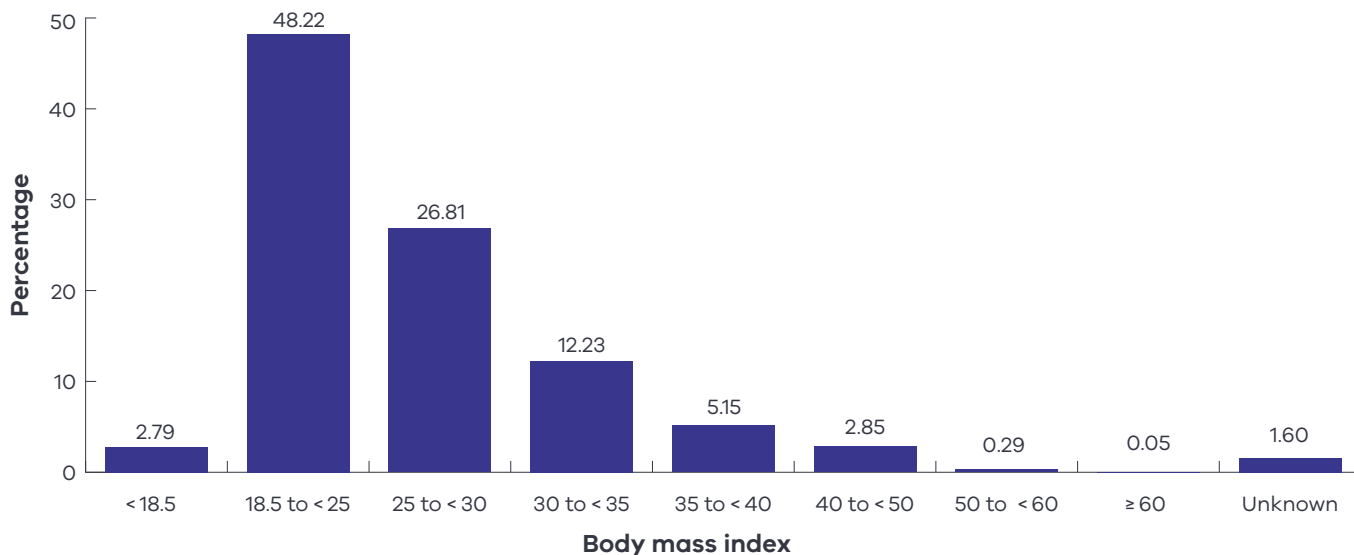


Figure 4a: Number of women reporting any smoking during first 20 weeks of pregnancy, 2018

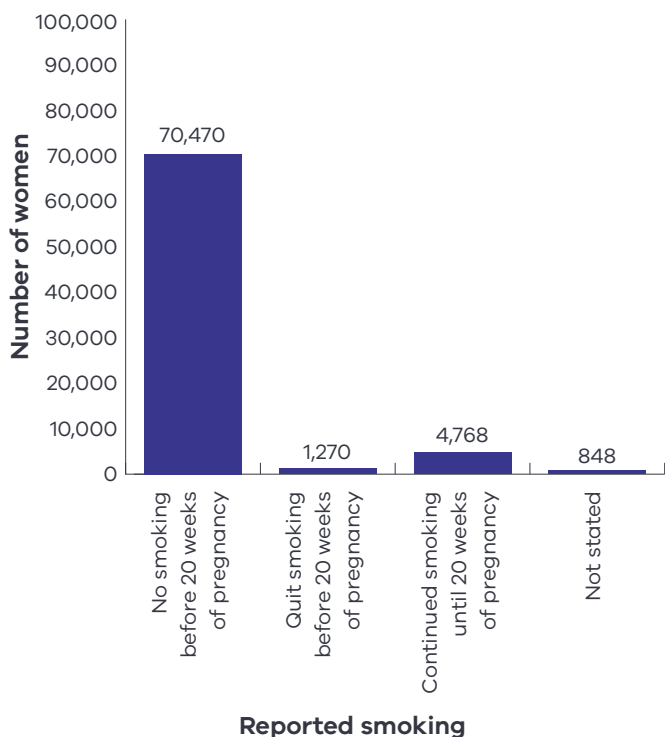
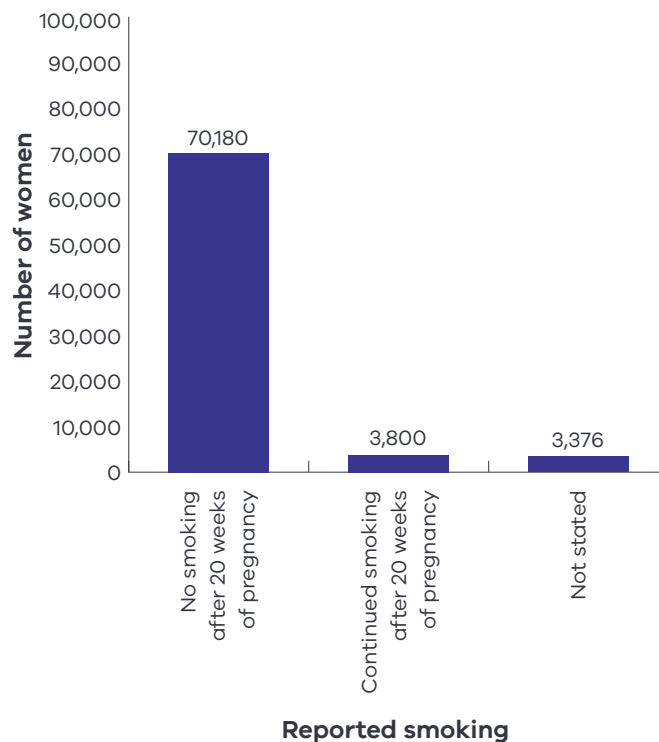


Figure 4b: Number of women reporting any smoking after first 20 weeks of pregnancy, 2018



In 2018:

- The number of women giving birth at over 35 years of age made up more than a quarter of all births (20,614), a slight increase from 2017 (20,526) and a continuation of a steady increase over time.
- 20.6 per cent of women were obese (BMI > 30) compared with 19.7 per cent in 2017.
- 8.0 per cent (6,192) of all women smoked at some time during pregnancy.
- 7.8 per cent (6,038) of women smoked in the first half of pregnancy and 4.9 per cent (3,800) smoked in the second half of pregnancy.
- 81.8 per cent of all women had had a pertussis vaccination and 67.1 per cent had had an influenza vaccination during pregnancy.
- 39.4 per cent of women giving birth were themselves born outside Australia: 5.4 per cent in countries in which English is the first language and 34.0 per cent in a country where English is not the main language.
- Of the women born in a non-English-speaking country: 50 per cent arrived in Australia after 2012; 83.2 per cent were reported as speaking English very well or well; 10.5 per cent were reported as not speaking English well; and 3.9 per cent were reported as not speaking English at all. English language proficiency was not reported for 2.4 per cent of women born in non-English-speaking countries.



In 2018, **60.4% of women** giving birth were born in Australia

Of those born in other regions **Southern and Central Asia** and **Southeast Asia** were the most common places of birth

- Babies born to women in the most socioeconomically disadvantage quintile (fifth) of women giving birth had significantly less favourable outcomes than babies born to women in the least socioeconomically disadvantage quintile.
 - 9.8 per cent of their babies were growth restricted (birthweight < 10th centile) compared with 7.3 per cent.
 - 8.4 per cent of babies were born before 37 weeks' gestation compared with 7.1 per cent.
 - 92.1 per cent of babies had breastfeeding initiated (regardless of gestation) compared with 96.5 per cent.

Figure 5: Trends in method of birth, all birthing episodes, 2015–2018



Labour, birth and after birth

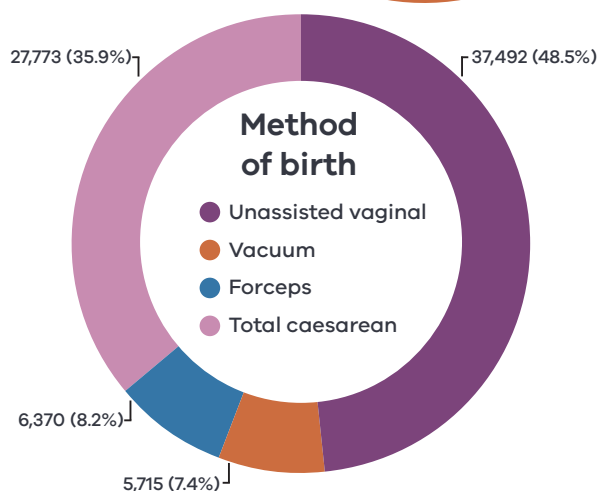
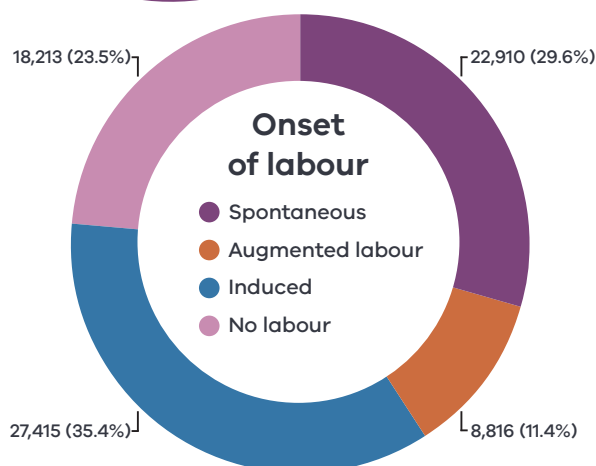
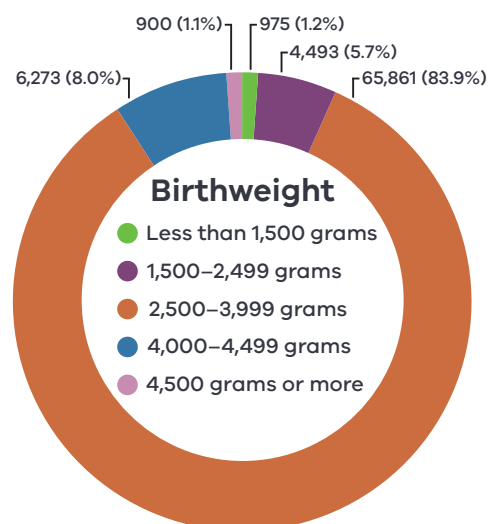
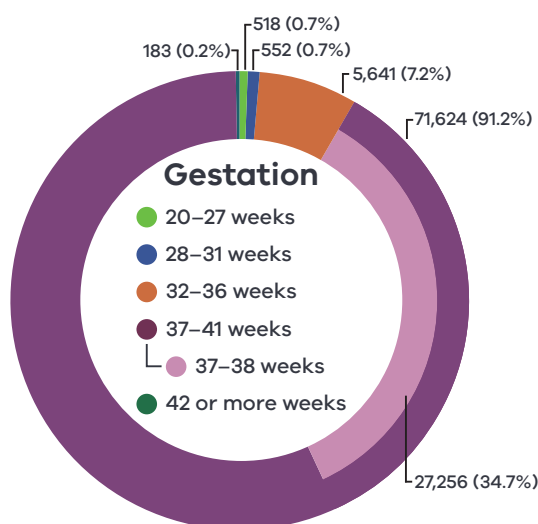
In 2018:

- Compared with 2017, there was an increase in induced labour and caesarean sections before the onset of labour and a reduction in spontaneous onset of labour, whether or not it was later augmented. This is a continuation of the trend seen for a few decades and requires further analysis to enable the prioritisation of improvement activities.
- One third (35.5 per cent) of all women who experienced labour used epidural analgesia for pain relief: 49.6 per cent of first births and 22.8 per cent of subsequent births.
- A trend of increasing caesarean births and decreasing unassisted vaginal birth continued. In 2018, 27,773 women (35.9 per cent) had a caesarean birth and 37,492 (48.5 per cent) had an unassisted vaginal birth (1,196 fewer women than in 2017).
- Over the past 20 years there has been an increase in women giving birth at 32–36 weeks and 37–41 weeks, and a corresponding decrease in over 42 weeks.
- Over the past 12 months there has been increasing interest in the births at early-term, particularly before 39 weeks. In 2018, 27,256 babies (34.7 per cent) were born between 37 and 39 weeks and, of those, 38.9 per cent were induced. Of those who were induced, 590 (8.0 per cent) were induced without a recorded medical indication.

Table 1: Trends in gestation, birthing episodes, 2000–2018

Gestation	2000	2005	2010	2015	2016	2017	2018
Total births	61,562	65,115	72,864	77,752	79,319	78,226	77,356
20–27 weeks	0.7%	0.6%	0.6%	0.5%	0.6%	0.5%	0.6%
28–31 weeks	0.7%	0.6%	0.7%	0.7%	0.6%	0.7%	0.6%
32–36 weeks	5.5%	5.5%	5.8%	6.4%	6.2%	6.4%	6.4%
37–41 weeks	91.8%	91.9%	91.6%	92.0%	92.2%	92.1%	92.1%
42 + weeks	1.3%	1.3%	1.2%	0.5%	0.4%	0.3%	0.2%
Not reported	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%

Babies



Homebirths

In 2018 there was an increase in planned homebirths in Victoria. A planned public homebirth is a birth at home under the care of public maternity services. The two public homebirth models of care are at Western Health (Sunshine) and Monash Health (Casey). Hospital midwives provide care under a continuity of care model and under the public hospitals policies, procedures and clinical practice guidelines. A planned private homebirth is a birth at home under the care of a privately practising midwife.

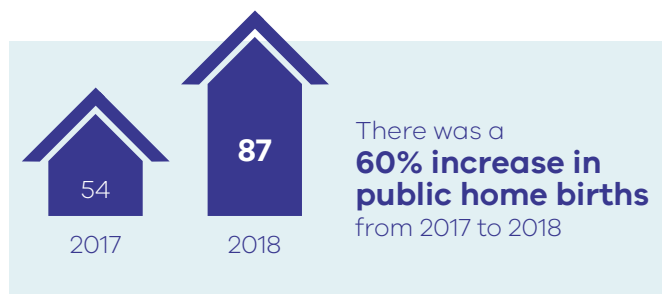
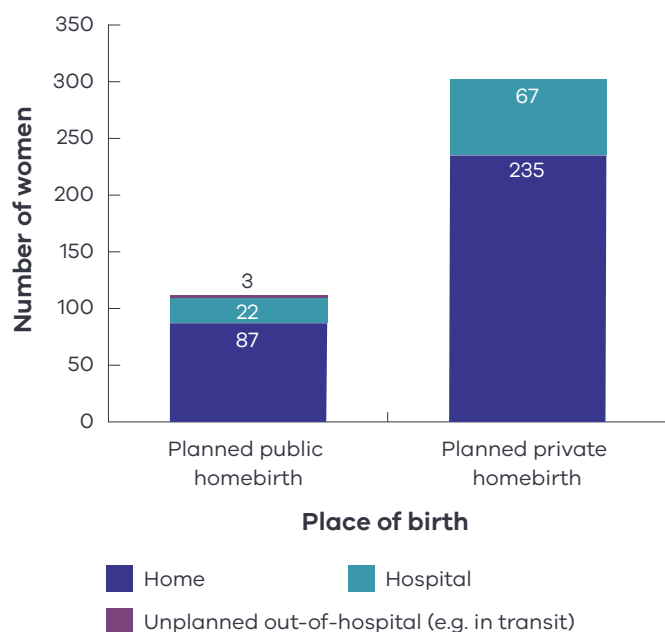


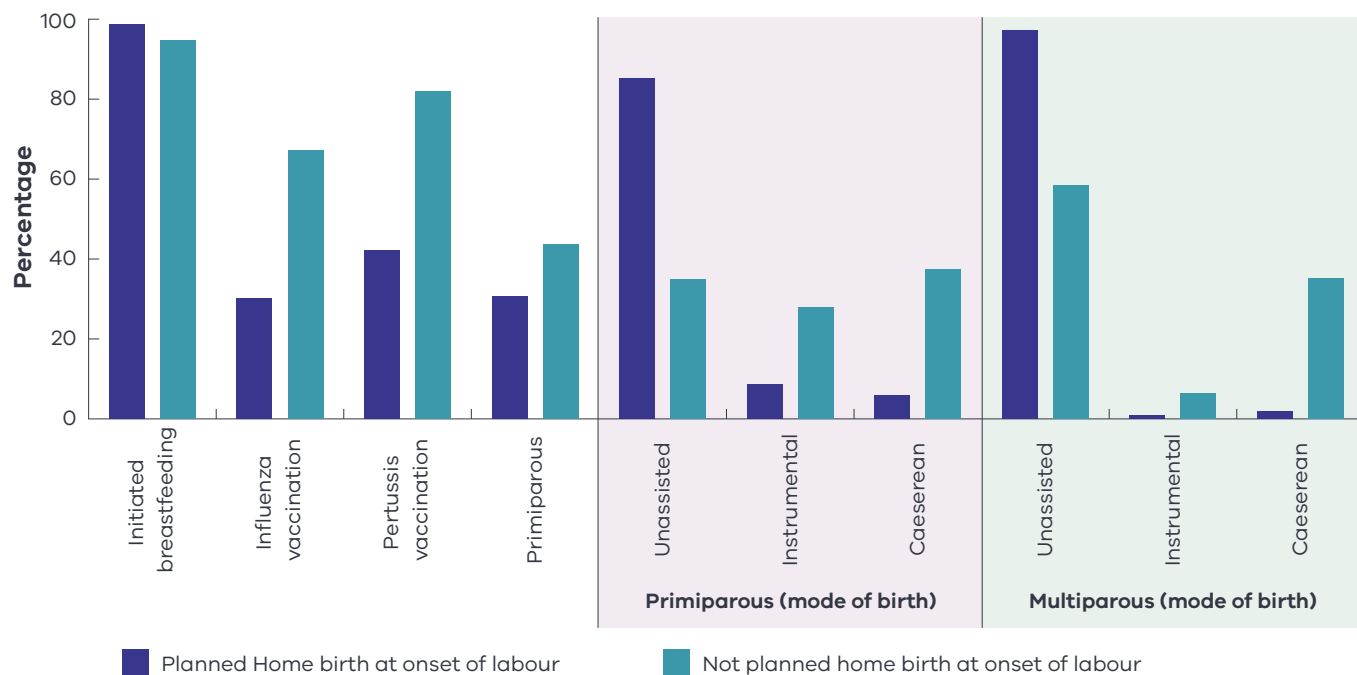
Figure 6: Place of birth for planned homebirths*, 2018



- There was a 60 per cent increase in the number of public homebirths (87) in 2018 compared with 2017 (54).
- 10 per cent of women planning homebirths were in the most disadvantaged quintile compared with 20 per cent of women who gave birth in hospital.
- 89.2 per cent of women planning homebirths had a 'straightforward birth' compared with 17.9 per cent of women who gave birth in hospital. For the purpose of this analysis, a 'straightforward' birth is defined as birth with no epidural, no induction, no augmentation and no episiotomy.

*at the onset of labour women planned to give birth at home

Figure 7: Comparison of planned homebirth characteristics with women who planned to give birth at hospital, 2018



3.2 FURTHER INFORMATION

Perinatal Services Performance Indicator Report

<https://www.bettersafercare.vic.gov.au/reports-and-publications/victorian-perinatal-services-performance-indicators-reports>

Consumer resources

Homebirth – Better Health Channel

<https://www.betterhealth.vic.gov.au/health/servicesandsupport/homebirth>

4 Maternal mortality and morbidity

Maternal mortality and morbidity includes all maternal deaths during pregnancy and within a year of birth, and all Intensive Care Unit (ICU) admissions during pregnancy and up to 42 days after birth.

Vulnerability matters for women

This increasing complexity of needs for women poses a significant challenge for the health and human services sector, organisations and clinicians in both the acute and primary health sectors. More women are beginning their pregnancy with underlying medical conditions, many are overweight, and some have mental health issues. There is also an increase in women with issues such as substance use, family violence and social isolation. These can further increase the challenge of providing appropriate individualised and timely care. In Australia, maternal deaths are rare. However, with the increases in medical and psychosocial needs for women, monitoring and reviewing cases of severe acute maternal morbidity (SAMM) has become an important adjunct to our analysis of appropriate and timely care for women. Maternal deaths and severe maternal morbidity are an important indicator of maternal health and the hospital or community service's ability to respond to the physical and psychosocial needs of women during pregnancy and in the first year following birth.

In this report, maternal deaths occurring during pregnancy or within 42 days of the end of pregnancy are classified as:

direct – relating to the pregnancy or birth

indirect – relating to a pre-existing medical condition or newly diagnosed condition

incidental – unrelated to the pregnancy or birth.

Additionally, maternal deaths occurring more than 42 days after the end of the pregnancy and up to one-year post birth are reported as 'late'.

CCOPMM uses the World Health Organization's (WHO) definition to calculate the maternal mortality ratio (MMR), which includes direct and indirect deaths that occur during pregnancy or within 42 days of the end of pregnancy. Incidental and late deaths are not included in this calculation.

By reviewing every maternal death and understanding any contributing factors, recommendations can be made to assist health and community services and clinicians in improving outcomes for women.

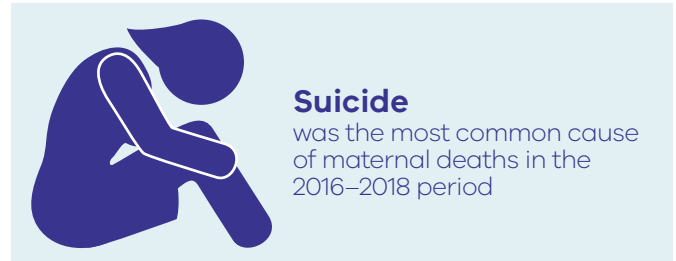
4.1 MATERNAL MORTALITY

In Australia, all maternal deaths are reviewed to determine the likely cause and the presence of factors that contributed to the death. For reporting purposes, a maternal death is defined as the death of a woman while pregnant or within 12 months of the end of pregnancy, from any cause.

Snapshot

- In 2018, there were 14 maternal deaths. In 2017 there were seven reported deaths and 18 in 2016.
- Of the 14 deaths, two were direct, three were indirect and nine were late deaths (of which two were direct, two indirect and five incidental).
- In the 2016–2018 triennium there were 39 deaths, of which 12 were direct, 12 were indirect, one was incidental and 14 were late.

- The Victorian MMR from 2016 to 2018 was 10.2, lower than the 2015–2017 triennium, which was 10.6 per 100,000 women who gave birth.
- Suicide was the most common cause of all maternal deaths (12) in the 2016–2018 period.



Trends and comparisons

Figure 9 compares the Victorian and Australian MMRs. Due to the small numbers, and the fact that the Australian MMR data has not been published for the 2016–2018 triennium, comparison between the national rate and the Victorian rate should be interpreted with caution.

Figure 8: Maternal mortality ratios by triennia, 1988–2018

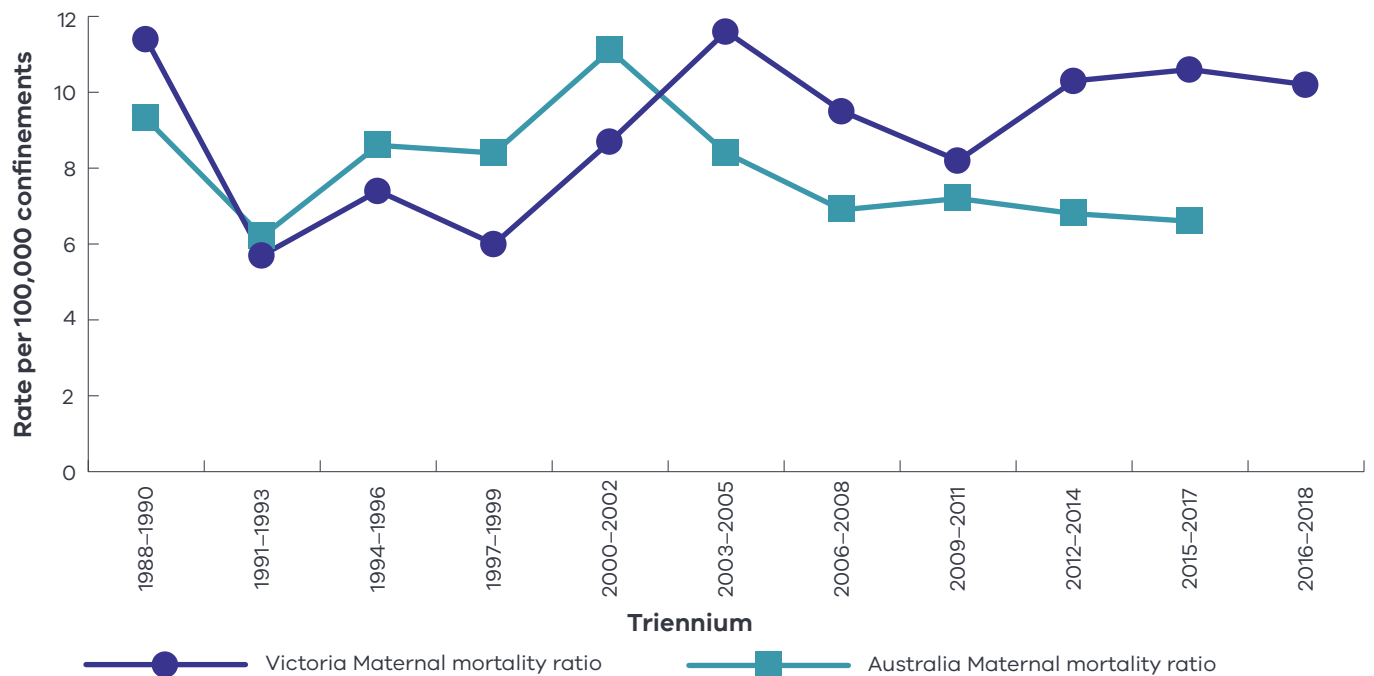


Table 2: Causes of maternal death, 2016–2018

Cause of death	Number
Direct maternal deaths	12
Pulmonary embolus	3
Eclampsia	1
Suicide	4
Amniotic fluid embolus	1
Group A Streptococcus infection	1
Ruptured ectopic pregnancy	1
Severe post-partum haemorrhage	1
Indirect maternal deaths	12
Suicide/suspected suicide	3
Multiple sclerosis	1
Hypoxic ischaemic encephalopathy	1
Substance use	1
Meningoencephalitis complicating otitis media	1
Gamma-hydroxybutyrate (GHB) toxicity	1
Drug induced cardiomyopathy	1
Cardiac arrhythmia	1
Undetermined	2
Incidental maternal deaths	1
Mechanical asphyxia – workplace accident	1
Late maternal death (direct or indirect)	8
Suicide	5
Metastatic breast cancer	1
Pulmonary embolus	1
Primary pulmonary hypertension	1
Late incidental maternal deaths	6
Motor vehicle collision	2
Homicide	2
Mixed drug toxicity	2
Total deaths	39

Contributing factors identified in maternal deaths

The review of maternal deaths over the most recent triennium (2016–2018) revealed a range of contributing factors. In addition, multiple contributing factors were present in some cases. In recent years, during the review of maternal mortality cases, an increase in vulnerabilities were identified in these women.

The subcommittee identified several key themes:

- communication between staff was inadequate when an issue or complication had been identified
- a mental health illness that limited a woman's ability to access and engage with care.
- the lack of recognition by the woman or her family of the complexity or seriousness of her condition when substance use was a major factor, or her mental state was deteriorating

4.2 SEVERE ACUTE MATERNAL MORBIDITY (SAMM)

In countries with low maternal mortality, such as Australia, there is increasing interest in severe morbidity related to pregnancy and birth to monitor maternal health and guide focussed improvements in maternity care. Victoria is the first jurisdiction in Australia to introduce mandatory reporting of SAMM cases, which began on 1 July 2017. In Victoria, SAMM is measured as an admission to an intensive care unit (ICU) during pregnancy and up to 42 days after birth. ICU admission was chosen because it best captures the most severe cases and is a simple and identifiable criterion for use. The criteria for ICU admission may vary across hospitals, and it is recognised that not all maternity services in Victoria have direct access to an ICU.

Snapshot

- 239 women were admitted to an ICU with SAMM.
- 157 of the 239 of these women (65 per cent) were born in Australia.
- Seven (2.9 per cent) of the total SAMM cases were Aboriginal women.
- 30 out of the 239 (12.5 per cent) of women admitted to ICU had a contributing factor. One-third of these were related to organisation and management issues, one-third related to personnel issues and one-third were due to issues around barriers to access or influences from the women's context.
- 31 per cent of women admitted to ICU had a BMI of 30 or higher.

Trends and comparisons

Figure 9: Proportion of maternal ICU admissions by region of birth compared with all women who gave birth, 2018

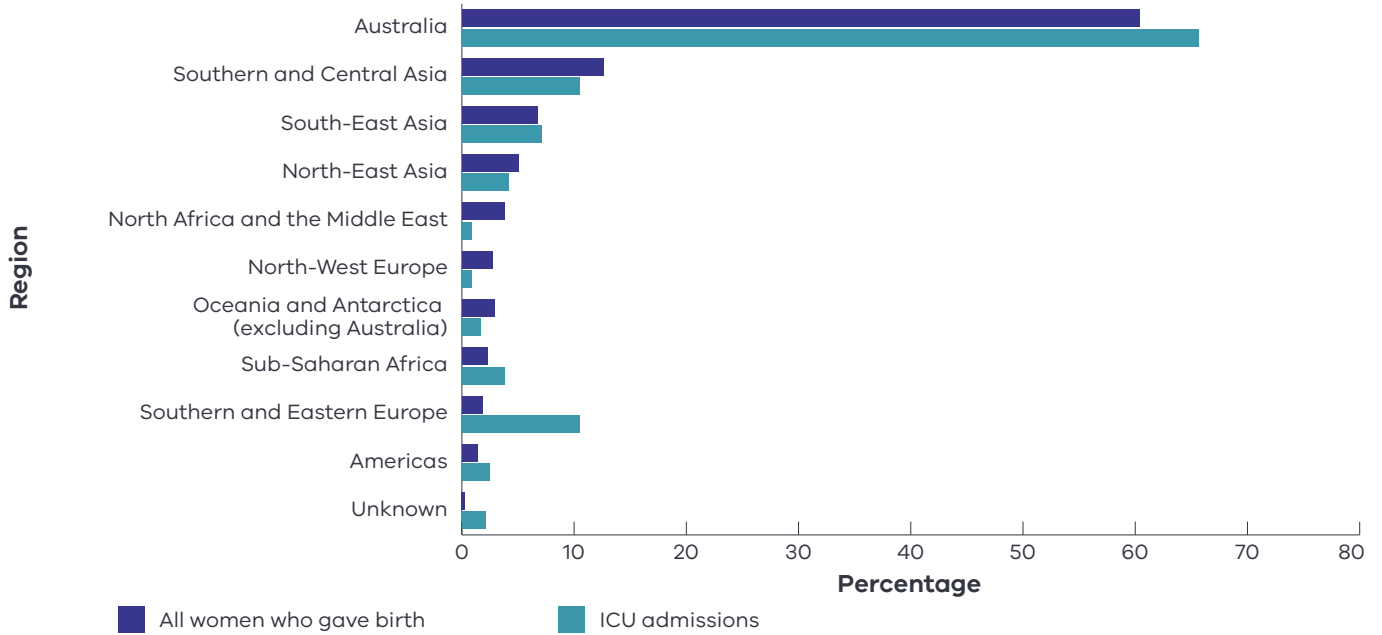
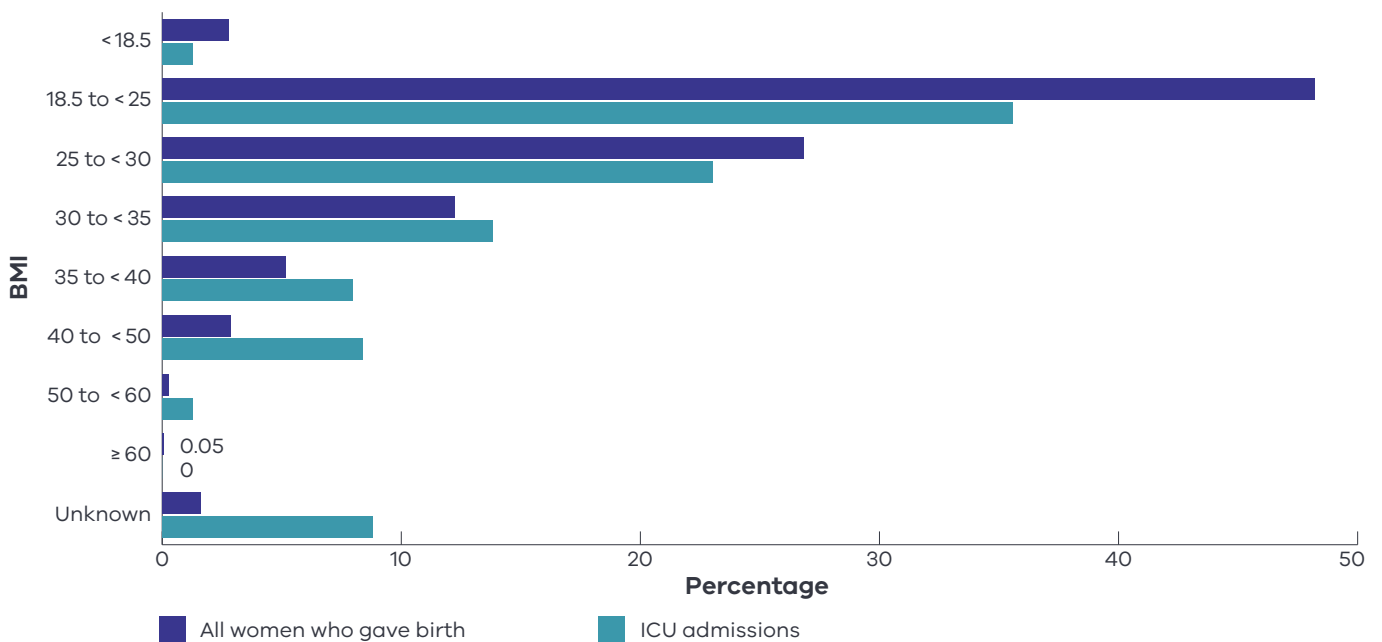


Figure 10: Proportion of maternal ICU admission by BMI categories compared with all women who gave birth, 2018



- Of the 239 women admitted to ICU, 30 women (12.6 per cent) were pregnant on admission to ICU. Three women were in their first trimester, 14 were in their second trimester and 13 were in their third trimester.
- 87.4 per cent (209) of women were admitted to an ICU in the postpartum period.
- Of the women admitted during the post-partum period, 4 (1.6 per cent) had a pregnancy which had ended prior to 20 weeks' gestation, three of which were ruptured ectopic pregnancies.
- The dominant condition requiring admission to an ICU was primary severe postpartum haemorrhage (PPH), contributing to 38 per cent of all admissions (91 out of 239). Pre-eclampsia was the next most common, contributing to 8.7 per cent of all ICU admissions (21 out of 239).

4.3 AREAS OF FOCUS

Postpartum haemorrhage

Postpartum haemorrhage (PPH) is the leading cause of maternal mortality worldwide. It was the cause of one maternal death in the last triennium and 38 per cent (91) of all SAMM reported in 2018.

There are well-documented policies available regarding PPH, which should be reinforced in clinician education and audited for compliance on a regular basis. The principles of preparation, prevention, risk identification and management are well documented in the *Victorian Maternity e-Handbook* <<https://www.bettersafecare.vic.gov.au/resources/clinical-guidance/maternity-ehandbook>> and Council suggests that all maternity organisations utilise this resource. PPH can have a lasting impact on women and their partners, and can result in the separation of women and their babies for a period of time. It is important that this recognised and appropriate psychological care is also provided as needed.

Themes identified in the cases reviewed included:

- inadequate risk identification, during pregnancy, labour and/or birth
- inadequate recognition of PPH
- an inadequate initial response, and inadequate management of PPH
- failure to administer therapeutic agents in a timely or evidence-based manner; in particular, the overreliance and excessive doses of misoprostol and the underutilisation of carboprost and tranexamic acid.
- frequent delays in transferring a woman to an operating theatre to manage a PPH
- delays in exploring and treating uterine atony, in particular, when membranes were incomplete
- failure to record cumulative blood loss over 24 hours
- failure to follow hospital policy and evidence-based guidelines
- failure to escalate or involve senior clinical assistance in a timely manner

Recommendation: Develop and implement a system-wide improvement program to prevent postpartum haemorrhage

Ogilvie's syndrome

In 2018 CCOPMM reviewed a number of SAMM cases of Ogilvie's syndrome in women after caesarean section. Ogilvie's syndrome (acute colonic pseudo-obstruction) is defined as an acute dilatation of the colon usually involving the caecum and right hemicolon, without any existing mechanical obstruction.

In a few cases there was a delay in surgical review, seemingly related to a lack of recognition of the need for an urgent response, even when requested. Several cases were reported where

there was caecal perforation following attempts at colonoscopy with decompression. In the cases reported, impressive results were seen with the administration of neostigmine, after excluding obstruction, however it was not frequently used. There was an inconsistency in reporting dilatation of the bowel by both radiologists and surgeons.

Recommendation: Develop a guideline for the recognition and management of Ogilvie's syndrome

CCOPMM recommends developing guidelines for recognising and management of Ogilvie's syndrome. Clinicians should consider Ogilvie's syndrome for any woman who presents with progressive abdominal distension two to 12 days after a caesarean section and ensure a rapid response of a surgical team when obstetricians request assistance for suspected Ogilvie's syndrome.

For further information, see CCOPMM's clinical alert <<https://www.bettersaferecare.vic.gov.au/news-and-media/alert-ogilvies-syndrome>>.

GOOD PRACTICE POINT

Health services should conduct internal system-based multidisciplinary reviews of all unplanned ICU admissions to identify contributing factors across all levels of the system.

Health services should ensure that this clinical governance process is in place and that this system is multidisciplinary, has clearly defined process for case investigation and that contributing factors are identified, recommendations are formulated, documented and actioned in a timely manner and any findings are shared to facilitate learnings.

5 Perinatal mortality

Perinatal mortality includes fetal deaths (stillbirths) and deaths of live-born babies within the first 28 days after birth (neonatal deaths).

Vulnerability matters for babies

A number of women are more vulnerable to experiencing perinatal loss including those with medical conditions (such as diabetes mellitus, chronic hypertension and autoimmune conditions), certain age groups, those not receiving antenatal care, those who achieved a pregnancy following fertility treatment, smokers, Aboriginal women, women of African or South Asian background, women who are overweight or obese, or those with a low household income.¹⁻⁴

Many of the factors linked to stillbirth are prevalent in women from socially disadvantaged backgrounds, which will likely further compound their vulnerability to experiencing perinatal mortality.⁴

Strategies that are likely to improve outcomes for vulnerable populations include focusing on smoking cessation, providing language services and improved education about how to access healthcare services for refugee, immigrant and non-English-speaking populations.⁵ In addition, the development of maternity care models that enable midwifery continuity of care and delivery of culturally appropriate care can improve trust, engagement and empower women.⁵

This section uses 'adjusted' perinatal mortality and stillbirths, where terminations of pregnancy for psychosocial indications are excluded. This provides a more accurate measure for assessing avoidable mortality and for comparisons with other jurisdictions both nationally and internationally. Statistics for unadjusted perinatal mortality can be found in the supplementary tables for this report.

Snapshot

- There were 675 adjusted perinatal deaths compared with 702 in 2017.
- The adjusted perinatal mortality rate (PMR) was 8.6 per 1,000 births, slightly lower than 2017 (8.8 per 1,000 births).
- The adjusted stillbirth rate for babies born after 20 weeks' gestation in 2018 was 6.0 per 1,000 births. This is a slight reduction from 6.3 per 1,000 births in 2017.
- The neonatal mortality rate was 2.6 per 1,000 live births in 2018 compared with 2.5 per 1,000 live births in 2017.
- The leading cause of perinatal mortality was spontaneous preterm birth (excluding terminations for congenital anomalies).
- PMR in women smoking at any time during pregnancy was 9.9 per 1,000 births compared with 6.0 per 1,000 births in those who did not smoke while pregnant.
- A gradual decline in the rates of perinatal autopsy have been widely reported. 35.5 per cent of perinatal deaths in 2018 underwent a perinatal autopsy (39.5 per cent stillbirths and 26.0 per cent neonatal).
- There is current national work which aims to reduce the number of stillbirths after 28 weeks, excluding congenital anomalies. In 2017, there were 159 stillbirths that met these criteria and in 2018 there were 116 such stillbirths.

5.1 TRENDS AND COMPARISONS

Figure 11: Trends in perinatal mortality rates, 2009–2018



Figure 12: Causes of stillbirths, neonatal and perinatal deaths PSANZ perinatal death classification, 2018

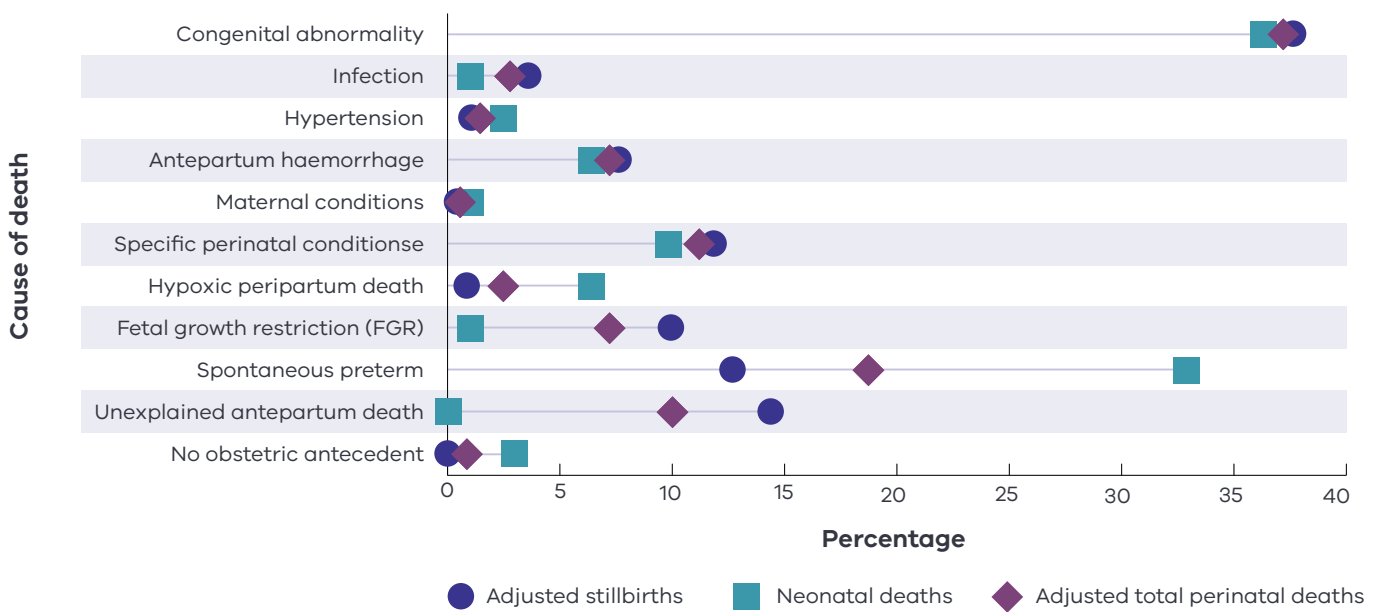
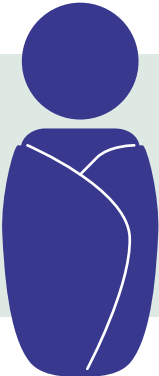


Table 3: Perinatal mortality rates by maternal place of birth, 2018

Place of birth	Adjusted total births	Live births	Adjusted stillbirths	Neonatal deaths	Adjusted perinatal deaths	% of all Perinatal deaths	PMR ^{Adjusted} by maternal place of birth
Americas	1,115 (1.4%)	1,112 (1.4%)	3	2	5	0.7	4.5
North-East Asia	3,943(5.0%)	3,927 (5.0%)	16	6	22	3.3	5.6
Australia	47,591 (60%)	47,319 (60.7%)	272	111	383	57.2	8.0
Southern and Eastern Europe	1,454 (1.9%)	1,448 (1.9%)	6	6	12	1.8	8.3
North Africa and the Middle East	2,971 (3.8%)	2,952 (3.8)	19	8	27	4.0	9.1
Southern and Central Asia	9,885 (12.6)	9,816 (12.6%)	69	29	98	14.6	9.9
Sub-Saharan Africa	1,815 (2.3%)	1,799 (2.3%)	16	2	18	2.7	9.9
Oceania and Antarctica (excluding Australia)	2,307 (2.95)	2,291 (2.9%)	16	8	24	3.6	10.4
North-West Europe	2,150 (2.7%)	2,133 (2.7%)	17	6	23	3.4	10.7
South-East Asia	5,251 (6.7%)	5,217 (6.7%)	34	23	57	8.5	10.9
Missing	218 (0.3%)	213 (0.3%)	5	1	6	0.9	27.5
Total	78,700	78,227	473	202	675	100.0	8.6



In 2018 the **Perinatal mortality** rate was **8.6** per 1,000 births, comprising **6.0** stillbirths per 1,000 births and **2.6** neonatal deaths per 1,000 live births

The 2018 adjusted PMR for:

- singletons was 7.9 per 1,000 births
- twin pregnancies was 27.7 per 1,000 births
- triplet pregnancies was 234.0 per 1,000 births
- women born in South-East Asia (10.9 per 1,000 births) was substantially higher compared with women born in Australia (8.0 per 1,000 births).

The leading causes of stillbirth (after excluding terminations for congenital anomalies) was unexplained antepartum (fetal) death (14.4 per cent), where a definitive cause could not be established.



In 2017, the **stillbirth mortality rate** was **6.3** per 1,000 births

In 2018, it was **6.0** per 1,000 births

Spontaneous preterm birth (33.2 per cent) and congenital anomalies (22.3 per cent) were the two most common causes of neonatal death (excluding terminations for congenital anomalies).

CCOPMM classifies perinatal deaths according to the PSANZ classification system <<https://sanda.psanz.com.au/assets/Uploads/Section-7-PSANZ-Classification-of-perinatal-deaths-V3-100418.pdf>>.

Contributing factors for perinatal deaths in 2018

Reviewing all perinatal deaths to determine if there were preventable contributing factors is key to improving the quality of care and improving perinatal outcomes. The role of the subcommittee involves examining whether there were any associated factors that may have contributed to the death.

Contributing factors may be systemic (for example, resources such as staffing, access to appropriate services, ability to communicate or share information), personnel (availability of appropriately skilled staff, adequate staff numbers, training and education) or be attributable to other factors such as no or low attendance for clinical care, poor compliance with advice (for example, not understanding the importance of taking medications or testing blood sugars in the case of diabetes in pregnancy).

Good practice point

In the first instance, health services should conduct internal system-based multidisciplinary reviews of all deaths to identify contributing factors across all levels of the system. All health services must have a multidisciplinary mortality and morbidity review committee to conduct these reviews. Health services should ensure that this clinical governance process is in place and that this system is multidisciplinary, has clearly defined process for case investigation and that contributing factors are identified, recommendations are formulated, documented and actioned in a timely manner and any findings are shared to facilitate learnings.

Cases identified as having contributing factors are reviewed by one of the CCOPMM expert subcommittees – the Stillbirth Subcommittee or the Neonatal Subcommittee.

Where identified, the contributing factors are graded occurring to the PSANZ classification as:

- unlikely to have contributed to the outcome (insignificant)
- might have contributed to the outcome (possible)
- likely to have contributed to the outcome (significant).

Please note that significant factors may not necessarily be preventable or be indicative of unacceptable standards of care.

The following table refers to the contributing factors identified in the review of the 496 perinatal deaths not from termination of pregnancy for maternal psychosocial indication or congenital anomaly.

137 cases had one or more contributing factors identified.

Table 4: Factors identified in perinatal deaths, 2018

Significance of identified factors in...	Factors relating to organisational and/or management identified	Factors relating to personnel identified	Barriers to accessing /engaging with care identified	Total
Stillbirths				
Insignificant: Sub-optimal factors identified but unlikely to have contributed to outcome	1	2	15	18
Possible: Sub-optimal factors identified might have contributed to outcome	5	30	70	105
Significant: Sub-optimal factors identified were likely to have contributed to outcome	2	14	34	50
Total number of factors	8	46	119	173
Total number of cases	7	30	78	100
Neonatal deaths				
Insignificant: Sub-optimal factors identified but unlikely to have contributed to outcome	0	2	8	10
Possible: Sub-optimal factors identified might have contributed to outcome	11	14	34	59
Significant: Sub-optimal factors identified were likely to have contributed to outcome	3	23	13	39
Total number of factors	14	39	55	108
Total number of cases	9	16	25	37

5.2 AREAS OF FOCUS

Smoking and perinatal mortality

Table 5: Smoking status and perinatal mortality rates, 2018

		Stillbirths		Neonatal deaths		Perinatal mortality	
		Number	Rate per 1,000 births	Neonatal deaths	Rate per 1,000 live births	Number	Rate per 1,000 births
Any smoking during pregnancy	Yes	43	6.8	19	3.0	62	9.9
	No	269	3.9	150	2.2	419	6.0

In 2018, among babies to women who reported smoking at any time during pregnancy (6,238), 1.0 per cent (62) were stillborn or died in the neonatal period compared with 0.6 per cent (419) stillbirths or neonatal deaths among non-smoking women (69,152).

The PMR in women smoking at any time during pregnancy was 9.9 per 1,000 births compared with 6.0 per 1,000 births in those who did not smoke while pregnant.



Strategies that focus on smoking cessation are likely to yield reductions in stillbirth rates and are therefore a key feature in many stillbirth reduction initiatives. It is important to recognise that women from socially disadvantaged backgrounds have lower smoking cessation rates reported.⁶ Programs that support women to cease smoking should be an area prioritised in any Victorian initiative to reduce stillbirths.

Pre-term birth and perinatal mortality

Victoria has seen a trend over the last ten years to more babies being born before 37 weeks. In 2018, 6711 babies (8.5 per cent) were born before 37 weeks. Between 2010 and 2018 the primary increase occurred in babies born between 32 and 36 weeks (6.5 per cent to 7.2 per cent), with the rate of births prior to 32 weeks remaining relatively stable.

After congenital anomalies, spontaneous pre-term birth was the most common cause of death for neonatal infants in 2018 (33.2 per cent). Additionally, babies born preterm have higher rates of neonatal morbidity and are at higher risk of neurodevelopment disorders than babies born at term.

Aboriginal women, women who smoke, women who have had a prior preterm birth and women who are over or under weight are at increased risk of preterm birth. Programs focussing on smoking cessation, similar to those aimed at reducing stillbirths, are likely to improve preterm birth rates and neonatal mortality. Early in pregnancy, clinicians should initiate conversations with women about the optimal gestation at which birth should occur, which in most cases should not be before 39 weeks, and ensure timely identification, assessment and appropriate management of preterm labour.

For more information see the Maternity eHandbook guidelines on preterm labour <<https://www.bettersafecare.vic.gov.au/resources/clinical-guidance/maternity-e handbook/preterm-labour>>.

Fetal growth restriction

Fetal growth restriction (FGR) is an important risk factor for stillbirth⁷ and is associated with neonatal death, perinatal morbidity and other adverse health outcomes. Despite this, many growth restricted babies are not detected until birth. Improving detection and management of FGR should be a priority for all clinicians providing pregnancy care. Reductions in adverse outcomes associated with FGR have been shown with improved risk assessment and detection during pregnancy, combined with careful management and timely birth. In the past year there have been cases reviewed where FGR was not identified in a timely manner. Common to many of these cases was failure to recognise maternal risk factors, lack of timely recognition and appropriate management of suspected FGR. Clinicians should focus on identification of maternal risk factors, standardisation of clinical examination, and clear pathways for the recognition and management of suspected FGR. There continues to be variation between Victorian hospitals in their rates of detecting FGR, highlighting the need for greater standardisation in care of women with suspected FGR.

Recommendation: Undertake education for all relevant clinicians in recognising and managing

(a) Fetal growth restriction

CCOPMM recommends that education be undertaken by all clinicians in the detection and management of FGR. All clinicians should have training that includes identifying risk factors for FGR at the first pregnancy visit and every

subsequent visit during pregnancy, following surveillance and management pathways for all women according to their individual risks, standardising symphyseal fundal height (SFH) assessment, using a growth chart to monitor fetal growth velocity over time, diagnosing FGR and discussion about timing of birth.

Decreased fetal movements

A similar focus should be on recognition and management of decreased fetal movements (DFM). Maternal perception of decreased movements can indicate pregnancies at increased risk of adverse outcomes including FGR, preterm birth and stillbirth. Areas of care that remain a concern is women not reporting DFM to care providers in a timely manner and inappropriate responses to maternal perception of DFM from maternity care providers. It is recommended that all women should be asked about their fetal movements at each pregnancy visit, are supported to learn their own baby's pattern of movement, and are advised as to what action to take if there is any change in their baby's movement – either in pattern, strength or frequency. Women should be encouraged to seek immediate review if concerned about a change in their babies' movement at any time. All women who report DFM should be immediately assessed and appropriate action should be taken, including further follow-up and conversations about DFM and the woman's perception about her babies' movements.

Recommendation: Undertake education for all relevant clinicians in recognising and managing

(b) Decreased fetal movements

CCOPMM recommends that education should be undertaken by all maternity care clinicians in supporting/teaching women to be aware of their baby's movements and ensure that all

services are consistent in responding to DFM in line with current best practice. All women should be educated and reminded about the importance of reporting DFM at all pregnancy care visits – including information about pattern, strength and frequency. Women should be advised what to do and who to contact if they perceive a change in fetal movements. It is recommended that clinical assessment of those reporting reduced movements from 28 weeks should be undertaken within two hours of presentation. Each service should have a clear care pathway to ensure that women reporting DFM are cared for in line with current best practice.

The importance of perinatal autopsies

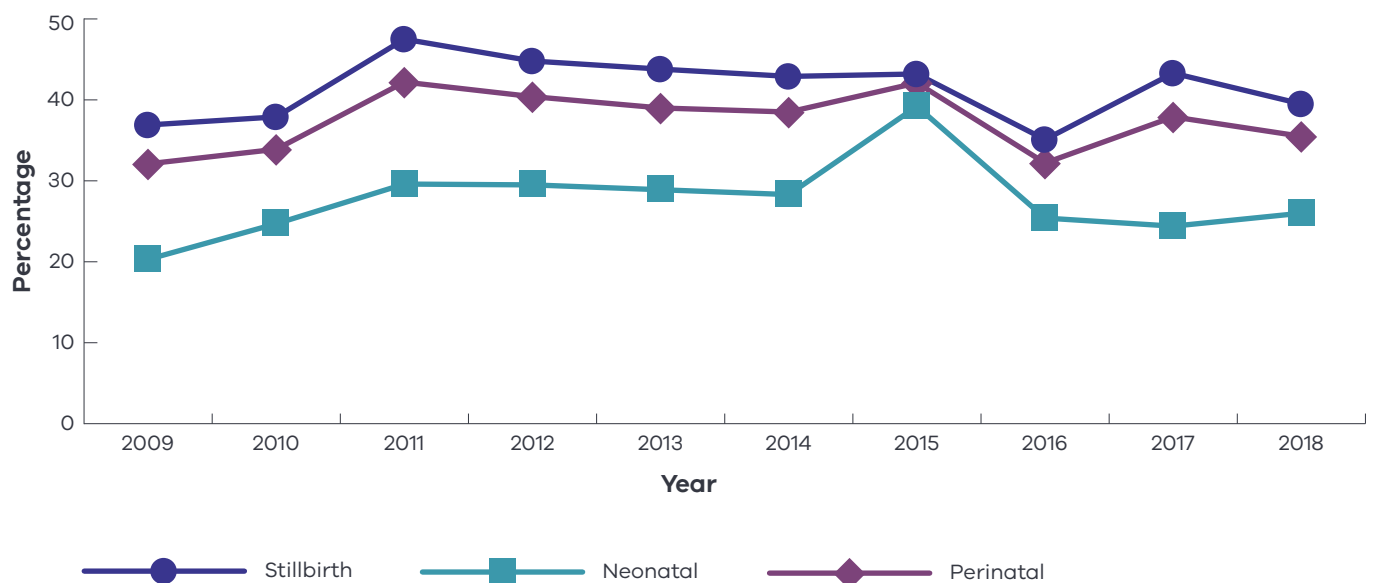
Perinatal autopsies remain the gold standard when investigating a perinatal death.⁸ International evidence reports that their use, in addition to placental histopathology, clinical history and laboratory tests, can identify the cause of death in 74 per cent of cases, compared

with 24 per cent where only clinical and laboratory information is available.⁹ In addition to identifying the cause of death, perinatal autopsies can also provide additional benefit through providing more information or even changing the diagnosis in 22–76 per cent of cases.¹⁰ There are further benefits as well, such as improving the quality of antenatal diagnoses, where autopsies have identified missed or incorrect diagnoses in 23.5 per cent of cases and led to a decline in the rate of these errors over time.¹¹

For the women and families affected by stillbirth, the process of autopsy can provide peace of mind and alleviate guilt, with a higher chance of feelings of regret experienced by those electing not to have an autopsy performed.^{12,13}

Despite reported benefits, a gradual decline in the rates of perinatal autopsy have been widely reported, potentially due to a lack of education for health professionals on what an

Figure 13: Adjusted perinatal autopsy rates, 2009–2018



autopsy is, its benefits and how to appropriately counsel bereaved parents. Similarly, parents declining an autopsy reported their main concerns related to not wanting their baby examined or they felt the reason for the stillbirth was already known and that a perinatal autopsy would not add further benefit.¹⁴

Understanding factors that influence why an autopsy may not be undertaken provides knowledge to health services to review the rates within their service and explore equipping staff with better skills in caring for families affected by stillbirth and counselling for autopsy. It is also important that services work towards prioritising perinatal autopsies to provide feedback to families sooner, with many families being negatively affected by the wait for results.¹⁴ However, the importance of services also providing formal processes for providing the results of stillbirth investigations to families is paramount.^{13,14}

Providing the best care for women during pregnancy and perinatal loss

Good practice point

In the circumstances of parents declining the opportunity of an autopsy, consider recommending photographs, radiological, laboratory or genetic studies, which may add to the understanding of their baby's death.

Good practice point

All clinicians reporting fetal growth scans should align their reports with the template developed and endorsed by RANZCOG, the Royal Australian and New Zealand College of Radiologists and the Australasian Society for Ultrasound in Medicine. The Third Trimester Fetal Growth Scan reporting template is available to download from the RANZCOG website <https://ranzcoг.edu.au/RANZCOG_SITE/media/RANZCOG-MEDIA/Women%27s%20Health/Statement%20and%20guidelines/Clinical-Obstetrics/Third-Trimester-Fetal-Growth-Scans-Reporting-Template-FINAL-2019.pdf?ext=.pdf>.

Good practice point

In complex perinatal conditions, combined multidisciplinary counselling, including obstetricians, midwives, nurses and neonatologists, and social workers should take place with the woman and her partner early in the clinical course. This should include the planned timing, mode and place of birth, and expected range of perinatal outcomes.

Following a high-risk pregnancy or birth, postpartum counselling should address:

- the events surrounding pregnancy and birth, performing any additional investigations and identifying risk factors that could affect future pregnancies (including appropriate genetic investigations)
- care planning for future pregnancies, including optimal place and model of care, and place and mode of birth
- optimising pregnancy intervals to reduce the risks in a future pregnancy, with appropriate contraceptive advice.

Good practice point

Midwifery continuity of care should be prioritised for women at risk of pre-term birth and stillbirth. Evidence suggests that increasing access to midwifery continuity of care reduces preterm birth and stillbirths, especially when tailored to the needs and context of the individual women.

Midwifery continuity of care is defined as care provided by a known midwife or a small group of midwives to women during pregnancy, birth and postnatal period. There are many ways in which midwifery continuity of care can be arranged and provided. This care is provided in collaboration with other relevant healthcare providers, including obstetricians and general practitioners when appropriate, as well as with specialised staff such as social workers and other allied health clinicians. This good practice point provides further clarity to the 2017 recommendation – Improve access to continuity of care for pregnant women.

Good practice point

Whenever an infant requires escalation in respiratory support, sepsis must be considered. Neonatal sepsis occurs in one to eight per 1,000 live births with the highest incidence occurring among infants of very low birthweight and gestation. Signs are usually non-specific since other conditions cause similar clinical states (for example, cardiac or respiratory failure, metabolic disorders).

For more information please see the *Maternity eHandbook* guidelines on sepsis in neonates <<https://www.bettersafercare.vic.gov.au/resources/clinical-guidance/maternity-and-newborn-clinical-network/sepsis-in-neonates>>

Good practice point

Health services and individual practitioners providing maternity care should ensure that an appropriately qualified clinician is available to receive urgent telephone reports from radiology practices in the case of abnormal findings. The clinical pathway and contact details for communicating urgent results should be clearly provided to any radiology practice performing the scan for women in their care (for example, on the ultrasound referral form).

5.3 FURTHER INFORMATION

StillbirthCRE Clinical position statement – Smoking

https://resources.stillbirthcre.org.au/elearn/resources/Element1_Smoking_Cessation_Position_statement.pdf

Stillbirth CRE Clinical Practice Guideline – Decreased fetal movements

https://resources.stillbirthcre.org.au/elearn/resources/Element%203_DFM%20Clinical%20Practice%20Guideline.pdf

StillbirthCRE Clinical position statement – Fetal Growth restriction

https://resources.stillbirthcre.org.au/elearn/resources/Element2_Fetal_Growth_Restriction_Position_Statement.pdf

Perinatal Services Performance Indicator Report

<https://www.bettersafecare.vic.gov.au/reports-and-publications/victorian-perinatal-services-performance-indicators-reports>

Consumer resources

Miscarriage, stillbirth and newborn death support – SANDS <<https://www.sands.org.au/>>

Grief and loss support – Red Nose <<https://rednosegriefandloss.org.au/>>

Smoking and pregnancy – Better Health Channel <<https://www.betterhealth.vic.gov.au/health/healthyliving/pregnancy-and-smoking>>

Fetal movements – Movements Matters <<http://movementsmatter.org.au/information-for-women>>

Post-mortem information for families – The Royal Women’s Hospital <<https://thewomens.r.worldssl.net/images/uploads/fact-sheets/Post-mortem-info-for-families-301118.pdf>>

Investigations about why your baby died – Stillbirth Foundation <<https://stillbirthfoundation.org.au/autopsy-and-investigations-about-why-your-baby-died/>>

6 Aboriginal births, mortality and morbidity

Aboriginal births, mortality and morbidity includes births to Aboriginal women. Births to Aboriginal fathers and non-Aboriginal women are not included.

Vulnerability matters for Aboriginal women and their babies

Aboriginal women, and babies born to Aboriginal women, have consistently poorer outcomes, including an increased rate of perinatal mortality. The Aboriginal PMR has increased since the 2014–2016 figure and the gap between this and the non-Aboriginal PMR has widened again since it was almost at parity in 2014–2016 triennium.

Aboriginal women who gave birth in Victoria in 2018 were substantially more likely to be socioeconomically disadvantaged than non-Aboriginal women, with nearly half (48.9 per cent) of Aboriginal women and 19.7 per cent of others living in the most disadvantaged areas. In 2018, as in previous years, Aboriginal women were less likely to have received the pertussis and/or influenza vaccination and more likely to continue smoking in pregnancy. They were more likely to give birth to babies that were preterm, or underweight, as compared with non-Aboriginal women.

Aboriginal women and babies have poorer outcomes than non-Aboriginal women and babies. The PMR for babies born to Aboriginal women has been substantially and consistently higher than for those babies born to non-Aboriginal women over many years. In Victoria, over time, the gap between Aboriginal and non-Aboriginal women and babies in relation to mortality has reduced, but the specific factors that contribute to this require further investigation.

Snapshot

- 1,138 Aboriginal women gave birth to 1,152 babies (1.5 per cent of all women and

1.5 per cent of all babies born in Victoria) in 2018. This is slightly higher than in 2017.

- The proportion of babies born to Aboriginal women has more than doubled from 0.6 per cent in 2000 to 1.3 per cent in 2011 and has remained relatively stable since then (1.5 per cent in 2018). This may be the result of better ascertainment of Aboriginal status as well as an increase in the number of Aboriginal women of childbearing age.
- Aboriginal women were more likely to give birth before 37 weeks' gestation (12.4 per cent) and have babies with a birthweight below the 10th centile (11.8 per cent) compared with non-Aboriginal women (8.5 per cent and 8.3 per cent respectively).
- Although there has been a sustained decrease over many years, the triennial PMR for Aboriginal babies has increased from the previous triennium, and the gap between Aboriginal and non-Aboriginal PMR has also increased in this time.
- For the 2016–2018 triennium:
 - The Aboriginal PMR was 11.5 per 1,000 births compared with the non-Aboriginal rate of 8.7 per 1,000 births.
 - The Aboriginal stillbirth mortality rate was 7.1 per 1,000 births compared with the non-Aboriginal rate of 6.2 per 1,000 births.
 - The Aboriginal neonatal mortality rate was 4.4 per 1,000 births compared with the non-Aboriginal rate of 2.6 per 1,000 births.
- Aboriginal women were more likely to be younger than 20 years of age, have smoked during pregnancy, have a BMI of 30 or higher, live in a rural location and be more socioeconomically disadvantaged.

6.1 TRENDS AND COMPARISONS

Maternal comparisons

- Aboriginal women were significantly more likely to report smoking during pregnancy (40.2 per cent) when compared with non-Aboriginal women (7.5 per cent)
- A greater percentage of Aboriginal women were overweight or underweight compared with non-Aboriginal women.
- 76.3 per cent of Aboriginal women had pertussis vaccination compared with 82.1 per cent of non-Aboriginal women.
- 54.4 per cent of Aboriginal women had influenza vaccination compared with 67.4 per cent of non-Aboriginal women.

Babies comparisons

- The Aboriginal PMR has increased since the 2014–2016 figure, and the gap between this and the non-Aboriginal PMR has widened again since it was almost at parity in 2014–2016 triennium.
- Aboriginal women were more likely to give birth at 32–36 weeks' gestation (9.6 per cent) and have babies with a birthweight below 10th centile (11.8 per cent) compared with non-Aboriginal women (7.1 per cent) and (8.3 per cent).
- Babies born to Aboriginal women were more likely to weigh less than 2,500 g at birth (139 babies, 12.1 per cent) as compared with non-Aboriginal women (5,311 babies, 6.9 per cent).

In 2018, compared with non-Aboriginal women, Aboriginal women were more likely to:



smoke during pregnancy
40.2%
versus **7.5%** for
non-Aboriginal women



have pre-term births
9.6%
versus **7.1%** for
non-Aboriginal women



give birth to babies
under 2,500 g
12.1%
versus **6.9%** for
non-Aboriginal women

Figure 14: Maternal age by Aboriginal status, birthing episodes, 2018

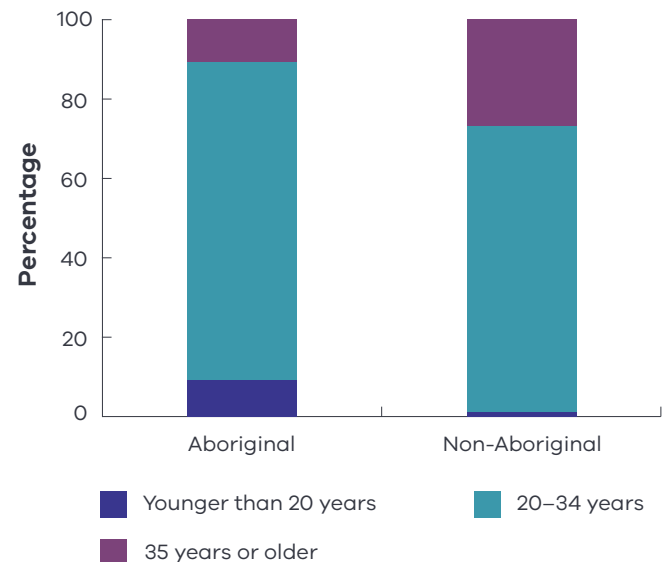


Figure 15: Maternal body mass index by Aboriginal status, birthing episodes, 2018

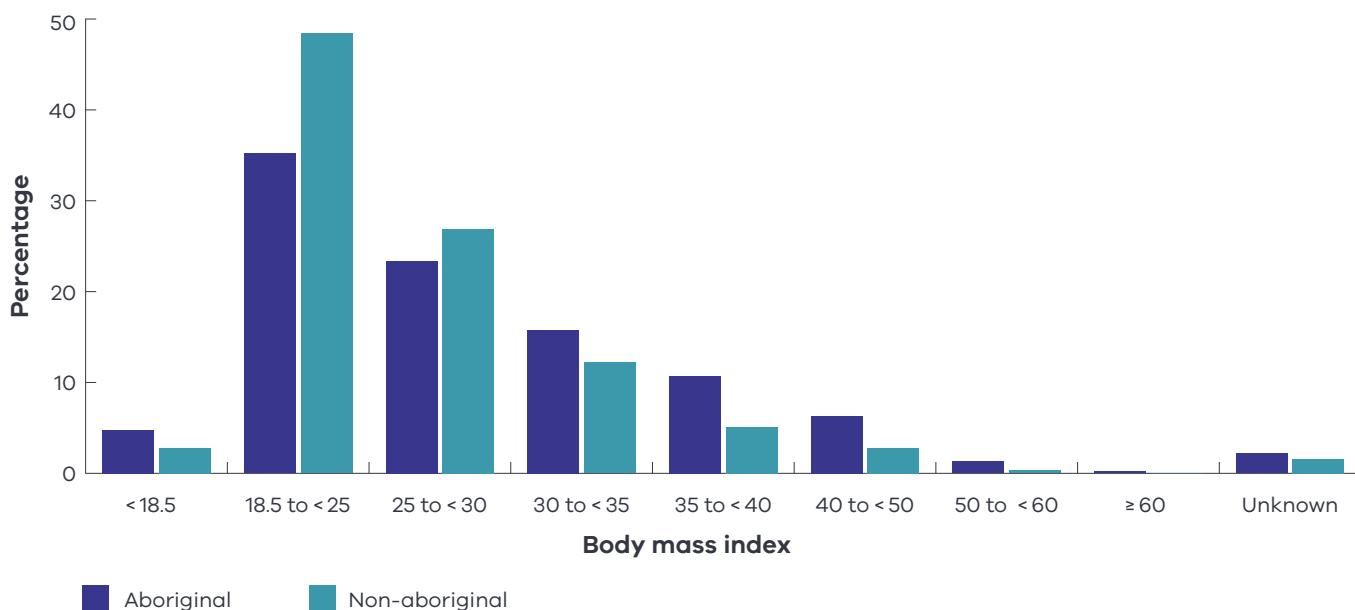
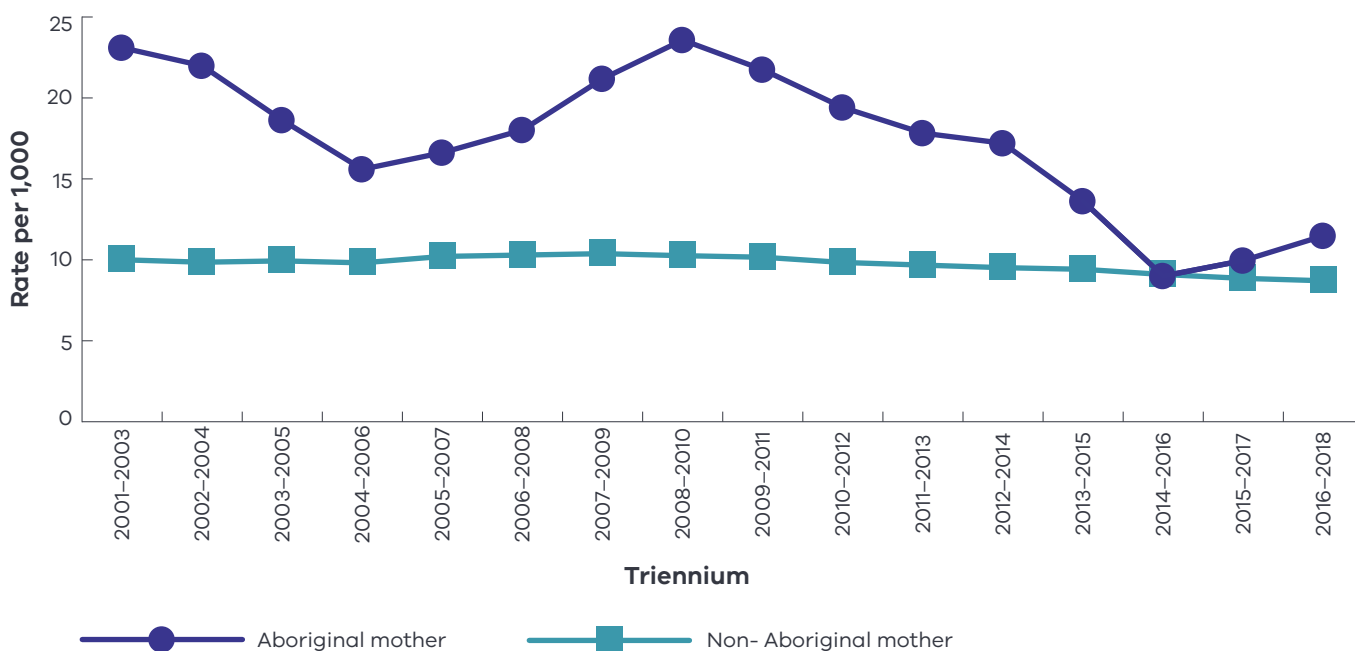


Figure 16: PMR by Aboriginal status of mother, by rolling triennia, 2001–2018



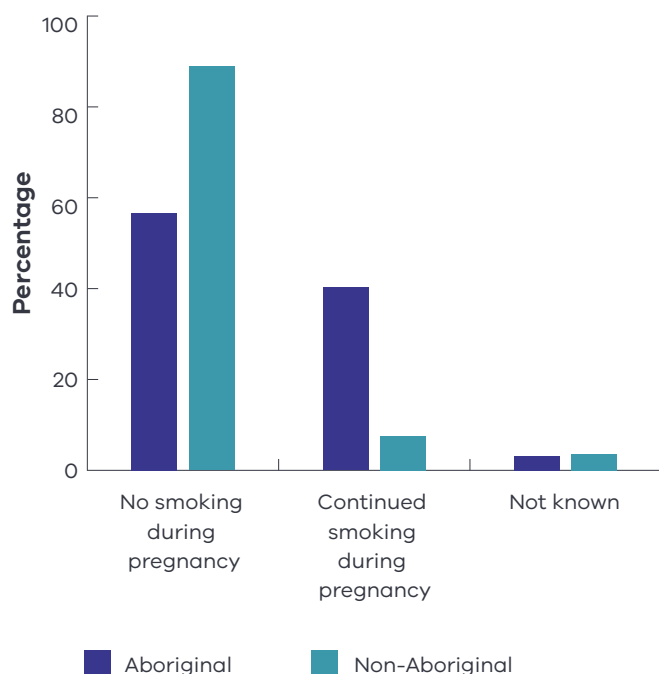
6.2 AREAS OF FOCUS

Smoking cessation

Aboriginal women were significantly more likely to report smoking during pregnancy (40.2 per cent) when compared with non-Aboriginal women (7.5 per cent).

In 2017 CCOPMM made a recommendation relating to the effectiveness of **smoking cessation programs and breastfeeding support services for Aboriginal women**. The 2018 data continues to support this recommendation which needs to be prioritised for Aboriginal women and their babies.

Figure 17: Proportion of women who smoked at all during pregnancy, by Aboriginal status, 2018



Good practice point

Midwifery continuity of care should be prioritised for Aboriginal women as they are at increased risk of preterm birth and stillbirth. Evidence suggests that increasing access to midwifery continuity of care reduces preterm birth and stillbirths, especially when tailored to the cultural needs and context of Aboriginal women. In addition, continuity of care may result in reduced smoking rates improved breastfeeding rates and uptake of vaccinations.

Midwifery continuity of care is defined as care provided by a known midwife or a small group of midwives to women during pregnancy, birth and postnatal period. There are many ways in which midwifery continuity of care can be arranged and provided. This care is provided in collaboration with other relevant healthcare providers, including obstetricians and general practitioners when appropriate, as well as with specialised staff such as Koori maternity care workers and as social workers. This good practice point provides further clarity to the 2017 recommendation – Improve access to continuity of care for pregnant women. There remains significant work to do to implement this recommendation successfully and it should remain a priority area.

Consumer resources

You and your boorai – The Royal Women’s Hospital <<https://www.thewomens.org.au/health-information/pregnancy-and-birth/aboriginal-and-torres-strait-islander-women/you-and-your-boorai/>>

Koori maternity service program – Victorian Aboriginal Community Controlled Health Organisation (VACCHO) <<https://www.vaccho.org.au/wd/kms/koori-maternity-service-program/>>

7 Child and adolescent mortality

Child and adolescent mortality includes deaths for post-neonatal infants, children and adolescents between the ages of 28 days and 17 years (up to, but not including the 18th birthday)

Vulnerability matters for children and adolescents

In Victoria, child mortality rates are low, but each year some young Victorians die from preventable causes. There are a high number of deaths among children living in vulnerable circumstances. An understanding of vulnerability provides opportunities for targeted interventions in this group in both the acute and primary health sectors and in the community.

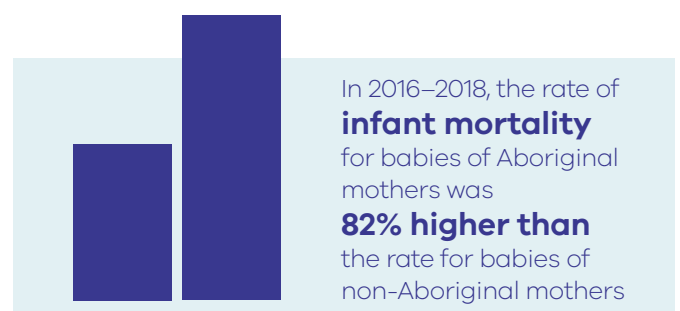
Children can be vulnerable to poor outcomes from illness if they are living in households where there is social disadvantage, reduced access to services, family violence, mental health issues or substance use, where the environment is unsafe, and social marginalisation, including coming from an Aboriginal, immigrant, or refugee family. Children who have been known to child protection are also over-represented in deaths.

Among adolescents, additional social risk factors include disengagement from school, substance use, mental health issues or engagement with the youth justice system. The causes of death among such children and adolescents span the range of diagnoses: sudden unexplained death in infancy (SUDI), unintentional injuries, intentional self-harm (including suicide), epilepsy, asthma, infections, malignancy, congenital problems and other chronic health conditions.

There is a clear gradient in percentage of deaths between the most disadvantaged quintile and least disadvantage quintile. Almost one-third of all deaths were in the most disadvantaged group.

Snapshot

- Overall, mortality rates continue to decline, with slight year-on-year variation.
- In 2018, 181 deaths of Victorian residents aged 28 days–17 years who died in Victoria were reported to CCOPMM. In 2017 and 2016 there were 205 and 206 respectively. In 2018 there were 24 fewer deaths than in 2017.
- This is the lowest number of deaths in Victoria since reporting began including the 15–17-year age group in 2005.
- There were 118 deaths in children and adolescents aged between one and 17 years, compared with 136 in 2017. There were 63 deaths of post neonatal infants in 2018, a reduction from 2017 when 69 post neonatal infants died.
- The highest rate of death is in the age group 28–364 days.
- In 2018 mortality rates per 1,000 live births in Victoria for infants (0–364 days) and those aged under five years were similar to the Australian national rates (3.0 compared with 3.1; 3.4 compared with 3.7) respectively.



7.1 TRENDS AND COMPARISONS

Leading causes of deaths by age groups in 2018

Post-neonatal infants (aged 28–364 days) (63 total deaths)

- Congenital anomaly: 38.1 per cent (24)
- Sudden infant death syndrome: 23.8 per cent (15)
- Prematurity: 14.3 per cent (9)

Children aged one to four years (33 total deaths)

- Congenital anomaly: 24.2 per cent (8)
- Malignancy: 18.2 per cent (6)
- Undetermined: 18.2 per cent (6)

Children aged five to nine years (18 total deaths)

- Malignancy: 27.8 per cent (5)
- Congenital anomaly: 16.7 per cent (3)
- Other acquired disease: 16.7 per cent (3)

- Motor vehicle accidents: 11.1 per cent (2)

Children aged 10–14 years (27 total deaths)

- Congenital anomaly: 25.9 per cent (7)
- Motor vehicle accidents: 25.9 per cent (7)
- Malignancy: 14.8 per cent (4)

Adolescents aged 15–17 years (40 total deaths)

- Intentional self-harm (including suicide): 40.0 per cent (16)
- Congenital anomaly: 20.0 per cent (8)
- Malignancy: 17.5 per cent (7)
- Motor vehicle accidents: 5.0 per cent (2)

Complete data on causes of death is available in the supplementary table.

Figure 18: Deaths by major cause, 2009–2018 (28 days – 17 years)

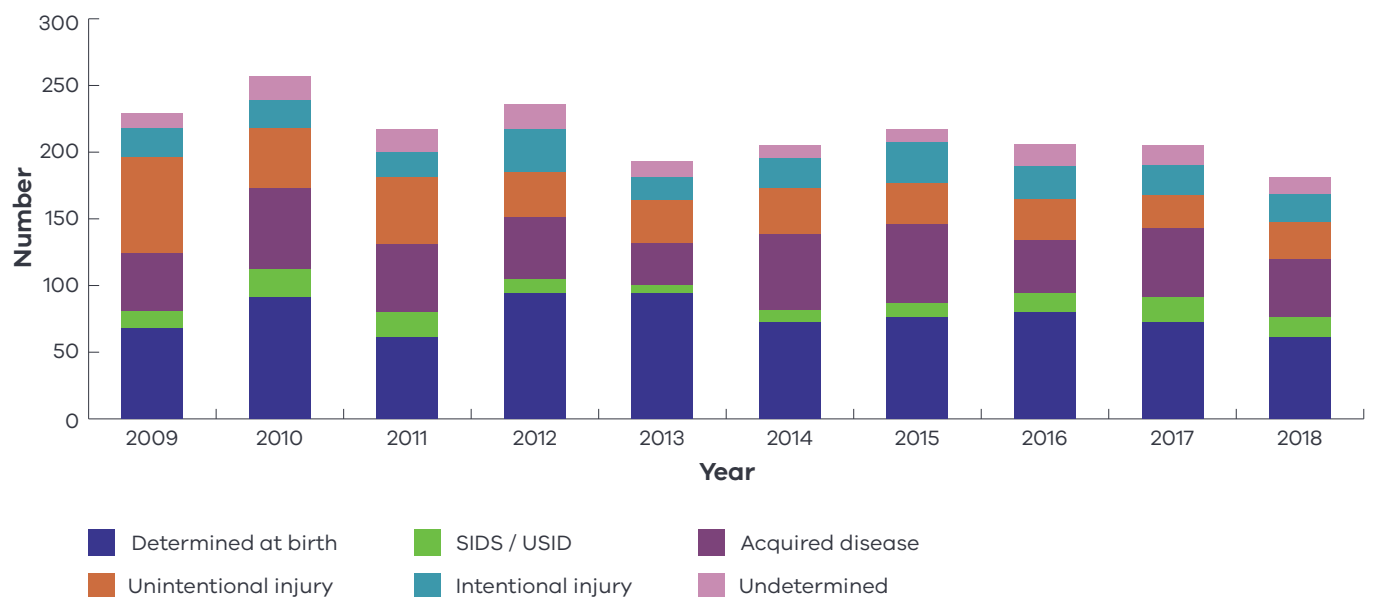
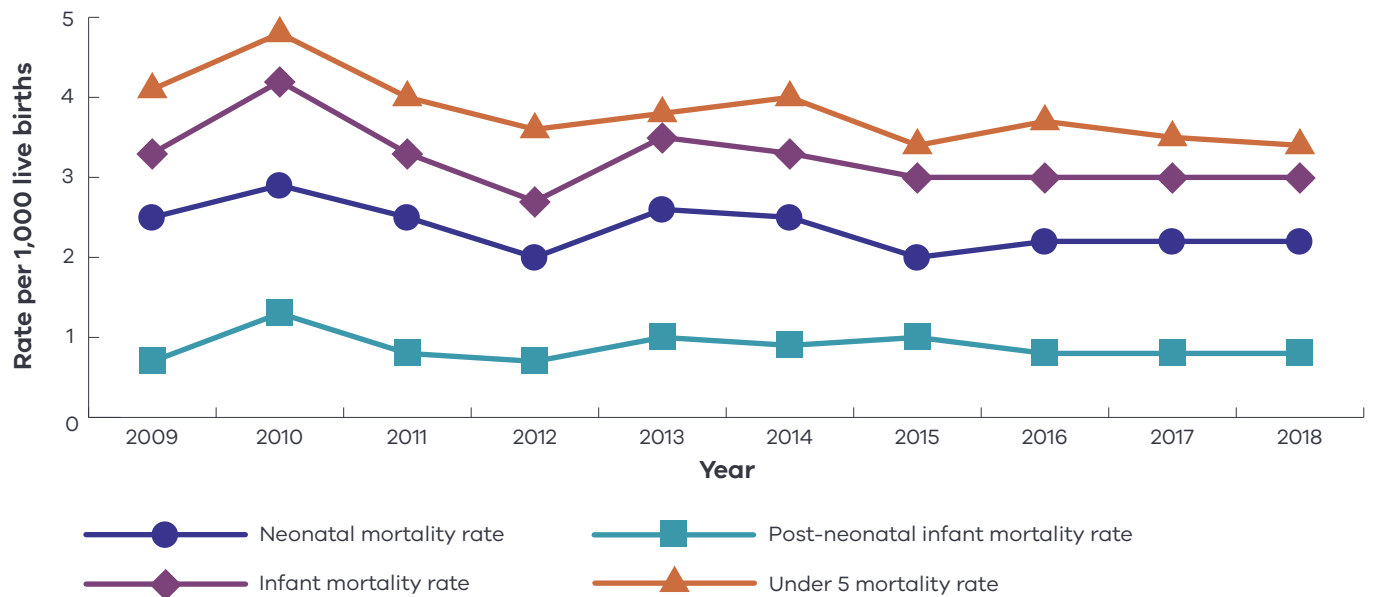


Figure 19: Rates of death by age group, 2009–2018



Figure 20: Neonatal, post-neonatal, infant and under-five mortality rates, 2009–2018

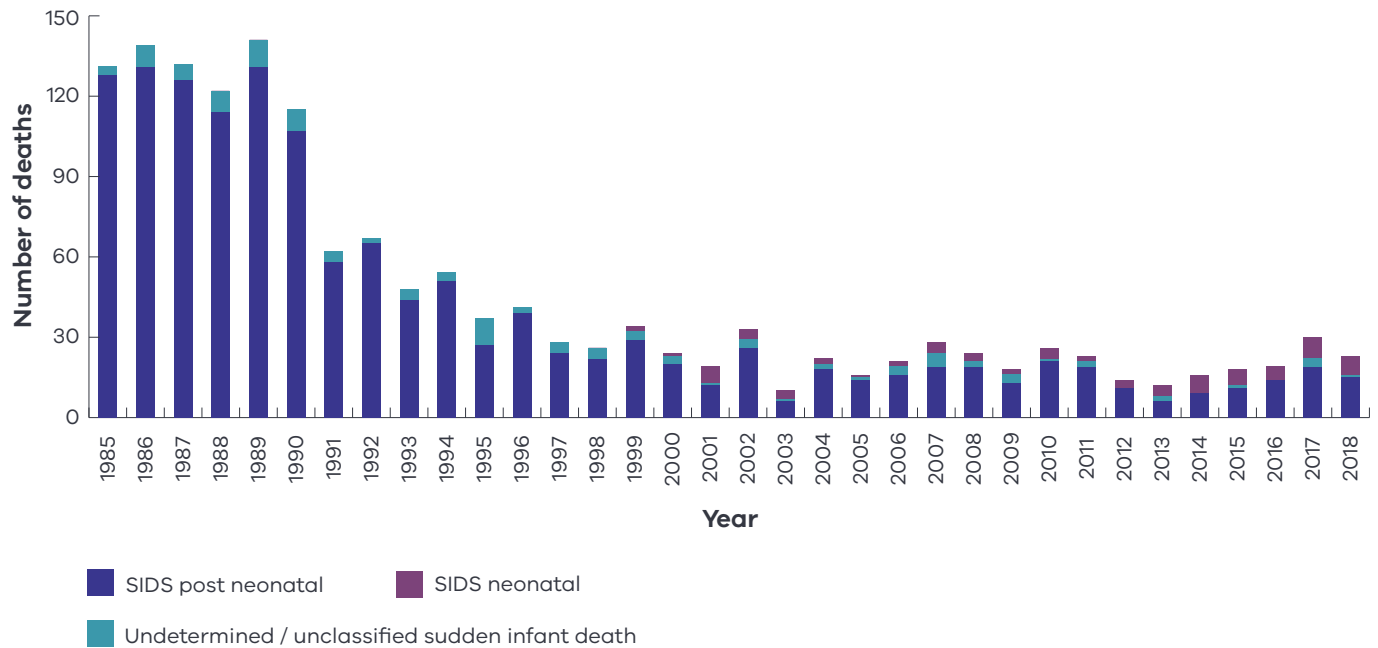


7.2 AREAS OF FOCUS

Sudden unexpected death in infancy (SUDI)

- In 2018 there were 26 SUDI deaths of infants under one year of age. Of these:
 - 11 infants (42 per cent) were co-sleeping in an adult bed or on a mattress on the floor at the time of their death
 - one of the 15 non-co-sleeping infants (7 per cent) was not in a safe bed designed for infants
 - eight (31 per cent) infants were exposed to maternal smoking during pregnancy or after birth
- 14 (54 per cent) infants were not breastfed at the time of their death
- six (23 per cent) infants were born preterm
- four (15 per cent) infants were born with a birthweight under 2,500 g
- two (8 per cent) infants had illicit drugs detected in their blood on post mortem toxicology
- two (8 per cent) infants did not have a full post mortem
- 23 (88.5 per cent) infants had no pathological diagnosis at post mortem, with 16 having a diagnosis of Sudden Infant Death Syndrome (including one neonate) and seven having an undetermined cause of death.

Figure 21: Unexplained sudden unexplained death in infants, 1985–2018



Death due to unintentional injuries

Despite declines in child and adolescent deaths over the past 30 years from unintentional injuries, children die in Victoria each year from avoidable injuries.

Children continue to die from a lack of supervision around water including baths, swimming pools and dams, and from a lack of protection from other hazards such as roadways, motorised vehicles (as a pedestrian, passenger or driver), and foreign objects and medications that can be inhaled or swallowed.

Legislation and regulation of safety measures (for example, seatbelts, child car restraints, pool fencing, blood alcohol testing and product design standards) together with parental education have reduced the number of unintentional injuries; however, not all hazards can be removed with these methods. Parental supervision and community awareness of potential hazards is essential to minimise the deaths from unintentional injury.

In 2018:

- 27 children and adolescents died from unintentional injury
- 10 of these children (37 per cent) were under the age of five years, 8 (30 per cent) were aged 10–14 years and 5 (19 per cent) were aged 15–17 years
- 12 (44 per cent) died from accidents related to motor vehicles or other non-motorised conveyances on roadways
- five children drowned
- four children died from other unintentional injuries.

Children and motor vehicle safety

Our current legislation and public health messages still leave children at risk when travelling in cars. Proper child restraint use, ensuring that a child is in a restraint that correctly fits the child and the vehicle is essential to reduce the risk of death and injury in the event of an accident. Over the years CCOPMM has reviewed deaths that may have been prevented if appropriately fitted child restraints were utilised.

There were 12 deaths of children from motor vehicle accidents in 2018. This represents 6.6 per cent of all child deaths.

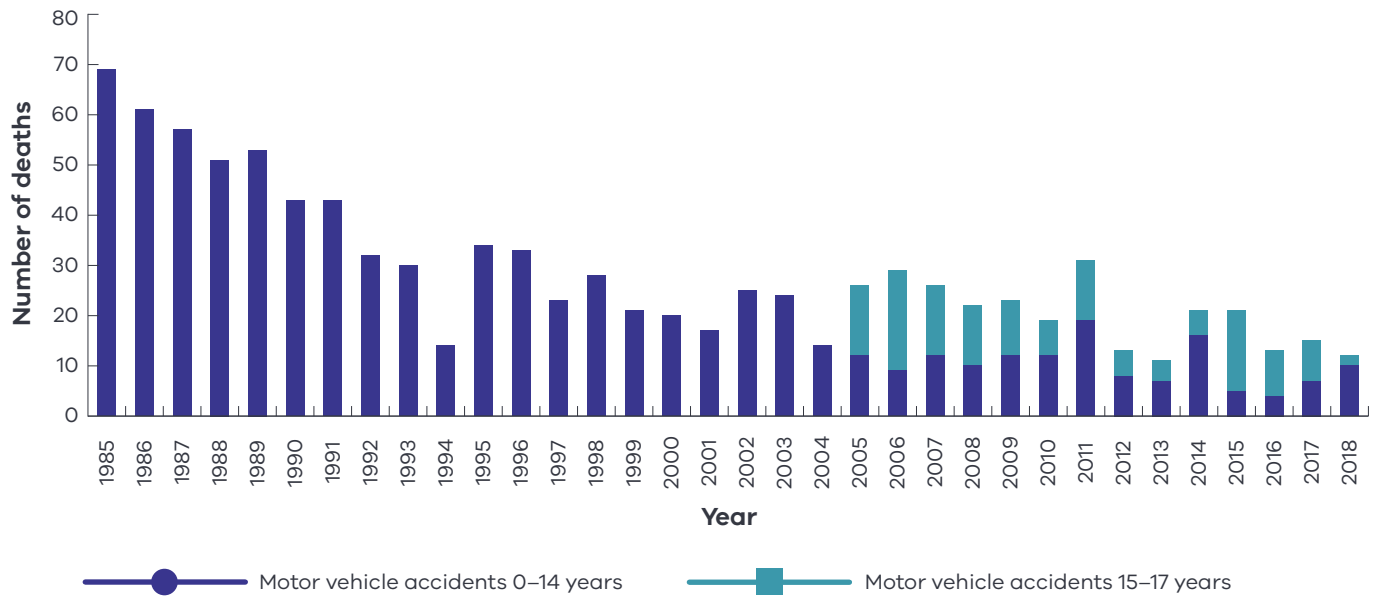
In half of these deaths the child was a passenger in a motor vehicle. In the remaining deaths, the child was a pedestrian or a motorcycle/trail bike rider.

In the past 10 years, 179 children aged 28 days to 17 years have died in motor vehicle accidents.



The current laws require children under the age of seven to be restrained in cars using specifically designed enclosed capsules and child seats with a five-point restraint. However, for children over the age of seven years, the safest restraint requirements are not clear. Victorian law states that children between the age of seven and 16 years 'must travel in either a booster seat or a seat belt.'¹⁵

Figure 22: Deaths from motor vehicle accidents by age group, 1985–2018



This leaves the decision to parents, carers or guardians of children over seven as to which type of child restraint to use.

The one strong public message, communicated by Australian National Road Rules, implemented in every state, stipulates that certain restraint types be used in accordance with the age of the child. However, due to the inexact relationship between age, stature and restraint fit, there is concern that some age-based decision-making, while permissible by law, may leave many children exposed to preventable and increased risks. In addition, there should be a focus on education and support for vulnerable families.

Recommendation: Ensure the provision of clear information and support for families on the safest way for every child to travel in cars at all times.

- (a) Consideration be given to strengthening the recommendations and / or legislation for children aged seven years or older
- (b) There be wider dissemination of information and support, particularly to vulnerable families, on current best practice for restraining children in motor vehicles, particularly those aged seven years or older:
 - (i) 'It's less about age, and more about size and height'
 - (ii) wider dissemination of information about the safety, use and availability of types of car restraints available for children above the age of seven years

- (iii) the minimum requirements of a child to move to an adult seat belt (using the '5 step test', and the child's height)
- (iv) the safest place to sit is in a rear sitting position for children ≤ 12 years
- (c) Improve measures to increase correct restraint use:
 - (i) recommendations for families to familiarise themselves with their restraints prior to installing, and to carefully reviewing the product information including booklets and videos on how to install the product before attempting it
 - (ii) increased access to restraint fitting and checking stations across Victoria, including provision of appropriate child restraints for vulnerable families.
- (d) Greater exploration and identification of factors contributing to child injuries and deaths in motor vehicles, including but not limited to, at-risk cohorts, type of restraint used at the time of car accidents, appropriate use of restraint etc. This would allow further evidence to contribute to clearer messages and stronger actions.

Liquid nicotine and e-cigarettes usage

CCOPMM is concerned about the use of e-cigarettes in two main areas – the accidental ingestion of liquid nicotine by young children and emerging international evidence on significant health effects and deaths related to the use of e-cigarettes. A death was reviewed which occurred after a child ingested liquid nicotine. CCOPMM is concerned that without a rapid response to this emerging practice, more deaths and significant harm will occur in young Victorians.

Recommendation: Strengthen the regulation and education on e-cigarettes and liquid nicotine

CCOPMM recommends that the Victorian Government works with federal and state counterparts, including the Therapeutic Goods Administration, to:

- (a) strengthen the regulation of the importation, sale and marketing of e-cigarettes products and liquid nicotine
- (b) implement a nationally consistent approach to minimise the poisoning risk to children of e-cigarette products, such as e-liquids and liquid nicotine, by ensuring any products permitted for importation meet child-resistant packaging standards and include safety warning labels
- (c) encourage prescribing doctors to supply patients with information about the risks to children of poisoning, the need to store liquids safely and not to leave products open when children are present
- (d) undertake a public education campaign about the dangers and storage requirements of e-cigarettes and liquid nicotine, especially in relation to children.

Care of children in a mixed emergency department or urgent care centre

Triaging children who present to an emergency department (ED) or an urgent care centre (UCC) requires attention to certain details that differ from adult triage. This can be challenging in an ED or in a UCC that sees both adults and children. It is important for clinicians to be aware of these differences and ensure that children are seen by the most appropriate practitioner.

All children should have a primary assessment at triage that includes a brief history of the presenting problem plus careful and systematic assessment of clinical signs.

Any child with abnormal clinical signs should have their vital signs measured and recorded. The vital signs should be documented on a ViCTOR observation chart to highlight abnormal values for the child's age.

Parents have a unique ability to identify deviations from normal in their child's level of function. Listen to the parents if they say their child is very unwell – they are usually correct.

Recommendation: Ensure the care provided in a mixed emergency department and urgent care centres meets the specific needs of children.

CCOPMM recommends that when children present to a mixed emergency department or urgent care centre, if the clinical assessment cannot be adequately performed at the triage counter, the child should be taken to an area where the primary assessment can be performed by a nurse or doctor experienced in assessing children.

Health services must ensure all staff involved in triage or initial assessment of sick children have basic paediatric knowledge and adequate training on how to take vital observations and plot them accurately on a VICTOR chart.

Providing the best care for infants, children and adolescents

Good practice point: extra vigilance for signs of injury or illness in non-verbal children

Children who are not able to communicate their medical symptoms effectively, particularly those with a disability, and present with a change in behaviour, increased irritability or a symptom such as vomiting or pain, must be treated with extra vigilance. Often there is an underlying serious medical condition requiring treatment that can be missed. The importance of listening to parents and caregivers at this time is also vital in treating non-verbal children.

Good practice point: avoid mental health bias

Adolescents who seek medical care for an acute or chronic illness may also have mental health issues. It is important that significant physical illness is not dismissed as anxiety, and that depression in adolescents is not explained away by physical illness alone.

An example is an acute pulmonary embolus in an adolescent may present with tachypnoea and may be misinterpreted as anxiety. A full clinical assessment should be undertaken, including oxygen saturation. Tachycardia needs an explanation. Hypoxia also needs an explanation and represents a physical problem.

On the other hand, a young adolescent with a chronic medical problem may present with physical symptoms and yet be depressed. It is essential for children with chronic health conditions to have at least one trusted medical practitioner who knows them well and can identify physical deterioration and mental vulnerability.

Good practice point: assessing the conscious state of children

Seriously ill children can present with a decrease in conscious state. A decrease in conscious state can be due to meningitis, encephalitis, febrile convulsions, metabolic encephalopathy, head injury, drug overdose or as side effect of sedative medication (for example, anticonvulsants). It is essential that all clinicians know how to assess the conscious state of a sick child. This assessment should include the use of the AVPU scale (Alert, Verbal, Pain, Unresponsive). The AVPU scale is included in the ViCTOR monitoring charts.

If a child is unconscious, assess their motor response to pain and record changes in conscious state over time. In addition, in a child with a head injury, try to determine the best motor response at any time since the injury by taking a careful history from paramedic and/or the parents. If there is no motor response to pain, record whether both pupils are dilated and fixed to light.¹⁶

A child who is unconscious and not able to localise to painful stimuli, or with a deteriorating AVPU scale needs urgent escalation of treatment to a senior doctor and/or Paediatric Infant Perinatal Emergency Retrieval (PIPER). Unconsciousness without being able to localise to painful stimuli is a PIPER 'Go Now' criterion for immediate clinical response.

Good practice point: use of central venous access devices

Children may have central venous access devices (CVAD) for emergency procedures, medium-term for drug administration or long-term for chemotherapy or other ongoing vascular access needs. CVADs involve a high risk of central line associated blood stream infections (CLABSI). All hospitals who insert or use CVADs in neonates or children must have clearly defined protocols and clinical guidance on their use.

For more information see the Royal Children's Hospital Clinical guidelines <https://www.rch.org.au/policy/public/Central_Venous_Access_Device_Management/#Management_of_CVAD>.

Good practice point: lymphopenia in hospitalised children

Lymphopenia (low blood lymphocytes) is common in seriously ill children and is associated with acute infections. If an otherwise well child has lymphopenia, this needs to be followed up. Lymphopenia that persists a week after the onset of an acute infection requires the measurement of lymphocyte subsets to detect low or absent T-cell levels and rule out severe combined immunodeficiency (SCID) or another treatable immunodeficiency.

Measure lymphocyte subsets immediately to investigate for SCID if a child has lymphopenia and any signs that are suspicious for immune deficiency: recurrent infections, failure to thrive, cytomegalovirus viremia, or pneumonia suspicious of pneumocystis.

Good practice point: risk of pulmonary embolism when starting the oral contraception pill

Recent commencement of the oral contraception pill, smoking, obesity (BMI > 30), immobilisation and family history of venous thromboembolism are associated with increased risk of venous thromboembolism. The risk of venous thromboembolism is two to three times greater in users of oral combined hormonal contraception compared with non-users. The risk is highest in the first four months of use.

If the oral contraceptive pill has been recently commenced, any symptoms such as chest pain, shortness of breath, dyspnoea, dizziness, collapse or palpitations should prompt investigations for pulmonary embolism.

Good practice point: recognising myocarditis

Myocarditis is a much less common cause of respiratory distress than viral or bacterial pneumonia, but it can mimic diseases such as bronchiolitis or sepsis. Symptoms suggestive of myocarditis are tachypnoea and persistent marked tachycardia, often pallor, cold hands and feet, peripheral cyanosis and an enlarged liver. Cardiomegaly is seen on chest x-ray. Kawasaki disease is a differential diagnosis if there has been fever for several days in young children. In cases reviewed by CCOPMM, myocarditis was unrecognised because of:

- a fixed diagnosis of bronchiolitis in an infant with atypical features, particularly pallor and persistent tachycardia
- failure to reassess and recognise when a child is not following the expected clinical path
- failure to listen to parents' concerns
- failure to escalate when a child is persistently in the Purple Zone of the ViCTOR charts.

For a child with suspected myocarditis, do a chest x-ray and give oxygen.

Minimal handling is important. Get an echocardiograph if you can. Call PIPER and a paediatric cardiologist. Suspected myocarditis is a 'Go Now' criterion for PIPER.

Good practice point: radiographic features of a chest mass in children

Take note of children who have a complete or near complete white-out of one lung on chest x-ray. There are four possible causes of this: (1) pleural effusion, (2) consolidation, (3) collapse, (4) a mass or tumour. These can usually be differentiated on clinical and radiographic features. A large effusion or empyema has mediastinal shift to the opposite side. Lung collapse has mediastinal shift to the affected side. Consolidation has air bronchograms and no mediastinal shift. A chest mass has mediastinal shift to the opposite side, or a widened mediastinum if it is a midline mass. Chest tumours are rare in children but are sometimes mistaken for a pleural effusion, and some tumours also have an associated pleural or pericardial effusion. If in doubt, seek an opinion from a radiologist or clinical specialist, or refer through PIPER. It can be dangerous to lie down or sedate a child with a large chest mass, so seek help in all suspected cases.

Consumer resources

Child car seats – The Royal Children’s Hospital <https://www.rch.org.au/kidsinfo/fact_sheets/Safety_Child_car_seats/>

Child restraints and care seats: what you need to know – Early Learning Association of Australia <<https://carseatssavelives.com.au/>>

Kidsafe Australia
<<https://kidsafe.com.au/>>

E-cigarettes – Better Health Channel
<<https://www.betterhealth.vic.gov.au/health/healthyliving/e-cigarettes>>

E-liquids for e-cigarettes – Better Health Channel <<https://www.betterhealth.vic.gov.au/health/healthyliving/e-liquids-for-use-in-e-cigarettes>>

Child and Adolescent Mental Health Services – Better Health Channel <<https://www.betterhealth.vic.gov.au/health/serviceprofiles/child-and-adolescent-mental-health-services-CAMHS-service>>

Mental health – Head Space
<<https://headspace.org.au/>>

Kids Helpline <<https://kidshelpline.com.au/>>

8 Research

Research is a core function of CCOPMM. The council is legislated to conduct research related to mortality and morbidity that will benefit women, babies, children and adolescents. In addition to this core research function, CCOPMM data is also available to address a multitude of other research questions. These do not necessarily translate immediately into recommendations or good practice points, but rather add to the body of evidence that leads subsequently to improvements in care for women, babies and children. CCOPMM promotes high-quality research and collaboration that may contribute to or establish new evidence for translation into practice.

Under the Public Health and Wellbeing Regulations 2009, CCOPMM may make data collected by the perinatal data collection available to researchers.

CCOPMM databases

CCOPMM is the data custodian of the following databases:

- Victorian Perinatal Data Collection (VPDC) – a register recording more than 100 data items for all births in Victoria of at least 20 weeks' gestation or (if gestation is unknown) 400 g birthweight
- Victorian Congenital Anomalies Register (VCAR) – information on all congenital anomalies for livebirths, stillbirths and terminations of pregnancy diagnosed before birth to six years old, voluntarily notified to CCOPMM
- CCOPMM Mortality Database – information on all cases of maternal, perinatal and paediatric mortality in Victoria.

Accessing CCOPMM data

All requests for research are reviewed in accordance with CCOPMM's legislative requirements. You can make a request for CCOPMM data through the VAHI Data Request

Hub <<https://vahi.freshdesk.com/support/home>>. Approved research involving data linkage may be facilitated by the Centre for Victorian Data Linkage <<https://www2.health.vic.gov.au/about/reporting-planning-data/the-centre-for-victorian-data-linkage>>.

Research Special Interest Group

In 2019 a CCOPMM Research Special Interest Group (RSIG) was formed. The RSIG is a multidisciplinary group combining specialist clinical and research knowledge to drive CCOPMM's research function. Functions of the RSIG include reviewing requests for external research projects and publications arising from CCOPMM data, identifying priority areas for research and reviewing research processes (including supporting the introduction of the new VAHI Data Request Hub and optimising data linkage). In addition, the RSIG is responsible for providing advice and assistance to CCOPMM on areas of research that have been identified as relevant or priorities to maternal, perinatal, infant and child and adolescent mortality and morbidity.

Research-related events in 2018

The VPDC forum provides an interdisciplinary platform for maternity managers, midwives, obstetricians, educators and researchers to discuss outcomes and trends in perinatal research. It also provides an opportunity to review areas where data quality can be improved, and learnings shared. The 2018 VPDC forum was attended by 150 professionals.

The Perinatal Services Performance Indicators (PSPI) forum was held in April 2018, following the release of the PSPI report <<https://www.bettersaferecare.vic.gov.au/reports-and-publications/victorian-perinatal-services-performance-indicators-reports>>.

The PSPI report aims to improve outcomes for Victorian women and their newborns by reporting outcomes for individual maternity services. These can be used to guide quality improvement activities. The PSPI forum is an opportunity for quality and safety experts and clinicians at maternity and newborn services to discuss current performance data and to share and improve practice for Victorian women and babies. The PSPI report and forum provides an opportunity for reflection and to identify new areas for investigation, research and translation. View the 2018 PSPI forum online <<http://www.webevent.com.au/pspi2019/>>.

In September 2018 SCV hosted the Institute for Healthcare Improvement and British Medical Journal (IHI-BMJ) Quality and Safety in Healthcare conference with the theme *Connect. Co-Create. Communicate.* This conference looked at how supporting connections between patients, frontline staff and management leads to a culture of collaboration where everyone in a workforce is empowered to make a difference. There were more than five projects presented at the conference that used VPDC data provided by CCOPMM to investigate quality improvements in health care. View a selection of the posters <<https://www.flickr.com/photos/160839483@N06/sets/72157699910299721/>>.

Research projects

CCOPMM undertakes internal research projects relating to priority areas and has supported two projects in 2018.

Fetal growth restriction

Studies have shown that fetal growth restriction is a strong risk factor for stillbirth, particularly when undetected. CCOPMM recognised this risk and is supporting an ongoing project to investigate the detection and management of fetal growth restriction in Victoria. This work, led Dr Mary-Ann Davey who supervised PhD candidate Roshan Selvaratnam, is critically examining the public reporting of a fetal growth restriction hospital performance measure in the PSPI report. The project is using whole-of-state data to assess the impact of reporting this fetal growth restriction performance measure, including improvements in care and potential unintended harm. Outputs of the work include one Honours thesis, one paper under review, several papers prepared for submission to peer-reviewed journals, and several presentations at local, national and international conferences

Severe fetal anomalies

In 2018 CCOPMM identified that obstetric ultrasound providers failed to recognise severe fetal anomalies (namely cardiac anomalies) in several cases of perinatal mortality and that this may have contributed to the outcome for the baby. CCOPMM supported a study to assess the quality and effectiveness of obstetric ultrasound in detecting significant cardiac anomalies and to determine whether there are differences in quality and effectiveness of detection between different types of ultrasound providers. The study was led by Dr Miranda Davies-Tuck, Research Fellow at SCV.

Publications

Each year CCOPMM approves requests for external research. In 2018 there were 14 requests to access extracts of the VPDC. Select projects published in 2016–2018 are outlined below.

Journal articles

Reid SM, Meehan E, Gibson CS, Scott H, deLacy M, on behalf of the ACPR group 2016, 'Biological sex and the risk of cerebral palsy in Victoria, Australia', *Developmental Medicine & Child Neurology* 58 (Suppl.2): 43–49.

Belihu F, Davey MA, Small R 2016, 'Perinatal and obstetric health outcomes of eastern African immigrant women in Victoria, Australia: a population-based study', *BMC Pregnancy and Childbirth*, 16: 86.

Thyer J, Wong J, Thomson A, Bell B, Hyland C, Challis D 2018, '50 years of RhD immunoglobulin (anti-D) therapy in Australia – celebrating a public health success story', *Medical Journal of Australia*, 2019 (8).

Flood M, McDonald S, Pollock W, Cullinane F, Davey MA 2018, 'Incidence, trends and severity of primary postpartum haemorrhage in Australia: a population-based study using Victorian Perinatal Data Collection data for 764,244 births', *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 59(2): 228–234.

Edvardsson K, Axmon A, Powell R, Davey MA 2018, 'Male-biased sex ratios in Australian migrant populations: a population-based study of 1 191 250 births 1999–2015', *International Journal of Epidemiology*, 47(6): 2025–2037 .

Boyle DIR, Versace VL, Dunbar JA, Scheil W, Janus E, Oats JJN, et al. 2018, 'Results of the first recorded evaluation of a national gestational diabetes mellitus register: challenges in screening, registration, and follow-up for diabetes risk', *PLoS ONE* 13(8): e0200832.2018.

Agius PA, Davey MA, Small R 2018, 'Risk of unplanned caesarean birth in Vietnamese-born women in Victoria, Australia: a cross-sectional study', *Women and Birth*, 1;31(6): 496–504.

Davies-Tuck ML, Wallace EM, Davey MA, Veitch V, Oats JJN 2018, 'Planned private homebirth in Victoria 2000–2015: a retrospective cohort study of Victorian perinatal data', *BMC Pregnancy and Childbirth*, 18(1): 357.

Theses

Poulton A 2017, *Prenatal diagnosis of single gene disorders* [Honour's thesis], Department of Paediatrics, The University of Melbourne, Melbourne.

Selvaratnam RJ, Davey M-A, Wallace EM 2018, *Trends in the detection of fetal growth restriction in Victoria*, [Honour's thesis] Monash University, Melbourne

Reports

Department of Health and Human Services 2016, *Your health: Report of the Chief Health Officer, Victoria*.

Aboriginal Health and Wellbeing Branch 2017. *Aboriginal executive report card report*.

Steering Committee for the Review of Government Service Provision (SCRGSP) 2018, *Report on Government Services 2018*, Productivity Commission, Canberra.

Mildura Rural City Council 2018, *State of Mildura Rural City report 2018*.

Wyndham City Council 2018. *Status of Wyndham's children and young people report*.

The State of Queensland (Queensland Family and Child Commission) 2017, *Annual report: Deaths of children and young people, Queensland, 2016–17*.

Website

Victorian Women's Health Atlas <[http://victorianwomenshealthatlas.net.au/#!/atlas/Sexual%20and%20Reproductive%20Health/SRH/Teenage%20Fertility/SRH_06/2015%20Rate%20\(per%201,000\)/116/F/state/all/false](http://victorianwomenshealthatlas.net.au/#!/atlas/Sexual%20and%20Reproductive%20Health/SRH/Teenage%20Fertility/SRH_06/2015%20Rate%20(per%201,000)/116/F/state/all/false)>

9 Council functions and audit meetings

9.1 ABOUT CCOPMM

CCOPMM was established in 1962 under the *Health Act 1958*, which has been repealed and replaced by the *Public Health and Wellbeing Act 2008* ('the Act'). CCOPMM is an advisory body to the Minister for Health on maternal, perinatal and paediatric mortality and morbidity, with members being appointed by the Minister for Health. Four substantive subcommittees also report to CCOPMM:

- Maternal Mortality and Morbidity Subcommittee
- Stillbirth Subcommittee
- Neonatal Mortality and Morbidity Subcommittee
- Child and Adolescent Mortality and Morbidity Subcommittee.

CCOPMM works closely with the department and SCV in its role to advise on strategies to reduce avoidable mortality and morbidity. The Consultative Councils Unit, within the Stewardship and Support Division of SCV, manages and supports CCOPMM's work programs and those of two other consultative councils.

9.2 CCOPMM FUNCTIONS

Under the Act, CCOPMM's functions are to:

- Conduct study, research and analysis into the incidence and causes in Victoria of maternal deaths, stillbirths and the deaths of children;
- Conduct study, research and analysis into the incidence and causes of obstetric and paediatric morbidity;
- Conduct a perinatal data collection unit for the purpose of—
 - Collecting, studying, researching and interpreting information on and in relation to births in Victoria
 - Identifying and monitoring trends in respect of perinatal health including birth defects and disabilities;
 - Providing information to the Secretary on the requirements for and the planning of neonatal care units;
 - Providing information for research into the epidemiology of perinatal health including birth defects and disabilities;
 - Establishing and maintaining a register of birth defects and disabilities
- Provide to health service providers—
 - Information on obstetrics and paediatrics;
 - Strategies to improve obstetric and paediatric care;
- Consider, investigate and report on any other matters in respect of obstetric and paediatric mortality and morbidity referred to CCOPMM by the Minister or the Secretary;
- Liaise with any other Consultative Council (whether or not prescribed) on any matter relevant to the functions of CCOPMM;
- Publish an annual report on the research and activities of CCOPMM;
- Perform any other prescribed function;
- Collect information for the purpose of performing its functions as outlined in the Act.

9.3 CCOPMM MEMBERS, 2018–2021

Consultative Council on Obstetric and Paediatric Mortality and Morbidity

Adj. Prof. Tanya Farrell (Chair)
Prof. Susan McDonald (Deputy Chair)
Dr David Fuller
Dr Alison Green
Prof. Caroline Homer
Ms Robyn Hudson
Prof. Rodney Hunt
Ms Ann Jorgensen
Dr Niroshini Kennedy
Dr Mark Lubliner (resigned January 2019)
Prof. John McNeil
Prof. Paul Monagle
Adj. Assoc. Prof. Robert Roseby
Ms Karen Sawyer
Dr Alexis Shub
Assoc. Prof. Glyn Teale
Mr Nicolas Thomas
Prof. Mark Umstad

Maternal Mortality and Morbidity Subcommittee

Prof. Mark Umstad (Chair)
Dr Malcolm Barnett
Ms Bree Bulle
Dr Jacqueline Collett
Dr Mary-Ann Davey
Adj. Prof. Tanya Farrell
Dr Alison Green
Dr Elizabeth Hessian
Prof. Caroline Homer
Ms Kim Howland
Dr Matthew Lynch
Prof. Susan McDonald

Ms Abby Monaghan
Dr Louise Newman
Prof. Daniel O'Connor
Prof. Michael Permezel
Dr Wendy Pollock
Ms Karen Sawyer
Assoc. Prof. Glyn Teale
Dr Craig Walker

Stillbirth Subcommittee

Prof. Susan McDonald (Chair)
Dr Lisa Begg
Dr Jodie Benson
Dr Jacqueline Collett
Dr Mary-Ann Davey
Adj. Prof. Tanya Farrell
Ms Kym Harrison
Assoc. Prof. Lisa Hui
Dr Emily Olive
Dr Kirsten Palmer
Dr Warrick Pill
Assoc. Prof. Joanne Said
Ms Sonia Shaw
Prof. Mark Umstad
Ms Colleen White

Neonatal Mortality and Morbidity Subcommittee

Prof. Rod Hunt (Chair)
Ms Jane Bailey
Dr Lisa Begg
Dr Rosemarie Boland
Dr Jacqueline Collett
Dr Mary-Ann Davey
Adj. Prof. Tanya Farrell
Dr Jim Holberton
Dr Isaac Marshall
Prof Peter McDougal
Dr Sarah Parsons
Ms Emma Saviane
Ms Cindy Scott
Dr Alexis Shub
Dr Alice Stewart
Assoc. Prof. Michael Stewart
Dr Mark Tarrant
Assoc. Prof. Glyn Teale
Dr Sophie Treleaven
Prof. Susan Walker
Ms Julie Wright
Dr Melanie Archer (co-opted)

Child and Adolescent Mortality and Morbidity Subcommittee

Prof. Paul Monagle (Chair)
Ms Marcia Armstrong
Ms Tracy Beaton
Dr Mick Creati
Prof. Richard Doherty
Prof. Trevor Duke
Dr Karen Dunn
Assoc Prof. Alan Eade
Adj. Prof. Tanya Farrell
Dr David Fuller
Dr Richard Haslam
Dr Annie Moulden
Dr Sarah Parsons
Adj. Assoc. Prof. Robert Roseby
Dr Greg Rowles
Prof. Frank Shann
Dr David Tran
Dr Sophie Treleaven
Dr Peter Wearne
Prof. Katrina Williams
Dr Joanna Glengarry (co-opted)

10 Collecting and reviewing information

10.1 REVIEW OF DEATHS

CCOPMM's primary role is to review all maternal, perinatal and paediatric deaths in Victoria, determine factors that may have contributed to these deaths and provide advice and recommendations on effective strategies to address preventable harm and improve clinical outcomes. All perinatal deaths from 20 weeks' gestation (or 400 g birthweight if gestation is not known) and all child deaths under the age of 18 years that occur in Victoria are reviewed. Information is sought from multiple sources, including the VPDC, hospital case records, individual doctors and midwives, pathology services, the State Coroner, Ambulance Victoria and PIPER. CCOPMM considers the clinical features of each case and classifies each perinatal death according to the PSANZ's Perinatal Mortality Classification System and classifies each post-neonatal infant, child and adolescent death using the *International statistical classification of diseases and health related problems*, 10th revision, Australian modification (6th edition).

In many cases, CCOPMM has multiple sources of information available regarding children (including health, welfare and education records) and may not limit the cause of death classification to the cause of death recorded in post-mortem reports or death certificates. In some cases, new information may become available at a later time that leads to a change in the classification assigned to a particular death or group of deaths. Complex or contentious mortality cases are referred to CCOPMM's specialist subcommittees for review. CCOPMM assesses preventability and makes recommendations for improving clinical practice and systems based on the findings from each review and the best available evidence. Avoidable factors cannot always be identified from the information available during case review,

therefore the actual number of cases that may have preventable factors could be higher.

10.2 REVIEW OF BIRTHS

The Act requires that births that occur in Victoria are reported to CCOPMM within a prescribed period. CCOPMM has statutory responsibility for the VPDC and VCAR. The department and SCV manage the data collections on CCOPMM's behalf. The collections enable information to be analysed in relation to the health of women, babies and children in order to contribute to improvements in their health. Information is collected on obstetric conditions, procedures and outcomes, as well as neonatal morbidity and congenital anomalies relating to every birth in Victoria of at least 20 weeks' gestation or, if gestation is unknown, at least 400g birthweight.

Victorian Perinatal Data Collection

The VPDC was established in 1982. It operates under the Act and consists of sociodemographic characteristics and clinical outcome data on all births occurring in Victoria. Data are collected from public and private hospitals, birth centres and homebirth practitioners from their clinical and patient administrative system via secure data exchange. Find more information about the VPDC on the Better Safer Care website <<https://bettersafecare.vic.gov.au/about-us/about-scv/councils/ccopmm/notifying-the-vpdc>>.

Victorian Congenital Anomalies Register

As per the Act, CCOPMM has a legislative responsibility to maintain a register of congenital anomalies and disabilities. The data collected in this register provides the necessary information to monitor, research and plan clinical improvement initiatives. The VCAR includes suspected or confirmed congenital anomalies. Data is obtained

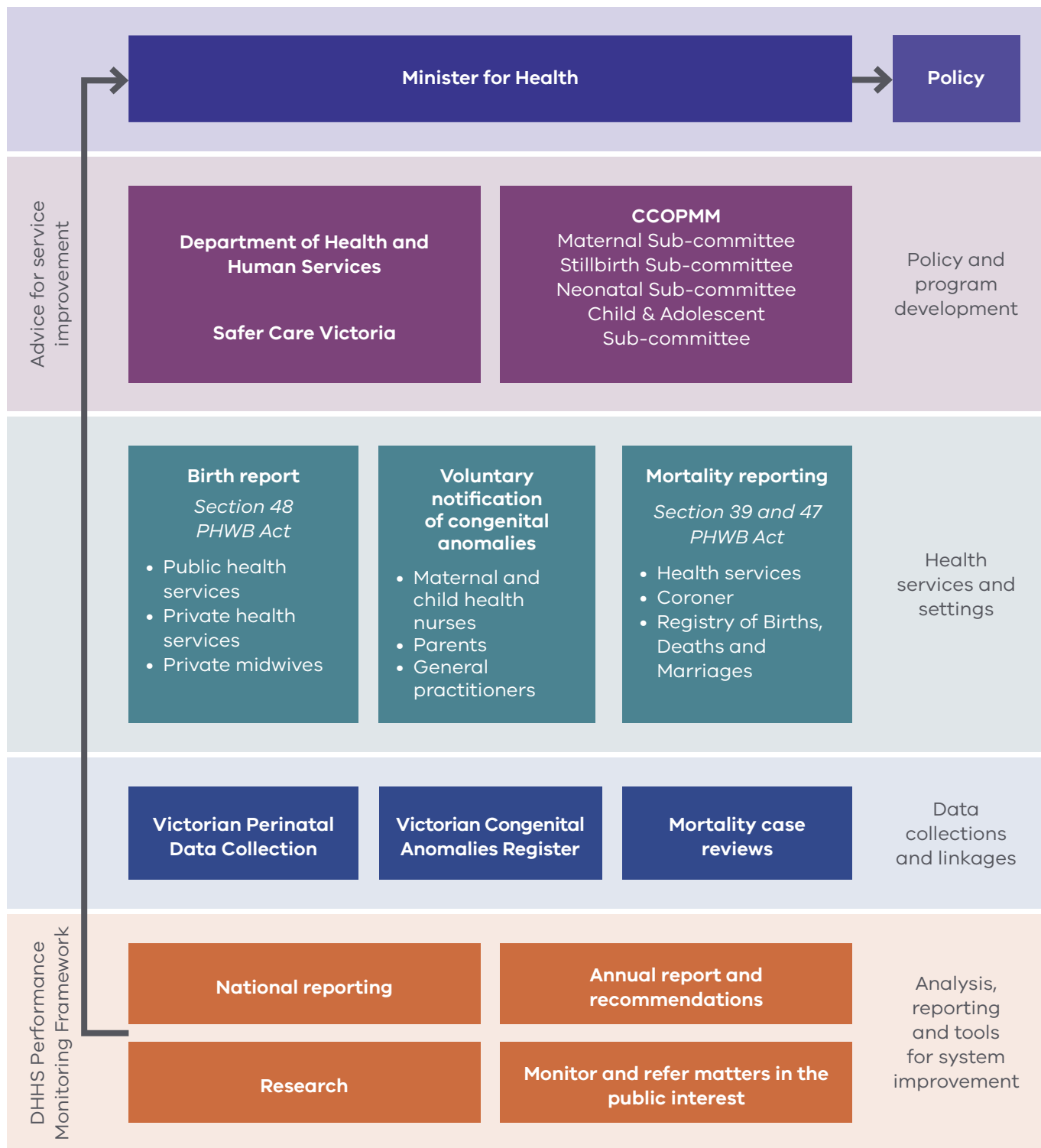
from multiple sources including the VPDC, hospital records, perinatal death certificates, autopsy reports, cytogenetics reports, clinicians and others in the community such as parents. Any person has the ability to notify the VCAR via CCOPMM's website. Find more information about VCAR on the Better Safer Care website <<https://bettersafecare.vic.gov.au/about-us/about-scv/councils/ccopmm/victorian-congenital-anomalies-register>>.

Reporting and analysis

The VPDC contributes to the National Perinatal Data Collection managed by the Australian Institute of Health and Welfare (AIHW). The AIHW produces the annual report *Australia's mothers and babies*, using the National Perinatal Data Collection and other data. The VPDC contains additional items to enable more detailed analysis on the health of women and babies in Victoria. CCOPMM supports research that is strategic and targeted at themes and recommendations requiring further evidence to inform clinical outcome improvements.

Regulation 10 of the Public Health and Wellbeing Regulations 2009 sets out the circumstances in which CCOPMM is authorised to release data for research purposes. All research requests involving CCOPMM-held data must be submitted to CCOPMM for approval. Research proposals must conform to the NHMRC's *National statement on ethical conduct in human research* (2007), and a properly constituted Victorian Human Research Ethics Committee must give approval prior to CCOPMM considering the request. In the public interest, CCOPMM is also authorised to provide information to authorities and interested parties specified under s. 41 of the Act. Find more information about data and research requests on the Better Safer Care website <<https://bettersafecare.vic.gov.au/about-us/about-scv/councils/ccopmm/reporting-to-ccopmm>>.

Figure 23: CCOPMM's relationships, accountabilities and role



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Appendix 1: Definitions and acronyms

Definitions

Apgar score

A measure of the physical condition of a newborn infant. It is obtained by adding points (2, 1 or 0) for heart rate, respiratory effort, muscle tone, response to stimulation and skin coloration. A score of 10 represents the best possible condition.

Child death

The death of a child occurring after and including the first birthday and up to, but **not** including, the 18th birthday (one to 17 years).

Confinements

The number of women who gave birth to one or more live births or stillbirths (regardless of plurality) with a pregnancy of 20 weeks' gestation or more.

Congenital anomaly (formerly 'birth anomaly')

Any anomaly of prenatal origin arising from conception or occurring before the end of pregnancy. This includes structural, functional, genetic, chromosomal and biochemical anomalies. PSANZ coding uses the wording 'congenital abnormality.' CCOPMM uses the wording 'congenital anomaly' and the terms 'congenital abnormality' and 'congenital anomaly' are considered to be the same.

Crude birth rate

Measured by the number of live births (see definition below) per 1,000 estimated female resident population aged 14–44 years for a given calendar year.

Episiotomy

A surgical incision of the perineum and the posterior vaginal wall usually performed to enlarge the opening for the baby to pass through.

Estimated resident population (ERP)

The ERP is an Australian Bureau of Statistics measure of the population based on the concept of residence and refers to all people, regardless of nationality or citizenship, who usually live in Australia, except for foreign diplomatic personnel and their families. The CCOPMM report uses estimated female resident population (EFRP), aged 15–44 years, in its tables.

Infant death

The death of a live-born infant occurring within one year of birth. Infant death can be divided into 'neonatal death' referring to the death of a liveborn infant less than 28 days after birth, of at least 20 weeks' gestation or, if gestation is unknown, weighing at least 400 g, and 'post-neonatal infant death', referring to the death of an infant between 28 days and 364 days.

Late maternal death

The death of a woman after 42 days but within a year of the birth or end of the pregnancy. The death may be due to direct, indirect or incidental causes. Late deaths are not included in the MMR.

Live birth

The birth of a child who, after delivery, breathes or shows any evidence of life such as a heartbeat.

Maternal death

Maternal death refers to the death of a woman while pregnant or within 42 days of the end of the pregnancy, irrespective of the cause of death. This definition allows for classification of maternal deaths as follows:

- **direct** – the death is considered to be due to a complication of the pregnancy (for example, haemorrhage from placenta praevia)
- **indirect** – the death is considered to be due to a pre-existing or newly diagnosed condition aggravated by the physiological or pathological changes of pregnancy (for example, deterioration in pre-existing heart disease or diabetes); deaths as a result of psychiatric disease are usually categorised as indirect, except for puerperal (postpartum or postnatal) psychosis, which is classified as direct
- **incidental** – the death is considered unrelated to pregnancy (for example, a passenger in a motor vehicle accident)
- **late maternal death** – when the death occurs after 42 days but within a year of the birth or end of pregnancy.

For calculating the maternal mortality ratio

The World Health Organization (WHO) defines maternal death as 'the death of a woman during pregnancy, childbirth or in the 42 days of the puerperium (the period between childbirth and the return of the uterus to its normal size), irrespective of the duration and site of the pregnancy, from any cause related to, or aggravated by, the pregnancy or its management'. This WHO definition allows maternal deaths to be identified as either direct or indirect only. It includes deaths from abortion and ectopic pregnancy, however, excludes incidental deaths from causes unrelated to pregnancy such as deaths from injury or malignancy. CCOPMM uses the WHO definition to calculate the MMR.

Perinatal death

CCOPMM defines perinatal death to include stillbirth and neonatal deaths within 28 days of birth of infants of gestation ≥ 20 weeks or, if gestation is unknown, of birthweight ≥ 400 g. Stillbirths and livebirths with only brief survival are grouped on the assumption that similar factors are associated with these losses.

CCOPMM also reports nationally on perinatal deaths of infants with a birthweight of ≥ 500 g or, if the birthweight is unknown, infants of ≥ 22 weeks' gestation. This definition has certain advantages because it excludes from the calculation those mostly pre-viable live births of < 500 g and most cases where the pregnancy was terminated for fetal or maternal indications.

Post-neonatal infant, child and adolescent deaths classification

These deaths are classified under the following categories:

- determined at birth
- sudden unexpected deaths in infancy, including sudden infant death syndrome
- unintentional injury
- acquired disease
- intentional injury
- undetermined.

Standardised mortality ratio

A risk ratio where the observed mortality pattern in a group is compared with what would have been expected if the variable-specific mortality rates had been the same as the specified reference population. Indirect standardisation adjusts for differences in the distribution of the variable of interest (for example, age) between the study and reference population.

Stillbirth

The birth of an infant of at least 20 weeks' gestation or, if gestation is unknown, weighing at least 400 g, who shows no signs of life at birth.

Sudden unexpected deaths in infancy (SUDI)

This group of deaths includes all infants (under one year of age) who die suddenly and unexpectedly after they are placed for sleeping. SUDI can be classified as unexplained:

- sudden infant death syndrome – the sudden unexpected death of an infant under one year of age, with onset of the fatal episode apparently occurring during sleep
- unclassified sudden infant death, with or without autopsy
- undetermined

or explained:

- suffocation while sleeping (including asphyxiation by bedclothes and overlaying)
- infection, metabolic disorders, congenital anomalies, genetic conditions
- other, for example, non-accidental injury.

Some international definitions of SUDI include unexpected events such as unintentional injury (for example, motor vehicle accidents). CCOPMM does not include unintentional injuries in its SUDI definitions, but details of unintentional injury in infants are listed in the report. SUDI deaths where a cause of death is identified (usually at autopsy) are included in the 'explained' category and are also included within other appropriate categories (for example, congenital anomalies or genetic conditions, infection) elsewhere in the report.

Unexplained SUDI deaths are classified according to the following definition:

1. General definition of SIDS¹

The sudden unexpected death of an infant under 1 year of age, with onset of the fatal episode apparently occurring during sleep, that remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of death and the clinical history.

2. Category IA SIDS

Includes deaths that meet the requirements of the general definition and also all of the following requirements.

Clinical:

- older than 21 days and younger than nine months of age
- normal clinical history including term pregnancy (gestational age ≥ 37 weeks)
- normal growth and development
- no similar deaths among siblings, close genetic relatives (uncles, aunts or first-degree cousins) or other infants in the custody of the same caregiver.

Circumstances of death:

- investigation of the various scenes where incidents leading to death might have occurred and determination that they do not provide an explanation for the death
- found in a safe sleeping environment, with no evidence of accidental death.

1 Krous HF, Beckwith JB, Byard RW, Rognum TO, Bajanowski T, Corey T, Cutz E, Hanzlick R, Keens TG, Mitchell EA 2004, 'Sudden infant death syndrome and unclassified sudden infant deaths: a definitional and diagnostic approach', *Pediatrics* 114(1):234–238.

Autopsy:

- absence of potentially fatal pathologic findings; minor respiratory system inflammatory infiltrates are acceptable; intrathoracic petechial haemorrhage is a supportive but not obligatory or diagnostic finding
- no evidence of unexplained trauma, abuse, neglect or unintentional injury
- no evidence of substantial thymic stress effect (thymic weight of <15 g and/or moderate/severe cortical lymphocyte depletion); occasional 'starry sky' macrophages or minor cortical depletion is acceptable
- negative results of toxicological, microbiological, radiological, vitreous chemistry and metabolic screening studies.

3. Category IB SIDS

Includes infant deaths that meet the requirements of the general definition and also meet all of the criteria for category IA except that investigation of the various scenes where incidents leading to death might have occurred was not performed or ≥ 1 of the following analyses were not performed: toxicological, microbiological, radiological, vitreous, chemistry or metabolic screening studies.

4. Category II SIDS

Includes infants that meet category I except for ≥ 1 of the following.

Clinical:

- age range outside that of category IA or IB (that is, 0–21 days or 270 days (nine months) through to first birthday)
- similar deaths among siblings, close relatives or infants in the custody of the same caregiver that are not recognised suspect for infanticide or recognised genetic disorders

- neonatal or perinatal conditions (for example, those resulting from preterm birth) that have resolved by the time of death.

Circumstances of death:

- mechanical asphyxia or suffocation caused by overlaying not determined with certainty.

Autopsy:

- abnormal growth or development not thought to have contributed to death
- marked inflammatory changes or anomalies not sufficient to be unequivocal causes of death.

5. Unclassified sudden infant death

Includes deaths that do not meet the criteria for category I or II SIDS but for which alternative diagnoses of natural or unnatural conditions are equivocal, including cases where autopsies were not preformed.

6. Post-resuscitation cases

Infants found in extremis who are not resuscitated and later die ('temporarily interrupted SIDS') may be included in the aforementioned categories, depending on the fulfilment of relevant criteria.

Twin-to-twin transfusion syndrome

A disease that affects identical twins who share a common placenta. Blood vessels that connect the two umbilical cords on the surface of the placenta allow blood from one twin (the donor) to flow into the other twin (the recipient). This transfusion of blood occurs when there is an imbalance of blood flow from the donor twin to the recipient twin, which causes twin-to-twin transfusion syndrome.

Acronyms

BMI – body mass index

CCOPMM – Consultative Council on Obstetric and Paediatric Morbidity and Mortality

ICU – intensive care unit

IMR – infant mortality rate

MMR – maternal mortality ratio

NMR – neonatal mortality rate

PIPER – Paediatric Infant Perinatal Emergency Retrieval

PMR – perinatal mortality rate

PPH – postpartum haemorrhage

PSPI – Perinatal Services Performance Indicator

RANZCOG – Royal Australian and New Zealand College of Obstetricians and Gynaecologists

SAMM – severe acute maternal morbidity

SCV – Safer Care Victoria

SIDS – sudden infant death syndrome

SUDI – sudden unexpected death in infancy

VCAR – Victorian Congenital Anomalies Register

VPDC – Victorian Perinatal Data Collection

ViCTOR – Victorian Children’s Tool for Observation and Response

WHO – World Health Organization

Appendix 2: Measures

Maternal mortality ratio (MMR)

The MMR is defined as follows:

$$\text{Maternal mortality ratio} = \frac{\text{number of direct and indirect maternal deaths}}{\text{total number of confinements}} \times 100,000$$

The MMR excludes late maternal deaths.

Confinements is the number of pregnancies of 20 weeks' gestation or more resulting in live birth or stillbirth (regardless of plurality).

Maternal deaths in early pregnancy from direct or indirect causes are included in the numerator for the MMR even though the denominator does not include pregnancies that end before 20 weeks' gestation because the available data on the number of these pregnancies are unreliable.

Perinatal mortality rate (PMR)

The PMR is calculated as stillbirths and neonatal deaths per 1,000 total births (stillbirths and live births).

For CCOPMM statistics, the rate refers to all births of at least 20 weeks' gestation or, if gestation is unknown, of birthweight of at least 400 g. However, for purposes of continuity, PMR of infants of ≥ 500 g or, where the birthweight is unknown, of at least 22 weeks' gestation, is also presented (PMR500).

For international comparisons, the rate refers to all births of at least 1,000 g birthweight or, when the birthweight is unknown, of at least 28 weeks' gestation and neonatal deaths occurring within seven days of birth (recommended by the World Health Organization).

$$\text{Perinatal mortality rate} = \frac{(\text{number of stillbirths} + \text{neonatal deaths})}{\text{total (stillbirths} + \text{live births)}} \times 1,000$$

Neonatal mortality rate (NMR)

The NMR is calculated per 1,000 live births of at least 20 weeks' gestation or, if gestation is unknown, of birthweight at least 400 g.

$$\text{Neonatal mortality rate} = \frac{\text{number of neonatal deaths}}{\text{total live births}} \times 1,000$$

Stillbirth rate

$$\text{Stillbirth rate} = \frac{\text{number of stillbirths}}{\text{total (stillbirths + live births)}} \times 1,000$$

Infant mortality rate (IMR)

The IMR is calculated as the number of infant deaths divided by the number of total (Victorian-born) live births for the index year (reported as the rate per 1,000 live births). The live births are limited to those infants ≥ 20 weeks' gestation or, if the gestation is unknown, of birthweight ≥ 400 g.

Deaths during the neonatal period of infants born as the result of termination of pregnancy for congenital anomaly or maternal psychosocial indications are excluded from the IMR calculation.

$$\text{Infant mortality rate} = \frac{\text{number of infant deaths}}{\text{total live births}} \times 1,000$$

Appendix 3: Flow diagram for births in Victoria, 2018

Acronyms used in this flow diagram

BW – birthweight

CA – congenital anomaly

EFRP – estimated female resident population (see supplementary tables detailing births in Victoria)

IMR – infant mortality rate

MPI – maternal psychosocial indications

NND – neonatal death – death of a liveborn infant less than 28 days of age

PMR – perinatal mortality rate

SB – stillbirth

TOP – termination of pregnancy

VPDC – Victorian Perinatal Data Collection

Formulae

$$\text{Crude birth rate} = \frac{E}{EFRP} \times 1,000$$

$$PMR = \frac{(G + U(i))}{(G + C)} \times 1,000$$

$$IMR = \frac{Z(ii)}{E} \times 1,000$$

Notes for flow diagram

- a. Includes only births occurring in Victoria and their outcomes.
- b. Neonatal death exclusions (J) comprise:
 - J(i). Those live born < 20 weeks' gestation (n = 20)
 - J(ii). Those live born at unknown gestation with a birthweight < 400 g (n = 0).
- c. Stillbirth exclusions (N) comprise:
 - N(i). Stillbirths where death known to have occurred < 20 weeks' gestation but birth \geq 20 weeks' gestation with a birthweight < 400 g (n = 2)
 - N(ii). Stillbirths where death and birth occurred at < 20 weeks' gestation, with a birthweight < 400 g (n = 1)
 - N(iii). Stillbirths where death known to have occurred < 20 weeks' gestation but born \geq 20 weeks' gestation, with unknown BW (n = 4)
 - N(iv). Stillbirths where death occurred at unknown gestation, birth occurred \geq 20 weeks' gestation, but where BW < 150 g (n = 25)
 - N(v). Stillbirths where death known to have occurred > 20 weeks' gestation but born with unknown but very small BW (n = 0).
- d. An additional two neonatal deaths occurred in Victoria but are not included in this figure because the neonates were not born in Victoria.
- e. Deaths reported to CCOPMM as at 31 August 2019. Final figures will be given in the 2019 annual report.

