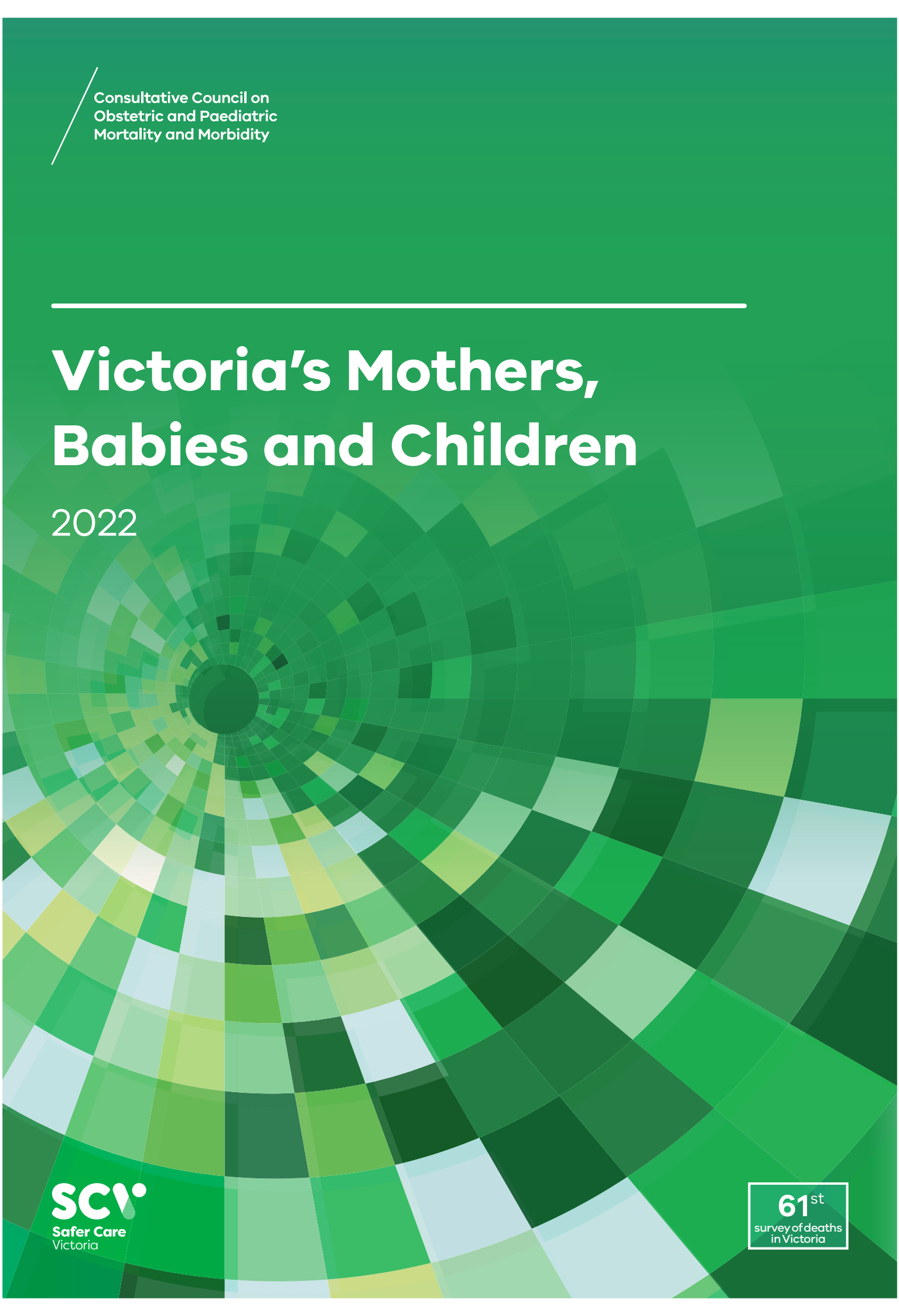
Consultative Council on Obstetric and Paediatric Mortality and Morbidity

Victoria's Mothers, Babies and Children

2022

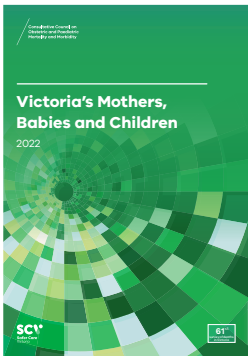


Safer Care Victoria

61st survey of deaths in Victoria

ABOUT THE COVER IMAGE

The 'radar' on the front cover signifies the multifaceted and interconnected focus of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM), leading to a central focus point or learning.



The layers symbolise the depth of analysis and review that leads to identifying the underlying circumstances that contributed to the adverse outcomes we see in this report. The central point of the radar also represents a focus on performance improvement for individual care and the broader health system, like a lens in a camera focusing on its subject.

ACKNOWLEDGMENT OF COUNTRY

We proudly acknowledge Victoria's Aboriginal communities and their rich culture and pay respect to their Elders past and present. We acknowledge Aboriginal people as Australia's First Peoples and as the Traditional Owners and custodians of the land and water on which we rely. We recognise and value the ongoing contribution of Aboriginal people and communities to Victorian life and how this enriches us. We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.

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VICTORIA State Government

LOOKING AFTER YOURSELF

This report contains information and data on deaths and harm occurring for women, babies, children and adolescents. While it is important to share the findings from our reviews, we acknowledge this information can be confronting to read.

We encourage all readers, including consumers, women, families, patients and clinicians, to look after themselves and to reach out to their own support networks, specific support networks and websites, and any relevant employee assistance program, for support and guidance. Additional resources available to help include:

- Beyond Blue beyondblue.org.au
- Headspace 1800 650 890 headspace.org.au
- Kids Helpline: 1800 551 800 kidshelpline.com.au
- Lifeline 13 11 14 lifeline.org.au
- Red Nose rednosegriefandloss.org.au
- SANDS sands.org.au

ACKNOWLEDGMENT OF LIVED EXPERIENCE

We acknowledge the lived experience of families, individuals and communities who have been affected by death and harm occurring to women, babies, children and adolescents. These tragic events have a deep impact on the lives of many.

To honour those affected, we have a duty to learn from these tragic events. We are committed to improving and creating a system that is safe for all mothers, babies and children in Victoria.

Contents

Abbreviations

BMI body mass index

CCOPMM Consultative Council on Obstetric and Paediatric Mortality and Morbidity

COVID-19 the infectious disease caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus

GPPs good practice points

IMR infant mortality rate

MMR maternal mortality ratio

NICU Neonatal Intensive Care Unit

NMR neonatal mortality rate

PMR perinatal mortality rate

PPH postpartum haemorrhage

PPROM preterm premature rupture of membranes

PSANZ Perinatal Society of Australia and New Zealand

SAMM severe acute maternal morbidity

SARS-CoV-2 severe acute respiratory syndrome coronavirus 2

SUDI sudden unexpected death in infants

VCAR Victorian Congenital Anomalies Register

VPDC Victorian Perinatal Data Collection

Terminology

This report uses the terms 'woman' and 'women' when referring to data collected in the Victorian Perinatal Data Collection (VPDC) and the CCOPMM mortality database.

Information on gender is not recorded in these data collections. The terms 'women' and 'mothers' refers to people who were pregnant and within the scope of these data collections.

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

Message from the Chair

The 2022 Annual Report of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) contains the recommendations and good practice points that have been developed by our five expert subcommittees.

CCOPMM has been functioning for over 70 years as an advisory body to the Victorian Minister for Health. CCOPMM conducts analysis of, and research into, all maternal, neonatal, child, and adolescent deaths, all stillbirths, and all women admitted to an intensive care unit during pregnancy.

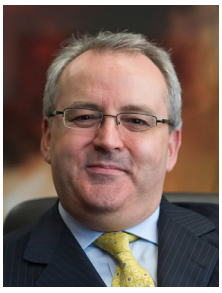
Recent years have been challenging for CCOPMM. During the pandemic, the CCOPMM secretariat was tasked with assisting the COVID-19 response of the Department of Health. Consequently, CCOPMM's usual role in data acquisition and analysis was deferred until the pandemic response had eased. An internal restructure has also seen the transition of the Consultative Councils Unit (CCU) to the Governance Secretariat team within Safer Care Victoria's Operations Branch.

I wish to acknowledge the significant efforts of the CCU and the Governance Secretariat in managing CCOPMM through change. The new secretariat is now embedded in CCOPMM with data collection and analysis being streamlined. We have taken the opportunity to release an abridged report so the next Annual Report can return to the usual contemporaneous and comprehensive format.

Despite the challenges that have faced CCOPMM over the last few years, we have continued to undertake case reviews, analyse data on perinatal, neonatal and childhood outcomes, continue to provide data for research, and contribute nationally to information reporting.

CCOPMM is privileged to include the expertise of many of the most senior clinicians in Victoria. Council and subcommittee members are well supported by our panel of senior clinical advisers and by our hard working secretariat. I wish to thank everyone involved at CCOPMM for your hard work and the valuable time that you contribute to our case reviews, data analysis, subcommittees and Council.

On behalf of CCOPMM and all its members and supporting staff, I encourage you to read the report, consider the recommendations and good practice points, and to continue providing your extraordinary care to the women, babies and children of Victoria.



Professor Mark Umstad AM

Chair, Consultative Council on Obstetric and Paediatric Mortality and Morbidity

About CCOPMM

CCOPMM FUNCTIONS

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.

As described in 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 of the Department of Health 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 CCOPMM's functions
- 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.

REVIEW OF DEATHS

CCOPMM's primary role is to:

- review all maternal, perinatal and paediatric deaths in Victoria
- review all cases of severe acute maternal morbidity
- determine factors that may have contributed to these deaths and morbidities
- provide advice and recommend effective strategies to prevent harm and improve clinical outcomes.

All perinatal deaths from 20 weeks' gestation (or 400 grams birthweight if gestation is not known) and all child deaths under the age of 18 years that occur in Victoria are reviewed. We collect information from multiple sources, including the Victorian Perinatal Data Collection (VPDC), hospital case records, individual doctors and midwives, pathology services, the State Coroner, Ambulance Victoria and Paediatric Infant Perinatal Emergency Retrieval (PIPER). The clinical features of each case are considered and then classified according to the relevant system. Perinatal deaths are classified in line with the PSANZ's Perinatal Mortality Classification System and post-neonatal infant, child and adolescent deaths are classified using the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (Eleventh Edition).

CCOPMM has multiple sources of information available regarding children (including health, welfare and education records) and does not limit the cause of death classification to the cause of death recorded in postmortem reports or death certificates. In some cases, new information may become available 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 to improve clinical practice and systems based on the findings from each review and the best available evidence. We cannot always identify avoidable factors from the information available during case review, meaning that the actual number of cases that may have preventable factors could be higher.

REVIEW OF BIRTHS

The Act requires all births that occur in Victoria to be reported to CCOPMM within a prescribed period. This period is defined in the Public Health and Wellbeing Regulations 2019 as 30 days after the birth.

CCOPMM has statutory responsibility for the VPDC and Victorian Congenital Anomalies Register (VCAR). The department and Safer Care Victoria manage the data collections on behalf of CCOPMM. The data collections enable information about the health of women, babies and children to be analysed and help support improvements in care provided and policy development. Information is collected on obstetric conditions, procedures and outcomes, neonatal morbidity and congenital anomalies relating to every birth in Victoria of at least 20 weeks' gestation or, if gestation is unknown, at least 400 grams birthweight.

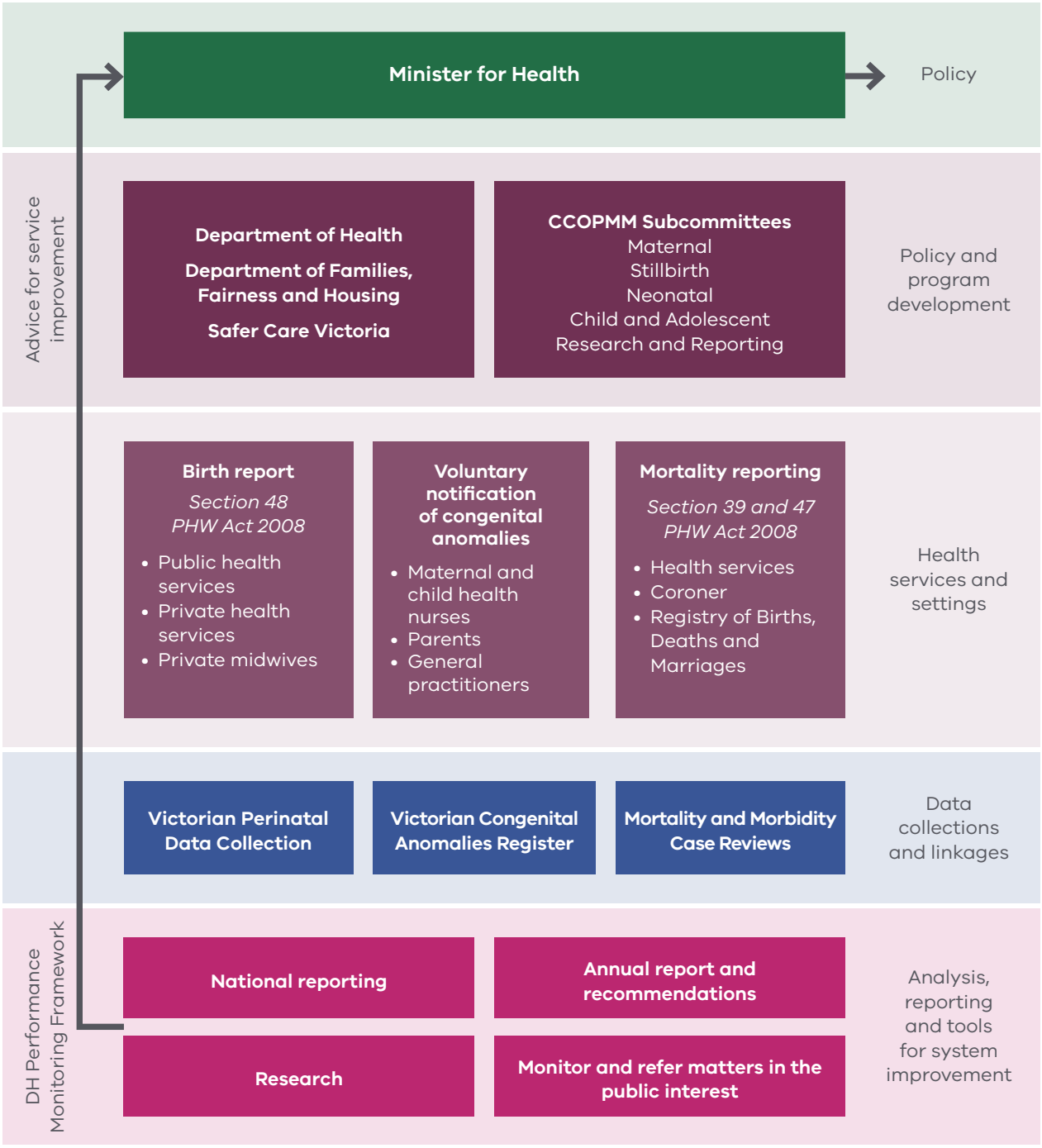
REPORTING AND ANALYSIS

The VPDC contributes to the Australian Institute of Health and Welfare's National Perinatal Data Collection, which informs the annual report Australia's mothers and babies. CCOPMM also supports strategic research that informs clinical outcome improvements, as described in the 'Research and quality improvement' chapter.

You can find previous editions of this annual report, *Victoria's mothers, babies and children*, on the Safer Care Victoria website.

An illustration of CCOPMM's relationships accountabilities and role is shown in Figure 1.

Figure 1: CCOPMM's relationships, accountabilities and role



CCOPMM DATA

CCOPMM is responsible for maintaining the following data collections established under the Act.

Victorian Perinatal Data Collection

The VPDC is a register established in 1982 that records sociodemographic characteristics and clinical outcome data on all births in Victoria of at least 20 weeks' gestation or, if gestation is unknown, 400 grams birthweight. Data is 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 Department of Health website.

Victorian Congenital Anomalies Register

The VCAR contains information on all congenital anomalies in livebirths, stillbirths and terminations of pregnancy diagnosed before birth to six years old, voluntarily notified to CCOPMM. The data collected in this register provide the necessary information to monitor, research and plan clinical improvement initiatives and includes suspected or confirmed congenital anomalies.

Data are 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 to the VCAR via CCOPMM's website. Find more information about the VCAR on the Safer Care Victoria website.

CCOPMM Mortality Database

The CCOPMM Mortality Database contains health and personal information on all cases of maternal, perinatal and paediatric mortality in Victoria. All Victorian health services must report mortality cases to CCOPMM. CCOPMM uses the information in this database to conduct study, research and analysis into the incidence and causes of maternal and neonatal deaths, stillbirths and the deaths of children under 18 in Victoria. CCOPMM shares the lessons learned from this data each year in this report to help health services and medical practitioners improve clinical practice and systems of care. Find more information on what and how to report to CCOPMM on the Safer Care Victoria website.

Severe acute maternal morbidity (SAMM)

Victoria was the first jurisdiction in Australia to introduce mandatory reporting of SAMM cases. CCOPMM's severe acute maternal morbidity dataset includes information on maternal admissions to intensive care during pregnancy and up to 42 days after birth or pregnancy end. Information is also collected on women who nearly died but survived a complication (requiring intensive care unit admission) that occurred during pregnancy, childbirth or within 42 days of birth or termination of pregnancy. Admission to intensive care is used because it is a simple, identifiable criterion and captures the most severe cases. Data are obtained from health services, which are obligated to report these cases under the Act. Find more information on what and how to report to CCOPMM on the Safer Care Victoria website.

CCOPMM SUBCOMMITTEES

There are five subcommittees that report to CCOPMM:

1. Maternal Mortality and Morbidity Subcommittee
2. Stillbirth Subcommittee
3. Neonatal Mortality Subcommittee
4. Child and Adolescent Mortality Subcommittee
5. Research and Reporting Subcommittee.

Introduction

Victoria's mothers, babies and children 2022 presents data and trends on the births and deaths reported to and reviewed by the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) and its subcommittees. The report includes good practice points for services and clinicians to review, implement and evaluate, supporting continuous improvement.

Rates of maternal, perinatal and child mortality in Victoria are among the lowest in the world. While this is reassuring for all Victorians, we can and must always strive to improve health outcomes and experiences for women, babies, children and their families.

Through its legislative functions, CCOPMM captures birth data, identifies trends and instances of preventable mortality and morbidity and highlights factors that contribute to preventable harm. Monitoring trends and reporting instances of preventability ensures we can collectively continually improve the quality and safety of care and experiences for Victoria's mothers, babies and children.

THIS ABBREVIATED REPORT HAS SIX SPECIFIC SECTIONS

1. Mothers and babies
2. Maternal mortality and morbidity
3. Perinatal mortality
4. Aboriginal births, mortality and morbidity
5. Child and adolescent mortality
6. Research and quality improvement

What is CCOPMM and what does it do?

CCOPMM is an advisory body to the Victorian Minister for Health. The functions of CCOPMM are legislated in the *Public Health and Wellbeing Act 2008* and are supported by the Public Health and Wellbeing Regulations 2019. These functions include collecting perinatal data, reviewing all cases of maternal, perinatal and paediatric mortality, and severe acute maternal morbidity (SAMM).

CCOPMM reviews occur in one of four subcommittees:

1. Stillbirth Subcommittee
2. Neonatal Mortality Subcommittee
3. Maternal Mortality and Morbidity Subcommittee
4. Child and Adolescent Mortality Subcommittee.

The work of CCOPMM is also supported by the Research and Reporting Subcommittee, a multidisciplinary group combining specialist clinical and research knowledge to drive CCOPMM's research function.

CCOPMM undertakes research and reports on its activities annually through a range of publications and resources.

CCOPMM provides independent advice and information on quality and safety monitoring to the Victorian Government. This helps prioritise improvement activities, contributes to policy and guideline development and provides feedback to the Victorian health and human services systems and to the general community. More information is available in the 'About CCOPMM' section of this report.

CCOPMM good practice points

Our good practice points reflect the findings of CCOPMM's review of all cases of maternal, perinatal and paediatric mortality and SAMM for 2022.

Good practice points (GPPs) are designed to direct local health services and clinicians towards the improvements required in their services and/or in their own clinical practice. All health services and clinicians should develop a plan to consider the GPPs in the context of their settings and implement those that will improve the care they provide.

To ensure ongoing improvement and prioritisation of areas on which to focus service and/or clinician action plans, all health services must review all maternal, perinatal, child and adolescent deaths and significant morbidity that occur in their service to determine contributing factors. This should be done by a multidisciplinary mortality and morbidity committee that is accountable to review all incidents, action any lessons and monitor ongoing performance.

Health services should ensure their clinical governance system:

- has a clearly defined and documented process for case investigation
- is multidisciplinary and includes consumers
- can identify contributing factors and make recommendations that are actioned and evaluated in a timely manner
- shares findings and lessons.

Data informing our work

The Victorian Perinatal Data Collection (VPDC) provides CCOPMM with information about mothers and their babies, including maternal and baby characteristics, medical conditions and complications of pregnancy. This includes details about the labour, birth, neonatal and postnatal periods for every birth in Victoria, whether the baby was born in a public or private hospital or at home. This information helps us:

- monitor and report on the safety and quality of care
- inform our improvement programs
- plan and conduct research activities
- make policy and planning decisions across Victoria.

VPDC data is analysed for this report.

The data provided by the VPDC is also used to produce the annual Perinatal Services Performance Indicators report. That report provides benchmarks and transparent site-specific outcome data across public and private maternity services. Services use these reports to prioritise their improvement programs.

Recommendation
Electronic medical records

The Maternal Morbidity & Mortality, Neonatal and the Stillbirth Subcommittees have identified limitations with the EMR and fragmentation of the medical record as a source of risk for patients. It is also noted that this fragmentation generates inefficiency and increases waste with duplication of resources and investigations.

CCOPMM recommends the development of a systems solution that allows easier, more timely, and better exchange of information between all maternity and neonatal care providers.

ELECTRONIC MEDICAL RECORD IN MATERNITY AND NEONATAL CARE

The use of electronic medical records (EMR) has become standard for most health services in Victoria. Whilst the many benefits of an EMR have been well documented, they also provide challenges for maternity care providers. CCOPMM also note that different EMR systems are used across Victoria, with no standardisation or integration of the medical record from one service to another. It is often necessary for maternity and neonatal patients to transfer between health services to access appropriate care; this is especially the case in high-risk pregnancy where either women or neonates may require additional investigations, investigations, counselling or higher-level management.

Safe provision of maternity care is dependent on a system facilitating easier, more timely, and better exchange of information. Such a system should encompass primary care and all state-wide maternity services (including pathology, imaging and associated services), with visibility to all providers of pregnancy and neonatal care to safeguard pregnant patients and their babies.

RECOMMENDATIONS FOR EMR IN PREGNANCY CARE

CCOPMM have identified specific aspects of working within the EMR environment that represent a source of potential risk for pregnant patients. These should be prioritised by Health Services:

Health services should ensure that maternity-specific reference ranges for vital sign observations (e.g., heart rate, blood pressure, respiratory rate, oxygen saturations) are embedded within the EMR and not reliant on manual adjustments by individual practitioners.

Maternal (and fetal) investigations and pregnancy record information should be linked to Neonatal EMR records to facilitate streaming of information.

Health services should aim to streamline and integrate patient care by ensuring investigation results from both internal and external sources (e.g., pathology and imaging investigations) are easily identified and reviewed within the EMR in a timely fashion.

When transferring patients between health services (e.g., to access higher level care or if a patient relocates to a new health service catchment), health services should ensure that all the pregnancy-related investigations and relevant documentation from the EMR are also included in the transfer summary.

CCOPMM

Good Practice Points

Following the review of mortality and morbidity occurring in (and from) 2022, CCOPMM's Subcommittees have developed the following good practice points (GPPs).

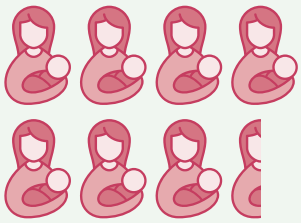
Mothers and babies

Victoria continues to be a safe place to give birth. However, we still see disparities in outcomes between different groups of women who are complex and based on a variety of factors. Aboriginal women, non–English speaking women, women of low socioeconomic status or without access to free health care, those who are affected by family violence and those with mental health challenges continue to have fewer favourable outcomes.

It is important for these disparities to be identified and addressed to ensure all women birthing in Victoria always receive high-quality care.

This chapter excludes terminations of pregnancy for congenital anomalies and for maternal psychosocial indications.
EFRP = estimated female resident population

75,221 women gave birth in 2022



↘ **5,101 fewer** than 2021

76,363 babies were born in 2022

↘ **5,071 fewer** than 2021

↘ **birthrate decreased to 55.5** livebirths per 1,000 EFRP

1.7% women who gave birth (1,259) **were Aboriginal**

↗ Slight increase from 2021

They gave birth to **1,280 babies**

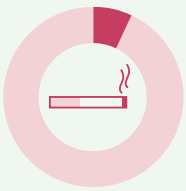
2.4% of all babies born in 2022 (1,811) were reported as being **Aboriginal**

10,577 women
(14.1%) instrumental vaginal births 2022
Down from 15.1% in 2021

30,776 women
(40.9%) caesarean section births 2022
Up from 39.2% in 2021

33,863 women
(45.0%) unassisted vaginal births 2022
Down from 45.8% in 2021

7.2% women smoked
at some time during their pregnancy in 2022
Similar to 2021



6.9% women smoked in first half pregnancy

4.2% women smoked in second half pregnancy

PREGNANCY AND BIRTH

- In 2022, 75,221 women gave birth to 76,363 babies. This is compared with 80,322 women who gave birth to 81,434 babies in 2021.
- There were 5,101 fewer women giving birth and 5,071 fewer babies in 2022 than in 2021.
- 29.9 per cent of women started labour spontaneously; around one-third of these went on to have labour augmented.
- 32.2 per cent of women had labour induced (this includes 2.1 per cent who experienced no labour following a failed induction of labour), and 26.0 per cent of women had no labour.
- Victoria continues to see an increase in caesarean rates (30,776 women, 40.9 per cent), with unassisted vaginal birth rates (33,863 women, 45.0 per cent) similar to 2021.
- 1,259 Aboriginal women gave birth to 1,280 babies (1.7 per cent of all women and 1.7 per cent of all babies born in Victoria). 1,811 babies (2.4 per cent) were reported as being Aboriginal.[1]
- 76.1 per cent of women gave birth under the care of a public maternity service. 23.3 per cent gave birth in a private hospital and 0.6 per cent of women had a planned homebirth under the care of a private midwife. There were 73 fewer public homebirths in 2022 compared with 2021.
- 7.2 per cent of women (5,401) smoked at some time during their pregnancy. This has not changed compared with 2021.
- 6.9 per cent of women (5,157) smoked in the first half of pregnancy and 4.2 per cent (3,182) smoked in the second half of pregnancy.

[1] For trends and comparisons specifically related to Aboriginal women and babies please refer to the 'Aboriginal births, mortality and morbidity' section.

Table 1: Trends in birthing episodes (number of women giving birth) and gestation (%), 2000–2022

Gestation	2000	2005	2010	2015	2016	2017	2018	2019	2020	2021	2022
20–27 weeks	0.7	0.6	0.6	0.5	0.6	0.5	0.6	0.6	0.5	0.5	0.5
28–31 weeks	0.7	0.6	0.7	0.7	0.6	0.7	0.6	0.7	0.6	0.6	0.7
32–36 weeks	5.5	5.5	5.8	6.4	6.2	6.4	6.4	7.0	5.9	5.7	5.7
37–41 weeks	91.8	91.9	91.6	92.0	92.2	92.1	92.1	91.5	92.7	92.8	92.6
42+ weeks	1.3	1.3	1.2	0.5	0.4	0.3	0.2	0.3	0.3	0.4	0.5
Not reported	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MOTHERS

- The median age of women giving birth in 2022 was 32 years. The median age of women having a first birth was 31 years.
- Just over half of all pregnant women were overweight (28.1 per cent) or obese (23.4 per cent).
- 36.9 per cent of women giving birth were born outside of Australia.

BABIES

- Of babies born at 20–27 weeks (0.5 per cent of all births, n = 411), 166 were born at 20–23 weeks and 245 were born at 24–27 weeks.
- In 2022, 26,043 babies (34.1 per cent) were born at 37 or 38 weeks and, of those, 8,345 (34.3 per cent) had labour induced. Another 10,106 (46.4 per cent) had a pre-labour caesarean section. Of those who were induced at 37 or 38 weeks, no medical indication was reported for 8.6 per cent.

Table 1 shows trends in birthing episodes and gestation.

Maternal mortality and morbidity

Maternal mortality includes all maternal deaths during pregnancy and within a year of birth. Maternal morbidity includes all intensive care unit (ICU) admissions during pregnancy and up to 42 days after birth or pregnancy end.

Victorian maternal mortality ratio (MMR)

6.0 deaths per 100,000 women who gave birth during 2020-22 triennium

This is fewer than 8.1 deaths per 100,000 women who gave birth during 2019-21 triennium

In Australia maternal deaths are rare, so it is important that all maternal deaths are reviewed to determine the likely cause and the presence of factors that contributed to the death. A maternal death is defined as the death of a woman during pregnancy or within 12 months of the end of pregnancy, from any cause.

In this report, maternal deaths occurring during pregnancy or up to six weeks after the end of pregnancy are classified as:

- **direct** – resulting from obstetric complications of pregnancy or its management
- **indirect** – resulting from diseases or conditions that were not due to a direct obstetric cause but were aggravated by the physiological effects of pregnancy
- **coincidental** – causally unrelated to the pregnancy or birth.

Maternal deaths occurring more than 42 days after the end of the pregnancy and up to one year after birth are reported as '**late**'. These deaths may have direct, indirect or coincidental causes.

The incidence of maternal deaths is expressed as the maternal mortality ratio, which is calculated using direct and indirect deaths that occur during pregnancy or within 42 days of the end of pregnancy. Late and coincidental deaths are not included in this calculation[2].

By reviewing every maternal death, and understanding contributing factors, recommendations can be made and safety opportunities shared with health and community services and clinicians to improve outcomes for women and their families.

[2] Note that the methodology for death classifications has changed over time to align with national standards. Numbers may differ from previous reports due to revisions to the data.

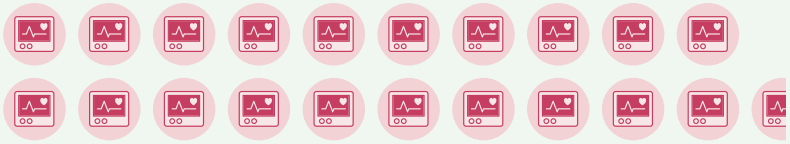
Maternal deaths per year

	From 2020-22: 32 maternal deaths	In 2022: 8 maternal deaths
Direct deaths	4	0
Indirect deaths	10	2
Coincidental deaths	10	6
Late deaths	8	0
Unclassifiable deaths	0	0

SNAPSHOT

- In 2022 there were eight maternal deaths, compared with 16 reported deaths in 2021 and eight in 2020.
- Of the eight deaths in 2022, two were indirect and six were coincidental. There were no direct, late or unclassifiable deaths in 2022.
- In the 2020–2022 triennium there were 32 deaths, of which four were direct, 10 were indirect, ten were coincidental and eight were late.
- Of these 32 deaths in the 2020-2022 triennium, seven were considered preventable by the Maternal Mortality and Morbidity Subcommittee.
- The Victorian maternal mortality ratio from 2020 to 2022 was 6.0 per 100,000 women who gave birth.
- In the 2020–2022 period, the top causes of maternal mortality were cardiovascular causes, non-obstetric haemorrhage, thromboembolism and cancer.

206
SAMM cases
reported to
CCOPMM



SEVERE ACUTE MATERNAL MORBIDITY

The audit of SAMM outcomes acts as a quality indicator of obstetric care. The focus until recently was on maternal mortality reporting, but this only gives insight to a fraction of the burden of maternal morbidity.

A concise and detailed review of SAMM ('maternal near misses' or 'near hits' or 'safety opportunities') is an important step towards promoting reflective practice and safe pregnancy care. It affords learning opportunities to identify underlying and/or preventable causes and contributing factors, and allows for identification of systems improvement strategies which, in turn, lead to an improvement of pregnancy care and maternal outcomes.

Victoria was the first jurisdiction in Australia to introduce mandatory reporting of SAMM cases in 2017. SAMM is measured as an admission to an ICU during pregnancy and up to 42 days after birth or termination of pregnancy. Each ICU admission is then categorised into one of 17 morbidities. Women who do not meet criteria for defined morbidities remain unclassified.

SUMMARY OF SEVERE ACUTE MATERNAL MORBIDITY

In 2022, there were 206 SAMM cases reported to CCOPMM.

Please note:

Analysis of SAMM cases is currently underway and a detailed analysis will be provided as an addendum to this report.

Good Practice Points

MANAGEMENT OF HEAVY VAGINAL BLEEDING IN THE PRESENCE OF A MISCARRIAGE

Where there is heavy vaginal bleeding in the presence of a miscarriage early surgical management should be initiated to reduce the likelihood of clinical deterioration and the need for blood transfusion.

SENIOR CLINICIAN REVIEW OF POSTNATAL PERIOD READMISSIONS

All women admitted with a pregnancy complication or readmitted in the postnatal period are reviewed by a senior clinician within 24 hours of admission.

MULTIDISCIPLINARY SIMULATION TRAINING FOR MANAGEMENT OF EPIDURAL COMPLICATIONS AND MATERNAL SEPSIS

Expand the use of multidisciplinary simulation training to improve the management of epidural complications including maternal collapse and maternal deterioration from sepsis.

MULTIDISCIPLINARY AND SENIOR CLINICIAN REVIEW OF ALL WOMEN WITH PRETERM PREMATURE RUPTURE OF MEMBRANES (PPROM) AT THE LIMITS OF VIABILITY

The care of all women with suspected or confirmed mid-trimester preterm premature rupture of membranes (PPROM) at the limits of viability should involve a senior obstetric clinician. Where there is consideration of terminating a pregnancy, timely multidisciplinary discussion is recommended.

INTERNAL REVIEWS OF ALL WOMEN MEETING CRITERIA FOR SEVERE ACUTE MATERNAL MORBIDITY (SAMM)

The Maternal Mortality and Morbidity subcommittee recommend that all women meeting criteria for severe acute maternal morbidity (SAMM) reporting are reviewed internally by the health facility to identify learning opportunities. This review is shared within three months with the Maternal Mortality and Morbidity subcommittee.

Perinatal mortality

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

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.

773
perinatal deaths 2022
Slight decrease from 785 in 2021

658
adjusted perinatal deaths 2022
Slight decrease from 696 in 2021

8.6
per 1,000 births
adjusted perinatal mortality rate 2022
Slight increase from 8.5 in 2021

35.4% of adjusted perinatal deaths in 2022 **underwent a full autopsy**
Up from 31.5% in 2021

40.2%
of adjusted stillbirths **underwent a full autopsy**
Up from 34.9% in 2021

21.6%
of adjusted neonatal deaths **underwent a full autopsy**
Down from 22.7% in 2021

6.4 per 1,000 births
adjusted stillbirth rate 2022
for babies born after 20 weeks' gestation
Compared with 6.1 per 1,000 in 2021

2.2 per 1,000 live births
adjusted neonatal mortality 2022
Compared with 2.4 per 1,000 live births in 2021

9.8 per 1,000 births adjusted perinatal mortality rate 2022 in women who **smoked at any time** while pregnant

8.6 per 1,000 births adjusted perinatal mortality rate 2022 in women who **did not smoke** while pregnant

SNAPSHOT

- There were 658 adjusted[3] perinatal deaths in 2022 compared with 696 in 2021.
- These included 487 adjusted stillbirths and 171 adjusted neonatal deaths.
- While there were fewer births in 2022 compare
d with 2021, the adjusted perinatal mortality rate (PMR) was 8.6 per 1,000 births in 2022, compared with 8.5 per 1,000 births in 2021.
- The adjusted PMR in women smoking at any time during pregnancy was 9.8 per 1,000 births compared with 8.6 per 1,000 births in those who did not smoke while pregnant.
- In 2022, 35.4 per cent of adjusted perinatal deaths underwent a full perinatal autopsy (40.2 per cent of stillbirths and 21.6 per cent of adjusted neonatal deaths).
- The adjusted stillbirth rate for babies born after 20 weeks' gestation was 6.4 per 1,000 births, a slight increase from 6.1 per 1,000 births in 2021.
- The adjusted neonatal mortality rate was 2.2 per 1,000 livebirths in 2022 compared with 2.4 per 1,000 livebirths in 2021.
- There were 141 stillbirths after 28 weeks in 2022 (excluding perinatal deaths from congenital anomaly and termination of pregnancy for maternal psychosocial indications) compared with 132 in 2021.

Perinatal mortality rates

The 2022 adjusted PMR was:

- 8.2 per 1,000 births for singletons
- 19.6 per 1,000 births for twin pregnancies
- 111.1 per 1,000 births for other multiple pregnancies.

[3] Note that the methodology for death classifications has changed over time to align with national standards. Numbers may differ from previous reports due to revisions to the data.

Table 2: Adjusted PMR by maternal place of birth, Victoria 2022[4,5]

Maternal place of birth	Adjusted total births		Livebirths[6]		Adjusted stillbirths	Adjusted neonatal deaths	Adjusted perinatal deaths	% of all perinatal deaths	Adjusted PMR by maternal place of birth
	N	%	N	%	N	N	N	%	
Americas	1086	1	1081	1.4	5	0	5	0.8	4.6
Southern and Eastern Europe	1200	2	1192	1.6	8	0	8	1.2	6.7
Oceania and Antartica	2053	3	2042	2.7	11	4	15	2.3	7.3
North-East Asia	3066	4	3050	4.0	16	7	23	3.5	7.5
North-West Europe	2006	3	1998	2.6	8	8	16	2.4	8.0
Australia	47714	62	47424	62.3	290	100	390	59.3	8.2
South-East Asia	4546	6	4514	5.9	32	11	43	6.5	9.5
North Africa and the Middle East	2414	3	2395	3.1	19	4	23	3.5	9.5
Southern and Central Asia	10077	13	10001	13.1	77	24	101	15.3	10.0
Sub-Saharan Africa	1731	2	1719	2.3	12	9	21	3.2	12.1
Unknown	682	1	673	0.9	9	4	13	2.0	19.1
Total	76575	100	76089	100	487	171	658	100	8.6

[4] The figures and calculations in this table exclude 114 stillbirths and 1 neonatal death from terminations of pregnancy for maternal psychosocial indications.
[5] This table is ranked by PMR (excluding missing data).
[6] Livebirths include all livebirths, including those who later die as neonatal deaths.

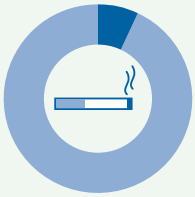
SMOKING AND PERINATAL MORTALITY

In 2022: 5,501 babies were born to women who reported smoking at any time during pregnancy (7.2 per cent of all adjusted births).

- There were 45 adjusted stillbirths and 9 neonatal deaths in women who smoked at any time during pregnancy.
- There were 429 adjusted stillbirths and 156 neonatal deaths in women who did not smoke at any time.

The adjusted PMR in women smoking at any time during pregnancy was 9.8 per 1,000 births compared with 8.6 per 1,000 births in those who did not smoke while pregnant.[7]

5,501 babies born
to women who smoked
at any time during their pregnancy in 2022.
(7.2% of all adjusted births)



9.8
adjusted PMR
per 1,000 births

45
stillbirths

9
neonatal deaths

in women who smoked at any time during their pregnancy in 2022.

8.6
adjusted PMR
per 1,000 births

429
stillbirths

156
neonatal deaths

in women who did not smoke at any time during their pregnancy in 2022.

[7] The data in this section refer to babies affected by smoking in pregnancy (i.e. twins would be counted separately), whereas the smoking data on page 33 refers to women who smoked in pregnancy regardless of whether they had a singleton or multiple pregnancy.

MOST COMMON CAUSES OF PERINATAL MORTALITY

Congenital anomaly (including termination of pregnancy for congenital anomaly) is the most common cause of death for adjusted stillbirths and neonatal deaths. In 2022 congenital anomaly accounted for:

- 208 adjusted stillbirths (42.7 per cent of all adjusted stillbirths)
- 55 neonatal deaths (32.2 per cent of all neonatal deaths)
- 263 adjusted perinatal deaths (40.0 per cent of all adjusted perinatal deaths).

After congenital anomalies, the most common causes of perinatal death in 2022, according to the Perinatal Society of Australia and New Zealand (PSANZ) perinatal death classification, were:

- spontaneous preterm labour or rupture of membranes (< 37 weeks' gestation) (100 deaths, 15.2 per cent)
- unexplained antepartum feal death (96 deaths, 14.6 per cent)
- placental dysfunction or causative placental pathology (47 deaths, 7.1 per cent).

The most common causes of neonatal death in 2022, according to the PSANZ perinatal death classification, were:

- spontaneous preterm labour or rupture of membranes (< 37 weeks' gestation) (62 deaths, 36.3 per cent)
- congenital anomaly (55 deaths, 32.2 per cent)
- hypoxic peripartum death (13 deaths, 7.6 per cent).

After congenital anomalies, the most common causes of stillbirth in 2022, according to the PSANZ perinatal death classification, were:

- unexplained antepartum fetal death (96 deaths, 19.7 per cent)
- placental dysfunction or causative placental pathology (46 deaths, 9.4 per cent)
- spontaneous preterm labour or rupture of membranes (< 37 weeks) (38 deaths, 7.8 per cent).

Good Practice Points

Improving diagnosis and management of a woman with a short cervix

AIM

CCOPMM recommends the following good practice points for the diagnosis and management of a woman with an asymptomatic short cervix at the midtrimester morphology scan.

REFERRAL

All women with risk factors for spontaneous preterm birth on history should be referred to a specialist preterm birth clinic or equivalent service before 14 weeks' gestation. Public patients should be referred to a specialist preterm birth clinic or equivalent maternal fetal medicine (MFM) service. Private patients should be seen by a suitably experienced practitioner.

CERVICAL ULTRASOUND AND REPORTING

Cervical ultrasound in private models of care should be performed by clinicians with Certification in Obstetrical and Gynaecological Ultrasound (COGU), Diploma of Diagnostic Ultrasound (DDU) or Fellowship of Royal Australian and New Zealand College of Radiologists (FRANZCR) or equivalent.

- The cervical length should always be reported at the 18-22 week morphology scan.
- Ultrasound providers must report whether cervical length measurements were performed transabdominally or transvaginally.
- If the transabdominal cervical length is <35mm TA, a transvaginal ultrasound (TV) length should be performed.
- Ultrasound providers should report the measurement of the closed cervical length.
- Women with a cervical length <25mm on transvaginal ultrasound should be referred to their care provider the same day for urgent management.

Provocation tests (such as fundal pressure or valsalva manoeuvre) are of no value and should not be performed.

ADVICE AND MANAGEMENT

- Women presenting to maternity service with an asymptomatic open cervix <4 cm dilation before 23 + 0 weeks should be offered the option of emergency cerclage.
- Women who elect to have a cerclage can be referred to a tertiary maternity service if local providers lack experience or confidence with the procedure.
- PIPER should standardise the advice given to the service. Asymptomatic women found to have an open cervix at < 4cm dilation in a non-tertiary centre who elect for expectant management may be transferred immediately to a tertiary maternity service, rather than waiting for a specific gestation.
- Amniotic fluid-specific biomarker tests for PROM (e.g., AmniSure or ActimProm) should not be performed in the presence of visible membranes due to the increased likelihood of false positive results from transudate.
- Women who are commenced on vaginal progesterone for a short cervix should have a follow up ultrasound measurement of cervical length at 5-7 days to assess for progressive shortening. Women with progressive shortening to < 10mm at < 23 weeks' gestation despite progesterone should be considered for cervical cerclage.

Planning pregnancy following bariatric surgery

AIM

The aim of this good practice point is to alert multidisciplinary teams, including bariatric surgeons, regarding the risks of pregnancy within 12 months of bariatric surgery.

SAMPLE VIGNETTE

"30 year old gastric sleeve surgery 3 months prior to pregnancy. Unplanned pregnancy, no pre-conception folic acid. Rapid weight loss post-surgery. Severely growth restricted fetus identified at morphology scan with fetal demise at 24 weeks"

BACKGROUND

Growing evidence suggests that pregnancy within 12-18 months of bariatric surgery doubles the risk of poor outcomes, including fetal growth restriction, nutritional deficiencies and pregnancy loss. This is possibly due to altered nutritional status resulting in rapid weight loss, micronutrient absorption deficiencies and lack of periconceptual folate. Women may experience unexpected fertility patterns in the setting of significant weight loss, and this increases the risk of unplanned pregnancy.

RECOMMENDATION

- If you are involved in the care of a woman planning bariatric surgery or review her following such a procedure, ensure there is a good contraception plan, and discuss and document pregnancy risks.
- Advise her to avoid pregnancy for 12-18 months post-bariatric surgery, or until weight loss has stabilised, whichever is the longer time.
- When planning a pregnancy after bariatric surgery:
  - Ideally wait until 12-18 months postoperatively before trying to conceive.
  - Aim for a body mass index (BMI) <35.
  - Ensure periconceptual folate commences at least 1 month prior to trying to conceive.
  - Review nutritional status including iron, vitamin D, vitamin B12 & zinc, & replace if inadequate.
  - Screen for type 2 diabetes/ impaired glucose tolerance, being mindful that a formal Oral Glucose Tolerance Test may not be advised following some forms of bariatric surgery.
  - Ensure a pregnancy multivitamin is taken that contains 150 micrograms of iodine.
  - Offer dietician review.
  - Early referral for pregnancy dating.
  - Consider the addition of low dose aspirin 150mg nocte from the time of confirmation of a viable pregnancy.
  - Multidisciplinary team care including gastroenterology and obstetric team with expertise in caring for women post-bariatric surgery.

Pregnancy risks associated with increased maternal BMI include miscarriage & stillbirth, no result on non-invasive Prenatal Testing (NIPT) or failed NIPT, gestational diabetes, hypertension / preeclampsia, infections, thromboembolic disorders, IUGR, preterm birth, sleep apnoea, shoulder dystocia and postpartum haemorrhage, instrumental birth, caesarean section, complications at caesarean section, delayed wound healing and infection, suboptimal views at scans (which may delay diagnosis of congenital anomalies), anaesthetic difficulties, maternal death, depression / trauma history.

Fetal risks include preterm birth, congenital malformations e.g. neural tube defects, macrosomia, shoulder dystocia and birth injury.

Shared care across maternity services

AIM

The aim of this good practice point is to ensure that the pregnancy care provided to a woman is optimised irrespective of requirements for transition of care during her pregnancy journey.

FOR WOMEN REQUIRING TRANSFER TO A HIGHER-LEVEL SERVICE DUE TO REAL OR THREATENED PREGNANCY COMPLICATION:

The most senior available clinician at the referring hospital should discuss the case with the PIPER consultant and on call team at the receiving hospital. All pregnancy notes should be sent with the woman to the receiving hospital.

FOR WOMEN REQUIRING TRANSFER FROM A HIGHER-LEVEL SERVICE BACK TO THEIR ORIGINAL BOOKING SERVICE WHILE UNDELIVERED:

Communication about the antenatal stay, plans for subsequent antenatal care and results of any investigations should be made available to the original treating team, and timely appointments for ongoing care made.

FOR WOMEN REQUIRING TRANSFER TO A HIGHER-LEVEL SERVICE AND WHO PROCEED TO DELIVERY AT THAT SERVICE:

Communication about the birth and any relevant details of the postnatal and neonatal stay should be provided to the referring hospital to facilitate ongoing local care as well as care in the next pregnancy.

Consideration of strategies to use hospital EMR access for common referral paths may be appropriate.

Neonatal

Good Practice Points

Management of infants at limits of viability

AIM

The aim of this good practice point is to provide some guidance around various aspects of the Extreme Prematurity Guideline, ahead of its formal revision.

BACKGROUND

In December 2020, Safer Care Victoria published the Extreme Prematurity Guideline. This guideline defined a zone of parental discretion (ZPD) between 22+0 and 23+6 weeks' gestation. During this gestational period, shared decision making is encouraged and, in the absence of significant adverse risk factors, parents' wishes regarding active or palliative care for their infant are supported even if the clinician does not agree. Since the guideline was implemented, there has been an increase in infants at 22 weeks being actively resuscitated. There has also been a marked increase of in utero transfers for pregnancies at 22 weeks where there are risk factors for preterm birth. However interpretation and implementation of this guideline remains variable across different health services. This variation has resulted in significant differences in the obstetric and neonatal care offered for infants born 22-24 weeks' gestation.

WHO SHOULD PROVIDE COUNSELLING TO PARENTS?

Provision of complex information pertaining to maternal and neonatal outcomes should be provided jointly by senior obstetric and paediatric/neonatal staff (i.e. consultants / senior registrars). This responsibility should not be devolved to junior members of the medical team.

Wherever possible, the conversations should be held as early in the clinical presentation as practicable and may need to be repeated as gestational age advances and other aspects of the clinical presentation change.

It is accepted that such counselling is complex, is time consuming for clinicians to provide and takes time for the parents to process. Options for counselling include:

- provision by local paediatricians and obstetricians, with telehealth support if required from PIPER or tertiary hospital Obstetricians and Neonatologists
- transfer to a Level 6 maternity and newborn service for the counselling to continue.

Telehealth, where appropriate to the context, can improve the quality of the counselling process. Optimising counselling may enable initial uncertainty to evolve to a desire for a palliative pathway and therefore avoid the need for transfer that results in separation from local supports and disruption of the continuity of clinical care.

Transfer ensures the woman is in the best environment for active neonatal care to be provided should she rapidly proceed to birth and remain uncertain about or express a wish for active care. Transfer to a level 6 service should be seen as part of an ongoing assessment and counselling process rather than a definite commitment to active care.

Given that a complete course of antenatal corticosteroids is defined by some as being 24 hours after the second dose of corticosteroid, consideration should be given to starting the conversation with parents about choices around resuscitation around 21+4 weeks' gestation, understanding that unexpected births prior to 22+0 weeks would not be offered neonatal resuscitation. Where there are additional adverse risk factors (PPROM, fetal growth restriction, multiples, impending birth outside of the tertiary hospital setting, maternal indications for expedited delivery (such as severe preeclampsia or placental abruption [where obviously there is not the opportunity to delay for steroids]) and other evidence of fetal compromise) these need to be discussed with the parents and will alter the strength of the recommendation to provide or withhold survival focused care.

Where there is a delay to the provision of counselling by senior obstetric and paediatric staff or uncertainty about which pathway to follow, it is strongly recommended that antenatal corticosteroids should be given unless the family are certain that they do not want active resuscitation. Willingness to resuscitate at 22 weeks' gestation and beyond will vary between centres, clinicians and patients, and additional case by case discussion is required in this regard.

WHAT IF PARENTS DECIDE CONCLUSIVELY THAT THEY DO NOT WANT THEIR INFANT TO RECEIVE ACTIVE RESUSCITATION?

Then steroids should not be given, nor the course completed, prior to the birth of the infant. Thereafter the infant should receive comfort care, as outlined in the parent information sheets.

WHAT IF PARENTS ARE UNDECIDED, OR CLEARLY WANT NEONATAL RESUSCITATION TO BE OFFERED?

If the parents want active care or are unsure, antenatal corticosteroids should be commenced at the referring hospital from 21+5 weeks and PIPER should be notified so that transfer to a tertiary centre can arranged at 21+5 weeks' gestation or soon thereafter. Positive outcomes for extremely preterm infants are contingent on an uncomplicated course, and birth within in a tertiary centre should be the aim wherever possible.

IF TRANSFER OCCURS?

Transfer of the woman and administration of antenatal corticosteroids does not commit the parents or the team caring for the woman to provide active care of the newborn. It does allow for multidisciplinary joint counselling by senior tertiary clinicians and ensures the birth will occur in the optimum setting i.e. tertiary centre.

If resuscitation is declined, and the pregnancy is continuing, ongoing care may be best provided at the tertiary hospital or at the referring hospital, depending on gestation, the families wishes and the clinical scenario. Where a decision is made not to offer resuscitation, back-transfer from the tertiary hospital to the booking hospital should be accommodated where parents desire this.

ACCEPTANCE OF IN UTERO TRANSFERS

Consensus across the 3 tertiary perinatal centres (The Royal Women's Hospital, Mercy Hospital for Women and Monash Health) to accept requests for in-utero transfers from 21+5 weeks is essential to provide equitable care to pregnant women and their infants. This should occur even if a complete dose of antenatal corticosteroids has not been completed at the time of request to accept an in-utero transfer.

Aboriginal births, mortality and morbidity

This chapter focuses only on births to Aboriginal women, mortality and morbidity. Births to Aboriginal fathers and non-Aboriginal women are not included.

Perinatal outcomes are improving for Victoria's Aboriginal mothers and babies; however we can do more to continue closing the gap. In recent times, the PMR for babies born to Aboriginal women is improving and approaching the PMR for babies born to non-Aboriginal women (11.2 compared to 8.6 per 1,000 births relatively, for this triennium). Notably, over the past decade the PMR for babies born to Aboriginal women has reduced (19.4 in the triennium ending in 2012 compared to 8.6 in the triennium ending in 2022).

SNAPSHOT

- In 2022, 1,259 Aboriginal women gave birth to 1,280 babies (1.7 per cent of all women who gave birth and 1.7 per cent of all babies born in Victoria).
- 12.4 per cent of babies born to Aboriginal women were born before 37 weeks' gestation compared with 7.6 per cent of those born to non-Aboriginal women.
- 11.5 per cent of babies born to Aboriginal women had a birthweight below the 10th percentile compared with 9.0 per cent of those born to non-Aboriginal women.

	ABORIGINAL WOMEN	NON-ABORIGINAL WOMEN
Births in 2022	**1,259** **Aboriginal women gave birth** in 2022 (1.7% of all women who gave birth) ↗ Compared with **1,250** (1.6%) women in 2021	**73,790** **non-Aboriginal women gave birth** in 2022 (98.1% of all women who gave birth)
Babies in 2022	**1,280** **babies were born to Aboriginal women** in 2022 (1.7% of all babies born) ↗ Compared with **1,271** (1.6%) babies in 2021	**74,907** **babies were born to non-Aboriginal women** in 2022 (98.1% of all babies born)

Percentage does not add to 100% as Maternal Aboriginal status was not reported for 172 women and 176 babies.

Improving

Steady

Needs improvement

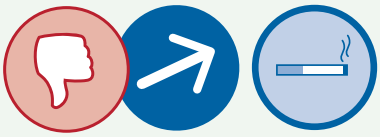
Care is to be taken when interpreting the results of the **traffic light** system. While green may show improvements or increases in trend data, they may still remain unacceptable in relation to existing gaps between Aboriginal and non-Aboriginal families.

Furthermore, while the gap may have reduced between Aboriginal and non-Aboriginal people, when combined, there may be an overall decline or deterioration across both population groups.

	ABORIGINAL WOMEN	NON-ABORIGINAL WOMEN
Adjusted Perinatal Mortality Rate	**10.2** deaths per 1,000 births **for 2020-2022** Compared with **11.2** in 2019-2021	**8.6** deaths per 1,000 births **for 2020-2022** Compared with **8.6** in 2019-2021
Adjusted Stillbirth Mortality Rate	**7.5** deaths per 1,000 births **for 2020-2022** Compared with **7.9** in 2019-2021	**6.2** deaths per 1,000 births **for 2020-2022** Compared with **6.3** in 2019-2021
Neonatal Mortality Rate	**2.7** deaths per 1,000 live births **for 2020-2022** Compared with **3.4** in 2019-2021	**2.4** deaths per 1,000 live births **for 2020-2022** Compared with **2.4** in 2019-2021

The gap has reduced between Aboriginal and non-Aboriginal PMR for the 2020-2022 triennium from the 2019-2021 triennium.

	ALL WOMEN	ABORIGINAL WOMEN	NON-ABORIGINAL WOMEN
Smoked during pregnancy	**7.2%** smoked during pregnancy Compared with **7.2%** in 2021	**40.0%** smoked during pregnancy Compared with **38%** in 2021	**6.6%** smoked during pregnancy Compared with **6.7%** in 2021



The gap has increased between Aboriginal and non-Aboriginal smoking rates during pregnancy since the 2021 report.

SMOKING AND ABORIGINAL BIRTHS, MORTALITY AND MORBIDITY

- The adjusted PMR for babies born to Aboriginal mothers for the triennium 2020–2022 was 10.2 per 1,000 births and 8.6 per 1,000 births for non-Aboriginal mothers. This compares with 11.2 and 8.6 per 1,000 births respectively for the triennium 2019–2021. The PMR for babies born to Aboriginal mothers has improved this triennium.
- The adjusted stillbirth rate for babies born to Aboriginal mothers for the triennium 2020–2022 was 7.5 per 1,000 births and 6.2 per 1,000 births for non-Aboriginal mothers. This compares with 7.9 and 6.3 per 1,000 births for the triennium 2019–2021 for Aboriginal and non-Aboriginal mothers, respectively.
- The neonatal mortality rate for babies born to Aboriginal mothers for the triennium 2020–2022 was 2.7 per 1,000 livebirths and 2.4 per 1,000 livebirths for non-Aboriginal mothers. This compares with 3.4 and 2.4 per 1,000 livebirths for the triennium 2019–2021 for Aboriginal and non-Aboriginal mothers, respectively.
- The neonatal mortality rate for babies born to Aboriginal mothers has improved compared with the previous triennium.

The gap between Aboriginal and non-Aboriginal PMR for the triennium 2020–2022 has reduced from the 2019–2021 triennium.

- 40.0 per cent of Aboriginal women smoked during pregnancy (up from 38.0 per cent in 2021) compared with 6.6 per cent of non-Aboriginal women.[8]
- 12.4 per cent of babies born to Aboriginal women were born before 37 weeks' gestation compared with 7.6 per cent of those born to non-Aboriginal women.
- 10.2 per cent of babies born to Aboriginal women were born between 32-36 weeks' gestation compared with 6.3 per cent of babies born to non-Aboriginal women.
- 10.8 per cent of babies born to Aboriginal women had low birthweight (under 2,500 grams) compared with 6.4 per cent of babies born to non-Aboriginal women.

[8] The data in this section refer to the smoking status of all mothers, whereas the section on page 24, 'Smoking and perinatal mortality', refers only to the smoking status of the mothers whose babies were included in the adjusted number of births (which excludes terminations of pregnancy for psychosocial indications).

Maternal findings

- 2.2 per cent of Aboriginal women were underweight (with a BMI under 18.5) compared with 2.0 per cent of non-Aboriginal women.
- Aboriginal women were also more likely to be obese (with a BMI of 30 or over) than non-Aboriginal women (39.9 per cent and 23.1 per cent, respectively).

	BORN TO ABORIGINAL WOMEN	BORN TO NON-ABORIGINAL WOMEN
Babies born before 37 weeks' gestation	**12.4%** of babies in 2022 were **born before 37 weeks' gestation** Compared with **12.4%** in 2021	**7.6%** of babies in 2022 were **born before 37 weeks' gestation** Compared with **7.7%** in 2021
Babies born below the 10th percentile	**11.5%** of babies had a **birthweight below the 10th percentile** Compared with **11.6%** in 2021	**9.0%** of babies had a **birthweight below the 10th percentile** Compared with **8.6%** in 2021

The gap has decreased between Aboriginal and non-Aboriginal babies born before 37 weeks' gestation since the 2021 report.

The gap has decreased between Aboriginal and non-Aboriginal babies born below the 10th percentile since the 2021 report.

Child and adolescent mortality

Child and adolescent mortality includes post-neonatal infant, child and adolescent deaths between the ages of 28 days and 17 years and 364 days.

This report includes all post-neonatal (28–364 days) and child and adolescent (1–17 years) deaths of children normally living in Victoria who died in Victoria during 2022.

- There were 189 post-neonatal infant, child and adolescent deaths (28 days – 17 years) reported in 2022, compared with 214 in 2021 and 181 in 2020.
  - There were 44 post-neonatal infant deaths, which is the lowest number ever recorded by CCOPMM.
  - There were 145 deaths in the age group 1-17 years.
- The highest rate of death was in the 28–364 days age group.
- The infant mortality rate in Victoria in 2022 was 2.5 per 1,000 livebirths for infants (0-364 days).
- The under-five mortality rate in Victoria in 2022 was 3.0 per 1,000 livebirths.

infant mortality rate
age 0 – 364 days

2.5 deaths
per 1,000 live births for infants in Victoria in 2022

under-5 mortality rate

3.0 deaths
per 1,000 live births for under-5 in Victoria in 2022

LEADING CAUSES OF DEATHS BY AGE GROUP, 2022

Post-neonatal infants (28–364 days)

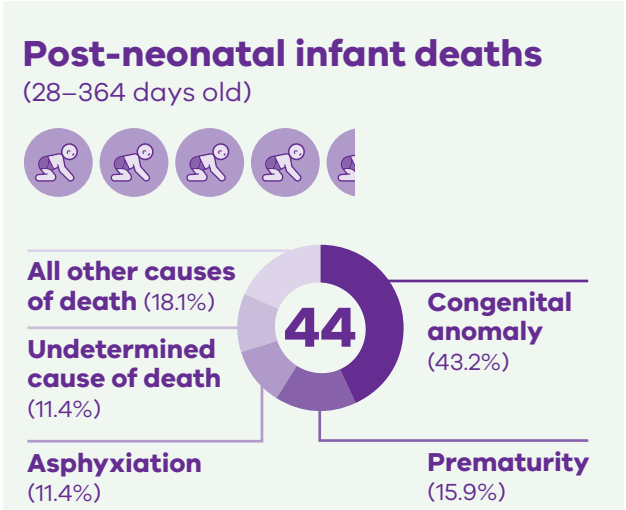
- The leading cause of post-neonatal infant deaths was congenital anomaly (43.2 per cent of 44 deaths).
- Prematurity (15.9 per cent) and asphyxiation and undetermined cause of death (both 11.4 per cent) were the next most common causes of post-neonatal infant deaths.

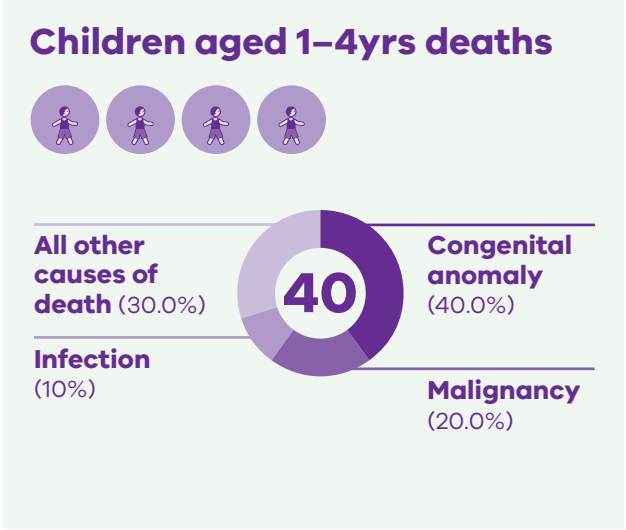
Children aged one to four years

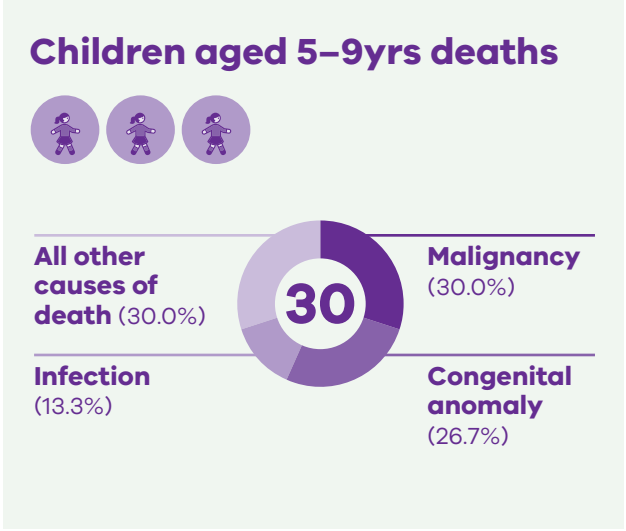
- The leading cause of death of children aged one to four years was congenital anomaly (40.0 per cent of 40 deaths).
- Deaths from malignancy (20.0 per cent) and infection (10.0 per cent) were the next most common causes of death in the one-to-four-year age group.

Children aged five to nine years

- The leading cause of death of children aged five to nine years was malignancy (30.0 per cent of 30 deaths).
- Deaths from congenital anomaly (26.7 per cent) and infection (13.3 per cent) were the next most common causes of death in the five-to-nine-year age group.





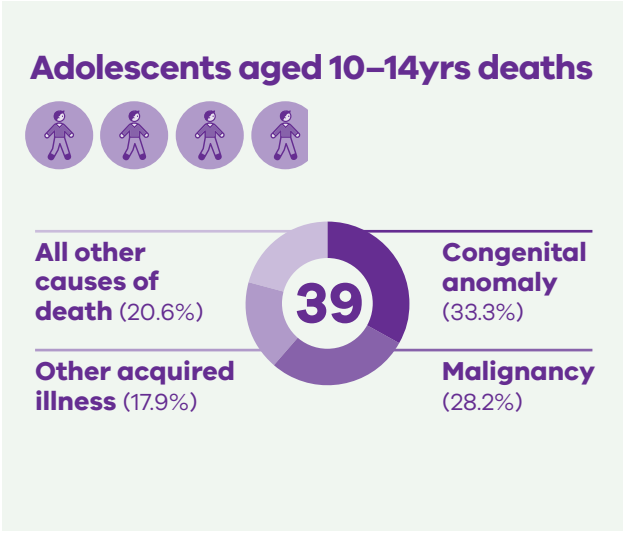


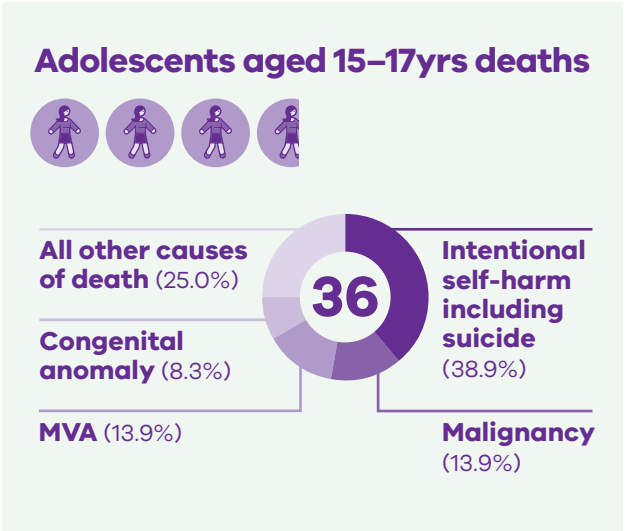
Children and adolescents aged 10–14 years

- The leading cause of death of children and adolescents aged 10 to 14 years was congenital anomaly (33.3 per cent of 39 deaths).
- Deaths from malignancy (28.2 per cent) and other acquired illness (17.9 per cent) were the next most common causes of death in the 10–14-year age group.

Adolescents aged 15–17 years

- The leading cause of death of adolescents aged 15 to 17 years was intentional self-harm (including suicide) (38.9 per cent of 36 deaths).
- Deaths from malignancy and motor vehicle accidents (each 13.9 per cent) were the next most common causes of death in the 15–17-year age group.





Good Practice Points

Management of Septic Shock

In the setting of septic shock, or evolving septic shock, cardiovascular status is of paramount importance. Severe shock is present if there is hypotension, tachycardia, very prolonged capillary refill time and cold limbs. Such children require fluid resuscitation with early repeated boluses of 10-20mL/kg of normal saline or a balanced salt solution. If shock persists despite 40mL/kg in total, a differentiated approach to shock is needed, and the addition of vasopressor or inotropic agents is required. Many children respond to oxygen, fluid, and low dose vasopressors.

Safety of intubation in children with deteriorating shock

If intubation is required because of deteriorating shock or severe hypoxaemia, adequate fluid resuscitation is needed prior to intubation to reduce the risk of severe hypotension and cardiac arrest. In a child with shock, the anaesthetic induction agents and doses should be chosen to minimise further cardiovascular deterioration.

Experienced assistance is needed in such severe cases, as sometimes too much fluid is administered, resulting in complications that themselves can be life threatening. But sometimes too little fluid is given, putting the child at high-risk of cardiac deterioration on anaesthetic induction. Induction anaesthetic drugs that cause myocardial depression such as propofol or thiopentone should not be used, nor should high doses of any sedative or cardio-depressant drug. Fentanyl (1-2mcg/kg) and rocuronium (muscle relaxant) are standard induction agents. Many other aspects of the safe induction of a child in shock should be considered. In centres without a PICU, an experienced anaesthetist or adult intensivist could be involved to support the paediatrician or ED physician. Advice should also be sought from PIPER, who can support treatment and resuscitation choices, and organise retrieval to a PICU.

INTRAVENOUS IMMUNOGLOBULIN

CCOPM has reviewed a case of a death from cerebral oedema following intravenous immunoglobulin (IVIg) for a valid indication and is aware of increased reports of other adverse reactions from IVIg.

The use of IVIg increased during the COVID-19 pandemic, often being used for the multisystem inflammatory syndrome associated with SARS-CoV-2.

The Red Cross Blood Bank has evidence-based criteria for approval of IVIg. Clinicians should prescribe IVIg for evidence-based indications and carefully consider the risk and benefit.

Clinicians should be aware of common and rare side effects. Common adverse events include nausea, vomiting, diarrhoea, abdominal pain, headache, and muscle pain. Aseptic meningitis may occur within 72 hrs of IVIg; the symptoms are headache, nausea, vomiting, fever and chills.

Before prescribing IVIg ask about previous adverse reactions if the patient has received it before. Discuss the indication, alternative treatment options and potential risks, including aseptic meningitis.

Provide families with the Royal Children's Hospital IVIg factsheet: https://www.rch.org.au/kidsinfo/fact_sheets/Intravenous_immunoglobulin_IVIg_infusion/

Ask nurses, patients, and families to alert the treating team if they detect any symptoms during or following their IVIg infusion.

Discuss all potential adverse events with a paediatric haematologist and seek haematology advice if you suspect aseptic meningitis or a serious adverse event following IVIg administration.

Belmouaz S. Posterior reversible encephalopathy induced by intravenous immunoglobulin. Nephrol Dial Transplant 2008: 23: 419

Orbach H. Intravenous Immunoglobulin: Adverse Effects and Safe Administration Clinical Reviews Allerg Immunol 2005

DRAWING UP UNFAMILIAR DRUGS

CCOPMM has reviewed cases where dosing errors have occurred with drawing up drugs and / or transfusions. This is particularly likely with drugs that are infrequently prescribed and with which staff are less familiar.

Health services and staff should consider strategies to reduce the likelihood of such errors occurring. These may include:

- Locating drawing up locations in quieter areas where staff are less likely to be disturbed
- Not interrupting staff who are in the middle of drawing up and checking drugs or infusions
- Some centres arrange for very uncommonly used infusions to be drawn up in the hospital pharmacy rather than by staff on the ward

Clinical staff should also note that although double checking and signing for drugs is a legal requirement, there can be pressure to "check" in too cursory a manner. By signing, you are verifying that you have independently checked the dosage and calculations, so it is important for all staff to check dosage as independently as possible, to speak up if in disagreement and to call in another staff member if you are not sure.

IMAGING FOR CHILDREN WITH DENTAL BRACES

Dental braces and other orthodontic attachments are not always a contraindication to CT or MRI scans of the head and neck.

If there is clinical concern of serious pathology the case should be discussed with a radiology consultant, as radiographers are able to use techniques to reduce metal artefact and improve image quality. If the images are insufficient to answer the clinical question, then the risk/benefit of hardware removal and repeating imaging must be considered.

MANAGING CHILDREN WITH DEVELOPMENT CHALLENGES AND DIFFICULTY COMMUNICATING

Providing care to children and adolescents with a neurodisability / neurodiversity requires a clear understanding of that individual child's functional level – their motor ability, their cognitive ability and especially their communication ability and style.

An understanding of how a child expresses pain is a key to recognising and responding to clinically important symptoms and signs. Asking about a child's communication should be an essential part of every clinical assessment and will inform clinical care.

URGENT VENTILATION WHEN ANAPHYLAXIS DOES NOT RESPOND TO ADRENALINE

In a child with anaphylaxis or asthma who is unconscious and needing bag and mask ventilation (i.e., in respiratory arrest), there is a need for urgent intubation, not other forms of respiratory support. Intubation by a skilled anaesthetist, intensivist, emergency physician, or MICA paramedic should occur within 4 minutes.

Adrenaline is the primary treatment for anaphylaxis, but in the event of arrest the sole-reliance on adrenaline, (or other interventions like defibrillation) and delaying intubation will lead to prolonged hypoxaemia and its consequences. It takes 4 minutes of hypoxia after an arrest for irreversible death of brain cells, so intubation cannot be delayed.

Several factors may lead to delayed intubation in such cases. These are trends in emergency management: in adult/mixed hospitals the success of defibrillation for VF has led to people to de-emphasise airway in the treatment algorithms; the successful use of non-invasive methods of respiratory support in many respiratory conditions where the patient is awake encourages an escalation ladder, which is not appropriate in a patient in arrest; and the general success of adrenaline in anaphylaxis leads people to delay airway management in cases of arrest.

ADRENALINE INJECTOR DEVICE FOR ALL ADOLESCENTS WITH SPECIFIC FOOD ALLERGIES OR COMORBIDITIES

Adolescents with a food allergy and/or comorbidities should be prescribed an adrenaline injector device. It is important to regularly renew their anaphylaxis action plan, optimise management of their comorbid conditions and emphasise the importance of always carrying their adrenaline injector device.

Adrenaline injector devices are considered first line emergency treatment for anaphylaxis.

Emphasis is made to the cohort of patients who are at risk of fatal anaphylaxis which would include:

Teenagers and young adults with food allergy. While food allergy is most common in young children aged 5 years or less, the majority of recorded fatal reactions to foods (~90%) occur in teenagers and young adults. This is likely to related to greater risk-taking behaviour, increased accidental exposure to food allergens when eating away from home, and less adherence to carrying their adrenaline autoinjectors and following management plans.

Peanut, tree nuts and seafood. Fatal anaphylaxis may arise from any food, but most fatalities arise from food allergy that persists into adolescence and adult life i.e.: nut and seafood allergies.

Co-morbidities – Conditions such as moderate severe asthma, cardiovascular disease and systemic mastocytosis are associated with a greater risk of fatal anaphylaxis.

EARLY RECOGNITION OF MENINGOENCEPHALITIS

Many children have febrile convulsions and recover within an hour to normal conscious state and normal neurological examination. Distinguishing these febrile children who have a self-resolving benign condition from those who have more serious CNS infections requires careful and repeated examination.

In recent years we have seen several deaths from fulminant necrotising encephalitis in previously well children, related to influenza, HHV6, enterovirus and human metapneumovirus. Despite pneumococcal vaccination, we are still seeing children with pneumococcal serotypes that are not included in the vaccine.

Children with serious necrotising encephalitis present with seizures, high fever and abnormal neurological examination and progression or lack of resolution of neurological signs.

Clinical assessment

Assess the conscious state (measure and document the Glasgow Coma Score), examine for hypertonicity, ankle clonus, eye deviation, pupillary abnormalities (a dilated pupil, difference in pupil size, or lack of reaction to light). Hyper-pyrexia (T>39 C), abnormal neurology, or failure to improve in the first hour are signs of serious CNS infection and requires urgent escalation. Such a child should be seen by a specialist paediatrician or emergency physician and discussed urgently with PIPER.

Do not assume a child has a febrile convulsion if they do not recover in the first hour. Listen to parents if they say their child remains "not right".

Management implications

Identification of serious CNS infection should trigger further investigations, as well as consideration of general intensive and neuroprotective treatments:

- Airway, breathing and circulation support
- Antibiotics – ceftriaxone for bacterial meningitis, and acyclovir for herpes encephalitis, and add flucloxacillin if the child has signs of generalised sepsis
- Corticosteroids – dexamethasone 0.15mg/kg Q6H
- Neuroprotection: 30° head up, a cerebral perfusion pressure of 40-60mmHg (age dependent), avoiding excessive BP or CPP, serum Na+145-150mmol/L, PaCO2 35mmHg, 30° head up
- Active cooling to T<38 C
- Follow the RCH Clinical Practice Guidelines for investigations of possible meningitis: https://www.rch.org.au/clinicalguide/guideline_index/Meningitis_encephalitis/
- Early use of MRI-B will identify changes not detected by CT. On MRI children with necrotising encephalitis have symmetrical changes often involving the thalami, basal ganglia, brain stem and / cerebellum.
- Tertiary referral centres may consider antiviral agents to target influenza (Oseltamivir) and HHV6 (high-dose ganciclovir) which will also cover HSV
- Referral for future genetic testing to identify any susceptibility if necrotising encephalitis identified. Some children with necrotising encephalitis have a genetic predisposition to mitochondrial stress in the setting of a viral infection (Levine JM, et al. Multiple Sclerosis and Related Disorders 2020: 43; 102194 p1-8).

The differential diagnosis of acute febrile encephalopathy is broad, so other investigations are important to exclude cerebral abscess, acute disseminated encephalomyelitis (ADEM), and autoimmune encephalitis, as well as other non-infectious causes.

For consumers

Good Practice Points

UNFAMILIAR SLEEP SITES FOR INFANTS

It is important to make every sleep for a baby a safe one. Safe sleeping may be overlooked when in unfamiliar settings such as holidays or visiting other homes.

When travelling with a baby, a portable cot (that meets Australian standard 2195:2015 folding cot) is recommended. If staying in accommodation or with friends or family, call ahead to check that the loan cot or port-a-cot your baby will be sleeping in meets Australian standards and is in excellent condition.

A baby should never be put down to sleep on a sofa, bean bag, sheepskin, or pillow. There is no Australian standard for bassinettes.

The safest place for a baby to sleep is in a safe cot that meets the Australian Standard AS2172:2003, with a clean firm flat mattress that is the right size for the cot and meets voluntary Australian standard (AS/NZS 8811.1:2013). The cot should not be tilted or elevated. The mattress should be covered with only a tightly fitted sheet and, if required, a thin tightly fitted mattress-protector under the fitted sheet.

In addition, when travelling, take a range of sleep wear (clothes, sleeping suits, bedding) to suit variations in climate to avoid a baby overheating in unfamiliar environments.

Resources:

https://rednose.org.au/article/what-is-a-safe-sleeping-environment

https://rednose.org.au/article/red-nose-six-safe-sleep-recommendations

https://rednose.org.au/article/setting-up-a-safe-nursery-what-products-do-you-really-need

https://rednose.org.au/news/going-away-keep-your-baby-safe-while-away-from-home

MANAGING ILLNESS ON SCHOOL TRIPS

Parents and carers know their children best. When young people are in the care of others and become unwell there is a risk of under-recognition or an inadequate response. This risk is increased for children with pre-existing illness.

Prior to travel students with chronic illness should attend their specialist or general practitioner to:

- ensure their condition is well managed
- decide if any changes in the management are required during the trip
- develop an individual healthcare plan which states what care and monitoring they need and which members of staff will help them

When a student becomes unwell all members of staff on the trip should:

- be aware of the student's condition
- monitor signs of the student becoming more unwell
- have a plan for what to do in the case of an emergency (a written escalation plan is recommended for many pre-existing conditions).
- arrange an online face-to-face meeting with the child's parents and the child to discuss healthcare management.

Research and quality improvement

CCOPMM is legislated to conduct research into the incidence and causes of mortality and morbidity in women, babies, children and adolescents. Undertaking and supporting research is a critical function of CCOPMM to ensure continuous improvements in quality of care. ***The Public Health and Wellbeing Regulations*** *allow CCOPMM to make perinatal data available to researchers.*

RESEARCH AND REPORTING SUBCOMMITTEE

Established in 2020, CCOPMM's Research and Reporting Subcommittee is a multidisciplinary group combining specialist clinical and research knowledge to drive CCOPMM's research function.

The group was formed to:

- facilitate research and report to CCOPMM on research and quality improvement (the subcommittee also supports research from Safer Care Victoria fellowship programs)
- provide advice and assistance to CCOPMM on research priorities and recommendations as relevant to maternal, perinatal, infant and child and adolescent mortality and morbidity
- assist CCOPMM's reporting activities including the annual *Victoria's mothers, babies and children* report, the periodic *Victorian congenital anomalies* report and relevant benchmarking activities including the advice and support on data used in the Perinatal Services Performance Indicators report
- provide advice and guidance on data governance issues in relation to CCOPMM data and support national reporting requirements
- review and approve annual changes to the Victorian Perinatal Data Collection
- approve the process for data requests as per regulation 10 of the Public Health and Wellbeing Regulations 2009
- monitor and support data requests through the Victorian Agency for Health Information Data Request Hub
- review and approve research publications using CCOPMM data (including presentations).

ACCESSING CCOPMM DATA

Each year CCOPMM receives requests for data from researchers outside Safer Care Victoria and the Department of Health. In 2022, there were 69 requests for CCOPMM data, many of which required extraction from the Victorian Perinatal Data Collection.

Requests for data are submitted through the Victorian Agency for Health Information Data Request Hub. Approved research involving data linkage is facilitated by the Centre for Victorian Data Linkage. All requests for data are reviewed in keeping with CCOPMM's legislative requirements.

The subcommittee is working towards publishing all approved projects and data requests using CCOPMM data so this information can be accessible to researchers and duplication of effort is minimised among the research community. Publishing current research requests may also facilitate partnerships for researchers with similar interests.

CCOPMM is making improvements to accessibility and equity of CCOPMM-supported student research projects by partnering with Victorian universities and medical research institutes in 2022.

CCOPMM DATABASES

CCOPMM is responsible for the following databases:

- **Victorian Perinatal Data Collection** – 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 grams birthweight
- **Victorian Congenital Anomalies Register** – information on congenital anomalies reported for livebirths, stillbirths and terminations of pregnancy diagnosed before birth to six years of age (reporting to the register is voluntary)
- **CCOPMM Mortality Database** – information on all cases of maternal, perinatal and paediatric mortality in Victoria
- **Severe Acute Maternal Morbidity (SAMM) Dataset** – information on maternal admissions to intensive care during pregnancy and up to 42 days after birth.

Appendix 1: Measures

MATERNAL MORTALITY RATIO (MMR)

MMR = number of direct and indirect maternal deaths / total number of birthing episodes × 100,000

The MMR includes all direct and indirect maternal deaths during pregnancy or within 42 days of the end of the pregnancy. It excludes coincidental and late maternal deaths.

'Total number of birthing episodes' is the number of pregnancies of 20 weeks' gestation or more (or if gestation is unknown, with birthweight of at least 400 grams) resulting in livebirth 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. This is because the available data on the number of these pregnancies are unreliable.

PERINATAL MORTALITY RATE (PMR)

PMR = (number of stillbirths + neonatal deaths) / total (stillbirths + livebirths) × 1,000

The PMR is calculated as the rate of stillbirths and neonatal deaths per 1,000 total births (including all stillbirths and livebirths).

For CCOPMM statistics, the rate refers to all births of at least 20 weeks' gestation (or a birthweight of at least 400 grams if gestation is unknown), and at least 150 grams birthweight unless known to have been alive at 20 or more weeks' gestation. However, for purposes of continuity, PMR of infants of ≥ 500 grams 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 grams 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).

NEONATAL MORTALITY RATE (NMR)

NMR = number of neonatal deaths / total livebirths × 1,000

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

STILLBIRTH RATE

Stillbirth rate = number of stillbirths × 1,000 total (stillbirths + livebirths)

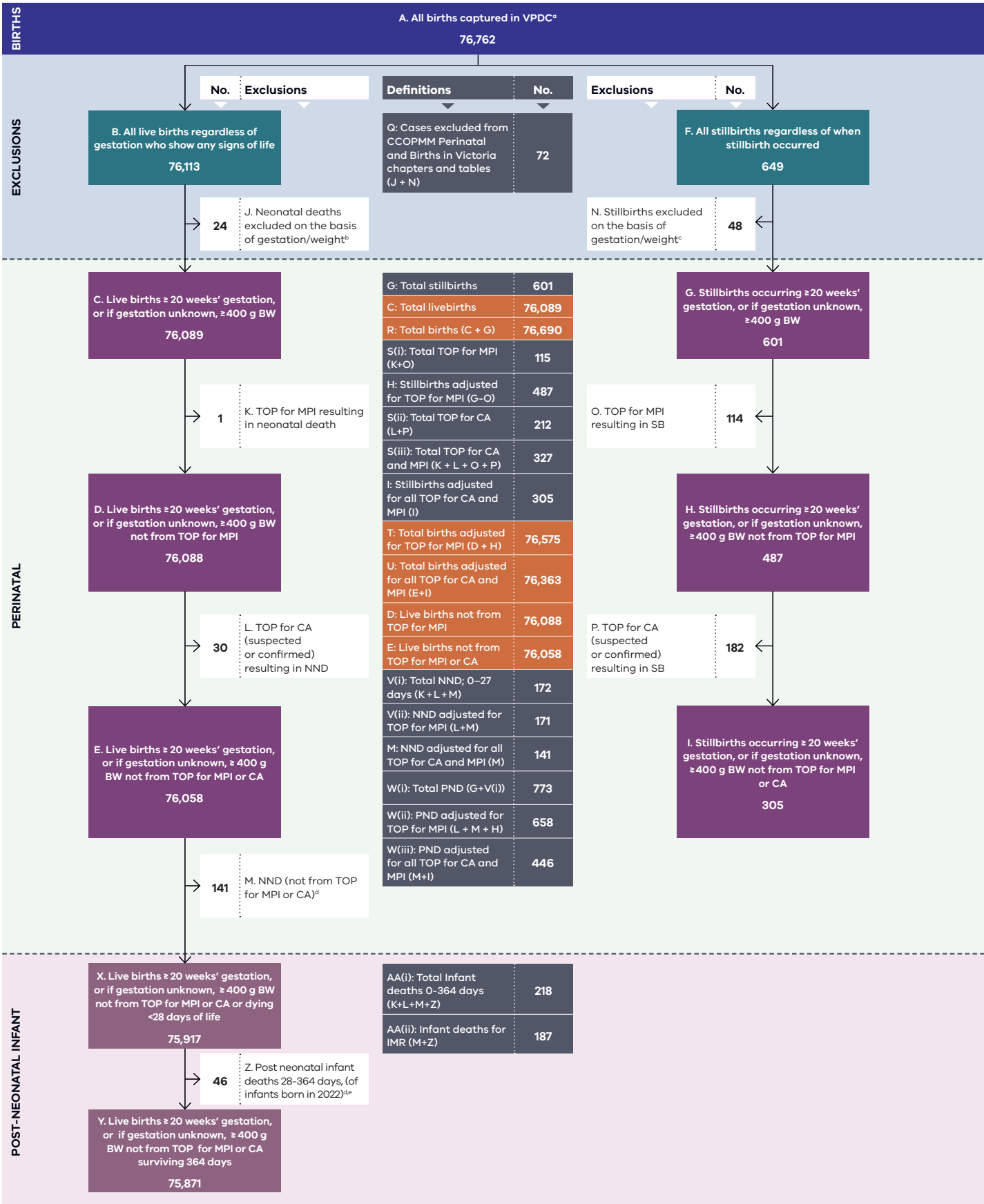
INFANT MORTALITY RATE (IMR)

IMR = number of infant deaths × 1,000 total livebirths

The IMR is calculated as the number of infant deaths divided by the number of total (Victorian-born) livebirths for the index year (reported as the rate per 1,000 livebirths). The livebirths are limited to those infants ≥ 20 weeks' gestation (or a birthweight of at least 400 grams if gestation is unknown), and at least 150 grams birthweight unless known to have been alive at 20 or more weeks' gestation.

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.

Appendix 2: Flow diagram for births in Victoria, 2022



ABBREVIATIONS USED IN THIS FLOW DIAGRAM

BW – birthweight

CA – congenital anomaly (suspected or confirmed)

EFRP – estimated female resident population

IMR – infant mortality rate

MPI – maternal psychosocial indications

NND – neonatal death

PMR – perinatal mortality rate

SB – stillbirth

TOP – termination of pregnancy

VPDC – Victorian Perinatal Data Collection

FORMULAE

Crude birth rate = E / EFRP × 1,000

PMR = (G + Vi) / (G + C) × 1,000

IMR = AA(ii) / E × 1,000

NOTES

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 = 24)

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 is known to have occurred < 20 weeks' gestation but birth ≥ 20 weeks' gestation with birthweight < 400 grams (n = 6)

N(ii). Stillbirths where death and birth occurred at unknown gestation, with a birthweight < 400 grams (n = 0)

N(iii). Stillbirths where death is known to have occurred < 20 weeks' gestation but born ≥ 20 weeks' gestation, with unknown birthweight (n = 0)

N(iv). Stillbirths where death occurred at unknown gestation, birth occurred ≥ 20 weeks' gestation, but where birthweight < 150 grams (n = 35)

N(v) stillbirths where death and birth are known to have occurred < 20 weeks' gestation (n = 0)

N(vi). Stillbirths where death known to have occurred ≤20 weeks' gestation but birth >20 weeks' gestation, with a birthweight < 400g (n = 5)

N(vii). Stillbirths where death known to have occurred < 20 weeks' gestation but birth ≥ 20 weeks' gestation, with a birthweight = 400 g (n=1)

N(viii). Stillbirths where death known to have occurred > 20 weeks' gestation, but where birthweight <150 g (n = 1)

d. Post-neonatal infant deaths includes all those born in 2022 with deaths occurring up until 30 December 2023.

e. Numbers of births can differ slightly between the 'Mothers and babies' section and Appendix 2: Flow diagram for births in Victoria, and 'Perinatal deaths' section of the report, as Births in Victoria uses gestation at birth, regardless of when the fetal death occurred, whereas Appendix 2 and the 'Perinatal deaths' section use gestation at the diagnosis of death, regardless of the gestation at which the birth occurred. For example, where a fetal death is diagnosed at 19 weeks but not born until 21 weeks, if the birthweight was ≥ 150 grams, this would be counted as a birth in the sections of this report dealing with births but excluded from Appendix 2 and the 'Perinatal deaths' section.

Appendix 3: Acknowledgements

The creation of this report each year is not possible without the generous assistance of many people. Midwives across Victoria notify CCOPMM of all births via the Victorian Perinatal Data Collection. Vital information about maternal, perinatal and child deaths is received from:

- health services
- the Registry of Births, Death and Marriages Victoria
- anatomical and forensic pathologists
- the Coroners Court of Victoria
- the Victorian Institute of Forensic Medicine
- the Paediatric Infant Perinatal Emergency Retrieval (PIPER) service
- individual treating practitioners
- palliative care services
- maternal and child health nurses
- Ambulance Victoria
- child protection services.

This report would not be possible without their assistance, and that of many others, and we thank them for their continued support and diligence in providing us with information that makes our work possible.

CCOPMM would like to express our gratitude to the Aboriginal Health Division at the Department of Health for their assistance and invaluable insights into the Aboriginal data in the report.

This report was developed by CCOPMM with support from the following Safer Care Victoria staff:

- Shirin Anil
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- Melissah Burnett
- Mary-Ann Davey
- Hope Deng
- Marina Forte
- Joanna Gaston
- Michelle Hawke
- Karen McNeil
- Deanne Needham
- Erin Smith
- Selina Takanashi
- Jake Valentine

We would also like to thank our **Senior Clinical Advisors**, who are critical in supporting the legislative responsibilities of CCOPMM and our subcommittees. We thank them for their passion and dedication to improving care for mothers, babies and children in Victoria. Their expert clinical knowledge is invaluable to the review and classification of cases notified to us:

- Dr Lisa Begg (Stillbirth)
- Dr Jim Holberton (Neonatal)
- Professor Susan McDonald (Stillbirth)
- Dr Erin Mills (Child and Adolescent)
- Assoc Professor Michael Stewart (Neonatal)
- Dr Sophie Treleaven (Child and Adolescent)
- Dr Julia Unterscheider (Maternal)
- Dr Carmel Walsh (Stillbirth)

Appendix 4: CCOPMM Member lists (2021 to 2024 term)

CCOPMM CHAIRS

- Professor Mark Umstad (from March 2023)
- Adjunct Professor Tanya Farrell (until March 2023)

CCOPPM COUNCIL

- Professor Mark Umstad (Chair)
- Adjunct Professor Tanya Farrell (previous Chair)
- Melanie Courtney
- Dr Alison Green
- Professor Caroline Homer
- Professor Rodney Hunt
- Ann Jorgensen
- Dr Niroshini Kennedy
- Adj. Professor Alan Lilly
- Siobhan Mansfield (until 2023)
- Jackie Mead
- Professor Susan McDonald
- Andrea Rindt
- Adj. Assoc. Professor Robert Roseby
- Assoc. Professor Glyn Teale

Child and Adolescent Subcommittee

- Adj. Clin. Assoc. Prof. Robert Roseby (Chair)
- Dr Giuliana Antolovich
- Ms Marcia Armstrong
- Ms Tracy Beaton (until 2023)
- Dr Mick Creati
- Prof Trevor Duke
- Dr Karen Dunn
- Adj. Assoc. Prof Alan Eade
- Dr David Fuller
- Dr Ric Haslam
- Dr Niroshini Kennedy
- Dr Annie Moulden
- Dr Sarah Parsons
- Ms Juliet Pellegrini
- Dr Greg Rowles
- Dr Sabapathi Subiramanian (until 2023)
- Dr David Tran
- Dr Sophie Treleaven

Maternal Subcommittee

- Associate Professor Glyn Teale (Chair)
- Professor Mark Umstad (previous Chair)
- Dr Alison Green
- Bree Bulle
- Dr Carmel Walsh
- Associate Professor Christopher MacIsaac
- Helen Lees
- Dr Jackie Collett
- Dr Julia Unterscheider
- Professor Louise Newman
- Karen Sawyer
- Dr Liz Hessian
- Dr Malcolm Barnett
- Dr Matthew Lynch
- Associate Professor Ryan Hodges
- Dr Stephen Cole
- Professor Susan McDonald
- Professor Louise Newman
- Andrea Rindt

Neonatal Subcommittee

- Professor Rod Hunt (Chair)
- Dr Lisa Begg
- Assoc Professor Rose Boland
- Dr Jackie Collett
- Dr Jim Holberton
- Assoc Professor Stefan Kane (from 2024)
- Dr Isaac Marshall
- Kirsty Nason
- Suzanne O'Shannessy
- Dr Sarah Parsons
- Cindy Scott (until 2023)
- Assoc Professor Alexis Shub
- Dr Alice Stewart
- Assoc Professor Michael Stewart
- Assoc Professor Glyn Teale
- Dr Mark Tarrant
- Dr Sophie Treleaven
- Professor Sue Walker
- Dr Jennifer Walsh
- Julie Wright

Stillbirth Subcommittee

- Professor Susan McDonald (Chair)
- Dr Lisa Begg
- Dr Jodie Benson
- Claire Burford (until 2023)
- Dr Jackie Collett
- Dr Mary-Ann Davey
- Adj Professor Tanya Farrell (until 2023)
- Assoc Professor Lisa Hui
- Sharon Kirsopp
- Dr Emily Olive
- Dr Kirsten Palmer
- Dr Warrick Pill
- Mrs Andrea Rindt
- Assoc Professor Joanne Said
- Sonia Shaw
- Dr Penelope Sheehan
- Dr Carmel Walsh
- Colleen White

Glossary

Adjusted perinatal death

Terminations of pregnancy for psychosocial indications are excluded in adjusted perinatal deaths. This provides a more accurate measure for assessing avoidable mortality and for comparisons with other jurisdictions both nationally and internationally.

Adjusted stillbirth

Terminations of pregnancy for psychosocial indications are excluded when calculating adjusted stillbirths. This provides a more accurate measure for assessing avoidable mortality and for comparisons with other jurisdictions both nationally and internationally.

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 colouration. A score of 10 represents the best possible condition.

Birthing episodes (previously confinements)

The number of women who gave birth (regardless of whether the pregnancy resulted in one or more babies, and regardless of whether the baby/babies were liveborn or stillborn) with a gestation of 20 weeks or more.

Child death

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

Congenital anomaly (formerly 'birth anomaly')

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

Crude birth rate

Measured by the number of livebirths (see definition below) per 1,000 estimated female resident population aged 15–44 years for a given calendar year.

Episiotomy

A surgical cut made at the opening of the vagina during childbirth to aid a difficult delivery and prevent rupture of tissues.

Estimated resident population

An Australian Bureau of Statistics measure of the population based on residence. It 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, aged 15–44 years, in its reporting.

Fetal growth restriction

Fetal growth restriction is a condition in which an unborn baby (fetus) is smaller than expected for the number of weeks of pregnancy (gestational age).

Infant death

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

Livebirth

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 12 months 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 due to a complication of the pregnancy or its management (for example, haemorrhage from placenta praevia).
- **Indirect** – the death is 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 resulting from a known mental health disorder are usually categorised as indirect. If there is no history of mental health disorder, the classification is direct.
- **Coincidental** – the death is considered unrelated to pregnancy (for example, a passenger in a motor vehicle accident). Coincidental deaths are not included in the maternal mortality ratio.
- **Early maternal death** – when the death occurs during pregnancy or within 42 days of birth or end of pregnancy. The death may be due to direct, indirect or coincidental causes.
- **Late maternal death** – when the death occurs after 42 days but within a year of the birth or end of pregnancy. The death may be due to direct, indirect or coincidental causes. Late deaths are not included in the maternal mortality ratio.

Median

The middle point of a set of numbers. The median is chosen rather than the mean (average) when describing the age of women giving birth because it is less skewed by ages that sit at extreme ends of the range.

Neonatal death

Death of a liveborn infant fewer than 28 days after birth. All neonatal deaths must be reported to CCOPMM. However, those included in the report are those of at least 20 weeks' gestation, or if gestation is unknown, weighing at least 400 grams.

Perinatal death

CCOPMM defines perinatal death to include stillbirth and neonatal deaths within 28 days of birth of infants of ≥ 20 weeks' gestation or, if gestation is unknown, of birthweight ≥ 400 grams. Stillbirths and livebirths with only brief survival are grouped into 'perinatal deaths' 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 grams 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 livebirths weighing < 500 grams 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.

Postpartum haemorrhage

Maternal blood loss of 500 mL or more in the 24 hours following birth.

Pre-eclampsia

A complication of pregnancy characterised by high blood pressure and damage to another organ/system.

Sepsis/septic shock

A life-threatening complication of an infection. Septic shock is also a life-threatening condition caused by severe localised or system-wide infection that requires immediate medical management.

Stillbirth

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

Sudden unexpected deaths in infancy

This group of deaths includes all infants (under one year of age) who die suddenly and unexpectedly after they are placed for sleeping. Sudden unexpected deaths in infancy (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 are included in the 'explained' category where a cause of death is identified (usually at autopsy) 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 definitions:

General definition: The sudden unexpected death of an infant under one 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.

Category IA: Includes deaths that meet the requirements of the general definition and all 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.
- Autopsy:
  - absence of potentially fatal pathological 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 grams 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.

Category IB: Includes infant deaths that meet the requirements of the general definition and the criteria for category IA, except that investigation of the various scenes where incidents leading to death might have occurred was not performed or ≥ one of the following analyses were not performed:

- toxicological
- microbiological
- radiological
- vitreous
- chemistry
- metabolic screening studies.

Category II: Includes infants that meet category I except for one or more of the following.

- Clinical:
  - age range outside that of category IA or IB (that is, 0–21 days or 270 days (nine months to first birthday)
  - similar deaths among siblings, close relatives or infants in the custody of the same caregiver that are not 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 abnormalities not sufficient to be unequivocal causes of death.

Trimester gestation values

- First trimester: gestation ≤ 13 completed weeks
- Second trimester: gestation 14–28 completed weeks
- Third trimester: gestation ≥ 29 completed weeks

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

Post-resuscitation cases: Infants found in extremis who are not resuscitated and later die ('temporarily interrupted SUDI') may be included in the previous categories, depending on the fulfilment of relevant criteria.

Consultative Council on Obstetric and Paediatric Mortality and Morbidity

Safer Care Victoria