

Victoria's Mothers, Babies and Children

2019

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.

The colour scheme was selected for its universality. The colours represent the diversity within the Victorian community, because CCOPMM aims to serve all Victorian mothers, babies and children, as well as the different specialty subcommittees of CCOPMM and their diverse expertise.

Please note: this report was republished in May 2021 to include corrections and updates in the maternal mortality chapter and flow diagram for births in Victoria.

Abbreviations

BMI	– body mass index
CCOPMM	– Consultative Council on Obstetric and Paediatric Mortality and Morbidity
EFRP	– estimated female resident population
ICU	– intensive care unit
IMR	– infant mortality rate
MMR	– maternal mortality ratio
NDC	– neonatal death classification
NMR	– neonatal mortality rate
PDC	– perinatal death classification
PIPER	– Paediatric Infant Perinatal Emergency Retrieval
PMR	– perinatal mortality rate
PPH	– postpartum haemorrhage
PSANZ	– Perinatal Society of Australia and New Zealand
PSPI	– Perinatal Services Performance Indicator
RANZCOG	– Royal Australian and New Zealand College of Obstetricians and Gynaecologists
SAMM	– severe acute maternal morbidity
SCV	– Safer Care Victoria
SUDI	– sudden unexpected death in infancy
VAHI	– Victorian Agency for Health Information
VCAR	– Victorian Congenital Anomalies Register
VPDC	– Victorian Perinatal Data Collection
WHO	– World Health Organization

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Message from the chair

As I write this foreword I wish to acknowledge that while this report has been written to reflect the outcomes of the 2019 year, it has been done during the most challenging year we have ever experienced – whether you are being cared for by, working in or supporting our healthcare system or our community, this year has been like no other. Through difficult times we have experienced extreme social and health challenges. These challenges have had an impact on women, babies, children and families in many different ways and I expect no one's story is the same.

What we have seen across our whole community drives this council to do better – to share what we glean from the data and case reviews, to communicate those broadly and to be more active in challenging the status quo – continuing to review, reflect and commit to further improvement.

For our 2019 work we share our findings in a different way to previous years. This report will be accompanied by a series of presentations that can be downloaded from our website and used across our health and human services sector, in hospitals and in our community. This ensures that our recommendations and good practice points – that come from hours, days, and weeks of analysis – are accessible to those who make the greatest difference to the care mothers, babies and children receive. There continues to be a strong connection to the 2018 report, particularly in the themes articulated and the recommendations made. We will continue to adapt and improve this report to ensure it meets the sector's needs and genuinely contributes to reducing preventable harm for Victoria's women, babies, children and families.

Across 2019 like in previous years we continue to see significant disparities associated with those who may be considered vulnerable. To address this in a sustainable way we need our health and human services system to reform. This needs to be prioritised so we can respond to the unique needs of women, children and families in a timely way and as close to home as possible. Continuity of care must underpin the breadth of health and wellbeing and span across our acute, primary and community sectors. This reform will require courage and the determination to change the way things are done today. We must not continue to say 'it's too hard, the time is not right' or 'we are not quite ready'. We must unpack these difficulties and overcome them. We must do this for, and with, women and families who are the experts in their own lives. They know what matters most to them.

We must never lose sight of the women, their partners, parents and families who experience an outcome that is far from what they expected. As a community, as a clinician, as a consumer of care we should check in with ourselves every day and ask 'if care or the situation was different, would the outcome have been different?' or 'are we/am I good to go today?'. We all need to understand where we fit, and how we contribute as an individual, a team and a service.

It is important that the work of the CCOPMM is connected to the work that is happening across the Victorian health system, our community, nationally and internationally.

We all have a part to play – what is yours? Where do you make the most difference to those who matter most?

Adj Prof Tanya Farrell
Chair, CCOPMM

About this report

Victoria's mothers, babies and children 2019 presents data and trends on the births and deaths reported to and reviewed by CCOPMM and its subcommittees. The report includes recommendations for government, health and community services, clinicians and the wider health and community sectors. Good practice points are also highlighted for clinicians and services in the supporting resources, outlined below.

While Victoria and Australia experience some of the lowest maternal, perinatal and child mortality rates internationally, we can and should always strive for better outcomes. CCOPMM identifies instances of preventable mortality and morbidity and their contributing factors. This helps us to continually improve the quality and safety of care for women, babies, children and families in Victoria.

THE REPORT HAS FIVE SPECIFIC SECTIONS

1. Women and babies
2. Maternal mortality and morbidity
3. Aboriginal women and babies
4. Perinatal mortality
5. Infant, child and adolescent mortality

Who is CCOPMM and what does it do?

CCOPMM is an advisory body to the Victorian Minister for Health with functions legislated in the *Public Health and Wellbeing Act 2008*, supported by the Public Health and Wellbeing Regulations 2019. These functions include reviewing all cases of maternal, perinatal and paediatric mortality, and severe acute maternal morbidity (SAMM). In addition, CCOPMM undertakes research and reports on its work through an annual report.

CCOPMM provides independent advice, quality and safety monitoring and information to the Victorian Government. This helps to prioritise improvement activities, contributes to policy and guideline development and provides feedback to the Victorian health and human services system.

More information is available in the 'About CCOPMM' section of this report.

Enhancing CCOPMM reporting

A new suite of tools will be provided this year aimed at improving the use of data and supporting you to share our recommendations and good practice points. These will evolve in the future as we consult with the sector.

As in previous years, our reporting suite includes:

- key findings and recommendations from the independent review of births and deaths
- good practice points for health and human services and clinicians
- identified areas of clinical risk and variation to inform practice, policy and system planning
- data on the death and morbidity of mothers, babies, children and adolescents.

Resources in the 2019 reporting suite

1. This *Victoria's mothers, babies and children 2019* report containing summary data and CCOPMM's 2019 recommendations.
2. A slide pack including additional summary data, trends, recommendations and good practice points.
3. Supplementary tables with more detailed data from 2019.

All resources are available on the [Better safer care website](#).

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:

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

CCOPMM recommendations and good practice points

Our recommendations and good practice points reflect the findings of CCOPMM's review of all cases of maternal, perinatal and paediatric mortality and SAMM in a reporting year.

In Victoria, these recommendations and good practice points are shared and put into practice through close collaboration with Safer Care Victoria (SCV), the Department of Health and Human Services (the department), the Women and Children Centre of Clinical Excellence, the Coroners Court of Victoria, and the Victorian Managed Insurance Authority.

Good practice points are designed to direct local improvements in clinical performance. To improve care and prioritise areas for improvement we must review all maternal, perinatal, child and adolescent deaths, and significant morbidity to determine contributing factors. All health services must have a multidisciplinary mortality and morbidity review committee to do this.

Health services should ensure that their clinical governance system:

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

Data informing our work

The Victorian Perinatal Data Collection (VPDC) provides CCOPMM with information about maternal characteristics, medical conditions and complications of pregnancy. This includes details about the labour, birth, neonatal and postnatal stay in hospital and in the early days at home for every birth 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, and make policy and planning decisions across the state.

The data provided by the VPDC also helps to produce the annual Perinatal Services Performance Indicators (PSPI) report, which provides benchmarks and transparent outcomes across public and private maternity services. In addition to the Mothers, babies and children report, the PSPI report is used by services to prioritise their focus for improving the outcomes of the women and babies they care for.

WHEN USING THIS REPORT

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

In the mortality sections (maternal, perinatal, child and adolescent mortality), data may refer to deaths that occurred over a period of three or more years (for example, the triennium 2017–2019) due to the low numbers of deaths.

Maternal or perinatal death cases in which there are potential contributing factors undergo a review by one of three CCOPMM expert subcommittees:

1. the Stillbirth Subcommittee
2. the Neonatal Mortality Subcommittee
3. the Maternal Mortality and Morbidity Subcommittee.

The identified contributing factors are graded as (according to the Perinatal Society of Australia and New Zealand (PSANZ) classification):

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

Information provided in the 'Collecting and reviewing information' section and in Appendix 1 under 'Definitions' and 'Abbreviations' should be used to fully interpret this report.

The statistical births flow diagram (Appendix 3) outlines the scope of the data collections and the case inclusions and exclusions used for reporting.

Findings and recommendations: 2019

Vulnerability matters

Vulnerability for women, babies and children continues to be seen in the cases reviewed by CCOPMM for 2019. Our analysis of outcome data has also shown significant disparities associated with those who may be considered vulnerable, and this continues to be of concern. Timely recognition and appropriate responses for women, babies, children and families who are vulnerable must be a priority. This requires our health and human services system to focus on how it can reform and respond in a more sustainable way.

Our challenge is that vulnerabilities are not always easy to recognise or define, they are complex and often require a tailored response which considers many factors. These vulnerabilities can be physical, social or emotional and can impact health and wellbeing outcomes in a variety of ways such as:

- difficulty accessing care
- inequitable service provision
- lack of attention to person-centred care
- culturally inappropriate and unsafe care
- unconscious biases
- reduced capacity to connect, and remain connected, with health and human services systems, in particular for those with chronic or long-standing challenges.

The mortality reviews and data analysis show poorer outcomes and over-representation of vulnerabilities among the medically complex and socially and economically vulnerable populations.

These include, but are not limited to:

- those who live in rural locations with limited access to health services
- refugees, immigrants or others from a non-English speaking background
- the socially disadvantaged
- women, children and families living with mental health conditions.

While many Aboriginal people in Victoria enjoy good or excellent health, as a group, our data confirm that Aboriginal people continue to experience a greater burden of disease and social and economic disadvantage related to the social determinants of health compared with non-Aboriginal people.

Mothers, babies and children who experience or are exposed to family violence, social isolation and substance use are also vulnerable and need to be cared for in a variety of ways that are often not adequately met by our current system of care.

While definitions of vulnerability may vary, we know that women, babies and children in such circumstances have poorer outcomes. If we want to see this change then we need to rethink the way we provide appropriate and timely care, in our health services and across the community sector. Clinicians and health services need to acknowledge that these factors do significantly impact on an individual's health and wellbeing outcomes.

Areas of focus in 2019

CCOPMM has identified a set of conditions and contributing factors that require action to prevent unwarranted and devastating outcomes for individuals, families and the Victorian community.

CCOPMM's 2019 recommendations address issues relating to:

- perinatal care
- maternal care
- child and adolescent care.

RECOMMENDATIONS FOR PERINATAL CARE

Recommendation 1

1a) Maternity services must develop and regularly audit a pathway that facilitates rapid access to an emergency operating theatre 24/7 to prevent significant maternal or perinatal morbidity or mortality.

1b) For all Category 1 caesarean sections, services must record the time in which the decision was made to perform the caesarean section – to enable the accurate recording of the time taken from the 'decision to deliver' to the birth of the baby.

About this recommendation

Many poor outcomes are due to the absence of a mechanism to expedite delivery effectively, despite recognising the need for urgent action.

All maternity services must have the staff and facilities to ensure that when the need for urgent caesarean section is recognised, a woman can be transferred, appropriately anaesthetised, and their baby delivered within the time necessary to avoid preventable harm.

In line with the position statement from the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG), a specific time has not been agreed, as a more nuanced approach is warranted. However, 30 minutes from decision to birth should be achievable if required.

This information will be reported via the PSPI report, so that health services can benchmark their activity against other similar services, and across the state.

Timely access to operating theatres requires necessary medical (obstetric, anaesthetic, neonatal or paediatric) and midwifery/nursing staff to be available 24/7. For some services that means that relevant staff can be called and can attend and respond.

All levels of a health service that provides maternity care, including the executive and the board, should be aware that obstetric emergencies must be prioritised and that access to an operating theatre will impact outcomes. In partnership with SCV, CCOPMM will monitor and assess delays that may have contributed to a poor outcome.

In the event of a stillbirth, neonatal death or maternal death, reporting to CCOPMM must include information around the time from 'decision to deliver', to birth of the baby for the purposes of CCOPMM's review.

Recommendations 2 and 3

- 2.** Develop and implement a formal time out process prior to every instrumental birth and emergency caesarean section, whether in a birth room or in the operating theatre, to improve situational awareness and decision making about whether it is the right mode of birth, in the right location, with the right instrument/s, and the right clinical team in attendance.
- 3.** Develop and implement a credentialing process for medical staff practising obstetrics at all levels of training and experience who are undertaking instrumental births and complex caesarean sections.

About these recommendations

Every year CCOPMM reviews perinatal mortality and morbidity that results from excessive use of traction to the head of the baby. This includes severe caput, subgaleal haemorrhage, skull fracture and often cerebral parenchymal injury – either direct, or traction related – and can lead to lifelong disability.

Developing and implementing a formal time out process prior to a woman undergoing an instrumental birth or complex caesarean section could improve situational awareness and decision making.

Staff are encouraged to routinely assess the choice of mode of birth, choice of instrument/s, choice of location, and personnel present. Women must also be included in this process.

This could lead to the following improvements:

- Confirmation that appropriate escalation from junior to senior medical staff and/or midwifery and neonatal nursing staff has occurred. This is particularly important for the medical team prior to commencing a complex birth.
- Appropriate medical (paediatric/neonatal) and nursing/midwifery staff attending at the time of birth for neonatal assessment and resuscitation as required.
- Confirmation that the birth is occurring in the correct location – and therefore minimising the risk of an unsuccessful instrumental birth occurring outside of an operating theatre that would lead to further delays if an emergency caesarean section were required.
- Ensuring that all members of the healthcare team – medical, midwifery and nursing – have a structured process in which further safety factors can be identified and clearly articulated prior to proceeding with an instrumental birth or complex caesarean section.

Developing and implementing a credentialing process for medical staff practising obstetrics who are undertaking instrumental births and complex caesarean sections could lead to the following improvements:

- Ensuring obstetric staff are knowledgeable and competent, in line with current clinical guidelines, and recognise the risks when undertaking instrumental births and complex caesarean section.
- Reducing the mortality and morbidity associated with use of excessive traction.
- Developing an understanding of the role and value of the whole healthcare team to increase awareness of the clinical situation and clarify roles at the time of a complex birth.

Recommendation 4

4. Formalise pathways for women to have timely access to specialist clinical consultations from a named tertiary (level 6) service for secondary and primary maternity services.

About this recommendation

Opportunities for improvement include the following:

- Enhanced relationships between clinicians within geographical regions, to ensure that optimal and consistent care is given to all women.
- Staff in clinical settings can access advice and consultation when faced with a clinical issue beyond their service's capability, and/or transfer is facilitated in a timely manner.
- Health services of higher capability recognise their responsibility for ensuring good maternal and neonatal outcomes extends beyond their own service and consider the needs of those services that consult them for advice.
- The use of telehealth could assist in timely triage and advice without the need for women to travel large distances for higher-level care.
- All women have timely access to relevant specialist services, regardless of location and capability of the service. Formal pathways should strengthen existing relationships and better clarify the roles and responsibilities of each maternity service across Victoria. It will ensure these relationships are consistent and meet the needs of the individual circumstances of each woman and/or her baby at all gestational ages.
- Where possible, women can access Maternal Fetal Medicine advice via telehealth in collaboration with the rural, regional or metropolitan clinical lead. Women in rural and remote areas, should have timely access to Certificate of Obstetric and Gynaecological Ultrasound services as close to their location as possible.

We recommend establishing defined pathways of referral that align with current service partnerships and be based around geographic locations.

RECOMMENDATIONS FOR MATERNAL CARE

Recommendation 5

5. Develop and implement a system-wide improvement program to prevent women experiencing postpartum haemorrhage (PPH).

About this recommendation

PPH is the leading cause of maternal mortality worldwide. In Victoria, it was the cause of 37 per cent (97 cases) of all severe acute maternal morbidity (SAMM) reported in 2019.

There are well-documented policies available to manage PPH. These policies should be reinforced in clinical education, both formally and informally. The principles of risk identification, preparation, prevention, and management are well documented in SCV's [Maternity e-Handbook](#) and CCOPMM suggests that all maternity organisations use this resource, audit practice and undertake regular simulated training.

We identified the following themes in the women's cases we reviewed in 2019:

- Failure to recognise that excessive bleeding can obscure damage to the woman's ureter. Accordingly, ureteric integrity should be ensured during surgery or at the earliest opportunity postoperatively.
- Failure to recognise the complete extent of the uterine wound at caesarean section. Identifying the apex of both the mucosal and serosal aspects at the angles, or anteriorly downward, should be incorporated into routine practice.
- Failure to seek a second opinion from a senior colleague when returning an acutely unwell woman to the operating theatre. If a second return to the operating theatre is required, a second opinion is highly recommended.
- The importance of ensuring all clinical staff are upskilled in the clinical management of women experiencing maternity emergencies through PROMPT or alternative programs. These programs should include simulations of rare and high-risk emergency situations.
- Delays in transferring women to hospital after a planned homebirth following delays in recognising and managing PPH.
- Inadequate risk identification when augmenting a multiparous woman with oxytocin. This is a high-risk clinical situation and involving a senior obstetrician in the decision is highly recommended.

Recommendation 6

6. Evaluate the effectiveness of current services in meeting the specific needs of women during pregnancy and in the year following birth. If gaps are identified, implement strategies to improve the health and wellbeing of women and families. The areas of mental health and family violence require specific focused attention.

About this recommendation

Suicide is again reported as the leading cause of maternal death during the three-year period to 2019. The issues facing women during pregnancy, and in the year following birth, are often complex. They pose significant challenges for the health and human services sector, as well as organisations and clinicians in the acute and primary health sectors.

More women are beginning their pregnancy with mental health issues and many develop them during their pregnancy or after the birth of their baby. CCOPMM has also seen an increase in the numbers of women experiencing family violence. These factors, on their own or in combination, require appropriate and timely responses. These responses need to be effective to meet the individual needs of women and be delivered close to their homes.

RECOMMENDATIONS FOR CHILDREN AND ADOLESCENTS EXPERIENCING VULNERABILITIES

Recommendation 7

7. Reform of statewide services is needed to ensure there is a coordinated and timely system response that supports the health and wellbeing of Victorian children in vulnerable situations.

About this recommendation

Every year, CCOPMM continues to review deaths of children from the most socioeconomically disadvantaged families. Each year, we provide advice that our system needs to be reformed. These families and their children, including those known to child protection, continue to be significantly over-represented in deaths.

In many areas, the deaths are almost exclusively in children from the most vulnerable situations and are preventable. In many cases, serious deficiencies were identified. These relate to lack of communication between child protection, community service organisations, carers and health professionals involved in a child's care. This lack of clear communication and cross agency linkages result in no one ultimately taking accountability for the individual child's health and wellbeing needs.

The report *Lost, not forgotten: Inquiry into children who died by suicide and were known to Child Protection*, was tabled in Victorian Parliament in October 2019. It highlighted issues within the child protection system that ultimately led to the deaths of children known to child protection.

The report made recommendations to the department to strengthen the child protection and family support response for vulnerable children. In addition, CCOPMM provided a submission to the Royal Commission into Victoria's Mental Health System recommending urgent reform.

This reform must be prioritised. It will require additional investment and ensure a sustainable and accessible mental health system that is affordable, geographically accessible and will meet the needs of Victorian children.

Vulnerable children often have poor access to community-based primary health services and specialist paediatric services. These services must be increased, with specialist paediatric services embedded into the primary healthcare system. Children's health and wellbeing needs cannot always be met in the hospital system.

There is an urgent need to improve the accessibility of paediatric services. This can be done by addressing affordability and ideally co-locating with other family support services in community settings outside of the hospital system using a community health and wellbeing model.

Some services that need to be expanded include the following:

- Clinical services in Victoria's Child and Adult Mental Health Services and Child and Youth Mental Health Services. Another option is to increase these services' capacity to consult with general practitioners.
- Support and education services for primary care health professionals involved in managing young people who are at risk of suicide.
- Drug and alcohol service accessibility in Victoria.

Recommendations 8 and 9

8. Develop and roll out an annual public health campaign on the importance of influenza vaccination for children using co-design principles with families and their communities.

9. Ensure all children have easy access to free influenza vaccination annually.

About these recommendations

Any public health campaign must be co-designed to meet the needs of families and identify any specific needs of our culturally and linguistically diverse communities.

Recommendation 10

10. Develop and implement a public information campaign regarding the dangers for children on farms, using co-design principles with families and their communities, in conjunction with organisations such as WorkSafe Victoria and the Victorian Farmers Federation.

About this recommendation

Unfortunately, the attention of CCOPMM is again brought to the risk for children of serious injury or death on farms. In recent years we have reviewed deaths from riding or being a pillion passenger on a quad bike or tractor, being around industrial farm equipment, or being struck by large animals and moving vehicles. Farms are workplaces. The Victorian Coroner has made recommendations aimed at keeping children safe while on farming properties, which may also be their home, and CCOPMM fully supports these recommendations.

Progress on 2018 recommendations

The 2018 Victoria's Mothers, Babies and Children report provided six recommendations for improvement across **three themes**:

1. Strengthening women-, child- and family-centred care
2. Education, training and guidelines
3. Caring for vulnerable women, children and families.

Through the review of deaths and serious morbidity for 2018, CCOPMM recommended the following:

- Develop and implement a system-wide improvement program to prevent PPH.
- Develop a guideline for the recognition and management of Ogilvie's syndrome.
- Undertake education for all relevant clinicians in recognising and managing:
 - fetal growth restriction
 - decreased fetal movements.
- Ensure the provision of clear information and support for families on the safest way for every child to travel in cars at all times.
- Strengthen the regulation and education on e-cigarettes and liquid nicotine.
- Ensure the care provided in a mixed emergency department and urgent care centre meets the specific needs of children.

More detailed information on these recommendations is available in the [Victoria's mothers, babies and children report 2018](#).

The 2018 report was published in December 2019 and presented to the Minister for Health, SCV and the department, who all supported the 2018 recommendations. Significant progress has been made in addressing five of the six recommendations.

RECOMMENDATION 1

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

Work on this recommendation has not progressed but will be considered by SCV in 2021. The importance of this work was identified in 2019 and reflected in CCOPMM's recommendations.

RECOMMENDATION 2

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

This guideline was completed and published in October 2019 and is now part of SCV's [Maternity eHandbook](#).

RECOMMENDATION 3

Undertake education for all relevant clinicians in recognising and managing:

Fetal growth restriction

Throughout a 12-month funded program, 699 clinicians from 24 regional and metropolitan health services attended fetal growth restriction workshops, including 'train-the-trainer' education. This educational program has been continued by the National Health and Medical Research Council Stillbirth Centre for Research Excellence and incorporated into the SCV Safer Baby Collaborative, a program aiming to reduce stillbirth.

Decreased fetal movements

The [Movements matter](#) campaign was developed by the Stillbirth CRE in partnership with SCV and was launched by the Health Minister in 2018. This work has also been incorporated into the Safer Baby Collaborative.

The first nine months of the Safer Baby Collaborative saw:

- an increase, from 23 to 54 per cent, in clinicians consistently sharing material, raising awareness and improving care for women with decreased fetal movements
- an increase, from 63 to 88 per cent, in clinicians consistently measuring and plotting symphyseal fundal height to check that a baby is growing at a healthy rate.

RECOMMENDATION 4

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

The Victorian Government has committed \$4 million to deliver the new, statewide 'Safe Seats, Safe Kids' program of free child car restraint checks. The program will be delivered by the Child Accident and Prevention Foundation of Australia (Kidsafe) in partnership with Neighbourhood Houses Victoria.

Although pilot events were due to commence in February, followed by a full program of statewide events, in the rapidly changing context of the coronavirus (COVID-19) pandemic, the program has been postponed to protect staff, fitters and families.

Families can sign up to receive updates on when the program will recommence, as well as for ongoing child car restraint information and advice. In the meantime, information regarding car and road safety resources, including child restraint guidelines, can be found on the [Kidsafe website](#).

Kidsafe has also recently updated child injury prevention resources for maternal and child health centres.

RECOMMENDATION 5

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

E-liquids for use in e-cigarettes are frequently sold in fruit and confectionary flavours and in brightly coloured packaging. The Victorian Government has advocated for a nationally consistent approach to the packaging and labelling of e-liquids, including child-resistant containers, to ensure they are safer and less attractive to children.

The department and SCV developed an e-cigarette and nicotine safety communication plan that included a short video, a factsheet and a social media campaign, based on the message '[e-liquids – keep them locked away](#)'. These resources aim to improve awareness of the risks associated with the use of e-cigarettes around children, and to remind health professionals to contact the Victorian Poisons Information Centre if they believe anyone has ingested nicotine or an e-liquid for use in an e-cigarette. The department also worked with partners, including Kidsafe, to distribute messages through their own networks.

The Better Health Channel provides information for the community about both [e-cigarettes](#) and [liquid nicotine](#).

RECOMMENDATION 6

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

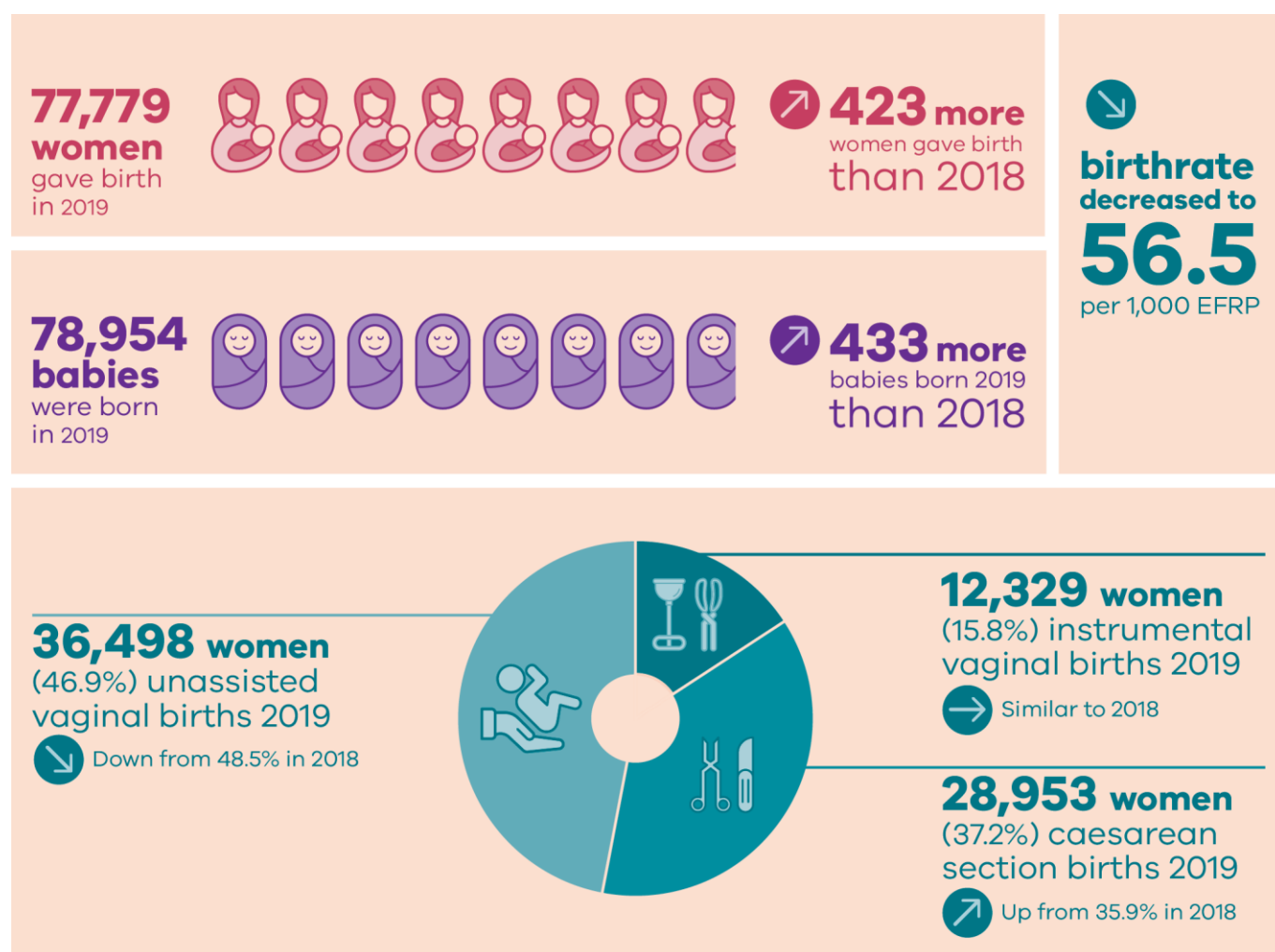
The following resources have been provided to support paediatric care provision in emergency departments and urgent care centres:

- Victorian Children's Tool for Observation and Response, including a version specially designed for urgent care centres.
- Statewide paediatric clinical practice guidelines.

Many of these guidelines are also endorsed for use in New South Wales and Queensland, as part of the Paediatric Improvement Collaborative, a joint initiative between SCV, Queensland Health Clinical Excellence Division and New South Wales Agency for Clinical Innovation to improve safety for children.

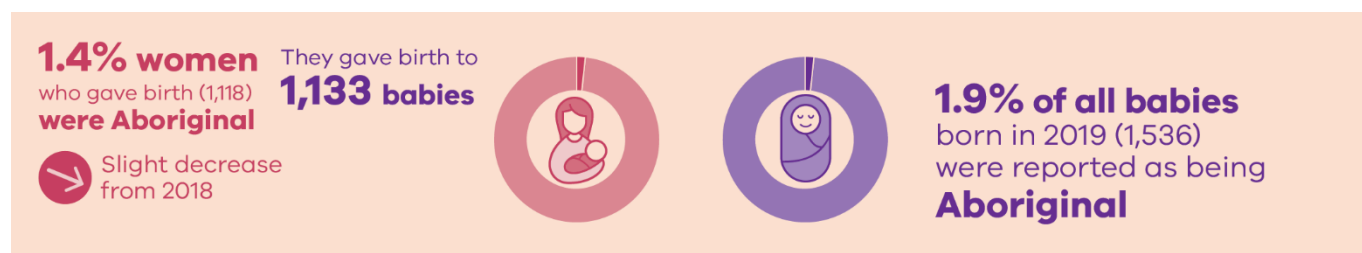
Mothers and babies

Having a baby in Victoria is safe. However, we still see disparities in outcomes between different groups of women that are complex and based on a variety of factors. Aboriginal women, immigrant women, women of low socioeconomic status, older women, very young women and those further away from Melbourne continue to have less favourable outcomes than others. In these groups we often see the impact of obesity, smoking, alcohol use and hypertension for mothers and impact of prematurity for babies.



SNAPSHOT

- In 2019, 77,779 women gave birth to 78,954 babies – 423 more women and 433 more babies than in 2018.
- Almost half of all women were overweight (26.9 per cent) or obese (21.2 per cent).
- 40.1 per cent of women started labour spontaneously, 35.5 per cent had labour induced and 24.3 per cent had no labour.
- Victoria continues to see a trend of increasing caesarean rates (28,953 women, 37.2 per cent) and decreasing unassisted vaginal birth rates (36,498 women, 46.9 per cent).
- 1,118 Aboriginal women gave birth to 1,133 babies (1.4 per cent of all women and 1.4 per cent of all babies born in Victoria). 1,536 babies (1.9 per cent) were themselves reported as being Aboriginal.



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

- The average (mean) age of women giving birth in 2019 was 32 years. The average age of women having a first birth was 30.
- 77.5 per cent of women gave birth under the care of a public maternity service, including 76 public home births. 22.3 per cent gave birth in a private hospital and 0.2 per cent of women had a planned homebirth under the care of a private midwife. There were 11 fewer public homebirths in 2019 compared to 2018.
- 39.9 per cent of women giving birth were born outside of Australia.

NEW MEASURES IN 2019

Consumption of alcohol during pregnancy was reported for the first time.

- Before 20 weeks' gestation:
 - 96.4 per cent of women did not drink any alcohol
 - 1.4 per cent of women reported drinking any alcohol (0.8 per cent drank monthly or less often, 0.3 per cent drank 2–4 times per month, 0.2 per cent drank two to three times per week and 0.1 per cent drank four or more times per week).
 - This item was not reported for 2.4 per cent of women.
 - On these occasions 0.9 per cent of women drank one or two standard drinks, 0.1 per cent of women drank three or four standard drinks and 0.05 per cent of women drank more than four standard drinks per day.

- After 20 weeks' gestation:
 - 97.0 per cent of women reported not drinking any alcohol. 0.6 per cent reported any drinking at this time, and this item was not reported for 2.4 per cent of women.
 - On any single occasion, 0.5 per cent of women drank one or two standard drinks, 0.04 per cent of women drank three or more standard drinks.

Smoking and pregnancy

- 7.7 per cent (6,016) of women smoked at some time during their pregnancy. This is a small reduction from 8.0 per cent of women in 2018 (6,192 women).
- 7.6 per cent (5,893) of women smoked in the first half of pregnancy and 4.8 per cent (3,757) smoked in the second half of pregnancy.

The chorionicity of multiple births was also reported for the first time.

- Of the 2,299 twins born:
 - 24.0 per cent were reported as monochorionic, and 72.8 per cent were reported as dichorionic
 - chorionicity was not reported or inadequately described for 3.3 per cent of twins.
- Of the 38 triplets born:
 - 7.9 per cent were monochorionic, 7.9 per cent were dichorionic and 81.6 per cent were reported as trichorionic
 - chorionicity was not reported for 2.6 per cent of triplets.

BABIES

Table 1: Trends in birthing episodes (number) and gestation (%), 2000–2019

Gestation	2000	2005	2010	2015	2016	2017	2018	2019
	61,562	65,115	72,864	77,752	79,319	78,226	77,355	78,954
20–27 weeks	0.7	0.6	0.6	0.5	0.6	0.5	0.6	0.6
28–31 weeks	0.7	0.6	0.7	0.7	0.6	0.7	0.6	0.7
32–36 weeks	5.5	5.5	5.8	6.4	6.2	6.4	6.4	7.0
37–41 weeks	91.8	91.9	91.6	92.0	92.2	92.1	92.1	91.5
42+ weeks	1.3	1.3	1.2	0.5	0.4	0.3	0.2	0.3
Not reported	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

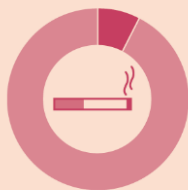
Over the past 20 years there has been an increase in women giving birth at 32–36 weeks, with an increase from 6.4 per cent of birthing episodes in 2018 to 7.0 per cent in 2019.

Of the babies born at 20–27 weeks, 197 were born at 20–23 weeks, and 264 were born at 24–27 weeks.

Over the past 12 months there has been increasing interest in the births at early term, particularly before 39 weeks. In 2019, 27,268 babies (34.6 per cent) were born at 37 or 38 weeks and, of those, 10,387 (38.1 per cent) had labour induced. An additional 9,274 (34.0 per cent) had a pre-labour caesarean section. Of those who were induced at 37 or 38 weeks, no medical indication was reported for 8.2 per cent.

7.7% women smoked at any time during their pregnancy in 2019

➔ 175 fewer women (-0.3%) from 2018



7.6% women smoked in first half pregnancy



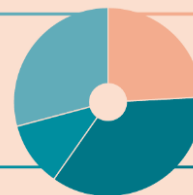
4.8% women smoked in second half pregnancy

onset of labour

of 77,779 women who gave birth

spontaneous and not augmented
29.0%

spontaneous and augmented
11.1%



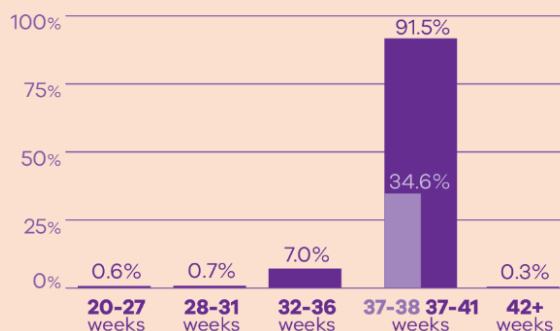
no labour pre-labour caesarean
24.3%

induced
35.5%

➔ All similar to 2018

gestation

of 78,954 babies born

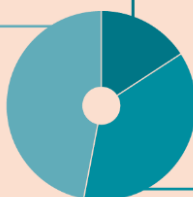


method of birth

of 77,779 women who gave birth

unassisted vaginal 46.9%

➔ Down from 48.5% 2018



instrumental vaginal 15.8%
forceps and vacuum

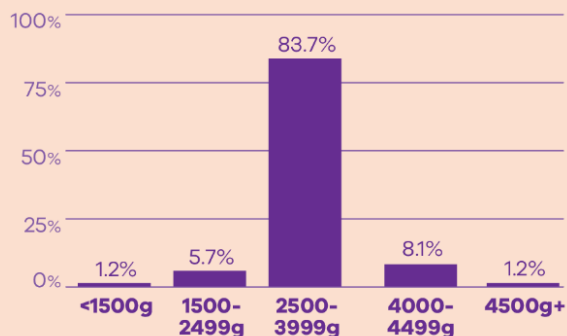
➔ Similar to 2018

caesarean section 37.2%

➔ Up from 35.9% in 2018

birth weights

of 78,954 babies born



Maternal mortality and morbidity

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

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 while pregnant or within 12 months of the end of pregnancy, from any cause.

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

- **direct** – relating to the pregnancy or birth
- **indirect** – relating to a pre-existing medical condition or newly diagnosed condition
- **coincidental** – unrelated to the pregnancy or birth.

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

The incidence of maternal deaths is expressed as the maternal mortality ratio (MMR), 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.¹

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

SNAPSHOT

- In 2019, there were nine maternal deaths, compared to 14 reported deaths in 2018 and seven in 2017.
- Of the nine deaths in 2019, one was direct, six were indirect, and two were late.
- In the 2017–2019 triennium there were 30 deaths, of which three were direct, 14 were indirect, two were coincidental and eleven were late.
- The Victorian MMR from 2017 to 2019 was 7.2 per 100,000 women who gave birth.
- Suicide was the most common cause of all maternal deaths (five) in the 2017–2019 period.

CONTRIBUTING FACTORS IDENTIFIED IN MATERNAL DEATHS

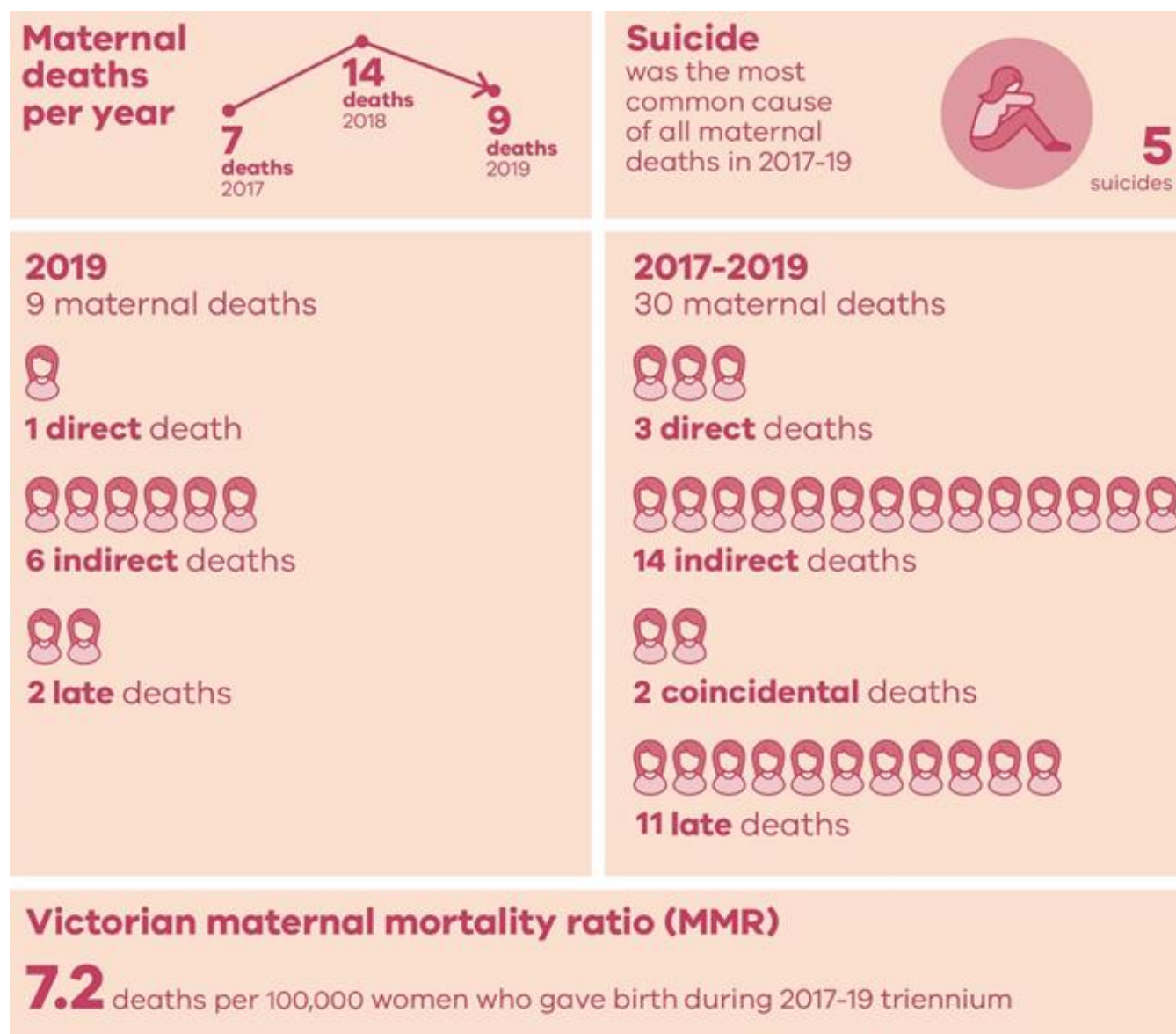
The review of maternal deaths over the most recent triennium (2017–2019) revealed a range of contributing factors. In many cases there were multiple contributing factors. We continue to see women with specific vulnerabilities feature in many of our reviews.

¹ Please 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.

In particular, we are concerned about these recurring themes:

- Lack of recognition by clinicians, the woman or her family of the complexity or seriousness of her condition particularly if there was substance use or a deterioration of her mental health.
- Inadequate communication and timely actions by clinicians when an issue or complication had been identified.
- A mental health issue or social circumstance that limited a women's ability to access and engage with care.

In the deaths reviewed these factors were even more complex in cases where child protection services were involved with a family.

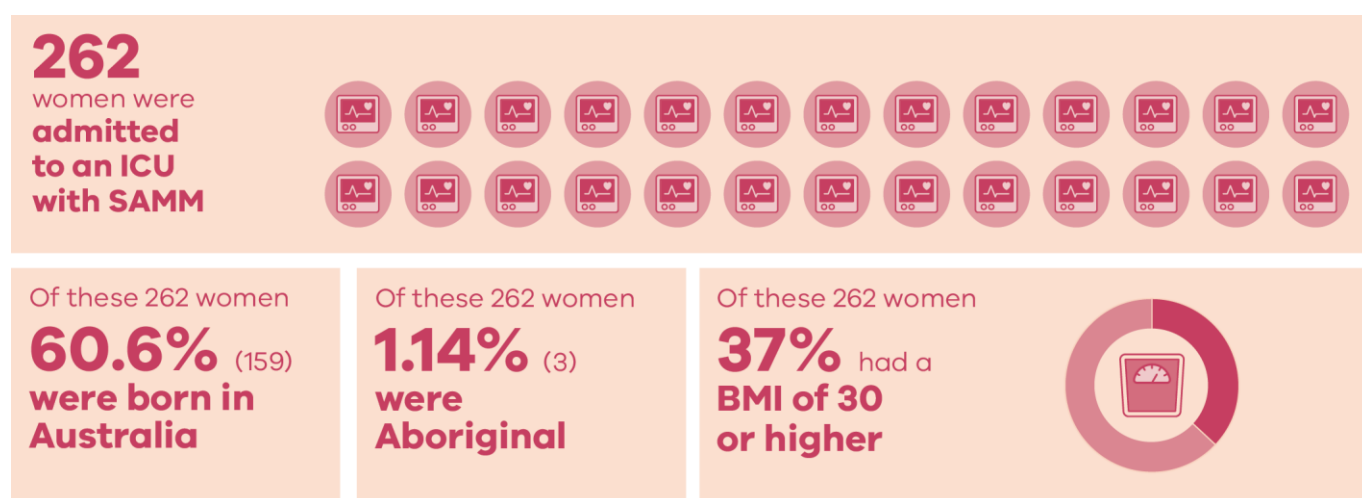


SEVERE ACUTE MATERNAL MORBIDITY (SAMM)

In countries with low maternal mortality, such as Australia, there is increasing interest in severe morbidity related to pregnancy, labour and birth and the days following birth to monitor outcomes for women and guide areas for improvement.

Victoria was the first jurisdiction in Australia to introduce mandatory reporting of SAMM cases, in July 2017. In Victoria, SAMM is measured as an admission to an ICU during pregnancy and up to 42 days after birth. ICU admission was chosen because it is a simple, identifiable criterion and best captures the most severe cases.

The criteria for ICU admission may vary across hospitals, and not all maternity services in Victoria have direct access to an ICU.



SNAPSHOT

- 262 women were admitted to an ICU with SAMM.
- 159 of the 262 of these women (60.6 per cent) were born in Australia.
- Three (1.14 per cent) of the total SAMM cases were Aboriginal women.
- 37 out of the 262 (14.1 per cent) of women admitted to ICU had a contributing factor.
- 37 per cent of women admitted to ICU had a body mass index (BMI) of 30 or higher.

In 2019²:

- Of the 262 women admitted to ICU, 42 women (16.0 per cent) were pregnant on admission to ICU. Seven women were in their first trimester, 15 were in their second trimester and 20 were in their third trimester.
- 83.9 per cent (220) of women were admitted to an ICU in the postpartum period.
- Of the women admitted to the ICU, two (0.7 per cent) had a pregnancy which ended prior to 20 weeks in a ruptured ectopic pregnancy.
- The dominant condition requiring admission to an ICU was primary severe postpartum haemorrhage (PPH), contributing to 37 per cent of all admissions (97 out of 262). This was reduced from 38 per cent in 2018. Pre-eclampsia was the second most common condition, contributing to 10.3 per cent of all ICU admissions (27 out of 262), and higher than 2018 numbers – 8.7 per cent (21 out of 239). Sepsis and septic shock was the next most common condition contributing to 9.5 per cent of all ICU admissions (25 out of 262).
- Of the 10 (3.8 per cent) cardiac conditions admitted to ICU, three (1.1 per cent) were cardiac arrests. This significant event has ongoing issues around the physical and emotional health outcomes for mothers and their capacity to fully parent their new baby.

² Note: There may be small variances in the data over time due to incomplete reporting of SAMM cases. The total number and report information may not reflect complete SAMM data for Victoria in 2019.

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. Statistics for unadjusted perinatal mortality can be found in the supplementary tables for this report.

860

perinatal deaths 2019

➔ Slight increase from 848 in 2018



688 **adjusted perinatal deaths 2019**

➔ Slight increase from 675 in 2018

8.7 per 1,000 births **adjusted perinatal mortality rate 2019**

➔ Slight increase from 8.6 in 2018

31.7% of adjusted perinatal deaths in 2019 **underwent an autopsy**

➔ Down from 35.5% in 2018

34.4% of stillbirths **underwent an autopsy**

➔ Down from 39.5% in 2018

23.9% of neonatal deaths **underwent an autopsy**

➔ Down from 26% in 2018

6.4 per 1,000 births **adjusted stillbirth rate 2019** for babies born after 20 weeks' gestation

➔ Compared with 6.0 per 1,000 in 2018



10.5 per 1,000 births **adjusted perinatal mortality rate 2019 in women who smoked at any time while pregnant**

2.3 per 1,000 live births **neonatal mortality rate 2019**

➔ Compared with 2.6 per 1,000 live births in 2018



8.6 per 1,000 births **adjusted perinatal mortality rate 2019 in women who did not smoke while pregnant**

SNAPSHOT

- There were 860 perinatal deaths in 2019, a slight increase from 2018 when 848 perinatal deaths occurred.
- There were 688 adjusted perinatal deaths (508 adjusted stillbirths and 180 neonatal deaths) in 2019 compared with 675 in 2018.
- The adjusted perinatal mortality rate (PMR) was 8.7 per 1,000 births, compared with 8.6 per 1,000 births in 2018.
- The adjusted PMR in women smoking at any time during pregnancy was 10.5 per 1,000 births compared with 8.6 per 1,000 births in those who did not smoke while pregnant.
- 31.7 per cent of adjusted perinatal deaths in 2019 underwent a perinatal autopsy (34.4 per cent of stillbirths and 23.9 per cent of neonatal deaths).
- The adjusted stillbirth rate for babies born after 20 weeks' gestation was 6.4 per 1,000 births compared with 6.0 per 1,000 births in 2018.
- The neonatal mortality rate was 2.3 per 1,000 livebirths in 2019 compared with 2.6 per 1,000 livebirths in 2018.

There is current national work which aims to reduce the number of stillbirths after 28 weeks, excluding congenital abnormalities. The number of stillbirths that met these criteria is 129, compared with 116 in 2018.

Perinatal mortality rates

The 2019 adjusted PMR for:

- singletons: 8.0 per 1,000 births
- twin pregnancies: 29.9 per 1,000 births
- triplet pregnancies: 52.6 per 1,000 births.

Table 2: Adjusted PMR by maternal place of birth, Victoria 2019^{3,4}

	Adjusted total births		Livebirths ⁵		Adjusted stillbirths	Neonatal deaths	Adjusted perinatal deaths	% of all perinatal deaths	Adjusted PMR by maternal place of birth
	N	%	N	%					
North-West Europe	2,207	2.8	2,197	2.8	10	0	10	1.5	4.5
North-East Asia	4,177	5.3	4,160	5.3	17	4	21	3.1	5.0
Americas	1,160	1.5	1,154	1.5	6	3	9	1.3	7.8
Southern and Eastern Europe	1,401	1.8	1,391	1.8	10	1	11	1.6	7.9
South-East Asia	5,359	6.8	5,322	6.8	37	6	43	6.3	8.0
Australia	47,592	60.1	47,307	60.1	285	112	397	57.7	8.3
Oceania and Antarctica (excl Australia)	2,256	2.8	2,246	2.9	10	9	19	2.8	8.4
Sub-Saharan Africa	1,757	2.2	1,745	2.2	12	4	16	2.3	9.1
Southern and Central Asia	10,310	13.0	10,222	13.0	88	32	120	17.4	11.6
North Africa and the Middle East	2,749	3.5	2,717	3.5	32	8	40	5.8	14.6
Missing	201	0.3	200	0.3	1	1	2	0.3	10.0
Total	79,169	100	78,661	100	508	180	688	100	8.7

SMOKING AND PERINATAL MORTALITY

In 2019:

- 6,109 babies were born to women who reported smoking at any time during pregnancy (7.7 per cent of all adjusted births)
- there were 47 adjusted stillbirths and 17 neonatal deaths in women who smoked at any time during pregnancy
- there were 443 adjusted stillbirths and 162 neonatal deaths in women who did not smoke at any time.

³ The figures and calculations in this table exclude 172 stillbirths from terminations of pregnancy for maternal psychosocial indications

⁴ This table is ranked by PMR (excluding missing data)

⁵ Livebirths include all livebirths, including those who later die as neonatal deaths

The adjusted PMR in women smoking at any time during pregnancy was 10.5 per 1,000 births compared with 8.6 per 1,000 births in those who did not smoke while pregnant.⁶

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

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.

Congenital anomaly accounts for:

- 222 adjusted stillbirths (43.7 per cent of all adjusted stillbirths)
- 74 neonatal deaths (41.1 per cent of all neonatal deaths)
- 296 (43.0 per cent of all adjusted perinatal deaths).

After congenital anomalies, the most common causes of neonatal death in 2019, according to PSANZ perinatal death classification (PDC), were:

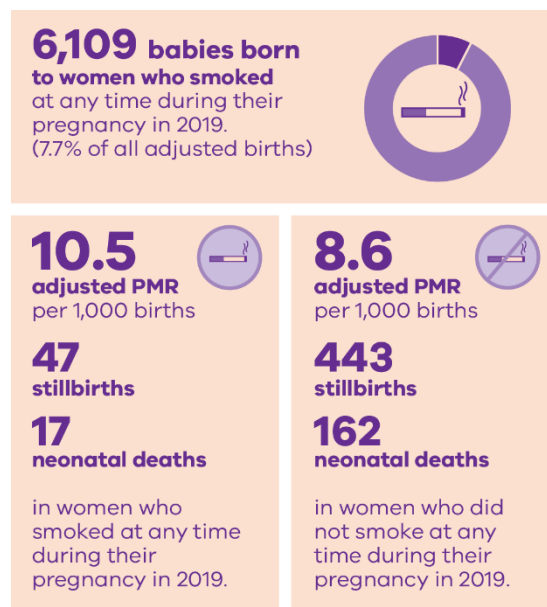
- spontaneous preterm labour or rupture of membranes (< 37 weeks' gestation) (69, 38.3 per cent)
- hypoxic peripartum death (10, 5.6 per cent) and perinatal infection (7, 3.9 per cent).

After congenital anomalies, the most common causes of death in 2019, according to the PSANZ neonatal death classification (NDC), were:

- extreme prematurity (59, 32.8 per cent)
- neurological (19, 10.6 per cent) and cardio-respiratory disorders (16, 8.9 per cent).

After congenital anomalies, the most common causes of death (PSANZ PDC) for adjusted stillborn infants in 2019 were:

- placental dysfunction or causative placental pathology (70, 13.8 per cent)
- unexplained antepartum fetal death (61, 12.0 per cent)
- spontaneous preterm labour or rupture of membranes (< 37 weeks' gestation) (59, 11.6 per cent).

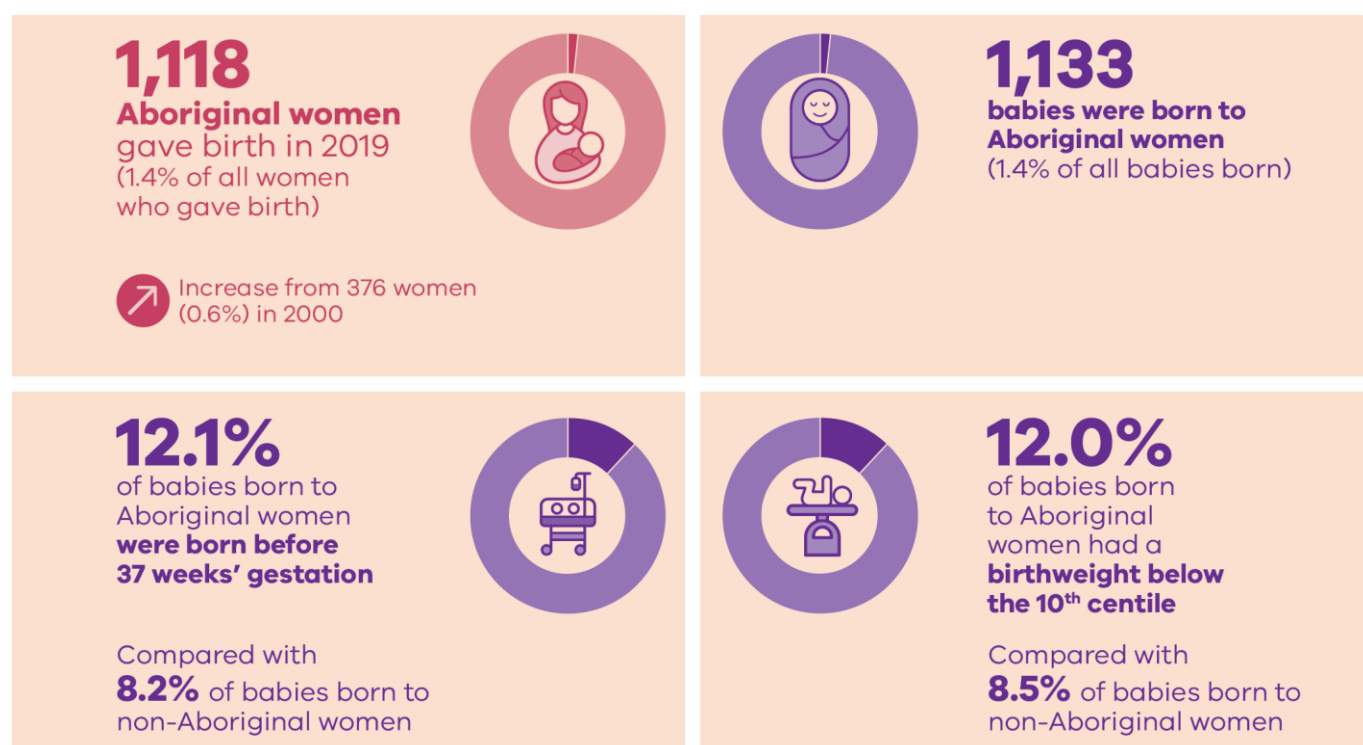


⁶ The data in this section refer to the smoking status of the mothers of babies (adjusted births), whereas the sections on page 18, 'Smoking and pregnancy' and 31, 'Smoking and Aboriginal births, mortality and morbidity', refer to the smoking status of mothers.

Aboriginal births, mortality and morbidity

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

Aboriginal women and babies continue to have poorer outcomes than non-Aboriginal women and babies. The perinatal mortality rate (PMR) for babies born to Aboriginal women has been substantially and consistently higher than for those babies born to non-Aboriginal women over many years.











SNAPSHOT

- 1,118 Aboriginal women gave birth to 1,133 babies (1.4 per cent of all women who gave birth and 1.4 per cent of all babies born in Victoria). This is an increase from 376 women (0.6 per cent) and 380 babies (0.6 per cent) in 2000.
- 12.1 per cent of babies born to Aboriginal women were born before 37 weeks' gestation, compared with 8.2 per cent of those born to non-Aboriginal women.
- 12.0 per cent of babies born to Aboriginal women had with a birthweight below the 10th percentile compared with 8.5 per cent of those born to non-Aboriginal women.
- The PMR for babies born to Aboriginal mothers for the triennium 2017–2019 was 12.6 per 1,000 births, and 8.7 per 1,000 births for non-Aboriginal mothers. This compares with 11.5 and 8.7 per 1,000 births respectively for the triennium 2016–2018.

- The stillbirth rate for babies born to Aboriginal mothers for the triennium 2017–2019 was 7.9 per 1,000 births, and 6.2 per 1,000 births for non-Aboriginal mothers. This compares with 7.1 and 6.2 per 1,000 births respectively for the triennium 2016–2018.
- The neonatal mortality rate for babies born to Aboriginal mothers for the triennium 2017–2019 was 4.7 per 1,000 livebirths, and 2.5 per 1,000 livebirths for non-Aboriginal mothers. This compares with 4.4 and 2.6 per 1,000 livebirths respectively for the triennium 2016–2018.

The gap between Aboriginal and non-Aboriginal PMR for the triennium 2017–2019 has increased from the 2016–2018 triennium. This increase is both for stillbirths and neonatal deaths.

	Aboriginal women	Non-Aboriginal women
Perinatal Mortality Rate (PMR)	12.6 deaths per 1,000 births for 2017–2019  Compared with 11.5 in 2016–2018	8.7 deaths per 1,000 births for 2017–2019  Compared with 8.7 in 2016–2018
Stillbirth Mortality Rate	7.9 deaths per 1,000 births for 2017–2019  Compared with 7.1 in 2016–2018	6.2 deaths per 1,000 births for 2017–2019  Compared with 6.2 in 2016–2018
Neonatal Mortality Rate	4.7 per 1,000 live births for 2017–2019  Compared with 4.4 in 2016–2018	2.5 per 1,000 live births for 2017–2019  Compared with 2.6 in 2016–2018
<div>   </div> <p>The gap has increased between Aboriginal and non-Aboriginal PMR for the triennium 2017–2019 from the 2016–2018 triennium. This increase is both for stillbirths and neonatal deaths.</p>		

SMOKING AND ABORIGINAL BIRTHS, MORTALITY AND MORBIDITY

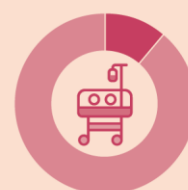
- 42.3 per cent of Aboriginal women smoked during pregnancy (up from 40.2 per cent in 2018) compared with 7.3 per cent of non-Aboriginal women.
- 11.3 per cent of Aboriginal women gave birth preterm (before 37 weeks) compared with 7.3 per cent of non-Aboriginal women.
- 11.7 per cent of babies born to Aboriginal women had low birthweight (< 2,500 grams) compared with 6.9 per cent of babies born to non-Aboriginal women.⁷

In previous reports CCOPMM has recommended focused action relating to smoking and Aboriginal women. As we have seen an increase in smoking rates in 2019, this suggests that we need to support Aboriginal women and their babies in a different way.

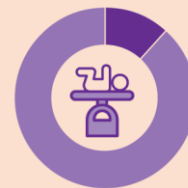
42.3%
of Aboriginal women
smoked during pregnancy
Compared with
7.3% non-Aboriginal women



11.3%
of Aboriginal women
gave birth preterm
Compared with
7.3% non-Aboriginal women



11.7% of babies
born to Aboriginal women
weighed <2,500g
Compared with
6.9% non-Aboriginal babies



Maternal comparisons

- 3.3 per cent of Aboriginal women were underweight (BMI < 18.5) compared with 2.6 per cent of non-Aboriginal women. Aboriginal women were also more likely to be obese (BMI ≥ 30) than non-Aboriginal women (35.1 per cent and 21.2 per cent respectively).

Babies comparisons

For the 2017–2019 triennium:

- In 2019, 9.9 per cent of babies born to Aboriginal women were born at 32–36 weeks' gestation compared with 7.0 per cent of those born to non-Aboriginal women.
- 12.0 per cent of babies born to Aboriginal women had a birthweight below the 10th centile compared with 8.5 per cent of those born to non-Aboriginal women.

Babies born to Aboriginal women were more likely to weigh less than 2,500 grams at birth (133 babies, 11.7 per cent) compared with those born to non-Aboriginal women (5,261 babies, 6.9 per

⁷ The data in this section refer to the smoking status of mothers, whereas the section on page 26, 'Smoking and perinatal mortality', refers to the smoking status of the mothers of babies (adjusted births).

Child and adolescent mortality

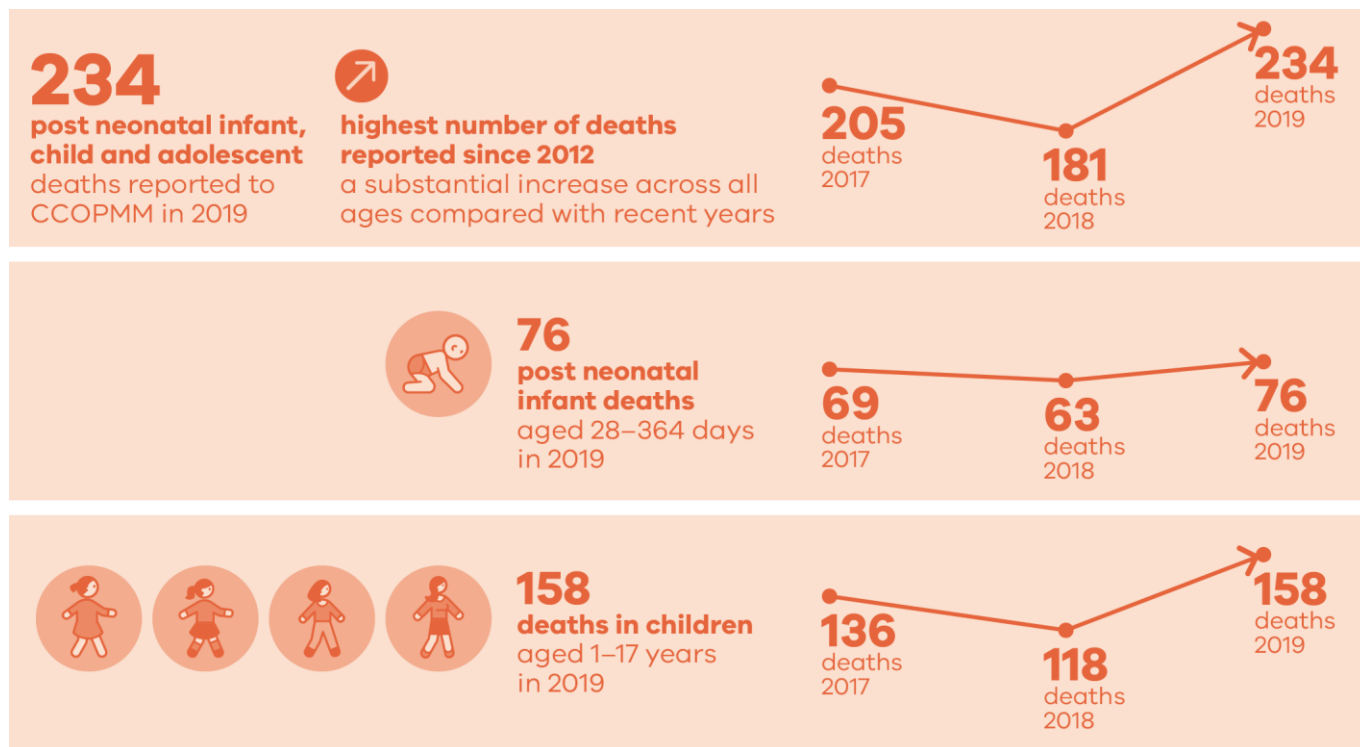
Child and adolescent mortality includes deaths for post-neonatal infants, children and adolescents between the ages of 28 days and 17 years and 364 days.

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

Children can be vulnerable to poor outcomes from illness if they are living in households where there is:

- social disadvantage
- family violence
- mental health issues or substance use
- an unsafe environment
- social marginalisation, including potentially coming from an Aboriginal, immigrant, or refugee family.

Children who have been known to child protection are also over-represented in deaths.



SNAPSHOT

- There were 234 post-neonatal infant, child and adolescent deaths reported in 2019. This is the highest number of deaths reported since 2012 and represents a substantial increase in deaths compared with recent years (181 in 2018 and 205 in 2017). The increases were across all age groups.
- There were 158 deaths in children aged one to 17 years, compared with 118 in 2018 and 136 in 2017.
- There were 76 post-neonatal infant deaths (28–364 days) compared with 63 in 2018 and 69 in 2017.
- The highest rate of death was in the 28–364 day age group.
- The infant mortality rate was 2.8 per 1,000 livebirths for infants (0–364 days). This is compared with the Australian infant mortality rate of 3.1 per 1,000 livebirths. ([The World Bank – World Development Indicators](#)).
- The under-five mortality rate was 3.3 per 1,000 livebirths compared with the Australian rate of 3.6 per 1,000 livebirths ([The World Bank – Data Bank](#)).

LEADING CAUSES OF DEATHS BY AGE GROUPS IN 2019

- **Post-neonatal infants (28–364 days)** – The leading causes of the 76 post-neonatal infant deaths were congenital anomaly (46.1 per cent), Sudden Infant Death Syndrome (19.7 per cent) and prematurity (11.8 per cent).
- **Children aged one to four years** – The leading causes of the 41 deaths were congenital anomaly (39.0 per cent), infection (17.1 per cent) and malignancy (9.8 per cent).
- **Children aged five to nine years** – The leading causes of the 33 deaths were malignancy (39.4 per cent), congenital anomaly (36.4 per cent) and infection (12.1 per cent).
- **Children and adolescents aged 10–14 years** – The leading causes of the 33 deaths were congenital anomaly (33.3 per cent), intentional self-harm, including suicide (21.2 per cent) and malignancy (12.1 per cent).
- **Adolescents aged 15–17 years** – The leading causes of the 51 deaths were intentional self-harm, including suicide (33.3 per cent), motor vehicle accident (19.6 per cent) and other acquired disease (13.7 per cent).

infant mortality rate

age 0 – 364 days



2.8 deaths

per 1,000 live births
for infants in Victoria



3.1 deaths

per 1,000 live births
for infants in Australia

under-5 mortality rate



3.3 deaths

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

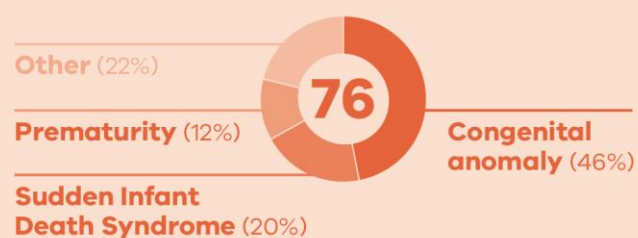


3.6 deaths

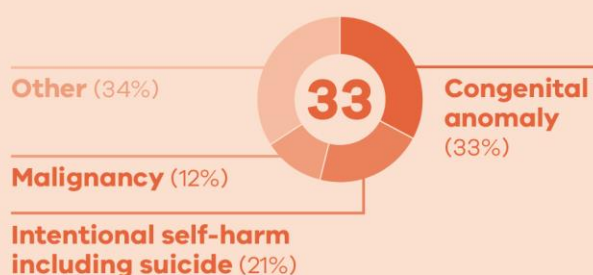
per 1,000 live births
for under-5 in Australia

Post-neonatal infant deaths

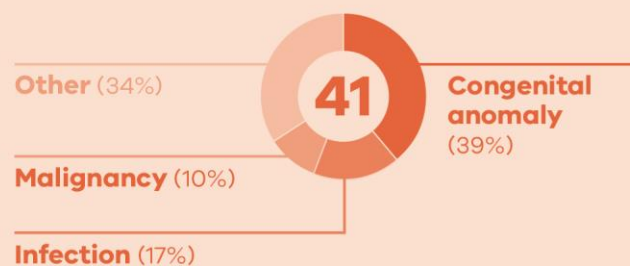
(28–364 days old)



Adolescents aged 10–14yrs deaths



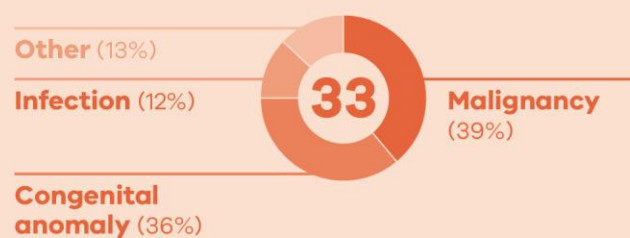
Children aged 1–4yrs deaths



Adolescents aged 15–17yrs deaths



Children aged 5–9yrs deaths



Research

Research is a core function of the work of CCOPMM. CCOPMM is legislated to conduct research related to mortality and morbidity that will benefit women, babies, children and adolescents. In addition to this core research function, the [Public Health and Wellbeing Regulations](#) allow CCOPMM to make perinatal data available to researchers.

CCOPMM DATABASES

CCOPMM is responsible for the following databases:

- **Victorian Perinatal Data Collection (VPDC)** – A register recording more than 100 data items for all births in Victoria of at least 20 weeks' gestation or (if gestation is unknown) 400 grams birthweight.
- **Victorian Congenital Anomalies Register (VCAR)** – Information on all congenital anomalies for livebirths, stillbirths and terminations of pregnancy diagnosed before birth to six years old, voluntarily notified to CCOPMM.
- **CCOPMM Mortality Database** – Information on all cases of maternal, perinatal and paediatric mortality in Victoria.
- **Severe acute maternal morbidity (SAMM) dataset** – Information on maternal admissions to intensive care during pregnancy and up to 42 days after birth.

RESEARCH SPECIAL INTEREST GROUP

CCOPMM's Research Special Interest Group is a multidisciplinary group combining specialist clinical and research knowledge to drive CCOPMM's research function.

This group was formed to:

- review requests for external research projects and publications that arise from the data
- identify priority areas for research and review research processes (including to support the Victorian Agency for Health Information (VAHI) Data Request Hub and data linkage)
- provide advice and assistance to CCOPMM on areas of relevant research or priorities for maternal, perinatal, infant and child and adolescent mortality and morbidity.

ACCESSING CCOPMM DATA

All requests for research are reviewed in accordance with the CCOPMM's legislative requirements. Requests for data can be submitted through the [VAHI Data Request Hub](#). Approved research involving data linkage may be facilitated by the [Centre for Victorian Data Linkage](#).

RESEARCH AREA OF FOCUS IN 2019

CCOPMM undertakes internal research projects on key priority areas. One area of focus for 2019 is highlighted here.

Fetal growth restriction

Studies have shown that fetal growth restriction is a strong risk factor for stillbirth, particularly when undetected. CCOPMM recognised this risk and is supporting MD-PhD candidate Roshan Selvaratnam, under the supervision of Dr Mary-Ann Davey and Prof Euan Wallace, to investigate the detection and management of fetal growth restriction in Victoria.

Part of this work has examined the impact of publicly reporting hospital performance in their rate of detection of severe fetal growth restriction in the Victorian PSPI report. Using whole-of-state data, this work showed that the performance reporting has been associated with improved detection of severe fetal growth restriction across the state and a reduction in stillbirth among those babies.

While these are welcome findings, there was also a significant increase in unintended early interventions, and associated morbidity, for normally grown babies who were incorrectly suspected of fetal growth restriction. These findings were published in the *British Journal of Obstetrics and Gynaecology*. CCOPMM is now looking at approaches to mitigate this potential harm. This includes the possible introduction of a balance measure in 2020 that aims to make the unintended harm more visible to health services. The neonatal and longer-term childhood outcomes for babies delivered early for suspected fetal growth restriction – both true positives and false positives – are also being investigated.

Outputs from this work include one Honours thesis, one PhD thesis, five published papers, five submitted papers, and several presentations at local, national and international conferences.

RESEARCH REQUESTS

Each year CCOPMM receives requests for data from researchers outside SCV and the department. In 2019 there were 49 such requests to access extracts of the VPDC.

Research events in 2019

The Victorian Perinatal Data Collection (VPDC) forum

This forum is an annual event, for hospital executives, maternity managers, midwives, obstetricians, educators and researchers, to learn about Victorian perinatal data and reporting, and discuss recommendations to improve clinical outcomes for mothers and babies.

Perinatal Services Performance Indicators (PSPI) forum

This forum was held in February 2019, following the release of the [PSPI report](#). The PSPI report aims to improve outcomes for Victorian women and their newborns by reporting outcomes for individual maternity services. These can be used to guide quality improvement activities.

The forum was an opportunity for quality and safety experts and clinicians at maternity and newborn services to discuss performance data and improve practice for Victorian women and babies. The PSPI report and forum offered the chance to reflect and identify new areas for investigation, research and translation.

About CCOPMM

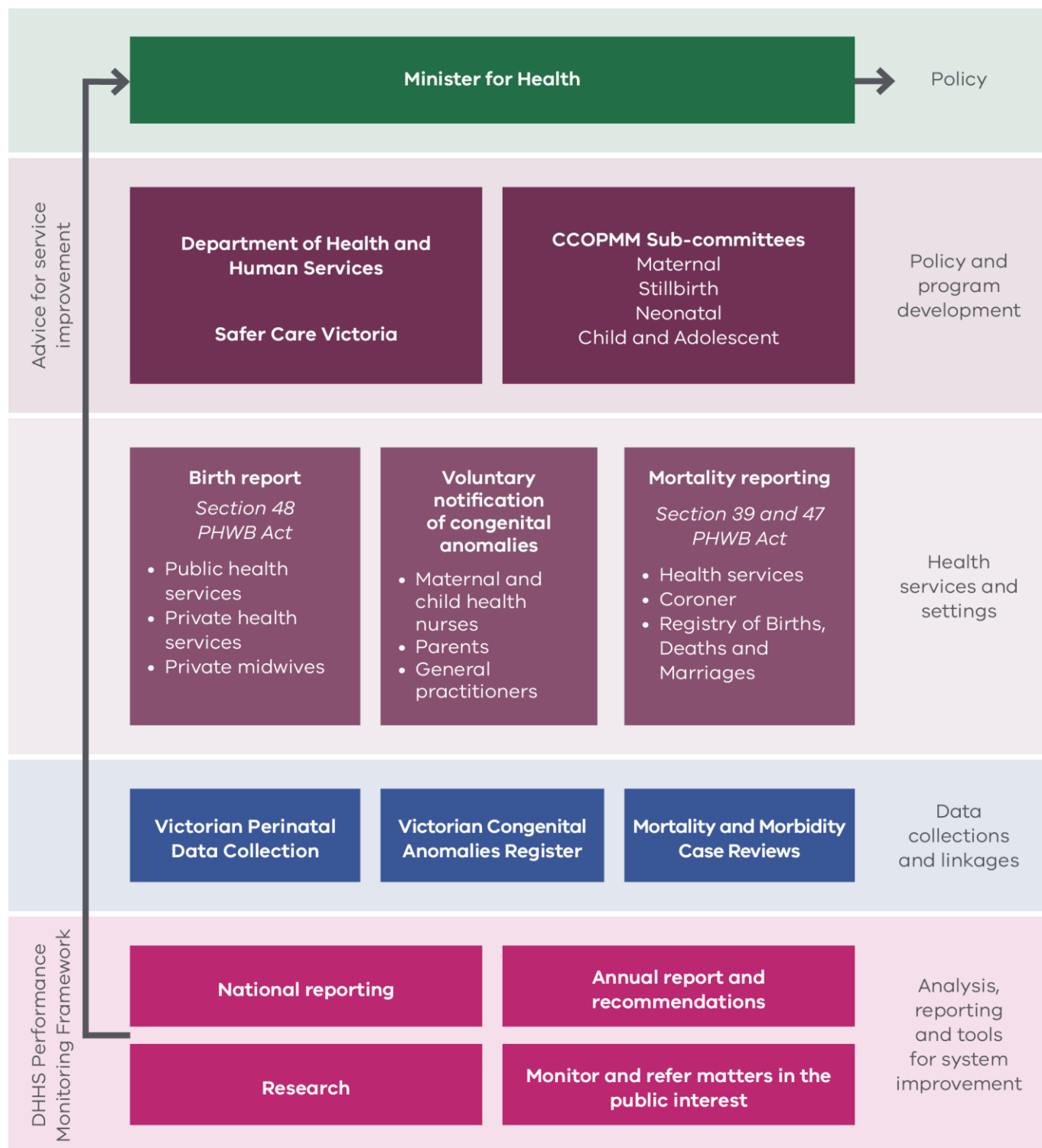
CCOPMM FUNCTIONS

As described in the Public Health and Wellbeing Act, CCOPMM's functions are to:

- conduct study, research and analysis into the incidence and causes in Victoria of maternal deaths, stillbirths and the deaths of children
- conduct study, research and analysis into the incidence and causes of obstetric and paediatric morbidity
- conduct a perinatal data collection unit for the purpose of:
 - collecting, studying, researching and interpreting information on and in relation to births in Victoria
 - identifying and monitoring trends in respect of perinatal health including birth defects and disabilities
 - providing information to the Secretary on the requirements for and the planning of neonatal care units
 - providing information for research into the epidemiology of perinatal health including birth defects and disabilities
 - establishing and maintaining a register of birth defects and disabilities
- provide to health service providers:
 - information on obstetrics and paediatrics
 - strategies to improve obstetric and paediatric care
- consider, investigate and report on any other matters in respect of obstetric and paediatric mortality and morbidity referred to CCOPMM by the Minister or the Secretary
- liaise with any other consultative council (whether or not prescribed) on any matter relevant to the functions of CCOPMM
- publish an annual report on the research and activities of CCOPMM
- perform any other prescribed function
- collect information for the purpose of performing its functions as outlined in the Act.

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

Figure 1: CCOPMM's relationships, accountabilities and role



CCOPMM SUBCOMMITTEES

There are four subcommittees that report to CCOPMM:

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

CCOPMM MEMBERS, 2018–2021

Adj Prof Tanya Farrell (Chair)

Prof Susan McDonald (Deputy Chair)

Dr David Fuller

Dr Alison Green

Prof Caroline Homer

Ms Robyn Hudson

Prof Rod Hunt

Ms Ann Jorgensen

Dr Niroshini Kennedy

Prof John McNeil

Prof Paul Monagle

Adj Clin Assoc Prof Robert Roseby

Ms Karen Sawyer

Assoc Prof Alexis Shub

Assoc Prof Glyn Teale

Mr Nicolas Thomas

Prof Mark Umstad

Maternal Mortality and Morbidity Subcommittee

Prof Mark Umstad (Chair)

Dr Malcolm Barnett

Ms Bree Bulle

Dr Jackie Collett

Dr Mary-Ann Davey

Adj Prof Tanya Farrell

Dr Alison Green

Dr Elizabeth Hessian

Assoc Prof Ryan Hodges (appointed July 2020)

Prof Caroline Homer

Ms Kim Howland

Dr Matthew Lynch

Prof Susan McDonald

Ms Abby Monaghan

Prof Louise Newman

Prof Daniel O'Connor

Prof Michael Permezel

Dr Wendy Pollock (resigned February 2020)

Ms Karen Sawyer

Assoc Prof Glyn Teale

Dr Craig Walker

Stillbirth Subcommittee

Prof Susan McDonald (Chair)

Dr Lisa Begg

Dr Jodie Benson

Dr Jackie Collett
Dr Mary-Ann Davey
Adj Prof Tanya Farrell
Ms Kym Harrison
Assoc Prof Lisa Hui
Dr Emily Olive
Dr Kirsten Palmer (appointed August 2019)
Dr Warrick Pill
Assoc Prof Joanne Said
Ms Sonia Shaw
Prof Mark Umstad
Ms Colleen White

Neonatal Mortality and Morbidity Subcommittee

Prof Rod Hunt (Chair)
Ms Jane Bailey
Dr Lisa Begg
Dr Rosemarie Boland
Dr Jackie Collett
Dr Mary-Ann Davey
Adj Prof Tanya Farrell
Dr Jim Holberton
Dr Isaac Marshall
Dr Sarah Parsons
Ms Emma Saviane (co-opted 2020 only)
Ms Cindy Scott
Assoc Prof Alexis Shub
Dr Alice Stewart
Assoc Prof Michael Stewart
Dr Mark Tarrant

Assoc Prof Glyn Teale
Dr Sophie Treleaven
Prof Susan Walker
Dr Jennifer Walsh
Ms Julie Wright
Dr Melanie Archer (co-opted 2019 only)

Child and Adolescent Mortality and Morbidity Subcommittee

Prof Paul Monagle (Chair)
Ms Marcia Armstrong
Ms Tracy Beaton
Dr Mick Creati
Prof Richard Doherty
Prof Trevor Duke
Dr Karen Dunn
Adj Assoc Prof Alan Eade
Adj Prof Tanya Farrell
Dr David Fuller
Dr Richard Haslam
Dr Annie Moulden
Dr Sarah Parsons
Adj Clin Assoc Prof Robert Roseby
Dr Greg Rowles
Prof Frank Shann
Dr David Tran
Dr Sophie Treleaven
Dr Peter Wearne
Prof Katrina Williams
Dr Joanna Glengarry (co-opted 2019 only)

Collecting and reviewing information

REVIEW OF DEATHS

CCOPMM's primary role is to review all maternal, perinatal and paediatric deaths in Victoria, determine factors that may have contributed to these deaths, 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 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 accordance with the PSANZ's Perinatal Mortality Classification System, post-neonatal infant, child and adolescent death are classified using the International statistical classification of diseases and health related problems, 10th revision, Australian modification (6th 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 post-mortem 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 Public Health and Wellbeing Act requires all births that occur in Victoria to be reported to CCOPMM within a prescribed period. This period is defined within the Public Health and Wellbeing Regulations as 30 days after the birth.

CCOPMM has statutory responsibility for the VPDC and Victorian Congenital Anomalies Register (VCAR). The department and SCV manage the data collections on the CCOPMM's behalf. The data collections enable information about the health of women, babies and children to be analysed and help support improvements in their health. 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.

Victorian Perinatal Data Collection (VPDC)

The VPDC was established in 1982. It operates under the Public Health and Wellbeing Act and includes sociodemographic characteristics and clinical outcome data on all births occurring in Victoria. Data are collected from public and private hospitals, birth centres and homebirth practitioners from their clinical and patient administrative system via secure data exchange. Find more information about the VPDC on the [Better Safer Care website](#).

Victorian Congenital Anomalies Register (VCAR)

Under the Act, CCOPMM has a legislative responsibility to maintain a register of congenital anomalies and disabilities. 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 VCAR via CCOPMM's website. Find more information about VCAR on the [Better Safer Care website](#).

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 supports strategic research that informs clinical outcome improvements, as described in the previous chapter.

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

References

Australian Bureau of Statistics: <https://www.abs.gov.au/statistics/people/population/deaths-australia/latest-release#data-download> downloaded October 13 2020

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

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

Data Bank: <https://databank.worldbank.org/home.aspx#>

Movements Matter: <http://movementsmatter.org.au/>

Perinatal services performance indicators forum 2019: <http://www.webevent.com.au/pspi2019/>

Public Health and Wellbeing Act 2008: <https://content.legislation.vic.gov.au/sites/default/files/2020-02/08-46aa040%20authorised.pdf>

Public Health and Wellbeing Regulations 2019: <https://content.legislation.vic.gov.au/sites/default/files/2020-09/19-135sra009%20authorised.pdf>

The Centre for Victorian Data Linkage: <https://www2.health.vic.gov.au/about/reporting-planning-data/the-centre-for-victorian-data-linkage>

VAHI Data Hub: <https://vahi.freshdesk.com/support/home>

Victoria's mothers, babies and children 2018 report: <https://www.bettersafercare.vic.gov.au/reports-and-publications/victorias-mothers-babies-and-children-2018-report>

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

Appendix 1: Definitions

Apgar score

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

Child death

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

Chorionicity

The number of placentas in a multiple pregnancy.

Confinements (also known as birthing episodes)

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.

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. PSANZ coding uses the wording 'congenital abnormality.' CCOPMM uses the wording 'congenital anomaly' and the terms 'congenital abnormality' and 'congenital anomaly' are considered to be the same.

Crude birth rate

Measured by the number of livebirths (see definition below) per 1,000 estimated female resident population aged 14–44 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 (ERP)

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 (EFRP), aged 15–44 years, in its tables.

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).

Hypoxic peripartum death

Death caused by acute or chronic oxygen deprivation around the time of birth.

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 less 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 42 days of the end of the pregnancy, irrespective of the cause of death. This definition allows for classification of maternal deaths as follows:

- **Direct** – the death is considered to be due to a complication of the pregnancy or its management (for example, haemorrhage from placenta praevia).
- **Indirect** – the death is considered to be due to a pre-existing or newly diagnosed condition aggravated by the physiological or pathological changes of pregnancy (for example, deterioration in pre-existing heart disease or diabetes); deaths as a result of psychiatric disease are usually categorised as indirect, except for puerperal (postpartum or postnatal) psychosis, which is classified as direct.
- **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.
- **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 (MMR).

Ogilvie's Syndrome

Ogilvie's syndrome (acute colonic pseudo-obstruction (ACPO)) is defined as an acute dilatation of the colon (large bowel) usually involving the caecum and right hemicolon, without any existing mechanical obstruction.

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 (PPH)

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

Preeclampsia

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

PROMPT

PROMPT is an evidence-based, multi-professional obstetric training package that trains all those who care for mothers and their babies together in the effective management of obstetric emergencies.

Ruptured ectopic pregnancy

A pregnancy that implants and develops outside the main body of the uterus is an ectopic pregnancy, most commonly occurring in the Fallopian tube. The growing pregnancy can rupture the Fallopian tube requiring urgent treatment.

Sepsis/septic shock

Sepsis is 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.

Standardised mortality ratio

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

Stillbirth

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

Sudden unexpected deaths in infancy (SUDI)

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

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

or **explained**:

- suffocation while sleeping (including asphyxiation by bedclothes and overlying)
- 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 of the following requirements.

- Clinical:
 - older than 21 days and younger than nine months of age
 - normal clinical history including term pregnancy (gestational age \geq 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 pathologic findings; minor respiratory system inflammatory infiltrates are acceptable; intrathoracic petechial haemorrhage is a supportive but not obligatory or diagnostic finding
 - no evidence of unexplained trauma, abuse, neglect or unintentional injury
 - no evidence of substantial thymic stress effect (thymic weight of < 15 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 \geq 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 \geq one 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 recognised suspect for infanticide or recognised genetic disorders
 - neonatal or perinatal conditions (for example, those resulting from preterm birth) that have resolved by the time of death.

-
- Circumstances of death:
 - mechanical asphyxia or suffocation caused by overlaying not determined with certainty.
 - Autopsy:
 - abnormal growth or development not thought to have contributed to death
 - marked inflammatory changes or abnormalities not sufficient to be unequivocal causes of death.

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.⁸

Symphyseal fundal height

A measurement used to assess fetal growth during a singleton pregnancy. From 24 weeks' gestation, the distance in centimetres from the highest point of the uterus (the fundus) to the pubic symphysis approximates the age of the fetus in weeks.

Twin-to-twin transfusion syndrome

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

⁸ Krous HF, Beckwith JB, Byard RW, Rognum TO, Bajonowski T, Corey T, Cutz E, Hanzlick R, Keens TG, Mitchell EA 2004, 'Sudden infant death syndrome and unclassified sudden infant deaths: a definitional and diagnostic approach', *Pediatrics* 114(1):234-238.]

Appendix 2: Measures

MATERNAL MORTALITY RATIO (MMR)

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

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.⁹

'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)

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

For CCOPMM statistics, the rate refers to all births of at least 20 weeks' gestation or, if gestation is unknown, of birthweight of at least 400 grams. 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 WHO).

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

NEONATAL MORTALITY RATE (NMR)

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.

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

STILLBIRTH RATE

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

⁹ Please 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.

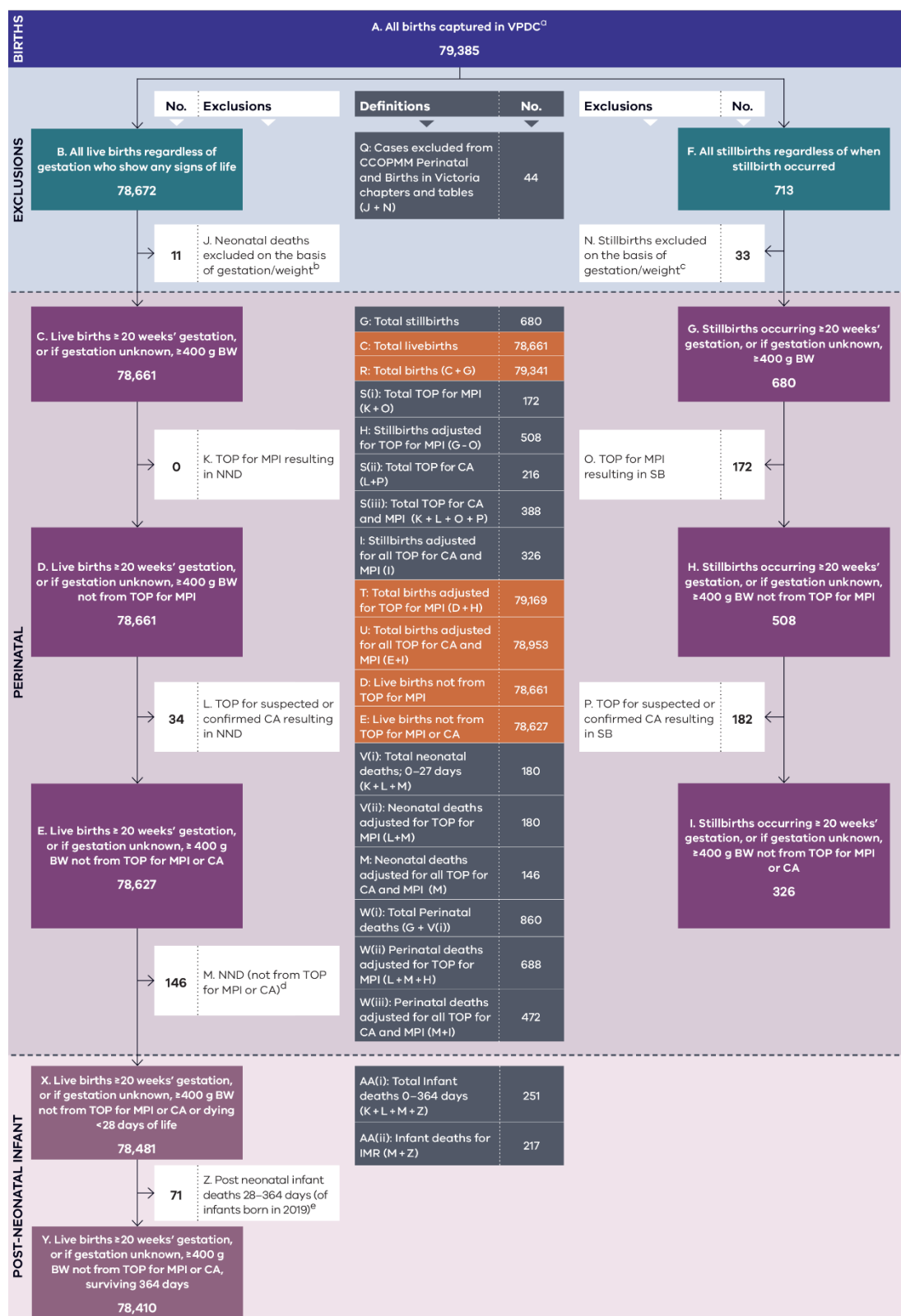
INFANT MORTALITY RATE (IMR)

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, if the gestation is unknown, of birthweight ≥ 400 grams.

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.

IMR = number of infant deaths \times 1,000 total livebirths

Appendix 3: Flow diagram for births in Victoria, 2019



ABBREVIATIONS USED IN THIS FLOW DIAGRAM

BW – birthweight

CA – congenital anomaly (suspected or confirmed)

EFRP – estimated female resident population (see online supplementary tables detailing Mothers and Babies)

IMR – infant mortality rate

MPI – maternal psychosocial indications

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

PMR – perinatal mortality rate

SB – stillbirth

TOP – termination of pregnancy

VPDC – Victorian Perinatal Data Collection

FORMULAE

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

PMR = $(G + U(i)) / (G + C) \times 1,000$

IMR = $Z(ii)/E \times 1,000$

NOTES

a) The diagram includes only births occurring in Victoria and their outcomes.

b) Neonatal death exclusions (J) comprise:

J(i). Those live born < 20 weeks' gestation
(n = 11)

J(ii). Those live born at unknown gestation with a birthweight < 400 grams (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 BW < 400 grams (n = 7)

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

N(iii). Stillbirths where death is known to have occurred < 20 weeks' gestation but born ≥ 20 weeks' gestation, with unknown BW (n = 2)

N(iv). Stillbirths where death occurred at unknown gestation, birth occurred ≥ 20 weeks' gestation, but where BW < 150 grams (n = 24)

N(v). Stillbirths where death is known to have occurred > 20 weeks' gestation but born with unknown but very small BW (n = 0)

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

d) One additional neonatal death and one additional post-neonatal infant death occurred in Victoria but are not included in this figure because the neonates were not born in Victoria.

e) Post-neonatal infant deaths reported to CCOPMM as at 28 July 2020. Final figures will be given in the 2020 annual report.

f) Numbers of births can differ slightly between the 'Mothers and babies' section and Appendix 3: Flow diagram for births in Victoria, 2019 and 'Perinatal deaths' section of the report, as Births in Victoria uses gestation at birth, regardless of when the fetal death occurred, whereas Appendix 3 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 3 and the 'Perinatal deaths' section.

Appendix 4: 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 VPDC. Vital information relating to maternal, perinatal and child deaths is received from:

- health services
- the Registry of Births, Death and Marriages Victoria
- anatomical and forensic pathologists
- the Coroner's Court of Victoria
- the Victorian Institute of Forensic Medicine
- 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.

This report was developed by CCOPMM with support from the following staff from [SCV](#):

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