2012 and 2013
Victoria’s Mothers, Babies and Children

Section 1: Findings and Recommendations
About the cover image

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

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

The Division within the Department of Health and Human Services, which provides secretariat and project support to the Council, has a focus on health service safety, quality and performance. This is symbolised by the central ‘focus’ on system improvement. Council held data is used in ‘radar graphs’ to capture related health service performance measures – contributing a new focus on the use of information for performance improvement.

The colour scheme was selected for its universality; because the Council aims to serve all Victorian mothers, babies and children.
Chairman’s Message

Victoria remains one of the safest jurisdictions for women to give birth and for their children to grow to adulthood. Our challenge is to continue to maintain this situation and to further reduce both mortality and severe morbidities among mothers, babies and children.

This report highlights the principal causes of adverse outcomes and the recommendations that have come from the review of cases of maternal and child deaths by the expert Sub-committees of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM).

CCOPMM’s role is not primarily one of being an early detector or warning system of adverse outcomes, rather to review with a state wide perspective, to determine trends in outcomes and hence where indicated to recommend strategies to minimise these events. A number of initiatives have been, or are being, introduced to enhance CCOPMM’s ability to review cases in a more timely way, including electronic lodgement of birth information, a co-ordinated State Perinatal Autopsy Service and an electronic perinatal mortality reporting system. In addition support for regional perinatal mortality and morbidity review committees is being rolled out. All of these initiatives should lead to further improvements in maternity and paediatric outcomes.

This report coincides with the end of the term of the 2013-2015 Council and marks the retirement from Council and its Sub-committees of a number of members who have given their valued advice so generously to Council and its Sub-committees.

This report is the result of many hours of work from the members of the Clinical Councils Unit of the Department of Health and Human Services under the leadership of Ms Vickie Veitch and on behalf of Council I express our gratitude.

I commend the report to you and welcome feedback so that we can continue to modify and refine future reports.

Jeremy J N Oats  
Chair CCOPMM
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1. Executive Summary

Whilst Victorians experience world class maternal, perinatal and paediatric services, continually improving the health outcomes for mothers, babies and children is a priority for the Victorian Government. This commitment is demonstrated through the well-established systems of reporting on births, as well as maternal, perinatal, child and adolescent mortality and morbidity.

The review and reporting functions of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) are integral to monitoring the safety and quality of health services provided to Victorian women and families.

*Victoria’s Mothers, Babies and Children 2012 and 2013* presents key findings and recommendations arising from the review of births and deaths by CCOPMM. This report will inform service monitoring and delivery at all levels of the Victorian health system and contribute to improved health outcomes for mothers, babies, children and adolescents. Additionally, the report draws attention to areas of clinical risk to inform clinical practice, health policy and service planning.

Victorian women and their families can be confident in the State’s well-established maternity and neonatal service system. It is important however, to acknowledge the recently reported incidents at Bacchus Marsh Hospital, particularly from the perspective of the families concerned and residents of the Bacchus Marsh community. Although Victoria and Australia experience one of the lowest maternal and perinatal mortality rates internationally, identifying preventable or contributing factors and sharing lessons learned is vital in improving the safety and quality of health services.

Strengthening clinical governance is a priority of the Victorian Government. Public health services will be better supported by CCOPMM with work underway to enhance the visibility and dissemination of recommendations arising from the review of births and deaths. Building on the strong collaborative arrangements between CCOPMM and the Department of Health and Human Services, the Coroners’ Court of Victoria and the Victorian Managed Insurance Authority will also help to improve processes for quality improvement and management of risk.
1.1 Key priorities

This report highlights a number of key priorities that significantly impact the health and wellbeing outcomes of Victorian women and families and require attention by both the Victorian health system and the community more broadly.

**Obesity** is a significant risk factor for women and babies and has implications for service delivery. One in six women who give birth in Victoria is obese\(^a\). These women are more likely to require a caesarean section and less likely to exclusively breastfeed at the time of discharge from hospital. Obesity was also found to be a contributing factor in a significant number of perinatal deaths reviewed by CCOPMM.

**Perinatal mortality and morbidity review** is an essential component of high quality maternity and neonatal services. Although Victoria’s overall maternal and perinatal mortality rates are low, there remain cohorts of women who experience poorer perinatal outcomes. Understanding the causes of death and identifying avoidable factors contributes to improved health care planning and response. All Victorian health services are required to review and report on every maternal and perinatal death according to the standards set by the Perinatal Society of Australia and New Zealand. The department is committed to implementing and monitoring this standard.

**Fetal growth restriction (FGR)** is a major cause of perinatal mortality but can be difficult to detect. Differing approaches to the detection and management of FGR make this a complex and challenging issue for the health system. It is however, a priority for Victorian health services and individual practitioners to collaborate on to address.

**Cardiotocograph (CTG) monitoring** is an important tool to assist health care providers assess fetal wellbeing, especially during labour and childbirth. Factors associated with the use of CTG monitoring have been identified during CCOPMM's review of perinatal mortality cases, and this requires the urgent priority and attention of Victorian health services. The department has been working with Victoria's maternity services to ensure high quality standards of safety are maintained.

**Inappropriate and unsupervised use of quad bikes and motorcycles by children** has been identified as a preventable risk factor for mortality and an area requiring legislative intervention. Children under the age of 16 lack sufficient strength, coordination and maturity to adequately manage incidents associated with quad bikes and motorcycles when they occur, leading to severe morbidity or, in some cases, fatality.

**Family violence** is a major cause of early death, disability and illness in women aged 15 to 44 years. For the first time, this report presents data on maternal, child and perinatal deaths\(^b\) between 2008 and 2013 where family violence was an associated factor. Improvements to the way family violence data is collected are required, as it is currently difficult to accurately define trends over time.

**Aboriginal women and babies** continue to experience poorer health outcomes than their non-Aboriginal counterparts. This is a significant concern, not the least because outcomes such as low birth weight and low rates of breastfeeding translate into future health risks for both women and their babies. The perinatal mortality rate for babies born to Aboriginal women between 2011 and 2013 was twice as high as for babies born to non-Aboriginal women.

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\(^a\) Obesity in pregnancy is considered to be a BMI of 30 or more at the first antenatal consultation.

\(^b\) Perinatal deaths are defined to include stillbirth and neonatal deaths within 28 days of birth of infants of gestation ≥ 20 weeks or, if gestation is unknown, of birth weight ≥ 400 g.
1.2 Key findings

The 2012 and 2013 data provides insight into the needs of Victorian women, babies, children and adolescents that can inform clinical practice, health policy and service planning.

Births in Victoria

The number of babies born in Victoria plateaued between 2012 and 2013 following a six per cent increase from 2011.

One in three women who gave birth in 2012 and 2013 did so by caesarean section. The rate of caesarean section increases with age and was significantly higher for women admitted as private patients.

Approximately one in 200 women planned a homebirth in 2012 and 2013. There are two available models of care for homebirth in Victoria: as a private patient of an independent midwife; or under a public homebirth programa.

Maternal mortality

Review of maternal deaths between 2010b and 2013 confirmed that these deaths remain uncommon. Of the maternal deaths that did occur, the leading causes were cardiovascular disease, non-obstetric haemorrhage, thromboembolism, obstetric haemorrhage, and psychosocial related causes.

Factors that were identified following the review of deaths but were not necessarily causal, were identified in almost half of all maternal deaths including socio-demographic characteristics, mental health issues, family violence and sub-optimal standards of practice.

Perinatal mortality

The perinatal mortality ratec continues to decrease. The perinatal mortality rates in 2012 and 2013 were lower than the rates for 2009 to 2011. Despite this, perinatal mortality rates remain high for the following groups:

- babies of Aboriginal women
- babies of women born in North Africa, the Middle East or southern and central Asia
- multiple pregnancies
- babies born pre-term or with fetal growth restriction.

Contributing factorsd were identified in approximately five per cent of all perinatal deaths reported to CCOPMM. Recurrent themes include inadequate antenatal and intrapartum fetal monitoring, inadequate management of the second stage of labour and inadequate paediatric management, including advanced neonatal resuscitation.

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a In 2012 and 2013 public homebirth programs were operating at Monash Health (Casey Hospital) and Western Health (Sunshine Hospital).
b While the reporting period is 2012 and 2013, the reporting of maternal deaths from 2010 to 2013 is included due to the very small numbers involved.
c Perinatal mortality (including stillbirths and neonatal deaths) is reported as an “adjusted” rate to exclude terminations of pregnancy for psychosocial reasons. This adjustment provides a better measure of avoidable mortality.
d Sub-optimal clinical management or health system management factors.
Child and adolescent mortality

Overall, child and adolescent mortality rates continue to decline in Victoria, however clear patterns are evident that relate to the age of the child. In 2012, congenital anomaly was the leading cause of death for all children under the age of 15. This changed in 2013 however, with congenital anomaly being the leading cause of death for children under the age of 10 and malignancy (cancer) the leading cause of death for children aged 10 – 14 years. Sadly, suicide was the leading cause of death in both 2012 and 2013 for adolescents aged 15 – 17 years.

Certain causes of death are an ongoing concern for CCOPMM. These include:

- sudden and unexplained death in infancy, associated with unsafe sleep environments and practices.
- youth suicide, which had the highest number of recorded deaths in 2012 since reporting in the 15 – 17 age group began in 2005. Youth suicide decreased in 2013.
- deaths occurring on farms, rural properties and workplaces, which continue to occur under circumstances of inadequate supervision or when children engage in activities beyond their strength, coordination or maturity.
- asthma deaths associated with poor asthma control and suboptimal emergency management.
1.3 Recommendations

These recommendations have been developed following confidential case reviews undertaken by the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM). They aim to influence system change to improve health outcomes for Victorian mothers, babies, children and adolescents.

Maternal obesity

One in six women in Victoria is obese and the risk of obstetric complications and perinatal mortality increases with increasing Body Mass Index (BMI). Perinatal mortality is doubled for women with a BMI greater than 40.

Recommendation 1

All Victorian health services must ensure that policies and procedures exist, addressing the appropriate clinical management or referral of pregnant women with a high Body Mass Index (BMI), which are in accordance with the following policies of the Department of Health and Human Services:


b. Defining levels of care for Victorian newborn services (2015)

c. Specialist clinics in Victorian public hospitals: access policy (2015) and Specialist clinics in Victorian public hospitals access policy: ensuring access to maternity care (2015)


Perinatal mortality and morbidity review and investigation

Although Victoria’s maternal and perinatal mortality rates are low, there remain cohorts of women who experience poorer perinatal outcomes. Understanding the causes of death and identifying avoidable factors contributes to improved monitoring and reporting of outcomes and to health care planning and response.

Recommendation 2

Health services must review, classify and report all perinatal deaths to CCOPMM within the specified time period and in accordance with the Perinatal Society of Australia and New Zealand’s Clinical Practice Guideline for Perinatal Mortality Audit (2009).

Health services are to utilise the Victorian Perinatal Autopsy Service (VPAS) for all perinatal autopsies (or alternative investigations) from 20 weeks gestation.

Unexpected late gestation or intrapartum deaths are to be reported to CCOPMM and VPAS within 48 hours.

a The recommendations are not numbered in any order of priority
b Mandatory for all public health services and recommended for private health services.
Fetal growth restriction

Fetal growth restriction (FGR) is a major cause of perinatal mortality, including many deaths where the cause cannot be explained. Detection of FGR, especially in some population groups, poses a significant challenge for health care providers and differing approaches to detect or address FGR contribute to this challenge. Nonetheless, the rate of severely growth-restricted babies who are not identified or managed appropriately is high across Victorian hospitals and should be addressed.

**Recommendation 3**

There should be a targeted and collaborative effort in Victoria to disseminate agreed best approaches for the timely detection and management of fetal growth restriction across all levels of the maternity health care system.

Cardiotocograph (CTG) monitoring

Cardiotocograph (CTG) monitoring is an important tool to assist health care providers assess fetal wellbeing, especially during labour and childbirth. Mis-use, mis-interpretation and over-reliance of CTG monitoring have been identified as contributing factors in perinatal deaths reviewed by CCOPMM.

**Recommendation 4**

Health services\(^a\) must ensure that clinicians working within their organisation who provide intrapartum care or utilise CTG monitoring antenatally are competent in the application and interpretation of CTG’s. Health services should ensure regular competency training is provided to clinicians and a system to monitor this standard at their health service is implemented.

Quad bikes and motorcycle use in children

CCOPMM has identified the use of quad bikes and motorcycles by children, especially on farms and rural properties, as a preventable risk factor for mortality. Children under the age of 16 lack sufficient strength and coordination to adequately manage incidents associated with quad bikes and motorcycles when they occur, leading to severe morbidity or in some cases, fatality.

**Recommendation 5**

Legislation should be amended, which:

a. prohibits children under the age of 14, riding quad bikes or motorcycles of any size

b. restricts quad bike or motorcycle use by children aged 14 – 15, to vehicles no larger in engine capacity than 90cc and is coupled with regulation around the use of protective gear, helmets, training and constant adult supervision.

Further research is required to evaluate the safety of 14 – 15 year old adolescents riding lower engine capacity vehicles.

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\(^a\) Mandatory for all public health services and recommended for private health services.
Family violence

Family violence directly affects one in five Victorian women over the course of their lifetime and is the leading contributor to preventable death, disability and illness in women aged 15 to 44 years. Pregnancy increases the risk of family violence against women. CCOPMM has reviewed 23 cases of child deaths and six cases of maternal deaths attributed to or associated with family violence between 2008 and 2013; however this is likely to be a substantial underestimate, as routine screening was not widely practiced during these years.

Recommendation 6

Health services should monitor the uptake of the Department of Health's National Evidence-based Antenatal Care Guidelines (2012), specifically relating to family violence assessment and response during pregnancy. Victoria should also:

a. support the development of a nationally consistent family violence screening tool for use in pregnancy; and

b. consider further data development so that the true burden of family violence on adverse pregnancy outcomes can be ascertained and addressed.

Aboriginal mothers and babies

The health outcomes for Victoria’s Aboriginal mothers and babies continue to be poorer than non-Aboriginal women and perinatal mortality rates have not substantially improved in over a decade. Aboriginal babies are almost twice as likely to die during pregnancy or childbirth and are 50 per cent more likely to have low birth weights or be born prematurely than non-Aboriginal babies. Aboriginal women are reported to have higher smoking rates during pregnancy and lower breastfeeding rates.

Recommendation 7

There should be improved access to culturally appropriate maternity care services and support to manage the risks experienced by Aboriginal mothers and babies in Victoria. Data collection systems should be developed to monitor the effectiveness of these services.

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1. Mandatory for all public health services and recommended for private health services.
2. About this report

The review and reporting functions of the Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) provide a vital service to the Victorian Government in monitoring the safety and quality of the Victorian health care system. The annual report of CCOPMM informs service monitoring, delivery and improvement. It includes recommendations directed at all levels of the health and family service systems, and the broader community. The report also contains important data to support research in maternal and child health.

This report provides:

- key findings and recommendations arising from CCOPMM’s review of births and deaths in Victoria in 2012 and 2013
- comprehensive mortality and childbirth related morbidity statistics
- summary information on the main causes of death, contributing factors and trends
- de-identified clinical case studies to highlight recommendations and areas of particular concern
- Good Practice Points arising from the review of cases during the reporting period, and
- key messages for consumers, where these were relevant to the cases reviewed.

The report contains a revised structure to ensure that the key findings, lessons and recommendations are readily accessible to consumer and expert audiences. The inclusion and separation of Good Practice Points, Messages for Consumers and a Further Information section have been developed for improved targeting of information. Although these messages have been developed based on 2012 and 2013 case reviews, the context of the message is still valid today. It is hoped that the new format will help facilitate improved transfer of information and implementation of recommendations at all levels of the health system, including:

- government, authorities and departments
- health service boards, hospital executives and managers
- clinicians
- professional organisations and colleges
- academics and researchers
- consumers and the broader community.

The report is presented in two parts: the first highlighting the key findings, emerging themes and recommendations; the second describing the methodology and definitions, and providing the detailed data tables for reference by researchers, epidemiologists and other interested parties. The definitions and methods should be used to fully interpret the key findings. The statistical flowcharts provided in Figures 10.1 and 10.2 in Section 2 outline the scope of the data collections, and the case inclusions and exclusions used for reporting.

The report relates to data from births and deaths that occurred in 2012 and 2013. Data from other years is included where it is available and where it provides useful contextual information. In the chapters on mortality, data may refer to deaths that occurred over a period of three or more years (for example the triennium 2010 to 2012) due to the low numbers of these events.

Please share this report. CCOPMM values your feedback, which can be provided at:
ccopmm@dhhs.vic.gov.au.
Based on the cases presented to CCOPMM and the data sources available to the department, a number of key priorities for the Victorian health system have been identified. These priority areas reflect factors and circumstances that impact significantly on women and children, in terms of:

- the proportion of the population affected
- the severity of the impact
- the sustained disparities or slow improvement in outcomes.
3.1 Obesity

One in six women who give birth in Victoria is obese. Maternal obesity is a significant risk factor for women and babies, and has implications for the organisation of care and service delivery.

Local and international data shows that women who are obese are at greater risk of having a stillbirth\(^1\) and of serious life-threatening complications such as thromboembolism, gestational diabetes, pre-eclampsia, postpartum haemorrhage and wound infection.\(^2\) They are also more likely to require intervention during birth such as a caesarean section (AIHW Australia’s Mothers and Babies 2012).

Analysis of the Victorian Perinatal Data Collection (VPDC) demonstrates that the babies of pregnant women who have a Body Mass Index (BMI) greater than 40 are twice as likely to die before birth or in the first 28 days of life.

Early identification, documentation and management of maternal obesity are essential to reducing the risks for mothers and babies.
Snapshot

- One in six women (17 per cent) who gave birth in Victoria in 2012 and 2013 was obese (BMI greater than 30). Across Australia this figure ranged from 17.9 per cent in the Australian Capital Territory to 24.4 per cent in South Australia, with the Australian average being about the same as Victoria’s in 2013 (20.3 per cent). Women with a BMI of 40 or more were nearly twice as likely to have a caesarean section in 2013 compared to women of healthy weight (BMI 18.5 - 24.9) (refer to Figure 1).
- Babies of pregnant women who were obese were less likely to be exclusively breastfed on discharge from hospital than women of healthy weight.
- Maternal obesity was a contributing factor in a significant proportion of perinatal deaths reviewed by CCOPMM. The risk of perinatal death was nearly doubled for the babies of women with a BMI greater than 40 compared with women whose BMI was less than 25.
- The rate of obesity during pregnancy has remained unchanged since BMI data collection commenced in 2009.

For 12 per cent of women giving birth in 2012 and 2013, health services did not report a BMI to the VPDC.

Figure 1. Caesarean section rates by maternal BMI category, Victoria 2013

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a The national report was based on preliminary data for Victoria and differs from that reported here.
b The VPDC collects self-reported or measured height (in centimetres) and weight (in kilograms) around the time of conception, to calculate the BMI for women who gave birth in Victoria. The BMI was calculated only for women with valid values reported for height and weight.
Figure 2. Perinatal mortality rate (PMR) by maternal BMI category, Victoria 2013

Figure 3. Exclusive breastfeeding at discharge and use of infant formula in hospital, for term breastfed babies by maternal BMI category, Victoria 2013
Recommendation 1

All Victorian health services must ensure that policies and procedures exist, addressing the appropriate clinical management or referral of pregnant women with a high Body Mass Index (BMI), which are in accordance with the following policies of the Department of Health and Human Services:


b. Defining levels of care for Victorian newborn services (2015)


Good practice points

- According to the agreed capability level\(^3\) of the health service, there should be clear booking criteria relating to BMI and documented processes for the referral and safe transfer of care to a maternity service with the adequate facilities and capability.
- Health services should ensure maternal height and weight are reported accurately to the VPDC.
- Women with a high BMI should be carefully reviewed for additional risk factors at the initial antenatal visit. This assessment should be discussed with women and well documented.\(^4\) An appropriate plan for care should be developed and documented including the options when approaching a threshold for safe care at the service.
- An ultrasound should be considered in the third trimester for women with a BMI greater than 35 to detect FGR.
- In women with a high BMI, a fetal scalp electrode (FSE) should be applied when external CTG monitoring cannot be reliably obtained or interpreted. This is particularly important in the second stage of labour.
3.2 Perinatal mortality and morbidity review and investigation

Perinatal mortality and morbidity review is an established mainstay of good maternity care. The cluster of deaths found at a Victorian health service during this period highlights the importance of high quality and expert review of all deaths, to ensure the lessons for services and practitioners are identified, acted upon and disseminated.

The presence or absence of contributing factors is assessed for all perinatal deaths reported to CCOPMM. Where potential concerns are identified, cases are referred to the relevant expert clinical review committee for further investigation. In deciding if a contributing factor was present, the committee determines the extent to which the factors identified were likely to have contributed to the outcome.

Deaths that occurred during the period 2008 to 2013 are included in this section to provide a more comprehensive understanding of potential deficiencies in care or systems.

Contributing factors are identified in about five per cent of all stillbirth and neonatal cases reported to CCOPMM and most cases have multiple contributing factors relating to clinical or system management.

The contributing factors can be broadly grouped into three main categories:

- obstetric factors (antenatal care, management and monitoring)
- infant factors (delay in recognition or delay in treatment)
- paediatric factors (clinical management or resuscitation practice).

The recurrent themes in care deficiencies over the period are:

- inadequate antenatal and intrapartum fetal monitoring, including inadequate use or misinterpretation of the CTG
- inadequate management of the second stage of labour, including delayed intervention
- inadequate paediatric management, including advanced neonatal resuscitation.

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a Sub-optimal clinical management or health system management factors
Victoria’s perinatal mortality rate has dropped from 10.7 per 1,000 births in 2009 to 9.9 per 1,000 births in 2013.\(^a\)

Victoria’s perinatal mortality rate was equal to or lower than the overall Australian rate in 2012 and 2013.

But there is work to do

Some babies are at greater risk of stillbirth or dying within 28 days.

- **2x**... twice as high for babies of Aboriginal women
- **1.5x**... one-and-half times as high for babies of women born in North Africa, the Middle East or southern and central Asia
- **3-5x**... three to five times higher for twins, triplets

\(^a\) From 20 weeks gestation adjusted for terminations of pregnancy for maternal psychosocial indicators.
Snapshot

- There were 5,769 perinatal deaths between 2008 and 2013 in Victoria of babies with a birth weight of 500 g or more.
- Thirty-six per cent of these cases (2,087) were considered to potentially involve contributing factors. Of these, 21 per cent required review by an expert Sub-committee (437 cases) which equates to approximately eight per cent of all perinatal deaths.
- Of the 437 cases reviewed by the Sub-committee, 281 were assessed as having one or more contributing factors (5 per cent of all perinatal deaths). A total of 528 contributing factors were identified.
- Approximately half of the 281 cases (48 per cent) were identified as only having one contributing factor. The remaining 52 per cent of cases were identified as having between two and nine factors.
- Between 2012 and 2013, a total of 61 contributing factors were identified in 58 cases reviewed by CCOPMM.

The most common contributing factors for perinatal deaths between 2008 and 2013 were:
- inadequate intrapartum care and management of specific conditions (34 per cent)
- inadequate clinical monitoring (17 per cent)
- inadequate antenatal care (14 per cent)

Specific issues that occurred more frequently were:
- misinterpretation of, or undue reliance on clinical tests
- inadequate intrapartum monitoring
- failure to expedite delivery

The most common contributing factors in stillbirth cases between 2008 and 2013 were:
- inadequate antenatal monitoring (25 per cent);
- inadequate antenatal care (22 per cent);
- inadequate intrapartum care and management of specific conditions (22 per cent)

Specific issues that occurred more frequently were:
- misinterpretation of, or undue reliance on clinical tests;
- insufficient antenatal care;
- lack of consultation in high risk pregnancies;
- clinical need for test apparent (but not performed)

The most common contributing factors in neonatal cases between 2008 and 2013 were:
- inadequate intrapartum care and management of specific conditions (48 per cent);
- delays in recognition or treatment of the infant (14 per cent)

Specific issues that occurred more frequently were:
- inadequate intrapartum monitoring;
- failure to expedite delivery;
- delayed caesarean section;
- resuscitation factors;
- management of paediatric conditions.
Figure 4. Frequent contributing factors identified in stillbirth cases (%), Victoria 2008-2013.

- Misinterpretation of or undue reliance on tests
- Insufficient antenatal care
- Clinical need for test apparent
- Delay or lack of consultation in high-risk pregnancy
- Inadequate management of the growth-restricted fetus
- Family neglect or ignorance

Figure 5. Frequent contributing factors identified in neonatal death (%), Victoria 2008-2013.

- Inadequate intrapartum monitoring
- Failure to expedite delivery
- Resuscitation
- Paediatric management
- Caesarean section too late
Recommendation 2

Health services must review, classify and report all perinatal deaths to CCOPMM within the specified time period and in accordance with the Perinatal Society of Australia and New Zealand’s Clinical Practice Guideline for Perinatal Mortality Audit (2009).

Health services\textsuperscript{a} are to utilise the Victorian Perinatal Autopsy Service (VPAS) for all perinatal autopsies (or alternative investigations) from 20 weeks gestation.

Unexpected late gestation or intrapartum deaths are to be reported to CCOPMM and VPAS within 48 hours.

\textsuperscript{a} Mandatory for all public health services and recommended for private health services.

Good practice points

- Health services are to report to the State Coroner, any unexpected baby deaths in the neonatal period.
- Where a stillbirth occurs, health services are required to send the placenta for pathological examination.
- Where resuscitation is required at birth, the placenta is required to be kept by the health service for 24 hours to allow for further examination, should the baby’s condition deteriorate.
- Antenatal ultrasound is important for diagnosis of many congenital anomalies, including congenital heart disease.
- Clinicians who perform and interpret antenatal ultrasounds should have the appropriate qualifications and experience to detect congenital anomalies.
- Health services should ensure that staff undertaking antenatal ultrasound have adequate training and credentials, including the diagnosis of congenital heart disease.
- Systems should be in place to ensure follow up of abnormal results, or to repeat ultrasound where adequate views cannot be initially achieved. There should be no loss to follow up.
3.3 Fetal Growth Restriction

Fetal growth restriction (FGR) refers to the inadequate growth of a baby during pregnancy and is a major contributor to perinatal mortality if not detected and managed correctly. A significant proportion of stillbirths associated with FGR are potentially avoidable, however the problem can be difficult to detect and variation in the approaches to clinical assessment make this a complex challenge for the health care system.

A baby’s birthweight is a key determinant of health status with low birthweight associated with a number of poor health outcomes including being admitted to a special care nursery or neonatal intensive care unit. In the long term, low birthweight babies are also at risk of developing cardiovascular disease and diabetes (fetal origins of adult disease).

Although any small baby may be at risk, a baby whose birthweight is in the lowest 10 per cent for gestation is generally considered small for gestational age and particularly at risk. Severe FGR refers to babies who are in the lowest three per cent, which is associated with high perinatal mortality, especially as pregnancy advances.

Early detection and management of FGR in the antenatal period is essential to minimise the risk of perinatal mortality. The Royal College of Obstetricians and Gynaecologists (RCOG) evidence based guidelines on the management of the small for gestational aged fetus recommends delivery by no later than 37 weeks.

Fetal Growth Restriction is one of the top causes of stillbirths in Victoria. Fetal Growth Restriction accounted for: 7% of all stillbirths and 3% of all neonatal deaths.
Snapshot

- FGR is in the top five most common causes of stillbirth in Victoria, accounting for approximately seven per cent of all stillbirths and up to three per cent of neonatal deaths in 2012 and 2013.
- Contrary to accepted guidelines, 33 per cent of severely growth-restricted babies born in Victorian hospitals in 2013 were not born by 40 weeks gestation^8.
- Maternal hypertensive disorders were a factor in a number of the deaths associated with FGR.
- During 2008 to 2013 the most common contributing factor for perinatal death was the misinterpretation of, or undue reliance on, important clinical tests including ultrasound and cardiotocographs (CTG), used to monitor fetal wellbeing. The third most common contributing factor for stillbirths was the failure to perform a clinical test when its necessity was apparent.

Table 1. All perinatal deaths (unadjusted) caused by fetal growth restriction by gestational age, 2012 and 2013.

<table>
<thead>
<tr>
<th>PSANZ Perinatal Death Classification</th>
<th>20–27 weeks n (%)</th>
<th>28–31 weeks n (%)</th>
<th>32–36 weeks n (%)</th>
<th>37+ weeks n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal growth restriction</td>
<td>2012</td>
<td>2013</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stillbirths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>20 (7)</td>
<td>15 (3)</td>
<td>8 (12)</td>
<td>11 (11)</td>
<td>46 (7)</td>
</tr>
<tr>
<td>Neonatal deaths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>2 (1)</td>
<td>15 (3)</td>
<td>0 (0)</td>
<td>1 (3)</td>
<td>6 (3)</td>
</tr>
<tr>
<td>Stillbirths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>15 (3)</td>
<td>7 (15)</td>
<td>16 (21)</td>
<td>11 (12)</td>
<td>49 (7)</td>
</tr>
<tr>
<td>Neonatal deaths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>0 (0)</td>
<td>7 (12)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (0)</td>
</tr>
</tbody>
</table>
Clinical case study – fetal growth restriction

The woman was a 29 year old with a singleton pregnancy, a history of smoking and a Body Mass Index (BMI) of 19. Her two previous babies were delivered by caesarean section.

There was concern about growth clinically and three formal ultrasounds were conducted between 33 and 37 weeks gestation to investigate fetal growth.

The ultrasound at 33 weeks estimated fetal weight (EFW) to be 1.82kg (30th centile) abdominal circumference (AC) at the 5th percentile and systolic-diastolic (SD) ratio / Amniotic Fluid Index (AFI) was normal.

For the ultrasound at 35 weeks, there was no actual comment on the EFW even though it was two Standard Deviations (SD) below mean. Abdominal circumference (AC) < head circumference (HC), SD/AFI normal.

Ultrasound at 37w 2.52 (2 SD below) AC<HC. SD/AFI normal.

The woman presented with reduced fetal movements at 38 weeks. Fetal death in-utero (FDIU) was confirmed on ultrasound. Artificial Rupture of Membranes (ARM) occurred and a normal vaginal birth of a stillborn female infant weighing 2290g (less than 3rd centile) followed. Parents did not give consent for a post-mortem.

Key messages

The main issue identified in this case was the inadequate management of FGR. Despite clinical and ultrasound evidence, there was no clear management plan such as further tests or planned induction of labour.

There were also issues relating to inadequate ultrasound reporting. It was concluded that the quality of the ultrasound was substandard and did not provide a growth measure. This again emphasises the need for standardised ultrasound reporting.
Recommendation 3

There should be a targeted and collaborative effort in Victoria to disseminate agreed best approaches for the timely detection and management of fetal growth restriction across all levels of the maternity health care system.

Good practice points

- Clinicians should measure the symphyseal-fundal (S-F) height with a tape measure at each antenatal visit, as it improves the sensitivity for detection of FGR, compared with abdominal palpation alone. This is most relevant for inexperienced clinicians or when multiple clinicians are involved in antenatal care.
- Clinicians should be vigilant in the assessment of fetal growth in women with a high BMI or large uterine fibroids. For these women, ultrasound assessment should be considered due to the difficulties associated with fetal growth assessment. An ultrasound for suspected abnormalities of fetal growth should be performed by around 35 to 36 weeks gestation.
- Once severely growth restricted babies (less than 3rd centile) have been identified, health services are to ensure the babies are born before 40 weeks gestation to reduce the risk of mortality.
- Accurately dating the pregnancy is important. Once gestational age has been established, fundal height measurement to determine the appropriateness of the size of the fetus is the mainstay of routine antenatal surveillance.9
- Clinicians should use serial ultrasound to confirm the diagnosis of FGR. However, overreliance on, or misinterpretation of ultrasound results, is a common contributing factor in stillbirths.
- Clinicians are reminded that the risk factors for fetal growth restriction include:10
  - pregnancy related hypertension
  - maternal heart disease
  - living at high altitudes
  - ethnicity
  - fetal genetic disease
  - placental anomalies
  - pre-existing diabetes
  - toxic exposure to smoking, alcohol or drugs
  - living in developing countries
  - family or prior history of FGR
  - fetal malformations
  - fetal infection
  - autoimmune disease
  - malnutrition
  - low socioeconomic status
  - extremes of maternal age
  - multiple gestation
  - maternal malaria.
3.4 Cardiotocograph (CTG) Monitoring

Monitoring fetal growth and wellbeing is one of the corner stones of care during pregnancy and childbirth.

Antenatal ultrasound and cardiotocograph (CTG) monitoring are both fetal assessment tools that can provide important information on the baby’s health. Obstetric ultrasound is essential for diagnosing congenital anomalies and assessing fetal growth. Clinicians need to be competent in using and interpreting these tools, in order to understand the findings and for optimised decision making.

Over-reliance on, misinterpretation of, or failure to perform an important clinical test are all contributing factors to perinatal mortality and morbidity.

Clinical case study - Antenatal CTG monitoring

The woman was 30 years old with no significant medical history. Early pregnancy was normal. She presented at her local rural hospital at 31+4 weeks gestation with fresh vaginal blood loss. There was no associated abdominal pain but she did report reduced fetal movements. She was admitted to hospital for bed rest and fetal assessment. The admission cardiotocograph (CTG) was normal. The following evening the woman reported a gush of clear fluid vaginally. A CTG revealed absent variability and no accelerations. The CTG was removed after 90 minutes and plans made for a repeat CTG the following morning.

The next CTG was similar to the one performed the previous evening with no accelerations (non-reactive) and absent baseline variability. The CTG was removed after 10 minutes in preparation for an ultrasound assessment. The ultrasound was performed an hour or so later, and revealed that the baby had died. Labour was induced with vaginal Prostin gel. The woman gave birth vaginally to a stillborn female infant weighing 1940g (75th centile for gestation).

The post-mortem revealed a normally developed female infant with weights and measurements consistent with 31 weeks gestation. Microbiology culture of fetal lung tissue yielded profuse ureaplasma urealyticum. The placental pathology revealed moderate acute chorioamnionitis and a fresh retroplacental haemorrhage. A Kleihauer test\(^a\) was negative.

Key Messages

In this case, the second CTG was sufficiently abnormal to warrant another mode of fetal assessment such as biophysical profile or consideration of delivery. The decision to wait and repeat the CTG the following day was inappropriate and the repeat abnormal CTG was sufficient to necessitate emergency delivery, particularly in the context of an antepartum haemorrhage (APH), reduced fetal movements and likely preterm pre-labour rupture of the membranes.

This case highlights the need for health services to ensure that clinicians are adequately trained to undertake fetal surveillance and review CTG results in the context of the full clinical picture. In the rural setting where on-site specialist expertise may not be readily available, the need for established supportive relationships with specialist tertiary services and the provision for remote review of CTGs are recommended.

\(^{a}\) The Kleihauer test indicates if the baby has bled into the maternal circulation
Recommendation 4

Health services\textsuperscript{a} must ensure that clinicians working within their organisation who provide intrapartum care or utilise CTG monitoring antenatally are competent in the application and interpretation of CTGs. Health services should ensure regular competency training is provided to clinicians and a system to monitor this standard at their health service is implemented.

\textsuperscript{a} Mandatory for all public health services and recommended for private health services.
Good practice points

Health services are required to develop and implement processes for logging and documenting phone calls in relation to fetal wellbeing through pregnancy or in labour. A pregnant woman’s calling history needs to be available to all clinicians taking calls. Where a woman makes three calls within a 24 hour period, they should be advised to present to a health service to be assessed.

Health services and organisations undertaking ultrasounds should ensure that;

- clinicians who perform and interpret antenatal ultrasound have appropriate qualifications and experience to assess fetal growth parameters and identify congenital abnormalities, including congenital heart disease
- systems are in place to ensure that abnormal results are reviewed appropriately, or a repeat ultrasound is undertaken where adequate views could not be initially achieved.
- Clinicians should ensure all labouring women with a CTG have a maternal heart rate probe attached. This is particularly important for women with a high BMI or other circumstance associated with a loss of device contact.
- The role, if any, for cervical length measurement in low risk pregnancies remains uncertain. There is some suggestive evidence that interventions, such as progesterone and/or cervical cerclage, in women found to have a short cervix (<15-20 mm) at the time of the routine mid trimester ultrasound scan may reduce the risk of preterm birth.
- For women with a previous history of preterm birth, particularly mid pregnancy, ultrasound measurement of cervical length may assist the clinician in determining if cervical cerclage and/or vaginal progesterone therapy are indicated.
3.5 Farms, rural properties and workplaces

While child and adolescent deaths as a result of unintentional injury have declined steadily over the last 20 years, a number continue to be associated with inadequate supervision or involve children engaging in activities beyond their strength, coordination or maturity.

Unintentional paediatric deaths on farms or rural properties are unfortunately common and are usually attributed to the inappropriate or unsupervised use of motorised vehicles (quad bikes, motorcycles and other agricultural vehicles such as tractors). The infographic below contains the findings of a recent study on quad bike related injury.11

Efforts to address this issue include the introduction of health and safety laws that apply to children in workplaces and on farms, even if they are not employees.12 Worksafe’s *Keeping children safe in the workplace: a handbook for workplaces* (2010) provides information on health and safety regulations for

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Quad bikes and motorbikes can be dangerous for children because they lack the strength and coordination to get themselves out of tricky situations

| Among Victorian children up to 14 years of age, from 2002-03 to 2010-11 | 3 deaths |
| quad bikes have been responsible for: | 158 hospital admissions |
| 263 presentations to an Emergency Department |
children on farms, rural properties and other workplaces. Despite these guidelines and educational efforts, preventable deaths and injuries continue to occur.

In response to similar concerns, other jurisdictions in Australia and overseas have recently reviewed or are currently reviewing child and adolescent deaths from motorcycles and quad bikes\textsuperscript{13, 14} and have developed policy recommendations\textsuperscript{15} and legislation accordingly\textsuperscript{16}.

Other causes of unintentional injury deaths on farms, rural properties and workplaces include drowning, motor vehicle accidents and deaths occurring in private driveways.

Drowning is largely preventable through adequate supervision by a responsible adult\textsuperscript{a}. Ongoing parent education campaigns have continued to address this and other risks such as driveway safety. Recent legislative changes in relation to leaving children unattended in cars have endeavoured to address this risk.

**Snapshot**

- There were 34 deaths in 2012 and 32 deaths in 2013 from unintentional injuries of all types.
- The number of deaths and injuries to children and adolescents that occur on farms or rural properties is disproportionately high. Deaths occurred where children were assisting with work or recreational activities, and where their safety was not properly considered.
- Causes of death from unintentional injury in 2012-13 include those from motor vehicle (including driveway) accidents (24 deaths), drowning (11 deaths), asphyxia (nine deaths) fire (five deaths) and other unintentional injury deaths (15 deaths).
- For quad bikes alone, there were three deaths, 158 hospital admissions and 263 emergency department presentations in the 0 to 14 year age group over a nine year period in Victoria.

**Figure 6. Rates of unintentional injury deaths by age group, Victoria 1985-2013\textsuperscript{b}**

\textsuperscript{a} The Royal Life Saving Society describes supervision as constant visual contact, being within arms’ reach. Supervision should be ‘active’ – all of the adult’s attention (older children or siblings are not appropriate supervisors), all of the time, without distractions (such as telephones, doorbells or breaks).

\textsuperscript{b} the 2009 peak in deaths in the 28 day – 14 year age group relates to Vic bushfires of February 2009. CCOPMM commenced reporting in the 15-17 year age group in 2005.
Recommendation 5

Legislation should be amended, which:

a. prohibits children under the age of fourteen, riding quad bikes or motorcycles of any size
b. restricts quad bike or motorcycle use by children aged 14-15, to vehicles no larger in engine capacity than 90cc and is coupled with regulation around the use of protective gear, helmets, training and constant adult supervision.

Further research is required to evaluate the safety of 14-15 year old adolescents riding lower engine capacity vehicles.
3.6 Family violence

CCOPMM continues to review maternal and child deaths attributed to, or associated with family violence. Family violence is the leading contributor to preventable death, disability and illness in Victorian women aged 15 to 44\textsuperscript{17}. It is disturbing that pregnancy increases the risk of family violence against women,\textsuperscript{18, 19} with up to 20 per cent of Australian women experiencing family violence during pregnancy or after birth\textsuperscript{20, 21}.

To more clearly quantify the issue of family violence, this report presents the data on maternal and child deaths grouped to highlight cases where family violence is an associated factor. Deaths that occurred during the six year period 2008 to 2013 are included to provide a more comprehensive understanding of the impact of family violence.\textsuperscript{a}

\textsuperscript{a} In previously published reports, CCOPMM did not present data associated with family violence in an identifiable manner. Maternal data was previously presented by ‘actual cause of death’ and child deaths associated with family violence were categorised as ‘intentional injury deaths’ in the subset of ‘injury to another person’.

Overview

The extent of family violence around pregnancy and childbirth is unknown, due to the difficulty for health professionals (and the broader community) to accurately determine its occurrence.

The literature suggests that the incidence of family violence is likely to be much higher than reported. The World Health Organization describes the levels of violence experienced by women around the world as a global public health problem of epidemic proportions, requiring urgent action.\textsuperscript{22}

In addition to the risk of death, violence poses serious health risks to pregnant women and their babies. Specific risks to women include breast and genital injury, miscarriage, antepartum haemorrhage and infection, blunt or penetrating abdominal trauma, and postnatal depression and suicide.\textsuperscript{23}

Antenatal care provides an opportunity to ask women about exposure to violence especially at home or in their family. Asking appropriate questions assists women to disclose their experiences of violence to health professionals and can enable them to access additional support and care at this critical time, including community, legal and police support services.\textsuperscript{24} Health services must be informed that training programs improve the confidence and competency of health professionals in identifying and caring for women experiencing family violence.

CCOPMM has collected information on family violence for every maternal death in Victoria since 2010. Maternal deaths due to assault, substance misuse and ‘events of undetermined intent’ are classified as ‘incidental’\textsuperscript{15}, as it is not always possible to distinguish if a death is directly related to pregnancy or not.

\textsuperscript{b} Refer to Appendix 1 for the full definitions of maternal death. An incidental maternal death refers to a death considered unrelated to the pregnancy.
One in five Australian women will be directly affected by family violence in their lifetime.

Among the Victorian cases reviewed by the Council between 2008 and 2013, family violence was linked to:

- 23 child deaths
- 6 maternal deaths
Snapshot

Maternal deaths associated with family violence

Case reviews undertaken by CCOPMM suggest that maternal death by suicide is often associated with family violence. However, improvements to the way family violence data is collected are required, as it is currently difficult to accurately monitor maternal and perinatal outcomes associated directly with family violence.

The small numbers of maternal deaths make it difficult to discern trends over time; however from 2008 to 2013 there were nine deaths, specifically:

- one maternal death from alleged homicide by a male partner
- one maternal death resulting from assault injuries
- one suspicious maternal death referred for further police investigation
- three suicides associated with recent history of family violence or where intimate partner violence was identified as a possible contributing factor, and
- six suicides with complex psychosocial issues identified and family violence status unknown.

Perinatal (stillbirths and neonatal deaths) and child deaths associated with family violence

In this analysis, ‘family’ means someone currently or previously living with the child (parent, step-parent, boyfriend/girlfriend of parent or a carer/guardian). Family ‘violence’ includes (but is not limited to) any sort of intentional injury to a child, including those perpetrated by an adult with mental illness.

Based on the information that CCOPMM receives, assumptive conclusions have been made in some cases where the identity of the perpetrator was uncertain (either the case against a person was dropped or where a perpetrator could not be identified) that it was likely the perpetrator was someone in the ‘family’. As such, this data should be interpreted with caution. What was evident was that in each of these cases the child suffered an injury that was caused by another person(s).

- Between 2008 and 2013, there was one stillbirth associated with family violence.

Child and adolescent deaths

- Between 2008 and 2013, there were 23 child deaths resulting from intentional injury inflicted by a ‘family’ member
- In addition to child deaths from family violence, there were also child deaths from intentional injury inflicted by random or unrelated perpetrators.

At least 11% of the women admitted to hospital (in Victoria) for intimate partner violence (IPV)-related assault injury were pregnant. There was evidence to suggest that the abdomen/pelvic area of pregnant women was over-involved in IPV-related assaults. Among hospital admissions, half of the pregnant women had injuries to the abdomen, lower back and pelvis compared with 15% of their counterparts who were not pregnant.
Recommendation 6

Health services should monitor the uptake of the Department of Health’s *National Evidence-based Antenatal Care Guidelines* (2012), specifically relating to family violence assessment and response during pregnancy. Victoria should also;

a. support the development of a nationally consistent family violence screening tool for use in pregnancy; and

b. consider further data development so that the true burden of family violence on adverse pregnancy outcomes can be ascertained and addressed.

Good practice points

- All clinicians involved in the care of pregnant women should participate in education focused on the assessment and management of pregnant women who may be the victims of family violence.
- Health services must provide patients and staff with up-to-date information regarding local services and resources for assisting victims of family violence. Culturally appropriate information must be made available for Aboriginal women.
- At the first antenatal visit, maternity care providers should inform all women that asking about family violence is a routine part of antenatal care. They should also enquire about each woman’s exposure to family violence. This enquiry should be done when alone with the woman, tailoring the approach to her individual situation and the practitioner’s own skills and experience (e.g. using open-ended questions about the woman’s perception of safety at home or using an assessment tool).25

Further information

CCOPMM, in consultation with the Department of Health and Human Services, will assess the feasibility of routinely collected data relating to violence in pregnancy for surveillance and future planning. This was a recommendation of *The National plan to reduce violence against women and their children 2010-2022* (Second Action Plan: Moving Ahead 2013-16).26
Information and emergency contacts for families

In an emergency, if you, a child, or another person is in immediate danger, always call triple zero (000) for police or ambulance services. If you are experiencing family or family violence or sexual assault or know someone who is, please call:

- National Sexual Assault, Family Domestic Violence Counselling Line Tel. 1800RESPECT (1800 737 732) (24 hours a day, seven days per week) or visit www.1800respect.org.au

- Safe Steps Family Violence Response Centre (previously the Women’s Domestic Violence Crisis Service) Tel. (03) 9322 3555 or 1800 015 188 (24 hours a day, seven days per week)

- inTouch Multicultural Centre Against Family Violence Tel. (03) 9413 6500 or 1800 755 988

- Elizabeth Hoffman House Aboriginal Women’s Service Tel. (03) 9482 5744 or 1800 796 112 (24 hours a day, seven days per week)

- Aboriginal Family Violence Prevention and Legal Service Tel. (03) 9244 3333 or 1800 105 303
3.7 Aboriginal mothers and babies

Aboriginal mothers and babies continue to experience poorer health outcomes compared to their non-Aboriginal counterparts including higher perinatal mortality, lower birth weight babies, more prematurity and lower rates of breast feeding. This gap has changed little over the past decade and requires a renewed focus to improve outcomes.

The disparities in outcomes for Aboriginal mothers and babies remain a significant priority, not the least because they translate into future health risks for this population.

Birthweight is an important indicator reported in ‘Closing the gap’ strategies and is not only related to immediate birthing outcomes but is linked to a number of chronic health conditions in later life. Contributing factors associated with low birthweight in this group include preterm birth, smoking in pregnancy, younger maternal age and inadequate antenatal care.

Breast feeding is also a key determinant of future health and if improved, has the potential to reduce long-term health disparities between Aboriginal and non-Aboriginal children.

**Snapshot**

- The number of Aboriginal women reported to give birth has steadily increased with 965 babies born to 955 Aboriginal women in 2012 and 1014 babies born to 1000 Aboriginal women in 2013. An additional 949 (445 in 2012 and 504 in 2013) Aboriginal babies were born to non-Aboriginal mothers.
- In 2012 and 2013, 13.4 per cent of Aboriginal women giving birth were younger than 20 years compared with 2.1 per cent of non-Aboriginal women.
- In 2013, 43.7 per cent of Aboriginal women smoked anytime during pregnancy including 33.5 per cent who continued to smoke in the second half of pregnancy. This compares with around 10 per cent of non-Aboriginal women smoking at any stage and around 6 per cent who continued to smoke in the second half of pregnancy.
- Aboriginal women were less likely to have medical intervention for labour and childbirth (65 per cent and 61 per cent had an unassisted vaginal delivery in 2012 and 2013 respectively compared to 53 per cent and 52 per cent of non-Aboriginal women).
- Aboriginal babies were more than 1.5 times likely to be born with a low birthweight (below 2,500 grams) and about 1.5 times more likely to be born before 37 weeks gestation as non-Aboriginal babies.
- In 2011 to 2013, the perinatal mortality rate was nearly twice as high for infants born to Aboriginal women. This disparity has remained relatively unchanged since the 2001-03 triennium.
- Although the disparity in outcomes for Aboriginal mothers and babies remains high, there has been a reduction in the overall perinatal mortality rate from 24 per 1000 births in 2008-10, to 18 per 1000 births in 2011-13.
- Aboriginal women were less likely to initiate breastfeeding (82 per cent in 2013) compared with around 94 per cent of non-Aboriginal women.

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*a The Victorian Perinatal Data Collection includes separate information on whether either the mother or the baby identify as Aboriginal or Torres Strait Islander. It does not include information on paternal Aboriginal status.*
Aboriginal babies are twice as likely to be stillborn or die after childbirth compared to all Australian babies.

Aboriginal babies are 50% more likely to have low birthweight or be premature compared to all Australian babies.

Aboriginal women have higher smoking rates during pregnancy and lower breastfeeding rates.
Figure 7. Maternal age for Aboriginal and non-Aboriginal women who gave birth in Victoria, 2012 and 2013

Figure 8. Smoking in pregnancy for Aboriginal and non-Aboriginal women who gave birth in Victoria, 2012 and 2013
Figure 9. Preterm birth (before 37 weeks gestation) and low birth weight (less than 2,500 grams) for Aboriginal and non-Aboriginal babies born in Victoria, 2012 and 2013

Figure 10. Perinatal mortality rate (PMRAdjusted) by Aboriginal status, Victoria 2001-2013
Recommendation 7
There should be improved access to culturally appropriate maternity care services and support to manage the risks experienced by Aboriginal mothers and babies in Victoria. Data collection systems should be developed to monitor the effectiveness of these services.

Good practice point
- Health services should ensure Aboriginal status of mothers and babies is accurately reported. This can be assisted by collecting this information, particularly about the baby, during pregnancy.
4. Birthing in Victoria

Information about births in Victoria informs health care policy and service planning, and draws attention to areas of risk to be considered by health services and clinicians.

In addition to information about birthing rates, maternal characteristics such as age, country of birth, marital status, place of residence (rural versus metropolitan areas) and socio-economic status provide insight into the needs of mothers and their babies. For example, a mother’s age and country of birth can be important risk factors for outcomes such as low birthweight and perinatal mortality. Mothers experiencing social disadvantage may also be at higher risk and less able to access health care in the antenatal period. New mothers in rural areas tend to be more socially disadvantaged than those in metropolitan areas.

Information about risks such as maternal obesity and smoking as well as the types of birthing intervention and outcomes is helpful in identifying clinical and organisational priorities. This type of health information is often referred to as co-morbidities and morbidity.

This section highlights some of the key health or morbidity findings from the Victorian Perinatal Data Collection (VPDC) in 2012 and 2013, and incorporates relevant recommendations from CCOPMM.

4.1 Overview of birth statistics and maternal characteristics

While birthing in Victoria remains very safe, there are some important differences in childbirth intervention rates between the public and private health sectors as well as a disparity in important outcomes between Aboriginal and non-Aboriginal populations and for women from particular ethnicities.

For all women, further areas for improvement are apparent, for example smoking in pregnancy and breastfeeding rates.

Between 2012 and 2013, there was no significant increase in the number of Victorian babies born, following a six per cent increase between 2011 and 2012.

Snapshot

- In 2012 and 2013, there were 78,410 and 78,360 births in Victoria reported to the VPDC respectively, an increase of six per cent from 2011.
- The increase in births reflects a growing number of women in the child-bearing age group (15 to 44 years) and an increase in the size of families. The rate of births per 1,000 women of child-bearing age increased from 62 live births per 1,000 women in 2011 to 64 live births per 1,000 women in 2013.
- There was a small decrease in the proportion of women giving birth who were aged younger than 20 years (2.4 per cent in 2011 to 2.2 per cent in 2013) as well as a small decrease in the proportion of women aged 35 years or older (25.5 per cent in 2011 to 25.1 per cent in 2012 and 2013).
- India and China are the leading countries of origin of mothers from a non-English speaking background in Victoria. The number of births to women born in these two countries has increased from 519 and 883 respectively in 2000 to 4,244 and 2,376 in 2013.
• In 2013, 6.2 per cent of women continued to smoke after 20 weeks gestation. This was considerably more common in those aged younger than 20 years (22.0 per cent) compared with those aged 30 or older (4.0 per cent).

• Around one third of women gave birth by caesarean section in 2012 and 2013. The rate for women admitted as public patients is 29.5 per cent compared with 42.2 per cent of women admitted as private patients in 2013.

• Breastfed babies born in private hospitals at or after 37 weeks gestation were more likely to be given formula in hospital than those born in public hospitals (38.6 per cent and 25.3 per cent respectively in 2013) and less likely to be fully breastfed on discharge (74.5 per cent and 79.7 per cent respectively in 2013).

Figure 11. Trends in births and livebirths per 1,000 female population of child bearing age, Victoria 1985 to 2013
Figure 12. Change over time in proportion of births to mothers born in countries outside Australia where English is not the first language, Victoria 1990 to 2013

Figure 13. Births by location of maternal residence (1km radius), Metro Melbourne 2012
4.2 Caesarean section

In 2012 and 2013, around 25,000 women gave birth each year by caesarean section in Victoria. This equates to one in three births.

Birth by caesarean section may be necessary where a normal vaginal birth poses additional risks to the health of the mother and/or baby. This may include situations such as “lack of progress” in labour, fetal compromise, abnormal position of the baby, placenta praevia or where the mother has had a previous caesarean section and there is a clinical reason not to attempt a vaginal birth.

Rates of caesarean section have risen over the past three decades with a corresponding decline in unassisted vaginal births. A range of factors contribute to this trend including social and health system factors, and maternal factors such as increasing age and obesity.

Caesarean section is more common among older women and women with a high BMI and those who are admitted as private patients. It is also more common in multiple pregnancies and is recommended practice for some births such as breech births.

While caesarean birth is safer now than in the past there is a small risk of serious complications for mother and baby. Women having a caesarean birth also take longer to recover, are more likely to have difficulty establishing breastfeeding and face increased risk in later pregnancies. Women usually stay longer in hospital after a caesarean birth which has implications for health service capacity and costs.

**Snapshot**

- In 2013, 33.3 per cent of women who gave birth in Victoria did so by caesarean section. This is a small increase since 2011 (32.0 per cent). Just over half of these caesarean births were planned during the pregnancy while the other half occurred in response to a problem encountered at the time of childbirth.
- The rate of caesarean section increased with increasing age; 27.4 per cent in 2013 for women aged 25 – 29 years, and 39.9 per cent for women aged 35 to 39 years.
- In 2013, 15 per cent of standard primiparae in public hospitals gave birth by caesarean section compared with 33 per cent of those admitted to private hospitals.[27], a
- Around 30 per cent of women having a second or subsequent birth in 2012 and 2013 had had at least one prior caesarean section, with around six per cent having had two or more.
- In 2013, 42.2 per cent of women admitted as private patients gave birth by caesarean, compared with 29.5 per cent of those admitted as public patients. Private patients were also more likely to have an instrumental vaginal birth.
- The average length of stay for women who had a caesarean was four days compared with two days for women who had a vaginal birth.

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a Standard primiparae are women aged 20-34 years having their first baby at term, with a well-grown, singleton fetus in the ‘head first’ position, and with no complications of pregnancy and no specified pre-existing maternal medical conditions.
Figure 14. Trends in method of birth, all confinements, Victoria 1995 to 2013 (%)

Figure 15. Proportion of women who gave birth by caesarean section, by maternal age and admission status, Victoria 2012
Good practice points

- It is the responsibility of a senior clinician to decide whether to attempt a vaginal birth or a caesarean section, where serious fetal compromise is suspected.
- Clinicians should be aware of the following specific situations when assessing a pregnant woman prior to a caesarean section:
  - There should be routine auscultation of the fetal heart to exclude fetal death in utero, especially for women presenting with decreased fetal movements.
  - For women in labour, vaginal assessment is recommended just prior to the caesarean, given the potential for rapid progress and potential difficulties with performing a caesarean section in advanced second stage.
- Where an unborn baby has died, health services are required to inform women that a caesarean section significantly increases the risk of abnormal placentation (placenta praevia, placenta accreta/percreta) in future pregnancies.28
4.3 Homebirth

Homebirth is chosen by a small proportion of Victorian women: 414 women planned a home birth in 2013 (0.54 per cent of all women giving birth) with 79.4 per cent giving birth at home as planned. There are two available options for homebirth in Victoria: as a private patient of an independent midwife; or more recently, under the public hospital system where a homebirth program operates from a public health service. The information provided in this section includes outcomes from the private and public homebirth models.

Since 2012, public health services that include a homebirth stream provide women at low risk of pregnancy or birth complications an option to have a planned birth at home under the care of public hospital midwives. There are two health services in the metropolitan area (Monash Health - Casey Hospital and Western Health - Sunshine Hospital) which operate public homebirth programs following a pilot during 2009 to 2012. The Victorian Government’s ongoing commitment to providing women with greater choice and access to safe maternity service models is demonstrated through the continuation of these programs and the recent release of the department’s guidance material for other Victorian health services wishing to implement a public homebirth program.

**Snapshot**

- There were fewer planned homebirths overall in 2012 (0.36 per cent, n=275) compared to 2011 (0.44 per cent, n=321). In 2013 this increased to 331 women (0.44 per cent of birthing women).
- In 2013, around one in eight women who planned for the birth to occur at home was transferred to hospital during labour.
- Women who transferred during labour had a similar rate of caesarean section as other women who gave birth in public health services (30.6 per cent in 2013). Those who transferred to hospital and had a vaginal birth were more likely to have a serious perineal laceration than other women.
- Women who gave birth at home in 2013 were less likely than others to have a postpartum haemorrhage, reflecting the lower risk and complexity of these women. Those who transferred to hospital during labour, were more likely to experience a post-partum haemorrhage, than women who planned a hospital birth.
- Of the babies born at home in 2013 under either public or private home birth models, there was a similar percentage of low Apgar scores at 5 minutes. Babies who were planned to be born at home, but were delivered in a hospital, were more likely to have a low Apgar score at 5 minutes, than babies planned to be born in hospital.
Figure 16. Maternal outcomes by place of birth, Victoria 2013

Figure 17. Neonatal outcomes (Apgar <7 at 5 minutes for livebirths) by place of birth, Victoria 2013

\[\text{The denominator for 3rd or 4th degree lacerations is vaginal births.}\]
Good practice points

- Health services and private practitioners are required to provide evidence based information on the safety and risks of homebirths to women and to document these discussions.
- Private practitioners who are supporting women with a homebirth, who have either a breech presentation or are classified as a high risk pregnancy, are required to refer the mother to specialist care for documented discussions of associated risks and safety options.29
- Public health services and private practitioners must document discussions with women who decline recommended tests during pregnancy, as outlined in the Australian College of Midwives National Midwifery Guidelines for Consultation and Referral. Appendix B: Record of understanding of the National Midwifery Guidelines for Consultation and Referral can be used to document these discussions.

Further information

- Victorian public health services establishing or continuing a home birth program should refer to the Department of Health and Human Services guidance document Implementing a public home birth program: Guidance for Victorian public health services (2015).30
5. Maternal deaths

Maternal death during pregnancy or following childbirth is rare in Australia. There are however, important lessons that can be shared from the review of maternal deaths to ensure Victorian rates remain low. Year-on-year fluctuations in the number of maternal deaths occur due to the low numbers involved. For this reason, this section provides information on the examination of deaths over a four year period from 2010 to 2013.

5.1 Overview of maternal mortality

Although Victoria (and Australia) has one of the lowest maternal mortality rates internationally, it is important to continue surveillance of trends and causes of maternal deaths to improve system planning and identify contributing or preventable factors. The majority of maternal deaths during 2010 to 2013 (58 per cent) were due to pre-existing conditions.

Due to the increasing prevalence of chronic diseases such as obesity and diabetes, and psychosocial risk factors, more women are entering pregnancy with complex health and social problems. This challenges the health system and increases the need for optimal coordination of access to specialist care.

Many maternal deaths occur in the context of complex psychosocial issues including poorer socio-economic status, drug and alcohol abuse, mental health problems and family violence. In Victoria, family violence is a major cause of early death, disability and illness in women aged 15 to 44 years. It is reported that women and unborn babies are at increased risk of family violence during pregnancy, although further research is necessary to ascertain the true burden of family violence in Victoria.

Snapshot

Overview

- Out of around 305,000 births there were 41 maternal deaths in Victoria between 2010 and 2013.
- Thirteen deaths (31.7%) were due to complications associated with the pregnancy (direct deaths).
- Twenty-four deaths (58.5%) were due to pre-existing conditions or newly diagnosed conditions that were exacerbated by the pregnancy (indirect deaths).
- Four deaths (9.8%) were due to reasons unrelated to the pregnancy (incidental causes).
- The Maternal Mortality Ratio\(^a\) (MMR) from 2010 to 2013 is 10.0 per 100,000 confinements (12 direct and 18 indirect deaths). The MMR for Australia was 7.1 per 100,000 confinements in 2008-12.\(^\) Although there has been a very slight increase in the rate of maternal mortality in recent years, the overall number of cases remains small by international comparisons. The comparative national

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\(^a\) Not all maternal deaths are included in the maternal mortality ratio (MMR) for national and international comparison (see Appendix 1). The MMR is calculated based on direct and indirect deaths that occur during pregnancy or within 42 days of birth.
and international maternal mortality ratios from the World Bank modelling estimates for 2011-15 (per 100,000 live births) are:\(^3\)
- Australia 6
- New Zealand 11
- UK 9
- USA 14
- Sweden 4
- Norway 5
- Papua New Guinea 215

Causes

- The leading causes of maternal deaths were cardiovascular disease, non-obstetric haemorrhage, thromboembolism, obstetric haemorrhage and psychosocial causes (refer to Table 2). These causes are similar to those reported nationally and in other OECD countries such as the United Kingdom (UK).
- There were nine deaths from cardiac disease.
- There were four deaths due to obstetric haemorrhage (two from placenta accreta/increta and two were related to other post-partum haemorrhage). One case of ‘catastrophic post-partum haemorrhage’ was in the clinical setting of amniotic fluid embolism (AFE).
- The rate of severe haemorrhage (blood loss greater than 1,500ml) in all births was 1.5 per cent in 2013 compared with 1.3 per cent in 2011.
- There were four deaths from thromboembolism (pulmonary embolism). A number of risk factors were identified, including obesity, smoking and operative delivery. Morbid obesity (BMI > 40) was identified as a risk factor in two cases as well as non-adherence to medical advice.
- There were four deaths from suicide and a number of deaths were related to family violence (see section 4.2).
- There were two deaths from sepsis.
- For two women the exact cause of death remains undetermined, even though an autopsy was performed for one.
Table 2. Causes of maternal deaths, Victoria 2010-2013

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Maternal deaths included in mortality ratio</th>
<th>Late maternal deaths&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct</strong> (due to a complication of the pregnancy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thromboembolism</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Obstetric haemorrhage</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Anaesthetic related death</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Amniotic fluid embolus</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hypertensive disorders in pregnancy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Early pregnancy death - ectopic pregnancy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Post-partum sepsis – Streptococcus Group A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Indirect</strong> (related to a pre-existing or newly diagnosed condition exacerbated by pregnancy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Non-obstetric haemorrhage (includes intracerebral bleeding)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Psychosocial</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sepsis – acute pyelonephritis</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Undetermined</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Carcinoma of the cervix</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Bronchopneumonia</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Incidental</strong> (where the pregnancy is unlikely to have contributed significantly to the death)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family violence</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Asphyxia</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Undetermined</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Bronchopneumonia</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>11</td>
</tr>
</tbody>
</table>

<sup>a</sup> Late maternal deaths occur after 42 days but within 1 year of the birth and are not included in the maternal mortality ratio.
Clinical case study - thromboembolism

The patient was a 40 year old woman with a BMI greater than 35 with no history of smoking. A previous pregnancy and birth was normal.

The patient collapsed unexpectedly at home at 30 weeks gestation; no heart beat was detectable on arrival at hospital and the patient could not be resuscitated.

She had presented to her GP three days earlier complaining of shortness of breath and chest pain. All assessments, including a chest x-ray, were normal and she was discharged home with follow-up arranged. The Coroner’s post-mortem report confirmed that the cause of death was pulmonary embolism.

Key messages

Thromboembolism is a common cause of direct maternal death however a downward trend has been observed both nationally and in the UK. This is attributed to improved early identification of high-risk women and thrombo-prophylaxis.

The prevalence of risk factors such as obesity and morbid obesity are increasing in pregnancy. Therefore improved screening in early pregnancy or pre-pregnancy to identify risk factors for venous thromboembolism is a key strategy for prevention. A list of risk factors can be found in the current Royal College of Obstetricians and Gynaecologists Green–top guidelines.34

Clinical case study – obstetric haemorrhage

The patient was a 34 year old who had two previous caesarean sections.

She was diagnosed with placenta praevia during her pregnancy. She presented to hospital with vaginal bleeding at 37 weeks gestation.

Emergency caesarean section was performed and the patient was found to have placenta accreta and there was difficulty separating and removing the placenta. Persistent bleeding resulted in cardiac arrest and she was unable to be resuscitated despite ongoing attempts.

Key messages

Women who have previously given birth by caesarean section are at increased risk of having a morbidly adherent placenta (placenta accreta) especially if the placenta is attached to the anterior lower uterine segment.

Expert ultrasound assessment for possible placenta accreta should be undertaken, as well as an MRI if indicated. Prior to undertaking a caesarean section in such cases, even when ultrasound and/or MRI do not identify placenta accreta, the woman should be prepared for a hysterectomy if complete and simple separation of the placenta does not occur. These operations should take place in a hospital with the necessary expertise and access to blood supplies.
Clinical case study – cardiac disease

The patient was a 36 year-old multipara who collapsed at home seven days post-partum and was unable to be resuscitated on arrival at the emergency department.

She had a history of rheumatic heart disease and in her first pregnancy developed pulmonary oedema in the setting of pre-eclampsia postnatally requiring admission to intensive care.

A repeat echocardiogram during her current pregnancy was deemed normal and she was referred to the high-risk pregnancy team. This pregnancy was non-eventful apart from some mild transient hypertension. She was discharged home on day three following the birth. She developed pulmonary oedema at home and deteriorated rapidly.

Post-mortem examination and review found that the cause of death was diastolic dysfunction and noted that there had been a similar episode in her last pregnancy.

Key messages

Cardiac disease has been reported as the leading cause of maternal death in Australia and the UK. It is thought that with increasing incidence of risk factors such as obesity, smoking, advanced maternal age and hereditary cardiac disease, there is a relative increase in the incidence of cardiac disease.

There is an increasing number of women with congenital heart disease surviving to adulthood and ‘childbearing’ age. Cardiac disease often remains undiagnosed until ‘unmasked’ by pregnancy.
5.2 Contributing factors in maternal deaths

Review of maternal death cases occurring in the period 2010 to 2013 reveals a range of contributing factors including socio-demographic characteristics, mental health issues, family violence and sub-optimal standards of practice. For maternal deaths occurring from 2010 to 2013, one or more contributing factors were identified in 17 of the 41 deaths (41 per cent).

It is important to note however that the contributing factors identified may not have directly caused the death or had an influence on the outcome. Although data collection and research in this area is improving, better information on the impact of these factors is required, so that evidence based preventative measures can be applied.

The presence or absence of contributing factors is assessed for all maternal deaths reported to CCOPMM. The factors are grouped into three main categories:

- factors relating to professional practice
- factors relating to access to care, including access to appropriate expertise, services and treatment
- factors related to the woman, her family and social situation.

An emerging theme from the review of recent maternal deaths is the barriers to accessing care that recent immigrants, refugees and asylum seekers may face. As well as these challenges, these women may face social isolation and negative psychological impacts from experiencing pregnancy and motherhood in an unfamiliar environment. Information about these maternal factors is not comprehensively collected and further research is needed to fully understand this issue.

Snapshot

- One or more contributing factors were identified in 41 per cent of all maternal deaths:
  - eleven deaths were associated with sub-optimal professional practice
  - three deaths were associated with a delay or lack of access to care, and
  - three deaths were associated with factors relating to the woman, her family or social situation.

Sub-optimal clinical practice

- Factors relating to clinical practice accounted for the majority (60 per cent) of all the contributing factors identified during the review of maternal mortality cases. Sub-optimal professional practice was identified in 11 maternal deaths. The most common factors were:
  - failure to recognise clinical deterioration
  - inadequate clinical monitoring, for example not recognising an obstetric complication such as significant blood loss following birth.
- Examples of other contributing factors identified include:
  - failure to identify high risk/clinical complexity
  - inadequate management of women with higher complexity pregnancies
  - inadequate communication between health services or health care providers.
Factors related to the woman, her family and social situation

- Accounted for 29 per cent of the contributing factors in maternal deaths
- Identified in three maternal deaths, with the most common factors being:
  - substance misuse
  - socio-cultural factors including language barriers
  - family violence
- There were a small number of maternal deaths where poor compliance with treatment or medical advice was likely to have contributed to the outcome.
- Data regarding the contribution of socio-demographic factors is limited.

Table 3. Assessment of contributing factors in maternal deaths, Victoria 2010-2013

<table>
<thead>
<tr>
<th>Contributing factor</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors relating to access to care</td>
<td>4</td>
</tr>
<tr>
<td>Delay in transfer</td>
<td>2</td>
</tr>
<tr>
<td>Lack of access to specialist care and services</td>
<td>2</td>
</tr>
<tr>
<td>Factors relating to professional practice</td>
<td>21</td>
</tr>
<tr>
<td>Delay in access to specialist assistance</td>
<td>2</td>
</tr>
<tr>
<td>Delay in diagnosis and transfer</td>
<td>1</td>
</tr>
<tr>
<td>Failure to diagnose placenta accreta</td>
<td>1</td>
</tr>
<tr>
<td>Failure to follow recommended best practice</td>
<td>2</td>
</tr>
<tr>
<td>Failure to maintain an adequate airway and ventilation</td>
<td>2</td>
</tr>
<tr>
<td>Failure to recognise clinical deterioration</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate communication</td>
<td>2</td>
</tr>
<tr>
<td>Inadequate management of obstetric haemorrhage</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate clinical monitoring</td>
<td>3</td>
</tr>
<tr>
<td>Inadequate resuscitation</td>
<td>1</td>
</tr>
<tr>
<td>Inadequate screening for risk factors</td>
<td>1</td>
</tr>
<tr>
<td>Inappropriate discharge</td>
<td>1</td>
</tr>
<tr>
<td>Poor organisational management</td>
<td>1</td>
</tr>
<tr>
<td>Factors relating to the pregnant woman, her family and social situation</td>
<td>10</td>
</tr>
<tr>
<td>Compliance with medical advice</td>
<td>1</td>
</tr>
<tr>
<td>Compliance with treatment for mental health condition</td>
<td>1</td>
</tr>
<tr>
<td>Delay in seeking medical advice</td>
<td>1</td>
</tr>
<tr>
<td>Family violence</td>
<td>2</td>
</tr>
<tr>
<td>Socio-cultural factors</td>
<td>2</td>
</tr>
<tr>
<td>Substance misuse</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
</tr>
</tbody>
</table>

Contributing factors were identified in 17 of the 41 maternal deaths (41%). Multiple contributing factors were present in some cases. There were 24 cases in which no contributing factors were identified.
Access to care

- Identified in three maternal deaths, with the most common factors related to a lack of, or delay in, access to specialist care and services, particularly in a rural area.

Good practice points

- To improve access to antenatal care, health services should develop and implement a structured process for identifying and managing pregnant women who have missed appointments. This is especially important for women who are identified as vulnerable.
- Psychosocial factors should be assessed in early pregnancy and again in the third trimester. Pregnant women who are diagnosed with mental health disorders are to be provided with effective pathways to treatment and services.38, 39
- Clinicians should not delay necessary radiological imaging, including chest x-ray, because of pregnancy. This risk to the fetus is minimal after the first trimester. This is particularly important when a life-threatening condition, such as aortic or splenic artery aneurysm, is suspected.
- Health services should ensure that clinicians contact the Adult Retrieval Victoria (ARV)40 call line 1300 368661 to expedite access to critical care beds for pregnant women who may need urgent transfer to a specialist surgical facility. In these situations, clinicians should communicate directly with the receiving consultant.
- Health services should ensure that clinicians are equipped to recognise and manage the following clinical situations:
  - Pre-eclampsia - for women who are hypertensive following birth, their blood pressure should be controlled to reduce the risk of intra-cerebral haemorrhage.
  - Placenta accreta - the possibility of placenta accreta should be anticipated when the placenta encroaches on the lower uterine segment whether or not ultrasound and/or MRI has demonstrated trophoblastic invasion into the uterine wall. Women who have had one or more previous caesarean sections are particularly at risk of requiring hysterectomy if complete and ready separation of placenta does not occur at the time of the caesarean section.
  - Amniotic fluid embolism (AFE) - AFE escalates rapidly and can be difficult to recognise. Wherever AFE is suspected, the involvement of senior medical staff should be arranged rapidly to improve clinical outcomes.
  - Bacterial sepsis - following pregnancy, particularly group A streptococcal infection. All health professionals should be aware of the signs and symptoms of maternal sepsis including the rapid and potentially lethal course of severe sepsis and septic shock.41 Suspicion of significant sepsis should trigger urgent referral to higher levels of care.

Further information

- Health services should implement locally appropriate protocols for blood transfusion during labour, based on the National Blood Authority Australia Patient Management Guidelines: Module 5 Obstetrics and Maternity.
- Health services should ensure clinicians undergo regular clinical education associated with blood transfusions.
- The Department of Health and Human Services is currently working with health services through the Blood Matters Program to ensure that elective blood transfusion and patient blood management practice is aligned to the National Blood Authority’s Patient Blood Management Guidelines.42
6. Perinatal deaths

Perinatal mortality includes fetal deaths (stillbirths) and deaths of live-born babies within the first 28 days after birth (neonatal deaths). The information in this chapter refers to the ‘adjusted’ perinatal mortality rate, where terminations of pregnancy for psycho-social reasons are excluded. This adjustment provides a better measure for avoidable mortality and for comparison nationally and with other jurisdictions. Statistics for unadjusted perinatal mortality can be found in section two of this report.

6.1 Overview of perinatal mortality

Although the perinatal mortality rates in 2012 and 2013 were below the rates for 2009 to 2011, there remain groups of women with a higher risk of losing a baby.

There are opportunities to achieve better health outcomes through early identification of risk factors such as obesity, past obstetric history and recognition and appropriate management of obstetric complications, such as fetal growth restriction (FGR), reduced fetal movements or high blood pressure.

A separate section on the importance of perinatal mortality and morbidity review is provided in Chapter 3: Priority areas.a

a Chapter 3 also includes information comprehensive information on the contributing factors in perinatal mortality and morbidity.

Despite overall reductions in perinatal deaths, rates remain higher for:

- babies of Aboriginal women
- babies of women born in North Africa, the Middle East or southern and central Asia
- multiple pregnancies
- babies born pre-term or with FGR.

Almost all perinatal deaths are due to factors during pregnancy and childbirth. The leading causes are congenital anomalies, preterm birth, FGR and intrapartum haemorrhage which reflect trends nationally and in the UK.44

Perinatal mortality reflects the health status of the general population including access to and quality of reproductive, preconception, antenatal and obstetric services for women as well as health care in the neonatal period. Broader social factors such as maternal education, nutrition, smoking, alcohol use in pregnancy and socioeconomic disadvantage are also significant.45

While addressing population risks and improving service provision are key strategies, early detection and monitoring of risks such as FGR and reduced fetal movements are important clinical activities to reduce perinatal mortality.

Understanding the causes and contributory factors for perinatal deaths is central to reducing the mortality rate further, and this relies to a large extent on thorough and consistent review and reporting by health professionals and health services.
Snapshot

- The perinatal death rate including stillbirth and neonatal death (up to 28 days) decreased from 10.7 per 1,000 births in 2009 to 9.4 per 1,000 births in 2012 and 9.9 per 1,000 births in 2013.
- Victoria's perinatal mortality rates were equal to or lower than the Australian rate in 2012 and 2013.
- The rate of perinatal death is higher for:
  - babies of Aboriginal women (two times higher, which has remained relatively unchanged since 2007)
  - babies of women born in North Africa, the Middle East or South and Central Asia (1.5 times higher than the lowest rate, according to maternal place of birth)
  - multiple pregnancies (three to five times higher)
  - lowest gestation and birthweight babies.
- The leading cause of stillbirth was congenital anomalies. Other leading causes were preterm birth, FGR and “specific perinatal conditions” which includes (but is not limited to) twin-to-twin transfusion syndrome, haemorrhage from the fetus to the mother, umbilical cord accidents, and birth trauma. The leading causes have remained the same for the last triennia.
- For newborns (up to 28 days), the leading causes of death were congenital anomalies and preterm birth.
- Around 16 per cent of stillbirths remained unexplained or underexplored in 2012 and 2013, and only around 40 per cent of stillbirths and 25 per cent of neonatal deaths had an autopsy performed.
- The most common contributing factors for perinatal death during 2008 to 2013 were:
  - misinterpretation of, or undue reliance on, clinical tests
  - inadequate intrapartum monitoring
  - failure to expedite delivery.
- For stillbirths, 33 per cent of all contributing factors related to inadequate antenatal monitoring including misinterpretation, over reliance, or failure to perform an important clinical test. Twenty-one per cent related to antenatal care and 19 per cent related to intrapartum care.
- For newborns, 33 per cent of all contributing factors related to intrapartum care factors such as intrapartum monitoring and failure to expedite delivery. Fifteen per cent related to the management of intrapartum conditions such as preterm delivery and 14 per cent were related to a delay in recognition or treatment of the infant.
Figure 18. Perinatal mortality rates (PMR), Victoria 2000 to 2013

Figure 19. PMR\textsubscript{Adjusted} by Aboriginal status, Victoria 2001-2013
Figure 20. Perinatal mortality rate (PMR) by maternal place of birth, Victoria 2013

- Americas
- North-West Europe
- Southern and Eastern Europe
- North-East Asia
- Oceania including New Zealand
- South-East Asia
- Australia
- Sub-Saharan Africa
- Southern and Central Asia
- North Africa and Middle East
- Unknown

Perinatal mortality rate

Figure 21. Perinatal cause of death (%), PSANZ PDC, Victoria 2013 (adjusted)

- Congenital abnormality: 33.9%
- Spontaneous preterm: 17.3%
- Unexplained antepartum death: 15.4%
- Specific perinatal conditions: 11.0%
- Fetal growth restriction (FGR): 6.5%
- Antepartum haemorrhage: 6.5%
- Maternal conditions: 2.6%
- Hypertension: 2.1%
- Infection: 1.9%
- Hypoxic peripartum death: 0.6%
- No obstetric antecedent: 2.3%
Good practice points

• Women at high risk for diabetes should be screened before pregnancy or as early as possible in pregnancy. Risk factors include:
  – previous gestational diabetes mellitus (GDM)
  – previously elevated blood glucose levels
  – women older than 40 years
  – first degree relative with diabetes or sister with GDM
  – a BMI greater than 35
  – previous macrosomic infant (birth weight greater than 4,500 grams or greater than the 95th percentile)
  – polycystic ovarian syndrome (PCOS), and/or
  – corticosteroid and antipsychotic medications.

• Health services should ensure that clinicians have access to/follow best practice guidelines for neonatal resuscitation. In particular, protocols and training should be provided to reinforce the following clinical recommendations:
  – Umbilical vein cannulation is the first option for intravenous (IV) access in a compromised baby requiring resuscitation with intravenous therapy.47
  – Following the insertion of an umbilical vein catheter (UVC), the baby should have a lateral and antero-posterior x-ray to confirm the UVC position.48 If the UVC position is incorrect it should be removed and alternative access established.
  – Adrenaline should be administered via the endo-tracheal tube (ETT) if venous access is not immediately available.49
  – A self-inflating bag should be available at every birth in the event of resuscitation equipment failure.
  – Safe insertion of pigtail catheters, particularly in very preterm babies, should be performed by a senior clinician experienced in the procedure.

• Clinicians should be aware of the following specific situations relating to neonatal resuscitation:
  – If unable to intubate the baby, ventilation with bag and mask should be continued until further clinical support arrives. Pressures may need to be actively increased if using a T-piece and clinicians should document the pressures being used. This is important in deciding when to intubate, as increasing pressures are a guide to changing management.
  – The ETT tube and monitoring equipment should be well secured.
  – Where a baby has an oximeter in place, ECG leads should also be attached to ensure that the correct fetal heart rate (FHR) is being reported.
6.2 Reduced fetal movements

Reduced fetal movements are frequently reported by mothers prior to fetal death and are strongly associated with an increased risk of stillbirth. As new evidence emerges on appropriate clinical responses to reduced fetal movements reported by mothers, it is apparent that some clinicians do not always follow evidence based practice. Improvements in the approaches to detection and intervention by clinicians have the potential to improve outcomes in this area.

Reduced fetal movements increase the risk of adverse outcomes including FGR, preterm birth and unexplained antepartum death. An inappropriate clinical response to maternal reports of reduced fetal movements is a common contributing factor in stillbirths. Improved awareness among pregnant women and clinicians, and improved management of reduced fetal movements would significantly reduce the risk of perinatal death.

There are challenges with quantifying the extent of reduced fetal movements nationally and internationally however researchers and organisations such as CCOPMM are working to resolve this.

Recent surveys of obstetricians and midwives in Australia have found that the management of reduced fetal movements varies widely. To support more consistent practice, the Australia and New Zealand Stillbirth Alliance (ANZSA) developed the Clinical practice guideline for the management of women who report decreased fetal movements in 2010, which has been adopted by both the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) and Australian College of Midwives (ACM).

Despite the availability of such guidance material, inappropriate management of reduced fetal movements is a recurring theme in deaths reviewed by CCOPMM. Clinicians appear to be falsely reassured by apparently normal investigations such as the CTG, amniotic fluid index (AFI) and umbilical artery doppler studies. Overreliance on umbilical artery doppler studies in particular, can be misleading in term pregnancies when the placental vasculature is maximally dilated.

Snapshot

- Reduced fetal movements are a recurring factor observed in a large proportion of deaths reviewed by CCOPMM.
- During 2008 to 2013, 11 perinatal deaths were found to be associated with a failure or delay by the mother to report reduced fetal movements.
- Avoidable factors in the management of reduced fetal movements include inadequate antenatal monitoring and overreliance on clinical tests.
Clinical case study – reduced fetal movements

A 33 year old woman, non-smoker and with a BMI of 30, had an otherwise normal pregnancy including a low combined first trimester risk for aneuploidy. At a routine 36 week antenatal visit the obstetrician identified a symphyseo-fundal height less than expected (33 cm) and arranged an ultrasound which reported an estimated fetal weight on the 25th centile for gestation. The amniotic fluid index (AFI) was 12cm (normal) and umbilical artery Doppler studies were normal. The woman was reassured that her baby was growing appropriately and routine follow-up was arranged.

When the woman was seen in the antenatal clinic at 39 weeks gestation she reported a seven day history of reduced fetal movements. Clinical tests for fetal growth were arranged that day and were all reported as normal. The woman was again reassured and given a clinic appointment for the following week. She presented four days later with a two day history of absent fetal movements. The death of the baby was confirmed and she gave birth to a stillborn boy, weighing 3130g (normal) and otherwise normally developed.

A post-mortem examination revealed a normally developed male infant with measurements generally consistent with 39 weeks. However, the brain liver ratio confirmed FGR. Placenta histology revealed a marginal cord insertion, maternal vasculopathy and a marginal haematoma. A Kleihauer test\(^1\) was negative and all other investigations were normal.

Key messages

A history of persistent reduced fetal movements at term, even if fetal surveillance is reassuring, is a sufficient indication for induction of labour.

The parameters of a normal CTG are largely based on the full-term (mature) fetus (RANZCOG Intrapartum Fetal Surveillance Clinical Practice Guideline). However, even in the prematurely developed fetus, the lack of baseline variability and accelerations in an antenatal CTG are abnormal findings that should be of concern and merit further fetal surveillance or consideration of expedited delivery.

Good practice points

- If the CTG trace is normal, clinicians should base the management of reduced fetal movements on a full clinical history and findings, such as metabolic and hypertensive disorders, or abnormal fetal growth.
- Pregnant women should be informed that the healthy fetus does not reduce the frequency of movement towards the end of pregnancy. Clinicians should educate pregnant women to report signs of decreased fetal movements.\(^5\)
- Women who report decreased fetal movement should be assessed for the presence of other risk factors associated with stillbirth. This includes FGR, hypertension, diabetes, advanced maternal age and obesity. Women who experience decreased fetal movements in combination with other risk factors should be managed as high risk.
- Health services who provide maternity care and services are required to adopt the guidelines provided by the Australian and New Zealand Stillbirth Alliance (ANZSA) Clinical Practice Guideline for the Management of Women who Report Decrease Fetal Movements.

\(^{1}\) The Kleihauer test indicates if the baby has bled into the maternal circulation.
Messages for consumers

The healthy baby does not move less ("kicking") towards the end of pregnancy.

During pregnancy, always let your health care provider know if you think that your baby is moving less than normal, as soon as you become aware of it.

If you report less than normal baby movements your health care provider should assess you and your baby’s wellbeing.

Further Information

- CCOPMM recognises the importance of improved data collection in this area. Improved reporting and data collection of reduced fetal movement at a state and national level will allow better surveillance and inform future prevention strategies.
- A brochure has been developed by ANSZA to assist clinicians in providing adequate information to women about what to expect from a baby’s movements as pregnancy progresses, and when to seek care if they become concerned about their baby’s movements. A copy of the brochure can be found at: http://www.stillbirthalliance.org.au/parent4.htm
7. Child and adolescent deaths

7.1 Overview of child and adolescent mortality

Child and adolescent mortality rates in Victoria are low however further reductions are achievable.

Overall, child and adolescent mortality rates continue to decline. However, certain causes of death are a concern which is the focus of this chapter including:

- sudden and unexplained death in infancy (SUDI), associated with unsafe sleep environments and practices.
- youth suicide in the 15–17 year age group, which in 2012 reached its highest level since reporting began in 2005; the number of youth suicides decreased in 2013.
- deaths occurring on farms, rural properties and workplaces continue to occur under circumstances of inadequate supervision or when children engage in activities beyond their strength, coordination or maturity.
- asthma deaths associated with poor asthma control and suboptimal emergency management.
- deaths due to severe food allergies especially the early identification and management of anaphylaxis.

Snapshot

- Overall, mortality rates continue to decline with slight year-on-year variation. In 2012, there were slightly more deaths (n=169) than in 2011 (n=157) for children and adolescents aged between one and 17 years. There was however a large decrease in the number of deaths in 2013, with 125 deaths in the one to 17 years age group.
- Victoria’s infant and under five years mortality rates per 1,000 live births are similar to national rates (3.5 compared to 3.4 and 3.8 compared to 4.0 respectively in 2013). However, Australia’s rates were ranked 18th and 17th respectively in 2013 for the 34 OECD countries.56, 57
- The main causes of death in post-neonatal infants (28 to 364 days of age) in 2013 were:
  - congenital anomaly (58 per cent), birth hypoxia and prematurity (19 per cent) and sudden infant death syndrome (nine per cent).
- The main causes of death in children aged 1 – 4 years in 2013 were:
  - congenital anomaly (46 per cent) and drowning, infection and undetermined (all 12 per cent)
- The main causes of death in children aged 5 – 9 years in 2013 were:
  - congenital anomaly (47 per cent), malignancy (27 per cent), and motor vehicle accident (10 per cent).
- The main causes of death in children aged 10 – 14 years in 2013 were:
  - malignancy (35 per cent), congenital anomaly (19 per cent) and motor vehicle accident (15 per cent).

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a The information in this chapter is not limited to deaths occurring in 2012
b Information on child and adolescent deaths related to farms, rural properties and workplaces is provided in Section 4: priority areas
- The main causes of death in adolescents aged 15 – 17 years in 2013 were:
  - suicide (36 per cent), congenital anomaly (17 per cent), motor vehicle accidents (11 per cent) and malignancy (11 per cent)

Figure 22. Neonatal, infant, child mortality rates, Victoria 2000-2013

Figure 23. Child and adolescent mortality rates, Victoria 1985-2013
Good practice points

- Health services should provide all new parents with information related to supervising children in and around water.
- Neonates should be assessed by checking for the presence and adequacy of femoral pulses and oxygen saturation by the use of a pulse oximeter.
- The early postnatal examinations (i.e. initial birth examination, discharge checks, and checks within the first weeks of life) must include and document the following to detect serious or potentially life threatening conditions:
  - Growth indices – weight, length and head circumference
  - Neurological examination – conscious state, reflexes and tone, fontanelles
  - Cardiovascular examination – femoral pulses, respiratory rate and effort, oxygen saturation (SpO2), heart sounds and murmurs
  - Abdominal examination – anus (presence, patency, position), genitalia including testes descent, umbilicus
  - Eye and ears – eyes including red reflex, mouth and palate, ears
  - Musculoskeletal examination – hips, skin
- In infants with complex cardiac conditions such as hypoplastic left heart syndrome, if there is increasing oxygen saturation or rapid weight gain, consideration should be given to excess pulmonary blood flow and fluid accumulation respectively. If oxygen saturation decreases, inadequate shunt flow should be considered. This can be exacerbated by dehydration.
- In infants and young children with unusual respiratory illness including sudden onset and repeated episodes or a prolonged course, consideration should be given to a possible foreign body in the respiratory tract.
- Children from a regional or interstate centre with acute leukaemia and very high white cell count (more than 300,000) should be transferred to a tertiary referral centre as soon as possible. Liaison (regarding pre-transfer treatment) with the tertiary referral centre oncology department should take place prior to the transfer. This treatment may include IV fluids, steroids and drugs (e.g. rasburicase) to treat tumour lysis syndrome.
- The Monospot test (a test of heterophil antibody agglutination of animal red blood cells) is often used to investigate Epstein Barr Virus (EBV) infection. However, testing for EBV-specific antibodies is the preferred way to diagnose EBV infection.
- A positive Monospot test should not be assumed to be only from EBV infection. Important causes of a positive Monospot test can include:
  - other infection including: cytomegalovirus, hepatitis, influenza, malaria, rubella, toxoplasmosis, varicella
  - leukaemia/lymphoma (especially Burkitt’s lymphoma)
  - pancreatic cancer
  - rheumatoid arthritis
  - serum sickness
  - systemic lupus erythematosus
- Preparing adolescents with chronic illness for organ transplantation should involve a multidisciplinary team to address their medical, social and emotional issues, and to identify support requirements. After transplantation, support should continue with a focus on ensuring adherence with the treatment regimen including anti-rejection medications. Appropriate involvement of parents or other significant adult carers is generally helpful in promoting adherence to treatment by adolescents.
Good practice points (continued)

- Clinicians have a responsibility to report suspected adverse effects of all medicines and vaccines to the Therapeutic Goods Administration in addition to conducting internal reviews. These include adverse events with therapeutic agents in uncommonly performed procedures or where the dose may not be well established in children such as:
  - botox therapy
  - sclerotherapy with ethanol, bleomycin or other agents
  - chemotherapy agents

Messages for consumers

- Parents and carers should never leave infants and young children alone in a bathtub or use bath seating aids as substitutes for supervision.
- Where a child is near water, an adult must be responsible for supervising that child at all times.
- Parents and carers should ensure that children’s sleep and play areas are free of hazards that may lead to accidental asphyxiation.
- Parents and carers should not leave infants and children unsupervised in, or playing around, unlocked or inadequately secured vehicles. Associated risks include:
  - run/roll over deaths if the hand/parking brake is disengaged.
  - heat related deaths, even within short periods or on days of moderately warm ambient temperature (>25 C).
- Cars should be left locked and keys kept in a safe place, to prevent children from gaining access.
- The number of driveway deaths has given rise to education campaigns (e.g. Driveway Safety Campaign http://www.kidsafavic.com.au/road-safety/driveway-safety) that highlights:
  - children should always be supervised when cars are moving in a driveway
  - the driveway should be treated like a road and not an extension of a children’s playing area
  - where possible, the driveway should be physically separated by fences, between the rest of the play area and gates to the road
  - drivers should always check and see that there are no children in the driveway prior to leaving and recognised that all cars have blind spots. Drivers should never reverse unless they know where children are.
- Adolescents with chronic health issues including asthma, diabetes, epilepsy, cystic fibrosis, attending school completion holidays (‘schoolies’) need to continue to maintain optimal management of their chronic medical condition and be aware of symptoms suggesting deterioration. Absence of parental oversight, together with increased likelihood of engaging in risky behaviours (e.g. alcohol, tobacco, illicit drug use) during school completion celebrations/holidays may undermine adherence to treatment and worsen health outcomes.
7.2 Sudden unexpected deaths in infancy (SUDI)

Although rates for SUDI\(^a\), including sudden infant death syndrome (SIDS), have reduced significantly since public health campaigns were introduced, deaths continue to occur in association with unsafe sleep environments and practices.

\(\text{a Sudden unexpected deaths in infancy (SUDI) includes all infants (under one year of age) who die suddenly and unexpectedly after they are placed to sleep. It is important to see sudden infant death syndrome (SIDS) as a subgroup within the category of SUDI.}\)

Although not all SUDI deaths can be eliminated, the promotion of safe sleeping for every sleep is the best way to minimise the risk. Infants continue to die in situations associated with unsafe sleep practices.

A key to further reducing preventable deaths in this category is to ensure parents and carers understand the safest sleeping environments and practices for infants, and have a safe sleep plan for every sleep.

Co-sleeping is a particular issue and is not recommended. Most at risk are premature or small for gestational age infants and those younger than three months of age. The risk is also highest where the co-sleeper is affected by sedating drugs or alcohol or is a smoker, or where the sleep surface is unsafe.

**Snapshot**

- There was a significant reduction in deaths from SUDI in the decade between 1985 and 1995 however further sustained reductions have not occurred since then (refer Figure 24).
- There were 14 deaths from SUDI in 2012, 12 in 2013, 23 deaths in 2011 and 26 deaths in 2010.
- The majority of deaths occur in the post-neonatal period (28 to 364 days).
- The majority of unexplained SUDI deaths occurred in circumstances where the SIDS and Kids Safe Sleeping message was not fully followed. Specifically, 14 per cent of unexplained SUDI deaths in 2012-13 occurred when the baby was placed to sleep on their front and 39 per cent occurred when the baby was co-sleeping with adults.
Further information

The Department of Education and Training, in consultation with the Department of Health and Human Services and key stakeholders, is developing an evidence-based safe infant sleeping guideline following recommendations from the State Coroner. Phase one of the project can be found at:


Phase two of the project is in the final stages of completion and will be released shortly.

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a neonatal = 0 to 27 days; post-neonatal = 28 to 364 days; USID – Unclassified Sudden Infant Death.
Messages for consumers

Based on the case review of infant deaths and consideration of the wider literature, CCOPMM provides the following recommendations on safe sleeping for parents. These are a modified version of the SIDS and Kids Safe Sleeping Message (http://www.sidsandkids.org/safe-sleeping/):

- All babies should sleep on their back from birth, not on their front or side
- Always sleep baby in a safe cot that meets the Australian Standard AS2172:2013, with a firm mattress that is the right size for the cot, and is not tilted or elevated. The mattress should be covered with only a tightly-fitted sheet and, if required, a thin tightly-fitted mattress-protector under the fitted sheet. A baby should never be put down to sleep on a sofa, bean bag, sheepskin or pillow.
- In the first 6-12 months, babies are to sleep in their own cot, in the same room as an adult caregiver. It is much safer for babies to sleep in their own cot than to sleep next to another person.
- A light-weight sleeping bag of correct size, that has a fitted neck, armholes/sleeves and no hood, is the appropriate sleeping material for newborn babies.
- Keep baby away from tobacco smoke before birth and after; the risk is increased even if a caregiver goes outside to smoke.
- Keep adults who are under the influence of alcohol or drugs or sedating medication away from babies.
- Breastfeed your baby if you can.
- A dummy can be offered to a baby as a sleep aid, for the first 6-12 months only. Dummies must not be forced, have a neck cord, covered in anything sweet or offered during awake time.
- When travelling with a baby, it is essential that a portable cot (that meets Australian Standard 2195:2015 folding cot) is used in addition to the recommendations above.
7.3 Youth suicide

The rate of youth suicide spiked in 2012 to the highest level since reporting within the age group of 15-17 years began in 2005. There was a decrease in 2013, with the number of suicides recorded returning to pre-2012 levels. This suggests a need for awareness and action on youth mental health across the community. Self-harm in young people is also recognised as a significant issue.

Mental health disorders are common in children and adolescents with up to 20 per cent of young people experiencing some form of mental health problem. A recent study has estimated that 10.7 per cent of the US population aged 12-17 years had at least one major depressive episode in 2013 (9.7 per cent in 2012). The Second Australian Child and Adolescent Survey of Mental Health and Wellbeing showed that 2.8 per cent of children and adolescents aged 4-17 years were assessed as having major depression in the previous 12 months. In other studies, deliberate self-harm occurred sometime during adolescence in approximately 16 per cent of the population. Young people who have been through difficult circumstances or feel marginalised by society are particularly at risk.

While awareness of depression in young people has grown significantly over the past decade, it is still not always identified. Even when it is detected, young people may not receive all the help they need to recover and stay well. Managing depression can be particularly hard for young people who have other mental or physical health problems such as alcohol and drug problems, a disability or a chronic illness. These groups are also at higher risk of suicide along with those who experience bullying, family stress or have had close contact with someone who has suicided.

Adolescents may attempt suicide in an impulsive way with little apparent planning, which poses a further challenge for prevention.

Snapshot

- There were 25 deaths from suicide in adolescents aged 13-17 years in Victoria in 2012 which includes 22 deaths in the 15-17 year age group. This number reduced in 2013 to 14 deaths, with 13 occurring in the 15-17 year age group.
Figure 25. Rates of youth suicide, Victoria 2005-13

Good practice points

- Any young person, who consults with a health professional, should have their emotional health and wellbeing assessed (as well as any substance abuse issues) as part of routine preventative healthcare.
- Health services must implement support structures that enable health professionals to seek advice/referral in regards to adolescents at risk.
- At risk adolescents need regular review and engagement with appropriately skilled primary care and mental health professionals. Emergency services also need to respond when requested.
- Where a health service believes it does not have the capacity to support adolescents at risk, referral and liaison with specialised adolescent mental health services must be undertaken.
- Mental health services must develop and implement strategies to ensure that at-risk adolescents are reviewed regularly and attend scheduled patient engagements. Where an at-risk adolescent misses a scheduled appointment, structures need to be in place, which allow the health service to follow up with an appropriate course of action.
- Threats of suicide need to be taken seriously by all community, educational and health professionals working with young people
- Threats of suicide require specialist mental health assessment.
- At risk adolescents and their families need direct support by responsive professionals in the community, educational and health sectors. Treatment and follow up is an urgent priority.
- Many young people can be supported to share their distress with people (e.g. parents) to help keep them safe. Occasionally, at times of very high risk, professionals are required to break a young person’s desire for confidentiality (around them not wanting to let others know the extent of their distress) in order to keep them safe.
Further information

- The National Youth Mental Health Foundation’s headspace (http://www.headspace.org.au/) provides general health advice, mental health and counselling services, education, employment, alcohol and other drug services for adolescents and young people aged 12 – 25 years. It also provides resources for health services and professionals who work with young people, which may assist in the management of self-harm.

Support is available for those who may be distressed by phoning:

- Kids Helpline 1800 551 800, or
- Lifeline 13 11 14, or
- beyondblue 1300 22 4636.
7.4 Asthma

Asthma accounted for over five per cent of all deaths in the 1 – 14 year age group in 2012. While deaths have not continued at this rate in 2013 and 2014, there is a need for ongoing diligence in ensuring childhood asthma is well controlled. Early and adequate response to acute asthma attacks is vital for saving lives.

Asthma affects 11 per cent of the Australian population and is one of the most common causes of hospital admission and visits to the doctor for young children. The highest rate of hospital separations (admissions) for asthma is the age group of 0 – 4 years, followed by children 5 – 14 years. Hospital admissions due to asthma are also higher for those who live in socioeconomically disadvantaged areas compared with those living in the least socioeconomically disadvantaged areas.

The aim of good asthma management is to ensure that children can lead a normal healthy life while taking only as much medication as is needed to keep them well and to avoid asthma attacks. A documented asthma plan is considered to be an essential aspect of treatment to ensure a shared understanding of asthma symptoms, the approach to treatment and what to do in an emergency. Children and family services as well as schools play an important role in supporting children with asthma.

Recent data from the 2014-2015 National Health Survey research show that only 28 per cent of Australians with asthma have a written asthma action plan.

Compliance with an asthma plan by children and ensuring all those responsible (for supervising and caring for children) understand the triggers and emergency response can be a challenge across the ages.

**Snapshot**

- There were six deaths from asthma in children aged 1 – 14 years in 2012. There were no deaths due to asthma in 2013 in this age group (however there was one death in the 15 to 17 year age group).
- Asthma deaths were associated with:
  - suboptimal management, including emergency management by carers
  - poor adherence to treatment and prevention
  - care provided by people unfamiliar with the emergency management of the child’s asthma.
Good practice points

- Children and adolescent asthma plans should be reviewed regularly and encompass asthma control, medication review, education and understanding of emergency care.
- Clinicians are required to create asthma plans that can be easily followed by adolescents and in the case of children, their families and carers.

Messages for consumers

- Adolescents with growing autonomy and independence need to be able to manage their asthma and be aware of symptoms suggesting deterioration. They need assistance from their parents, carers and health professionals to ensure they have a full understanding of regular and emergency care of their asthma.
- Carers of children with asthma who also have a history of anaphylaxis need to be able to confidently manage both their asthma and their anaphylaxis.

Further information

7.5 Severe food allergies (food-related anaphylactic deaths)

Deaths from food related anaphylaxis in Australia are most common in teenagers and young adults.

While most food allergies begin in childhood, they may arise at any age. While every precaution should be taken to ensure children are not exposed to food allergens, this is not always possible. It is therefore essential that members of the community are able to effectively identify and manage anaphylaxis.

Snapshot

- There were two deaths from food related anaphylaxis in both 2012 and 2013.
- Deaths from food-related anaphylaxis over the last 10 years (2004-13) reviewed by CCOPMM occurred in the following circumstances:
  - ingestion of food that was not prepared in the home, where the list of ingredients had not been assessed prior to consumption
  - failure to recognise the symptoms of anaphylaxis, leading to delays in management
  - mistakenly treating and managing the event purely as asthma
  - failure to carry an adrenaline auto-injector when away from home
  - failure to administer adrenaline via auto-injector for fear of having the wrong diagnosis, or when the child was resisting its administration.
  - co-existent asthma, especially if poorly controlled
  - exercise after allergen exposure.

Good practice points

- Children with anaphylaxis need to have regular review with their medical practitioner, and together with their families and regular carers, need to have ongoing education and reinforcement of the avoidance of triggers, and the recognition and emergency management of anaphylaxis
- The early administration of adrenaline is essential in the management of anaphylaxis.
- All children who have suffered anaphylaxis should be admitted to an emergency department or short stay unit, for four to six hours of observation.
Messages for consumers

- Families and carers should have the skills and confidence to administer the auto-injector at the first sign of anaphylaxis, even when there is resistance from the child.
- In the event a carer is unable to determine whether a child is suffering from asthma or anaphylaxis, an adrenaline auto-injector should be administered in the first instance, followed by any medication listed within the emergency management plan.
- A past history of food allergy is not a contraindication to exercise, however children who have had an acute (non-anaphylactic) allergic reaction to food should be advised to minimise exertion in the 2–4 hours after the allergic reaction to minimise the risk of anaphylaxis.

Further information

- All Victorian schools, with students enrolled who have been diagnosed as being at risk of anaphylaxis, are required to develop and implement an Anaphylaxis Management Policy, that meets the legislative and policy requirements of Ministerial Order No. 706: Anaphylaxis Management in Victorian Schools.
8. Council functions and audit methods

8.1 About the Consultative Council on Obstetric and Paediatric Mortality and Morbidity

CCOPMM was established in 1962 under the Health Act 1958 and now functions under the Public Health and Wellbeing Act 2008 (the Act).

CCOPMM is the advisory body to the Minister for Health on maternal, perinatal and paediatric mortality and morbidity. It consists of 12 members appointed by the Minister and four substantive Sub-committees:

- Maternal Mortality and Morbidity Sub-committee
- Stillbirth Sub-committee
- Neonatal Mortality and Morbidity Sub-committee
- Child and Adolescent Mortality and Morbidity Sub-committee

CCOPMM works closely with the Department of Health and Human Services in its role to advise on strategies to reduce avoidable mortality and morbidity.

The Clinical Councils Unit within the Health Service Programs Branch, Health Service Performance and Programs Division, Department of Health and Human Services manages and supports the work programs of CCOPMM and two other Consultative Councils.

Functions of CCOPMM

Under the Act, the functions of CCOPMM are to:

a. Conduct study, research and analysis into the incidence and causes in Victoria of maternal deaths, stillbirths and the deaths of children;

b. Conduct study, research and analysis into the incidence and causes of obstetric and paediatric morbidity;

c. Conduct a perinatal data collection unit for the purpose of –

i. collecting, studying, researching and interpreting information on and in relation to births in Victoria;

ii. identifying and monitoring trends in respect of perinatal health including congenital anomalies and disabilities;

iii. providing information to the Secretary on the requirements for and the planning of neonatal care units;

iv. providing information for research into the epidemiology of perinatal health including congenital anomalies and disabilities; and

v. establishing and maintaining a register of congenital anomalies and disabilities.

d. Provide to health service providers –

i. information on obstetrics and paediatrics; and

ii. strategies to improve obstetric and paediatric care.

e. Consider, investigate and report on any other matters in respect of obstetric and paediatric mortality and morbidity referred to the Council by the Minister or the Secretary;
f. Liaise with any other Consultative Council (whether or not prescribed) on any matter relevant to the functions of the Council;

g. Publish an annual report on the research and activities of the Council;

h. Perform any other prescribed function; and

i. Collect information for the purpose of performing its functions as outlined in the Act.

Members of CCOPMM 2012 and 2013

Consultative Council on Obstetric and Paediatric Mortality and Morbidity

– Professor Jeremy Oats (Chair)
– Dr Virginia Billson
– Dr Mary Anne Biro
– Professor Richard Doherty
– Ms Ann Catchlove
– Dr Jennifer Anderson
– Professor Peter McDougall
– Professor Paul Monagle
– Professor Terry Nolan
– Professor Michael Permezel
– Mr Nicolas Thomas
– Professor Euan Wallace

Stillbirth Mortality and Morbidity Sub-committee

– Professor Euan Wallace (Chair)
– Dr Virginia Billson
– Dr Lisa Begg
– Dr Mary Anne Biro
– Dr Fiona Cullinane
– Ms Patrice Hickey
– Professor Michael Permezel
– Associate Professor Glyn Teale
– Dr Christine Tippett
– Associate Professor Amarendra Trivedi (2012)
– Dr David Simon (2013)
– Professor Jeremy Oats
– Dr Jodie Benson (2013)
– Associate Professor Mark Umstad (2013)
Maternal Mortality and Morbidity Sub-committee
- Professor Jeremy Oats (Chair)
- Dr Virginia Billson
- Dr Fiona Cullinane
- Professor Michael Permezel
- Dr Wendy Pollock
- Dr Andrew Ross
- Associate Professor Louise Kornman (2012)
- Dr Craig Walker
- Professor Euan Wallace
- Dr Matthew Lynch
- Associate Professor Mark Umstad (2013)
- Dr Dennis Handrinos (2013)
- Dr Malcom Barnett (2013)

Neonatal Mortality and Morbidity Sub-committee
- Professor Peter McDougall (Chair)
- Dr Virginia Billson
- Dr Fiona Cullinane
- Dr Sue Jacobs
- Dr Andrew Watkins
- Dr Alexis Shub (2012)
- Dr Carl Kuschel
- Professor Jeremy Oats
- Ms Avril McLean
- Dr Sarah Parsons (2012)
- Dr Andrew Ramsden
- Dr Elizabeth Carse (2012)
- Dr Michael Stewart
- Dr Mark Tarrant
- Professor Susan Walker
- Dr Simon Fraser

Infant, Child and Adolescent Mortality and Morbidity Sub-committee
- Professor Terry Nolan (Chair)
- Professor Richard Doherty
- Professor Trevor Duke
- Dr Jenny Proimos
- Professor Jeremy Oats
- Dr Rosemary Lester
- Dr Cathie Rose
- Professor Susan Sawyer
- Professor Frank Shann
- Professor Mike South
- Dr Peter Wearne
- Dr Hubert van Doorn
- Associate Professor Duncan MacGregor
8.2 Collecting and reviewing information on births and deaths

Review of deaths

CCOPMM’s primary role is to review all maternal, perinatal and paediatric deaths in Victoria, determine factors that may have contributed to these deaths, and provide advice and recommendations on effective strategies to address preventable harm. All perinatal deaths (stillbirths and neonatal deaths) from 20 weeks gestation (or 400 grams birthweight if gestation is not known) and all infant and child deaths up to (but not including) the 18th birthday occurring in Victoria are reviewed.

Information is sought from multiple sources including the VPDC, hospital case records, individual doctors and midwives, pathology services, coronial services and the Paediatric Infant Perinatal Emergency Retrieval (PIPER) service. CCOPMM considers the clinical features of each case and classifies the death according to the PSANZ Perinatal Mortality Classification System for perinatal deaths and the International Statistical Classification of Diseases and Health related problems, 10th revision, Australian modification (6th Edition) for all post-neonatal infant, child and adolescent deaths.

In many cases, CCOPMM has multiple sources of information available regarding children (including health, welfare and education records) and may not limit the cause of death classification to the cause of death recorded in post-mortem reports or death certificates alone. In some cases, new information may become available at a later time that leads to a change in the classification assigned to a particular death or group of deaths.

Complex or contentious mortality cases are referred to the specialist Sub-committees of CCOPMM for review. CCOPMM assesses preventability and makes recommendations for improving clinical practice and systems based on the review findings and best available evidence. Avoidable factors cannot always be identified from the information available during case review; therefore the actual number of cases that may have preventable factors could be higher.
Figure 27. CCOPMM case review process

- **Notification of death**
  - State coroner
  - Registry of Births, Deaths and Marriages
  - Health service notifications

- **Review and classification of death**
  - Cases are reviewed and classified by the obstetric perinatal and paediatric epidemiologists based on the cause of death.

- **Case Open**
  - More information is needed from the health care provider in order to classify the death.
  - OR
  - Potential preventable factors are identified (the case is referred to the Chairperson of CCOPMM or to the CCOPMM sub-committees). The case is awaiting findings from the State Coroner.

- **Case closed**
  - Cases with enough information are classified and closed. The classification for each case is recorded.

- **Data validation**
  - Mortality data is validated against birth data.

- **Reporting**
  - A report and recommendations on births and deaths in Victoria is produced on behalf of the CCOPMM.

- **Requests for further medical information**
  - Under the Public Health and Wellbeing Act 2008, health care providers are required to provide CCOPMM with further information.
  - Some cases will be closed and some may need to be referred to sub-committee on the receipt of new information.

- **Referral to sub-committee**
  - Preventable or contributing factors may be identified. Clinical management or system improvement recommendations are developed for consideration by the CCOPMM. The case may be deferred until further information is obtained.

- **Minister for Health**

- **Report Publication**

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**Re-opened case**
A case that receives further information at a later time may need to be re-opened.
Review of births

It is a requirement of the Act that births that occur in Victoria are reported to CCOPMM within a prescribed time period. CCOPMM has statutory responsibility for the VPDC and the Victorian Congenital Anomalies Register (VCAR), formerly known as the Victorian Birth Defects Register. The data collections are managed by the Department of Health and Human Services.

The collections enable the analysis of information in relation to the health of mothers, babies and children in order to contribute to improvements in their health. Information is collected on obstetric conditions, procedures and outcomes, and neonatal morbidity and congenital anomalies relating to every birth in Victoria of at least 20 weeks gestation, or if gestation is unknown, at least 400g birth weight.

Data collected contributes to:

- planning and delivery of Victorian health services
- monitoring the safety and quality of Victorian health services
- informing the community on the safety and quality of maternal and child health care
- research and study on the incidence and causes in Victoria of maternal deaths, stillbirths and the deaths of children
- research on and in relation to births in Victoria
- research into perinatal health, including birth congenital anomalies and disabilities.

The Victorian Perinatal Data Collection (VPDC)

The VPDC was established in 1982 under the Health Act 1958 and consists of socio-demographic characteristics and clinical outcome data on all births occurring in Victorian.

Data is collected from public and private hospitals, birth centres and homebirth practitioners via an electronic extract of their clinical and patient administrative systems submitted to the department via a secure data exchange.


The Victorian Congenital Anomalies Register (VCAR)

CCOPMM has legislative authority for a register of congenital anomalies which provides information for surveillance, research and planning purposes. The VCAR includes suspected or confirmed congenital anomalies. Data is obtained from multiple sources including the VPDC (birth notifications), hospital sources, perinatal death certificates, autopsy reports, cytogenetics reports, maternal and child health nurses, other professionals and other people such as parents. Anyone can notify the VCAR via the CCOPMM website.

Reporting and analysis

The VPDC contributes to the National Perinatal Data Collection (NPDC) managed by the University of New South Wales’ National Perinatal Epidemiology and Statistical Unit (NPESU). The NPESU produces an annual report of Australia’s mothers and babies on behalf of the Australian Institute of Health and Welfare (AIHW) using the NPDC and other data. The VPDC contains additional items to enable more detailed analysis on the health of mothers and babies in Victoria.

CCOPMM supports research that is strategic and targeted at priority areas requiring further evidence. Regulation 10 of the Public Health and Wellbeing Regulations 2009 sets out the circumstances in which CCOPMM is authorised to release data for research purposes. All research requests involving CCOPMM-held data must be submitted to CCOPMM for approval. Research proposals must conform to the National Health and Medical Research Council’s National Statement on Ethical Conduct in Human Research (2007) and a properly constituted Victorian Human Research Ethics Committee must give approval prior to CCOPMMs consideration.

In the public interest, CCOPMM is also authorised to provide information to authorities and interested parties specified under section 41 of the Act.

Further information regarding data and research requests is at the CCOPMM website. The online data request form is available at http://www.health.vic.gov.au/ccopmm/forms.htm.
Figure 28. CCOPMM relationships, accountabilities and role

- **Minister for Health**
  - Policy and program development

- **Department of Health & Human Services**
  - Health Service Programs Branch
  - Secretariat and project support

- **CCOPMM**
  - Maternal Sub-committee
  - Stillbirth Sub-committee
  - Neonatal Sub-committee
  - Child & Adolescent Sub-committee

- **Policy**

- **Advice for service improvement**

- **Birth report**
  - Section 48 PHWB Act
  - Public health services
  - Private health services
  - Private midwives

- **Voluntary notification of congenital anomalies**
  - MCHN
  - Parents
  - GPs

- **Mortality reporting**
  - Section 39/47 PHWB Act
  - Health services
  - Coroner
  - Registry of BDM

- **DHHS Performance Monitoring Framework**

- **National reporting**

- **Annual report and recommendations**

- **Research**

- **Mortality case reviews**

- **Analysis, reporting and tools for system improvement**

- **Data collections and linkages**

- **Advice for service improvement**

- **VPDC**

- **VCAR**

- **Mortality case reviews**
9. References


[17] Monash University Injury Research Institute (2015), Hazard ( Edition No. 79); Hospital-treated assault injury among Victorian women aged 15 years and over due to intimate partner violence (IPV), Victoria 2009/10 to 2013/14


[28] Clark EAS, Silver RM. Long-term maternal morbidity associated with repeat caesarean delivery. AJOG, 2011, S2 10


[41] RANZCOG Green top guideline 64 available at https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg64b/


[54] RCOG Greentop Guideline No 57


[63] AIHW – Asthma in Australia, 2011 with a focus chapter on chronic obstructive pulmonary disease. AIHW, Canberra 2011

[64] AIHW – Asthma in Australia, 2011 with a focus chapter on chronic obstructive pulmonary disease. AIHW, Canberra 2011

Appendix 1: Definitions

Child death
Child death refers to the death of a child occurring after and including the 1st birthday and up to, but not including, the 18th birthday (1–17 years).

Confinements
Confinements refer to the number of women who gave birth to one or more live births and/or stillbirths (regardless of plurality) with a pregnancy of 20 weeks gestation or more.

Congenital anomaly, formerly birth anomaly
A congenital anomaly is any anomaly of prenatal origin, arising from conception or occurring before the end of pregnancy. This includes structural, functional, genetic, chromosomal and biochemical anomalies.

Crude birth rate
The crude birth rate is measured by the number of live births (see definition above) per 1,000 estimated female resident population aged 14–44 years for a given calendar year.

Estimated resident population
The estimated resident population (ERP) is an Australian Bureau of Statistics (ABS) measure of the population based on the concept of residence and refers to all people, regardless of nationality or citizenship, who usually live in Australia, with the exception of foreign diplomatic personnel and their families.

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

Late maternal death
Late maternal death refers to the death of a woman after 42 days but within a year of the birth or termination of the pregnancy. The death may be due to direct, indirect or incidental causes, however indirect and incidental late maternal deaths are not included in the maternal mortality ratio.

Live birth
A live birth is the birth of a child who, after delivery, breathes or shows any evidence of life such as a heartbeat.

Maternal death

For classification of cause of death
For classification purposes, 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 based on direct, indirect or incidental causes, as follows:

- **direct** – the death is considered to be due to a complication of the pregnancy (for example, haemorrhage from placenta praevia)
- **indirect** – the death is considered to be due to a pre-existing or newly diagnosed condition aggravated by the physiological or pathological changes of pregnancy (for example, deterioration in pre-existing heart disease or diabetes). Deaths consequent on psychiatric disease are usually categorised as indirect, except for puerperal psychosis, which is classified as direct
• **incidental** – the death is considered unrelated to pregnancy (for example, passenger in motor vehicle accident).

• **late maternal death** – when the death occurs after 42 days but within a year of the birth or termination of pregnancy.

**For calculating the maternal mortality ratio**

The World Health Organization (WHO) defines maternal death as ‘the death of a woman during pregnancy, childbirth or in the 42 days of the puerperium, irrespective of the duration and site of the pregnancy, from any cause related to, or aggravated by, the pregnancy or its management’. This WHO definition allows for identification of maternal deaths as either direct or indirect only. It includes deaths from abortion and ectopic pregnancy, however excludes incidental deaths from causes unrelated to pregnancy, such as deaths from injury or malignancy. The WHO definition is used by CCOPMM to calculate the maternal mortality ratio.

**Perinatal death**

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

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

For international comparison and as recommended by WHO, only fetuses and infants of at least 1,000g birth weight, or where birth weight is unavailable, the corresponding gestational age (28 weeks) or body length (35 cm crown–heel) are included in the perinatal mortality ratio.

**Post-neonatal infant, child and adolescent deaths**

These deaths are classified under the following categories:

• determined at birth
• SUDI, including SIDS
• unintentional injury
• acquired disease
• intentional injury
• undetermined.

**Standardised mortality ratio**

This is 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**

A stillbirth is defined as the birth of an infant of at least 20 weeks gestation or, if gestation is unknown, weighing at least 400g, 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 into explained SUDI and unexplained SUDI and can include deaths related to:

- unexplained
  - SIDS is the sudden unexpected death of an infant < 1 year of age, with onset of the fatal episode apparently occurring during sleep
  - unclassified sudden infant death (USID), with or without autopsy
  - undetermined
- explained
  - suffocation while sleeping (including asphyxiation by bedclothes and overlaying)
  - infection, metabolic disorders, congenital anomalies, genetic conditions
  - other – for example non-accidental injury.

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

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

Category IA SIDS

Category IA includes deaths that meet the requirements of the general definition and also all of the following requirements.

Clinical

- > 21 days and < 9 months of age
- normal clinical history including term pregnancy (gestational age ≥ 37 weeks)
- normal growth and development
- no similar deaths among siblings, close genetic relatives (uncles, aunts or first degree cousins) or other infants in the custody of the same caregiver.

Circumstances of death

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

Autopsy

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

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

Category II SIDS
Category II includes infants that meet category I except for ≥ 1 of the following.

Clinical
- age range outside that of category IA or IB (that is 0–21 days or 270 days [9 months] through to first birthday)
- similar deaths among siblings, close relatives or infants in the custody of the same caregiver that are not recognised suspect for infanticide or recognised genetic disorders
- neonatal or perinatal conditions (for example those resulting from preterm birth) that have resolved by the time of death.

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

Autopsy
- abnormal growth or development not thought to have contributed to death
- marked inflammatory changes or 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 SIDS, but for which alternative diagnoses of natural or unnatural conditions are equivocal, including cases where autopsies were not performed.

Post-resuscitation cases
Infants found in extremis who are resuscitated and later die (‘temporarily interrupted SIDS’) may be included in the aforementioned categories, depending on the fulfilment of relevant criteria.
Appendix 2: Measures of obstetric and paediatric mortality and morbidity

Maternal mortality ratio (MMR)

The MMR is defined as follows:

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

The MMR excludes late maternal deaths.

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

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

Perinatal mortality rate (PMR)

The PMR is calculated as stillbirths and neonatal deaths per 1,000 total births (stillbirths and live births). For CCOPMM statistics, the rate refers to all births of at least 20 weeks gestation or, if gestation is unknown, of birth weight of at least 400 g. However, for purposes of continuity, PMR of infants of ≥ 500 g or, where the birth weight is unknown, of at least 22 weeks gestation, is also presented (PMR500). For international comparisons, the rate refers to all births of at least 1,000 g birth weight or, when the birth weight is unknown, of at least 28 weeks gestation and neonatal deaths occurring within seven days of birth (recommended by WHO).

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

Neonatal mortality rate (NMR)

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

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

Stillbirth rate

\[
\text{Stillbirth rate} = \frac{\text{number of stillbirths} \times 1,000}{\text{total (stillbirths + live births)}}
\]
Infant mortality rate (IMR)

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

Deaths during the neonatal period of infants born as the result of termination of pregnancy for congenital anomaly or other reasons, such as CMV or maternal conditions, are excluded from the IMR calculation.

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