Office of the Chief Coroner
Province of Ontario

Obstetrics and Perinatal Death Review Committee (OPDRC)

OPDRC Annual Report

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Table of Contents

This report was prepared by Dr. Louise McNaughton-Filion,
Chairperson of the Obstetrics and Perinatal Death Review Committee (OPDRC),
Naomi Kasman – Lead Epidemiologist of the OPDRC
Kristen Wong – Executive Lead – Committee Management.

Introduction

Message from the Chair

The Obstetrics and Perinatal Death Review Committee (OPDRC) (formerly the Maternal Perinatal Death Review Committee (MPDRC)) has been providing expert advice to inform coroner investigations in Ontario since 1994. Although we will be sharing with you the results of our work in 2021 to 2022, this year is our 30th year working together with a goal of death prevention during pregnancy, the postpartum and the newborn period.

Many deaths during pregnancy and postpartum are preventable and some stillbirths and neonatal deaths can provide us with important insights and recommendations to prevent further deaths. Our goal is to review and identify any individual or systemic factors that may be changed, to make effective recommendations to the people and/or institutions who are in a position to make those changes, and inform families, healthcare professionals, institutions, governments and the public at large about important issues relevant to the health and safety of childbearing persons and newborns. Preventing further deaths is a goal that all members of our committee take very much to heart and there has been much change in the past few years to achieve this goal.

Here are some examples of the work being done over the past few years to inform improvements to obstetrical and perinatal health.

- In an effort to serve all childbearing persons in Ontario to the best of our ability, we have expanded our committee to ensure we have the right persons and the right expertise; we have also expanded the deaths reviewed on a mandatory basis to ensure all preventable pregnancy and postpartum deaths are evaluated in a thoughtful manner.

- We have sought out further expertise, in addition to the well-respected and experienced experts in obstetrics, midwifery, perinatal nursing, maternal-fetal medicine, obstetrical anesthesiology, pathology, neonatology and family medicine who have been working with our committee for many years. Experts in obstetrical cardiology, intensive care, public health and health policy have added depth and understanding to our reviews.

- An epidemiologist from the Office of the Chief Coroners Data Analytics, Safety and Health (DASH) Unit and new member of our committee has made our data capture more effective, taking information the Office of the Chief Coroner (OCC) has been gathering and making it truly “Speak for the Dead to Protect the Living” (the motto of the

OCC). We commit to continuous improvement of accurate data capture to help formulate more focused and practical death prevention recommendations.

- We have expanded our review of childbearing persons' deaths to one year postpartum instead of 42 days, as we have seen that preventable deaths related to pregnancy do occur that long after the pregnancy has ended. In addition, due to partnerships with the Office of the Registrar General and our own analytics, we have been able to more fully and completely review all deaths that have occurred during this time period.

Death review requires partnerships in order to improve overall obstetrical health. Representatives from the Society of Obstetricians and Gynaecologists of Canada (SOGC) have been instrumental in guiding the OPDRC on collaborative efforts to promote positive changes in obstetrics across not only Ontario, but also Canada. Partnerships are being developed with obstetrical death review committees from other provinces and territories, with Better Outcomes Registry and Network (BORN), and the Canadian Obstetric Survey System (CanOSS).

In the past 10 years, the committee has reviewed a total of 244 cases and generated 379 recommendations towards the prevention of stillbirths and deaths involving mothers and neonates. In 2021 - 2022, 48 cases were reviewed and 87 recommendations were made. The top areas of concern identified in recommendations made in 2021 - 2022 related to *Policy, Procedure and Guidelines* and *Education, Training and Resources*.

Obstetrical health does not exist in a vacuum. It is recognized that systems and overall population health have an impact on the wellbeing of those who are pregnant or postpartum. On review, we have seen a significant number of deaths related to substance use, mental health concerns, socioeconomic and other systemic issues, which we hope to share in this report and future ones. The prenatal and postpartum period may have unique opportunities to prevent death and improve health and wellbeing related to these identified issues.

We have looked at individual and systemic issues in health care provided in prenatal, labour and delivery and the postpartum, including the recognition of cardiac illness, sepsis, and postpartum hemorrhage, amongst other illnesses. One aspect we have not tracked accurately is racial identity, as well as socioeconomic factors which can affect health. We have committed ourselves to tracking this and other important information in future iterations of our annual report.

As mentioned previously, we have initiated partnerships across Canada and look forward to learning and sharing data and information with obstetrical death review committees across our country, as well as other persons and groups with varying perspectives and insights. It seems a

strange thing to state, but it is an exciting time in obstetrical death prevention, as there are so many dedicated persons mobilized to address this very important issue.

This report does not include the full, redacted reports that together provided the information we are sharing with you. If you would like to obtain copies of these reports, to better understand the recommendations and data, please contact occ.inquiries@ontario.ca. They will be available in both English and French. It is the hope of this committee that these reports may be used to educate and help improve obstetrical care.

It is an honour and privilege to Chair the work of the OPDRC. I am grateful for the commitment of its members to the people of Ontario. Their thoughtful reviews and discussions raise, highlight and document the issues we must address. Thank you to the Office of the Registrar General for working with us to obtain the provincial baseline data we needed. Coroners of Ontario, your diligence in connecting with families, conducting thorough investigations and providing the level of detail needed to make this data meaningful is much appreciated. Pathologists of the Ontario Forensic Pathology Service (OFPS), your careful and professional assessment of many of these deaths paved the way to our better understanding of the issues. I would also like to acknowledge the assistance of Ms. Naomi Kasman, epidemiologist from the DASH Unit supporting our committee and Ms. Kristen Wong, Senior Policy and Program Advisor, Executive Lead for the OPDRC. Without their data analysis and organizational expertise, the reviews and this report would not be possible. And finally, I would like to send a thank you to our many partners in obstetrical health, education, government, oversight bodies, non-governmental agencies, for your collaboration with us. Together, we can explore new and better ways to make meaningful recommendations to prevent further deaths.

It is my privilege to present to you the 2021– 2022 Annual report of the OPDRC.

Committee Membership (2021 – 2022)

Dr. Jon Barrett
Maternal Fetal Medicine

Dr. Jocelynn Cook
Society of Obstetricians and Gynaecologists of Canada – Chief Scientific Officer

Dr. Sharon Dore
Society of Obstetricians and Gynaecologists of Canada Representative

Dr. Michael Dunn
Neonatologist (Level 3)

Dr. Karen Fleming
Family Physician (Level 3)

Dr. Steven Halmo
Obstetrician (Level 2)

Ms. Susan Heideman
Perinatal Nurse

Dr. Robert Hutchison
Obstetrician (Level 3)

Dr. Sandra Katsiris
Anesthesiologist

Ms. Michelle Kryzanauskas RM
Midwife (Rural)

Dr. Dilipkumar Mehta
Neonatologist (Level 2)

Ms. Linda Moscovitch RM
Midwife (Urban)

Dr. Toby Rose
Forensic Pathologist

Dr. Gillian Yeates
Obstetrician (Level 1)

Dr. Louise McNaughton-Filion
Chairperson
Regional Supervising Coroner

Elizabeth Colonna
Executive Lead

Kristen Wong
Executive Lead

Naomi Kasman
Epidemiologist Lead

Terms of Reference (TOR)

Mission

The mission of the Obstetrics and Perinatal Death Review Committee (OPDRC) (previously known as the *Maternal Perinatal Death Review Committee)* is to identify factors contributing to deaths in pregnancy and the postpartum, as well as selected stillbirths and neonatal deaths, to inform recommendations to improve population health and clinical interventions that may enhance systems of care and prevent further deaths.

Purpose

The purpose of the OPDRC is to assist the Office of the Chief Coroner (OCC)/Ontario Forensic Pathology Service (OFPS) in the investigation, review, and development of recommendations towards the prevention of further deaths in pregnancy and in the perinatal period. The committee will review all deaths of persons occurring during pregnancy and the post-natal period. Any death of a person previously pregnant up to 365 days post-delivery will be referred to the committee. If the cause of their death is directly related or possibly related to the pregnancy or a complication of the pregnancy, the death will be further reviewed, and data collected and assessed.

The committee will review stillbirths and neonatal deaths where the family, coroner or Regional Supervising Coroner have concerns about the care that the childbearing person or infant received, or the circumstances/contributing factors surrounding the stillbirth or death.

Definitions regarding pregnant persons, stillbirth and neonatal deaths

The Obstetrics and Perinatal Death Review Committee reviews all deaths of pregnant persons in Ontario and some stillbirths and neonatal deaths.

Deaths of pregnant persons are classified by the following criteria:

- Ante-partum — The period of gestation, before delivery
- Intra-partum — during delivery or immediately following delivery
- Postpartum — < 42 days following delivery
- Late postpartum deaths — 42 days up to 365 days following delivery

Stillbirth is defined as the complete expulsion or extraction of a product of conception either after the 20th week of pregnancy or after the product of conception has attained the weight of 500 grams or more, and where after such expulsion or extraction there is no breathing, beating of the heart, pulsation of the umbilical cord or movement of voluntary muscle.

Neonatal deaths are defined as deaths within the first seven days after birth (early neonatal deaths).

Objectives

1. To assist coroners in the Province of Ontario in the investigation of stillbirths, deaths of pregnant persons and neonatal deaths and to make recommendations to inform the prevention of further deaths.
2. To provide expert review of the care provided during pregnancy, labour and delivery, and the care provided to pregnant persons and neonates in the postpartum period.
3. To provide expert review of the circumstances surrounding all deaths of pregnant persons in Ontario, with the goal of identifying the underlying causes of deaths of pregnant persons, including identification of those that may be preventable.
4. To inform doctors, midwives, nurses, institutions providing care to pregnant and postpartum persons and early neonates, and relevant agencies and ministries of government about practices and products of concern, identified during death reviews.
5. To produce an annual report available to doctors, nurses, midwives and other relevant stakeholders providing care to pregnant persons and infants, and hospital departments of Obstetrics, Midwifery, Pediatrics, Diagnostic Imaging, Anesthesia and Emergency for the purpose of helping to prevent further deaths.
6. To help identify systemic issues, problems, gaps, or shortcomings of each death to facilitate appropriate and timely recommendations for prevention.
7. To help in the early identification of trends, risk factors, and patterns from the deaths reviewed and/or data collected to make recommendations for effective intervention and prevention strategies.
8. To conduct, promote and support relevant research where appropriate.
9. To stimulate and promote educational activities through the recognition of systemic issues or problems and/or:
    - referral to appropriate agencies for action;
    - where appropriate, assist in the development of protocols with a view to prevention;
    - where appropriate, disseminate educational information.
10. To share data related to stillbirths, pregnant persons and neonatal mortality in a confidential manner with federal, provincial and territorial deaths of pregnant persons review committees and work towards consistent and evidence-based standards.

All of the above described objectives and attendant committee activities are subject to the limitations imposed by the Freedom of Information and Protection of Privacy Act (FOIPPA) and the Coroners Act***.***

Structure and Size

The committee membership will consist of practitioners in the fields of obstetrics, midwifery, family practice, specialty neonatology, community pediatrics, pathology and obstetrical nursing. The membership will be balanced to reflect wide and practicable representation, taking into account geography, culture and all levels of institutions providing obstetrical care including academic health teaching centers, to the extent possible. The Chairperson will be a

Deputy Chief Coroner or Regional Supervising Coroner, or person designated by the Chief Coroner.

Other individuals will be invited to the committee meetings as necessary on a case-by-case basis (for example, investigating coroner, Regional Supervising Coroner, other specialty practitioner relevant to the facts of the death, etc.).

The committee membership and its composition will be reviewed regularly by the Chairperson of the committee and by the Chief Coroner as requested.

The Strategy, Implementation and Oversight (SIO) Unit within the Office of the Chief Coroner will provide administrative support to the committee.

Limitations

This committee is advisory to the OCC/OFPS death investigation system.

The consensus reports of the committee are limited by the information provided. Efforts will be made to obtain all relevant information.

The committee opinions are subject to the limits imposed on coroner investigations and inquests by the *Coroners Act.*

Members of the committee will not provide opinions outside the death investigation system about deaths the committee has reviewed. In particular, members of the committee will not act as experts at civil trials for deaths which have been reviewed by the committee.

Members will not participate in discussions or prepare reports where they might have a conflict of interest, whether personal or professional.

Medical records, draft and consensus reports and the minutes of the meetings are confidential documents. Meetings of the committee are not open to the public.

Agenda / Meetings

1. The Chairperson shall set the agenda for each meeting.
2. Meetings will be held as necessary in response to deaths requiring review.
3. Minutes and/or notes will be kept and circulated prior to each meeting.

Chairperson Functions:

The Chairperson shall:

- Review all referred deaths to determine need for review by the committee.
- Assign deaths to individual members or external reviewers for review.

- Set the agenda for each meeting.
- Act as Chairperson at each meeting of the committee.
- Ensure minutes are reviewed and provided to members after each meeting.
- Review each draft report of committee members/reviewers to ensure the report reflects committee consensus after death review, presentation, and discussion and to ensure that it meets the requirements of a death investigation without altering the obstetrical, neonatal or pathological information and opinions expressed by the committee.
- Distribute consensus reports to the referring Regional Supervising Coroner.
- Receive information about post report activities related to the death reviewed.
- Perform other duties as requested by the Chief Coroner.
- Prepare an Annual Report.
- Delegate any duties to be executed to the SIO Unit.

Member Functions

Each member of the committee shall:

- Attend the scheduled meetings of the committee.
- Participate in the discussion of the death reviewed.
- Review deaths that are referred to them by the Chairperson.
- Be prepared and present deaths they have reviewed at the next meeting of the committee.
- Prepare a consensus report about the death for the Chairperson to edit and distribute to the requesting Regional Supervising Coroner.
- Act as an expert witness at inquests arising from the deaths the reviewer and/or the committee has reviewed.
- Decline requests to act as an expert witness when deaths reviewed by the committee are the subject of civil litigation.
- Respect confidentiality at all times.

Amendments to the Terms of Reference

The terms of reference can be amended by the authority of the Chief Coroner. Recommendations for amendments may come from the committee.

Access to Reports

Access to Committee reports will be governed by the provisions of the *Coroners Act* and the *Freedom of Information and Protection of Privacy Act*.

Annual Report

The Annual Report of the Obstetrics and Perinatal Death Review Committee will be a public document. The report will be available to hospitals or other institutions providing obstetric care, together with the governing bodies of physicians, midwives and nurses in Ontario and Canada and the public in general.

Data Review

Ontario Data

Over the last 10 years there have been 92 deaths during pregnancy in Ontario, ranging from three to 12 deaths per year (Figure 1). Figure 2 demonstrates that approximately half of these deaths were classified as **Natural**, which includes deaths due to infectious disease, pulmonary conditions (for example, pulmonary emboli), and cardiovascular conditions. The second most common manner of death during pregnancy was **Accident** which was reported for 25% of deaths. Of these accidental deaths, nearly eight out of 10 were the result of drug toxicity.

Figure 1. Number of deaths in Ontario during pregnancy

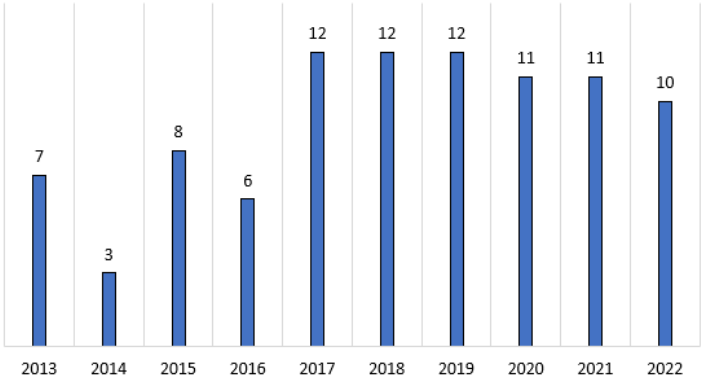
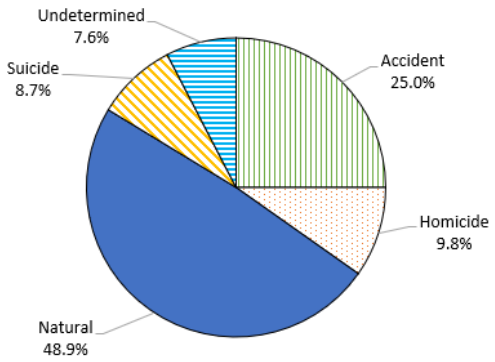


Figure 2. Manners of death in Ontario during pregnancy, 2013-2022



Unlike deaths that occurred during pregnancy which are required to be investigated by a coroner, deaths that occurred postpartum — up to 1 year after delivery — were only reported to the OCC if the death was: recognized to be related to pregnancy; sudden and unexpected; possibly non-natural; or met other criteria in Section 10 of the *Coroners Act*. Therefore, some postpartum deaths in the 2013–2022 period may not have been recognized or reported for investigation. It should be noted that, as of 2023, all postpartum deaths in the year after delivery should be reported to the OPDRC for investigation.

Although the number of postpartum deaths reported to the OCC fluctuates over time, there has been an overall increase over the last 10 years (Figure 3). More than 80% of early postpartum deaths — those which occur within 42 days of delivery — were classified as **Natural** (Figures 4 and 5). Late postpartum deaths — more than 42 days after delivery, and which may not be obviously related to a pregnancy — may only be reported to a coroner under exceptional circumstances and, as a result, natural deaths in the late postpartum period may not have been investigated. Late postpartum deaths were much more likely to be classified as **Suicides** (32%) or **Accidents** (25%) (Figure 6). All of the deaths classified as **Accidents** among this late postpartum group were the result of drug toxicity.

Figure 3. Number of deaths in Ontario during the postpartum period

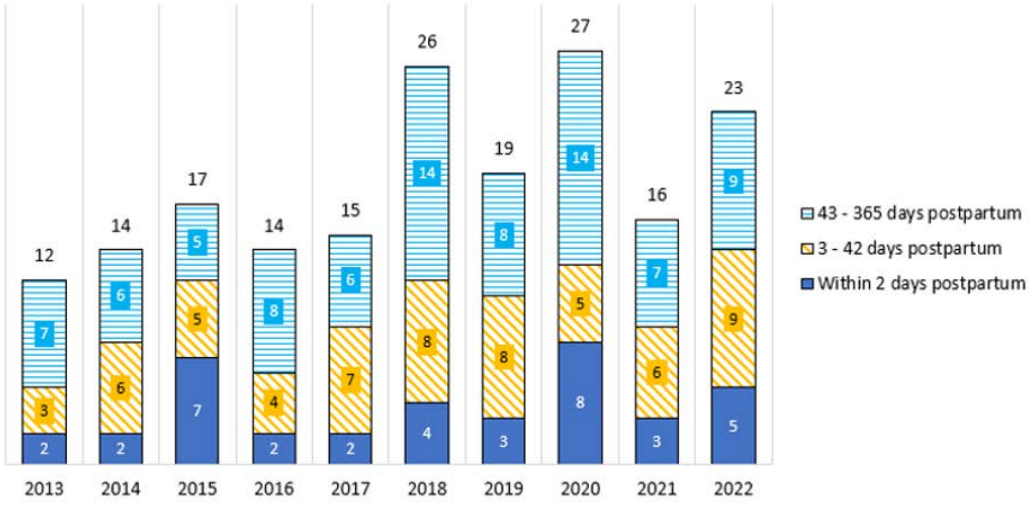


Figure 4. Manners of death in Ontario within 2 days postpartum, 2013-2022

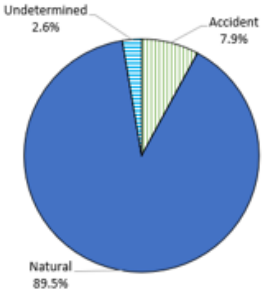


Figure 5. Manners of death in Ontario between 3 and 42 days postpartum, 2013-2022

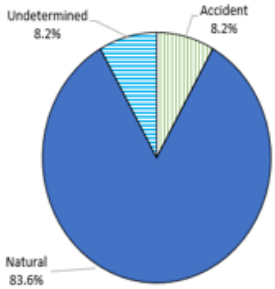
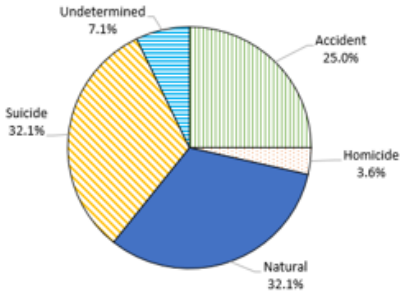


Figure 6. Manners of death in Ontario between 43 and 365 days postpartum, 2013-2022



Other details and common factors related to perinatal deaths are provided in Table 1. These show that deaths during pregnancy and the late postpartum period were more likely to occur in rural areas of the province. As well, nearly one in eight deaths that occurred within two days postpartum received no prenatal care, and late postpartum deaths occurred, on average, seven months after delivery.

Table 1. Factors related to obstetrical deaths investigated by the Office of the Chief Coroner in Ontario between 2013 and 2022

	Pregnancy	Within 2 days postpartum	3–42 days postpartum	43–365 days postpartum
Number of deaths	92	38	61	84
Average deaths per year	9	4	6	8
Average age (range) of birthing parent	31 (17–47)	33 (22–45)	33 (19–45)	31 (19–44)
Length of gestation/ postpartum period	20 weeks gestation	37 weeks gestation	1 month postpartum	7 months postpartum
No prenatal care	6.5%	13.2%	1.6%	1.2%
Rural*	15.9%	5.6%	8.5%	11.7%
Precariously housed	5.4%	2.6%	1.6%	3.6%

*Rurality is based on Statistics Canada's Statistical Area Classification with rural defined as levels 4–7.

Similar to postpartum deaths prior to 2023, not all neonatal deaths or stillbirths require investigation by a coroner. Only those that are non-natural, related to a birthing parent's death, or where there are concerns regarding healthcare are typically reported to the OCC. A comparison of cases reported to the OCC between 2015 and 2019 to those reported by the Office of the Registrar General — which includes all neonatal deaths and stillbirths — showed that approximately 10% of neonatal deaths and 3% of stillbirths were reported to the OCC (Table 2). Although the total number of stillbirths in the province, according to the Office of the Registrar General, is double the number of neonatal deaths, a greater number of neonatal deaths were reported to a coroner.

Table 2. Number of neonatal deaths and stillbirths reported by the Registrar General of Ontario and the Office of the Chief Coroner between 2015 and 2019

	Registrar General of Ontario	Office of the Chief Coroner
Neonatal deaths	1,971	197
Stillbirths	4,083	128

Note: Terminations have been excluded from the Registrar General's counts in order to increase comparability with the OCC.

Over the last 10 years, there have been an average of 40 neonatal deaths and 26 stillbirths reported to the OCC each year (Figure 7). The majority of deaths in both groups were classified as Natural (Figures 8 and 9), which includes deaths resulting from extreme prematurity, congenital disorders, and infectious disease. It should be noted that for stillbirths the official certificate of stillbirth does not contain a manner of stillbirth. Within our data system, the only possible manners of stillbirth are **Natural**, **Undetermined**, and **Accident**, while neonatal deaths (which have a medical certificate of death completed) may also be classified as **Homicides**.

Figure 7. Number of neonatal deaths and stillbirths investigated by the Office of the Chief Coroner in Ontario

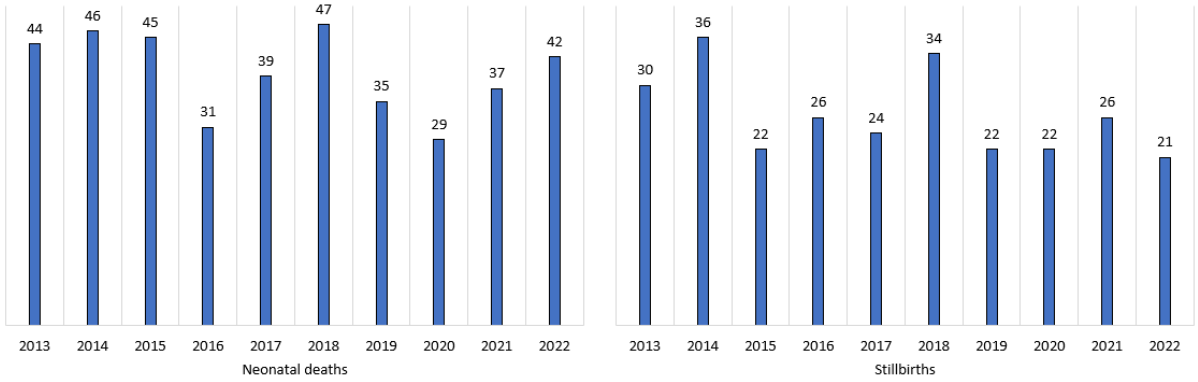


Figure 8. Manner of death in neonates investigated by the Office of the Chief Coroner in Ontario, 2013-2022

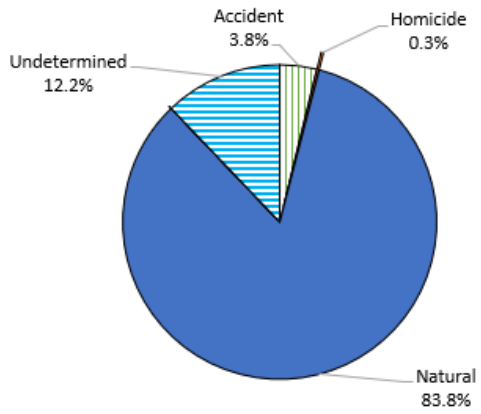
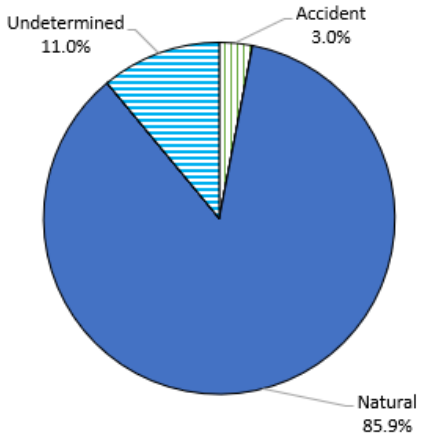


Figure 9. Manner of stillbirth when investigated by the Office of the Chief Coroner in Ontario, 2013-2022



Among both neonatal deaths and stillbirths reported to the OCC, the average birthing parent's age was 30, and the average length of gestation was 34 weeks (Table 3). Differences were seen in the proportion of deaths with no prenatal care and in the proportion of deaths in rural communities, both of which were higher among stillbirths, while neonatal deaths had a higher proportion of cases where a child protection agency was involved with the family.

Table 3. Factors related to neonatal deaths and stillbirths investigated by the Office of the Chief Coroner in Ontario between 2013 and 2022

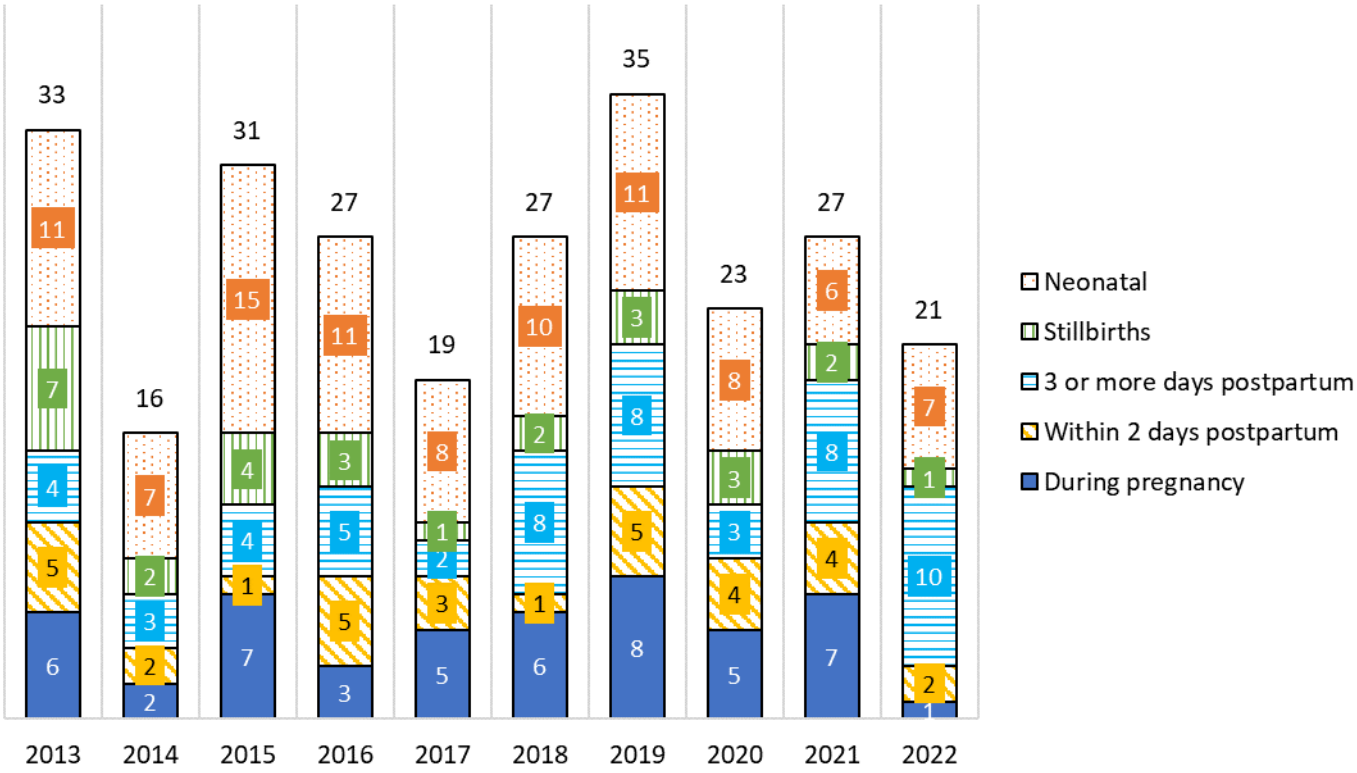
	Neonatal deaths	Stillbirths
Number investigated	395	263
Average investigated per year	40	26
Average birthing parent's age (range)	30 (16–46)	30 (14–46)
Average length of gestation	34 weeks	34 weeks
No prenatal care	8.9%	14.1%
Rural*	16.3%	24.0%
Involvement with child protection agency	19.8%	9.5%

*Rurality is based on Statistics Canada's Statistical Area Classification with rural defined as levels 4–7.

OPDRC Data

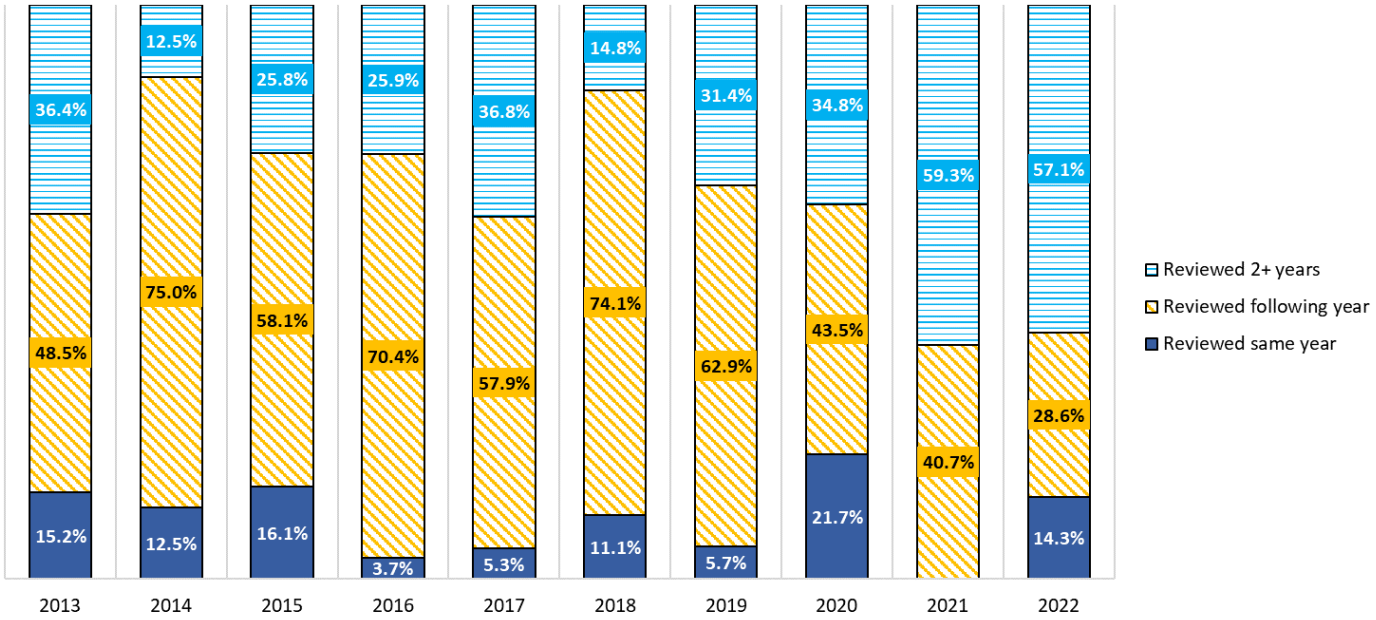
While the previous section describes all obstetrical and perinatal deaths/stillbirths reported to the OCC, this section focuses on deaths/stillbirths selected for review by the OPDRC. The number of deaths/stillbirths reviewed over the last 10 years ranged from 16 in 2014 to 35 in 2019 (Figure 10). While the type of deaths/stillbirths that were reviewed varies by obstetrical category each year, on average, 36% of OPDRC reviews were neonatal deaths (approximately nine cases per year), 32% were postpartum deaths (eight cases per year), 19% were deaths during pregnancy (five cases per year), and 11% were stillbirths (three cases per year).

Figure 10. Number of deaths/stillbirths in Ontario reviewed by the OPDRC by obstetrical category and year of review



The committee aims to review cases in a timely manner. Figure 11 shows that approximately two-thirds of the reviews are completed either the same year or the year following the death/stillbirth. Deaths/stillbirths which require more extensive investigation, or which were not reported to the OCC/OFPS at the time of death/stillbirth, may take longer for a review to be completed.

Figure 11. Distribution of time between deaths/stillbirth and review for all OPDRC cases, by year of review



The deaths/stillbirths reviewed by the OPDRC showed a number of common themes which are presented in Figure 12 for perinatal deaths (meaning during pregnancy and the postpartum period) and Figure 13 for neonatal deaths and stillbirths. Among perinatal deaths, a history of substance use was noted in more than 9% of cases, while substance use in the childbearing parent was identified in 7% of neonatal deaths and stillbirths. Other common factors included previous involvement with a child protection agency (for example, Children's Aid Society) and a lack of prenatal care. In all deaths reviewed, approximately 8% were known to be high risk pregnancies.

Figure 12. Common factors reported in deaths during pregnancy and the postpartum period reviewed by the OPDRC, 2013-2022

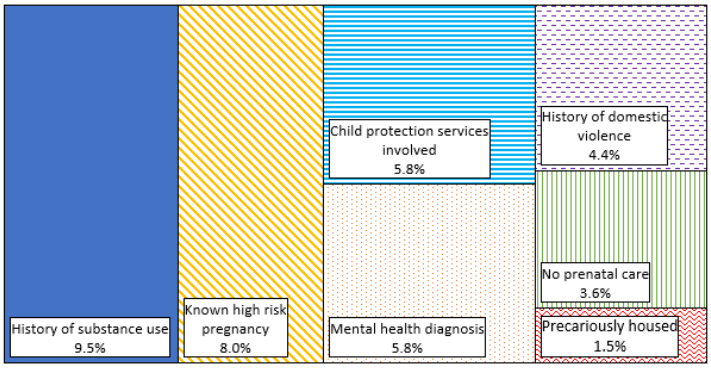
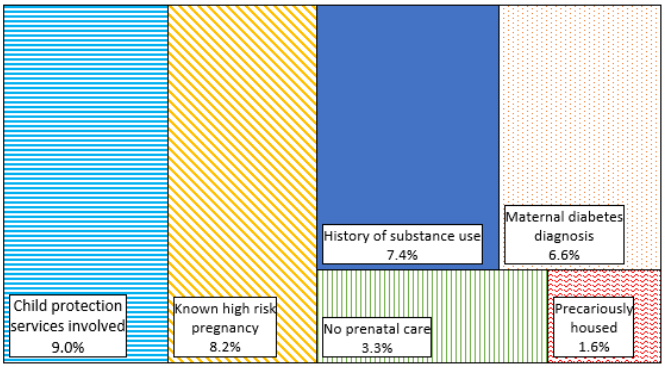


Figure 13. Common factors reported in stillbirths and neonatal deaths reviewed by the OPDRC, 2013-2022

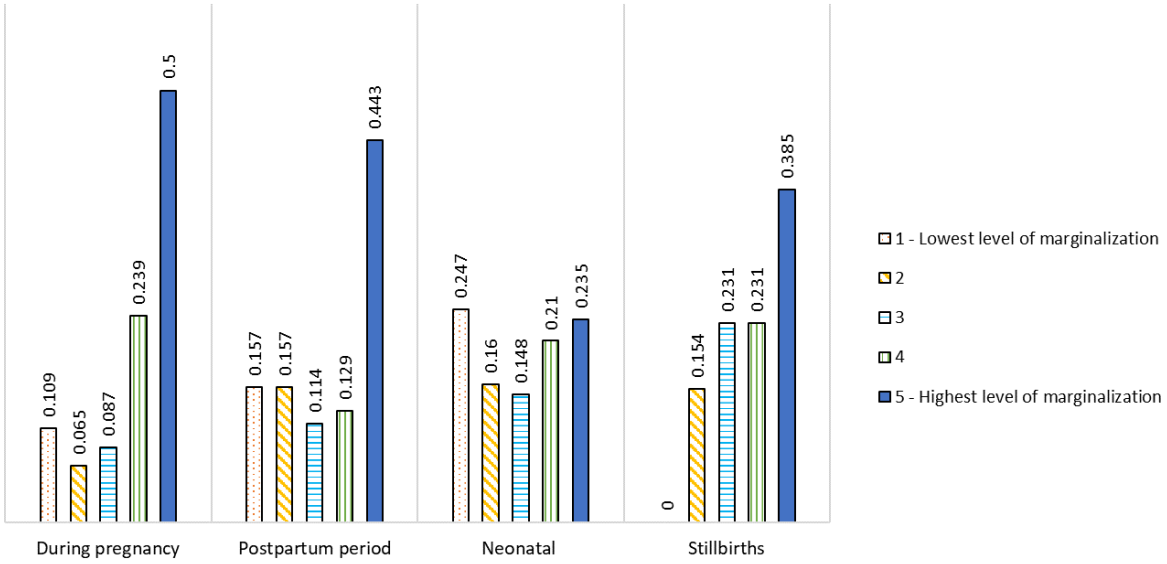


While the OCC does not regularly collect information about the socioeconomic status of individuals whose deaths they investigate, information about the residential neighbourhood where a deceased individual lived can provide insight into the level of marginalization they may have experienced. Public Health Ontario, The Centre for Urban Health Solutions, and St. Michael's Hospital have developed an index which identifies the level of marginalization

associated with a number of metrics based on an individuals' residential geography[1]. The indices are designed so that 20% of Ontarians fall within each quintile, and populations with greater than 20% in our analyses suggest a higher level of deprivation.

Figure 14 demonstrates the distribution of obstetrical deaths by the material resources index, which is closely connected to poverty and refers to the ability of individuals and communities to access and attain basic material needs relating to housing, food, clothing, and education. The results show that among those who died during pregnancy, 50% resided in areas with the highest level of material deprivation. High levels of material deprivation were also seen among deaths during the postpartum period and stillbirths.

Figure 14. Distribution of deaths/stillbirths reviewed by the OPDRC according to the material resources marginalization index, by obstetrical category, 2013-2022



[1] https://www.publichealthontario.ca/en/Data-and-Analysis/Health-Equity/Ontario-Marginalization-Index

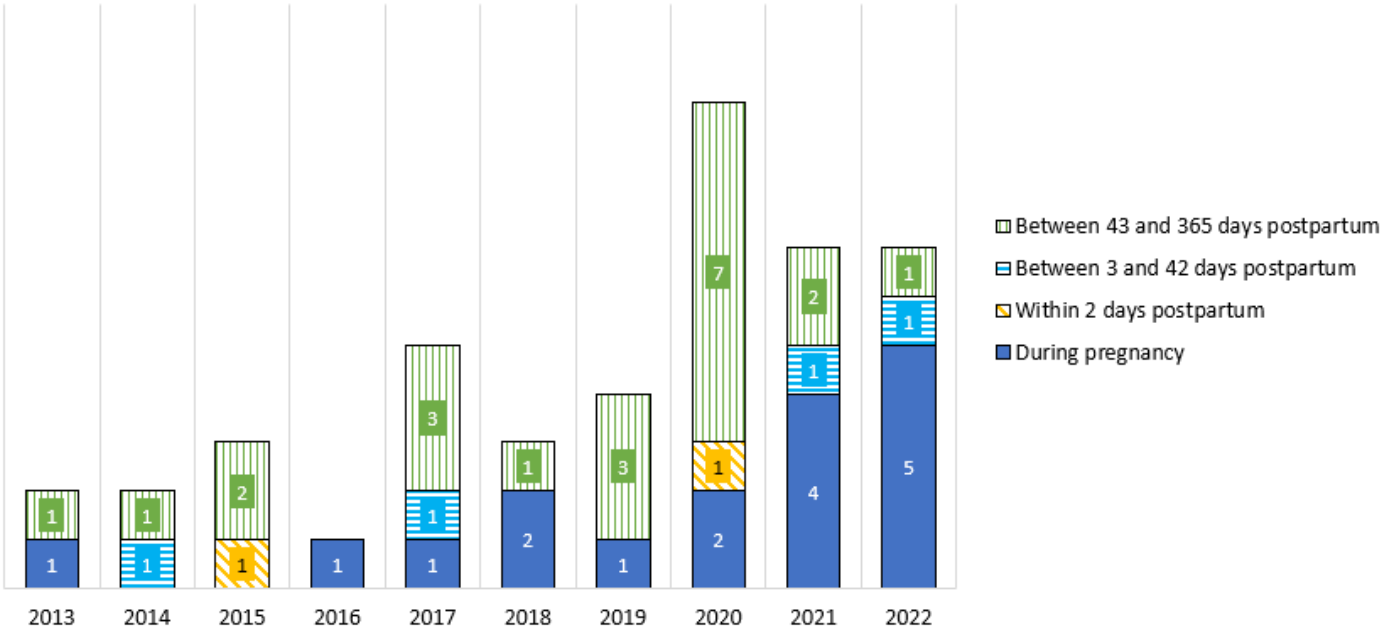
Lessons learned and new discoveries on obstetrical and neonatal deaths and stillbirths

1. Substance use

Current State

Similar to trends seen among the general population, there has been an increase in the number of deaths from drug toxicity among pregnant and postpartum individuals beginning in 2020 (Figure 15). In the most recent two years alone (2021–2022), there have been nine deaths during pregnancy that were the result of accidental drug toxicity[2].

Figure 15. Number of deaths in Ontario due to acute drug toxicity, while pregnant or during the postpartum period



Some key sociodemographics of those who died of drug toxicity while pregnant or during the postpartum period are shown in Table 4, while the frequency of other common factors and experiences are presented in Figure 16. Results show that among those who were pregnant at the time of their death from drug toxicity, the average age was 28 years, and they were 19 weeks into the pregnancy. Nearly one in four reported being precariously housed and one in six had received no prenatal care. Those who died during the postpartum period averaged 29 years of age and were approximately five months postpartum. One in three of these individuals

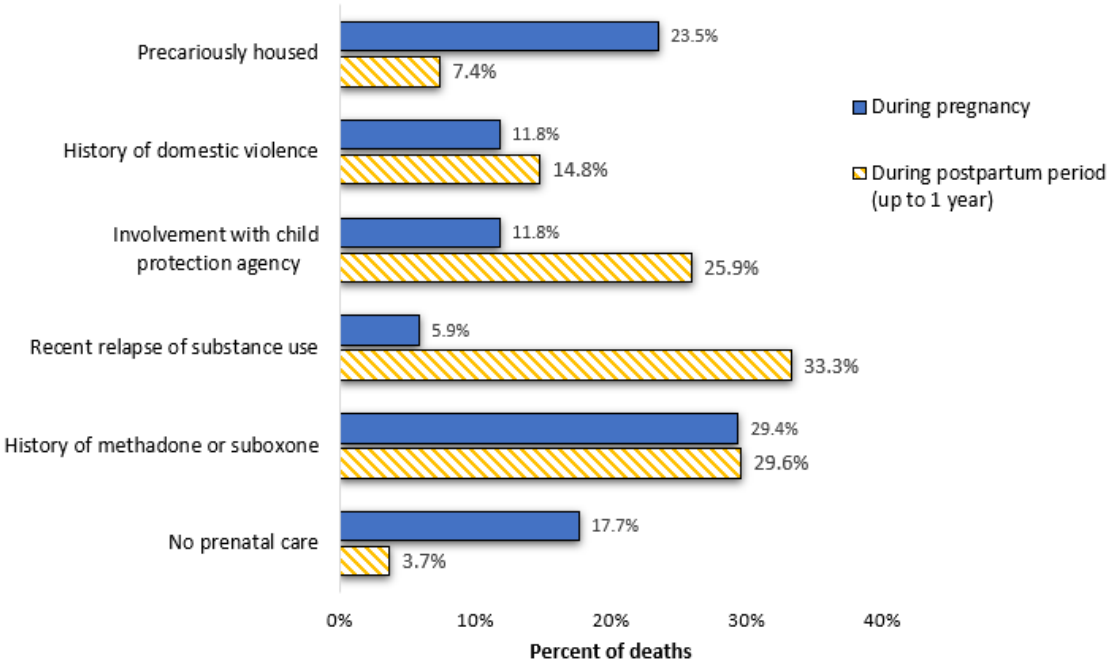
[2]Acute drug toxicity deaths exclude natural deaths resulting from chronic drug use, traumatic deaths where substance use was involved (for example, car accidents following substance use), suicides, and deaths with an undetermined manner.

had recently relapsed in their substance use and one in four had a history of involvement with a child protection agency.

Table 4. Factors related to acute drug toxicity deaths in Ontario during pregnancy or postpartum between 2013 and 2022

	During pregnancy	During postpartum period (up to 1 year)
Total deaths	17	27
Average age of birthing parent	28 years	29 years
Average gestation/postpartum period	19 weeks gestation	5 months postpartum
Percent living in areas with high material deprivation	56.2%	60.9%

Figure 16. Common factors among Ontarians who died from acute drug toxicity while pregnant or during the postpartum period, 2013-2022



Next Steps

In 2024 the OPDRC is initiating a subgroup focused on deaths in pregnancy due to drug toxicity, which will bring together experts in public health, substance use disorder treatment and health care during pregnancy as well as persons with lived experience, with a common goal of analysing these deaths in depth and making recommendations to prevent further deaths.

2. Mental health

Current State

In determining whether the mandate of the OPDRC should be extended beyond the previous limit of 42 days postpartum to one year postpartum, a review of all obstetrical deaths within one year of delivery was completed. One-third of all deaths beyond 42 days postpartum were classified as suicides (shown previously in Figure 6) and there was an average of three suicides per year during the postpartum period (Figure 17).

Figure 17. Number of deaths in Ontario classified as suicides, while pregnant or during the postpartum period

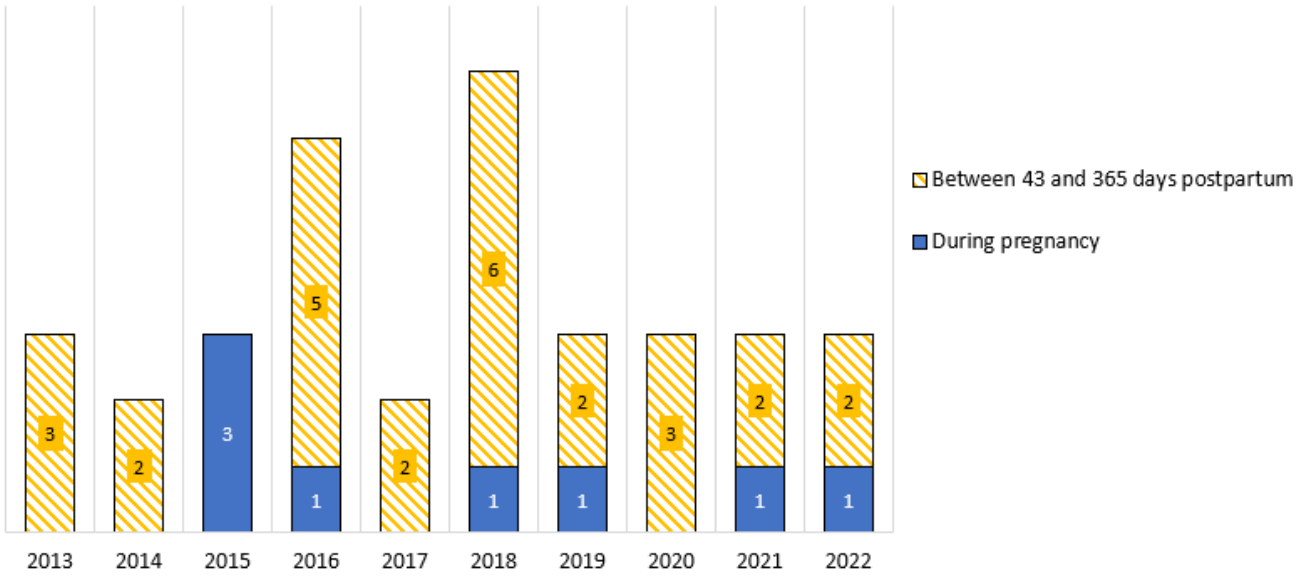


Table 5 shows that those who died by suicide during the postpartum period were approximately five years older than those who died by suicide during pregnancy. Suicides during the postpartum period were also less likely to take place in areas with high material deprivation or in rural locations.

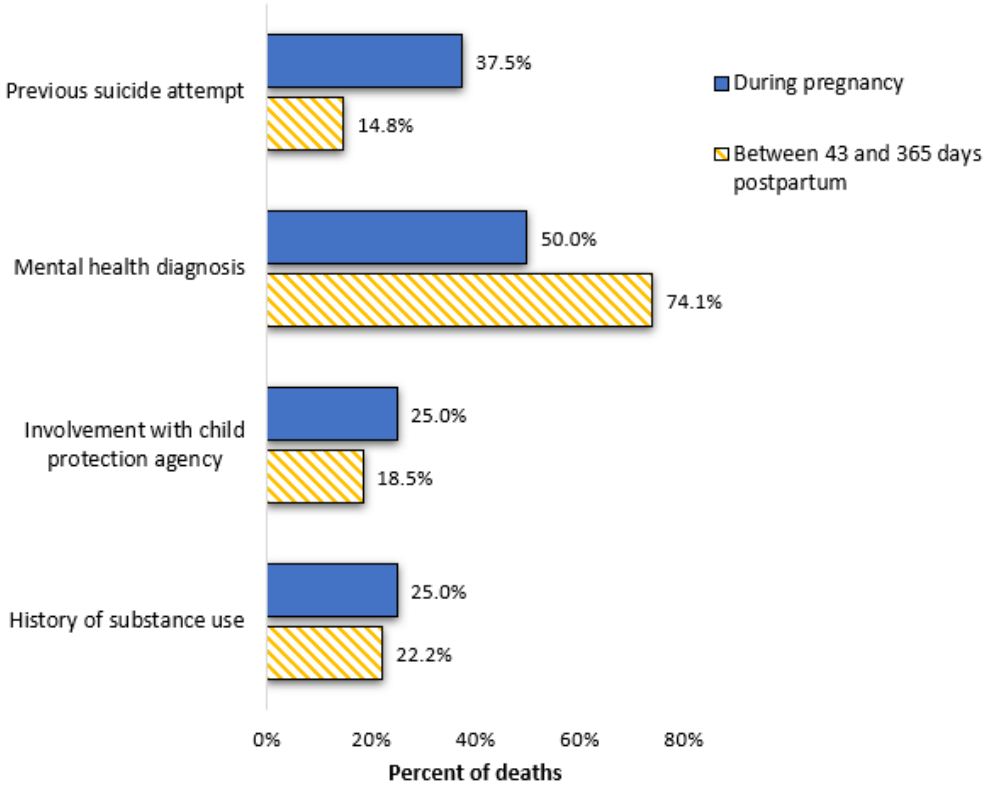
Table 5. Factors related to deaths in Ontario classified as suicides between 2013 and 2022 while pregnant or during the postpartum period

	During pregnancy	During postpartum period (up to 1 year)
Total deaths	8	27
Average age of birthing parent	28 years	33 years
Average gestation/postpartum period	10 weeks gestation	8 months postpartum
Percent living in areas with high material deprivation	33.3%	19.1%
Rural*	37.5%	12.0%

*Rurality is based on Statistics Canada's Statistical Area Classification with rural defined as levels 4–7.

Other differences between those who died by suicide during pregnancy versus during the postpartum period are seen in Figure 18. Of note, there was a larger proportion of those who died during pregnancy who had a previous suicide attempt (38% versus 15% postpartum) and a comparatively lower likelihood of pregnant individuals having received a mental health diagnosis (50% versus 74% postpartum).

Figure 18. Common factors reported among Ontarians whose deaths were due to suicide while pregnant or during the postpartum period, 2013-2022



Next Steps

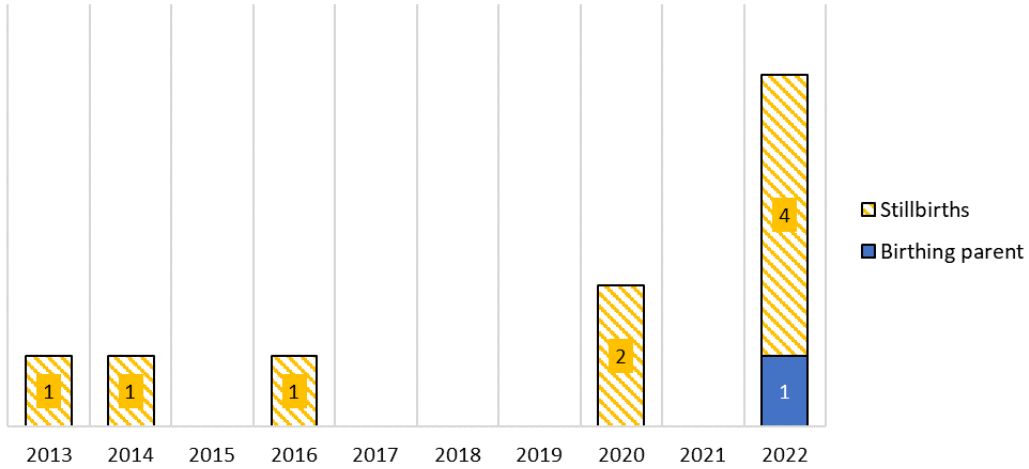
Further analysis of these deaths is necessary. As mandatory referrals of postpartum deaths to the OPDRC have been extended to 365 days after the end of a pregnancy, a more complete picture of these deaths should provide improved insights into this health issue.

3. Unattended births

Current State

The OPDRC review of deaths in 2022 identified an unexpected cluster — deaths/stillbirths occurring in home deliveries where there was no medical professional present (meaning no physician or midwife). This phenomenon — known widely as "freebirth" — involves **intentionally** delivering at home without the help of midwives or physicians. Since 2020, there have been seven deaths/stillbirths related to unattended births which is a marked increase from the previous years, when only three stillbirths were seen between 2013 and 2019 (Figure 19).

Figure 19. Number of deaths/stillbirths in Ontario related to births where the individual elected not to have a medical professional in attendance



Among the 10 deaths/stillbirths related to unattended births in the last 10 years, 30% were the individuals' first delivery and 60% had a designated birthing assistant present who was not recognized as an obstetrical care provider in Ontario. Reasons provided for choosing to have an unattended birth included religious beliefs, previous negative experiences with childbirth, and dissatisfaction with COVID-19 restrictions that were in place at the time, such as masking or vaccination requirements.

While "freebirth" is not a new concept, data provided by the Office of the Registrar General (Figures 20 to 22) show an increase since 2017 — and a steeper incline since 2020 — in the number of births registered in Ontario where no midwife or physician was present. While not all of these birth registrations qualify as "freebirth" situations where a midwife or physician was intentionally excluded — meaning cases where the birth took place in an ambulance or a precipitous home birth would also be included — it is likely that freebirths were a contributing factor.

Figure 20. Number of birth registrations for Ontario residents with a physician present at delivery

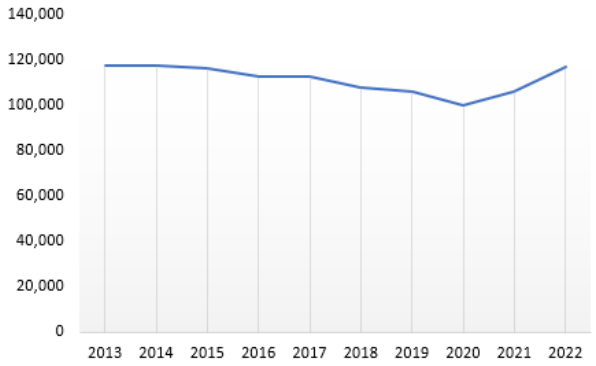


Figure 21. Number of birth registrations for Ontario residents with a midwife present at delivery

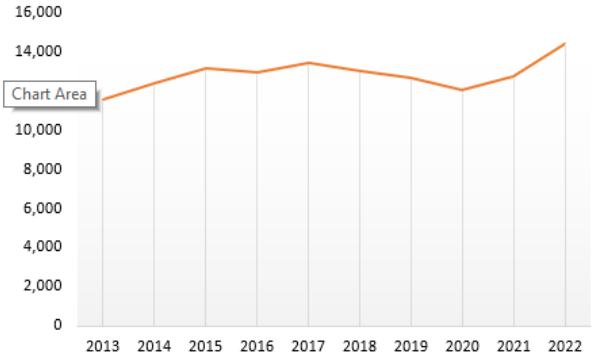
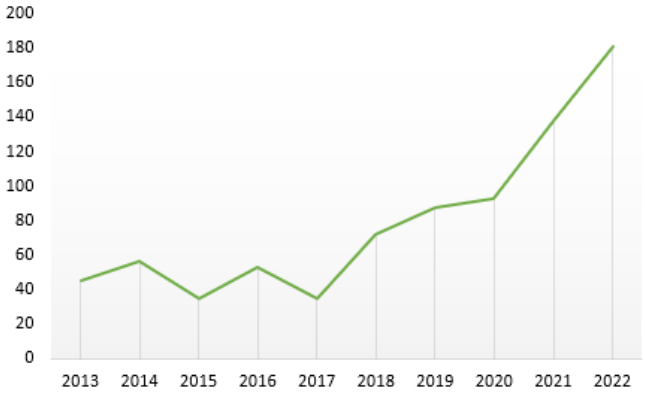


Figure 22. Number of birth registrations for Ontario residents without a physician or midwife present at delivery



Next Steps

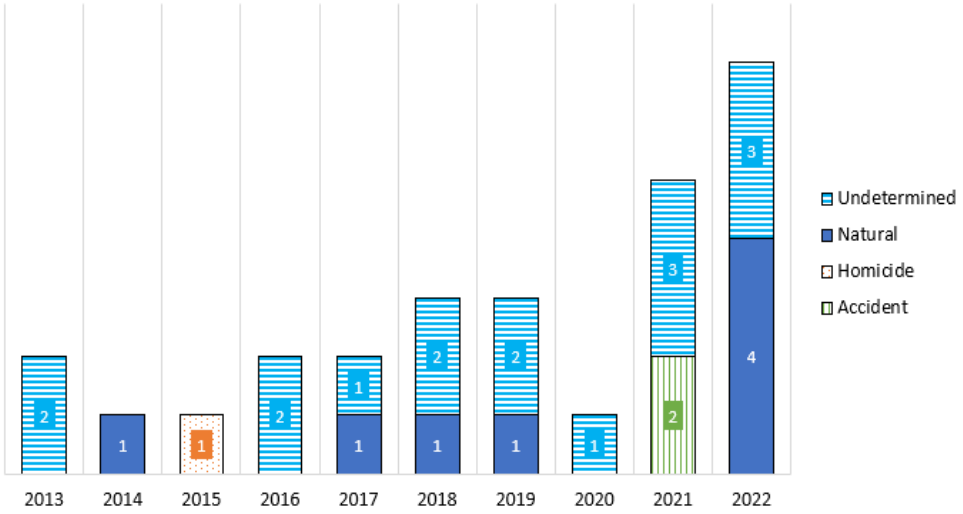
Deaths/stillbirths associated with unattended births are currently being reviewed by the OPDRC. In the interim, there is consensus from the committee that since we have seen an increase in stillbirths and deaths related to "freebirth", the committee strongly supports the attendance of a recognized obstetrical care provider (midwives or physicians) at all births. Further recommendations will follow arising from review of specific deaths.

4. Concealed births

Current State

In the course of the work of Ontario's coroners who are tasked with ensuring that no death will be overlooked, concealed, or ignored, an increase in deaths from concealed births has been recognized. Concealed births occur where there is an unattended delivery, no person other than the birthing person appears aware of the delivery, and no care is sought for the neonate after delivery. These deaths are not included in the unattended births in section 3. A review of these deaths over the last 10 years shows an average of two deaths per year between 2013 and 2020, and six per year, on average, in 2021-2022 (Figure 23).

Figure 23. Number of deaths related to concealed births in Ontario, by manner of death



In cases of concealed births — which were often seen in cases where the pregnancy itself was hidden or unacknowledged — a number of other common factors were reported (Table 6). Of note, more than one in four of the deaths involved a young mother (aged 20 years or younger), one in three deaths involved a history of substance use in the childbearing parent, and one in four were precariously housed, included unhoused individuals. Of note, due to time passed from birth to discovery of the remains, whether the concealed birth was a stillbirth or a neonatal death was sometimes impossible to determine due to decomposition.

Table 6. Factors related to deaths following concealed births between 2013 and 2022

Experiences of the birthing parent	Percent of deaths from concealed births
Aged 20 and under	27.8%
Known history of substance use	33.3%
Resides in an area with high material deprivation	58.3%
Involvement with child protection agency	18.5%
Precariously housed	26.9%
Living with parents	30.8%

Next Steps

Deaths related to concealed births have very little associated information and require tracking by the OPDRC to better understand any trends. Further information and possible recommendations to prevent further deaths may arise from this analysis.

Other important initiatives related to obstetrics and perinatal mortality reduction

Report from the Society of Obstetricians and Gynaecologists of Canada (SOGC)

Submitted by Jocelynn L. Cook, PhD., MBA Chief Scientific Officer

Over the past five years, the Society of Obstetricians and Gynaecologists of Canada (SOGC) has spearheaded initiatives to develop the key elements of a Confidential Enquiry System so that every death during pregnancy in Canada can be comprehensively reviewed, recommendations can be developed for prevention and for supporting healthcare providers and families, and trends and emerging issues can be identified. The enquiry is confidential in the sense that the details of the patient/hospital/involved clinicians remain anonymous to the review team. It is important to note that the process is focused on recognizing excellence in practices, policies and systems as well as gaps and opportunities for prevention.

The goals of these efforts are to increase awareness of the issues surrounding mortality in pregnancy and to promote change among individuals, healthcare systems, and communities in order to avoid **every preventable case of perinatal mortality and optimize outcomes for mother, babies and families**.

This has been a busy year, and we are proud to be making progress toward a better understanding of perinatal mortality in our country. The critical factor has been the recognition of the importance to understand perinatal mortality by healthcare providers, families, and policymakers in all provinces and territories and the commitment and perseverance to develop and implement processes for review in all jurisdictions.

The SOGC has been hosting quarterly meetings of the chairs of the six provincial perinatal mortality review committees in Canada, which functions as a virtual community of practice for support and sharing information and experiences. The participants work together for knowledge translation and dissemination through publications, infographics, presentations, and social media, and to mentor newcomers to the perinatal mortality review process; Ontario's committee chair is an active participant and leader. In 2024, all provinces and territories will participate in the community of practice through regular meetings.

The committee chairs planned and hosted a Summit on the Prevention of Maternal Mortality in Canada which was held in Ottawa in June 2023. The objective was to bring together experts, policy makers, researchers and clinicians to disseminate new knowledge and best practices and to promote networking among researchers, healthcare providers and policy makers across the country. Dr. McNaughton-Filion was a member of the planning committee and shared information and insight from Ontario's experience. She also shared emerging evidence about substance use and suicide as it related to perinatal mortality in Ontario. The outcomes

informed the topics for the second Summit, Education to Action: Preventing Maternal Mortality in Canada, which is being held in Edmonton on June 14th, 2024. Dr. McNaughton-Filion will again be participating as a speaker, bringing Ontario's expertise to the Summit.

The chairs also co-authored a submission to the House of Commons' Standing Committee on Health, *Understanding Maternal Health: A National System for Prevention of Maternal Mortality*, as evidence to be included in their Women's Health Study.

In this way, it has been a pivotal year with the leadership from the chairs of the provincial perinatal mortality review committees who have worked together to identify priorities and gaps as well as to anticipate the needs of provinces and territories who are working hard to move their initiatives forward. It has been rewarding to be a part of the ODPRC as it has expanded its membership, successfully advocated to review perinatal and postpartum deaths out to one year following the end of the pregnancy and synthesized and analyzed data in order to identify trends and to improve quality of data. Ontario's leadership is strong and the SOGC is grateful for our partnership and all that will come.

The Canadian Obstetric Survey System (CANOSS)

Submitted by Dr. Isabelle Malhamé MD and Dr. Rohan D'Souza MD

The Canadian Obstetric Survey System (CanOSS) initiative aims to create a network of all facilities providing pregnancy care across Canada and enable these facilities to identify all serious adverse pregnancy events, conduct local evidence-informed and respectful reviews (with the intention of learning lessons rather than apportioning blame), transfer de-identified data and local recommendations to a central database, and carry out interdisciplinary assessments of events aimed at generating Specific, Measurable, Achievable, Relevant and Time-bound (SMART) recommendations for practice. Through widespread dissemination of findings, an emphasis on implementation, and continued re-assessment of its clinical, societal, and economic impact, CanOSS will continually strive to reduce serious adverse pregnancy events and address inequities.

CanOSS has adopted a grassroots approach of engaging with local facilities through a feasibility study and connecting with diverse communities as part of a Virtual Hub for Knowledge Mobilization Activities to reduce pregnancy-related mortality and near-miss events, both funded by the Canadian Institutes for Health Research (CIHR). The feasibility and willingness of health facilities across Canada to establish CanOSS has been confirmed, and funds to initiate the process in Ontario have been secured while awaiting further funding for a nationwide launch.

CanOSS, through its inclusive approach, will not only aim to reduce severe adverse pregnancy outcomes and disparities within Canada, but as part of the International Network of Obstetric Survey Systems (INOSS), will also continually assess its impact against those of other INOSS-member countries with the aim of learning from each other and bringing about a global improvement in outcomes for pregnant women and people.

Overview of Cases Reviewed by the OPDRC 2013-2022

Table seven: # of Cases Reviewed (2013–2022)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	Avg/ yr
Total # of cases reviewed	**26**	**10**	**31**	**26**	**19**	**27**	**34**	**23**	**27**	**21**	**244**	**24**
Pregnant Persons - executive review			7	9	7	6	13	4	6	2	**54**	**7**
Pregnant Persons - full review	11	3	5	4	3	9	8	8	13	11	**75**	**8**
Pregnant Persons - total	11	3	12	13	10	15	21	12	19	13	**129**	**13**
Neonatal	10	5	15	10	8	10	11	8	6	7	**90**	**9**
Stillbirth	5	2	4	3	1	2	2	3	2	1	**25**	**3**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	avg/yr
Total # of cases reviewed	**26**	**10**	**31**	**26**	**19**	**27**	**34**	**23**	**27**	**21**	**244**	**24**
Maternal - executive review			7	9	7	6	13	4	6	2	**54**	**7**
Maternal - full review	11	3	5	4	3	9	8	8	13	11	**75**	**8**
Maternal - total	11	3	12	13	10	15	21	12	19	13	**129**	**13**
Neonatal	10	5	15	10	8	10	11	8	6	7	**90**	**9**
Stillbirth	5	2	4	3	1	2	2	3	2	1	**25**	**3**

Table seven shows the total number of cases reviewed from 2013–2022 broken down by pregnant persons (Executive and Full), Neonatal and Stillbirth reviews. On average, the OPDRC reviews 24 cases a year.

Table eight: # of Recommendation (2013–2022)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total	avg/yr
Total # of Recommendations made	**31**	**28**	**52**	**38**	**22**	**35**	**47**	**39**	**54**	**34***	**380***	**38**
Pregnant Persons	10	10	14	1	11	17	12	16	26	20	**137**	**14**
Neonatal	9	14	29	32	6	18	26	19	14	14	**181**	**18**
Stillbirth	12	4	9	5	5	0	9	4	14	2	**64**	**6**

Table eight shows the total number of recommendations provided from 2013–2022 broken down by pregnant persons (executive and full), neonatal and stillbirth reviews. Single death reviews can generate no recommendations, or multiple recommendations, dependent on the nature of review. On average, the OPDRC makes 38 recommendations a year.

* There was one joint review of a mother and stillborn that resulted in two recommendations.

Overview of Cases Reviewed by the OPDRC in 2021–2022

Note: Cases reviewed by the OPDRC in 2021–2022 may involve deaths that occurred in previous years.

Total number of deaths reviewed in 2021 (executive and full reviews): 27
Number of pregnant persons full death reviews: **13**
Number of pregnant persons executive reviews*: **6**
Number of stillborn deaths reviewed: **2**
Number of neonatal deaths reviewed: **6**

Total number of cases reviewed in 2022 (executive and full reviews): 21
Number of pregnant persons full death reviews: **11**
Number of pregnant persons executive reviews*: **2**
Number of stillborn deaths reviewed: **1**
Number of neonatal deaths reviewed: **7**

* Deaths involving pregnant persons, but where the pregnancy did not cause or contribute to the death, are noted and undergo an executive review. The executive review is conducted by a core team of representatives of the OPDRC and includes an analysis of the circumstances surrounding the maternal death. The results of the review are discussed with the full committee for any additional investigation or comment.

Recommendations

Recommendation Theme Definitions

1. **Institutional Operations and Oversight**
   - Core of the recommendation pertains to small or large institutions who could make revisions to their operations and oversight. For example, professional colleges (CPSO, CNO, CMO), hospitals
   - May involve single or multiple facilities
   - Recommendation could be related to operations, quality of care, staffing, oversight
   - Informs need to address systematic issues within facilities or organizations

2. **Policies, Procedures and Guidelines**
   - Relates to internal or external policies, guidelines, or procedures that an organization currently has or should adopt
   - Examples might include, risk assessment tools, reviews/evaluations, legislation, management of staff, standards of practice

3. **Communication/Collaboration**
   - Quality of documentation for patients or organizations (health records, communication between or within organizations)
   - Communication between family and organization
   - May be paired often with education/training/resources if involves better communicating risks to communities
   - Transfer of patient information/documents to another facility, provider or organization

4. **Persons Transfer/Transport**
   - Related to the physical transfer of the deceased person or involved persons
   - Transport services (EMS/Paramedical service transport)

5. **Education, Training and Resources**
   - Related to the implementation of educational tools including curriculums, awareness campaigns, advertisements
   - Expansion of formalized training on specific topics for key participants in Obstetrical care (Fetal Heart Rate (FHR) monitoring, simulation)
   - Provision of additional resources to expand current services offered/available

6. **Committee/Death Specific**
   - Not universally applicable. Only relevant to individual death or committee

Overview of Recommendation Themes in 2021–2022

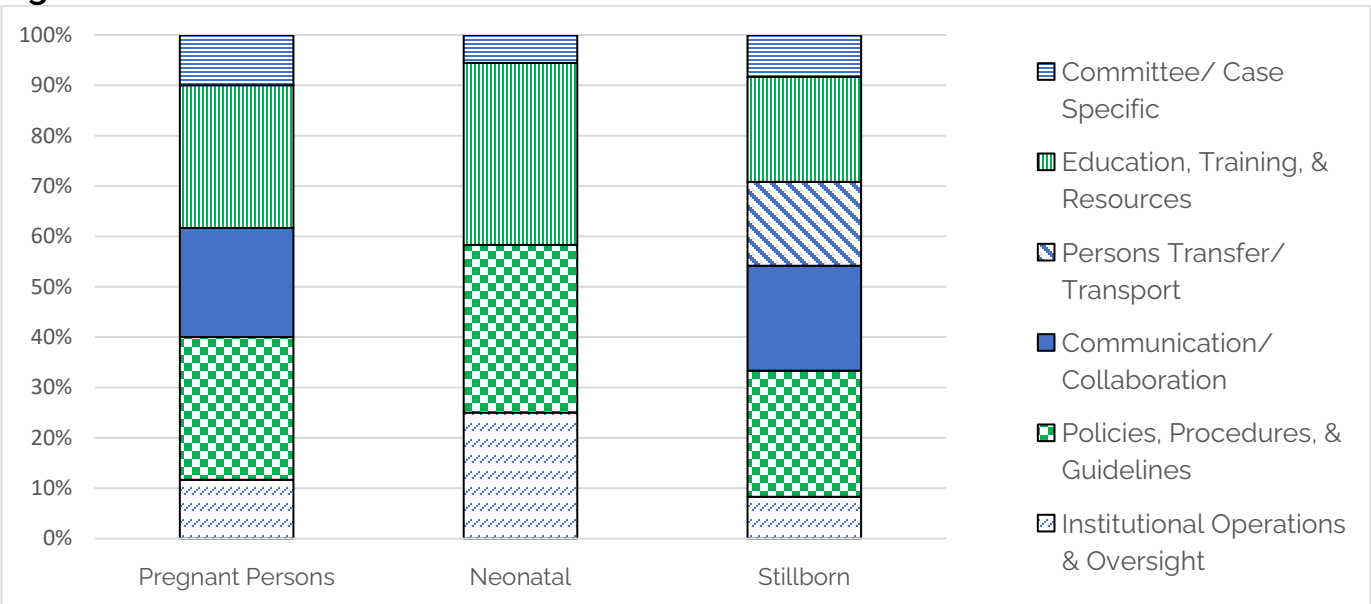
Table 9: Proportion of Recommendation Themes in 2021 to 2022

	Pregnant Persons	Neonatal	Stillborn	Total	% of Total
1. Institutional Operations and Oversight	7 39%	9 50%	2 11%	18	15%
2. Policies, Procedures and Guidelines	17 49%	12 34%	6 6%	35	29%
3. Communication/ Collaboration	13 72%	0 0%	5 11%	18	15%
4. Persons Transfer/ Transport	0 0%	0 0%	4 50%	4	3%
5. Education, Training and Resources	17 49%	13 37%	5 6%	35	29%
6. Committee/ Death Specific	6 60%	2 20%	2 20%	10	8%

Table 9 and Figure 24 provide the breakdown of recommendation themes by case type (pregnant persons, neonatal, stillborn). The most common recommendation theme made by the OPDRC in 2021–2022 relate to *Policies, Procedures and Guidelines (29%)* and *Education, Training and Resources (29%)*. Recommendations may be assigned to multiple themes.

*Pregnant persons is defined as: ante-partum — the period of gestation, before delivery; intra-partum — during delivery or immediately following delivery; postpartum — < 42 days following delivery; late postpartum deaths — 42 days up to 365 days following delivery

Figure 24: Breakdown of Recommendation themes (2021–2022)



Executive Summaries

Summary of 2021 Case Reviews

Case	Type	Summary	Recommendations by Theme
EX-01	Maternal Executive	The deceased was a person in their 20s, at 34 weeks gestation, who experienced heartburn, followed by becoming unresponsive. A Caesarean section was performed for the infant who was stillborn. Resuscitation of the mother was terminated. The cause of death was acute myocarditis.	**Committee/Case Specific** 1. It is recommended that the decedent's first-degree relatives undergo genetic counselling. **Communication/Collaboration** 2. At the first visit for a pregnant patient newly arrived to Ontario, medical records from any prior pregnancy should be obtained, to ensure continuity of care and identification of any high risk issues.
EX-02	Maternal Executive	The deceased was a person in their 30s, G1 P0 with a medical history of polycystic ovarian syndrome (PCOS) and gestational diabetes. She had a one-month history of dry cough and shortness of breath, which persisted despite multiple diagnostic tests and treatments, followed by a stillbirth at 25 weeks gestation, felt caused by severe hypoxemia and hypotension. She then experienced multi-system organ failure and severe respiratory acidosis, followed by her death, due to acute interstitial pneumonia.	None
EX-03	Maternal Executive	The deceased was a pregnant person in their 20s (gestation unknown) who experienced blunt force trauma to the head after being involved in a head-on vehicle collision. She was pronounced deceased at the scene.	None
EX-04	Maternal Executive	The deceased was a person in their 20s who was admitted to the hospital for induction of labour at 41 weeks gestation. Within minutes of delivering, the woman became hypoxic and suffered a cardiac arrest, followed by multiple medical treatments. The woman suffered a second cardiac arrest.	None

Case	Type	Summary	Recommendations by Theme
		The cause of death was attributed to amniotic fluid embolus.	
EX-05	Maternal Executive	The deceased was a person in their 20s who experienced a sudden shortness of breath following a pain in the leg that she had experienced for a few weeks. She was seven months postpartum from a previous pregnancy and nine weeks pregnant at the time of her illness. During medical treatment it was noted a spontaneous abortion had occurred. The cause of death was a pulmonary embolism due to deep vein thrombosis of the popliteal and parauterine veins.	None
EX-06	Maternal Executive	The deceased was a person in their 30s at 33 weeks' gestation who was involved in a head-on motor vehicle collision. She was transported to the local hospital where resuscitation was deployed, followed by an emergency Caesarean. Both the woman and the baby infant did not survive. The cause of death was multiple injuries due to a motor vehicle collision.	None
M-01	Maternal	The deceased was a person in their 30s who experienced a cardiac arrest during laparoscopic surgery for an ectopic pregnancy. It was postulated that carbon dioxide or amniotic fluid embolism during laparoscopic surgery was possible, A quality of care review was conducted by the hospital. The cause of death was due to complications of a ruptured ectopic pregnancy.	None
M-02	Maternal	The deceased was a person in their 20s G3 TPAL 1011 at 37 weeks and 2 days gestation. Ultrasounds of the fetus were normal. She reportedly felt unwell the night before her death, and was found to be non-responsive with rigor mortis setting in. The cause of death was attributed to an acute cardiac event of undetermined cause.	**Institutional Operations and Oversight** 1. The SOGC should develop a rigorous, national database on maternity care. This would include data from all provinces and territories, including information pertaining to race/ethnicity, including First Nations, Inuit and Metis, key factors related to maternal health status and outcome. Data should capture all maternal deaths from all

Case	Type	Summary	Recommendations by Theme
			causes in Canada. Data should ideally include all deaths out to 365 days after the pregnancy. **Institutional Operations and Oversight** 2. Health Canada/The Public Health Agency of Canada should dedicate funding into supporting better data collection and research related to Canada's maternal deaths and their circumstances.
M-03	Maternal	The deceased was a person in their 40s, G2 P1 with fetal genetic screen testing positive for Down syndrome and also gestational diabetes. She was admitted for induction at 38 weeks and three days' gestation, followed by a series of cardiac arrests. The cause of death was due to amniotic fluid embolus with onset just prior to emergent vaginal forceps delivery for fetal bradycardia.	None
M-04	Maternal	The deceased was a person in their 20s, G4 P1 who underwent a pregnancy termination at eight weeks' gestation, 10 days before her death. She complained of abdominal pain two days after the procedure and presented to the emergency department three days after the procedure. Eventually, she was diagnosed with septic shock and multi-organ failure secondary to the pregnancy termination. The cause of death was septic complications of a therapeutic abortion.	**Policies, Procedures and Guidelines;** **Education, Training and Resources** 1. Maternal health care providers, hospital emergency departments and emergency medical service providers should develop an early warning system for maternal sepsis built into the triage process together with a clear assessment and treatment care map, as well as documentation tools (including within electronic medical records systems) **Policies, Procedures and Guidelines**

Case	Type	Summary	Recommendations by Theme
			2. Accreditation Canada should require obstetrical units and emergency departments in hospitals to have a process for the early recognition and treatment of maternal sepsis as a quality indicator **Policies, Procedures and Guidelines** 3. The hospital involved should review its policy with regards to required consultation with its Critical Care Response Team (CCRT).
M-05	Maternal	The deceased was a person in their 30s, G2 A1 with type 2 diabetes, resulting in being followed regularly in the high-risk-clinic for her pregnancy. The woman developed high blood pressure, and a Caesarean was performed at almost 37 weeks' gestation, with the plans on repairing a tracheoesophageal fistula on the newborn. 18 days after delivery, the woman was found non-responsive, with rigor mortis The cause of death could not be ascertained, with possible causes consisting of a sudden cardiac arrythmia or seizure.	**Committee/Case Specific** 1. The Regional Supervising Coroner should recommend cardiac genetic counselling to first degree relatives of the decedent
M-06	Maternal	The deceased was a person in their 30s, G8 P7 who experienced a seizure and arrested during labour at 41 weeks' gestation, followed by a Caesarean where she experienced another cardiac arrest with pulseless electrical activity. The cause of death was due to systemic and pulmonary amniotic fluid embolism during labour.	None
M-07	Maternal	The deceased was a person in their 40s, with a planned Caesarean at 39 weeks' gestation due to previous fibroid surgery. Nine days postpartum she suffered an acute intracerebral hemorrhage, not felt related to her previous health or obstetrical care.	None

Case	Type	Summary	Recommendations by Theme
M-08	Maternal	The deceased was a person in their 20s, G1 P0 who was diagnosed with septic shock of uncertain origin at 34 weeks gestation. Emergency Caesarean was performed, where the woman delivered a stillborn infant. The woman remained critically ill with sepsis, profound acidosis, and multi-organ failure. The cause of death was attributed to meningococcemia.	None
M-09	Maternal	The deceased was a person in their 30s, who was found deceased in her bedroom and in a state of decomposition two weeks after she had seen a physician for an early pregnancy. The cause of death was due to ruptured ectopic pregnancy. Although prescribed Mifegymiso for a medical termination of pregnancy, this was not dispensed for the patient.	**Communication/Collaboration** 1. Emergency medical record (EMR) systems should be designed such that mandatory prompts would guide the thorough and comprehensive recording and documented assessment of a patient visit. A template or algorithm for recording information pertaining to a medical abortion would have been beneficial in this case. Committee comments: In this case, the assessment and treatment of the decedent were not well documented by the treating physician in the medical records. An EMR that prompts completion of certain information would create a record that is more thorough and complete. **Education, Training and Resources** 2. It is recommended that the College of Physicians and Surgeons Ontario consider including the circumstances of this case in an article published in Dialogue in order to highlight the importance of thorough

Case	Type	Summary	Recommendations by Theme
			and complete record keeping by physicians.
M-10	Maternal	The deceased was a person in their 30s, G7 TPAL 2042 who was documented as having hypertension in previous pregnancies. She underwent an elective repeat Caesarean at 38 weeks gestation and was discharged home on antihypertensives two days after delivery. Four days postpartum, she reported having a headache, saw her family physician who noted hypertension and instructed her to increase her antihypertensive medications and present to the emergency department. She returned home, and later became cold, short of breath, and agitated. After a period of time, emergency care was sought, she lost vital signs and died after a resuscitation attempt. The cause of death was determined to be acute left ventricular failure complicating postpartum pre-eclampsia in a person with underlying chronic systemic arterial hypertension.	**Communication/Collaboration; Education, Training and Resources** 1. The hospital involved should provide resources to new parents with high-risk pregnancies, so they understand when and where to seek further care if their condition worsens. This should be available in an easily readable format in the patient's primary language. (see SOGC Guideline No. 307, Recommendation #152, 153) (Strategies for Effective Patient Communication, Relias.com blog, Smallwood, R., March 6, 2017). **Policies, Procedures and Guidelines; Communication/Collaboration** 2. The SOGC in conjunction with their clinical partners such as HIROC, MoreOB and the Association of Ontario Midwives (AOM) should create a template for follow-up of high-risk pregnancies. This template could then be used by hospitals and health care providers to provide consistent follow-up when a postpartum patient is discharged into the community and presents to any health care provider. There should also be a version of this template provided to the patient, to ensure they

Case	Type	Summary	Recommendations by Theme
			understand the critical need for follow up. **Institutional Operations and Oversight; Policies, Procedures and Guidelines** 3. At discharge, the hospital and/or obstetrical care provider should ensure all women with hypertension in pregnancy have a scheduled blood pressure check at three to six days postpartum with appropriate review. (as per SOGC Guideline No 307, Recommendation #132)
M-11	Maternal	The deceased was a person in their 30s, primigravida at 10 weeks gestation, who had type 2 diabetes for at least a year, being advised to gradually increase her insulin intake. Following complaints of a headache, the woman was found deceased in her home. The cause of death was determined to be atherosclerotic coronary artery disease	**Committee/Case Specific** First degree relatives of the deceased should be advised to consult with their primary healthcare providers, regarding assessment of their cardiac risk factors and intervention to minimize atherosclerotic risk.
M-12	Maternal	The deceased was a person in their 30s, G2 TPAL 0010 who underwent an embryo transfer in another country, with ultrasound later confirming a dichorionic diamniotic twin gestation. She experienced abdominal pain that gradually worsened, and no fetal cardiac activity was seen for either fetus, followed by both being stillborn at 30 weeks gestation. Vaginal bleeding increased, affecting her blood pressure. The cause of death was complications of sepsis due to necrotic uterus from fetal demise of twins.	**Policies, Procedures and Guidelines** 1. The SOGC in collaboration with MOREOB, ALARM, HIROC, Ontario Base Hospital Program, the Canadian Association of Emergency Physicians, the College of Family Physicians of Canada, the Canadian Association of Midwives, Critical Care Ontario and hospital EMR providers should develop guidelines for the development and implementation of an obstetrical early warning system for maternal sepsis. This should be integrated into

Case	Type	Summary	Recommendations by Theme
			emergency medical services (EMS) and hospital protocols and documentation tools. **Institutional Operations and Oversight** 2. Accreditation Canada should make the early recognition and treatment of sepsis (maternal and otherwise) a quality indicator in emergency and obstetrical care. **Education, Training and Resources** 3. Professionals providing obstetrical care should be aware of the risk of acquisition of resistant organisms during international travel and consider travel history when caring for patients, both to identify effective treatment for infections and to ensure infection control interventions are in place to prevent spread of antimicrobial resistance. Consultation with an Infectious Disease specialist is recommended early in the presentation of sepsis, particularly when a patient has come from another country. Committee comments: Antimicrobial-resistant organisms can cause infections that are difficult to treat, often requiring the use of expensive, less effective, or more toxic alternative medications. Resistance can occur in many pathogens. The epidemiology

Case	Type	Summary	Recommendations by Theme
			of resistant organisms often varies globally from that seen in Ontario.
M-13	Maternal	The deceased was a person in their 30s, G2 P1 who developed hypertension late in her pregnancy. She was referred by her midwife to an obstetrician and was discharged home with antihypertensive medications. Over the next few days, she experienced visual symptoms and when she returned to the hospital, an ultrasound confirmed fetal demise at 36 weeks gestation, and she was diagnosed with HELLP syndrome. Following delivery, postpartum hemorrhage with disseminated intravascular hemorrhage and multi organ failure occurred. The cause of death was pre-eclampsia with HELLP syndrome.	**Communication/Collaboration** 1. Hospitals with electronic medical record (EMR) systems should have standardized order sets for postpartum hemorrhage, pre-eclampsia and fetal demise. These order sets should be entered by any member of the healthcare team, including administrative staff, if a verbal order by the most responsible health care provider is made, in order to avoid delay in a critical situation. **Policies, Procedures and Guidelines** 2. Hospitals should have clinical care pathways, or care maps, for postpartum hemorrhage, pre-eclampsia and fetal demise. Different options for care, and their indications, should be clearly indicated. These clinical care pathways can exist in an electronic medical record (EMR) system, if the hospital has computer records, but should be flagged automatically when a clinical diagnosis is entered. **Policies, Procedures and Guidelines** 3. Hospitals should have a code to deal with obstetrical hemorrhage emergencies (such as the "Code Omega"

Case	Type	Summary	Recommendations by Theme
			used at Sunnybrook Health Sciences Centre), which would allow for all relevant healthcare providers to be present and providing care and input at the moment of recognition of maternal hemorrhage. Clerical and laboratory staff should be part of this code team, to ensure timely and effective entry of order sets and performance of essential lab work, as required. **Education, Training and Resources** 4. Hospitals and all obstetrical providers should conduct and participate in regular, ongoing, proactive simulation/scenario exercises for obstetrical emergencies, to ensure adequate preparation and teamwork that will allow the rapid recognition and treatment of obstetrical emergencies. These scenarios should include order entry and have a checklist/audit of the required best practices and equipment, as well as a debrief of lessons learned. These simulations/scenarios can be sourced from MOREOB (Managing Obstetrical Risk Efficiently Program) https://www.moreob.com/ , PROMPT (Practical Obstetric Multi-Professional Training)

Case	Type	Summary	Recommendations by Theme
			https://www.promptmaternity.org/ **Education, Training and Resources** 5. The Society of Obstetricians and Gynecologists of Canada, the Canadian Association of Midwives and ALARM should use redacted versions of the Maternal and Perinatal Death Review Committee (MPDRC) case reviews to construct practice scenarios and/or simulations for obstetrical emergencies, which obstetrical care providers can use, in addition to what is available through MOREOB and PROMPT. **Institutional Operations and Oversight** 6. Hospitals should have a formal evidence-based assessment tool for determining the risk of maternal hemorrhage on admission. **Institutional Operations and Oversight** 7. Accreditation Canada should consider the evaluation and response for obstetrical emergencies a Required Organizational Practice (ROP) for hospitals providing obstetrical care, as exemplified by the US Joint Commission and California Maternal Quality Care Collaborative.

Case	Type	Summary	Recommendations by Theme
			Institutional Operations and Oversight 8. Regional Network Operating Forums (RNOF) should assist hospitals in conducting quality of care reviews from a patient safety perspective. This could include provision of an assessment template and coaching or educational tools for all involved in quality of care and risk management. **Institutional Operations andOversight** 9. All consultations between the primary obstetrical provider and another obstetrical provider should have clear written and verbal communication documented regarding the ongoing role of both providers. This should specify who will continue with the primary responsibility for care and follow up of the patient.
N-01	Neonatal	The neonate was born at 41 weeks gestation to an adolescent mother who was unaware of the pregnancy until approximately two weeks before delivery. Outlet vacuum extraction was performed for delivery of an infant, who was then transferred to the NICU but showed no spontaneous movement and was unresponsive to light. The baby developed multi-organ failure with seizures. Care was withdrawn, with infant death three days after birth due to hypoxic ischemic encephalopathy of unknown cause.	**Policies, Procedures and Guidelines** 1. Obstetrical care providers should consider intervention and delivery when intra-partum fetal surveillance cannot determine fetal well-being. **Committee/Case Specific** 2. The regional supervising coroner should communicate with the mother regarding

Case	Type	Summary	Recommendations by Theme
			genetic counselling for the 10q microdeletion
N-02	Neonatal	The neonate was born to a mother in her 20s, G2 P0. At 36 weeks' and six days' gestation, fetal tachycardia was confirmed, and a Caesarean was required. The infant was born in poor condition with no detectable heart rate or respiratory effort. Resuscitative measures were deployed, unsuccessfully, and at two hours of age, the infant was pronounced dead due to fetal hydrops because of probable hepatic Langerhans cell histiocytosis.	**Policies, Procedures and Guidelines** 1. Obstetrical care providers are reminded that if they encounter a pregnancy with persistent isolated fetal tachycardia, they should consider bedside ultrasound as part of their comprehensive assessment before additional intervention is taken. If a finding on ultrasound indicates a diagnosis that may best be treated in a tertiary care centre, urgent transport pre-delivery can then be considered.
N-03	Neonatal	The neonate was born to a mother in her 30s G2 TPAL 1001 who had a Caesarean section in the past for breech presentation. Induction was offered at term due to poor fetal growth and declined. Spontaneous labour commenced, with poor contractions noted, and oxytocin administered. Decelerations were noted and a stat Caesarean section performed, with the infant and placenta found in the abdominal cavity. The cause of death was due to intrapartum asphyxia due to intra-partum, intra-abdominal delivery through a C section scar and complete placental separation, due to uterine rupture during labour at 41 weeks gestation.	**Institutional Operations and Oversight;** **Policies, Procedures and Guidelines** 1. The hospital involved should ensure their policy and procedure regarding oxytocin use for the induction or augmentation of labour is consistent with the 2019 Provincial Council for Maternal and Child Health (PCMCH) recommendations for safe use of oxytocin. This should include a review of the use of oxytocin "wash out" as this practice is not supported by the literature. **Institutional Operations and Oversight** 2. The hospital involved should conduct a repeat quality of care review of the

Case	Type	Summary	Recommendations by Theme
			circumstances surrounding this death. It is recommended that the hospital utilize the expertise of the Regional Network Operating Forum (RNOF) in conducting this review and should include examination of documentation made by the healthcare team. The hospital may also wish to consider using a complete approach, demonstrated in the MOREOB (Managing Obstetrical Risk Efficiently Program) or via Healthcare Excellence Canada. **Education, Training and Resources** 3. Hospitals in Ontario should undergo training on conducting thorough quality of care reviews. The Regional Network Operating Forum (RNOF) is a valuable resource to consider when developing and conducting this training. **Institutional Operations and Oversight;** **Policies, Procedures and Guidelines** 4. Hospitals should have clinical care pathways, or care maps, for Trial of Labour After Caesarean Section (TOLAC). Different options for care, and their indications, should be clearly indicated. These clinical care pathways can exist in an electronic medical record system if the hospital has computer records but should

Case	Type	Summary	Recommendations by Theme
			be flagged automatically when TOLAC is entered. Clear indications and contraindications to the use of oxytocin should be included. **Policies, Procedures and Guidelines** 5. Hospitals should have a code to deal with obstetrical emergencies (such as the "Code Omega" used at Sunnybrook Health Sciences Centre), which would allow for all relevant health care providers to be present and providing care and input at the moment of recognition of uterine rupture. Clerical and laboratory staff should be part of this code team, to ensure timely and effective entry of order sets and performance of essential lab work, as required. **Education, Training and Resources** 6. Hospitals and all obstetrical care providers should conduct and participate in regular, ongoing, proactive simulation/scenario exercises for obstetrical emergencies, to ensure adequate preparation and teamwork that will allow the rapid recognition and treatment of obstetrical emergencies. These scenarios should include order entry and have a checklist/audit of the required best practices and equipment, as well as a debrief

Case	Type	Summary	Recommendations by Theme
			of lessons learned. These simulations/scenarios can be sourced from MOREOB (Managing Obstetrical Risk Efficiently Program) https://www.moreob.com/ , PROMPT (PRactical Obstetric Multi-Professional Training) https://www.promptmaternity.org/ **Education, Training and Resources** 7. The Society of Obstetricians and Gynecologists of Canada, the Canadian Association of Midwives and ALARM should use the Maternal Perinatal Death Review (MPDRC) case reviews in redacted form to construct practice scenarios and/or simulations for obstetrical emergencies, which obstetrical care providers can use in addition to what is available through MOREOB and PROMPT. **Education, Training and Resources** 8. Fetal heartrate monitoring and assessment should be regularly taught to all obstetrical providers (nurses, midwives, physicians) with knowledge evaluation and remediation if required, using real clinical scenarios and possibly using cases reviewed by the Maternal Perinatal Death Review Committee. This learning and evaluation should

Case	Type	Summary	Recommendations by Theme
			be a requirement for continued practice in a hospital setting or midwifery practice elsewhere. **Institutional Operations & Oversight;** **Education, Training, & Resources** 9. The Regional Network Operating Forum (RNOF) should assist hospitals in conducting quality of care reviews from a patient safety perspective. This could include provision of an assessment template, coaching or educational tools for all involved in quality of care and risk management.
N-04	Neonatal	The neonate was born to a mother in her 30s, G8 P3 A4 who delivered an infant at 39 weeks gestation who had poor respiratory effort with poor colour and perfusion. Concerns were raised due to delays in air transport to a tertiary care centre. The cause of death was pulmonary hemorrhage due to transient hypoxic and ischemic injury and coagulopathy due to placental malformation and overcoiling of the umbilical cord.	None
N-05	Neonatal	The neonate was born to a mother in her 30s, G2 P1 who delivered the infant by Caesarean at 38 weeks and five days gestation. Mother and infant were discharged home. The mother was readmitted to hospital with pneumonia within a few days of the birth, the infant developed a fever during this time. Acetaminophen was recommended, the infant's feedings dropped and the infant was found deceased in their crib. The cause of death was neonatal herpes hepatitis.	**Education, Training and Resources** A fever in a neonate is a red flag indicating possible life-threatening illness, requiring immediate physical assessment and investigation. This case should be reviewed and used for teaching purposes by all those involved in newborn care.
N-06	Neonatal	The neonate was born to a mother in her 30s, G3 P1 L1 who delivered a healthy infant via a planned Caesarean at 38 weeks and three days gestation.	**Education, Training and Resources** These two associations should publish a redacted version of this case, as a teaching tool and

Case	Type	Summary	Recommendations by Theme
		Three days postpartum mild jaundice was noted, which was further pronounced at five days postpartum with dark urine. Six days postpartum the neonate was acutely unwell and admitted to hospital with acute bilirubin encephalopathy. Death occurred at twelve days of age, due to neonatal bilirubin encephalopathy, with severe established brain injury.	reminder to obstetrical care providers regarding the need for close observation for developing jaundice in the newborn, despite a normal bilirubin measurement in the first few days after birth. The Ontario College of Midwives newsletter section on "Practice Advice" and the Canadian Medical Protection Association "CMPA Perspective" (or a similar publication) appear appropriate for the dissemination of this information.
S-01	Stillbirth	The stillbirth was delivered to a mother in her 30s, G3 TPAL 0111. The mother presented in active preterm labour at the closest hospital, which had no obstetrical services. Gestational age was 34 weeks. Attempts were made for urgent transfer, but unfortunately an undiagnosed breech was delivered, with attending physicians unable to deliver the head, leading to fetal demise before delivery. The stillbirth was delivered after transfer to the nearest obstetrical facility. The cause of stillbirth was head entrapment in the maternal pelvis at delivery due to breech presentation.	**Communication/Collaboration; Persons Transfer/Transport; Education, Training and Resources** 1. Obstetrical care providers should acknowledge the risk that distance to suitably resourced facilities adds to a pregnancy. Patients/clients should be thoroughly educated on the signs and symptoms of preterm labour (or worsening condition) and a complete delivery plan with contingencies for a precipitous delivery made. This discussion and plan should be documented with a copy to the patient. **Communication/Collaboration** 2. The Ministry of Health should consider adding an additional blank form for narrative notes on the antenatal forms in order to allocate adequate space for the clear documentation of discussions and issues that arise in the course of prenatal

Case	Type	Summary	Recommendations by Theme
			care. Committee comments: The review of this case was challenging, as the antenatal record gave little room for any documentation of issues arising and discussions with the patient. Additional documentation space would likely help both reviewers and those receiving a case in transfer. **Communication/Collaboration; Committee/Case Specific** 3. The obstetrician providing antenatal care in this case should review the standards for care for investigation, treatment and prevention of preterm birth. There should be discussions with families regarding resources available and birth plans, including appropriate actions if complications arise. These discussions should be fully documented.
S-02	Stillbirth	The stillbirth was delivered to a mother in her 20s, G2 TPAL 0010 with a BMI greater than 40 at the onset of pregnancy. The woman was noted to have hypertension near the end of pregnancy. Gestational age at delivery was 40 weeks. After attempts to stimulate labour were not successful, the mother, after discussion with care providers, chose to have oxytocin augmentation as the baby was not yet well down in the pelvis. Following a delayed delivery of head to the delivery of the body, a stillbirth was delivered. Despite the lack of vital signs or movement, a 45-minute resuscitation was performed, which was not successful.	**Committee/Case Specific** 1. The mother of the stillborn infant in this case should be recommended to seek out a high-risk pregnancy consultation through their primary care provider. This consultation should occur prior to conception, or at the latest, as early as possible in their next pregnancy, to address and manage risk factors which

Case	Type	Summary	Recommendations by Theme
			could adversely impact themselves or their fetus. **Education, Training and Resources** 2. The Society of Obstetricians and Gynecologists (SOGC) and Association of Ontario Midwives (AOM) should work together to develop and distribute a patient education tool (at a readable grade 5 level) or infographic to share information regarding high-risk pregnancies, such as those with maternal obesity. **Institutional Operations and Oversight** 3. The Society of Obstetricians and Gynecologists (SOGC) and Association of Ontario Midwives (AOM) should develop an audit tool to assess the implementation of clinical guidelines. This audit tool development should initially prioritize the Clinical Practice Guidelines (CPG) of the SOGC for Pregnancy and Maternal Obesity and the CPG of the AOM, The Management of High or Low Body Mass Index during Pregnancy 2019. **Policies, Procedures and Guidelines** 4. The hospital involved and other Ontario hospitals providing care at any stage of pregnancy should work together to put in place a care

Case	Type	Summary	Recommendations by Theme
			map (orders, plan of care) for pregnancies in those with a BMI > 30, especially those with Class 3 or Morbid Obesity (BMI> 40) based on the Clinical Practice Guidelines of the SOGC for Pregnancy and Maternal Obesity. This care map could be developed in conjunction with the SOGC, the AOM and CAPWHN. **Policies, Procedures and Guidelines;** **Persons Transfer/Transport** 5. Ontario Health and the Provincial Council for Maternal and Child Health should ensure the implementation of the Clinical Practice Guidelines of the SOGC for Pregnancy and Maternal Obesity in all centres providing maternal and newborn care and services. Criteria and guidelines for transfer to a higher level of care should be part of this implementation, specifically defining the site of delivery required for those with a BMI > 3 (Class 1) those with Class 2, (BMI >35) and especially those who are Class 3 (BMI > 40) or higher. **Policies, Procedures and Guidelines;** **Persons Transfer/Transport** 6. The Society of Obstetricians and Gynecologists (SOGC), Canadian Association of Midwives (CAM), College of

Case	Type	Summary	Recommendations by Theme
			Family Physicians of Canada (CFPC) should include in any Clinical Practice Guidelines for Pregnancy and Maternal Obesity recommendations for when transfer to a higher level of care is necessary. Emphasis should also be placed on a care plan which includes discussion of these recommendations and indications for transfer of a high-risk patient. **Institutional Operations and Oversight;** **Persons Transfer/Transport** 7. Ontario Health, the Ontario Health Teams, Ministry of Health (one number to call, phase 2) and the Provincial Council for Maternal and Child Health (PCMCH) should develop and put in place, across the province, an integrated network of antenatal consultation for pregnant patients with an elevated BMI. The referral network should provide streamlined transfer and/or consultation, with a no-refusal policy based on set criteria. **Policies, Procedures and Guidelines** 8. The hospital involved, and its obstetrical care providers should review their policy and procedures for cervical

Case	Type	Summary	Recommendations by Theme
			ripening with special attention to the use of misoprostol. **Policies, Procedures and Guidelines** 9. The hospital involved, and its obstetrical care providers should review their policy and procedures for cervical ripening with special attention to the use of misoprostol. **Policies, Procedures and Guidelines** 10. The SOGC and ISMP should work together to provide guidance on the use and accurate dosing of misoprostol. **Education, Training and Resources** 11. Shoulder dystocia remains a frequent and potentially severe complication of birth and is not always predictable. Thus, it should remain a high priority for training in midwifery education, residency, ALARM, Emergency Skills Workshop (ESW) and MOREOB. All obstetrical units should practice shoulder dystocia drills as outlined by MOREOB and AOM ESW.

Summary of 2022 Case Reviews

Case	Type	Summary	Recommendations by Theme
EX-01	Maternal Executive	The deceased was a person in their 30s, who was G2 P2A0 and had a	None

Case	Type	Summary	Recommendations by Theme
		Caesarean at 35 weeks five days gestation and delivered a healthy baby. She was found to have a liver metastasis at the time of assessment of complaints of shortness of breath postpartum but decided not to pursue evaluation and treatment immediately postpartum. She experienced a stroke 3.5 months postpartum, dying approximately one month after the stroke occurred. The cause of death was metastatic stage 4 colon cancer, with her postpartum state contributing to her death.	
EX-03	Maternal Executive	The deceased was a person in their 30s, G2 P1 with a history of precipitous birth who collapsed at home while in early labour at 39 weeks gestation. She suffered a cardiac arrest but had a return of spontaneous circulation. Caesarean was performed but unfortunately resulted in a stillbirth. The cause of death, which occurred five days postpartum, was probable amniotic fluid embolism due to pregnancy.	None
M-01	Maternal	The deceased was a person in her 20s, primigravida who was experiencing tooth pain and exudate from the nose. She delivered a healthy infant at 38 weeks and five days gestation and was discharged from the hospital. Following discharge, the woman experienced shortness of breath and bilateral leg swelling, culminating in a cardiac arrest. The cause of death was due to florid primary pulmonary hypertension. A thorough search found no common or preventable cause of pulmonary hypertension, and a genetic screen was negative.	None
M-02	Maternal	The deceased was a person in their 30s, G8 P6 who had an uncomplicated Caesarean for a	**Communication/Collaboration; Education, Training and Resources**

Case	Type	Summary	Recommendations by Theme
		footling breech presentation at > 40 weeks gestation. She was provided postpartum thromboprophylaxis. 12 days later, she had a large pulmonary embolism which was treated. She was discharged on anticoagulation after a two-day admission to hospital. Three days after discharge, she complained about increasing dyspnea, after which she was found unresponsive. The cause of death was pulmonary thromboembolism, due to her postpartum state, recent surgery and obesity.	1. Women/trans men who are planning a pregnancy should, where appropriate, be counselled on the risks of obesity in pregnancy. Weight loss prior to achieving a pregnancy is the most effective intervention in order to prevent complications in pregnancy. Pregnant persons with obesity should have a thorough discussion reviewing the increased antenatal and postpartum risks, including but not limited to: miscarriage, congenital abnormalities, hypertensive disorders of pregnancy, gestational diabetes, stillbirth, macrosomia, shoulder dystocia, birth trauma, Cesarean section, infection, venous thromboembolism, and postpartum depression. Care should be taken to avoid weight bias and stigmatization when treating pregnant patients who are obese. **Committee/Case Specific** 2. Family members should be encouraged to disclose a family history of VTE to their care providers, which would help guide individualized care and determine whether they are candidates for thromboprophylaxis or thrombophilia testing in specific settings with proper counselling.
M-03	Maternal	The deceased was a person in their 20s, who complained of nausea, vomiting and diarrhea, followed by a seizure. She lost vital signs and resuscitation occurred. In the emergency department BhCG was positive and free fluid was found on bedside ultrasound. An ectopic pregnancy was discovered upon emergency laparotomy, and removed, Unfortunately, massive blood loss led to her death from the ectopic pregnancy.	None

Case	Type	Summary	Recommendations by Theme
M-04	Maternal	The deceased was a person in their 20s, who apparently did not know she was pregnant and delivered her child alone in her bed at the home she shared with her parental family. Her past medical history was significant for idiopathic thrombocytopenic purpura and morbid obesity (BMI > 45). Emergency medical services were involved. The term stillbirth was unable to be resuscitated. The deceased lost consciousness and developed septic shock, dying the same day. The cause of stillbirth was congenital pneumonia with meconium aspiration. The cause of the mother's death was sepsis due to chorioamnionitis.	**Communication/Collaboration; Education, Training and Resources** 1. Women/trans men who are planning a pregnancy should, where appropriate, be counselled on the risks of obesity in pregnancy. Weight loss prior to achieving a pregnancy is the most effective intervention. **Communication/Collaboration; Education, Training and Resources** 2. Those women/trans men who are prescribed warfarin should receive counselling on the risks of pregnancy while taking this medication and be offered effective contraception
M-05	Maternal	The deceased was a person in their 30s, G3 P2 who was diagnosed with COVID-19 with increasing oxygen requirements. She was unvaccinated. A decision was made to proceed with Caesarean at 27 weeks gestation due to her worsening respiratory status, delivering a live infant. She eventually became more bradycardic and hypotensive, and died nine days after delivery.	**Communication/Collaboration** 1. Health care providers should ensure that vaccination recommendations in general and COVID-19 vaccination specifically be discussed and documented early in prenatal care. **Education, Training and Resources** 2. Consideration should be given to public awareness programs and standardized prenatal education to women and trans men, regarding the increased risk of infectious disease during pregnancy in general and from COVID-19 in particular. The increased morbidity and mortality of COVID-19 in pregnancy should continue to be highlighted to healthcare providers and the public. **Policies, Procedures and Guidelines** 3. Pregnant people should be prioritized in vaccination programs and in development of new vaccines. **Communication/Collaboration; Education, Training andResources**

Case	Type	Summary	Recommendations by Theme
			4. The safety and efficacy of COVID-19 vaccination in pregnancy should be emphasized to public and health care providers. Specific resources are available (for example, https://confidenceproject.ca/aboutus/; https://www.pcmch.on.ca/covid-19-resources/) and resources should be further developed to assist pregnant people obtain culturally appropriate information on COVID-19 vaccination and other vaccines.
M-06	Maternal	The deceased was a person in their 30s, 20 days postpartum, after an uneventful pregnancy and Caesarean section, who was woken by chest pain, and became unresponsive and pulseless on arrival to the hospital. The cause of death was pregnancy related spontaneous dissection of the left anterior descending coronary artery.	None
M-08	Maternal	The deceased was a person in their 20s, G6 T4P0A1L4S0 who delivered an infant at home with her family, but despite the birth being unattended, was followed by her midwife. She reported being tired and having a headache. Six days postpartum she was found deceased on her bed. The cause of death was Postpartum Endomyometritis.	None
M-09	Maternal	The deceased was a person in their 30s, G3 P2 who presented with severe chest pain four days postpartum. The cause of death was complications of myocardial infarction and pregnancy related spontaneous dissection of the left anterior descending coronary artery.	None
M-10	Maternal	The deceased was a person in their 30s, G1 P0 who suffered a significant left vaginal wall laceration during delivery at 39 weeks gestation,	**Policies, Procedures and Guidelines** 1. All institutions providing obstetrical care should have a standardized, evidence-based postpartum hemorrhage care

Case	Type	Summary	Recommendations by Theme
		leading to vaginal bleeding which was unable to be controlled. The cause of death was amniotic fluid embolism and complications of peri and postpartum hemorrhage. A quality-of-care review was performed after the death by the hospital with five recommendations to improve care.	map/order set, which ensures that appropriate maneuvers, medications, and blood products are used in an effective manner in this situation. **Education, Training and Resources** 2. All hospitals should conduct a practice code for massive maternal hemorrhage in the obstetrical department as part of education and training for all obstetrical care providers.
M-11	Maternal	The deceased was a person in their 20s, G1 who suffered a seizure and decreased levels of consciousness after undergoing a Caesarean section at 37 weeks gestation. The cause of death was due to a large basal ganglia bleed and intraventricular hemorrhage because of HELLP syndrome due to pre-eclampsia.	**Policies, Procedures and Guidelines; Education, Training and Resources** 1. This death should be reviewed, in a problem-based learning format, related to the management of hypertension and IUGR during pregnancy. Current guidelines should be reviewed, including delivery timing for women with preeclampsia. **Policies, Procedures and Guidelines; Communication/Collaboration** 2. A policy on consistent, evidence-based antenatal surveillance should be implemented in all hospitals providing obstetrical care, particularly the hospital in this review, to ensure that patients with hypertensive disorders of pregnancy are appropriately recognized and monitored. The policy should include alerts within an Electronic Medical Record (EMR) or elsewhere for recognition of maternal hypertension. It should also include standardized order sets and care maps integrated into any electronic medical record or other existing system of charting and patient care. This should include regularly scheduled ultrasounds for growth and biophysical profile, as well as assessments of vital signs, proteinuria, symptoms, and biochemical/hematological abnormalities.

Case	Type	Summary	Recommendations by Theme
			Current evidence-based guidelines should be used to guide antenatal monitoring for these patients. **Policies, Procedures andGuidelines; Committee/Case Specific** 3. Obstetrical units should implement a policy to ensure that patients with HDP are delivered at the appropriate gestation based on up-to-date guideline recommendations. The Committee requests confirmation that such a policy is implemented at the hospital involved in this review. **Education, Training and Resources** 4. This case, in redacted form, should be used for teaching purposes in the hospitals involved in this case. **Education, Training and Resources** 5. This review, in redacted form, should be shared directly with all health professionals involved in this case (antenatally, during active labour/delivery, postnatally and on-call), with the goal of stimulating thoughtful reflection and continuing education on the subject of the management of hypertensive disorders of pregnancy.
M-12	Maternal	The deceased was a person in their 30s, G7 P6L4 who was one week post Caesarean section for a 27 week gestation stillbirth due to placental abruption. She was found unresponsive, suffering multiple strokes and cardiac arrests. The cause of death was due to an intracerebral hemorrhage and multiple cerebral infarcts secondary to bilateral vertebral artery occlusion.	**Education, Training and Resources** 1. This report, in redacted form, should be used by the hospital involved for learning purposes. Postpartum headache, while generally benign, can be a sign of severe and life-threatening underlying conditions. Careful assessment of any postpartum patient complaining of severe headache is important in determining whether additional investigations should be undertaken. Documentation should include a description of symptoms and objective findings, and a differential

Case	Type	Summary	Recommendations by Theme
			diagnosis. Prior to their discharge, patients should be encouraged to seek help in an urgent fashion if a postpartum headache is worsening or not resolving. **Education, Training and Resources** 2. (2a) This case should be reviewed, in redacted form, as a learning exercise. **Policies, Procedures and Guidelines** (2b) Stillbirth, especially with a suspected placental cause, should reflexively lead to investigations including antiphospholipid antibody syndrome. Diagnosing and treating this condition can decrease the likelihood of a poor outcome in future pregnancies. Pregnancies subsequent to a stillbirth may benefit from additional ultrasound monitoring to exclude placental pathology. **Policies, Procedures and Guidelines; Communication/Collaboration** (2c) For pregnant patients with a history of poor obstetrical outcomes (such as uterine rupture, placental abruption, and stillbirth in this case), a consultation with a Maternal-Fetal Medicine (MFM) specialist is recommended. Pre-pregnancy MFM counselling may help identify modifiable risks prior to achieving another pregnancy. In instances where geographic location is a barrier, virtual care consultations should be offered. **Policies, Procedures andGuidelines; Committee/Case Specific** (2d) Low dose ASA (acetylsalicylic acid), 81–162mg taken daily, should be

Case	Type	Summary	Recommendations by Theme
			started between 12–16 weeks of gestation in patients with a history of placental-mediated obstetrical complication. This patient should have been offered low-dose ASA when she presented for early obstetrical care due to her history of stillbirth from placental abruption. **Policies, Procedures and Guidelines; Committee/Case Specific** 3. First degree relatives should be advised to consult with an expert in genetics and connective tissue disorders, to help determine if there is enough concern for an underlying connective tissue disorder such as vascular Ehlers-Danlos syndrome or Loeys Diets syndrome, to consider genetic testing and evaluation. Post mortem examination should be encouraged for all maternal deaths, and tissue saved for possible later genetic testing. In this case, the results of genetic testing for vEDS and LDS might have contributed to the effectiveness of her surviving family's genetic assessment. In addition, bilateral simultaneous vertebral artery dissection is unusual, even in conditions like vEDS and LDS – autopsy confirmation would be helpful to understanding the cause of her cerebro-vascular accidents.
N-01	Neonatal	The neonate was born to a mother in her 20s, G1 T0P0A0L0S0 who delivered an infant at 41 weeks gestation who had no respiratory effort. After a prolonged resuscitation and transfer to a tertiary care centre, it was determined with the family to transition to comfort care, with death occurring at 25 days of age. The cause of death was hypoxic-ischemic encephalopathy due to perinatal asphyxia.	**Policies, Procedures and Guidelines** 1. In hospital or out of hospital setting where there is a complicated delivery, with morbidity or mortality, a policy should be in place requiring the retention of the placenta for analysis. If the policy exists, or is being developed, it should have an accompanying order set, which would include a request (Y/N) as to whether the placenta be retained for analysis. **Institutional Operations and Oversight; Policies, Procedures and Guidelines**

Case	Type	Summary	Recommendations by Theme
			2. A policy should be in place in all institutions where obstetrical care is provided, such that when meconium is noted during labour and/or delivery, all care givers are empowered to contact dedicated personnel trained in neonatal resuscitation (NRP) immediately and request them to attend. If such a policy is already in place, an audit of request and personnel attendance at birth with meconium noted during labour and/or delivery should be performed, with the intent of encouraging this practice and improving perinatal care in a timely manner.
N-02	Neonatal	The neonate was born to a mother in her 30s, G1 who underwent a Caesarean at 40 weeks gestation. The cause of death was massive subgaleal hematoma due to an arrested second stage of labour. The hospital conducted a quality-of-care review, with two recommendations to improve care arising.	**Education, Training and Resources** 1. Obstetrical caregivers and learners are recommended to review this case in its redacted form as a part of morbidity and mortality rounds, or clinical case review. Key learning should focus on the appropriate management of operative vaginal birth, Fetal Health Surveillance with the appropriate use and interpretation of electronic monitoring in labour, as reviewed in the Society of Obstetrics and Gynecology of Canada (SOGC) guidelines (1)(2). Maternal and neonatal trauma associated with operative vaginal birth is further referenced in Up to Date (3) (4) and Canadian Medical Association Journal (5). **Institutional Operations and Oversight** 2. An in-depth review of this case must be done in the affected hospital in regard to management by all caregivers. The Canadian Patient Safety Institute may provide the tools required for a fulsome analysis, recommendations and actions. **Education, Training, & Resources**

Case	Type	Summary	Recommendations by Theme
			3. An educational review of Operative Vaginal Birth and Intrapartum Fetal Health Surveillance should be undertaken in this hospital and teaching program for all obstetric caregivers, using this case as one of the teaching examples. Indications of when to call the coroner should be included in this educational review. Consideration should be given to the use of the Committee Opinion No. 415: Impacted Fetal Head, Second-Stage Cesarean Delivery, by the SOGC.
N-03	Neonatal	The neonate was born to a mother in her 20s, G5 T2P0A2L2 who prematurely delivered the infant at 21 weeks and five days gestation. There were no resuscitative efforts due to extreme prematurity of the newborn and the infant was pronounced deceased less than two hours after delivery.	**Policies, Procedures and Guidelines** 1. When formulating and reviewing their use of force policy and training officers in the same, police services should include an assumption that a woman of childbearing age may be pregnant. When determining the appropriate use of force in any given situation, the possibility of an adverse pregnancy outcome should be considered.
N-04	Neonatal	The neonate was born to a mother in her 30s, G1, who delivered an infant in breech position at 23 and two weeks gestation. The mother had presented to another hospital the evening before birth, complaining of lower abdominal pain and urinary urgency. The cause of death was due to premature birth, cause unascertained.	**Committee/Case Specific** 1. The mother in this case should be recommended to seek out a high-risk pregnancy consultation due to her unexplained preterm labour at 23 weeks. Pre-pregnancy assessment and counselling, as well as close monitoring in future pregnancies, could help improve her pregnancy outcomes. As per SOGC guidelines and best practice, she should be offered serial cervical length monitoring, with consideration of intervention if the cervix measures <25mm before 24 weeks of gestation. **Institutional Operations and Oversight; Policies, Procedures and Guidelines; Education, Training and Resources** **2.** A process should be developed to ensure that patients presenting with symptoms

Case	Type	Summary	Recommendations by Theme
			consistent with possible preterm labour are appropriately assessed by a physician. Education to nursing staff in recognizing symptoms consistent with preterm labour can be useful in guiding interactions with physicians. When a process for possible preterm labour is put in place, or if one is already in place, a system of regular performance oversight should be implemented. **Policies, Procedures and Guidelines** 3. All hospitals and institutions providing care to pregnant patients, and obstetrical care providers should ensure there is a policy, triage alert and/or system process, such that preterm labour is considered as a possibility in every pregnant patient who presents with symptoms recognized as possible indicators for this diagnosis. When this possibility is flagged, physical assessment by a person responsible for their medical care should be mandatory, with a care map and/or order set which would help that person ensure evidence-based assessment for this diagnosis is performed in a timely manner.
N-05	Neonatal	The neonate was born to a person in her 30s at 39 weeks gestation, G2 T1L1. The person was morbidly obese, with a BMI greater than 55. There was difficulty monitoring during labour and ultimately multiple attempts at forceps delivery were undertaken. The infant was born limp with no respiratory effort. After extensive resuscitation, it was determined appropriate to transition to comfort care. The cause of death was due to hypoxic ischemic encephalopathy with Streptococcus group B, with subdural hematoma and skull fracture birth trauma contributing to death.	**Institutional Operations and Oversight** 1. A Quality Review should be performed by the hospital with regard to this case and lessons learned shared with all obstetrical care providers and obstetrical learners as well as the Maternal Perinatal Death Review Committee. Particular attention should include: • Planning for the care and management of patients who are morbidly obese for induction and while in labour • Appropriate fetal health surveillance, interpretation, and communication by caregivers

Case	Type	Summary	Recommendations by Theme
			• Review of operative vaginal delivery, in particular with regard to mid forceps use by obstetrical staff • Planning for delivery of the morbidly obese patient • Adequate sampling and interpretation of Beta Streptococcus cultures in the third trimester in morbidly obese patients • Review of the respiratory support provided to the newborn prior to arrival of the tertiary care transport team. **Policies, Procedures and Guidelines** 2. Morbid obesity in pregnancy increases risk to both the mother and fetus. All obstetrical caregivers and hospitals caring for patients with this condition should put in place a Comprehensive Plan for Pregnancy for Antenatal, Intrapartum and Delivery care of each patient who is classified as morbidly obese. **Education, Training and Resources** 3. Antenatal rectovaginal sampling for Beta Strep is routine in the third trimester of pregnancy. Morbid obesity may make adequate sampling difficult. Obstetrical caregivers should consider this in their comprehensive planning. **Policies, Procedures and Guidelines; Education, Training and Resources** 4. When fetal health in labour cannot be confirmed, another means of surveillance, such as a fetal scalp electrode clip and an intrauterine pressure catheter should be used. Continued inability to confirm fetal health warrants urgent delivery.
N-07	Neonatal	The neonate was born to a person in her 30s, G2 TPAL 2010 at 35 weeks gestation. The mother's past medical history was significant for	None

Case	Type	Summary	Recommendations by Theme
		polysubstance use during pregnancy. After an emergency Caesarean, the infant was delivered and immediately intubated and ventilated. Brain imaging showed extensive bilateral hemispheric cystic encephalomalacia. Due to poor prognosis, the infant was transitioned to comfort care and died. The cause of death was global cystic encephalomalacia due to an ischemic event in utero.	
N-08	Neonatal	The neonate was born to a person in her 30s, G1, at 39 weeks gestation. The mother was morbidly obese, with a BMI greater than 55. Sudden deterioration occurred during the delivery, the infant was born with no respiratory efforts. Resuscitative measures were performed, but the newborn developed multiorgan failure and severe hypoxic ischemic encephalopathy (HIE), transitioning to comfort care and dying at nine days of age. The cause of death was severe hypoxic encephalopathy due to perinatal asphyxia.	None
S-01	Stillbirth	The neonate was born to a person in her 20s, G1 who apparently did not know she was pregnant. The term infant was found on the bed with no vital signs. The cause of death was congenital pneumonia with meconium aspiration in the lungs.	See M-04

Conclusion (Summary)

Key Findings

While much of the discussion about health and health care during the 2021–2022 period focused on the COVID-19 pandemic, in Ontario there continued to be many potentially preventable perinatal and obstetric deaths reported to the OCC — 21 deaths during pregnancy, 39 during the postpartum period, 79 neonatal deaths and 47 stillbirths. Analyses were conducted on these deaths in a current systems approach, while individual deaths were referred for review by experts on the OPDRC after all other analyses were complete.

A systems informed approach, increased capacity and epidemiological support in 2021 and 2022 allowed for additional analyses to be conducted on deaths reviewed by the OPDRC, particularly in terms of relevant social and demographic factors. The results of these analyses show that over the last 10 years:

- 50% of deaths during pregnancy were among individuals living in areas with the highest level of material deprivation.
- 27 individuals who were between six weeks and one year postpartum died by suicide, 21 died by accident due to drug toxicity, and three died by homicide.
- 37 stillbirths and 35 neonatal deaths resulted from pregnancies where no prenatal care had been received.

These are some examples. Please review the specific section of this report for other important trends.

Other trends became apparent based on the deaths that were reviewed in 2021 and 2022. One such trend — an increase in deaths during pregnancy related to substance use — mirrored the overall experience seen across the province with an increasing number of toxicity deaths. In 2021–2022, there were nine deaths during pregnancy resulting from drug toxicity, which was more than the previous eight years combined. Active substance use was also found to be common in perinatal suicides, neonatal deaths and stillbirths, and to deaths following concealed births.

The importance of ongoing monitoring of the data was also shown in an unexpected cohort of deaths related to “freebirths”, where medical providers were intentionally excluded from attendance at the birth. While the numbers of deaths remain relatively low (five deaths in 2022, and five deaths in the previous nine years combined), this increase warrants closer examination.

While tracking current deaths, during 2021–2022, the OPDRC continued its incredibly important work and reviewed 48 deaths individually, resulting in 87 recommendations, many related to specific health care risks during pregnancy and the perinatal period. As we continue to analyze the social, cultural and demographic factors related to perinatal and obstetric deaths, we hope that a more complete picture of the related issues will support more relevant, holistic and effective recommendations.

Challenges

In 2023 updates were made to our investigation database, QuinC, to improve data entry on race and gender identity. Because this annual report represents OPDRC reviews on death investigations taking place prior to 2023 (i.e., reviewed by OPDRC in 2021 and 2022), the data being shown in this annual report are incomplete for race and gender identity.

Although pregnancy related deaths are a mandatory report to the Office of the Chief Coroner of Ontario (OCC) for investigation, if they are not recognized and reported, they cannot be explored further. The Office of the Registrar General of Ontario, since 2019, has revised medical certificates of death expanding checkboxes related to pregnancy and the postpartum up to one year postpartum, to help identify these deaths, either by the professional completing the certificate, or the Office of the Registrar General on review. This has made recognition and investigation of these tragic deaths more complete; we are currently reviewing deaths that were first brought to the attention of the OCC a few years after they occurred. Capturing all of these deaths for review should help improve our understanding of these deaths and provide more opportunities for prevention.

As mentioned earlier, commencing in 2023, coroners are to investigate all postpartum deaths up to one year postpartum. Prior to 2023, only those deaths up to 42 days postpartum, and deaths afterwards which appeared directly related to pregnancy were mandatory investigations. We have found that many deaths later in the postpartum are related to the pregnancy and may be preventable. It is our hope that investigating these later deaths will enhance and expand the recommendations which can be made to reduce mortality during this time period.

Plans for the Future

Thanks to improvements in data collection and analytic capacity, the OPDRC has been able to delve further into social, economic and geographic aspects of the deaths they review. Relationships between perinatal deaths and rurality, material deprivation and housing instability are a few of the factors already identified and discussed with our data. With the mandatory collection of information on race that began in 2023, and ongoing work to improve collection of gender identity, future analyses will be able to provide greater insight.

Other improvements to data collection at the OCC are also in progress, including the creation of standardized data collection templates for investigated neonatal deaths and stillbirths, and revisions to an existing template for pregnancy and postpartum deaths. These templates will improve the information that is available concerning social and cultural factors that may have been associated with deaths, such as language and ethnicity, types of support systems in place during pregnancy, and encounters with child protection agencies.

The types of analyses presented in this report have resulted in the creation of an OPDRC subgroup focusing on deaths from drug toxicity, and there are plans for other subgroups focused on mental health and suicide. As well, awareness has been raised about identified trends, including unattended births and concealed births, which will guide the future work of the OPDRC and hopefully others with interest in this area.

Finally, in conjunction with our partners at Better Outcomes Registry and Network (BORN), the OPDRC will be able to provide the maternal mortality rate (MMR) for Ontario for the next annual report. This should allow us to contribute to Canada's data and help the province compare with other jurisdictions on a standardized basis (the World Health Organization tracks each country's MMR).

There has been much learned over the past two years, and much more to do. Please share this document widely with your colleagues, friends, families and anyone you know who may have an interest in obstetrical and newborn health. The more we learn and share, the better pregnancy and childbirth outcomes will be.

Questions and Concerns

Questions and comments regarding this report may be directed to:

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