Minnesota Maternal Mortality Report

Reporting for 2017-2018

DEPARTMENT OF HEALTH

Prepared by

Minnesota Department of Health

Women & Infant Health Unit

625 Robert Street North PO Box 64882

St. Paul, MN 55164-0975

Phone: 651-201-3650

Email: health.women-health@state.mn.us

Contact health.communications@state.mn.us to request an alternate format.

www.health.mn.gov

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Dedication

The Minnesota Department of Health (MDH) would like to acknowledge the 48 people who died while pregnant or within one year of their pregnancy during 2017-2018. We recognize that everyone's families and communities were deeply impacted by their loss. Understanding the cause of pregnancy-associated deaths in Minnesota will help prevent future generations experiencing these tragic events and cultivate a safer, more just society for our children and families to learn and grow.

Acknowledgments

We would like to acknowledge the countless number of community stakeholders, partners, and advocates who continue to champion this work throughout the state. A special thanks to those pursuing change in maternal health through the levers of population health. In addition, we are grateful to the partners who have championed this work. Their leadership and guidance built the foundation of maternal mortality reviews in Minnesota: Dr. Elizabeth Elfstrand, Dr. Katy B. Kozhimannil, Dr. Kathleen Pfleghaar, Dr. Lisa Saul, and all other members who were a part of the Maternal Mortality Review Committee from 2012-2017. Thank you to partners in the Office of Vital Records, medical examiner offices, health systems records management, and law enforcement, for supporting MDH's work over many years. Additionally, we would like to acknowledge staff from the Centers for Disease Control and Prevention (CDC) Office of Reproductive Health who have provided support, technical assistance, guidance, and leadership in maternal health improvement as the nation moves this work forward.

We would like to thank our dedicated volunteers who currently serve on the Maternal Mortality Review Committee and those who have served in the past for their integral work completed over the years to identify opportunities to improve maternal health in Minnesota. The time, dedication, and devotion to this work from this group of people is appreciated and extend our gratitude to the partners and allies who have moved this work forward year after year.

Maternal mortality review committee membership from 2019-2020

Membership of this review committee reviewed 2017-2018 pregnancy- associated deaths during the years of 2019-2020.

Co-Chairs
Rachel Hardeman, Ph.D., MPH
Cresta Jones, MD

Gina Adasiewicz

Jennifer Almanza, DNP, CMN

Courtney Baechler, MD

Heather Bell, MD

Debbie Biffle, RN

Ashley Blaine, RN

Melissa Bray, MSN Ed, BSN, RNC-MNN

Erin Carder

Stephen Contag, MD

Rachel Cooper, MD

Mira Cummins, LICSW

Dorene Day

Elizabeth Elfstrand, MD

Sakeena Futrell-Carter, CNM, DNP-A,DNP-WH

Erica Gerrity

Jessica Holm MS, APRN, CNM

Lorren Jackson, III, MD

Lisa Johnson, RN, MHA, BSN

Robin Johnson, RN

Elizabeth LaRusso, MD

Laura Miller, MD

Carrie Neerland, Ph.D.

Fritz Ohnsorg

Rosemond Owens, CDM/MPH

Meghan Porter, MPH, CLS

Kathleen Pfleghaar, MD

Colleen Quesnell, ANP-BC, WHNP-BC

Lisa Saul, MD

Jennifer Schoenecker

Salma Shaker, MD

Abigail Stoffel, LNHA

Angela Thompson, MD

Anika Ward

Minnesota Department of Health Staff
Joan Brandt, Ph.D
Karen Fogg, MPH
Alina Kraynak DNP, RN
Kathryn Linde, MPH
Molly Meyer, MPH
Noya Woodrich, MSW
Mira Sheff Ph.D, MS
Lynn Thompson
Anne Walaszek, MPH

Other Contributors
Zoe Kusinitz, MPH
Neeti Seethi
Cecilia Wachdorf, CNM, Ph.D.

Executive summary

This report includes the findings of the Minnesota Department of Health's Maternal Mortality Review Committee (MMRC) and includes birthing people who died during or within one year after the end of the pregnancy in 2017-2018. A comprehensive review of these deaths was done by the MMRC, which is multidisciplinary and includes diverse members from systems and programs serving birthing people. Through the committee's review, recommendations are made for changes to policy, programs, systems, practice guidelines, and health care providers services. These recommendations focus on preventing pregnancy-associated deaths, improving health equity and birth outcomes. Below are the key findings from the 2017-2018 pregnancy-associated death reviews.

Maternal mortality key findings

In the years 2017-2018, there were 48 pregnancy-associated deaths to birthing people in Minnesota. The state's pregnancy-related mortality ratio (PRMR) for 2017-2018 was 8.8 pregnancy-related deaths per 100,000 births compared to the national PRMR of 17.3 pregnancy-related death per 100,000 births in 2017.

Pregnancy-Associated deaths (All deaths within one year of pregnancy)

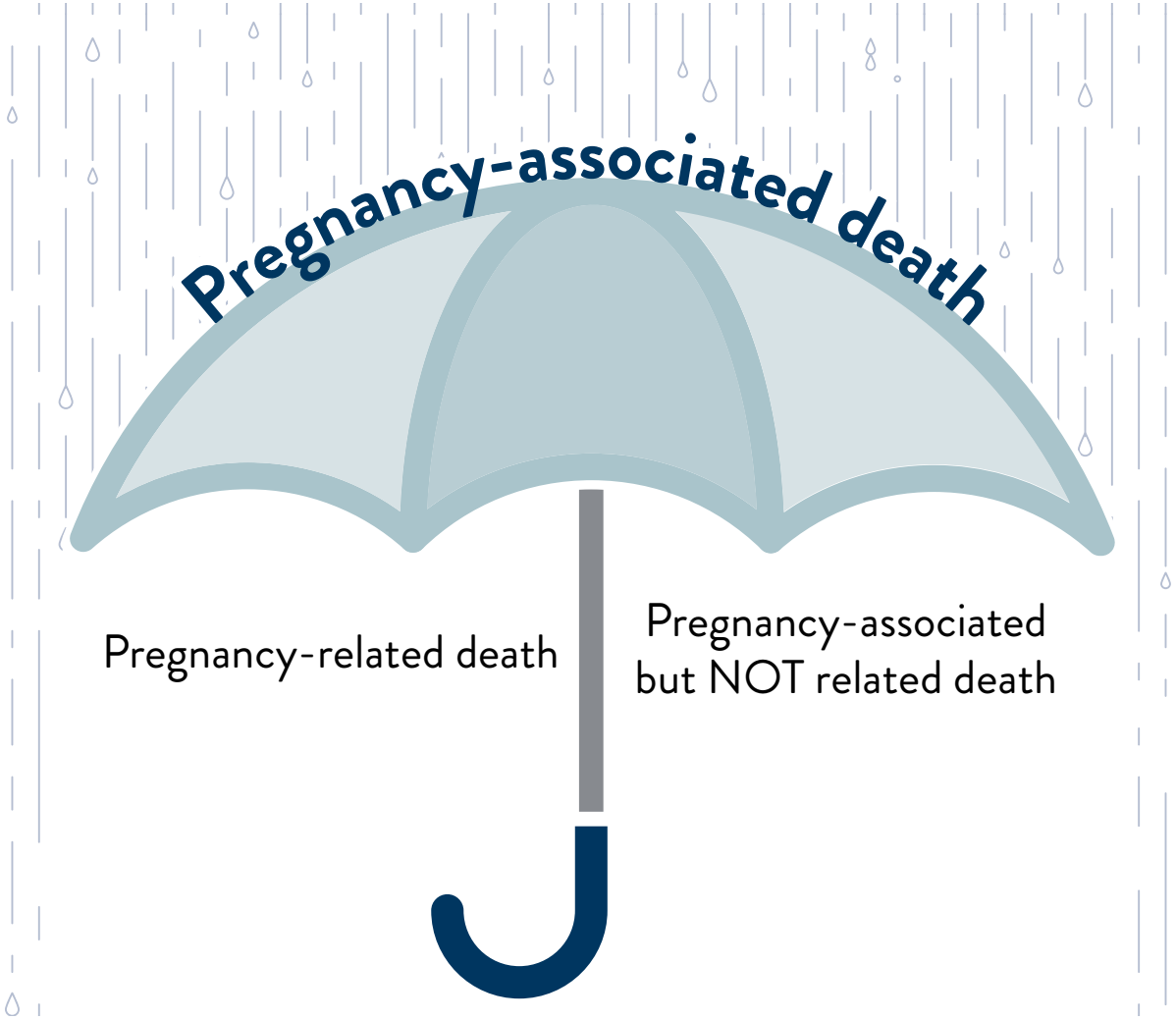
- While Black birthing people (13%) and American Indian birthing people (2%) are a small portion of the birthing population, they are disproportionately represented among the pregnancy-associated deaths, making up 23% and 8% of the deaths respectively.
- 52% of pregnancy-associated deaths occurred among residents of the seven-county metro area and 48% occurred among residents outside of the metro region.
- Most pregnancy-associated deaths (62.5%) occurred between six weeks after the pregnancy and one year postpartum, 20.8% occurred during pregnancy, and 16.7% occurred 0-42 days postpartum.
- Injuries are the leading cause of death for pregnancy-associated deaths (45.8%), including deaths related to motor vehicle accidents, poisoning/overdose, and homicide or suicide, including firearm-related deaths. Substance use was identified as a cause or contributing factor in 31.3% of the pregnancy-associated deaths.

Pregnancy-related deaths (deaths within one year of pregnancy where pregnancy was the aggravating factor)

- Of the pregnancy-related deaths, 100% of the deaths were determined to be preventable.
- Because of the relatively small number of pregnancy-related deaths, we were unable to identify trends in cause of death or report data showing race/ethnicity and location of residence due to the small number of pregnancy-related deaths
- Half (50%) of the pregnancy-related deaths occurred 0-42 days postpartum.

Pregnancy-associated but NOT related (deaths within one year of pregnancy where pregnancy was NOT the aggravating factor)

- Injuries from motor vehicle accidents (16.7%) is the leading cause of pregnancy-associated but NOT related deaths was followed by deaths from poisoning/overdose (12.5%).
- Three quarters (75%) of the pregnancy-associated but NOT related deaths occurred six weeks to one year postpartum.



Highlighted recommendations:

1. Expand Medicaid coverage to include benefits immediately beginning during the prenatal period and at one year postpartum. As of July 1,2022, Medical Assistance will now extend one year postpartum.
2. Support statewide improvements for birthing people who have substance use disorders (SUD) or mental health conditions, including adequate identification of substance use and mental health conditions in the birthing population, referral to behavioral health services and support groups, and increased funding to expand treatment and access to treatment throughout the state.
3. Develop standardization of referral network within systems and regions to refer birthing people to locations for appropriate level of care, and to decrease delay in needed diagnostics, interventions, or elevation of care.
4. Improve the postpartum period by assuring that birthing people have access to care team no later than three weeks postpartum.
5. Address bias in systems perpetuating disparities in the birthing population. Acknowledge historical trauma and racism and the impacts on birthing people.
6. Fund community lead networks and support systems to provide culturally informed care to fit birthing person's needs.
7. Listen and support birthing people. Listen to concerns, provide a network of support during and after the postpartum period.

Maternal mortality overview

The purpose of this report is to describe the state of pregnancy-associated deaths that occurred in Minnesota from 2017-2018. This report describes demographic characteristics of pregnancy-associated deaths of Minnesotans and summarizes the causes of deaths and factors contributing to these deaths. The Minnesota Department of Health's Maternal Mortality Review Committee (MMRC) reviews and examines all deaths that occur while pregnant or within one year of the termination of pregnancy, which includes both pregnancy-associated and pregnancy-related deaths. This includes people died during a pregnancy, or within 12 months of a fetal death, live birth, or other termination of pregnancy. The MMRC creates recommendations tailored to improve policies and practices for individuals/support persons, providers, facilities, systems, and communities. The goal of the recommendations is to identify opportunities to improve outcomes for birthing people and reduce the numbers of preventable pregnancy-associated deaths in Minnesota.

Committee structure

The Maternal Mortality Review Committee (MMRC) is a multidisciplinary committee of expert professionals involved in the care of pregnant persons. Professions represented include but are not limited to obstetrics/gynecology, maternal fetal medicine, family medicine, midwifery, nursing, psychiatry, forensics, social work, Tribal Liaisons, law enforcement, emergency medicine, racial equity research, and health policy. This diverse group ensures a multifocal approach to pregnancy-associated death reviews, allowing recommendations to address all spectrums of an individual's health and well-being. With the restructuring of the review committee, the inclusion of community advocates, organizations, and diverse birthing practice background was paramount. With all reviews, engaging community organizations serving communities most impacted is integral to improving health outcomes. The review committee structure includes and will continue to include non-medical voices to promote collaboration and partnership between systems and community organizations.

This report includes the activities of the MMRC in 2019-2021, and recruitment for this committee occurred during the spring/summer of 2019. A survey was distributed to professional and community organizations throughout the state to ensure the composition of the review committee represented the geographic, demographic, and health disciplines providing care to birthing people

History of review committee activities

In Minnesota, pregnancy-associated deaths have been reviewed for decades. From 1950-1985, a physician-only pregnancy-associated death review committee studied pregnancy-related deaths and provided critique and recommendations for medical care in Minnesota. The committee disbanded in 1985 after concluding that pregnancy-related deaths had reached an "irreducible minimum" in terms of preventability. Minnesota continued its commitment to pregnancy-associated death surveillance activities from 1985-2011. However, minimal work was done to create systemic recommendations to reduce or prevent pregnancy-associated deaths.

Legislation authorizing the commissioner of health to conduct pregnancy-associated death studies was enacted in 2001. From 2012 to 2017, the Minnesota Commissioner of Health convened a multi-disciplinary pregnancy-associated death review committee forming the Minnesota Maternal Mortality Review Project. The Maternal Mortality Review Project consistently convened prior to the summer of 2017. These reviews followed similar logic and strategy of the current reviews. In 2019, Minnesota implemented the CDC's Maternal Mortality Review Information Application (MMRIA) to assist with standardizing the review process. The reviews occurring before 2019 have many similarities with the current process; however, the output is not included in the report at this time as the identification and reporting of pregnancy-associated deaths has significantly improved. A retrospective report focusing on the work completed in 2013-2016 will be released later.

In 2021, the authorizing statute was amended to formally establish the MMRC, specify the composition of the MMRC, and clarify and expand data sources related to the birthing person's death (MINN. STAT. 145.901 (2021)). As a result, the committee is now composed of 25 members appointed by the Minnesota Commissioner of Health.

Definitions

There are multiple definitions of what is classified as a pregnancy-associated death. In Minnesota, we use the definitions from the American College of Obstetricians and Gynecologists (ACOG) and the CDC.

- ***Pregnancy-associated death:*** A death during pregnancy or within one year of the end of pregnancy, irrespective of cause.
- ***Pregnancy-related death:*** A death during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.
- ***Pregnancy-associated but NOT related death:*** A death during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy.
- ***Pregnancy-associated but unable to determine pregnancy relatedness:*** A death during pregnancy or within one year of the end of pregnancy from a cause that could not be determined as pregnancy-related or not pregnancy-related. Maternal Mortality Review Committee Facilitation Guide. (2021)
- ***Health care team:*** A group of professionals contributing to the care of birthing people. This includes all provider types and ancillary staff birthing people may encounter during their pregnancy journey. Examples include but are not limited to: family medicine provider, obstetrician, maternal fetal medicine provider, nurse practitioner, physician assistant, midwife, registered nurse, social worker, doula, occupational therapist, phlebotomist, pharmacists, rooming staff, and lactation consultant.

Maternal mortality review process

Pregnancy-associated death identification and narrative

The Minnesota Department of Health's Child and Family Health Division (CFH) and Office of Vital Records (OVR) collaborate to identify pregnancy-associated deaths by using vital records and enhanced surveillance methods. The OVR uses improved ascertainment methods recommended by the CDC to identify deaths of birthing people using one of the following:

- Pregnancy check box selected on the death certificate indicating:
    - Pregnant at the time of death
    - Not pregnant, but pregnant within 42 days of death
    - Not pregnant, but pregnant 43 days to 1 year before death
- Medical coding indicating a pregnancy-related cause of death, and/or
- Linking a birth or fetal death certificate within one year of the date of a pregnancy-associated death.

In addition, CFH staff review obituaries, Facebook pages, newspaper articles, and other internet searches to identify other potential pregnancy-associated deaths. Using the identified pregnancy-associated death information, CFH staff request health-related records to capture the events of the person's life leading up to and including their death. Information requested includes but is not limited to hospital records of a birth, a fetal death, facility where birth or death occurred, medical examiner, prenatal care by a provider/clinic, law enforcement interaction, and other pertinent health information

The information is abstracted by a medical professional into MMRIA, a secure CDC database system, and it is summarized into a pregnancy-associated death narrative, which is a detailed story of the person's experiences prior to their death. For privacy reasons, the narrative is unidentified and presented with the MMRC to start the discussion of how to prevent future deaths.

The MMRC review of the pregnancy-associated death follows the Committee Decision form from MMRIA.
The committee addresses the following for each pregnancy-associated death:

- Was the death pregnancy-related, determine underlying cause of death.
- Was the death preventable, factors that contributed to the death.
- What recommendations may help prevent future deaths?

Limitations to the 2017-2018 data

Some pregnancy-associated death information was not entirely complete for the MMRC review. Significant barriers to accessing records for the review include: identifying sources of prenatal and other related health care, birthing location or care provided in institutions, and law enforcement documents. An improvement for pregnancy-associated death reviews would be access to all medical records of a person, including substance use, WIC participation, family home visitor records, and additional medical visits that are not included in other records requests. The MMRC does not review out-of-state deaths. If a Minnesota resident is identified as a pregnancy-associated death in another state or jurisdiction, CFH staff work with the vital records and maternal mortality review staff of state/jurisdiction where the death occurred to obtain charts and information pertinent to the death review.

During the 2017-2018 pregnancy-associated death reviews, the MMRIA committee decision form was updated to include documentation of discrimination, systemic racism, and interpersonal racism as contributing factors. In this report these three contributing factors are likely to be under-represented due to the addition of documenting this information halfway through review meetings. In addition, with the committee decision form changes, SUD diagnosis at the time or pregnancy-associated death reviews are categorized as injuries or unintentional injuries, which could underestimate rates of pregnancy-associated deaths involving substance use.

Pregnancy-associated deaths

From 2017-2018, 48 pregnancy-associated deaths were reviewed by the MMRC in Minnesota. Age, education level, and location of residence were identified from the death certificate. Race/ethnicity* was identified from the birth record when available, otherwise the death certificate was used. Figure 1 provides the race/ethnicity of all pregnancy-associated deaths in comparison to births occurring in the state. Most deaths were among non-Hispanic white people (60%), followed by 23% among non-Hispanic Black, 8.3% American Indian, 4.2% Asian, and 4.2% Hispanic. Rates based on small numbers are unstable and can be misleading, therefore are not calculated for these populations.

However, to give these numbers context, the percentages can be compared to the percent of births by race. Most births occurred among non-Hispanic white people (69%), followed by 13% non-Hispanic Black, 8% Asian, 7% Hispanic, and 2% American Indian people. The data shows a higher percentage of deaths among non-Hispanic Black and American Indian birthing people when compared to the percent births for each group. This data is not reflective of location of where the birthing person was born. Therefore, U.S. born and foreign-born birthing people are combined in this data.

Pregnancy associated deaths by race/ethnicity (overall), 2017-2018

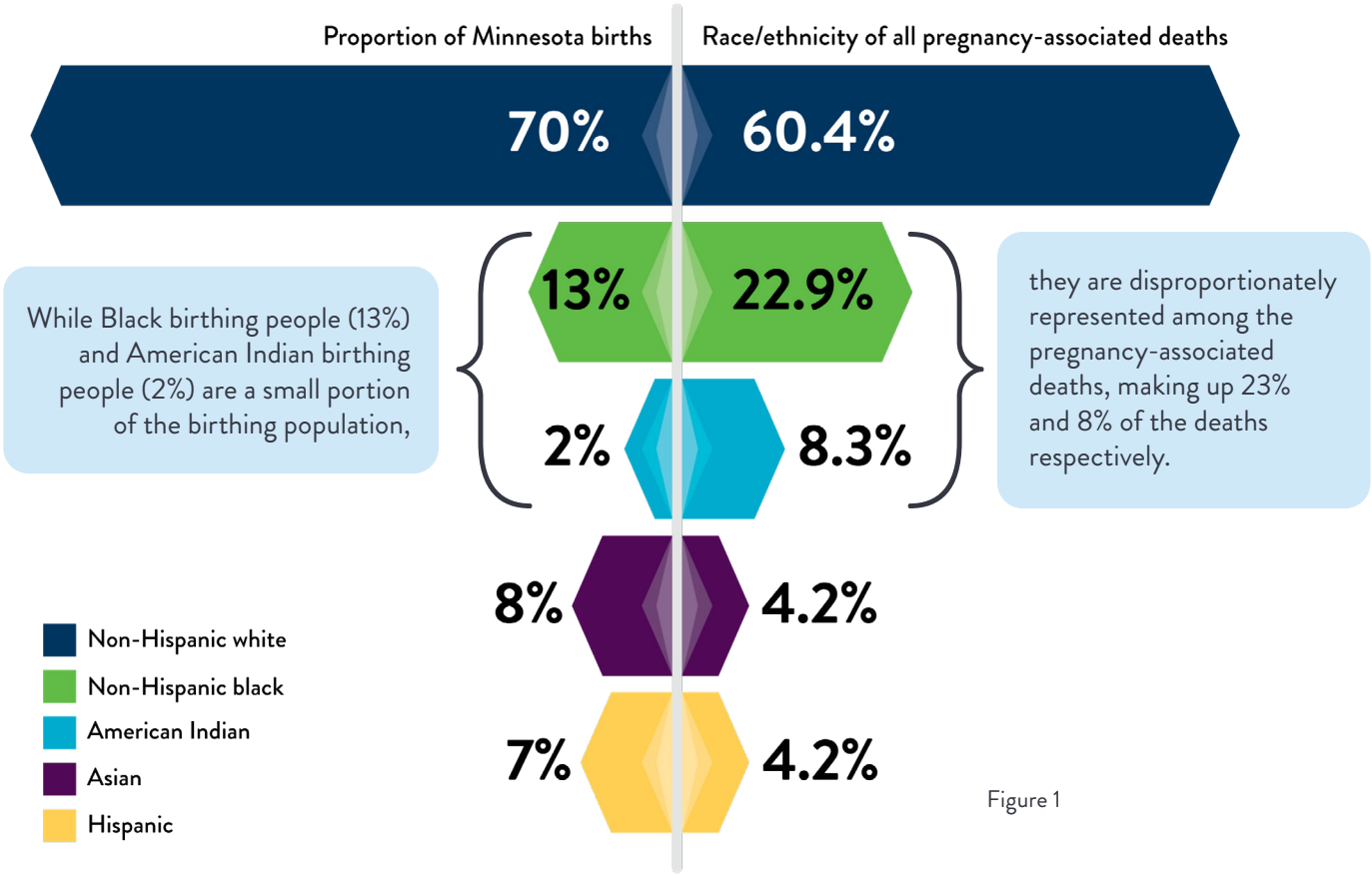


Figure 1

Race/ethnicity is determined from the birth certificate or fetal death record when available. If no birth/fetal death record was available, then race/ethnicity is determined from the death certificate. If a death was of mixed race and American Indian was one of the racial groups noted, then the death was classified as Non-Hispanic American Indian. Otherwise, if a death was mixed race and included Black/African American, then the death was classified as Non-Hispanic Black. Hispanic can include any racial group.

1 in 4 deaths is pregnancy related

Location of residence

In 2017-2018, more than 50% of the pregnancy-associated deaths occurred in the seven-county metro region. The central region of the state had 14.6% (seven) of the pregnancy-associated deaths, and both the northwest and south-central regions had 10.4% (five deaths each). Figure 2, *Location of residence for pregnancy-associated death vs. Proportion of MN births by location*, compares the number of births occurring in each region** for 2017-2018 to the pregnancy-associated deaths occurring in these regions. The Northwest and South Central regions have a higher percentage of deaths compared to percentage of births. With pregnancy-associated deaths by regions occurring in small numbers, this prohibits calculation of rates that are ideal for comparisons.

Location of residence of pregnancy-associated death vs. proportion of MN births by location

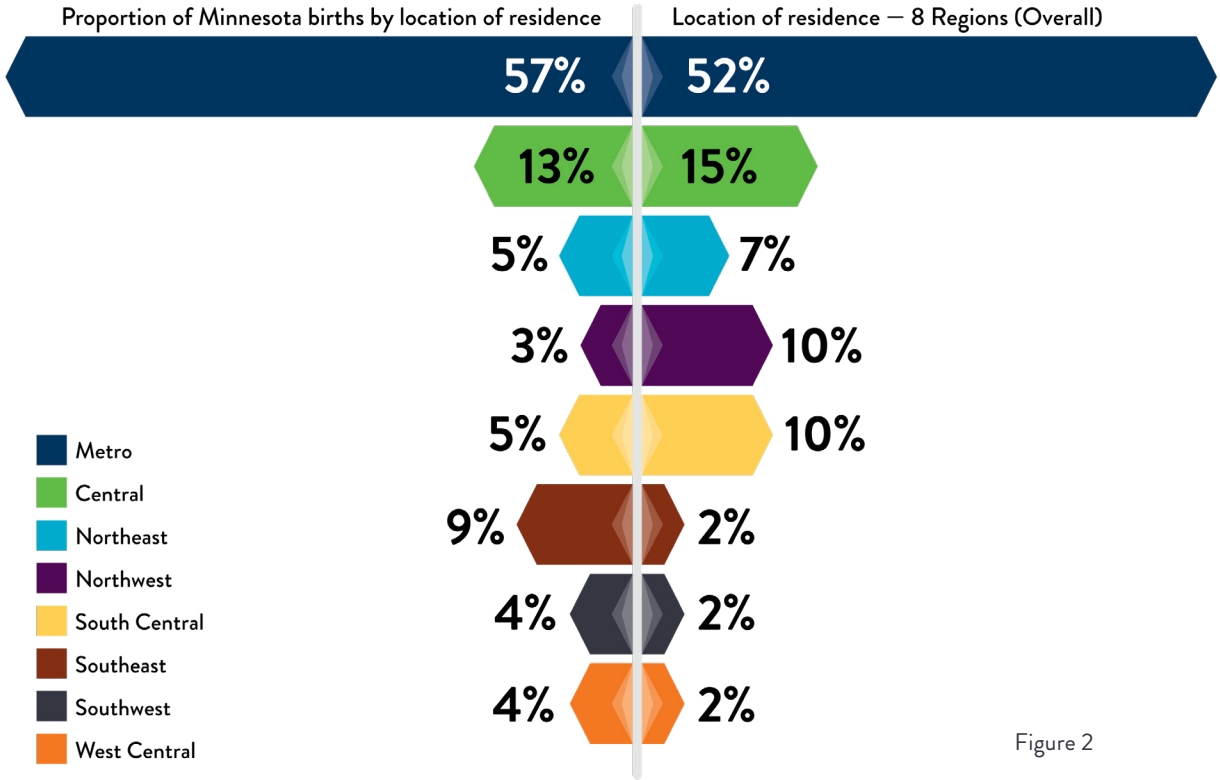


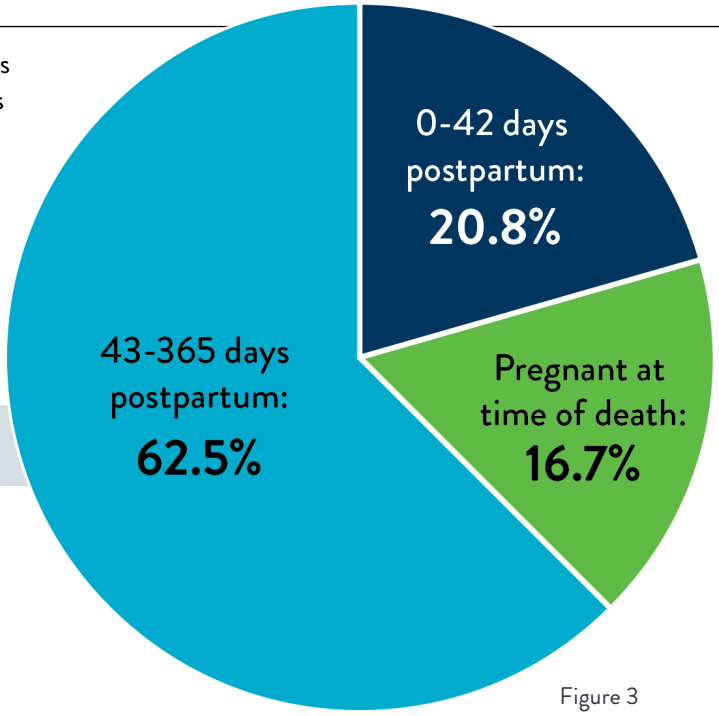
Figure 2

In 2018, 5,611,179 people lived in Minnesota, with more than half (55%) of its residents living in the 7-county Minneapolis-St. Paul metropolitan area
Metro counties include Anoka, Carver, Dakota, Hennepin, Scott, Ramsey, and Washington. The regions used in the report are based on the State Community Health Services Advisory Committee (SCHSAC) configuration.

***Birth location is determined by location of where birthing persons residence is at the time of birth*

Pregnancy status

From 2017-2018, 62.5% pregnancy-associated deaths occurred six weeks – one year postpartum or 6 weeks to one year after birth event Twenty percent of the deaths occurred while the person was pregnant, and 16.7% occurred 0-42 days postpartum. (Figure 3)



Timing of death (overall)

Figure 3

Leading cause of death for pregnancy-associated deaths

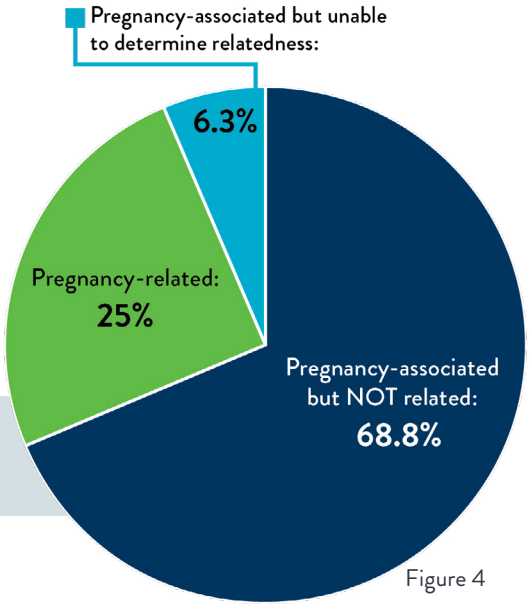
The leading causes of death for the 48 identified pregnancy-associated deaths from 2017-2018 is in table below. The leading cause of pregnancy-associated death was injury (45.8%, n = 22) which includes eight motor vehicle accidents (16.7%), six poisoning/overdoses (12.5%), four hanging/strangulation/suffocation (8.3%), and three (6.25%) by firearm. In addition, there were four deaths caused by cancer (8.3%), three related to infection (6.25%), three related to neurologic/neurovascular diagnosis (6.25%), and two other injuries (4.17%).

Table 1: Leading cause of death for pregnancy-associated deaths

Cause of death	Frequency	Percent
Injury - motor vehicle accident	8	16.7%
Injury - poisoning/overdose	6	12.5%
Injury - Hanging/strangulation/suffocation	4	8.3%
Cancer	4	8.3%
Firearm, infection, neurological/neurovascular	3 (for each diagnosis)	6.25%

Pregnancy-related vs. pregnancy-associated but NOT related

Of the 48 pregnancy-associated deaths identified, the MMRC determined the majority, 33 (68.8%) of pregnancy-associated deaths were pregnancy-associated but NOT related (Figure 4). Due to the small number of deaths, pregnancy-associated but unable to determine relatedness are not discussed in detail to maintain decedent privacy.



Committee determination of pregnancy-relatedness, pregnancy-associated deaths

Figure 4

The pregnancy-associated mortality ratio (PAMR) allows states to calculate pregnancy-associated death ratios per total number of births occurring in the state, and it allows for standardized comparisons to other states or national data. This is calculated by dividing the number of pregnancy-associated deaths by the number of live births occurring for both years, and then multiplying by 100,000.

For 2017-2018, Minnesota's PAMR was **35.3** pregnancy-associated deaths per 100,000 live births.

A pregnancy-related mortality ratio (PRMR) can be calculated using number of identified pregnancy related deaths and dividing by the number of live births for both years and then multiplying by 100,000. PAMR and PRMR for each race/ethnicity cannot be reported at this time.

For 2017-2018, Minnesota's PRMR was **8.8** pregnancy-related deaths per 100,000 live births.

The national PRMR 2017 was 17.3 pregnancy-related death per 100,000 births prospectively. Because of the small number of pregnancy-associated deaths within each racial/ethnic group, PAMR and PRMR were not calculated.

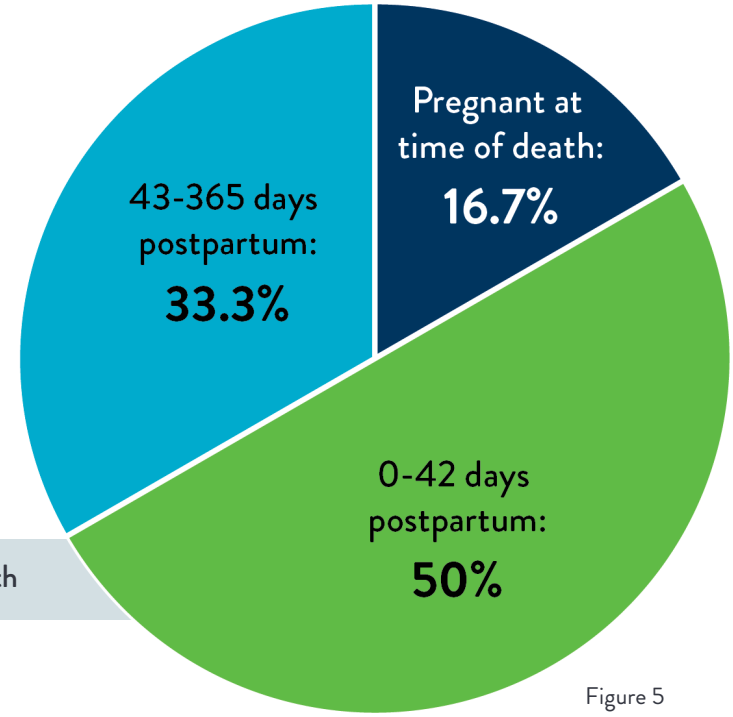
Pregnancy-related deaths

Pregnancy-related deaths have typically been the focus of surveillance and analysis for maternal outcomes on a national and global scale. However, because of the relatively small number of pregnancy-related deaths in Minnesota from 2017-2018, we are unable to identify trends in cause of death or report data showing race/ethnicity and location of residence due to the small number of pregnancy-related deaths. Small numbers are not reported to maintain the decedent's privacy. However, there were similar contributing factors identified among the pregnancy-related deaths which allowed the MMRC to suggest recommendations for improvement.

Timing of death

In 2017-2018, among the 12 pregnancy-related deaths identified by the MMRC, half (5) occurred 0-42 days postpartum, (Figure 5). Most pregnancy-related deaths (58.3%; n=7) occurred in metropolitan areas (population of 50,000-2,499,999 residents), while 25% (3) occurred in rural areas (less than 10,000 residents), and 16.7% (2) occurred in micropolitan areas (populations of 10,000-49,999 residents).

The MMRC reviews all pregnancy-associated deaths to determine preventability. Of the identified 12 pregnancy-related deaths, 100% were deemed preventable by the committee.



Pregnancy-related deaths by timing of death

Figure 5

Underlying causes of pregnancy-related deaths

The causes of pregnancy-related death identified from 2017-18 include: infection (16.7%, n=2), cardiomyopathy (8%, n=1), cardiovascular conditions (8%, n=1), embolism (8%, n=1), collagen vascular/autoimmune (8%, n=1), hematologic (8%, n=1), hemorrhage (8%, n=1), hypertensive disorders (8%, n=1), injury (8%, n=1), pulmonary (8%, n=1), and unknown cause of death (8%, n=1). Due to the small number of pregnancy-related deaths from 2017-18, no underlying trends in pregnancy-associated deaths could be identified, therefore data is not depicted.

Pregnancy-associated but NOT related deaths

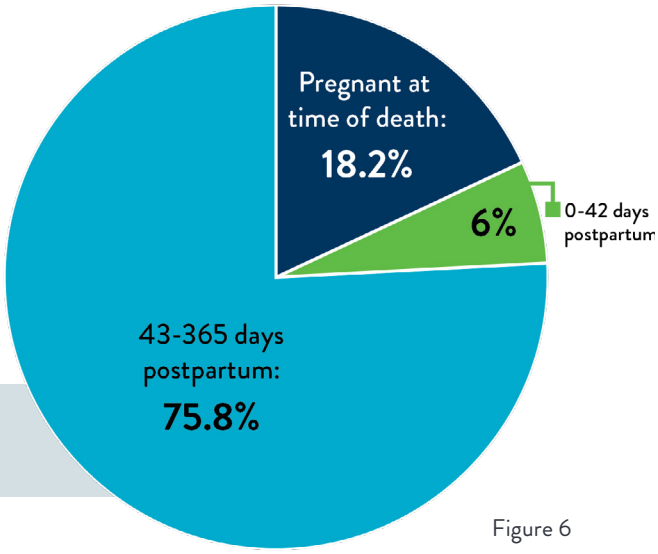
Among the 48 pregnancy-associated deaths in Minnesota from 2017-2018, 68.8% (33) were determined to be pregnancy-associated but NOT related to the pregnancy. Though pregnancy did not cause the death, reviewing and applying population health principles to these deaths allows stakeholders the opportunity to identify areas of improvement.

The majority (75.7%; n=25) of pregnancy-associated but NOT related deaths occurred in metropolitan areas (50,000-2,499,999 residents), 15.1% (5) occurred in rural areas (less than 10,000 residents) and 9% occurred in micropolitan areas (10,000-49,999 residents).

In determination of preventability for the pregnancy-associated but NOT related deaths, the majority were determined preventable (87.9%; n=29), while the remaining were determined by the committee to be not preventable (12.1%; n=4).

Timing of death

Figure 6 depicts the timing of death for pregnancy-associated but NOT related deaths, with 75.8% (25) occurring six weeks to one year postpartum. To note, during this timeframe, if an individual was on Medical Assistance during their pregnancy, their insurance was not extended past 6 weeks postpartum.



Timing of death for pregnancy-associated but NOT related deaths

Figure 6

Leading cause of death pregnancy-associated but NOT related deaths

Table 2 depicts the five identified leading causes of death by pregnancy-associated but not related deaths. Motor vehicle was identified as the leading cause with eight pregnancy-associated deaths, followed by five pregnancy-associated deaths by poisoning/overdose.

Table 2: Leading Cause of Death for Pregnancy- Associated but NOT related Deaths

Cause of death	Frequency	Percent
Motor Vehicle	8	40%
Poisoning or Overdose	5	25%
Hanging or Strangulation	3	15%
Firearm	2	10%
Other or sharp instrument	3	15%

Recommendations

The MMRC's goal is to identify contributing factors and recommendations to prevent future deaths for the identified pregnancy-associated deaths. In this process, the MMRC identified 231 contributing factors in total to the pregnancy-associated deaths. These contributing factors may not necessarily cause the pregnancy-associated death; however, recommendations were developed by the MMRC to address opportunities of intervention for each factor. These groupings are recognized and organized by level of impact. The groupings were created by CDC. They include the health care team, facility, system, and community

Contributing factors to the pregnancy-associated deaths can include factors affecting an individual all the way to a systems level. Recommendations from the MMRC are grouped as the following:

HEALTH CARE TEAM: A person or group of people with education and training, who provide care, treatment, and/or advice.

FACILITY: Physical location where direct care is provided including clinics, urgent care, and hospitals.

SYSTEM: Interacting entities that support services before, during, or after pregnancy, including health care systems, payors, and public services and programs.

COMMUNITY: A grouping based on a shared sense of place or identity including physical neighborhoods or community based on common interests, culture, and shared circumstances.

For all pregnancy-associated deaths, there were many contributing factors where the impact was primarily on the birthing people or their support persons (patient/family). However, by applying multidisciplinary backgrounds in the reviews of the pregnancy-associated deaths, the MMRC was able to develop recommendations intended for health care teams, facilities, systems, and communities.

Figure 7, *Recommendations from MMRC by level of impact*, depicts the role of systems (42%) and facilities (19%) to implement change that could impact maternal health outcomes.

Recommendations by level of impact

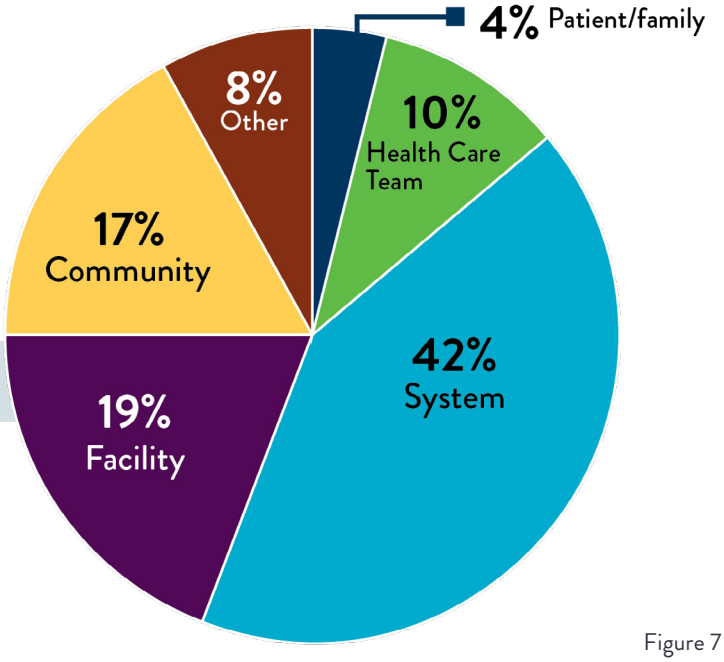


Figure 7

Population-level recommendations

Below are recommendations from the MMRC to improve population-level maternal health outcomes for all pregnancy-related deaths with a focus on the leading contributing factors. Many of these recommendations overlap with the MMRC's recommendations for pregnancy-associated but not related deaths.

Health care teams:

- Listen to birthing people if they express concerns around birthing process, options in care, or questions in the postpartum period. Work with them and their support people to meet level of readiness and share urgent warning signs. The CDC's Hear Her campaign is a great resource for birthing people and health care professionals.
- Understand how conscious and unconscious bias may exhibit in care. Work with the care team to unlearn bias and build a framework of equity in care delivery services.
- Encourage cross-collaboration with providers. Develop referral networks or communities of practice to allow consultation on patients and help identify risky diagnosis in a timely fashion.

Facilities:

- Encourage having the same health care teams providing care to birthing people. Consistent care team providers could lead to improved opportunities in care plans to ensure needs are addressed.
- Provide holistic wrap-around services for birthing people. Work with social work, doulas, and community organizations to ensure family's needs are covered while individual is pregnant and postpartum.
- Provide teaching and education about pregnancy in the patient's preferred language and learning style. Birthing people should have tools and options for treatments.
- If there is a question or concern including from support persons, facilities and systems should listen to them and work in collaboration to address concern. Facilities and systems should offer doula services.
- Facilities should provide a 360° training for providers focused on bias and trauma. Educate staff about how and how this can be triggering to the birthing person, and how health care team may be delivering care in a biased, inequitable way. Provide annual coaching for staff to understand and address biases. Create opportunities for birthing persons to report experiences of bias and address those root causes by implementing systemic changes.
- Implement trigger tools in electronic health records and emergency departments to identify in the record that the patient has been pregnant in the past year and include postpartum reference. Include metrics in the record to quickly identify signs and symptoms attributed to sepsis, postpartum bleed, hypertensive crisis, etc. to alert health care team of possible elevation of care.
- On top of discharge summaries, facilities should include a triage line to contact care team directly when there are concerns or questions. Have care team discuss with birthing person and support persons options to contact team when at home (develop a communication plan).
- Facilities should set up a postpartum plan prior to discharge, following ACOG Optimizing Postpartum Care Recommendations. Birthing people should have contact with care team within 3 weeks of discharge. Utilization of culturally-focused doulas, community health workers, or integration of a home visitor nurse model for multiple touch point to follow up.

Systems:

- Statewide and regionally develop standard protocols for treating emergencies that may occur during pregnancy and postpartum, such as hypertension, sepsis, and hemorrhage. Utilize telehealth consults and identify means to improve quick transfers for elevation of level of care needs.
- Develop standardization of referral network to build capacity within systems and regions to refer people during pregnancy and postpartum to other locations for appropriate level of care. Consultation specialties could include cardiology, endocrinology, high-risk pregnancy specialist, and SUD/behavioral health specialties.
- Offer one-year postpartum health coverage (Medicaid and other insurance) to treat chronic health conditions, complications, reproductive health, medication coverage and mental/chemical health. As of July 1,2022, Medical Assistance will now extend one year postpartum.
- Provide access to care through integrated behavioral health homes and medical home access. Insurance coverage should be expanded to address mental health and behavioral health needs in the full year postpartum.
- Systems and facilities should collaborate and utilize doulas and community health workers during pregnancy and postpartum including implementation of doula services during hospitalizations. Systems need to support an emphasis on improving doula reimbursement models.
- Systems improvement around the postpartum (Fourth trimester). Emphasis on insurance coverage and public programs for all medical needs. Care coordination and support is integral for the first few weeks after discharge.

Communities:

- Support more maternal health improvement trainings and programs developed by communities impacted by pregnancy-associated deaths. Fund and create networks focused on the advancement of education to create a more diverse workforce serving birthing people throughout the state.
- Acknowledge that different birthing plans are necessary to meet the needs of the family. Integrate different models of care, focused on addressing each person's need and lead by needs of the community.
- Fund programs led by communities for communities to address strengths and gaps in resources, with funding to support a livable wage and receive equitable care. Listen and implement community identified strategies to cultivate a community where all birthing people can thrive.

Substance use disorders and mental health

The use of substances and incidence of mental health conditions during pregnancy and in the postpartum period has increased in identified pregnancy-associated deaths. Substance use disorder is a leading contributing factor of pregnancy-associated but not related deaths. Additionally, it was identified as a cause or contributing factor in 31.3 % of the pregnancy-associated deaths. The review committee identified the following recommendations to address substance use disorder contributing factors and means of improvement for providers, facilities, and systems to potentially improve maternal health outcomes:

Birthing people and their support people

- Provide information on signs and symptoms of possible overdose and access to education on Narcan use.
- Provide information with signs and symptoms of postpartum depression, so birthing people and their support system can call hotlines or seek referral if experiencing sadness during and after pregnancy.
- In collaboration with community groups, work on harm reduction programs and education in a trauma-informed care approach.

Health care teams

- Birthing people should be screened by heath care team for mental health/depression, substance use, and domestic violence, with appropriate referral networks in place for next steps. Using different screening models, such as SBIRT and other techniques, cultivate a relationship and identify their needs of support during and after pregnancy. These screenings should occur frequently throughout care to provide opportunities to seek assistance.
- Health care teams should increase the number of Buprenorphine waiver-trained advance practice providers. Provide a system of mentorship and resources for health care staff to integrate addition medicine practices into care.
- Use a holistic approach of connecting obstetric specialists, family medicine, traditional medicine and addiction medicine when working with birthing people and use substances during pregnancy and the postpartum period.
- Staff should receive training about de-stigmatizing mental health conditions and addiction. The training should include addressing how screenings and subsequent discussions around these conditions may place blame on the person.

Facilities

- Provide services such as the integration of harm reduction models, telehealth, and coordination with treatment facilities and residential programs. Use social workers, care coordinators, and doulas while in the hospital to identify needs of birthing people.
- Provide access to doula or community health worker services during and after pregnancy, with a connection to peer recovery specialist and programs.

Systems

- Connect people with comprehensive outreach and housing programs and resources for daily cares (safe home, transportation, childcare, food) during and after pregnancy.
- Increase availability of trauma-informed and culturally-appropriate mental health care and addiction programs. Enhance training to allow community focused and diverse workforces in behavioral health specialties, train more BIPOC mental health/drug counselors.
- Increase access and availability of crisis mental health services and general referral services for individuals in crisis.
- Support statewide projects to identify evidence-based care models, opportunities for screening for SUD and mental health conditions and referrals for treatment. Existing work with the continuous quality improvement model focuses include the Minnesota Hospital Association's neonatal abstinence syndrome perinatal road map and the Minnesota Perinatal Quality Collaborative.

Communities

- Increase funding and other resources for community-driven outreach and care coordination, which should be available during and after pregnancy for people who may use substances or have a mental health condition. Embolden organizations to increase access, services, and supportive networks statewide to connect people with culturally-appropriate treatment models.
- Provide access to Narcan and related use training, education, and safety around using certain substances that can lead to unintentional overdoses. Increase awareness and access to fentanyl testing strips and increased harm reduction practices.

Violence during pregnancy

Five (10.4%) of the pregnancy-associated deaths had violence as a cause or contributing factor. These include pregnancy-associated deaths from suicide and homicide. They were identified through the maternal mortality reviews. Recommendations focus on steps to address violent pregnancy-associated deaths with intimate partner violence identified as a contributor.

- Explore gun safety laws such as background check, screening, and education of those purchasing or handling guns for those around or sharing a household with a birthing person. Gun safety legislation could include restrictions on home manufactured firearms.
- During postpartum visits, screen for guns in the home and ask if mother feels safe in the home. Implement home visiting to check if guns are in the home and what steps can be implemented to keep people safe after pregnancy.
- Recognize, screen, and refer all birthing people for 1) intimate partner violence, 2) gun safety screening, 3) postpartum depression, and 4) substance misuse.
- Improve and implement care models focused on screening and assessing for intimate partner violence during pregnancy and in the postpartum period. Increase funding and resources for community organizations supporting this work.
- Explore opportunities to work with and align maternal mortality death studies with the Missing and Murdered Indigenous Women's Task Force.

Recommendations for state agencies and partners

At the state level, recommendations to reduce maternal mortality were:

- Expand Medicaid coverage to include benefits immediately beginning during the prenatal period and a one year postpartum. This should include behavioral health treatment needs. As of July 1,2022, Medical Assistance will now extend one year postpartum.
- Collaborate with the Department of Transportation to identify opportunities of safe driving strategies, improved signs and safety opportunities for drivers, passengers, and pedestrians.
- Modify controlled substance laws in Minnesota to support wrap-around care and treatment of the pregnant person. Address how laws may lead to birthing people not seeking care for substance use, due to the laws' punitive nature.
- Increase available funding for communities disproportionately impacted by SUD and mental health conditions, recognizing the impacts of historical racism. Allow community led organizations to develop and integrate trauma-informed models of care focused on culture and empowerment.

Improving pregnancy-associated deaths identification and information collection

Completeness of the pregnancy-associated death record is imperative to the committee to make informed committee determinations and recommendations for each death. The review committee identified the need for improvement on pregnancy-associated death information. In reviewing identified deaths, the committee is limited to information presented at the meeting to provide a clear understanding of factors that may have contributed to each death.

- Health systems and state agencies should work closely to report pregnancy-associated deaths when they occur in real-time. Facilities and providers can directly report pregnancy-associated deaths to MDH using the Report of Maternal Deaths form.
- Improve partnerships across state agencies and all health systems for clear information sharing on pregnancy-associated deaths. Minnesota residents may give birth in neighboring states; however, information on the services received outside of Minnesota are extremely limited to the review committee. A concerted effort from a federal approach or state regionalized approach could improve completeness of record reviews.
- Build partnerships in requesting records for complete information from state partners such as health systems, law enforcement, medical examiners, housing facilities, behavioral health and substance use treatment facilities, child protective services, and family home visiting programs.
- Integrate informant or next-of-kin interviews with the decedent's family and close acquaintances to provide a better understanding of the experience for each person who gives birth. Some aspects from family and friends may provide a snapshot of the life they were living during their pregnancy and at the time of their death. This perception and account of the person is often missing from the information collected and provides people close to the decedent an opportunity to share about the decedent's life.
- Develop statewide interventions to review maternal morbidities in addition to maternal morality reviews. Maternal morbidities are considered 'a near miss', like injuries or incidents related to pregnancy or childbirth that did not result in death. Maternal morbidities impact thousands of birthing persons every year, and these reviews would be a mechanism of determining opportunities for improvement of care.
- Incorporate active integration of community-led groups, funding, activities, and leadership in maternal mortality reviews.

A call to action

All Minnesotans have a role to play in addressing and improving maternal health in the state. From an individual who may be considering a family in the future, to statewide systems implementing programing addressing health outcomes, awareness and engagement is needed to identify and eliminate maternal mortality.

We invite partners in community and family health to review the recommendations and apply them to practice. From advocacy, community action, and quality improvement around birthing support, we invite state partners to coalesce to create a just and equitable future Minnesotans and their families.

Glossary

Pregnancy-associated death: A death during or within one year of pregnancy, regardless of cause.

Pregnancy-related death: A death during or within one year of pregnancy, from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

Pregnancy-associated but NOT related death: A death during or within one year of pregnancy from a cause that is not related to pregnancy.

Pregnancy-associated but unable to determine pregnancy relatedness: A death during pregnancy or within one year of the end of pregnancy from a cause that could not be determined as pregnancy-related or not pregnancy-related.

Preventability: A death is considered preventable if the committee determines that there was at least some chance of the death being averted by one or more reasonable changes to patient, family, provider, facility, system and/or community factors.

The following are standardized descriptions of contributing factors provided by the CDC. Using standardized language to categorize factors contributing to a pregnancy-associated death allows for clear understanding of the factor and allows national comparisons of factors impacting pregnancy-associated deaths.

Access/financial: Systemic barriers, e.g., lack or loss of health care insurance or other financial duress, as opposed to noncompliance, impacted their ability to care for themself (e.g., did not seek services because unable to miss work or afford postpartum visits after insurance expired). Other barriers to accessing care: insurance non-eligibility, provider shortage in their geographical area, and lack of public transportation.

Assessment: Factors placing the individual at risk for a poor clinical outcome recognized, and they were not transferred/transported to a provider who could give a higher level of care.

Continuity of care/care coordination: Care providers did not have access to individual's complete records or did not communicate their status sufficiently. Lack of continuity can be between prenatal, labor and delivery, and postpartum providers.

Delay: The provider or patient was delayed in referring or accessing care, treatment, or follow-up care/action.

Discrimination: Treating someone less or more favorably based on the group, class, or category they belong to resulting from biases, prejudices, and stereotyping. It can manifest as differences in care, clinical communication, and shared decision-making. (Smedley et al, 2003 and Dr. Rachel Hardeman)

Knowledge: The provider or patient did not receive adequate education or lacked knowledge or understanding regarding the significance of a health event.

Mental health conditions: The patient had a documented diagnosis of a psychiatric disorder. This includes postpartum depression. If a formal diagnosis is not available, refer to your review committee subject matter experts (e.g., psychiatrist, psychologist, licensed counselor) to determine whether the criteria for a diagnosis of substance use disorder or another mental health condition are met based on the available information.

Substance Use Disorder (SUD): Substance use disorder is characterized by recurrent use of alcohol and/or drugs causing clinically and functionally significant impairment, such as health problems or disability. The committee may determine that substance use disorder contributed to the death when the disorder directly compromised their health status (e.g., acute methamphetamine intoxication exacerbated pregnancy- induced hypertension, or they were more vulnerable to infections or medical conditions).

Violence and Intimate Partner Violence (IPV): Physical or emotional abuse perpetrated by current or former intimate partner, family member, friend, acquaintance, or stranger.