# MATERNAL MORBIDITY AND MORTALITY IN NEBRASKA

**2014-2018**

Office of MCH Epidemiology

September 2021

A first edition report of its kind, this document describes maternal morbidity and mortality in Nebraska based on available data at the time of publication. Additional information and questions can be directed to the authors at dhhs.cmdrt@nebraska.gov.

The Office of Maternal and Child Health Epidemiology, in the Lifespan Health Services Unit, Division of Public Health, Nebraska Department of Health and Human Services has the defined mission to "generate high quality data to improve the health of families through partnerships." This mission is furthered by a vision of happy, healthy families, communities, and Nebraskans who are fulfilled and prosperous.

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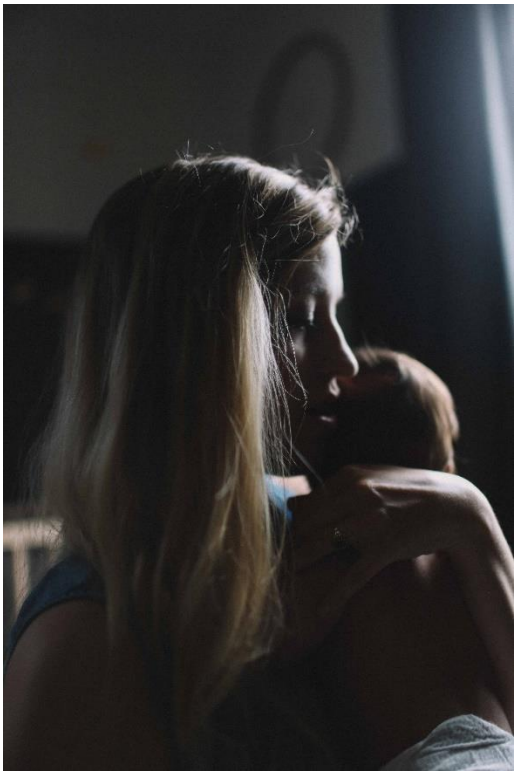

# Contents

## ACKNOWLEDGEMENTS

We would first like to acknowledge the women who died, the loved ones they left behind, and those who provided care to them. The purpose of the work of the Maternal Mortality Review Committee is to prevent future deaths and improve the lives of women and families throughout Nebraska. We also wish to acknowledge the dedicated professionals who volunteer their time and expertise to the committee to improve women's health and healthcare provision in the State of Nebraska.

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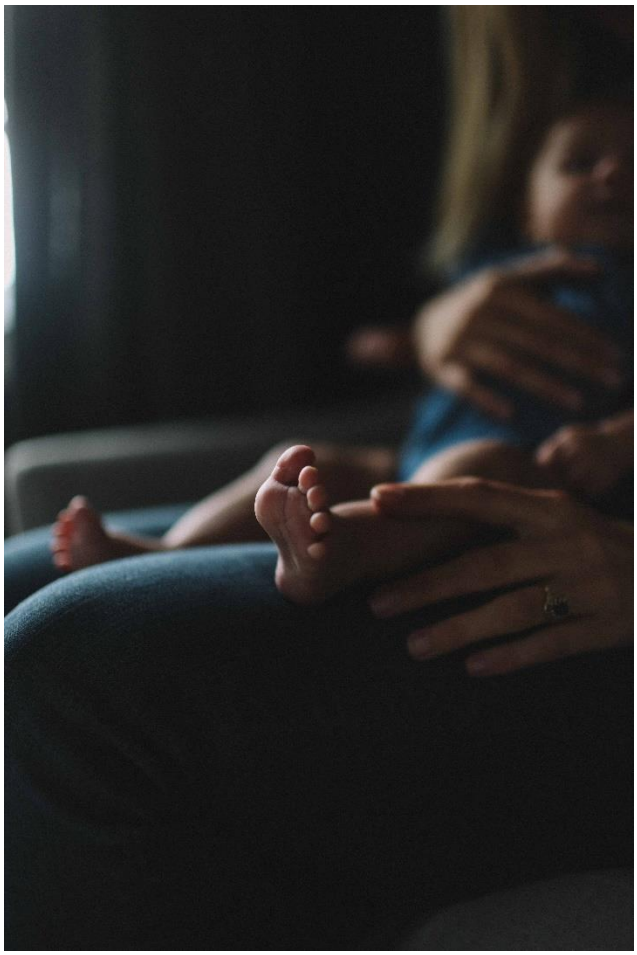
We would also like to acknowledge Jackie Moline, MMRC nurse abstractor, for her commitment and detailed work as well as the Office of Maternal and Child Health Epidemiology staff involved in writing this report: Celeste Illian, Jennifer Severe-Oforah, Erika Fuchs, Shannon Twist, and Jessica Seberger.

## SEVERE MATERNAL MORBIDITY

Maternal mortality represents a small proportion of the burden of negative maternal health outcomes. Examining Severe Maternal Morbidity (SMM), or significant negative health consequences of labor and delivery, allows for deeper understanding of the causes and other factors related to these outcomes, enhances recommendations for prevention, and improves surveillance. Using hospital discharge claims data from 2016-2018, we analyzed SMM by maternal age group.

### BACKGROUND



SMM includes unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health (Centers for Disease Control and Prevention (CDC), 2021). Surveillance of SMM helps assess the progress toward the Healthy People 2030 objective "reduce severe maternal complications identified during delivery hospitalizations" and is conducted by Health Resources and Services Administration (HRSA) on a national and state level using the Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (SID) (U.S. Department of Health and Human Services, 2021). For this measure, SMM is defined by CDC as the number of delivery hospitalizations with an indication of severe morbidity from International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) diagnosis or procedure codes (Centers for Disease Control and Prevention, 2019).

SMM is more than 100 times as common as pregnancy-related mortality and has increased up to 75 percent in the last decade, according to HRSA Federally Available Data (FAD) (Maternal and Child Health Bureau, 2021). Chronic comorbidities increase the likelihood of a person experiencing SMM. There are also significant racial and ethnic disparities related to SMM nationwide.

## METHODS

De-identified Nebraska hospital discharge data (HDD) from 2016-2018 were provided by the Nebraska Hospital Association. HDD for female, Nebraska residents ages 12-55 with a birth admission, defined using Diagnosis Related Group (DRG), diagnostic codes, and procedure codes were included. Cases resulting in maternal death and transfer between facilities were excluded using criteria defined by CDC. All analyses were conducted using SAS software, Version 9.4 (SAS Institute Inc, 2013).

SMM events were identified with CDC-developed standards using ICD-10-CM codes to identify the indicators of SMM representing serious complications of pregnancy or delivery (*Table 1*).

SMM rates were calculated per 10,000 live births. Chi-squared tests were used to assess the significance of the association between maternal characteristics and SMM with $\alpha = 0.05$.

**Table 1**

| **Severe Maternal Morbidity Indicators** | | |
|---|---|---|
| Acute myocardial infarction | Cardiac arrest/ventricular fibrillation | Pulmonary edema/acute heart failure |
| Acute renal failure | Conversion of cardiac rhythm | Sepsis |
| Adult respiratory distress syndrome | Disseminated intravascular coagulation | Severe anesthesia complications |
| Air and thrombotic embolism | Eclampsia | Shock |
| Amniotic fluid embolism | Heart failure/arrest during surgery or procedure | Sickle cell disease with crisis |
| Aneurysm | Hysterectomy | Temporary tracheostomy |
| Blood products transfusion * | Puerperal cerebrovascular disorders | Ventilation |

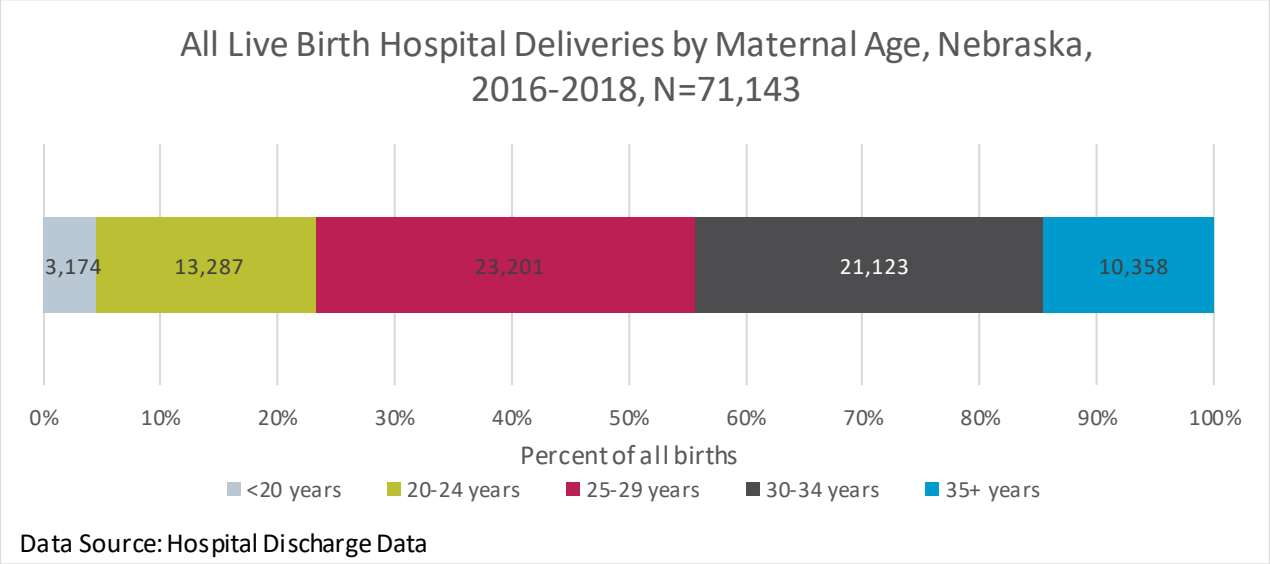
***No longer used, however presented for completeness in accordance with CDC definition.**

**(Centers for Disease Control and Prevention, 2019)**

## FINDINGS

From 2016-2018, there were 71,143 live birth hospitalizations among 12-55 year old Nebraskan residents; approximately one in three births were to mothers ages 25-29 and another 30% were to mothers ages 30-34 *(Figure 1)*.

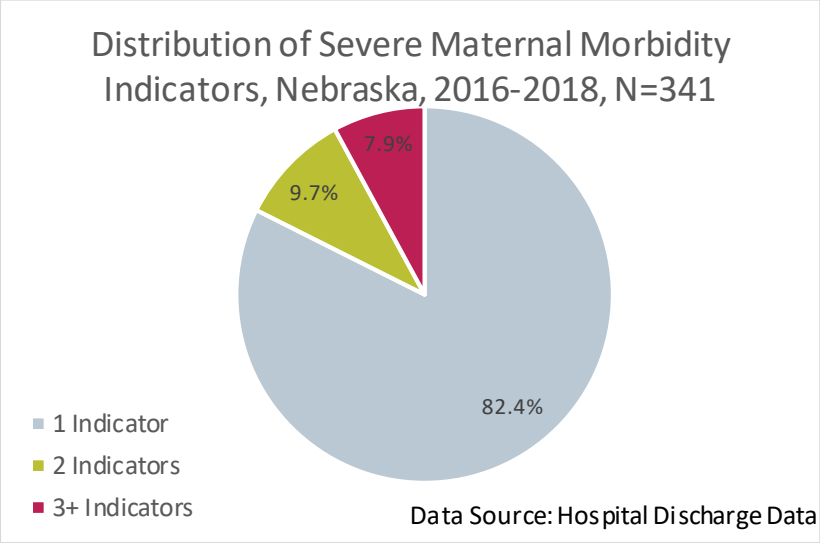
**Figure 1**




Data Source: Hospital Discharge Data

From 2016-2018, 341 unique Nebraskan women experienced 446 SMM indicators, averaging 114 per year. During the three-year period, the overall SMM rate in Nebraska was 47.9 SMM cases per 10,000 live births. Among those who experienced SMM, the majority of women experienced one severe morbidity indicator; however, a smaller proportion of women experienced two or three or more severe medical indicators during their delivery hospitalizations *(Figure 2)*.

**Figure 2**




The most common causes of SMM from 2016-2018 included hysterectomy (9.8 per 10,000), adult respiratory distress syndrome (8.4 per 10,000), acute renal failure (7.7 per 10,000), and sepsis (6.9 per 10,000) *(Figure 3)*. There were zero instances of temporary tracheostomy or heart failure/arrest during surgery or procedure during the three-year period.

There were statistically significant differences in SMM by age group. Risk for SMM was lowest among those ages 25-29 (34.1 per 10,000), with risk increasing on both sides of the maternal age spectrum *(Table 2).* The oldest mothers ages ≥35, experienced the highest rate of SMM at 57.9 per 10,000.

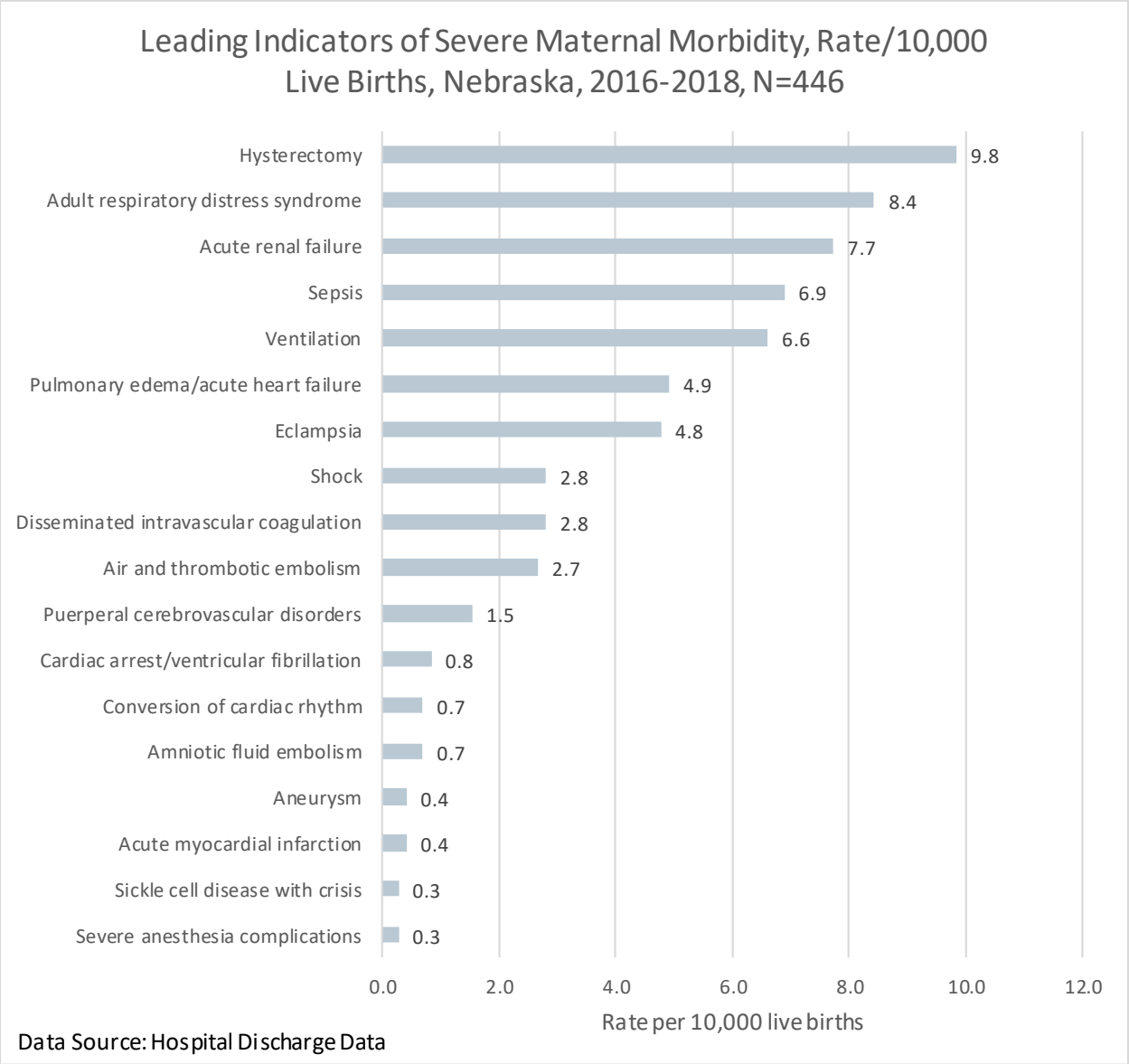
There were large differences in SMM rates by delivery method. SMM rates among repeat cesarean births (128.9 per 10,000) were twice that of primary cesarean live births (66.3 per 10,000). The deliveries least likely to be accompanied by SMM were vaginal births, with a rate of 29.1 per 10,000.

The rate of SMM per 10,000 live births did not differ significantly by payer source *(Table 2).* Women with private insurance as their primary payer source had an SMM rate of 43.6 per 10,000 while those with Medicaid had an SMM rate of 55.9 per 10,000.

SMM rates did not differ significantly by urbanicity. Women in residing urban areas (defined as Douglas, Lancaster, and Sarpy counties) had an SMM rate of 45.0 per 10,000 while those residing in other Nebraska counties had an SMM rate of 52.3 per 10,000 *(Table 2).*

Maternal race was missing in over 97% of delivery admissions, so no conclusions could be made based on available data.

## Figure 3




Data Source: Hospital Discharge Data

## Table 2

| Severe Maternal Morbidity by Maternal Characteristics, Nebraska, 2016-2018, N=446 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Total Deliveries | SMM Cases | Rate per 10,000 Deliveries | Percent of Total Deliveries | Percent of SMM Cases | Chi-Square P-value |
| Maternal Age | <20 | 3,174 | 16 | 50.4 | 4.50% | 4.70% | 0.0059 |
| | 20-24 | 13,287 | 69 | 51.9 | 18.70% | 20.20% | |
| | 25-29 | 23,201 | 79 | 34.1 | 32.60% | 23.20% | |
| | 30-34 | 21,123 | 117 | 55.4 | 29.70% | 34.30% | |
| | 35+ | 10,358 | 60 | 57.9 | 14.60% | 17.60% | |
| Delivery Type | Vaginal | 51,496 | 150 | 29.1 | 72.40% | 44.00% | <0.0001 |
| | Primary Cesarean | 9,953 | 66 | 66.3 | 14.00% | 19.40% | |
| | Repeat Cesarean | 9,694 | 125 | 128.9 | 13.60% | 36.70% | |
| Urbanicity | Urban | 42,445 | 191 | 45 | 59.70% | 56.00% | 0.1685 |
| | Rural | 28,698 | 150 | 52.3 | 40.30% | 44.00% | |
| Payer Source | Private | 45,172 | 197 | 43.6 | 63.50% | 57.80% | 0.1328 |
| | Medicaid | 23,255 | 130 | 55.9 | 32.70% | 38.10% | |
| | Other Public | 2,322 | 13 | 56 | 3.30% | 3.80% | |
| | Uninsured | 393 | 1 | 25.4 | 0.60% | 0.30% | |
| Data Source: Hospital Discharge Data | | | | | | | |

# MATERNAL MORTALITY

## MATERNAL MORTALITY IN THE UNITED STATES

Maternal mortality, defined as the death of a woman during pregnancy or within one year of the end of the pregnancy, affects approximately 700 women and their families every year nationwide (Centers for Disease Control and Prevention, 2020). CDC reports the rate of maternal mortality has been increasing since the 1980s, with the United States experiencing a higher maternal mortality rate than most other developed countries (The World Factbook, 2021). Nebraska has examined maternal mortality via a multidisciplinary Maternal Mortality Review Committee (MMRC) since 2014. This report summarizes findings from all identified maternal deaths from 2014-2018.

## WHAT IS A MATERNAL DEATH?

Different definitions of maternal mortality are used to track and analyze deaths by different organizations. For purposes of this report, maternal mortality is the death of a person while pregnant or within one year of the end of a pregnancy. This definition is standardized by the CDC, which allows for comparison across states (Centers for Disease Control and Prevention, 2020).

## PREGNANCY-ASSOCIATED DEATH

A pregnancy-associated death is the death of a person within one year of the end of a pregnancy from any cause (Review to Action, 2021). Pregnancy-associated deaths represent the broadest category of maternal deaths, and can be broken down further into two main categories: pregnancy-related deaths and deaths unrelated to pregnancy.

## PREGNANCY-RELATED DEATH

A pregnancy-related death is a maternal death due to a pregnancy complication. More specifically, these deaths occur during pregnancy or within a year of the end of a pregnancy and are due to a chain of events initiated by the pregnancy or the aggravation of an unrelated condition by the physiologic effects of pregnancy (Review to Action, 2021).

# SURVEILLANCE OF MATERNAL MORTALITY IN NEBRASKA

## STATE STATUTE

> "(1) The Legislature finds and declares that it is in the best interests of the state, its residents, and especially the children of this state that the number and causes of death of children in this state be examined. There is a need for a comprehensive integrated review of all child deaths in Nebraska and a system for statewide retrospective review of existing records relating to each child death.
>
> (2) The Legislature further finds and declares that it is in the best interests of the state and its residents that the number and causes of maternal death in this state be examined. There is a need for a comprehensive integrated review of all maternal deaths in Nebraska and a system for statewide retrospective review of existing records relating to each maternal death.
>
> (3) It is the intent of the Legislature, by creation of the Child and Maternal Death Review Act, to:
>
> (a) Identify trends from the review of past records to prevent future child and maternal deaths from similar causes when applicable;
>
> (b) Recommend systematic changes for the creation of a cohesive method for responding to certain child and maternal deaths; and
>
> (c) When appropriate, cause referral to be made to those agencies as required in section 28-711 or as otherwise required by state law."
>
> *Neb Rev Stat 71-3404*

Nebraska's MMRC is guided by Nebraska Revised Statute 71-3404 – 71-3411, also referred to as the Child and Maternal Death Review Act. In part, the statute declares there is a need for the number and causes of maternal death to be examined through comprehensive review.

## PREVIOUS MATERNAL MORTALITY WORK IN NEBRASKA

The review of all maternal deaths began in 2014 after being added to the Child Death Review Team's scope in 2013. The review of deaths that occurred in 2014-2016 were conducted under contract by the Nebraska Medical Association (NMA).

In 2018, the Child and Maternal Death Review Team (CMDRT) approved and supported the reorganization of how maternal death reviews were conducted. This resulted in a sub-committee of the CMDRT: Nebraska MMRC, staffed by the Office of Maternal and Child Health Epidemiology at the Department of Health and Human Services (DHHS). This shift was spurred by the national movement to conduct standardized reviews in all states and jurisdictions named Review to Action as steered by CDC, the CDC Foundation, and the Association of Maternal and Child Health Programs (AMCHP) (Review to Action, 2021).

Now that Nebraska's MMRC is operational, results from the MMRC Decision Forms and other abstracted data can be examined to more comprehensively understand maternal mortality in the state. Five years of maternal death reviews have been completed, providing sufficient sample size to release data in this report. In the future, the team intends to release annual reports, conduct epidemiologic studies, and provide recommendations for action based on MMRC results.

Nebraska's CMDRT and MMRC are fully funded by the Title V Maternal and Child Health Block Grant and uses the CDC MMRIA (Maternal Mortality Review Information Application), a data system designed to facilitate MMRC functions through a common data language. CDC, in partnership with maternal mortality reviews and subject matter experts, developed the system and it is available to all MMRCs. In addition, CDC via Review to Action provides best practices, formal guidance, ongoing technical assistance, and networking for all MMRCs.

## HOW MMRC CONDUCTS REVIEWS

Nebraska's MMRC is currently comprised of representatives from DHHS, Nebraska Medicine, Nebraska Methodist Health System, Children's Hospital and Clinics, York Medical Clinic, and Mid-City OB-GYN. Future plans include identifying and recruiting members from other organizations with a wide variety of expertise and interaction with pregnant and parenting populations. In future iterations, the MMRC will also pursue representation of diverse communities in regard to race, ethnicity, immigration status, sexual orientation, and English proficiency when recruiting new members.

Nebraska's MMRC meets quarterly and reviews all pregnancy-associated deaths among Nebraska residents, as defined above.

After Nebraska's Vital Records finalizes annual birth and death datasets, a maternal and child health epidemiologist identifies pregnancy-associated deaths using the following methods: 1) the pregnancy checkbox on the death certificate (if the woman was known to be pregnant at time of death or within one year of death), 2) by linking the decedent's name on the death certificate to maternal name on live birth certificates within one year of the date of death, and 3) by linking the decedent's name on the death certificate to maternal name on fetal death certificates occurring within one year of the date of death. A de-identified case number is then produced for each maternal death identified. Prenatal, hospital, police, and autopsy records are subsequently requested for all cases, as appropriate. After receipt of records, a nurse abstractor summarizes pertinent information from the data sources, completing the CDC MMRIA entry for the case (Centers for Disease Control and Prevention, 2021).

Fully abstracted, de-identified cases are reviewed by the MMRC, and the committee completes the MMRC Decision Form (Enhancing Reviews and Surveillance to Eliminate Maternal Mortality, 2021). The form seeks to answer six core questions:

1. Was the death pregnancy-related?
2. What was the cause of death?
3. Was the death preventable?
4. What were the critical contributing factors to the death?
5. What are the recommendations and actions that address those contributing factors?
6. What is the anticipated impact of those actions if implemented?

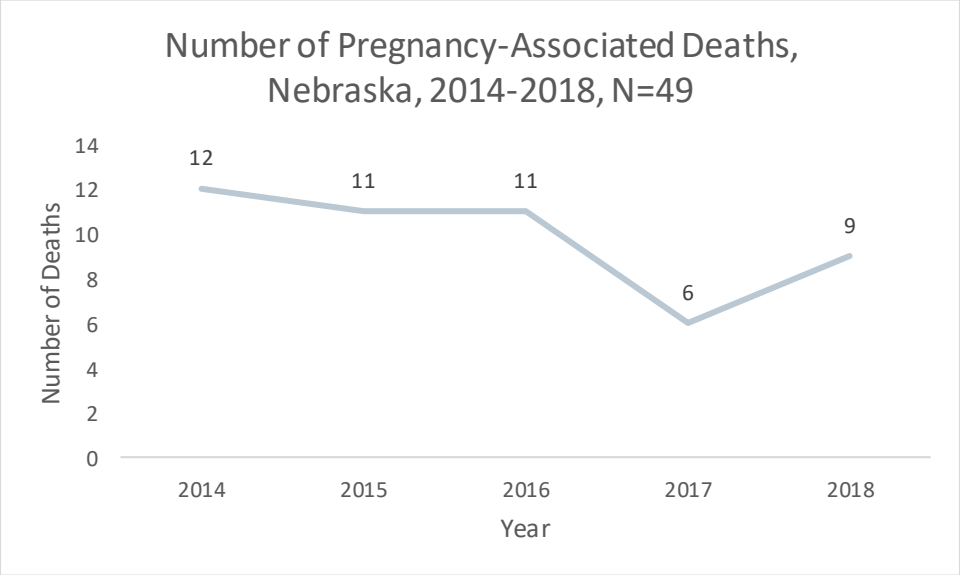
## FINDINGS

### MATERNAL MORTALITY TRENDS

During 2014-2018, 49 Nebraskan women who died within one year of pregnancy were identified. The mean annual number of deaths was approximately 10. The lowest number of deaths occurred during 2017, with 6 deaths; the highest number of deaths occurred during 2014, with 12 deaths. During the same five-year period, there were 131,394 live births to Nebraska residents. Therefore, the pregnancy-associated mortality ratio (PAMR) for Nebraska residents from 2014-2018 was 37.29 deaths per 100,000 live births. PAMR per 100,000 will be used throughout this report to discuss overall maternal mortality.

Of the 49 pregnancy-associated deaths, 18 were determined to be pregnancy-related. The pregnancy-related mortality rate for Nebraska residents from 2014-2018 was 13.70 deaths per 100,000 live births, compared to the national rate of 19 pregnancy-related deaths per 100,000 live births (The World Factbook, 2021).

**Figure 4**




Due to Nebraska's small population and relatively low number of maternal deaths per year, even a combined five years of maternal mortality data presents analytic difficulties. Examining data by race, ethnicity, maternal age, maternal education, delivery payer source, and maternal Body Mass Index (BMI) is important in better understanding the current status of Nebraskan maternal mortality and developing recommendations for prevention; however, calculating rates and ratios based on small counts can lead to highly variable, unreliable conclusions. Any rates presented in this report based on counts of 20 and below should be used and interpreted with caution.

Table 3

**PREGNANCY ASSOCIATED MORTALITY RATIO (PAMR) BY DEMOGRAPHICS, NEBRASKA, 2014-2018**

| INDICATOR | | Count | Percent of Maternal Deaths | Population | Ratio/100,000 Population Births |
|---|---|---|---|---|---|
| **OVERALL** | | 49 | | 131,394 | 37.29 |
| **RACE*** | White | 42 | 85.71% | 100,922 | 41.62 |
| | All other races | 7 | 14.29% | 17,165 | 40.78 |
| | Unknown | 0 | 0.00% | 13,307 | - |
| **ETHNICITY*** | Hispanic | 6 | 12.24% | 21,217 | 28.28 |
| | Non-Hispanic | 43 | 87.76% | 110,090 | 39.06 |
| | Unknown | 0 | 0.00% | 87 | - |
| **AGE RANGE** | <25 | 11 | 22.45% | 31,740 | 34.66 |
| | 25-29 | 10 | 20.41% | 42,733 | 23.40 |
| | 30-34 | 17 | 34.69% | 38,395 | 44.28 |
| | 35+ | 11 | 22.45% | 18,526 | 59.38 |
| **EDUCATION** | High school education or less | 27 | 55.10% | 69,678 | 38.75 |
| | More than high school education | 22 | 44.90% | 61,626 | 35.70 |
| **INSURANCE AT DELIVERY** | Private insurance | 12 | 24.49% | 77,523 | 15.48 |
| | Public insurance** | 20 | 40.82% | 46,487 | 43.02 |
| | Unknown | 17 | 28.57% | - | - |
| **BMI** | Under weight (<18.5) | 4 | 8.16% | 3,644 | 109.77 |
| | Normal weight (18.5 - <25) | 8 | 16.33% | 58,909 | 13.58 |
| | Overweight (25 - <30) | 10 | 20.41% | 34,065 | 29.36 |
| | Obese (30+) | 13 | 26.53% | 34,776 | 37.38 |
| | Unknown | 14 | 28.57% | - | - |

**Race and ethnicity population based on maternal, self-reported race and ethnicity on birth certificate.*

**Public Insurance includes Medicaid, Indian Health Service, CHAMPUS/TRICARE, and other government payment sources.

*Data sources: Maternal Mortality Review Committee; Nebraska Vital Statistics*

More than 8 in 10 maternal deaths in Nebraska were among white women; however, when comparing to relative population sizes, white and non-white women died at nearly the same rate (Table 3). For every 100,000 live births among white Nebraska residents, approximately 42 white women died (n=42; PAMR: 41.62). Women of all other races, combined into one group, experienced a PAMR of 40.78 (n=7).

For every 100,000 live births among women of Hispanic ethnicity, approximately 28 Hispanic women died (n=6; PAMR: 28.28). Non-Hispanic women experienced a PAMR of 39.06 (n=43).

For every 100,000 live births among women under 25 years old, approximately 35 women in the same age group died (n=11; PAMR: 34.66). Women aged 25-29 experienced the lowest PAMR of all age groups (n=10; PAMR: 23.40). More women 30-34 years old died than any other age group, however when compared to the relative population size, this age group experienced a PAMR of 44.28 (n=17). Women 35 and older experienced the highest PAMR, and were more than twice as likely to die within a year of pregnancy compared to those ages 25-29 (n=11; PAMR: 59.38).

The PAMR among women with a high school education or less was 38.75 per 100,000 (n=27). The ratio was slightly less among women with more than a high school degree, with a PAMR of 35.70 (n=22).

Women with public insurance at their baby's birth were more than two and a half times more likely to die compared to women with private insurance for delivery. The PAMR for the 20 women with public insurance who died within a year of the end of pregnancy was 43.02 while the PAMR for the 12 women with private insurance was 15.48 per 100,00 live births.

For every 100,000 live births to women with normal BMI (18.5 to less than 25), approximately 14 women died (n=8; PAMR: 13.58). Women considered underweight (BMI less than 18.5) experienced a PAMR of 109.77 (n=4); those with a BMI from 25 to less than 30 (overweight) experienced a PAMR of 29.36 (n=10); those with a BMI of 30 or more (obese) experienced a PAMR of 37.38 (n=13). There were 14 maternal deaths among women with unknown BMI.

## MANNER OF DEATHS

The underlying cause field on the death certificate helps categorize general types of pregnancy-associated death. The standard categories used include medical, motor vehicle crashes, unintentional injuries, homicides, and suicides. Due to small numbers, other unintentional injuries are combined with suicides and homicides in this report to maintain confidentiality (Table 4).

Table 4

| MATERNAL MORTALITY MANNER OF DEATH, NEBRASKA, 2014-2018, N=49 | | | |
|---|---|---|---|
| | Count | Percent of Maternal Deaths | PAMR per 100,000 Live Births |
| **MEDICAL** | 29 | 59.18% | 22.07 |
| **MOTOR VEHICLE CRASHES** | 10 | 20.41% | 7.61 |
| **OTHER UNINTENTIONAL & INTENTIONAL INJURY** | 10 | 20.41% | 7.61 |

From 2014-2018, 59% of Nebraska pregnancy-associated deaths were medical. An additional 10 cases (20.41%) were due to motor vehicle crashes, and the final 10 were related to other unintentional injuries, homicides, and suicides.

One duty of the MMRC is to determine, after review of comprehensive records, whether the committee agrees or disagrees with the cause of death listed on the death certificate. If the committee disagrees, based on the other information gleaned from other available records, an alternative cause of death is determined as a group. For the 2014-2018 cases, there were four instances (8.16%) in which the MMRC disagreed with the cause of death on the death certificate.

## ADDITIONAL INFORMATION

### Timing of death

Thirty nine of the 49 maternal deaths reviewed had known pregnancy end dates. On average, maternal death occurred 128 days after the end of a pregnancy with a range of -1 (fetus was declared dead one day after maternal death was determined) to 337 days. Of those with a known pregnancy end date (n=39), three people were pregnant at the time of death (7.7%), another third of the maternal deaths occurred 1-42 days after the end of the pregnancy (n=13; 33.3%), and the remaining 59.0% occurred between 43-365 days. There were ten cases with unknown pregnancy end dates.

### Preventability

After committee review, three in four deaths were determined to be preventable (n=37; 75.5%). Ten deaths, or about 1 in 5 maternal deaths were determined not to be preventable (20.4%); the two remaining deaths did not have sufficient information for the committee to make such a determination.

## CONTRIBUTING FACTORS TO MATERNAL DEATHS

The MMRC is tasked with determining any factors that contributed to the maternal death. The Decision Form (Appendix 1) includes 28 possible contributing factors from which the committee can choose.

The most common contributing factors to maternal deaths included lack of access or financial resources, continuity of care or care coordination, tobacco use, adherence to medical recommendations, and clinical skill or quality of care (Table 5).

**Table 5**

| ***Contributing Factors*** | ***Count*** |
|---|---|
| *Lack of access/Financial resources* | 11 |
| *Continuity of care/Care coordination* | 10 |
| *Tobacco use* | 7 |
| *Adherence to medical recommendations* | 5 |
| *Clinical skill/Quality of care* | 5 |
| *Delay to care* | 5 |
| *Mental health conditions* | 4 |
| *Substance use disorder* | 4 |
| *Other* | 4 |
| *Violence* | 3 |
| *Failure to screen/Inadequate assessment of risk* | 3 |
| *Social Support/Isolation* | 3 |
| *Lack of standardized policies/procedures* | 2 |
| *Poor communication/lack of case coordination* | 2 |
| *Lack of knowledge regarding importance of treatment/follow-up* | 2 |
| *Chronic disease* | 1 |
| *Cultural, religious, or language factors* | 1 |
| *Discrimination* | 1 |
| *Inadequate law enforcement response* | 1 |
| *Legal* | 1 |

## RECOMMENDATIONS

The Decision Form includes space for the MMRC to create recommendations based on the issues and contributing factors identified in each case. Nebraska's MMRC continues to grow and develop the way these recommendations are constructed, however a total 21 recommendations have surfaced from the completed reviews (Table 6). The first five recommendations were most common, identified in five or more cases reviewed.

**Table 6**

| Recommendations |
|---|
| 1. Peripartum implementation of mental health & substance use screening, assessment, and referral |
| 2. Clinician coordination with specialists/consultations |
| 3. Public health education on the dangers of smoking, especially during pregnancy |
| 4. Development of a coordinated benefits system to identify resources for peripartum persons |
| 5. Public education about safe operation of motor vehicles, including importance of wearing a seat belt and risks of driving while under the influence of drugs/alcohol |
| 6. Medical home establishment for all persons |
| 7. Develop, distribute, and provide education to all health care providers and pregnant persons about maternal early warning signs of medical emergencies |
| 8. Clinician education on unbiased, equitable treatment of all persons |
| 9. Establish state level funding for autopsies of all peripartum deaths, and require an autopsy performed for all peripartum deaths |
| 10. Medicaid eligibility one year post-pregnancy |
| 11. Statewide rural transport system |
| 12. Patient education on how medical history affects personal health |
| 13. Prenatal and postpartum referrals to mental health treatment & coverage by Medicaid |
| 14. Family support for peripartum persons |
| 15. Develop strategies to improve provider/patient communication to increase adherence to medical advice |
| 16. Coordinated access to supplies for chronic disease management |
| 17. Reduction of access to firearms, especially among persons in mental health crises |
| 18. First trimester entry to prenatal care for all persons |
| 19. Public education about mental health first aid |
| 20. Clinician education on contraception counseling, and patient's decision-making autonomy |
| 21. Appropriate language service use by all care providers |

## CONCLUSION

Severe maternal morbidity and mortality are important health indicators that affect individuals, families, and communities. The health of mothers should be prioritized on a local, state, and federal level to ensure happy, healthy and prosperous families. While this report is an important step in understanding the scope of maternal health in Nebraska, there are known gaps in and limitations to the data presented. Future iterations of this report will aim to fully explain disparities across multiple categories, additional detail in maternal mortality trends, and recommendations for action based on best available evidence.

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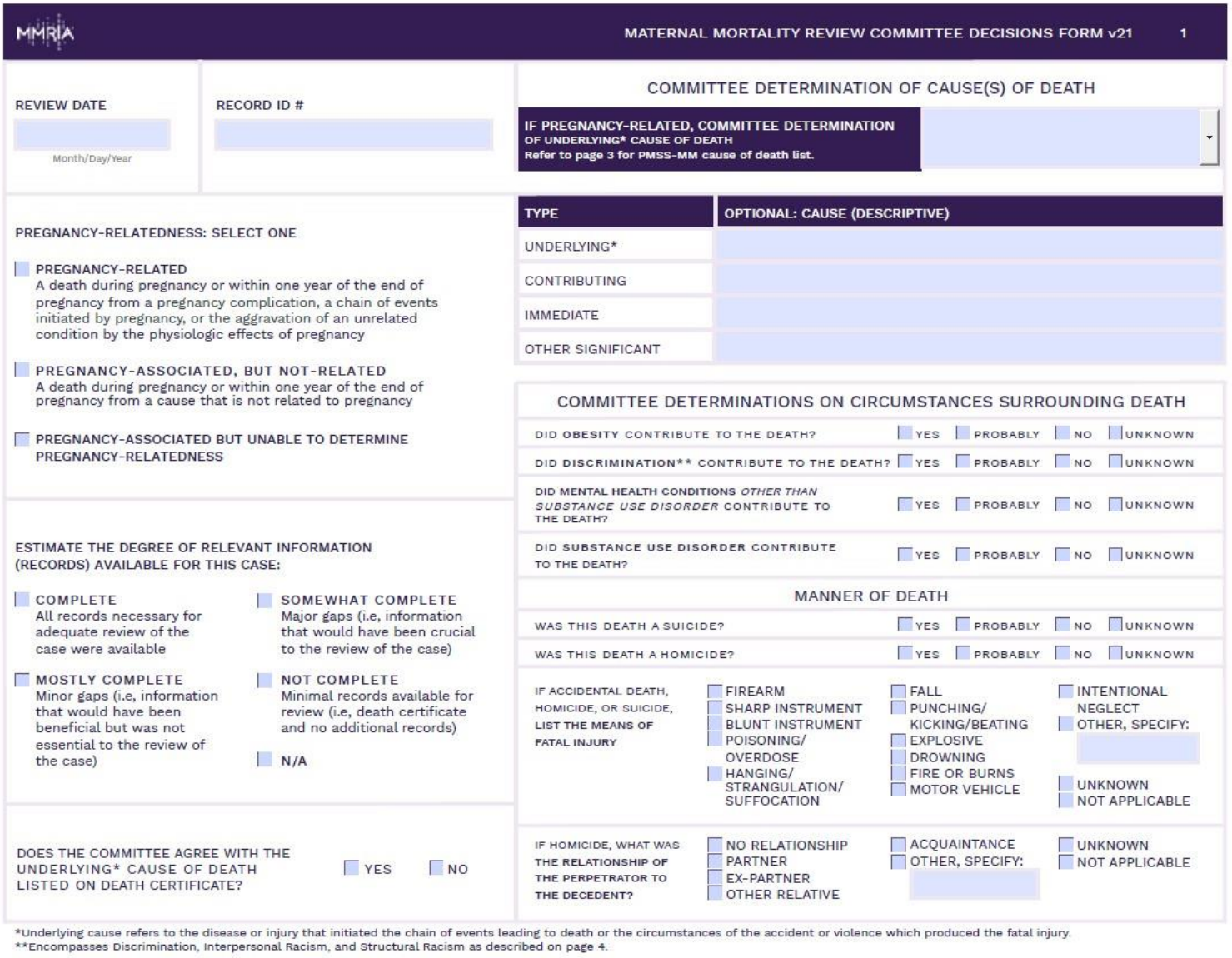

MMRIA

MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v21 1

REVIEW DATE

Month/Day/Year

RECORD ID #

COMMITTEE DETERMINATION OF CAUSE(S) OF DEATH

IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING* CAUSE OF DEATH
Refer to page 3 for PMSS-MM cause of death list.

| TYPE | OPTIONAL: CAUSE (DESCRIPTIVE) |
|---|---|
| UNDERLYING* | |
| CONTRIBUTING | |
| IMMEDIATE | |
| OTHER SIGNIFICANT | |

PREGNANCY-RELATEDNESS: SELECT ONE

- PREGNANCY-RELATED
  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
  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

ESTIMATE THE DEGREE OF RELEVANT INFORMATION (RECORDS) AVAILABLE FOR THIS CASE:

- COMPLETE
  All records necessary for adequate review of the case were available
- MOSTLY COMPLETE
  Minor gaps (i.e, information that would have been beneficial but was not essential to the review of the case)
- SOMEWHAT COMPLETE
  Major gaps (i.e, information that would have been crucial to the review of the case)
- NOT COMPLETE
  Minimal records available for review (i.e, death certificate and no additional records)
- N/A

DOES THE COMMITTEE AGREE WITH THE UNDERLYING* CAUSE OF DEATH LISTED ON DEATH CERTIFICATE? YES NO

COMMITTEE DETERMINATIONS ON CIRCUMSTANCES SURROUNDING DEATH

| | | | | |
|---|---|---|---|---|
| DID OBESITY CONTRIBUTE TO THE DEATH? | YES | PROBABLY | NO | UNKNOWN |
| DID DISCRIMINATION** CONTRIBUTE TO THE DEATH? | YES | PROBABLY | NO | UNKNOWN |
| DID MENTAL HEALTH CONDITIONS *OTHER THAN SUBSTANCE USE DISORDER* CONTRIBUTE TO THE DEATH? | YES | PROBABLY | NO | UNKNOWN |
| DID SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH? | YES | PROBABLY | NO | UNKNOWN |

MANNER OF DEATH

| | | | | |
|---|---|---|---|---|
| WAS THIS DEATH A SUICIDE? | YES | PROBABLY | NO | UNKNOWN |
| WAS THIS DEATH A HOMICIDE? | YES | PROBABLY | NO | UNKNOWN |

IF ACCIDENTAL DEATH, HOMICIDE, OR SUICIDE, LIST THE MEANS OF FATAL INJURY

- FIREARM
- SHARP INSTRUMENT
- BLUNT INSTRUMENT
- POISONING/ OVERDOSE
- HANGING/ STRANGULATION/ SUFFOCATION
- FALL
- PUNCHING/ KICKING/BEATING
- EXPLOSIVE
- DRowning
- FIRE OR BURNS
- MOTOR VEHICLE
- INTENTIONAL NEGLECT
- OTHER, SPECIFY:
- UNKNOWN
- NOT APPLICABLE

IF HOMICIDE, WHAT WAS THE RELATIONSHIP OF THE PERPETRATOR TO THE DECEDENT?

- NO RELATIONSHIP
- PARTNER
- EX-PARTNER
- OTHER RELATIVE
- ACQUAINTANCE
- OTHER, SPECIFY:
- UNKNOWN
- NOT APPLICABLE

*Underlying cause refers to the disease or injury that initiated the chain of events leading to death or the circumstances of the accident or violence which produced the fatal injury.
**Encompasses Discrimination, Interpersonal Racism, and Structural Racism as described on page 4.

## COMMITTEE DETERMINATION OF 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.

| | | |
|---|---|---|
| WAS THIS DEATH PREVENTABLE? | ☐ YES | ☐ NO |
| CHANCE TO ALTER OUTCOME | ☐ GOOD CHANCE<br>☐ NO CHANCE | ☐ SOME CHANCE<br>☐ UNABLE TO DETERMINE |

## CONTRIBUTING FACTORS AND RECOMMENDATIONS FOR ACTION (Entries may continue to grid on page 5)

### CONTRIBUTING FACTORS WORKSHEET

What were the factors that contributed to this death?
Multiple contributing factors may be present at each level.

### RECOMMENDATIONS OF THE COMMITTEE

If there was at least some chance that the death could have been averted, what were the specific and feasible actions that, if implemented or altered, might have changed the course of events?

| DESCRIPTION OF ISSUE (enter a description for EACH contributing factor listed) | CONTRIBUTING FACTORS (choose as many as needed below) | LEVEL | COMMITTEE RECOMMENDATIONS [Who?] should [do what?] [when?] Map recommendations to contributing factors. | LEVEL | PREVENTION TYPE (choose below) | EXPECTED IMPACT (choose below) |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |

### CONTRIBUTING FACTOR KEY (DESCRIPTIONS ON PAGE 4)

- Access/financial
- Adherence
- Assessment
- Chronic disease
- Clinical skill/ quality of care
- Communication
- Continuity of care/ care coordination
- Cultural/religious
- Delay
- Discrimination
- Environmental
- Equipment/ technology
- Interpersonal racism
- Knowledge
- Law Enforcement
- Legal
- Mental health conditions
- Outreach
- Policies/procedures
- Referral
- Social support/ isolation
- Structural racism
- Substance use disorder - alcohol, illicit/prescription drugs
- Tobacco use
- Trauma
- Unstable housing
- Violence
- Other

### DEFINITION OF LEVELS

- **PATIENT/FAMILY:** An individual before, during or after a pregnancy, and their family, internal or external to the household, with influence on the individual
- **PROVIDER:** An individual with training and expertise who provides care, treatment, and/or advice
- **FACILITY:** A physical location where direct care is provided - ranges from small clinics and urgent care centers to hospitals with trauma centers
- **SYSTEM:** Interacting entities that support services before, during, or after a pregnancy - ranges from healthcare systems and payors to public services and programs
- **COMMUNITY:** A grouping based on a shared sense of place or identity - ranges from physical neighborhoods to a community based on common interests and shared circumstances

### PREVENTION TYPE

- **PRIMARY:** Prevents the contributing factor before it ever occurs
- **SECONDARY:** Reduces the impact of the contributing factor once it has occurred (i.e, treatment)
- **TERTIARY:** Reduces the impact or progression of what has become an ongoing contributing factor (i.e, management of complications)

### EXPECTED IMPACT

- **SMALL:** Education/counseling (community- and/or provider-based health promotion and education activities)
- **MEDIUM:** Clinical intervention and coordination of care across continuum of well-woman visits (protocols, prescriptions)
- **LARGE:** Long-lasting protective intervention (improve readiness, recognition and response to obstetric emergencies/LARC)
- **EXTRA LARGE:** Change in context (promote environments that support healthy living/ensure available and accessible services)
- **GIANT**: Address social determinants of health (poverty, inequality, etc.)

## IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING CAUSE OF DEATH* PMSS-MM

* PREGNANCY-RELATED DEATH: 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.

**Hemorrhage (Excludes Aneurysms or CVA)**
10.1 - Hemorrhage – Uterine Rupture
10.2 - Placental Abruption
10.3 - Placenta Previa
10.4 - Ruptured Ectopic Pregnancy
10.5 - Hemorrhage – Uterine Atony/Postpartum Hemorrhage
10.6 - Placenta Accreta/Increta/Percreta
10.7 - Hemorrhage due to Retained Placenta
10.10 - Hemorrhage – Laceration/Intra-Abdominal Bleeding
10.9 - Other Hemorrhage/NOS

**Infection**
20.1 - Postpartum Genital Tract (e.g., of the Uterus/Pelvis/Perineum/Necrotizing Fasciitis)
20.2 - Sepsis/Septic Shock
20.4 - Chorioamnionitis/Antepartum Infection
20.6 - Urinary Tract Infection
20.7 - Influenza
20.8 - COVID-19
20.10 - Pneumonia
20.11 - Other Non-Pelvic Infection (e.g., TB, Meningitis, HIV)
20.9 - Other Infection/NOS

**Embolism - Thrombotic (Non-Cerebral)**
30.1 - Embolism – Thrombotic (Non-Cerebral)
30.9 - Other Embolism (Excludes Amniotic Fluid Embolism)/NOS

**Amniotic Fluid Embolism**
31.1 - Embolism - Amniotic Fluid

**Hypertensive Disorders of Pregnancy**
40.1 - Preeclampsia
50.1 - Eclampsia
60.1 - Chronic Hypertension with Superimposed Preeclampsia

**Anesthesia Complications**
70.1 - Anesthesia Complications

**Cardiomyopathy**
80.1 - Postpartum/Peripartum Cardiomyopathy
80.2 - Hypertrophic Cardiomyopathy
80.9 - Other Cardiomyopathy/NOS

**Hematologic**
82.1 - Sickle Cell Anemia
82.9 - Other Hematologic Conditions including Thrombophilias/TTP/HUS/NOS

**Collagen Vascular/Autoimmune Diseases**
83.1 - Systemic Lupus Erythematosus (SLE)
83.9 - Other Collagen Vascular Diseases/NOS

**Conditions Unique to Pregnancy**
85.1 - Conditions Unique to Pregnancy (e.g, Gestational Diabetes, Hyperemesis, Liver Disease of Pregnancy)

**Injury**
88.1 - Intentional (Homicide)
88.2 - Unintentional
88.9 - Unknown Intent/NOS

**Cancer**
89.1 - Gestational Trophoblastic Disease (GTD)
89.3 - Malignant Melanoma
89.9 - Other Malignancy/NOS

**Cardiovascular Conditions**
90.1 - Coronary Artery Disease/Myocardial Infarction (MI)/Atherosclerotic Cardiovascular Disease
90.2 - Pulmonary Hypertension
90.3 - Valvular Heart Disease Congenital and Acquired
90.4 - Vascular Aneurysm/Dissection (Non-Cerebral)
90.5 - Hypertensive Cardiovascular Disease
90.6 - Marfan Syndrome
90.7 - Conduction Defects/Arrhythmias
90.8 - Vascular Malformations Outside Head and Coronary Arteries
90.9 - Other Cardiovascular Disease, including CHF, Cardiomegaly, Cardiac Hypertrophy, Cardiac Fibrosis, Non-Acute Myocarditis/NOS

**Pulmonary Conditions (Excludes ARDS-Adult Respiratory Distress Syndrome)**
91.1 - Chronic Lung Disease
91.2 - Cystic Fibrosis
91.3 - Asthma
91.9 - Other Pulmonary Disease/NOS

**Neurologic/Neurovascular Conditions (Excluding CVA)**
92.1 - Epilepsy/Seizure Disorder
92.9 - Other Neurologic Disease/NOS

**Renal Disease**
93.1 - Chronic Renal Failure/End-Stage Renal Disease (ESRD)
93.9 - Other Renal Disease/NOS

**Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy**
95.1 - Cerebrovascular Accident (Hemorrhage/Thrombosis/Aneurysm/Malformation) not Secondary to Hypertensive Disorders of Pregnancy

**Metabolic/Endocrine**
96.2 - Diabetes Mellitus
96.9 - Other Metabolic/Endocrine Disorder/NOS

**Gastrointestinal Disorders**
97.1 - Crohn's Disease/Ulcerative Colitis
97.2 - Liver Disease/Failure/Transplant
97.9 - Other Gastrointestinal Disease/NOS

**Mental Health Conditions**
100.1 - Depressive Disorder
100.2 - Anxiety Disorder (including Post-Traumatic Stress Disorder)
100.3 - Bipolar Disorder
100.4 - Psychotic Disorder
100.5 - Substance Use Disorder
100.9 - Other Psychiatric Condition/NOS

**Unknown COD**
999.1 - Unknown COD

## CONTRIBUTING FACTOR DESCRIPTIONS

**LACK OF ACCESS/FINANCIAL RESOURCES**
Systemic barriers, e.g, lack or loss of healthcare 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.

**ADHERENCE TO MEDICAL RECOMMENDATIONS**
The provider or patient did not follow protocol or failed to comply with standard procedures (i.e, non adherence to prescribed medications).

**FAILURE TO SCREEN/INADEQUATE ASSESSMENT OF RISK**
Factors placing the individual at risk for a poor clinical outcome recognized, and they were not transferred/transported to a provider able to give a higher level of care.

**CHRONIC DISEASE**
Occurrence of one or more significant pre-existing medical conditions (e.g, obesity, cardiovascular disease, or diabetes).

**CLINICAL SKILL/QUALITY OF CARE (PROVIDER OR FACILITY PERSPECTIVE)**
Personnel were not appropriately skilled for the situation or did not exercise clinical judgment consistent with standards of care (e.g, error in the preparation or administration of medication or unavailability of translation services).

**POOR COMMUNICATION/LACK OF CASE COORDINATION OR MANAGEMENT/ LACK OF CONTINUITY OF CARE (SYSTEM PERSPECTIVE)**
Care was fragmented (i.e, uncoordinated or not comprehensive) among or between healthcare facilities or units, (e.g, records not available between inpatient and outpatient or among units within the hospital, such as Emergency Department and Labor and Delivery).

**LACK OF CONTINUITY OF CARE (PROVIDER OR FACILITY PERSPECTIVE)**
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.

**CULTURAL/RELIGIOUS, OR LANGUAGE FACTORS** The provider or patient demonstrated that any of these factors was either a barrier to care due to lack of understanding or led to refusal of therapy due to beliefs (or belief systems).

**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).

**ENVIRONMENTAL FACTORS**
Factors related to weather or social environment.

**INADEQUATE OR UNAVAILABLE EQUIPMENT/TECHNOLOGY**
Equipment was missing, unavailable, or not functional, (e.g, absence of blood tubing connector).

**INTERPERSONAL RACISM**
Discriminatory interactions between individuals based on differential assumptions about the abilities, motives, and intentions of others and resulting in differential actions toward others based on their race. It can be conscious as well as unconscious, and it includes acts of commission and acts of omission. It manifests as lack of respect, suspicion, devaluation, scapegoating, and dehumanization. (Jones, CP, 2000 and Dr. Cornelia Graves).

**KNOWLEDGE - LACK OF KNOWLEDGE REGARDING IMPORTANCE OF EVENT OR OF TREATMENT OR FOLLOW-UP**
The provider or patient did not receive adequate education or lacked knowledge or understanding regarding the significance of a health event (e.g, shortness of breath as a trigger to seek immediate care) or lacked understanding about the need for treatment/follow-up after evaluation for a health event (e.g, needed to keep appointment for psychiatric referral after an ED visit for exacerbation of depression).

**INADEQUATE LAW ENFORCEMENT RESPONSE**
Law enforcement response was not in a timely manner or was not appropriate or thorough in scope.

**LEGAL**
Legal considerations that impacted outcome.

**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.

**INADEQUATE COMMUNITY OUTREACH/RESOURCES**
Lack of coordination between healthcare system and other outside agencies/organizations in the geographic/cultural area that work with maternal health issues.

**LACK OF STANDARDIZED POLICIES/PROCEDURES**
The facility lacked basic policies or infrastructure germane to the individual's needs (e.g, response to high blood pressure, or a lack of or outdated policy or protocol).

**LACK OF REFERRAL OR CONSULTATION**
Specialists were not consulted or did not provide care; referrals to specialists were not made.

**SOCIAL SUPPORT/ISOLATION - LACK OF FAMILY/ FRIEND OR SUPPORT SYSTEM**
Social support from family, partner, or friends was lacking, inadequate, and/or dysfunctional.

**STRUCTURAL RACISM**
The systems of power based on historical injustices and contemporary social factors that systematically disadvantage people of color and advantage white people through inequities in housing, education, employment, earnings, benefits, credit, media, health care, criminal justice, etc. (Adapted from Bailey ZD. Lancet. 2017 and Dr. Carla Ortique).

**SUBSTANCE USE DISORDER – ALCOHOL, ILLICIT/ PRESCRIPTION DRUGS**
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).

**TOBACCO USE**
The patient's use of tobacco directly compromised the patient's health status (e.g, long-term smoking led to underlying chronic lung disease).

**TRAUMA**
The individual experienced trauma: i.e,, loss of child (death or loss of custody), rape, molestation, or one or more of the following: sexual exploitation during childhood plus persuasion, inducement, or coercion of a child to engage in sexually explicit conduct; or other physical or emotional abuse other than that related to sexual abuse during childhood.

**UNSTABLE HOUSING**
Individual lived "on the street," in a homeless shelter, or in transitional or temporary circumstances with family or friends.

**VIOLENCE AND INTIMATE PARTNER VIOLENCE (IPV)**
Physical or emotional abuse perpetrated by current or former intimate partner, family member, friend, acquaintance, or stranger.

**OTHER**
Contributing factor not otherwise mentioned. Please provide description.

## CONTRIBUTING FACTORS AND RECOMMENDATIONS FOR ACTION (Continued from page 2)

### CONTRIBUTING FACTORS WORKSHEET

What were the factors that contributed to this death?
Multiple contributing factors may be present at each level.

### RECOMMENDATIONS OF THE COMMITTEE

If there was at least some chance that the death could have been averted, what were the specific and feasible actions that, if implemented or altered, might have changed the course of events?

| DESCRIPTION OF ISSUE (enter a description for EACH contributing factor listed) | CONTRIBUTING FACTORS (choose as many as needed below) | LEVEL | COMMITTEE RECOMMENDATIONS [Who?] should [do what?] [when?] Map recommendations to contributing factors. | LEVEL | PREVENTION TYPE (choose below) | EXPECTED IMPACT (choose below) |
|---|---|---|---|---|---|---|
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