

Fatality Review & Prevention Division

December 2020



Indiana Maternal Mortality Review Committee: 2020 Annual Report



Section 1: Acknowledgments



This report was made possible through detailed review of maternal death cases by a volunteer review committee. We are deeply grateful to the members of this review committee for their insight, dedication, and generosity. We acknowledge the Indiana Department of Health Vital Records, Trauma and Injury Prevention, and Epidemiology Resource Center Divisions for their collaboration in providing data analysis support in the identification of Indiana maternal deaths. We thank the health systems, healthcare providers, healthcare facilities, Indiana Hospital Association, Indiana Department of Child Services, Family and Social Services Administration, and coroners who provided the records that allowed meaningful review to occur.

Our gratitude extends to the Centers for Disease Control and Prevention for their technical support in this work, as Indiana strives to honor Indiana mothers through expansion of our maternal mortality review program.

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Dedication

The Indiana Department of Health would like to acknowledge the Indiana women who died within one year of pregnancy during 2018, and their families and friends.

We hope that our efforts to learn from their stories will help us prevent this heartbreak in the future.

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Dear Colleagues,

The Indiana Department of Health (IDOH) is pleased to share the first ever Indiana Maternal Mortality Report. This report shares the findings and recommendations of the Indiana Maternal Mortality Review Committee (MMRC) from their review and discussion of all 2018 maternal deaths in Indiana.

The Indiana MMRC is comprised of volunteers from several disciplines, working tirelessly to identify statewide trends in maternal mortality, and offer recommendations to improve the health and safety of Indiana women. The committee honors the women who have died and understands the impact on their families and communities.

MMRC members shared their expertise and knowledge to identify opportunities for prevention, with the hope that fewer Indiana families will have to suffer the tragic losses associated with maternal mortality. IDOH is committed to learning from their review processes and partnering with other state and local agencies to implement recommendations detailed in this report.

Many efforts are already under way.

Volunteers of America Indiana's Fresh Start and Community Health network's CHOICES programs have shown promise in allowing women in need of substance use treatment to keep their children with them. The Indiana Perinatal Quality Improvement Collaborative (IPQIC) has facilitated the establishment of a substance use protocol for Indiana's hospitals that includes screening at the time of delivery, cord tissue testing and discharge planning for both mother and baby.

Indiana is also one of 10 states participating in the CMS Maternal Opioid Misuse (MOM) program. The MOMII (Maternal Opioid Misuse Indiana Initiative) program partners with four Medicaid Managed Care Entities and the IU School of Medicine ECHO program to improve care coordination, increase postpartum coverage, address social determinants of health, and connect women and their babies to compassionate, well-trained providers. Enrollment for this program begins in July 2021.

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We have joined the Alliance for Innovation on Maternal Health and have adopted safety bundles, including the obstetric hemorrhage and maternal hypertension bundles, and will be adopting AIM's substance use disorder toolkit next. Our OB Navigator program, known as My Healthy Baby, provides local support to women during their pregnancy and through the first year of their babies' lives. And our Levels of Care system ensures that women deliver their babies at the hospital best equipped to meet their needs.

The impact of these programs will be reflected in the continued work of the Indiana MMRC, which is already identifying and reviewing maternal deaths that occurred in 2019. I fully believe that the cumulative data and recommendations that result from that review will benefit Indiana women.

I want to extend my sincere appreciation to the Indiana MMRC members and the leadership of Dr. Mary Pell-Abernathy, chairwoman of the MMRC. This group has contributed countless hours of time as they lend their expertise to a careful examination of each of the maternal deaths reviewed. Together, we can prevent maternal mortality and improve the health of Indiana families.

Yours in health,

A handwritten signature in blue ink that reads 'Kristina M. Box MD FACOG'.

Kristina M. Box, MD, FACOG
State Health Commissioner

Executive Summary

Maternal mortality can be an indicator of the overall health of a community or state. In response to the increasing recognition of disparate maternal mortality rates in the United States, Maternal Mortality Review Committees (MMRC) are pertinent. These groups identify and examine pregnancy-associated deaths in order to understand their causes and contributing factors, and ultimately put forth recommendations for preventing them in the future.

Indiana began developing its MMRC in 2017. Legislation mandating its formalization took effect in July 2018, and the State Health Commissioner appointed members who began reviewing all pregnancy-associated deaths in the fall of 2018. This multi-disciplinary committee has worked tirelessly to review all pregnancy-associated deaths that occurred in 2018 to better understand their causes and preventability.

Identification of all deaths of Indiana women during and within one year of pregnancy resulted in pregnancy-associated and pregnancy-related mortality ratios that differ greatly from those traditionally reported by the National Vital Statistics System (NVSS) and the Pregnancy Mortality Surveillance System (PMSS), respectively. NVSS relies exclusively on death certificate coding and targets only women up to 42 days post-partum. PMSS data includes women through one year from the end of pregnancy and establishes pregnancy-relatedness through linkages with birth certificates and fetal death reports. A significant number of false positives were identified in each dataset that were ultimately excluded, and an equally significant number of cases were identified by the Indiana MMRC through matching, facility reporting, and other means that were not identified in the NVSS dataset (false negatives). The MMRC-derived data presented in this report more accurately reflect the burden of maternal mortality in Indiana and cannot be compared to other datasets.

KEY FINDINGS

- In Indiana in 2018, a total of 63 pregnancy-associated deaths occurred during pregnancy or within one year of the end of pregnancy.
- 86% of pregnancy-associated deaths occurred postpartum, including 37% after 6 weeks.
- Substance use disorder was the most common contributing factor to maternal deaths, likely contributing to over half of all pregnancy-associated deaths in 2018.
- Accidental overdose was overwhelmingly the leading cause of death, accounting for 36.5% of all pregnancy-associated deaths.
- The MMRC deemed 87% of reviewed pregnancy-associated deaths were preventable.

OPPORTUNITIES FOR INTERVENTION

- Limited communication between providers, based on perceived legal barriers, limits comprehensive care coordination and collaboration for pre-, ante-, and post-partum women in Indiana.
- A significant delay exists for substance abuse treatment and recovery services in the pregnancy and post-partum periods.
- Indiana must continue to expand access to appropriate substance use treatment, recovery, and mental health care resources, particularly for pregnant women.
- There are gaps in protocols addressing severe hypertension in pregnant women.

KEY RECOMMENDATIONS

- *For the State of Indiana*
 - Promote a statewide information exchange network among Indiana providers and agencies.
 - Prioritize the AIM bundle addressing substance use in pregnancy.
 - Extend postpartum coverage for Medicaid clients, and include parity to ensure appropriate access to care for chronic conditions, including substance use and mental health disorders.
- *For Systems of Care*
 - Optimize the health and well-being of women with chronic conditions, including substance use and mental health disorders, and their infants.
 - Improve linkages to comprehensive support and care, including treatment for substance use and mental health disorders, recovery support, housing, social isolation, and food insecurity
 - Standardize clinician education to include implicit bias and trauma-informed care to decrease stigmatizing messages
 - Provide follow-up care for early pregnancy diagnosis, particularly for women with substance use disorder
 - Ensure that all social service providers provide alternative resource options for those that, for any reason, are ineligible for traditional services
- *For Facilities*
 - Increase provider adherence to ACOG heart disease and pregnancy guidelines.
 - Require all postpartum discharges to include post-birth warning education and literature.
 - Provide ongoing education to staff on trauma-informed care and the impacts of compassion fatigue.

➤ *For Communities*

- Create a culture of compassion, understanding, and healing for the mother-infant dyad affected by chronic illnesses, including mental health and substance use disorders.
- Engage social service providers in identifying families in need of assistance accessing resources, including family planning, mental health treatment, and parenting education.
- Enforce state-mandated toxicology testing in all motor vehicle fatalities.

➤ *For Providers*

- Improve recognition of and reduce stigma and increase support for women with mental health and substance use disorders.
- Increase education for and awareness of mental health diagnoses.
- Improve provider adherence to ACOG heart disease and pregnancy guidelines.
- Increase connectivity to navigation programs that assist with resources, such as home visiting

➤ *For Patients/Families*

- Increase awareness about intimate partner violence and the public duty to inform in situations where victims are in danger.
- Understand the challenges of maintaining recovery for patients being discharged from substance use treatment programs.

Introduction

The Indiana Maternal Mortality Review Committee (MMRC) was formalized in July 2018 following passage of [IC 16-50](#), which required the multi-disciplinary review of pregnancy-associated deaths in Indiana and secured protections for the confidentiality of the process. The MMRC was developed with guidance from the Centers for Disease Control and Prevention (CDC) Division of Reproductive Health's *Building US Capacity to Review and Prevent Maternal Deaths* program and is modeled after other well-established MMRCs in the United States. Coordination for the MMRC and related activities is under the purview of the Indiana Department of Health (IDOH) in the Division of Fatality Review & Prevention.

The Indiana MMRC includes representation from a broad range of physicians and nurses from multiple specialties (Obstetrics & Gynecology, Cardiology, Pulmonary Medicine, Anesthesiology, Pathology, Maternal-Fetal Medicine, Public Health), along with social workers, coroners, health advocates, and other allied health professionals. These volunteers extensively review pregnancy-associated deaths to identify opportunities for prevention. As the goal of the review is identifying systems level changes and not assigning individual blame, the names of patients, medical providers, and involved institutions are not disclosed to MMRC members nor included in this report.

The purpose of this report is to describe the state of maternal mortality in Indiana., Concrete recommendations about ways to prevent future negative outcomes for Indiana women were derived from the review of pregnancy-associated deaths that occurred among Indiana women during 2018.. This includes an in-depth look at some of the social factors that are associated with poor maternal health outcomes, and how data can inform effective actions toward improvement.

Background

MATERNAL HEALTH IN INDIANA

According to the most recent United States Census estimates, Indiana is the 17th most populous state in the United States, with 6.7 million residents, including 2.18 million women between the ages of 10 and 59 years. More than 81,000 live births occurred to Indiana women in 2018.

Among Indiana live births in 2018, the majority (71%) were to White, non-Hispanic women, followed by births to Black, non-Hispanic women (13%) and to Hispanic women of any race (10%) (Figure 1). The other 6% of live births were to mothers of another race (including women identifying as Asian, Pacific Islander, American-Indian or Alaska Native, and those who indicated multiple races on the birth certificate).

Indiana has geographic considerations that influence the availability of health care resources and impact health outcomes. The IDOH Division of Maternal and Child Health has mapped out distances from residence to birthing facilities (Figure 2), graphically displaying the geographic challenges associated with accessing the appropriate level of obstetric care for some Indiana women.

In 2018, in cooperation with the Indiana Hospital Association, IDOH identified 33 counties in Indiana that lack a hospital with inpatient delivery services. These counties are

Figure 1: Indiana Live Births by Race of the Mother
Indiana Department of Health, Vital Records (2018)

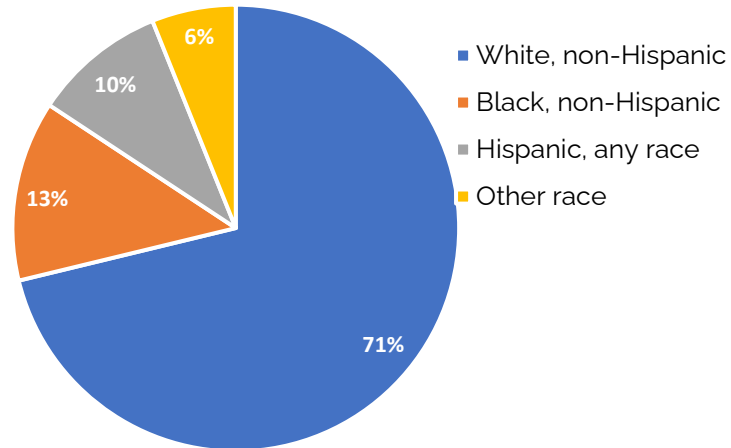
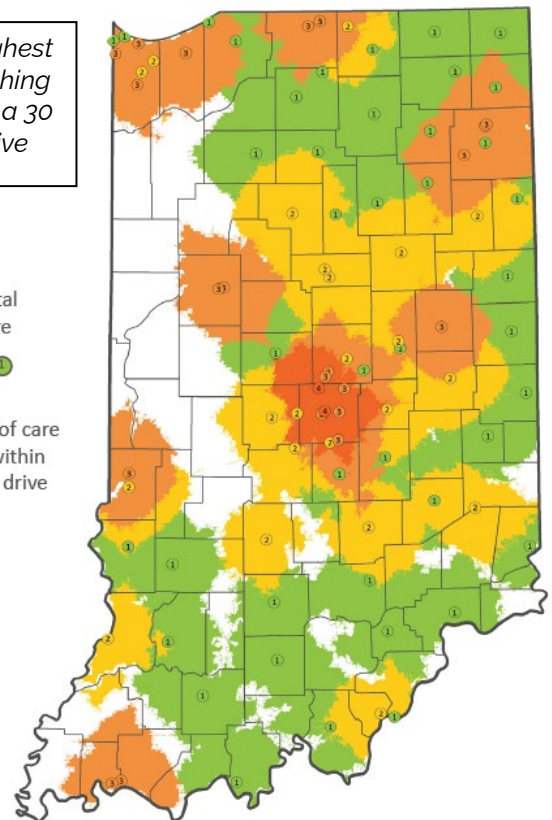
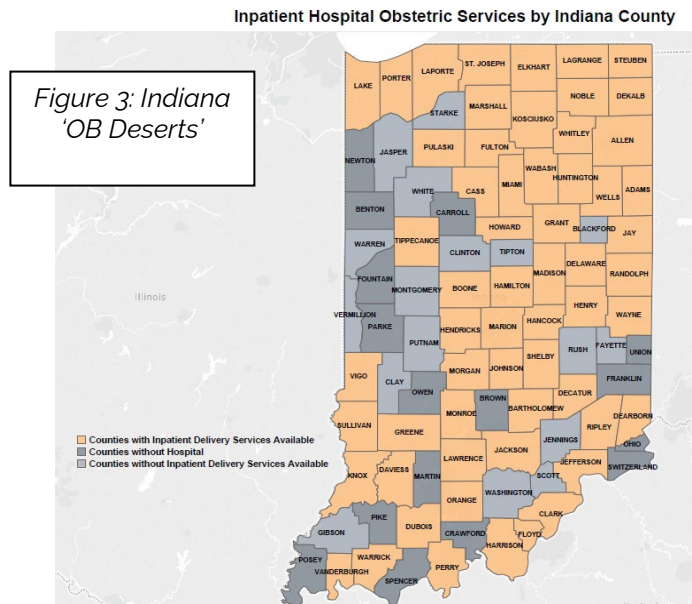


Figure 2: Highest Level of Birthing Care Within a 30 Minute Drive



referred to as OB Deserts (Figure 3). Current initiatives, including the OB Navigator program now known as My Healthy Baby, aim to connect pregnant women in these low-resource regions with prenatal and obstetric care.

MATERNAL MORTALITY REVIEW IN INDIANA



Maternal health is defined as the health of women during pregnancy, childbirth, and in the postpartum period. Typically, women have more interaction with and access to healthcare services during pregnancy. As a result, care during pregnancy can highlight larger concerns, such as underlying chronic disease. It provides an opportunity to identify, treat, and manage conditions to improve a woman's overall health. New and expectant mothers are often keenly focused on the health of their infant, but healthcare services can and should equally emphasize her health during this high-risk period.

Broadly defined, maternal mortality is the death of a woman during pregnancy or close in time to pregnancy. These deaths are considered sentinel events that highlight critical issues in women's health and healthcare systems. Thus, studying cases of maternal mortality and analyzing these data are essential to learning and identifying opportunities for improvement.

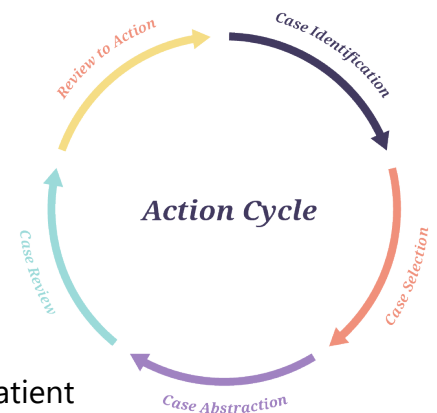
In July 2018, [IC 16-50](#) was enacted and required IDOH to coordinate a multi-disciplinary MMRC, whose goal is to determine risk and protective factors contributing to pregnancy-associated deaths, including pregnancy-related deaths. Resulting data is used to identify interventions aimed at improving systems of care and preventing future maternal morbidity and mortality in Indiana.

Establishing an MMRC has been encouraged as a feasible strategy to reduce pregnancy-associated deaths, but initial attempts to conduct effective reviews in Indiana were impeded by inconsistencies in reporting and death classification practices, lack of collaboration between stakeholders, and other challenges. In 2019, the IDOH Division of Fatality Review & Prevention was awarded funding through the CDC project entitled Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM). This grant and the associated technical assistance have allowed for the expansion of efforts already underway to

systematically identify and collect relevant information pertaining to pregnancy-associated deaths, review the findings, and make data-driven recommendations.

Outcomes for ERASE MM and the Indiana MMRC include:

- Timely, accurate, and standardized information available about deaths of women during pregnancy and the year after the end of pregnancy, including opportunities for prevention, within Indiana;
- Increased awareness of the existence and recommendations of the MMRC among the public, clinicians, and policy makers; and
- Implementation of data-driven recommendations, such as evidence-based practices, screenings, and patient education by providers.



The work of the Indiana MMRC aligns with Indiana’s health improvement priorities. Improving birth outcomes and addressing the opioid epidemic are among the goals listed for the five priority topics in Indiana’s 2018-2021 State Health Improvement Plan. In addition, Governor Eric J. Holcomb’s agenda has included addressing substance use disorder, infant mortality, and maternal health. By ensuring access to treatment for substance use disorder and targeting interventions that strive to reduce the infant mortality rate in Indiana, cross-cutting measures are achieved in maternal health, as well.

Maternal Mortality

Maternal mortality is the death of a woman while pregnant or close in time to pregnancy. Maternal mortality serves as an indicator of the quality of health and health care in a community or state. Different categories of maternal mortality are used to track and analyze these deaths. Traditionally, some organizations, such as the World Health Organization, have measured only deaths that occur within 42 days of pregnancy to study maternal morbidities and mortality. However, many groups, including the CDC, have begun using a broader definition, extending further into the postpartum period to capture longer-term effects of pregnancy and childbirth on women's health and survival.

As an ERASE MM state, Indiana uses the following standard definitions defined by the CDC:

Pregnancy-Associated Death = The death of a woman while pregnant or **within one year** of the termination of a pregnancy, regardless of the cause.

Pregnancy-Associated, But Not Related Death = The death of a woman during pregnancy or within one year of the end of pregnancy, from a cause that is not related to pregnancy

Pregnancy-Related Death = The death of a woman during pregnancy or **within one year** of the end of a pregnancy from a pregnancy complication, a chain of events initiated by the pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

Pregnancy-associated deaths, therefore, represent all women who die within one year of pregnancy. Pregnancy-associated deaths encompass three key sub-categories: those related to pregnancy, those unrelated to pregnancy, and those for which the MMRC could not determine relatedness. Tracking pregnancy-associated deaths overall, as well as pregnancy-related deaths, is important for understanding maternal mortality.

These varying definitions can be a source of global debate and confusion. Throughout this report, deaths through one year of the end of pregnancy are included and referred to specifically as pregnancy-associated or pregnancy-related where appropriate. In addition, the word "maternal" is used generally to refer to women

PREGNANCY ASSOCIATED DEATH

The death of a woman while pregnant or within 1 year of the end of a pregnancy, regardless of cause.

PREGNANCY RELATED DEATH

The death of a woman during pregnancy or **within one year** of the end of a pregnancy from a pregnancy complication, a chain of events initiated by the pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

during pregnancy, childbirth, and the postpartum periods. Use of this broad definition ensures that causes leading to maternal death beyond 42 days postpartum are neither missed nor neglected.

Identifying and Counting Deaths

There are two essential phases for tracking and understanding maternal mortality in Indiana. The first phase is to identify all pregnancy-associated deaths. The second is reviewing those deaths to closely examine the cause of death, identify factors that influenced the death, and develop potential recommendations for preventing future deaths.

Figure 4: OB Diagnoses Coding with ICD-10
O00–O08. Pregnancy with abortive outcome
O09. Supervision of high-risk pregnancy
O10–O16. Edema, proteinuria, and hypertensive disorders in pregnancy, childbirth, and the puerperium
O20–O29. Other maternal disorders predominantly related to pregnancy
O30–O48. Maternal care related to the fetus and amniotic cavity and possible delivery problems
O60–O77. Complications of labor and delivery
O80–O82. Encounter for delivery
O85–O92. Complications predominantly related to the puerperium
O94–O95, O98–O9A. Other obstetric conditions, not elsewhere classified
A34. Obstetrical tetanus

Indiana uses multiple methods simultaneously to ensure pregnancy-associated deaths are accurately identified and counted each year.

Traditionally, death certificates were the only way maternal deaths were counted, and they are still used as a first step for identifying deaths for MMRC. There is a checkbox on the death certificate that indicates whether a woman was pregnant at the time of death or pregnant within the last year. Additionally, there may be ICD-10 codes among the coded causes of death that indicate the death was pregnancy-associated (“O codes”) (Figure 4). After these women are identified, the abstraction staff obtain any records necessary to confirm pregnancy status. These may include hospital records from death, birth, or prenatal care, autopsy reports, and even through communication with coroners. This

process is critical to eliminate any false positives.

Another method for identifying pregnancy-associated deaths is to match women’s death certificates to birth and fetal death records. Death certificates for any woman age 10 to 60 years are linked with vital records for all births and fetal deaths that occurred during the previous two years. Matching variables include mother’s last name, mother’s maiden name,

<p>36. IF FEMALE:</p> <p><input type="checkbox"/> Not pregnant within past year</p> <p><input type="checkbox"/> Pregnant at time of death</p> <p><input type="checkbox"/> Not pregnant, but pregnant within 42 days of death</p> <p><input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death</p> <p><input type="checkbox"/> Unknown if pregnant within the past year</p>

mother's birthdate, and mother's Social Security number. Examining two complete years of records is essential to account for a full year before the woman's death. If a birth or fetal death record is discovered during the 12-month period prior to a woman's death, her death is flagged as pregnancy-associated and marked for abstraction and review. Without this matching process, Indiana would miss a significant number of pregnancy-associated deaths, as the death records did not include appropriate completion of the pregnancy checkbox.

In addition to the state public health data systems, pregnancy-associated deaths in Indiana are detected through multiple other means.



Maternal Death Report
Indiana State Department of Health

Per [IC 16-50-1-6\(a\)](#) please send this report immediately after the death of a woman who was currently pregnant or was pregnant within 365 days of death. Report the event regardless of where the patient died with as much details as possible.

Name of Woman _____
Last First Middle Maiden

Address _____
Street City State ZIP

Date of Birth (MM/DD/YYYY) _____
 Date of Death (MM/DD/YYYY) _____
 Name of birth hospital (if known) _____
 Name of Obstetric Provider (if known) _____

Place of death
 Hospital (name of facility and city) _____
 Residence other (Please specify) _____

Medical Record number _____
 No Autopsy
 Autopsy Performed
 o Facility or address where autopsy was performed _____
 o Autopsy performed by: _____
 Autopsy pending

Cause of death
 Primary _____
 Contributing factors _____

 Manner of Death _____

Report Prepared by _____ Date _____
 Email _____ phone _____

When complete, please scan and email to MMR@ISDH.in.gov
 For any questions please call ISDH Maternal Mortality Review Coordinator 317-232-4300

The Indiana Hospital Association provides the Indiana MMRC with a list of all known pregnancy-associated deaths. For 2018, this method helped identify two additional women for MMRC review.

All Indiana hospitals are required by [IC 16-50](#) to report any known pregnancy-associated deaths to IDOH, and a communication system exists for this purpose (Figure 4 and Appendix A). Hospitals began submitting notifications of pregnancy-associated deaths occurring in 2018 but did not do so until the legislation was enacted in July 2019. Only seven pregnancy-associated deaths that occurred in 2018 were reported by facilities.

Lastly, IDOH completes regular searches of major newspapers and social media outlets

for articles or obituaries that indicate the death of a woman while pregnant or within one year of pregnancy. For example, if a woman's obituary mentions a surviving child who is less than one year old, she is flagged as a potential pregnancy-associated death for MMRC review.

2018 CASE IDENTIFICATION PROCESS (FIGURE 5)

1. Initial case identification used 2018 death certificates of women ages 10-60 with a pregnancy checkbox on the death certificate indicating the woman was pregnant at the time of death or within one year of death. Also included were women with causes of death coded with ICD-10 codes starting with "O," as well as A34.
2. Abstraction team acquired medical records, autopsies, and spoke with death certifiers to confirm pregnancy status and excluded falsely identified cases.
3. Indiana Hospital Association cross-checked records of known pregnancy-associated deaths in 2018.
4. Matched all 2018 women's death in Indiana (ages 10-60 years) to all birth and fetal death records in Indiana between 2017-18, to identify women with a recent birth or fetal death (within year of death). Identified additional pregnancy-associated deaths not correctly marked on their death certificates.
5. Worked with IDOH's Epidemiology Resource Center Data Analysis team to verify case identification process and confirm number of positive identified cases.



REVIEWING AND ASSESSING PREGNANCY-ASSOCIATED DEATHS

Though information from death certificates and other public health records may help identify counts of pregnancy-associated deaths, these records cannot determine the preventability of cases or the factors involved in the case. The CDC recommends gathering additional information (e.g., medical records, social service records, law enforcement records) to support comprehensive review of pregnancy-associated deaths by a multidisciplinary MMRC to determine how the woman died, whether the death was preventable, and opportunities for preventing future deaths.

IDOH contacts hospitals and health centers where the women received care to request any relevant medical records, with specific focus on records from the time of her most recent pregnancy to her death. These medical records provide details about the woman's death and relevant medical history about the sentinel pregnancy. For instance, records are routinely requested from the hospital where the woman died, the hospital where she gave birth, and the physician office or health center where she received prenatal care.

Often, as medical records are abstracted, additional care providers or referrals are detected within the charts. These supplemental records are also requested. The ability to compel all records required for death review is granted through IC 16-50, and hospitals and medical providers are encouraged to comply within 30 days of IDOH's requests.

When relevant, records are also obtained from the Indiana National Violent Death Reporting System (housed within the IDOH Division of Trauma and Injury), local police departments, sheriffs' offices, Indiana Department of Child Services, and coroner's offices. Other programming coordinated within the Division of Fatality Review & Prevention, including Fetal-Infant Mortality Review and Suicide and Overdose Fatality Review, are also instrumental in the collection of circumstantial information about many pregnancy-associated deaths.

The abstraction staff examine all available records for each case, and abstract relevant information. They then present the anonymous case narrative and timeline to the full MMRC for review. Following review of all the available information, the Indiana MMRC makes the following decisions for each case:

1. Was the death pregnancy-related?
2. What was the underlying cause of death?
3. Was the death potentially preventable?
4. What were the factors that contributed to the death?
5. What are the recommendations and actions that address those contributing factors?

All of these questions are critical, but the last three highlight the unique role of the MMRC. Using a standardized decision form, each case is assessed for the following:

Chance to Alter Outcome. The MMRC determines if there was no chance, some chance, or a good chance "of the death being prevented by one or more reasonable changes to patient, family, community, provider, and / or systems factors."

Preventability. A death was considered preventable if the MMRC determines that there was at least some chance of the death being averted.

Contributing Factor. Factors identified by the MMRC that contributed to the death. These are steps along the way that, if altered, may have prevented the woman's death. The factors may be related to the patient, health care providers, facilities / hospitals where the woman sought care, or to the systems that influence the lifestyle, care, and health services for the woman.

MMRIA SYSTEM



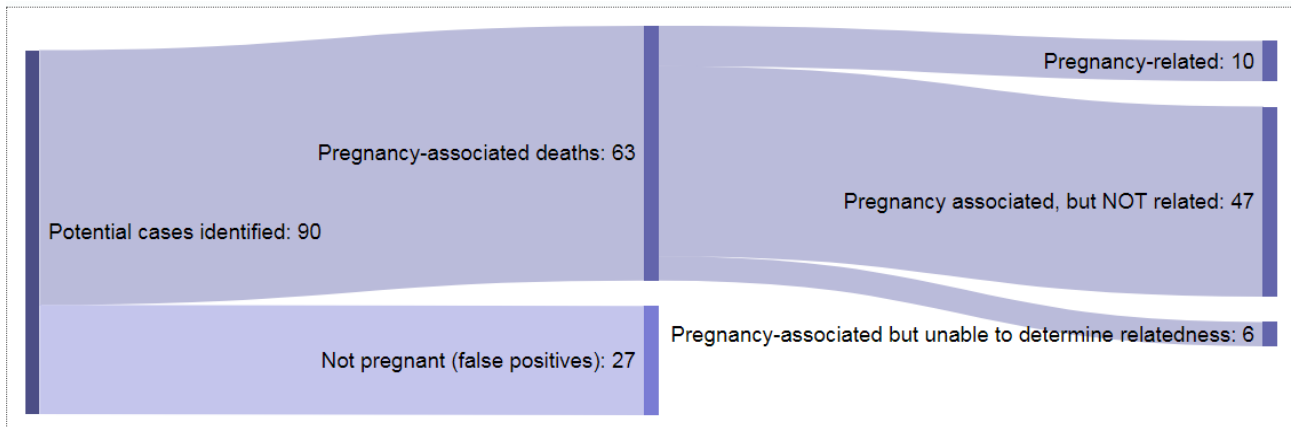
For its data analysis processes, the Indiana MMRC uses the Maternal Mortality Review Information Application (MMRIA or “Maria”). MMRIA is a CDC-created and -hosted data entry system that serves a two-fold purpose: 1) it supports the abstraction of medical and social records for case review, and 2)

provides standardized data for analysis and surveillance through the MMRIA Committee Decisions Form (v19) (Appendix B).

By using the MMRIA Committee Decisions Form and case abstraction data entry, the Indiana MMRC can function with a common language, critical to collaboration with and comparison to other MMRCs. Case definitions and definitions of other terms analyzed in this report come directly from their descriptions in the MMRIA Committee Decisions Form.

2018 Indiana MMRC Findings

The Indiana MMRC identified 63 pregnancy-associated deaths among Indiana women in 2018 and convened seven times between August 2019 and August 2020 to review each death. All discussions included determinations of pregnancy-relatedness, preventability, and contributing factors to the death. From these data, the Indiana MMRC created recommendations for prevention.



The committee determined 10 deaths to be pregnancy-related. This means the Indiana MMRC could state with confidence that the deaths occurred as a *direct result of a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiological effects of pregnancy*. Examples of these causes of deaths included postpartum cardiomyopathy, pulmonary disease, or intimate partner violence.

Another 47 deaths were determined to be pregnancy-associated, but NOT related. For the remaining six deaths, the Indiana MMRC was unable to conclusively determine relatedness from the available records and case narrative.

Using the pregnancy-associated deaths identified and the Indiana MMRC's decisions on relatedness, pregnancy-associated and pregnancy-related mortality ratios were calculated for 2018.

The pregnancy-associated mortality ratio was 77.2 per 100,000 live births. This is the overall ratio of death to live births to Indiana women ages 10 to 60 who died either during or within one year of pregnancy *due to any cause*.

The pregnancy-related mortality ratio was 12.2 per 100,000 live births. This is the specific ratio of death to live births to Indiana women ages 10 to 60 who died either during or within one year of pregnancy. The pregnancy-related mortality ratio is a subset of the overall pregnancy-associated mortality ratio.

Maternal Mortality Ratios for 2018

- **77.2 per 100,000 live births:**
pregnancy-associated mortality ratio in Indiana in 2018
- **12.2 per 100,000 live births:**
pregnancy-related mortality

COMPARISON TO PREVIOUS MATERNAL MORTALITY RATES OR OTHER SOURCES

Historically, Indiana and other states have used maternal mortality rates determined by the United States National Vital Statistics System (NVSS) at the National Center for Health Statistics. These pregnancy-associated deaths are established exclusively via the death certificate O-codes, including A34, and the pregnancy checkbox to determine the number and rate of maternal deaths. These numbers do not include late maternal deaths, or those occurring 43 days to one year after the end of the pregnancy.

PMSS is a subset of NVSS data, establishing and reporting pregnancy-related deaths only. Like the MMRC process defined above, PMSS data defines a maternal death as the death of any woman within one year of pregnancy or childbirth, and links to birth and fetal death records. However, unless specifically requested by states, supplemental confirming documents (such as medical records) are not consulted to confirm pregnancy status.

Through the Indiana MMRC case identification, linking, and abstracting processes, 27 false positives were discovered among the list provided through NVSS and PMSS. This means these identified pregnancy-associated deaths were not actually pregnant or recently pregnant. Additionally, facility reporting of pregnancy-associated deaths and the birth and death records matching process uncovered 30 false negatives, not included in the PMSS data. These were women who had died while pregnant or recently pregnant who were not captured in the NVSS or PMSS data or rates.

As a result, the maternal deaths traditionally represented in PMSS data differ greatly from those reviewed by the Indiana MMRC. The calculated pregnancy-associated and pregnancy-related mortality ratios are a much more accurate measure of the burden of maternal mortality in Indiana and should be used in place of PMSS data where possible.

This distinction will present challenges when attempting to compare Indiana’s maternal mortality ratios to the national average and those of other states. Currently, 42 states (and two cities) have MMRCs that identify, review, and analyze maternal deaths. Each has individually determined which subsets of maternal deaths they will identify and review. Some states report only on those deaths determined to be pregnancy-related, while other states report on all pregnancy-associated deaths. As such, there is currently no national MMRC dataset to determine a comparable national pregnancy-associated or pregnancy-related mortality ratio.

Comparisons of pregnancy-associated and pregnancy-related ratios can be made on a case-by-case basis. However, special care must be taken to ensure that only MMRC-reported rates or ratios are compared, and then only to correlating mortality ratios. For example, Indiana can compare its MMRC-determined pregnancy-related ratios to those originating from other MMRCs that analyze their pregnancy-related deaths. Alternatively, Indiana can compare pregnancy-associated ratios with MMRCs that review all pregnancy-associated deaths.

The 2018 mortality ratios in this report should not be used for comparisons to any rates based on PMSS or other data.

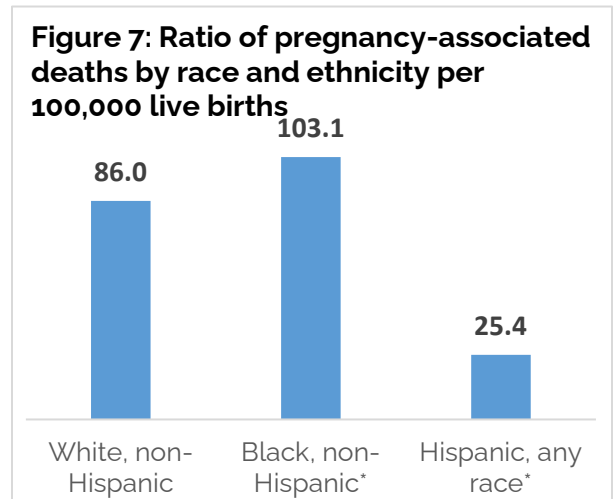
2018 PREGNANCY-ASSOCIATED DEATHS: CASE CHARACTERISTICS

Through the review of birth and death certificates, prenatal records, delivery records, mental health and social histories, and any other records available, the abstraction team was able to identify and report to the Indiana MMRC any primary characteristics for 2018 pregnancy-associated deaths. These included demographics, geography, and some other possible contributing factors to maternal mortality in Indiana.

Data in this report is descriptive in nature and meant to illustrate the characteristics of the 2018 cohort of pregnancy-associated deaths. Because of the relatively low number of deaths (n=63) and having only a subset of those were pregnancy-related (n=10), categorizing will result in small numbers and unstable rates. Numbers under five may be suppressed to ensure confidentiality. Unstable rates – or those under 20 - may not be accurate for comparisons, and they will be noted below. As the Indiana MMRC continues to review pregnancy-associated deaths over the coming years, multi-year cumulative data will be presented, which should result in fewer unstable rates.

White non-Hispanic women accounted for a majority of deaths, with 50 reviewed by the Indiana MMRC (79.4%), followed by Black non-Hispanic women with 11 deaths (17.5%), and Hispanic women of any race with two deaths (3.2%) (Figure 6). Because the proportion of births differs by race and ethnicity in Indiana, comparisons must be between mortality ratios. Figure 7 shows there appears to be some disparity in the rate of death by race and ethnicity, with Black, non-Hispanic women experiencing the highest rate of death, and Hispanic women experiencing the lowest.

Figure 6: Race/Ethnicity	N	%
White, non-Hispanic	50	79.4%
Black, non-Hispanic	11	17.5%
Hispanic, any race	2	3.2%
Other	0	0.0%

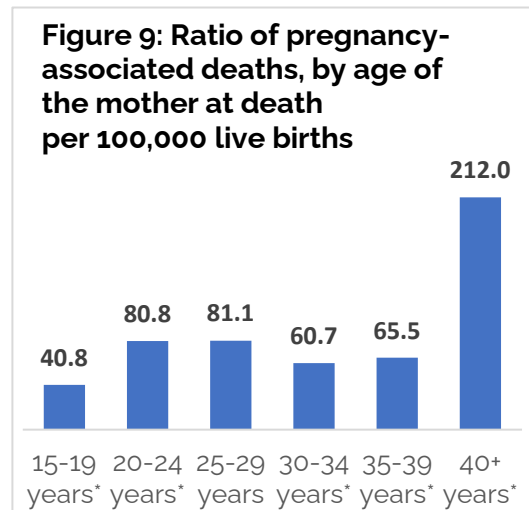


*The rates above are considered unstable because they are based on small numbers. Comparisons using these rates may not represent long-term differences. As the Indiana MMRC continues to collect additional years of data, the stability of rates will improve.

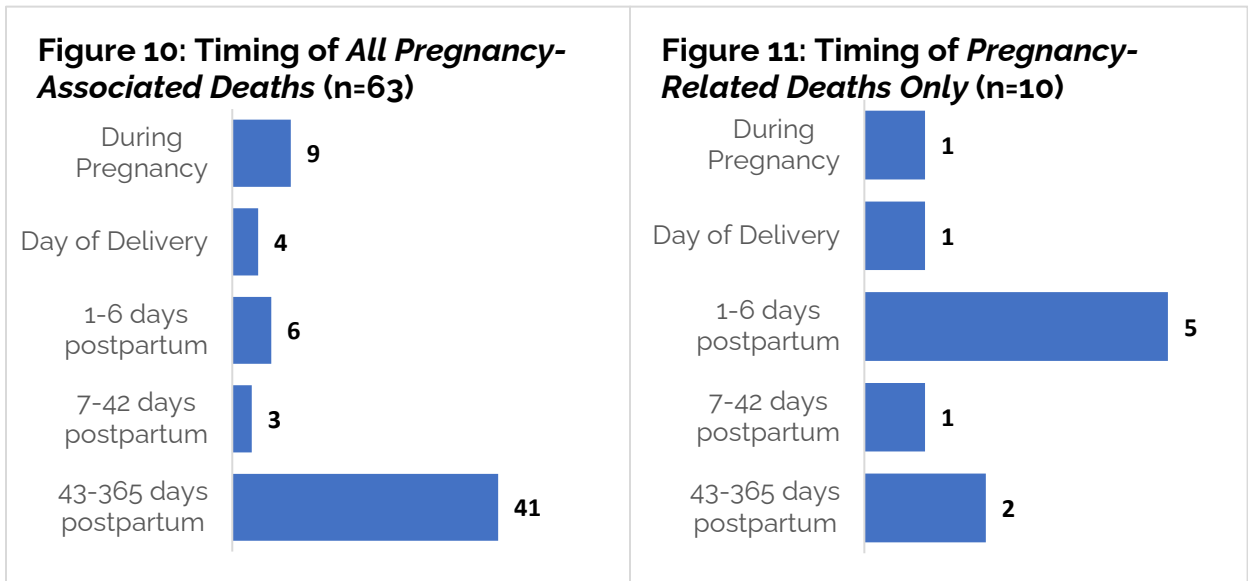
Women between the ages of 20 and 34 accounted for 80.9% of all pregnancy-associated deaths in 2018 (Figure 8). Due to the differences in pregnancy and childbirth rates among different age groups, disparity is best represented by age-specific mortality ratios, seen in Figure 9.

People aged 15-19 years accounted for the smallest percentage (3.2%). Teen women experienced the lowest ratio of pregnancy-associated deaths and were about 50% less likely to die within a year of pregnancy or childbirth as women in their 20s. Women over the age of 40 had the highest pregnancy-associated mortality ratio and were 2.5 times as likely to die within a year of pregnancy or childbirth as were women in their 20s.

Figure 8: Age at Death	N	%
15-19 years	2	3.2%
20-24 years	16	25.4%
25-29 years	22	34.9%
30-34 years	13	20.6%
35-39 years	6	9.5%
40+ years	4	6.3%



*The rates above are considered unstable because they are based on small numbers. Comparisons using these rates may not represent long-term differences. As the Indiana MMRC continues to collect additional years of data, the stability of rates will improve.



One of the main differences noted between overall pregnancy-associated deaths and the subset of pregnancy-related deaths was the timing of death relative to pregnancy, as seen in Figures 10 and 11. While the majority of pregnancy-associated deaths (65%) occurred six weeks or more post-partum, 70% of the deaths determined to be pregnancy-related occurred either during pregnancy or within the first week post-partum. These findings suggest women are most at risk for dying from a pregnancy complication or other condition aggravated by pregnancy during pregnancy and in the first week following childbirth. However, their risk of dying from other causes, including injury or other medical conditions, is highest six or more weeks out from childbirth.

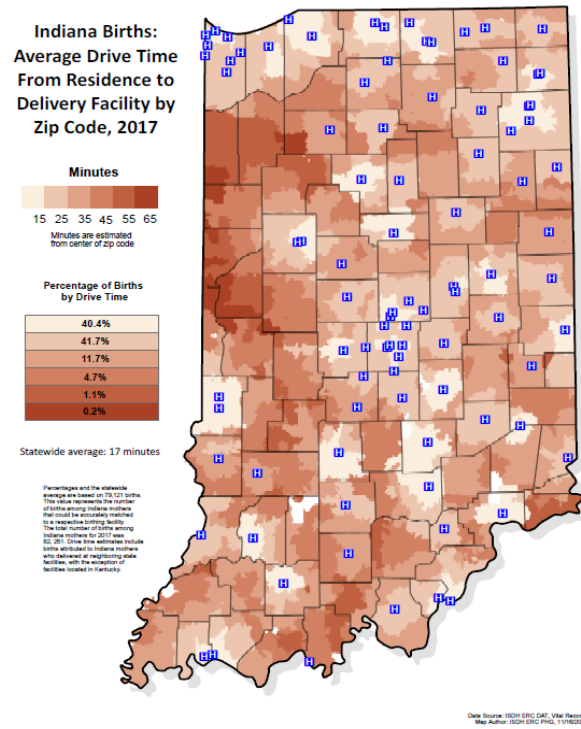
GRAVIDITY OF SENTINEL PREGNANCY

Gravidity indicates the number of times a woman has been pregnant, regardless of the outcome, and includes current pregnancies. The gravidity of the last pregnancy for the women whose deaths the Indiana MMRC reviewed were examined for trends (Figure 12). In the pregnancy-associated deaths from 2018, there did not appear to be any pattern in gravidity, with regard to the sentinel pregnancy. There were an equal number of pregnancy-associated deaths that occurred among women experiencing their first, second, or third pregnancy, and some in their fourth or more. Maternal mortality does not therefore affect only women during first pregnancy or women with many previous pregnancies. Women at any gravidity can be at risk for pregnancy-associated mortality.



The address for the women’s last residence, including the county, were accessed from vital records. However, it is important to note that a woman’s place residence at the time of her death is not necessarily where she lived over the course of her pregnancy. This is especially true for women who, for any reason, were experiencing housing instability. Housing instability was a noted circumstance during a very small number of pregnancy-associated deaths reviewed by the Indiana MMRC (n=2), but in both cases it was determined to have an effect on her ability to access regular prenatal and other types of care.

Figure 15: Average Drive Time from Residence to Delivery Facility, by ZIP Code



of

SOCIOECONOMIC FACTORS

Social determinants of health such as income level, education level, housing status, and employment status are known to be upstream factors for many public health topics, including maternal and infant health. While the individual or family income levels were not available for the women included in the review, other social factors below can be used as a best estimate of socioeconomic status. These measures provide insights as to what roles social determinants are playing in maternal mortality.

Figure 16: Education Level	N	%
Less than HS	8	12.7%
HS grad or GED	33	52.3%
Some college	11	17.4%
Associates or bachelors	11	17.4%
Advanced degree	0	0.0%

Women with a high school degree/GED or less accounted for 65% of all pregnancy-associated deaths in 2018 (Figure 16).

Census estimates (American Community Survey, 2019) found 44.6% of all women in Indiana aged 18-24 years and 42% of all Indiana women 25+ years had attained a high school degree/GED or less. This is not a direct comparison, as these are all women, not just pregnancy and post-partum women. However,

these comparisons suggest that lower educational attainment may be a risk factor for pregnancy-associated death.

Employment status is another important social determinant of health, as it has significant influence not only on income level, but also on insurance access and eligibility. Women who were unemployed or listed as a homemaker accounted for 33.3% of all pregnancy-associated deaths. Women who had some occupation listed accounted for over half (55.6%) of all pregnancy-associated deaths (Figure 17).

Figure 17: Occupation at Death	N	%
Employed	35	55.6%
Unemployed or listed as homemaker	21	33.3%
Disabled	1	1.6%
Student	2	3.2%
Unknown	4	6.3%

By comparison, Census estimates (American Community Survey, 2019) found that 67.9% of women ages 16-50 years who had given birth in the last twelve months were employed. This age range is not equivalent to that represented in the pregnancy-associated deaths reviewed by the Indiana MMRC but does show slightly higher levels of unemployment among the women who died of pregnancy-associated causes in 2018.

PRENATAL CARE

Figure 18: Entry into prenatal care (PNC)	N	%
1 st trimester (early PNC)	28	44.4%
2 nd trimester	15	23.8%
3 rd trimester (late PNC)	3	4.8%
No prenatal care	15	23.8%
Unknown	2	3.2%

Prenatal care is crucial to ensure that women have a healthy and safe pregnancy and childbirth experience.

The American Congress of Obstetricians and Gynecologists (ACOG) recommends a first prenatal care visit at 8-10 weeks of pregnancy. By connecting with a prenatal care provider, pregnant women can monitor their health and become informed of steps they can take to protect their infant and themselves. Additionally, early prenatal care can identify high-risk pregnancies that may

require a higher level of care.

For pregnancy-associated deaths in 2018 in Indiana, less than half (44.4%) of the women accessed prenatal care in the first trimester of their sentinel pregnancy (Figure 18). This

proportion is much lower than the proportion of all Indiana births to mothers with early prenatal care (68.1%). Another 28.6% of pregnancy-associated deaths in 2018 occurred among women who received prenatal care in the second or third trimesters, and 23.8% received no prenatal care at all. The disparity between the proportion of early prenatal care accessed by mothers for all Indiana live births and the proportion of pregnancy-associated deaths among women who had early prenatal care suggests inadequate prenatal care is a contributing factor to maternal mortality.

The Indiana MMRC attempted to ascertain circumstances preventing women from entering prenatal care during the first trimester. All available records associated with each pregnancy-associated death were assessed, but reasoning for late entry to prenatal care or lack of prenatal care was often not available. The Indiana MMRC requests and receives records, but there may exist other records that were not requested of which the committee was not aware nor available at the time of fatality review. Additionally, it is challenging to document the absence of care, and it should be noted that there were instances among 2018 pregnancy-associated deaths where known barriers existed that affected women's access to prenatal care. These barriers included unstable housing, recent release from incarceration during pregnancy, a lack of reliable transportation, and challenges associated with insurance enrollment and eligibility.

Timing of entry into prenatal care is critical, but quality of care is also an important factor. For a low-risk pregnancy, ACOG recommends visits with a provider every four weeks until 28 weeks gestation, every two to three weeks until 36 weeks gestation, and then every week after 36 weeks gestation. The optimal number of prenatal visits depends on gestation, but for a woman who gives birth at 40 weeks, the recommended number of prenatal care visits is between 12 and 14. This, of course, may vary depending on specific needs.

Among the 2018 deaths with a documented history of prenatal care, the average was just under 10 prenatal visits – fewer than recommended. Logically, the number of visits varied greatly by which point in their pregnancy they entered care. Women initiating prenatal care in their first trimester averaged 11.7 visits. Entry into prenatal care during the second trimester resulted in an average of 6.8 visits, and third trimester entry resulted in an average of only 4.0 visits.

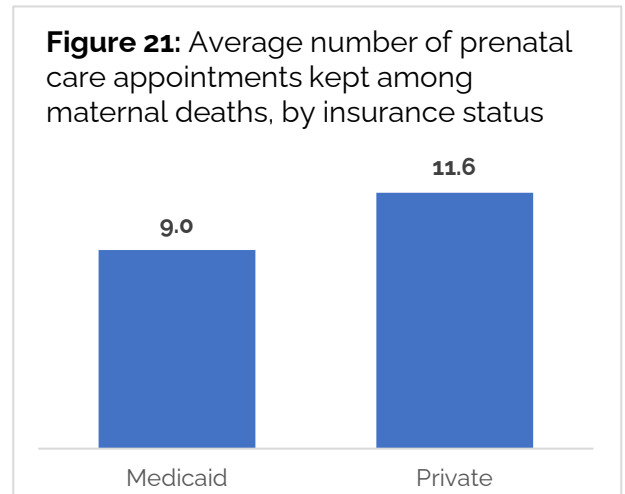
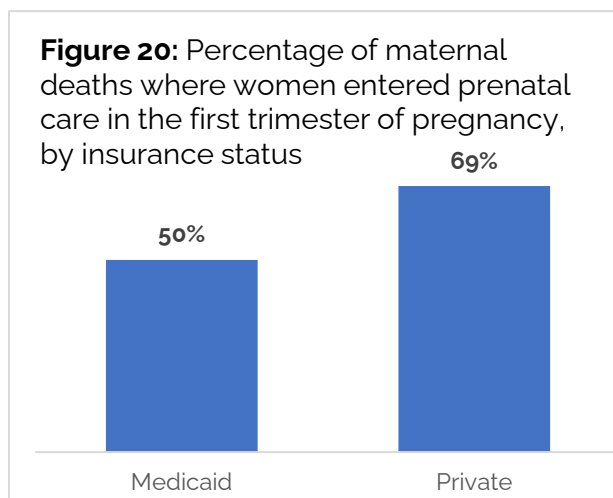
Narrowing down analysis for those women residing in designated "OB Deserts" prior to their death does not show a significant variation in prenatal care access or initiation. In fact, 85% of these women received at least some prenatal care, and 71% entered prenatal care in their first trimester. However, these women attended on average 8.5 prenatal care visits, about one fewer than the visits for the overall cohort. The percentages above are based on the small number of reviewed 2018 deaths among women who resided in "OB Deserts."

Data collected over the next 5 to 10 years will clarify whether these data trends persist over time and can be generalized.

INSURANCE STATUS

Access to health insurance is often a factor in the healthcare decisions of many Americans. In Indiana, pregnant women under a certain income level qualify for Medicaid. The insurance status of women who died from pregnancy-associated deaths was assessed through a variety of means, including birth certificate records, prenatal records, and other medical records. Over half of all women who died from pregnancy-associated deaths in Indiana in 2018 were Medicaid enrolled (Figure 19).

Analysis about the timing and amount of care received by women revealed differences, depending on the types of insurance used. Among the 2018 pregnancy-associated deaths of women who had private insurance, 100% had prenatal care, 69% entered prenatal care in their first trimester, and they had on average 11.6 prenatal care visits.



By comparison, of the pregnancy-associated deaths of women who were Medicaid-insured, 91.7% had prenatal care, 50% entered prenatal care in their first trimester, and they had on average 9.0 prenatal care visits (Figures 20 and 21). These results suggest there is disparity in the timely entry into prenatal care and the number of visits between private-insured women and Medicaid-insured women.

CAUSE OF DEATH

Figure 22 shows the most prevalent causes of death among the 63 pregnancy-associated deaths in 2018, using the official death certificate cause of death. Accidental overdose was overwhelmingly the leading cause of death, accounting for 36.5% of all pregnancy-associated deaths. Also, among the top causes of death are other injury-related deaths, including motor vehicle collisions, suicide, and homicide. Including overdose, unintentional, or intentional injuries accounted for a total of 60.3% pregnancy-associated deaths in 2018. Cancer of various systems, usually a chronic condition, was the third most common cause of death, accounting for 9.5% of all pregnancy-associated deaths. Of the more acute medical conditions, sepsis and other complications of infection accounted for another 7.9% of pregnancy-associated deaths

The remaining causes of death occurred in fewer than three cases in the 2018 cohort. These included:

- Cardiovascular accident or myocardial infarction
- Cardiomyopathy
- Pulmonary embolism
- Uterine hemorrhage
- Fire, smoke inhalation
- Chronic alcoholism
- Respiratory distress from asthma
- Childbirth complications
- Hypokalemia
- Anoxic brain injury
- Intracranial hemorrhage

Figure 22: Top Causes of Death for all 2018 Pregnancy-Associated Deaths
(Indiana Department of Health Vital Records, 2018 [n=63])

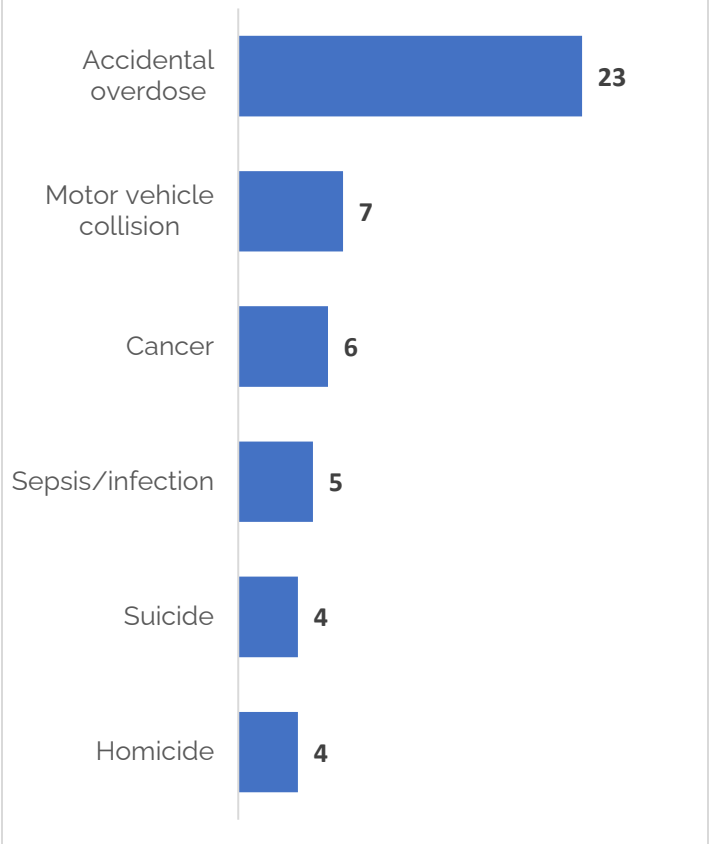
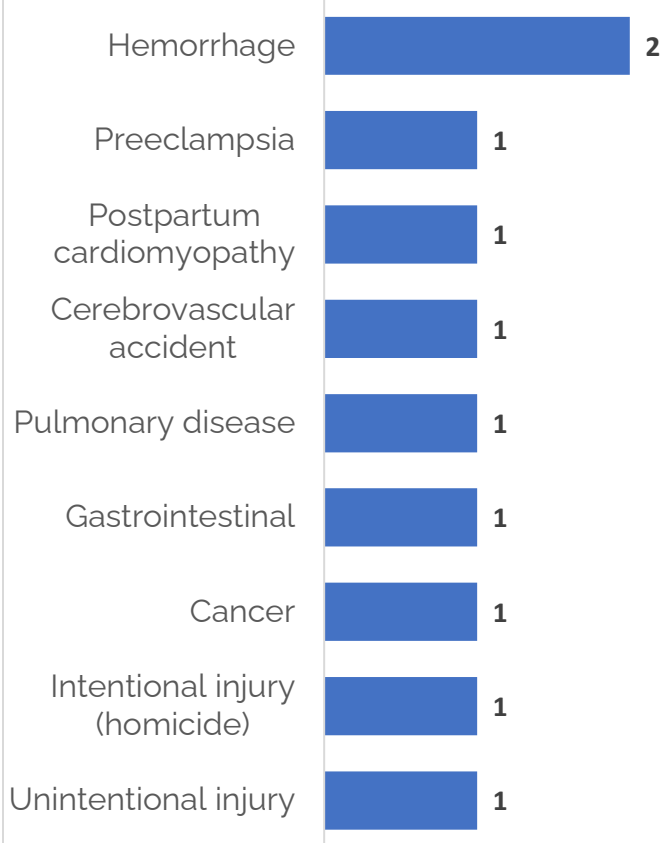


Figure 23: Causes of Death for 2018 Pregnancy-Related Deaths
(MMRC decision based on PMSS-MM codes, 2018 [n=10])



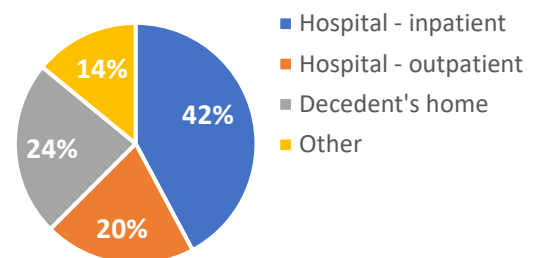
For the deaths that were determined to be pregnancy-related, the Indiana MMRC employed the MMRIA Committee Decisions Form to determine the causes of death from among a list provided by CDC. Among the 10 deaths from 2018 determined to be pregnancy-related, the committee decisions are found in Figure 23.

The causes of pregnancy-related deaths in 2018 show no obvious trends or top causes. As the Indiana MMRC continues to review more pregnancy-associated deaths, cumulative data from multiple years will be better able to describe the top causes of pregnancy-related deaths in Indiana, and more accurately inform prevention.

PLACE OF DEATH

The location of the sentinel event was recorded on the death certificates for all the pregnancy-associated deaths reviewed by the Indiana MMRC. Many pregnancy-associated deaths (62%) occurred in a hospital, either in an inpatient or outpatient setting (including the emergency department). However, almost a quarter of pregnancy-associated deaths (24%) occurred in the women’s own homes. Other places of death included the home of friends or family, a highway/roadway, a parking lot, and hotels (Figure 24).

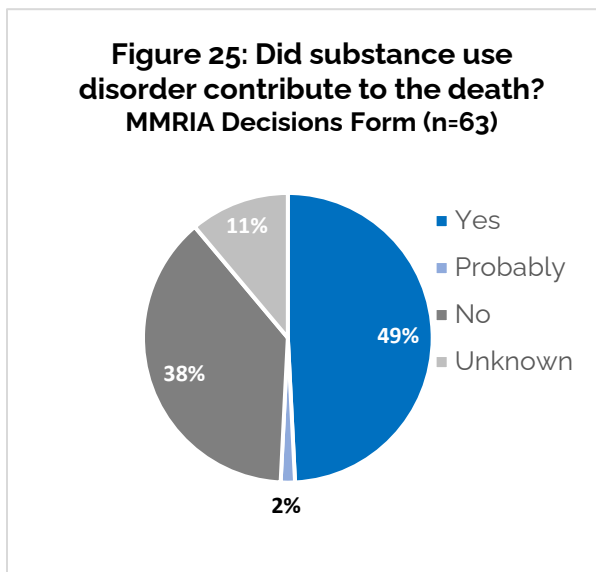
Figure 24: Place of Death for Pregnancy-Associated Deaths



Examining the place of death as a possible intervention point is important for the Indiana MMRC. Understanding the sentinel event can present potential prevention opportunities and can influence recommendations directed at the patient or family. Data shows many of the deaths occurring in 2018 did not take place in a healthcare facility or with other people on scene. Thus, the need to look beyond the events immediately preceding death is critical. The committee used available records and medical and social histories to identify potential upstream interventions that could have addressed the woman’s needs many years before her death, in some cases.

CONTRIBUTING FACTORS

While the underlying cause of death among pregnancy-associated and pregnancy-related deaths provides an answer to HOW Indiana mothers die, it does not address WHY.



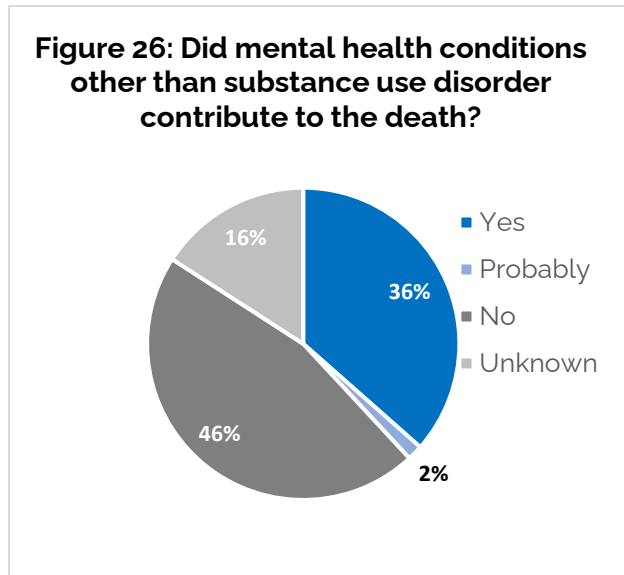
Assessing and measuring circumstantial factors that contributed to pregnancy-associated death in 2018 can exemplify issues affecting pregnant and postpartum women in Indiana and present avenues for intervention.

The Indiana MMRC examined all available records for the 63 pregnancy-associated deaths from 2018 to determine whether substance use disorder (SUD) contributed in any way to each (Figure 25). They determined that in 51% of pregnancy-associated deaths, SUD either **definitely** or **probably** contributed to the

death.

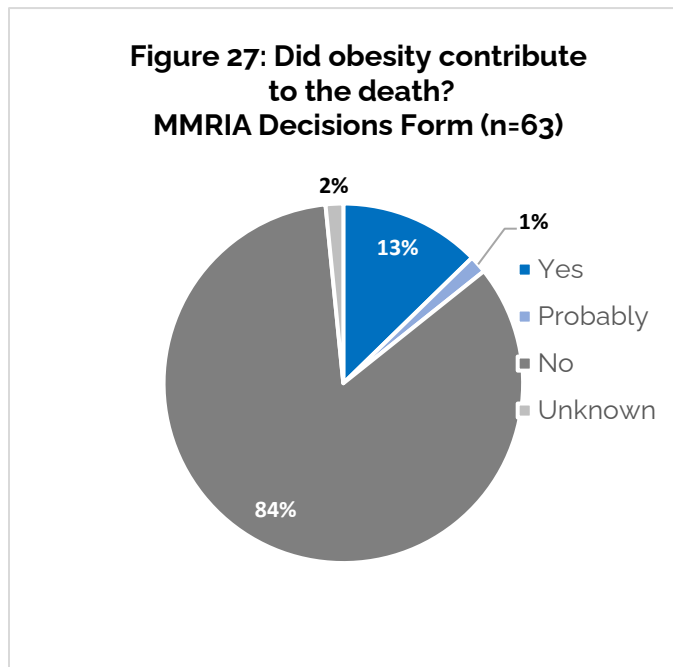
Note that the contribution of SUD went beyond accidental overdoses, with substance use contributing to and exacerbating other conditions that led to the death of pregnant or recently pregnant women. Interventions aimed at helping pregnant women, recently pregnant women, and even non-pregnant women of reproductive age access treatment resources could help prevent over half of pregnancy-associated deaths in Indiana.

Mental health conditions other than substance use, such as depression, also contributed



significantly to pregnancy-associated deaths 2018. In 38% of the Indiana MMRC-reviewed deaths, mental health conditions (other than SUD) either **definitely** or **probably** contributed to the death (Figure 26).

There is heavy overlap between the presence of SUD and other mental health conditions. Of the 32 pregnancy-associated deaths where SUD was believed to be a contributing factor, 66% also had the presence of co-morbid mental health conditions that contributed to their death. The high comorbidity of SUD and other mental health conditions reflects a need for these two prevalent contributing factors to be addressed in a comprehensive manner.



Obesity was another notable contributing factor to Indiana pregnancy-associated deaths in 2018. In 14% of deaths, obesity either **definitely** or **probably** contributed to the death. However, it should be noted the Indiana MMRC leadership received new training and guidance on when to consider obesity as a contributing factor early in the review process. This created minor discrepancies in the MMRC decisions for the 2018 cohort. As a result, the calculated contribution of obesity for 2018 pregnancy-associated deaths is expected to be an overestimate of the true burden.

In the summer of 2020, the CDC updated the MMRC Committee Decisions Form. This new version (v19) added a question regarding whether discrimination contributed to a pregnancy-associated death. The Indiana MMRC adopted v19 during its review of the 2018 cohort, but not all reviewed pregnancy-associated deaths will reflect this data point. Regardless, the Indiana MMRC was still able to discuss and note discrimination in open-ended recommendations, and document them on the MMRIA Committee Decisions Form. In future reviews, the Indiana MMRC will consider whether discrimination was a contributing factor for ALL pregnancy-associated deaths reviewed and resulting reports should be able to address the prevalence of discrimination for Indiana maternal mortality.

INDIANA DEPARTMENT OF CHILD SERVICES HISTORY

The Indiana Department of Child Services (DCS) collaborated with the Indiana MMRC to ascertain relevant DCS histories for the 2018 pregnancy-associated deaths. Records were made available for women who had any previous involvement with DCS, including as victims in their childhood. These records provided not only a history of a woman's

involvement with DCS as a parent, but also gave the context of her social history, childhood trauma, victimization, and previous social services accessed.

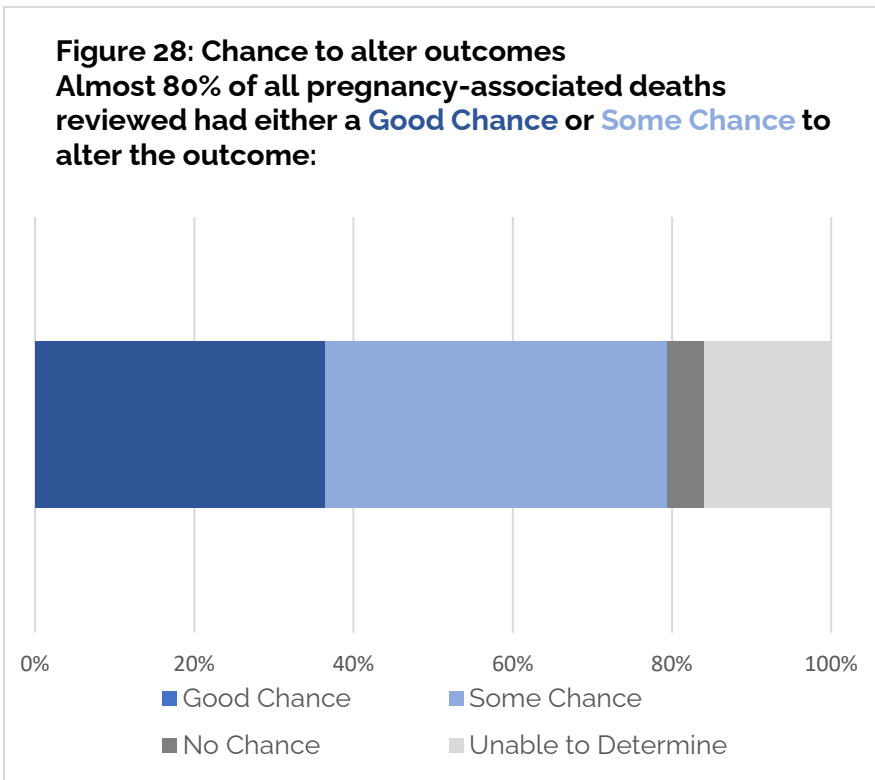
In 2018, 11.1% of the pregnancy-associated deaths occurred to women with relevant DCS history that offered significant context to her life course. The value of these experiences as an indicator of Adverse Childhood Experiences (ACEs) and intersections with social services helped the Indiana MMRC understand more completely the upstream approach to creating recommendations which address generational trauma.

PREVENTABILITY

After reviewing all relevant obstetric, medical, and social history of a pregnancy-associated death, the Indiana MMRC collectively discusses whether the death was preventable. A death is considered preventable “if the committee determines there was at least some chance of the death being averted by one or more reasonable changes to patient, family, provider, facility, and/or community factors,” according to the MMRIA Committee Decisions Form.

87% of all *pregnancy-associated deaths* were preventable
90% of *pregnancy-related deaths* were preventable

The Indiana MMRC found the overwhelming majority (87%) of all 2018 pregnancy-



associated deaths reviewed were preventable, although the committee was unable to determine the chance to alter outcome in 8% of them. Similarly, almost all (90%) deaths labeled pregnancy-related were determined to be preventable.

Different pregnancy-associated death narratives present different opportunities for prevention, and some opportunities can be expected to have a larger chance to alter outcomes.

Of the cases reviewed, 42% had some chance to alter the outcome and 37% had a good chance to alter the outcome. Stated another way, the majority (79%) of cases reviewed had some chance or good chance to alter the outcome. (Figure 28).

When records associated with a woman's care or social history were incomplete, or the Indiana MMRC had unanswered questions, there were occasional challenges to assessing the chance to alter outcomes.

Regardless, the high level of preventability determined by the Indiana MMRC for the 2018 pregnancy-associated death cohort exemplifies the opportunity to prevent similar deaths in the future.

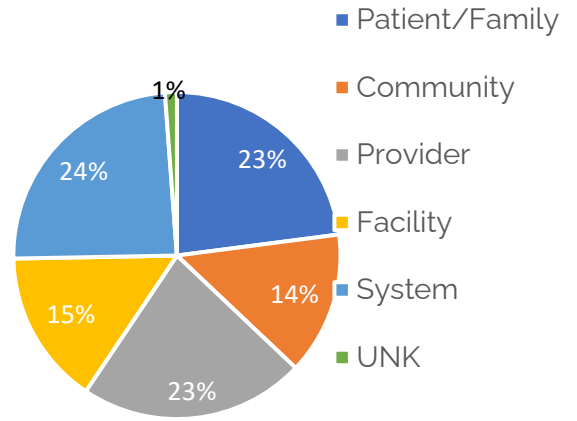
The MMRIA Committee Decisions Form (Appendix B) assists MMRCs in a standardized process for documentation of identified contributing factors and recommendations. As part of the review of each death, the committee identifies recommendations, including strategies and action steps that may address factors that contributed to the death. Organization of the recommendations by prevention level (primary, secondary, and tertiary), as well as the level in the continuum where the influence can be expected, guided the Indiana MMRC in producing impactful suggestions. It is critical for MMRCs to recognize that the levels of change will not often be at the provider/family level, but rather in larger systems and overarching policies.

Among the 63 pregnancy-associated deaths that occurred in 2018, the Indiana MMRC recognized and documented a total of **170** unique circumstantial contributing factors and created recommendations in response to each. For each death reviewed, an average of three recommendations were created, with the guidance of the MMRIA Committee Decisions Form.

MMRCs capture information on factors that contribute to a death. Each factor is categorized into one of five levels: patient/family, provider, facility, systems of care, or community. These categories describe where in the continuum interventions can be applied to improve maternal health outcomes.

Together, factors at the *Provider*, *Facility*, and *Systems of Care* levels comprised 62% of all factors identified that contributed to pregnancy-associated deaths in Indiana in 2018. Another 14% of factors were at the Community level. While patient/family level factors accounted for 23% of contributing factors, the individual does not necessarily have control over the factors at that level (Figure 29).

Figure 29: Distribution of Levels of Contributing Factors for Pregnancy-Associated Deaths in Indiana,



OPPORTUNITIES FOR PREVENTION

An integral part of the maternal mortality review process is identifying factors that contributed to the pregnancy-associated death and action steps that could have prevented the death. The key opportunities for prevention or process improvement were the basis for all levels of recommendations. The Indiana MMRC then prioritized recommendations based on these overarching identified gaps and challenges.

- 1) Limited communication between providers, based on perceived legal barriers, limits comprehensive care coordination and collaboration for pre-, ante-, and post-partum women in Indiana.
- 2) Indiana women are inadequately screened for, referred to, and engaged in substance use treatment during pregnancy and the postpartum periods.
- 3) Providers may not be aware of, nor discussing the risks of, opioid pain management and potential drug interactions after childbirth.
- 4) Women at risk for substance use disorder are not being provided Naloxone, nor the accompanying warm hand-off to mental health services, upon discharge.
- 5) Emergency departments and primary care providers fail to recognize and address hypertension in pregnant and postpartum women.
- 6) Many SUD treatment programs in Indiana do not allow pregnant and postpartum women to stay with their child, which can deter women from seeking treatment.

Recommendations

Throughout Indiana MMRC review sessions, every recommendation developed in response to each pregnancy-associated death was documented, in accordance with the MMRIA Committee Decisions Form. The full list of these recommendations for the year was then prioritized based on feasibility and impact.

Based on the themes that emerged from the 2018 pregnancy-associated deaths, the Indiana MMRC made recommendations that are specifically tailored toward the State of Indiana, communities, systems of care, facilities, providers, and women and their families.

RECOMMENDATIONS FOR THE STATE OF INDIANA

Preventing infant and maternal death is a priority for Indiana. Policymakers should seek to provide state-level solutions and policy options. They have the unique authority to align resources and enact laws for statewide application. Indiana should ensure policies support data-driven, coordinated strategies that foster healthy families. Participating state and local agencies should be encouraged to play active, collaborative roles in Indiana maternal mortality prevention and response efforts.

Indiana's MMRC discussions reflect the need for upstream policy improvements, as they relate to current health outcomes and disparities, specifically those identified in the data analysis. The presence of persistent population-level disparities in maternal mortality suggest recommendations should include not only individual-level factors that distinguish "high risk" from "low risk" women, but also social contextual factors that systematically expose populations of women to higher- or lower-risk environments (Review to Action).

PROMOTE A STATEWIDE INFORMATION EXCHANGE NETWORK AMONG INDIANA PROVIDERS AND AGENCIES

High-quality care for women and families in Indiana requires an increased emphasis on a coordinated, team-based approach and treating the whole patient. Too often, the Indiana MMRC felt a woman's outcome would have been different if organizations and agencies were able and willing to share what they knew about her personal history and care course.

This patient-centered orientation of care delivery is often problematic, due to real and perceived challenges presented by workflow, communication barriers, and legal limitations to records sharing. Particularly regarding chronic condition management, outcomes could have been improved through intentional communication, records-sharing, case management, and warm hand-offs between clinicians and service providers. Effective communication between medical, behavioral, recovery, and social resources, as well as with patients and families, will not only improve health outcomes, but also improve patient satisfaction.

Barriers to inter-provider communication can include time limitations within clinical settings, disjointed electronic health record systems, real or perceived barriers from HIPAA rules, and fragmented data sharing between state agencies and local providers.

Indiana should emphasize the importance of community health exchanges and include behavioral and social service providers in the information network. Individuals, systems, hospitals, DCS, IDOH, FSSA, criminal justice, education, and other partner agencies should be trained on the importance of and encouraged to actively participate a medical-home model for all women in Indiana. The goal should be to address the whole person in care.

PRIORITIZE THE AIM BUNDLE ADDRESSING SUBSTANCE USE IN PREGNANCY

The Alliance for Innovation on Maternal Health (AIM) is an initiative of ACOG, in partnership with other professional organizations, to promote consistent safe maternity care. Patient safety bundles are evidence-based action steps created by AIM that obstetric and women's health units can implement to reduce maternal mortality and morbidity.

Indiana became a member of the AIM network in January 2019, under the auspices of the Indiana Department of Health Division of Maternal and Child Health. Indiana AIM:

- Promotes the best practices in maternal health with the alignment of maternal safety efforts on a local, state, and national level;
- Provides intensive technical assistance with team-based communication, effective collaboration, and harmonized data collection for participating hospitals; and
- Facilitates networking and collaboration among delivering facilities to share learning opportunities.

Indiana AIM chooses and supports the implementation of patient safety bundles and tools in facilities across the state. The first bundle to be put into operation in Indiana was the Obstetric Hemorrhage bundle. This was assisted by the Indiana Perinatal Quality Improvement Collaborative (IPQIC) and its Maternal Hemorrhage Toolkit. Indiana AIM assessed the readiness for each participating women's care facility to implement the bundle activities, which standardized preparation and treatment for obstetric hemorrhage incidents for all patients.

The Council on Patient Safety in Women's Health Care and AIM offer several other maternal safety bundles, including those that address severe hypertension in pregnancy and post-partum care basics. Due to the high number of pregnancy-associated deaths from 2018 for which substance use or mental health conditions were a contributing factor, the Indiana MMRC recommends the prioritization and immediate engagement of the AIM bundle standardizing Obstetric Care for Women with Opioid Use Disorder. Activities dictated by this bundle include management of substance use disorder as a chronic disease, patient and family education, health system-wide education on substance use disorder, and the establishment of pre-, peri-, and post-partum clinical pathways for women with substance use disorders that incorporate care coordination among providers. The addition of trauma-

informed care, as well as the increased awareness of how stigma impacts the quality of care, are also critical steps to improve outcomes for Indiana women.

EXTEND POSTPARTUM COVERAGE FOR MEDICAID CLIENTS AND ENSURE APPROPRIATE ACCESS TO CARE FOR CHRONIC CONDITIONS, INCLUDING SUBSTANCE USE AND MENTAL HEALTH DISORDERS

The post-partum period can be a particularly vulnerable time for many women, as it may introduce or exacerbate medical, behavioral, or mental health conditions. The Healthy Indiana Plan (HIP) pays for prenatal care and births and provides coverage for 60 days during the post-partum period. Women who experience health challenges more than 60 days after the end of pregnancy can have difficulty accessing and receiving appropriate care services. For women with substance use or mental health disorders, the challenges are even greater.

More than 57% of women who died from a pregnancy-associated cause in 2018 were Medicaid-insured. Further, 41 of the 63 pregnancy-associated deaths in 2018 occurred after 43 days post-partum. The potential life-saving impact from extending the availability of Medicaid, as well as expanding services to include behavioral health treatment and recovery resources, cannot be overstated. Ensuring that low-income women have continuous, comprehensive coverage would support improvements in infant and maternal outcomes.

Expanding coverage periods is not the only place to improve services for Indiana women. Coverage should ensure appropriate access to subspecialty care for all chronic conditions, including substance use and mental health disorders. Indiana should decrease barriers to medication access, including emergency medication for women with substance use disorder. Parity for these services should be comparable to that of pre-, ante-, and post-partum care received for physical health.

RECOMMENDATIONS FOR SYSTEMS OF CARE

Health systems and social service networks have significant opportunity to prevent maternal mortality. Integrating standardized practices, provider education, safe prescribing practices, and coordinated support for Indiana women during the pre-, ante, and post-partum periods can improve health outcomes, patient satisfaction, and reduce costs for providers.

OPTIMIZE THE HEALTH AND WELL-BEING OF WOMEN WITH CHRONIC CONDITIONS, INCLUDING SUBSTANCE USE AND MENTAL HEALTH DISORDERS, AND THEIR INFANTS

Health systems should strive to improve linkages to comprehensive support and care, including treatment for substance use and mental health disorders, recovery support, housing, social isolation, and food insecurity. Addressing as a continuum the physical, behavioral, and social needs for Indiana women can greatly improve the health outcomes.

All recommended screenings, assessments, and referrals should be standard protocol for women during pregnancy and after the end of pregnancy. These should include warm hand-offs to appropriate specialists, with emphasis on coordinated care. Universal referral of women with a history of or active substance use or mental health disorders should be implemented in policy.

Health systems and social service providers should also standardize professional education to include training on implicit bias and trauma-informed care, aimed at decreasing stigmatizing communication methods, which often lead women to avoid seeking care.

For women for whom pregnancy is diagnosed in the emergency department, particularly those with accompanying chronic conditions, follow-up care with treatment and peer/recovery support should be standard procedure. Additionally, immediate access to social work services should be provided, even if via telehealth.

Social support and behavioral health systems often have criteria limiting those who qualify. Fortunately, alternative programs may exist in the community. For women navigating these resources, many barriers can exist. To reduce the burden of the patient or client attempting to receive support from health systems or social services, all providers should automatically provide alternative resource options for those who, for any reason, are ineligible for traditional services.

RECOMMENDATIONS FOR FACILITIES

There are many opportunities for preventing maternal morbidity and mortality within facilities. This includes hospitals, care centers, and other clinical sites. Delivering facilities and emergency departments were frequent points of interaction for the women who died from pregnancy-associated causes in 2018. By implementing standardized policies and education to address the social, emotional, and physical health needs of pregnant and post-partum women, care providers in facilities of all levels can reduce maternal mortality in Indiana.

IMPROVE PROVIDER ADHERENCE TO ACOG HEART DISEASE AND PREGNANCY GUIDELINES

Maternal heart disease was a cause of death for multiple pregnancy-related deaths in 2018. The Indiana MMRC noted instances where pregnant and post-partum women presented to emergency departments or clinicians with symptoms indicative of severe hypertension or other cardiovascular crises yet were undertreated or not offered appropriate referrals or follow-up care. In some of the deaths, this could have been due to the overlap of cardiovascular symptoms with those of normal pregnancy.

Facilities should prioritize the implementation of standardized policies that universally consider cardiovascular disease a differential diagnosis by treating healthcare providers (ACOG 2019). Facilities should implement protocols for addressing pre-eclampsia and

eclampsia, hemorrhage, cardiovascular disease, thrombosis, infection prevention, and contacting patients who are lost to follow-up. Facilities should provide education on and support for ACOG's guidance for the care of management of cardiovascular disease during and after pregnancy. Additionally, support for care coordination should be facilitated between all providers.

REQUIRE ALL POSTPARTUM DISCHARGES TO INCLUDE POST-BIRTH WARNING EDUCATION AND LITERATURE

For pregnancy-related and pregnancy-associated causes of death, educating patients and families about warning signs and potential complications could help them recognize and respond appropriately and in a timely manner. By improving and standardizing post-partum education, Indiana facilities can ensure all women receive consistent messaging and guidance on self-advocacy when symptoms arise. This can apply not only to hemorrhagic and hypertensive symptoms, but also social and behavioral indicators, such as that of post-partum depression.

Additionally, educating facility staff and providers on the early warning signs and putting universal responses into policy can decrease the inconsistencies in clinical reasoning, thereby improving the facilities' ability to advocate for their patients.

Early warning systems should include staff education, patient education and literature, and tools for providers to monitor and document care provided for sudden health declines.

PROVIDE ONGOING EDUCATION TO STAFF ON TRAUMA-INFORMED CARE AND THE IMPACTS OF COMPASSION FATIGUE

The Indiana MMRC does not just view pregnancy-associated deaths through a clinical lens. Social records and histories are also carefully considered, to determine any events during the women's life course, which could contribute to generational trauma or a high stress-load. With mental health and substance use disorders significantly contributing to the 2018 cohort, educating providers about appropriate person-centered messaging, biases, and the impact of compassion fatigue is critical. Improving message delivery and reducing stigma can increase the patient quality of care and satisfaction, while simultaneously allowing providers to address both the physical and social needs of their patients.

RECOMMENDATIONS FOR COMMUNITIES

CREATE A CULTURE OF COMPASSION, UNDERSTANDING, AND HEALING FOR THE MOTHER-INFANT DYAD BY CHRONIC ILLNESSES, INCLUDING MENTAL HEALTH AND SUBSTANCE USE DISORDERS

Communities should strive to improve linkages to comprehensive support and care, including treatment for substance use and mental health disorders, recovery support,

housing, social isolation, and food insecurity. Addressing as a continuum the physical, behavioral, and social needs for Indiana women can greatly improve the health outcomes.

Communities should strive to become trauma-informed, offering training on implicit bias, person-centered language, and decreasing stigma, which often leads women to avoid seeking care.

Social support and behavioral health systems often have criteria limiting those who qualify. Fortunately, alternative programs may exist in the community. For women navigating these resources, many barriers can exist. Communities should establish information networks and 'one-stop-shop' resource directories for families in need of services.

ENGAGE SOCIAL SERVICE PROVIDERS IN IDENTIFYING FAMILIES IN NEED OF ASSISTANCE ACCESSING RESOURCES, INCLUDING FAMILY PLANNING, MENTAL HEALTH PLANNING, AND PARENTING EDUCATION

The Indiana Department of Child Services, Community Partners for Child Safety, home-visiting programs, and other family support services should actively cooperate to identify families in need of assistance and collaborate to provide comprehensive holistic care. When possible, this care should include warm hand-offs, rather than simple referrals.

ENFORCE STATE-MANDATED TOXICOLOGY TESTING IN ALL MOTOR VEHICLE FATALITIES

Motor vehicle collision was the second-leading cause of death for the 2018 pregnancy-associated death. The Indiana MMRC noted in several that toxicology tests were not administered to the drivers, despite state law mandating it. Communities and law enforcement agencies should educate staff and enforce the adherence to this statute for all fatal vehicle collisions.

RECOMMENDATIONS FOR PROVIDERS

Health care and social services providers, particularly those in outpatient settings, are critical interaction points for women during and after pregnancy. By addressing women's health needs in a coordinated, holistic manner, providers can address chronic conditions which may contribute to poor maternal health. Adherence to best-practice recommendations, standardized screening protocols, and appropriate referral and follow-up can help minimize barriers to appropriate healthcare for pregnant and recently pregnant women.

IMPROVE RECOGNITION OF, REDUCE STIGMA, AND INCREASE SUPPORT FOR WOMEN WITH MENTAL HEALTH AND SUBSTANCE USE DISORDERS

All providers should understand the challenges faced by women with substance use and mental health disorders, particularly during and after pregnancy. These health conditions are among the most stigmatized conditions, and providers' attitudes toward them can impact the care received by the patient or client. When seeking or accessing care is limited by providers' attitudes, other chronic conditions or those needs associated with pregnancy may also go unaddressed.

Ongoing, targeted training may help providers more easily recognize and address chronic conditions in their patients and clients. Increased awareness in the effects of stigma can also improve treatment and recovery responses, as well as drive coordinated referral and follow-up protocols.

INCREASE ADHERENCE TO PROTOCOL FOR CONTROLLING HYPERTENSION, BOTH DURING AND AFTER PREGNANCY

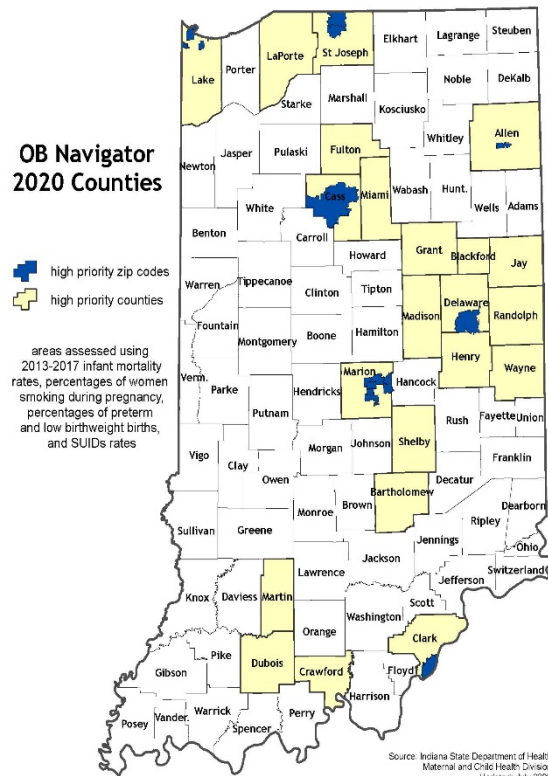
Hypertensive disorders are a leading cause of maternal mortality and morbidity, and related problems can occur during pregnancy or into the post-partum period. Maternal heart disease was a cause of death for multiple pregnancy-related deaths in 2018. The Indiana MMRC noted instances where pregnant and post-partum women presented to emergency departments or clinicians with symptoms indicative of severe hypertension yet were undertreated or not offered appropriate referrals or follow-up care.

Providers should adopt and adhere to standardized policies that universally consider cardiovascular disease a differential diagnosis (ACOG 2019). All patients presenting with hypertensive symptoms should be treated per the ACOG Practice Guidelines. Additionally, care coordination should be facilitated between all providers.

INCREASE CONNECTIVITY TO NAVIGATION PROGRAMS THAT ASSIST WITH RESOURCES, SUCH AS HOME VISITING

One approach to improving health outcomes for Indiana families is home visiting, which provides support to pregnant women and families who have young children. These programs meet the clients where they are, whether that be in their homes or other places in the community, to provide resources, education, referrals, and, in some cases, clinical care. These programs can be critical partners in the coordinated delivery of mental health, primary care, substance use, recovery, and pre-, ante-, and post-partum care.

The Indiana OB Navigator program, now known as My Healthy Baby, has begun in counties identified by their high infant mortality rates. The goal of the program is to identify women early in their pregnancies and provide personalized referrals into local networks. While the program is currently being rolled out in 22 Indiana counties, more counties will be added in the coming years. Local programs are available to serve Indiana families in all 92 counties, and providers should be aware of all possible resources within their network and community to offer all patients referrals to appropriate services.



RECOMMENDATIONS FOR PATIENTS AND FAMILIES

The Indiana MMRC emphasized recommendations addressing resources and service delivery to pregnant and recently pregnant women. Many of the challenges or experiences of the woman and her support system should be addressed upstream, removing the responsibility of systems improvements from the patients and clients entirely.

However, there are some opportunities that can be communicated to women and families to increase their awareness of risks associated with maternal morbidity and mortality.

INCREASE AWARENESS ABOUT INTIMATE PARTNER VIOLENCE AND THE PUBLIC DUTY TO INFORM IN SITUATIONS WHERE VICTIMS ARE IN DANGER

Providers routinely screen women about intimate partner violence. However, if they disclose the need for resources, a lack of resources and community support can be potentially challenging for both patient and provider.

All women, their support system, and community members should be educated on the dangers of interpersonal violence and should understand their duty to inform the proper authorities if they know interpersonal violence is present in a relationship. Resources should be well-advertised, and social services support should be available and consistently offered to appropriately guide victims through the legal system, if necessary.

UNDERSTAND THE CHALLENGES OF MAINTAINING RECOVERY FOR PATIENTS BEING DISCHARGED FROM SUBSTANCE USE TREATMENT PROGRAMS

Women and families experiencing substance use disorder must understand the challenges associated with coming home from inpatient treatment facilities. In the pregnancy-associated deaths from 2018, there were instances in which women died soon after leaving an inpatient treatment facility. The period immediately following discharge is a particularly critical time for individuals in recovery.

Immediate connection to outpatient recovery services should be offered, and follow-up care should be standard. Supporting pregnant or recently pregnant women through recovery should include connectivity to social support services, recovery networks, and activities to support recovery. Additionally, families and women in recovery should have Naloxone available and understand its use.

Future of Indiana MMR Program

The technical assistance offered by the CDC through the ERASE MM project has allowed IDOH to evaluate opportunities to strengthen Indiana's process for reviewing maternal deaths. Indiana MMR program staff visited the CDC, as well as similar teams in Illinois and Wisconsin, for guidance on best-practices for MMR, including procedures and processes, from case identification through data quality assurance measures.

Several key opportunities for improving Indiana's MMR processes were identified and will be addressed as the MMRC begins its review of pregnancy-associated deaths from 2019.

The MMRC membership is regularly evaluated by IDOH and the committee chairperson to ensure appropriate professional disciplines are represented, per IC 16-50, as well as to structure a team with a racial and geographic representation of the Indiana population. As it became increasingly clear that mental health and substance use disorders were a significant contributor to many 2018 pregnancy-associated deaths, social services, law enforcement, and experts in treatment and recovery were engaged and asked to provide insights to the landscape of behavioral health services in Indiana.

Additionally, many MMRCs are identifying implicit biases within the MMRC membership and program staff that could be impacting the review process and discussions therein. ERASE MM technical assistance has strongly encouraged the adoption of implicit bias training as part of the continuing education of the committee. IDOH is still examining options for structuring and offering this resource, particularly in the face of social distancing restrictions due to Covid-19, but plans to actively address this challenge during the review of 2019 pregnancy-associated deaths.

The process by which the abstraction team creates, and structures pregnancy-associated death case presentations is being evaluated. Suggestions from Indiana MMRC membership, as well as input from other fatality review programs, including Suicide and Overdose Fatality Review, indicate a chronological model would more effectively demonstrate the pregnant or recently pregnant woman's life course, thereby making opportunities for upstream prevention more apparent. Additionally, a more extensive sampling of records is being added, including Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) records, Medicaid records, histories of encounters with substance use and behavioral health treatment, and documentation from emergency medical services.

The matching of all death records with birth certificates and fetal death records has uncovered a significant number of pregnancy-associated deaths in which the woman died in Indiana but was a legal resident of another state. The ERASE MM guidance stresses the

necessity for all states to review pregnancy-associated and/or pregnancy-related deaths for their residents, so the Division of Fatality Review & Prevention has begun entering into formal collaborative relationships with neighboring states for reciprocal case notification and records sharing. Guidance by the IDOH legal team is being sought for establishing these relationships.

The Fetal Infant Mortality Review (FIMR) process has employed the maternal interview process as a qualitative assessment of the social factors and clinical care provided to families suffering a fetal or infant loss. The insights offered by grieving families about their interactions with care providers leading up to and including the death of their baby have led to frank discussions among case review and community actions teams about how pregnant and newly pregnant people are experiencing pregnancy in their jurisdictions.

Similarly, the Suicide and Overdose Fatality Review process has actively employed Psychological Autopsies to assess the experiences of the decedents and their families and friends. This certification is offered by the American Association of Suicidology and, through CDC Data to Action funding, has been hosted in Indiana, where about 15 professionals are actively conducting these interviews as a supplemental data source for fatality review.

With these precedents in mind, the Indiana MMRC has entered a collaborative relationship with the Grassroots Maternal Child Health Leadership Training Project. Grassroots trains and mentors women to help their neighborhoods improve pregnancy and infant development outcomes. They work to make change at the community, organizational, and policy levels, while meeting the needs of women, infants, and families in their neighborhoods by linking them to services. These community leaders will receive appropriate training for conducting survivor interviews and will partner with the abstraction team to embed this qualitative data into the pregnancy-associated death case presentations. This critical addition to the case narratives will help the Indiana MMRC better understand the experiences of the women who died, their families, friends, and communities who endured the loss of a pregnant or recently pregnant woman. By hearing the stories directly from those closest to the women who died, recommendations generated by the committee can be informed by the individual circumstances leading to the pregnancy-associated death. These informant interviews will also be captured as data in the MMRIA system.

Identifying opportunities for process improvement is essential for the Indiana MMRC to meet the ever-changing needs of childbearing women. Technical support from CDC, as well as other states' MMRC staff, will ultimately help Indiana most effectively operate its maternal mortality review program.

Conclusion

The Indiana Maternal Mortality Review Committee was established to comprehensively review pregnancy-associated deaths in Indiana and, based on an assessment of the compiled data, identify means and opportunities to reduce or eliminate future preventable maternal loss. This process is resource-intensive and often emotionally challenging work. But it remains the most comprehensive process to understand the true burden and impact of maternal mortality in Indiana.

The Indiana Department of Health and the Indiana MMRC determined an overwhelming majority of the pregnancy-associated deaths from 2018 were preventable and provided recommendations toward eliminating these. As the committee continues its work into the 2019 cohort, it is imperative that Indiana learns from these findings and looks for actionable steps to improve the health of Indiana women.

APPENDIX A: Maternal Death Report



Maternal Death Report Indiana State Department of Health

Per [IC-16-50-1-6\(a\)](#) please send this report immediately after the death of a woman who was currently pregnant or was pregnant within 365 days of death. Report the event regardless of where the patient died with as much details as possible.

Name of Woman _____
Last First Middle Maiden

Address _____
Street City State ZIP

Date of Birth (MM/DD/YYYY) _____

Date of Death (MM/DD/YYYY) _____

Name of birth hospital (if known) _____

Name of Obstetric Provider (if known) _____

Place of death

Hospital (name of facility and city) _____

Residence other (Please specify)

Medical Record number _____

- No Autopsy
- Autopsy Performed
 - Facility or address where autopsy was performed _____
 - Autopsy performed by: _____
- Autopsy pending

Cause of death

Primary _____

Contributing factors _____

Manner of Death _____

Report Prepared by _____ Date _____

Email _____ phone _____

When complete, please scan and email to MMR@ISDH.in.gov

For any questions please call ISDH Maternal Mortality Review Coordinator 317-232-4300

APPENDIX B: MMRIA Committee Decisions Form

MMRIA		MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v19	
<p>REVIEW DATE</p> <div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between;"> Month Day Year </div>	<p>RECORD ID #</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<p>COMMITTEE DETERMINATION OF CAUSE(S) OF DEATH</p> <div style="border: 1px solid black; height: 40px; width: 100%;"></div>	
<p>PREGNANCY-RELATEDNESS: SELECT ONE</p> <p><input type="checkbox"/> PREGNANCY-RELATED The death of a woman 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</p> <p><input type="checkbox"/> PREGNANCY-ASSOCIATED, BUT NOT -RELATED The death of a woman during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy</p> <p><input type="checkbox"/> PREGNANCY-ASSOCIATED BUT UNABLE TO DETERMINE PREGNANCY-RELATEDNESS</p> <p><input type="checkbox"/> NOT PREGNANCY-RELATED OR -ASSOCIATED (i.e. false positive, woman was not pregnant within one year of her death)</p>		<p>IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING* CAUSE OF DEATH Refer to page 3 for PMSS-MM cause of death list.</p>	
<p>ESTIMATE THE DEGREE OF RELEVANT INFORMATION (RECORDS) AVAILABLE FOR THIS CASE:</p> <p><input type="checkbox"/> COMPLETE All records necessary for adequate review of the case were available</p> <p><input type="checkbox"/> MOSTLY COMPLETE Minor gaps (i.e. information that would have been beneficial but was not essential to the review of the case)</p> <p><input type="checkbox"/> SOMEWHAT COMPLETE Major gaps (i.e. information that would have been crucial to the review of the case)</p> <p><input type="checkbox"/> NOT COMPLETE Minimal records available for review (i.e. death certificate and no additional records)</p> <p><input type="checkbox"/> N/A</p>		<p>TYPE</p> <p>OPTIONAL: CAUSE (DESCRIPTIVE)</p> <p>UNDERLYING*</p> <p>CONTRIBUTING</p> <p>IMMEDIATE</p> <p>OTHER SIGNIFICANT</p>	
<p>COMMITTEE DETERMINATIONS ON CIRCUMSTANCES SURROUNDING DEATH</p>			
<p>DID OBESITY CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN</p>		<p>DID DISCRIMINATION CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN</p>	
<p>DID MENTAL HEALTH CONDITIONS OTHER THAN SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN</p>		<p>DID SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN</p>	
<p>MANNER OF DEATH</p>			
<p>WAS THIS DEATH A SUICIDE? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN</p>		<p>WAS THIS DEATH A HOMICIDE? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN</p>	
<p>IF ACCIDENTAL DEATH, HOMICIDE, OR SUICIDE, LIST THE MEANS OF FATAL INJURY</p> <p><input type="checkbox"/> FIREARM <input type="checkbox"/> FALL <input type="checkbox"/> INTENTIONAL NEGLIGENCE</p> <p><input type="checkbox"/> SHARP INSTRUMENT <input type="checkbox"/> PUNCHING/ KICKING/BEATING <input type="checkbox"/> OTHER, SPECIFY:</p> <p><input type="checkbox"/> BLUNT INSTRUMENT <input type="checkbox"/> EXPLOSIVE</p> <p><input type="checkbox"/> POISONING/ OVERDOSE <input type="checkbox"/> DROWNING</p> <p><input type="checkbox"/> HANGING/ STRANGULATION/ SUFFOCATION <input type="checkbox"/> FIRE OR BURNS <input type="checkbox"/> UNKNOWN</p> <p><input type="checkbox"/> MOTOR VEHICLE <input type="checkbox"/> NOT APPLICABLE</p>		<p>IF HOMICIDE, WHAT WAS THE RELATIONSHIP OF THE PERPETRATOR TO THE DECEDENT?</p> <p><input type="checkbox"/> NO RELATIONSHIP <input type="checkbox"/> OTHER ACQUAINTANCE <input type="checkbox"/> UNKNOWN</p> <p><input type="checkbox"/> PARTNER <input type="checkbox"/> EX-PARTNER <input type="checkbox"/> OTHER, SPECIFY: <input type="checkbox"/> NOT APPLICABLE</p> <p><input type="checkbox"/> OTHER RELATIVE <input type="checkbox"/></p>	
<p>DOES THE COMMITTEE AGREE WITH THE UNDERLYING* CAUSE OF DEATH LISTED ON DEATH CERTIFICATE? <input type="checkbox"/> YES <input type="checkbox"/> NO</p>			

*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

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 CHANGE SOME CHANGE NO CHANGE 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?

LEVEL	CONTRIBUTING FACTORS (choose as many as needed below)	DESCRIPTION OF ISSUE (enter a description for EACH contributing factor listed)	COMMITTEE RECOMMENDATIONS [Who?] should [do what?] (when?) Map recommendations to contributing factors.	PREVENTION LEVEL (choose below)	EXPECTED IMPACT (choose below)
PATIENT/FAMILY					
PROVIDER					
FACILITY					
SYSTEM					
COMMUNITY					

CONTRIBUTING FACTOR KEY (DESCRIPTIONS ON PAGE 4)

- Access/financial
- Adherence
- Ageism
- Childhood abuse/trauma
- Chronic disease
- Clinical skill/communication
- Continuity of care/coordination
- Cultural/religious
- Disability
- Discrimination
- Environmental
- Equipment/technology
- Interpersonal racism
- Knowledge
- Law Enforcement
- Legal
- Mental health/conditions
- Outreach
- Policies/procedures
- Referral
- Social support/isolation
- Structural racism

PREVENTION LEVEL

- **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

If more than one is selected, please list them in order of importance beginning with the most compelling (1-2; no more than 2 may be selected in the system).

*PREGNANCY-RELATED DEATH: THE DEATH OF A WOMAN 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

- | | | |
|---|--|---|
| <input type="checkbox"/> 10 Hemorrhage (excludes aneurysms or CVA) | <input type="checkbox"/> 83 Collagen vascular/autoimmune diseases | <input type="checkbox"/> 92.1 Epilepsy/seizure disorder |
| <input type="checkbox"/> 10.1 Hemorrhage - rupture/laceration/ | <input type="checkbox"/> 83.1 Systemic lupus erythematosus (SLE) | <input type="checkbox"/> 92.9 Other neurologic diseases/NOS |
| intra-abdominal/bleeding | <input type="checkbox"/> 83.9 Other collagen vascular diseases/NOS | <input type="checkbox"/> 93 Renal disease |
| <input type="checkbox"/> 10.2 Placental abruption | <input type="checkbox"/> 85 Conditions unique to pregnancy (e.g. | <input type="checkbox"/> 93.1 Chronic renal failure/End-stage renal |
| <input type="checkbox"/> 10.3 Placenta previa | gestational diabetes, hyperemesis, liver | disease (ESRD) |
| <input type="checkbox"/> 10.4 Ruptured ectopic pregnancy | disease of pregnancy) | <input type="checkbox"/> 93.9 Other renal diseases/NOS |
| <input type="checkbox"/> 10.5 Hemorrhage - uterine atony/postpartum | <input type="checkbox"/> 88 Injury | <input type="checkbox"/> 95 Cerebrovascular accident (hemorrhage/ |
| hemorrhage | <input type="checkbox"/> 88.1 Intentional (homicide) | thrombosis/neurysm/ malformation) |
| <input type="checkbox"/> 10.6 Placenta accreta/increta/percreta | <input type="checkbox"/> 88.2 Unintentional | not secondary to hypertensive disease |
| <input type="checkbox"/> 10.7 Hemorrhage due to retained placenta | <input type="checkbox"/> 88.9 Unknown/NOS | <input type="checkbox"/> 96 Metabolic/endocrine |
| <input type="checkbox"/> 10.8 Hemorrhage due to primary DIC | <input type="checkbox"/> 89 Cancer | <input type="checkbox"/> 96.1 Obesity |
| <input type="checkbox"/> 10.9 Other hemorrhage/NOS | <input type="checkbox"/> 89.1 Gestational trophoblastic disease (GTD) | <input type="checkbox"/> 96.2 Diabetes mellitus |
| <input type="checkbox"/> 20 Infection | <input type="checkbox"/> 89.3 Malignant melanoma | <input type="checkbox"/> 96.9 Other metabolic/endocrine disorders |
| <input type="checkbox"/> 20.1 Postpartum genital tract (e.g. of the uterus/ | <input type="checkbox"/> 89.9 Other malignancies/NOS | <input type="checkbox"/> 97 Gas traintestinal disorders |
| pelvis/perineum/necrotizing fasciitis) | <input type="checkbox"/> 90 Cardiovascular conditions | <input type="checkbox"/> 97.1 Crohn's disease/ulcerative colitis |
| <input type="checkbox"/> 20.2 Sepsis/septic shock | <input type="checkbox"/> 90.1 Coronary artery disease/myocardial | <input type="checkbox"/> 97.2 Liver disease/failure/transplant |
| <input type="checkbox"/> 20.4 Chorioamnionitis/antepartum infection | infarction (MI)/atherosclerotic | <input type="checkbox"/> 97.9 Other gastrointestinal diseases/NOS |
| <input type="checkbox"/> 20.5 Non-pelvic infections (e.g. pneumonia, TB, | cardiovascular disease | <input type="checkbox"/> 100 Mental health conditions |
| meningitis, HIV) | <input type="checkbox"/> 90.2 Pulmonary hypertension | <input type="checkbox"/> 100.1 Depression |
| <input type="checkbox"/> 20.6 Urinary tract infection | <input type="checkbox"/> 90.3 Valvular heart disease congenital and | <input type="checkbox"/> 100.9 Other psychiatric conditions/NOS |
| <input type="checkbox"/> 20.9 Other infections/NOS | acquired | <input type="checkbox"/> 999 Unknown COD |
| <input type="checkbox"/> 30 Embolism - thrombotic (non-cerebral) | <input type="checkbox"/> 90.4 Vascular aneurysm/dissection (non-cerebral) | |
| <input type="checkbox"/> 30.9 Other embolism/NOS | <input type="checkbox"/> 90.5 Hypertensive cardiovascular disease | |
| <input type="checkbox"/> 31 Embolism - amniotic fluid | <input type="checkbox"/> 90.6 Marfan Syndrome | |
| <input type="checkbox"/> 40 Preeclampsia | <input type="checkbox"/> 90.7 Conduction defects/arrhythmias | |
| <input type="checkbox"/> 50 Eclampsia | <input type="checkbox"/> 90.8 Vascular malformations outside head and | |
| <input type="checkbox"/> 60 Chronic hypertension with superimposed | coronary arteries | |
| preeclampsia | <input type="checkbox"/> 90.9 Other cardiovascular disease, including CHF, | |
| <input type="checkbox"/> 70 Anesthesia complications | cardiomegaly, cardiac hypertrophy, cardiac | |
| <input type="checkbox"/> 80 Cardiomyopathy | fibrosis, non-acute myocarditis/NOS | |
| <input type="checkbox"/> 80.1 Postpartum/peripartum cardiomyopathy | <input type="checkbox"/> 91 Pulmonary conditions (excludes AROS-Adult | |
| <input type="checkbox"/> 80.2 Hypertrophic cardiomyopathy | respiratory distress syndrome) | |
| <input type="checkbox"/> 80.9 Other cardiomyopathy/NOS | <input type="checkbox"/> 91.1 Chronic lung disease | |
| <input type="checkbox"/> 82 Hematologic | <input type="checkbox"/> 91.2 Cystic fibrosis | |
| <input type="checkbox"/> 82.1 Sickle cell anemia | <input type="checkbox"/> 91.3 Asthma | |
| <input type="checkbox"/> 82.9 Other hematologic conditions including | <input type="checkbox"/> 91.9 Other pulmonary disease/NOS | |
| thrombophilias/TTP/HUS/NOS | <input type="checkbox"/> 92 Neurologic/neurovascular conditions | |
| | (excluding CVA) | |

CONTRIBUTING FACTOR DESCRIPTIONS

LACK OF ACCESS/FINANCIAL RESOURCES
System issues, e.g. lack of health insurance or other financial issues, as opposed to woman's non-compliance, impacted woman's ability to care for herself (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 woman's 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 woman at risk for a poor clinical outcome recognized, and the woman was not transferred/transported to a provider able to give a higher level of care.

CHILDHOOD SEXUAL ABUSE/TRAUMA
The patient experienced 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; physical or emotional abuse or violence other than that related to sexual abuse during childhood.

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 current 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 woman's complete records or did not communicate woman's status sufficiently. Lack of continuity can be between prenatal, labor and delivery, and postpartum providers.

CULTURAL/RELIGIOUS, OR LANGUAGE FACTORS Demonstration 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 omission and acts of commission. It manifests as lack of respect, suspicion, devaluation, scapegoating and dehumanization. (Jones, O.P. 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 carried a diagnosis of a psychiatric disorder. This includes postpartum depression.

INADEQUATE COMMUNITY OUTREACH/RE-SOURCES
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 woman'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.

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 Osoque)

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

SUBSTANCE USE DISORDER - ALCOHOL, ILICIT/ 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 a woman's health status (e.g. acute methamphetamine intoxication exacerbated pregnancy-induced hypertension, or woman was 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).

UNSTABLE HOUSING
Woman 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, or stranger.

OTHER
Contributing factor not otherwise mentioned. Please provide description.

