

LOUISIANA PREGNANCY- ASSOCIATED MORTALITY REVIEW

2017 REPORT

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Finally, we honor the women whose experiences we have attempted to understand and learn from here, as well as their partners, children, families, and communities. We hope that the lessons learned from their deaths will help to create new pathways to prevention, health, and equity.

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Key Definitions

The following terms will be used throughout the report. All definitions come from the U.S. Centers for Disease Control and Prevention (CDC), in collaboration with key partners in maternal mortality prevention, including the Association of Maternal and Child Health Programs (AMCHP).¹

Pregnancy-Associated Deaths¹

The death of a woman that occurs during pregnancy or within one year of the end of pregnancy, regardless of the cause. This term encompasses pregnancy-related deaths, pregnancy-associated, but not related deaths, and pregnancy-associated, but unable to determine relatedness deaths, as defined below.

This report focuses on all deaths that meet the criteria for this definition.

Pregnancy-Related Death	Pregnancy-Associated, but Not Related Death	Pregnancy-Associated, but Unable to Determine Relatedness
<p>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 the pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.</p>	<p>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>A pregnancy-associated death where the cause of death is unable to be determined as “pregnancy-related” or “pregnancy-associated, but not related.”</p>
Example Cause of Death*	Example Cause of Death*	Example Cause of Death*
<p>Preeclampsia and eclampsia (uncontrolled and extreme high blood pressure during pregnancy leading to serious health complications, including possible organ damage)</p>	<p>Motor vehicle crash (unintentional)</p>	<p>Suicide</p>

*Additional case-specific details beyond cause of death are required to determine which of the three subcategories a pregnancy-associated death falls into. The example causes presented here are not mutually exclusive to the categories they are paired with above.

Introduction

Maternal mortality in Louisiana, 2017

Maternal mortality is a crucial indicator of healthcare quality and gender equity, nationally and internationally.^{2,3} Studying maternal mortality can help reveal health and social challenges that women of reproductive age experience, and systemic responsiveness to these challenges.^{2,3} In the United States, maternal mortality is rising, with significant variation by race and ethnicity.¹

Collecting, analyzing and comparing maternal mortality data has been challenging to accomplish nationally and locally due to a lack of standard definitions, limited data collection systems, and lack of public investment in reliable processes for case identification and study.⁴ When interpreting any reported mortality rate or ratio, several factors must be considered:

1. The definition of maternal death used to calculate the mortality rate or ratio (e.g. pregnancy-associated versus pregnancy-related death, within 42 days of pregnancy versus 1 year following the end of a pregnancy).
2. The time period over which the rate is being reported (e.g. single versus multiple year).
3. The data source for the identified cases (e.g. cases drawn only from vital records, versus those based on a committee review).

While surveillance using vital statistics can capture general trends, it is recognized that local review committees are best positioned to comprehensively assess maternal deaths and identify opportunities for prevention.

In 2010, Louisiana Department of Health, Office of Public Health's Bureau of Family Health established the Louisiana Pregnancy-Associated Mortality Review (LA-PAMR) under the authorization of the Louisiana Commission on Perinatal Care and Prevention of Infant Mortality in order to understand and address maternal mortality in Louisiana. LA-PAMR seeks to establish a strong, reliable, and timely maternal mortality surveillance system in order to inform, guide, and evaluate mortality and morbidity prevention strategies.

LA-PAMR reviews all pregnancy-associated deaths. A maternal mortality review committee (hereafter referred to as "the committee") was assembled from experts who volunteered their time from March 2018 to December 2019 to complete reviews. The committee focused on all pregnancy-associated deaths, which include pregnancy-related deaths. Findings in this report are therefore presented for all pregnancy-associated deaths verified to have occurred *during pregnancy or within 1 year* of the end of a pregnancy.

Note on Data Comparisons

Findings from this report are not comparable to findings from the Louisiana 2011-2016 Maternal Mortality Review Report.⁵ That report compiled findings from an expedited review of **only pregnancy-related deaths that occurred during pregnancy or within 42 days of the end of the pregnancy**, between 2011 and 2016. This report compiles findings from a comprehensive review of **all pregnancy-associated deaths that occurred during pregnancy or within one year of the end of pregnancy** in 2017. The two reports use different criteria for what can be considered a pregnancy-related death (42 days after the end of a pregnancy vs. one year after the end of pregnancy). Further, the 2011-2016 report focused on a smaller subset of deaths. Comparisons between the two are discouraged and will likely be invalid.

Executive Summary

Maternal mortality in Louisiana, 2017

About Louisiana Pregnancy-Associated Mortality Review

The Louisiana Pregnancy-Associated Mortality Review (LA-PAMR) works to quantify and understand pregnancy-associated deaths in order to create actionable, comprehensive recommendations to prevent future deaths. This is accomplished through epidemiological surveillance and multidisciplinary case review (see Appendix D for full list of case review team members). LA-PAMR is an official activity of the Louisiana Commission on Perinatal Care and Prevention of Infant Mortality (Louisiana Perinatal Commission).

Vital records were used to identify maternal deaths, then medical records were used to verify pregnancy at or near the time of death. After the verification process, a review committee conducted in-depth reviews of those cases.

About This Report

This report summarizes LA-PAMR's review of 2017 pregnancy-associated deaths and resulting recommendations for prevention. *Note: This report has been updated since its original publication in July 2020 to include additional mortality ratios.*

Summary of Key Findings

The committee reviewed the 65 verified pregnancy-associated deaths which occurred in 2017. This represents a pregnancy-associated mortality ratio of 106.7 deaths per 100,000 births. Of the 65 cases, 15 deaths were *pregnancy-related*, 41 were *pregnancy-associated, but not related*; and 9 were *pregnancy-associated, but unable to determine relatedness* (see definitions on pg. 3).

1. The most common causes of pregnancy-associated deaths were homicide, cardiovascular and coronary conditions, motor vehicle crash, and accidental overdose.
 - The top cause of *pregnancy-related* death was cardiovascular and coronary conditions.
 - The top causes of *pregnancy-associated, but not related* death were homicide and motor vehicle crashes (the same number of deaths were attributed to each cause).
 - The top cause of *pregnancy-associated, but unable to determine relatedness* death was suicide.
2. For all pregnancy-associated deaths, black mothers were more than twice as likely to die (2.2 times) as white mothers in Louisiana. This disparity is more prominent in pregnancy-related deaths.
 - Among *pregnancy-related* deaths, over 5 black women (5.6) in Louisiana died for every 1 white woman.
 - Among *pregnancy-associated, but not related* deaths, almost 2 black women (1.9) in Louisiana died for every 1 white woman.
3. Women ages 35 years and older were at an increased risk of *pregnancy-related* death. Women less than 25 years old were at an increased risk of *pregnancy-associated, but not related* and *pregnancy-associated, but unable to determine relatedness* death.
4. The review committee deemed 80% of *pregnancy-related* deaths to be potentially preventable. 90% of *pregnancy-associated, but not related* deaths and 100% of *pregnancy-associated, but unable to determine relatedness* deaths were deemed to be potentially preventable.

Executive Summary

Maternal mortality in Louisiana, 2017

Summary of Key Findings (continued)

5. The PAMR Committee identified contributing factors to deaths across the following levels: patient/family, provider, facility, systems, and community.
 - Provider and facility level factors were the most commonly-identified contributing factors to *pregnancy-related* deaths, including issues related to lack of continuity of care.
 - Patient/family and community level factors were the most commonly-identified contributing factors to *pregnancy-associated, but not related* deaths. These included Substance Use Disorder (SUD) (patient/family level) and lack of resources for anger management, conflict resolution, social skills training, and stigma or fear surrounding SUD (community level).
 - Patient/family, provider and facility level factors were the most commonly-identified contributing factors to *pregnancy-associated, but unable to determine relatedness* deaths. These included mental health conditions (patient/family level), lack of referrals to mental/behavioral health or substance use treatment (provider level), and lack of continuity of care/care coordination (facility level).
6. Autopsies were performed in about two-thirds (68%) of cases. About 1 in 3 (34%) cases were missing at least some records crucial to case review.

Summary of Recommendations

Recommendations represent committee consensus following a critical review of each of the 65 deaths, and were drawn from both individual case reviews and overall data and findings. They are classified by point of intervention: systems, clinical quality improvement, social support, and policy. However, five overarching needs or themes emerged consistently throughout review:

- Improve care coordination before, during, and between pregnancies.
- Ensure pregnant women receive the appropriate level of care based on the complexity and severity of their medical issues and risk factors present.
- Expand the obstetric healthcare workforce to include cardiology, psychiatric and addiction specialists.
- Improve and expand identification of, and treatment for, substance use during pregnancy.
- Address racial and cultural bias across the network of care that serves pregnant and postpartum women (including hospitals, Emergency Medical Services, physician offices, and community clinics), as well as the institutions that influence or coordinate with that network (including public health agencies, Medicaid, and coroners).

From Data to Review

Maternal Mortality in Louisiana, 2017

Verifying and Confirming Maternal Deaths

Review process and criteria

Use of Vital Records death data alone is not enough to identify true pregnancy-associated deaths

In 2017, 92 potential pregnancy-associated deaths were identified using Vital Records data alone. Bureau of Family Health Regional Maternal and Child Health (MCH) Coordinators verified that 65 of the 92 identified deaths had a documented pregnancy at the time of death or within one year of death. The remaining 27 deaths were classified as false cases and not considered eligible for review. The PAMR committee determined that 15 of the 65 verified deaths were *pregnancy-related*, 41 were *pregnancy-associated, but not related*, and 9 were *pregnancy-associated, but unable to determine relatedness*. The committee used the *Building U.S. Capacity to Review and Prevent Maternal Deaths* project's Maternal Mortality Review Information Application's (MMRIA) Committee Decisions Form (version 14) to classify each case (see Appendix E).

92 Identified Deaths

Identified deaths met the following criteria:

- Louisiana resident at the time of death, and death occurred in Louisiana
- Between the ages of 10 and 55 years at the time of death
- Identified as having been pregnant at the time of death or within the preceding year by linkage of the death certificate to a corresponding live birth or fetal death certificate or inpatient hospital discharge record, indication of pregnancy status on the death certificate through the pregnancy checkbox, or cause of death had an ICD-10 code of A34, O00-O99 (causes related to pregnancy, childbirth, or complications during the postpartum period).

Cases reviewed by Regional Maternal & Child Health Coordinators

27 False (Unvalidated) Cases

These cases met the definition of a potential pregnancy-associated death based on the cause of death listed on death certificates, but could not be validated through medical records and/or coroner reports.

There was either no record of any pregnancy or there was a documented pregnancy that ended more than one year before death. See "Data Limitations" in Appendix C for more details.

These cases were ineligible for further review

STOP

65 Verified Deaths

Pregnancy-associated deaths met the below criteria:

- Documentation in medical records and/or coroner reports of a pregnancy at the time of death or within one year of death

Cases Reviewed by Committee

Committee determinations:

- 41 pregnancy-associated, but not related cases
- 15 pregnancy-related cases
- 9 pregnancy-associated, but unable to determine relatedness cases

Key Findings

Maternal Mortality in Louisiana, 2017

Snapshot of Pregnancy-Associated Deaths

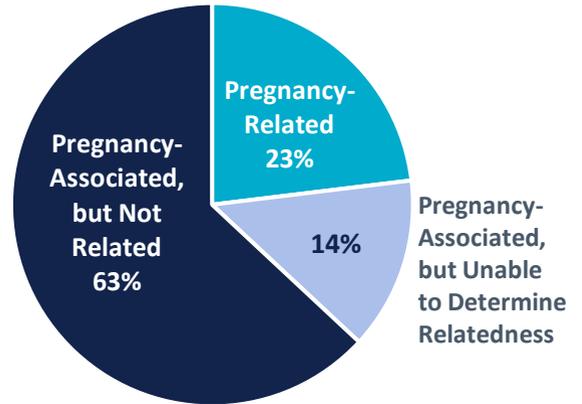
In 2017, Louisiana had 65 pregnancy-associated deaths. This represents a pregnancy-associated mortality ratio of 106.7 deaths per 100,000 births.

Breakdown of Pregnancy-Relatedness

Of the 65 deaths reviewed, the committee determined:

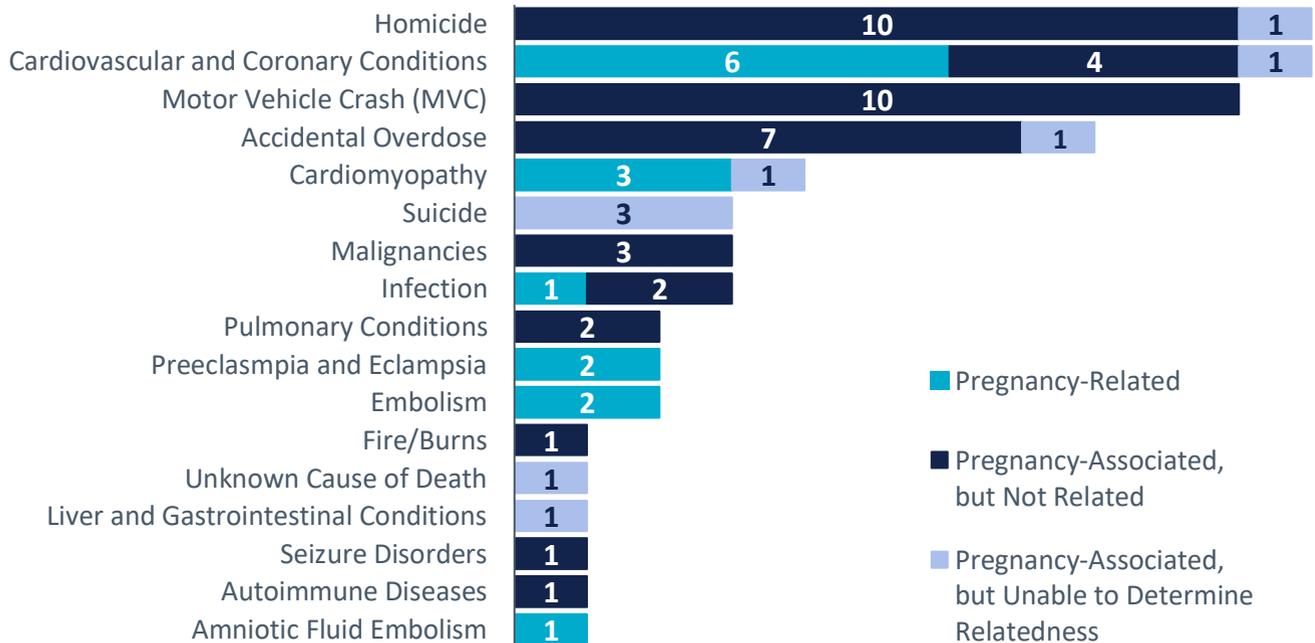
- 15 deaths (23%) were pregnancy-related.*
- 41 deaths (63%) were classified as pregnancy-associated, but not related.*
- 9 deaths (14%) were classified as pregnancy-associated, but the committee was unable to determine relatedness.

*See page 3 for definitions



Causes of Death

As determined by the PAMR Committee



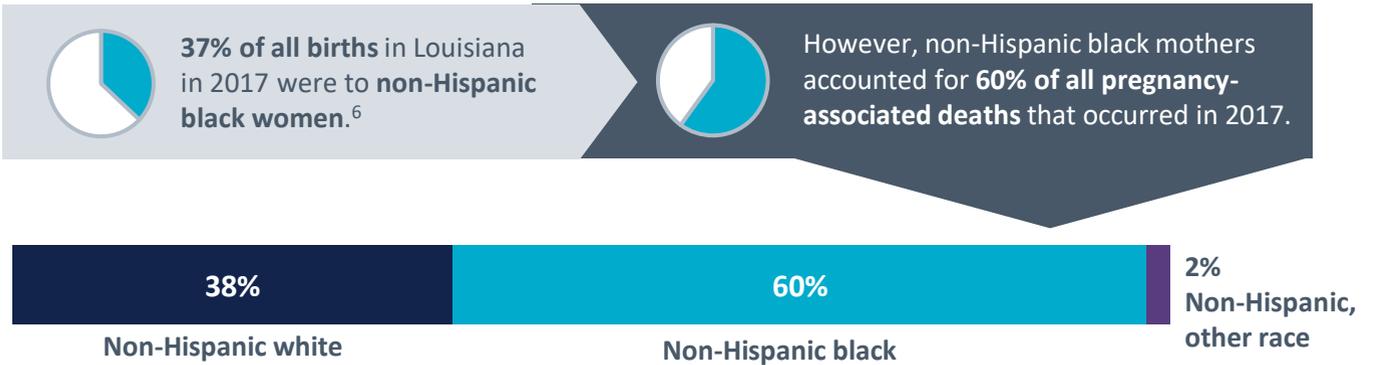
Key Points

- Nearly 1 in 4 (23%) deaths were determined to be pregnancy-related.
- Pregnancy-associated, but not related deaths accounted for the majority of deaths (63%).
- The leading causes of pregnancy-associated deaths were homicide (17%), Cardiovascular and Coronary Conditions (17%), and Motor Vehicle Crash (MVC) (15%).

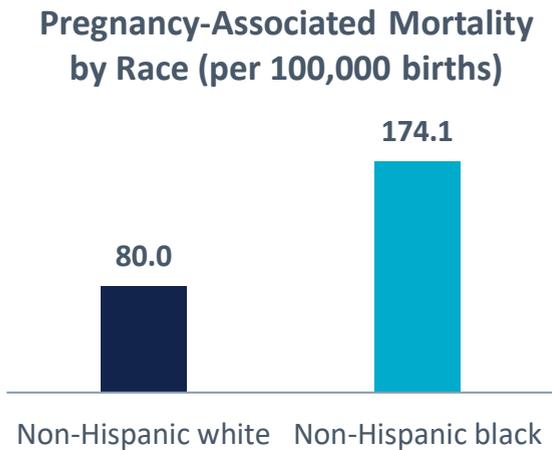
Racial Disparities in Pregnancy-Associated Mortality

Pregnancy-Associated Mortality by Race

Pregnancy-associated deaths can happen to women of any race. However, some women are disproportionately affected.



For all pregnancy-associated deaths, black mothers were more than twice as likely to die (2.2 times) as white mothers in Louisiana.



More than **2 black women** in Louisiana died...



...for every **1 white woman**



Key Points

- Racial disparities in maternal mortality are complex and due to many factors. Mortality is influenced by a wide range of economic, social, and clinical determinants. Some of those factors are directly related to pregnancy and birth itself, including health status prior to pregnancy and consistent access to quality healthcare during pregnancy and throughout the life course. Other, broader factors that contribute to adverse outcomes (including death), include social determinants of health such as racial bias and discrimination, lack of transportation or childcare, poverty, and racism in policies, practices and systems.^{8,9}

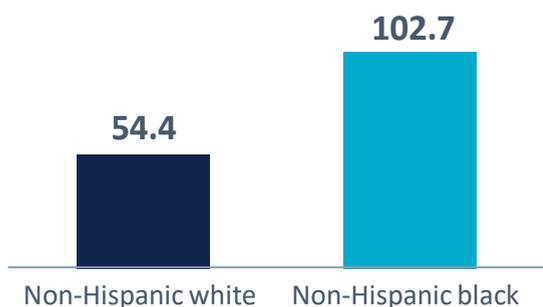
Racial Disparities

Pregnancy-associated, but not related deaths vs. pregnancy-related deaths

Significant racial disparities exist among all pregnancy-associated deaths. However, these disparities are **more prominent in pregnancy-related deaths**.

Disparities in Pregnancy-Associated, but Not Related Deaths

Pregnancy-Associated, but Not Related Mortality by Race (per 100,000 births)



Almost **2 black women** in Louisiana died...

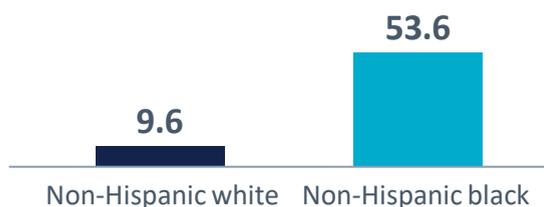


...for every **1 white woman**



Disparities in Pregnancy-Related Deaths

Pregnancy-Related Mortality by Race (per 100,000 births)



Over 5 black women in Louisiana died...



...for every **1 white woman**



Key Points

- For pregnancy-associated, but not related deaths, black women died at almost twice the rate of white women. Homicide was a top cause.
- For pregnancy-related deaths, black women died at five times the rate of white women. Complications from hypertensive emergencies contributed to this disparity.
- Implicit bias and systemic racism drive racial disparities in health and healthcare.¹⁰ Louisiana's health disparities demonstrate the need to continue efforts to address these issues at the provider and facility level to ensure equitable care.
- Social determinants of health such as food insecurity, intimate partner violence, lack of safe housing and lack of educational support contribute to disparities in all pregnancy-associated deaths.^{8, 9, 10}

Maternal Demographics

Insurance type and age

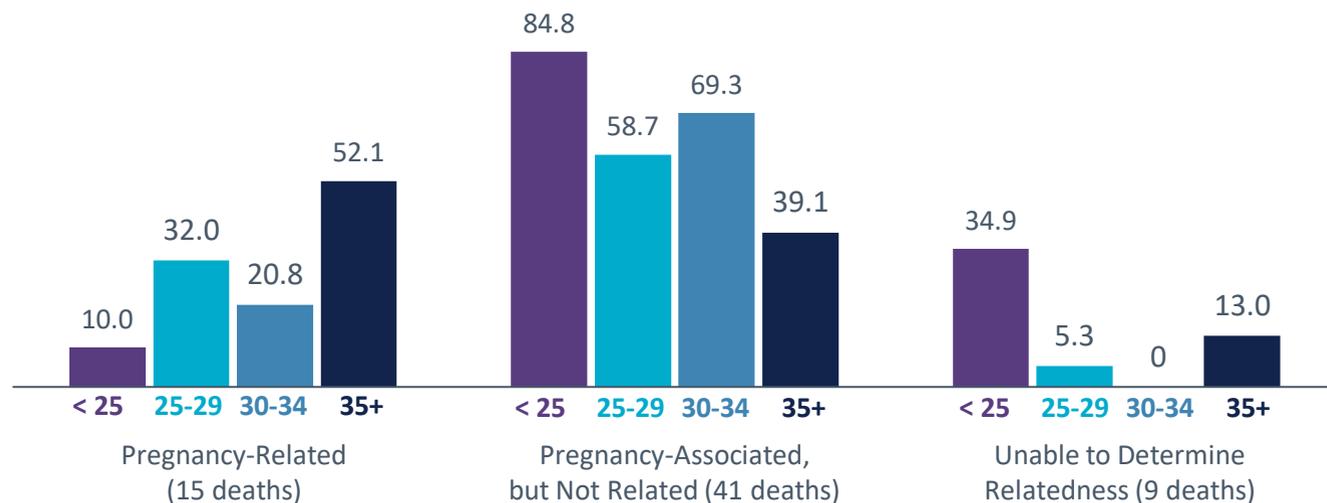
Insurance Type

68% of women who died had health insurance through **Medicaid**. The majority of Louisiana women (63%) who were pregnant or gave birth in 2017 had health insurance through Medicaid.¹¹



Mortality Ratios by Age

Mortality ratios below are deaths per 100,000 births. The age distribution of women who died is different for pregnancy-related deaths versus the two other categories of pregnancy-associated deaths. Women ages **35 years and older** were at an increased risk of *pregnancy-related* death. Women **less than 25 years old** were at an increased risk of *pregnancy-associated, but not related* and *pregnancy-associated, but unable to determine relatedness* death.



Key Points

- Medicaid covers the majority of pregnancies and births in Louisiana. This presents opportunities to optimize services covered by Medicaid to ensure quality healthcare before, during, and after pregnancies, and to provide coordinated care between pregnancies to prevent pregnancy-associated deaths.
- Pregnancy-associated, but not related deaths and pregnancy-associated, but unable to determine relatedness deaths disproportionately affect younger women (less than 25 years of age), while pregnancy-related deaths disproportionately affect among women over 35 years old. The top cause of death for pregnancy-associated, but not related deaths among women under age 25 was homicide, while the top cause of pregnancy-associated, but unable to determine relatedness deaths for women under age 25 was suicide.

Pregnancy-Related Deaths

15 deaths (24.6 deaths per 100,000 births)

80% of pregnancy-related deaths were considered potentially preventable.

A pregnancy-related death refers to 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 the pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

Preventability & Chance to Alter Outcomes

The committee reviewed all deaths and used the MMRIA Committee Decisions Form (see Appendix E) to determine their preventability and the chance to alter the outcome of each case. A death was considered preventable if the committee determined that there was any chance* the death could have been averted by making one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. **“Unable to Determine” cases were considered preventable, but the degree of preventability was unable to be determined.**

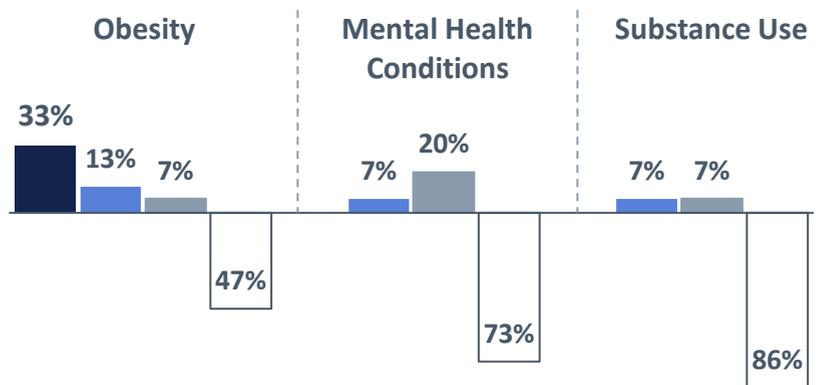
**Any chance to alter the outcome includes the MMRIA Committee Decisions Form categories: “Some Chance,” “Good Chance,” and “Unable to Determine.”*



The top underlying causes of death within this category were cardiovascular and coronary conditions (6 deaths), cardiomyopathy (3 deaths), preeclampsia and eclampsia (2 deaths) and embolism (2 deaths)

Obesity, Mental Health Conditions and Substance Use

The committee determined if these three conditions (as specified by the MMRIA Form – see Appendix E) contributed to each death. Regardless of individual-level factors, health systems can work to ensure all people have the safest pregnancy, birth, and postpartum experiences possible.



Key Points

- Preventability assessments help prioritize future areas of intervention and action.
- Determination of preventability is based on consensus achieved by the maternal mortality review committee.
- Louisiana committee findings suggest that deaths due to leading causes are highly preventable.

Contributing Factors

Among pregnancy-related deaths

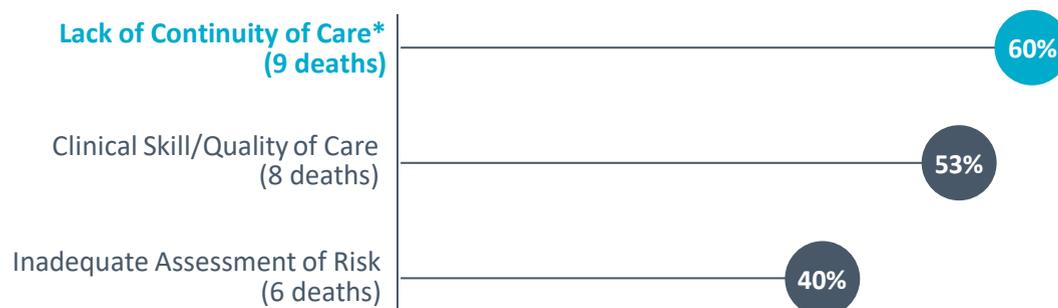
Provider and facility level factors were the most commonly-identified contributing factors to pregnancy-related deaths.

Review committee members identified contributing factors to pregnancy-related deaths using the MMRIA Committee Decisions Form (see Appendix G). Contributing factors included any behavior or systems issue which increased the severity of morbidity or the likelihood of mortality.¹² These factors did not necessarily cause the fatal outcome but may have been among a number of factors that led to the death. Contributing factors can be analyzed to develop and guide quality improvement efforts.

Each contributing factor identified through review committee discussion was categorized into 1 of 5 levels: patient/family, provider, facility, system, and community (see Appendix G for more details).

Top Contributing Factors: Provider and Facility Level

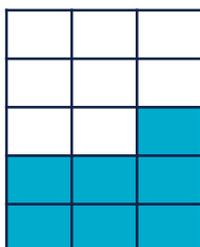
Contributing factors are not mutually exclusive – a death may have more than one of the following factors. In almost **two-thirds** (60%) of pregnancy-related deaths, a **lack of continuity of care** influenced the death.



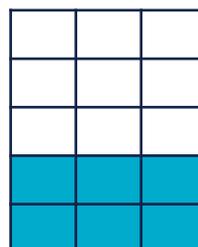
**Lack of continuity of care category included: not providing a cardiovascular consult; the decedent being seen by multiple doctors but no communication between them; and failure to admit patient to the hospital when outpatient management fails.*

Top Contributing Factors: Patient/Family Level

Completeness of medical records and availability of relevant information often limited the review committee's ability to assess for patient/family level contributing factors.



7 deaths (46%)
Patient or family members **did not have necessary knowledge** to identify symptoms/events that required treatment and follow-up.



6 deaths (40%)
Presence of **complex chronic disease** with need for primary care and tailored reproductive life planning

Pregnancy-Associated, but Not Related Deaths

41 deaths

90% of pregnancy-associated, but not related deaths were considered potentially preventable.

A pregnancy-associated, but not related death refers to 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.

Preventability & Chance to Alter Outcomes

The committee reviewed all deaths and used the MMRIA Committee Decisions Form (see Appendix E) to determine their preventability and the chance to alter the outcome of each case. A death was considered preventable if the committee determined that there was any chance* the death could have been averted by making one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. **“Unable to Determine” cases were considered preventable, but the degree of preventability was unable to be determined.**

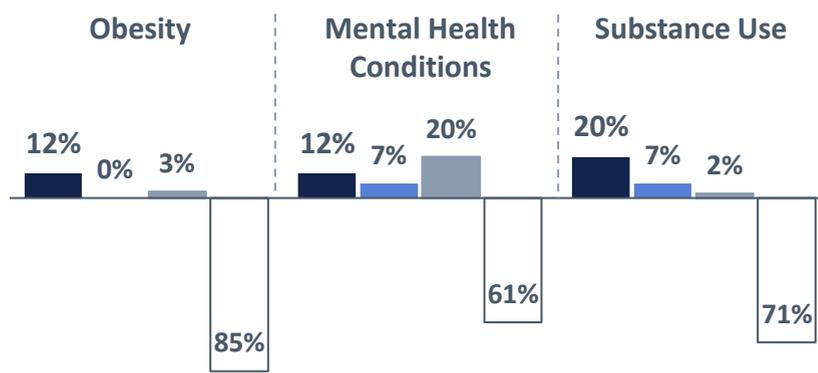
**Any chance to alter the outcome includes the MMRIA Committee Decisions Form categories: “Some Chance,” “Good Chance,” and “Unable to Determine.”*



The **top underlying causes of death** within this category were **homicide (10 deaths), motor vehicle crash (10 deaths) and unintentional overdose (7 deaths)**

Obesity, Mental Health Conditions and Substance Use

The committee determined if these three conditions (as specified by the MMRIA Form – see Appendix E) contributed to each death. Regardless of individual-level factors, health systems can work to ensure all people have the safest pregnancy, birth, and postpartum experiences possible.



Key Points

- Motor vehicle crashes and homicide were the leading causes of pregnancy-associated, but not related death.
- Substance use contributed or probably contributed to 1 in 4 (27%) pregnancy-associated, but not related deaths. Universal screening for mental health issues and Substance Use Disorders is recommended as a first step to identify women who need treatment and services.¹³

Contributing Factors

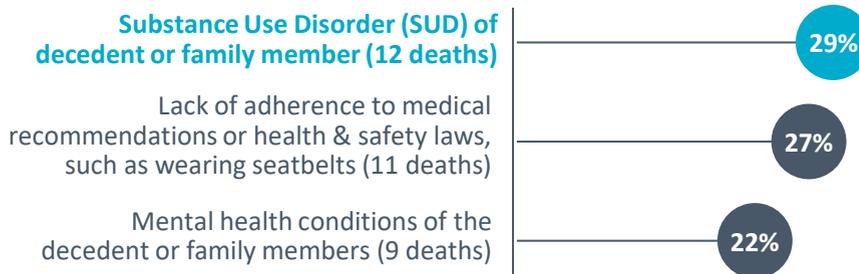
Among pregnancy-associated, but not related deaths

Patient/family and community level factors were the most commonly-identified contributing factors to these deaths.

Completeness of medical records and availability of relevant information often limited the review committee's ability to assess for patient/family and community-level contributing factors.

Top Contributing Factors: Patient/Family Level

Contributing factors are not mutually exclusive – a death may have more than one of the following top contributing factors. In almost **one third (29%)** of deaths, the woman or someone in her immediate family had a **Substance Use Disorder (SUD)** that influenced the death.



Top Contributing Factors: Community Level

In almost **one third (29%)** of deaths, **lack of community resources or outreach** for issues related to anger management, conflict resolution, social skills training, and stigma/fear surrounding SUD contributed to the death.



*This was a write-in category, which allows the review committee to capture factors not listed on the MMRIA Committee Decisions Form. If it had been a pre-existing option, this contributing factor may have been identified in additional cases

Key Points

- Screening for and treatment of Substance Use Disorders can prevent a significant proportion of deaths.¹⁴
- Patient education around health and safety issues, such as wearing seatbelts, plays a role in preventing pregnancy-associated deaths. Education must be appropriate for all health literacy levels.
- Addressing mental health conditions in pregnant individuals and the general population may improve maternal outcomes.
- Community resources that assist people with anger management and conflict resolution are needed to help reduce and prevent interpersonal violence.
- Lack of adherence to laws regarding access to firearms contributes to pregnancy-associated deaths.

Unable to Determine Pregnancy-Relatedness

9 deaths

100% of pregnancy-associated, but unable to determine relatedness deaths were considered potentially preventable.

For 9 out of 65 pregnancy-associated deaths, the committee was unable to determine pregnancy-relatedness (i.e. if the death occurred due to a pregnancy complication, chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy).

Preventability & Chance to Alter Outcomes

The committee reviewed all deaths and used the MMRIA Committee Decisions Form (see Appendix E) to determine their preventability and the chance to alter the outcome of each case. A death was considered preventable if the committee determined that there was any chance* the death could have been averted by making one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. **“Unable to Determine” cases were considered preventable, but the degree of preventability was unable to be determined.**

**Any chance to alter the outcome includes the MMRIA Committee Decisions Form categories: “Some Chance,” “Good Chance,” and “Unable to Determine.”*

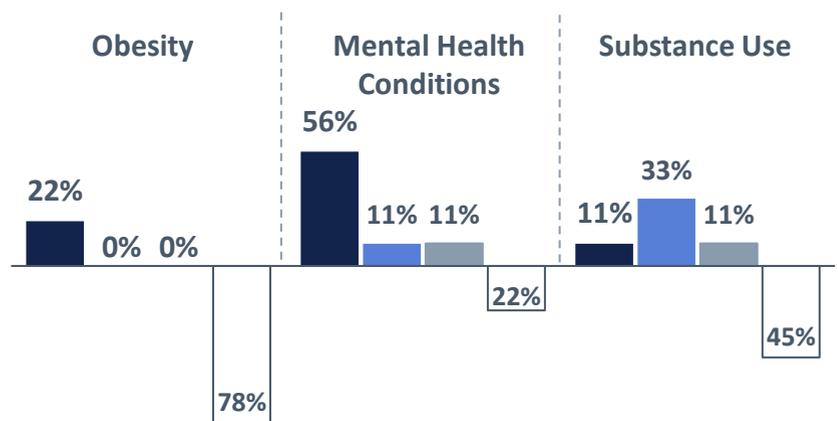


The top underlying cause of death within this category was suicide.

Obesity, Mental Health Conditions and Substance Use

The committee determined if these three conditions (as specified by the MMRIA Form – see Appendix E) contributed to each death. Regardless of individual-level factors, health systems can work to ensure all people have the safest pregnancy, birth, and postpartum experiences possible.

■ Yes ■ Probably
■ Unknown □ No



Key Points

- One third (33%) of pregnancy-associated, but unable to determine pregnancy-relatedness deaths were suicides. Other known causes of death included homicide, liver and gastrointestinal conditions, cardiomyopathy, and cardiovascular and coronary conditions.

Contributing Factors

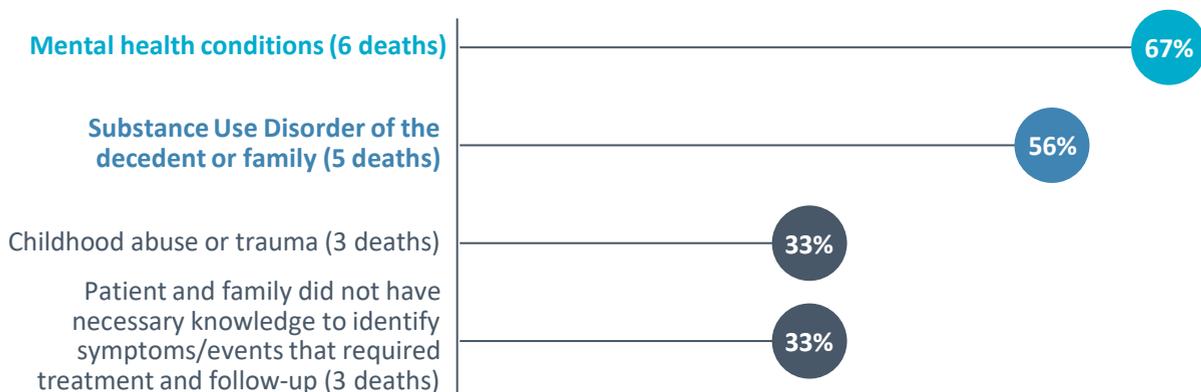
Among pregnancy-associated, but unable to determine relatedness deaths

Patient/family, provider and facility level factors were the most commonly-identified contributing factors to these deaths.

Completeness of medical records and availability of relevant information often limited the review committee's ability to assess for patient/family and community-level contributing factors.

Top Contributing Factors: Patient/Family Level

Contributing factors are not mutually exclusive – a death may have more than one of the following top contributing factors. In **two-thirds** (67%) of these deaths, **mental health conditions** influenced the death. In **over half** (56%) of these deaths, the woman or someone in her immediate family had a **Substance Use Disorder** that influenced the death.



Top Contributing Factors: Provider and Facility Level

In **two-thirds** (67%) of these deaths, **lack of referrals to treatment** for mental/behavioral health conditions or substance use influenced the death. In **over half** (56%) of these deaths, **lack of continuity of care or adequate care coordination** influenced the death.



Key Points

- Efforts to prevent these deaths can occur on several levels, including patient/family, provider, and facility level.
- Overwhelmingly, on multiple levels, mental health conditions and substance use contribute to pregnancy-associated deaths and must be addressed.

Understanding Pregnancy-Associated Deaths

Medical and autopsy records available for review

Autopsies were performed in about **two-thirds (68%)** of cases.
About **1 in 3** of cases were **missing at least some* records** crucial to case review.

Understanding pregnancy-associated deaths requires information from multiple types of records, including those from medical/health systems, law enforcement, mental/behavioral health providers and systems, and government or social service agencies. Records can be difficult to obtain due to:

- Lack of information or data sharing agreements and processes in place across and within these systems.
Example: Medical record sharing across health networks can be limited
- Legal restrictions and policies that regulate what information agencies can share.
Example: It is difficult to obtain records related to a death that is part of an ongoing criminal investigation
- Reluctance or hesitation to share copies of records obtained from external agencies.
- Staff turnover which hinders collaboration and information sharing between and across agencies or systems.

Completeness of Records for Review

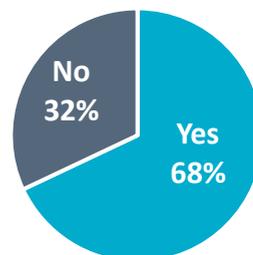
Access to complete records is critical to determine factors that contributed to pregnancy-associated deaths, and to determine their preventability. **20 out of 65** cases were determined by the committee to have **complete records available** for review.

*Approximately **one-third (22 cases)** were identified as having either **“somewhat complete”** or **“not complete” records**, meaning that **information crucial to the review of the case was not available** to the review committee (see Appendix E for full definitions of complete, mostly complete, somewhat complete and not complete).



Autopsies

- Autopsies reveal information that helps establish cause of death. Without an autopsy, it is challenging to determine the immediate and underlying cause of death in certain scenarios.
- Autopsies were performed on **68%** of deaths.



Key Points

- Data sharing across and within systems and agencies for the purpose of maternal mortality review would improve the review committee’s access to needed records (e.g. records related to or from prenatal care, mental health, Medicaid, etc.). Access to records would allow for a more complete understanding of deaths.
- Improved understanding of the causes and circumstances surrounding pregnancy-associated deaths is needed to direct quality improvement efforts and ensure effective resource allocation to prevention efforts. Autopsies and the availability of complete records for review are vital to this process.

Understanding Pregnancy-Associated Deaths

Timing of deaths

The majority (80%) of pregnancy-related deaths occurred during or within 42 days of pregnancy.

Timing of pregnancy-related deaths



27%

While pregnant



53%

Within 42 days of pregnancy



20%

43 days to 1 year after pregnancy

- Deaths occurring within 42 days of pregnancy were most frequently due to cardiovascular and coronary conditions.
- Deaths occurring 43 days to 1 year after pregnancy were most frequently due to cardiomyopathy.

Timing of pregnancy-associated, but not related deaths



27%

While pregnant



7%

Within 42 days of pregnancy



66%

43 days to 1 year after pregnancy

- Deaths occurring during pregnancy were most frequently due to motor vehicle accidents.
- Deaths occurring 43 days to 1 year after pregnancy were most frequently due to homicide.

Timing of pregnancy-associated, but unable to determine relatedness deaths



22%

While pregnant



11%

Within 42 days of pregnancy



67%

43 days to 1 year after pregnancy

- Deaths occurring 43 days to 1 year after pregnancy were most frequently due to suicide.

Key Points

- The majority (80%) of pregnancy-related deaths occurred during or within 42 days of pregnancy.
- Two thirds (66%) of pregnancy-associated, but not related deaths occurred 43 days to 1 year after pregnancy and were most frequently due to homicides.
- Two thirds (67%) of pregnancy associated, but unable to determine relatedness deaths occurred 43 days to 1 year after pregnancy and were most frequently due to suicide.

From Review to Action

Maternal Mortality in Louisiana, 2017

PAMR Committee Recommendations

Overview

Louisiana’s PAMR Committee generated the following recommendations through their review of 2017 maternal deaths. Recommendations represent committee consensus following a critical review of each of the 65 deaths. Committee reviews were guided by the U.S. Center for Disease Control and Prevention (CDC)’s Maternal Mortality Review Information Application’s (MMRIA) Committee Decisions Form. This form asks committee members to use their expertise to answer the question “*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?*” (see Appendix E). The recommendations are drawn from both individual case reviews and overall data and findings from all 65 deaths.

Recommendations are categorized by point of intervention: systems, clinical quality improvement, social support, and policy. Individuals and organizations working at each of these levels can use these recommendations to help inform and guide their efforts to improve maternal health outcomes.

Five overarching needs or themes emerged consistently throughout reviews:



Improve care coordination before, during, and between pregnancies. Care coordination is defined by the Agency for Healthcare Research and Quality as “the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient’s care to facilitate the appropriate delivery of healthcare services.”¹⁷ Existing medical conditions and social determinants of health can impact pregnancy outcomes, which means that women often require care from several providers, not just an obstetrician. Maternal care coordination requires all providers to communicate with each other about a patient’s care, and ensures patients are linked to non-medical resources such as supports for housing, education, and economic stability. Maternal care coordination has been shown reduce preterm births,¹⁸ improve use of perinatal services,¹⁹ and improve contraception use for the purpose of healthy birth spacing.²⁰ The PAMR Committee identified lack of care coordination as a contributing factor in multiple deaths.



Ensure pregnant women receive the appropriate level of care based on the complexity and severity (acuity) of their medical issues, and risk factors present. Health complications during labor, delivery, and the year after birth are more likely when medically high-risk patients are cared for at facilities designed to serve low-acuity patients (i.e. patients who do not experience severe illness or injury).²¹ The PAMR Committee identified a lack of risk-appropriate care as a contributing factor in multiple deaths. Facilities at all levels can improve their readiness to care for patients who experience severe complications or illness by performing risk assessments on all patients and implementing evidenced-based practices to support patient safety. Best practices include the Alliance for Innovation on Maternal Health’s Patient Safety Bundles focused on Obstetric Hemorrhage, Severe Hypertension in Pregnancy, Maternal Mental Health, Maternal Venous Thromboembolism, Reduction of Peripartum Racial/Ethnic Disparities, and Obstetric Care for Women with Opioid Use Disorder.²²



Expand the obstetric healthcare workforce to include cardiologists, psychiatric and addiction specialists. Left untreated, cardiac, psychiatric and substance use disorders can negatively impact maternal and child health.^{23,24} The PAMR Committee identified lack of access to healthcare providers in these areas as a contributing factor to multiple deaths. Multidisciplinary teams are needed to address the multiple medical issues seen in maternity care. To improve maternal outcomes and decrease maternal mortality, the obstetric workforce cannot be limited to obstetric providers.

PAMR Committee Recommendations

Overview



Address racial and cultural bias across the network of care that serves pregnant and postpartum women (including hospitals, Emergency Medical Services, physician offices, and community clinics), as well as the institutions that influence or coordinate with that network (including public health agencies, Medicaid, and coroners). Implicit bias and structural racism contribute to maternal mortality.²⁵ Implicit bias must be addressed at all levels of the healthcare system. Structural racism must be addressed within all systems that coordinate or impact care for women, including but not limited to public health agencies, health insurance providers/payors, and legislative or policymaking bodies.



Improve and expand identification of and treatment for substance use during pregnancy. The PAMR Committee identified Substance Use Disorder (SUD) as a leading contributing factor for multiple deaths. In particular, review of *pregnancy-associated, but not related* and *pregnancy-associated, but unable to determine relatedness* deaths reveal a lack of screening with a validated tool for SUD. Though Medication Assisted Treatment (MAT) for opioid use disorder is the standard of care,²⁶ case reviews indicated that women with SUD did not receive this course of treatment.

PAMR Committee Recommendations

Systems

Systems



Improve care coordination

- Health systems should invest in care coordinators to work within and across facilities, including across departments (e.g. primary care, emergency department, obstetrics and more), to help improve patients' general health and control chronic health conditions prior to, during, and after pregnancy.
- Cancer affects maternal health outcomes. Health systems and payors should ensure that all women, regardless of insurance type, have access to and are encouraged to use preventive medical care throughout their lives, especially cancer screenings.
- Birthing and medical facilities need to work with other systems – such as home visiting services, Federally Qualified Health Centers, and correctional facilities – to establish pathways to facilitate the exchange of health information.
- Health systems should develop referral mechanisms and networks to help obstetric care providers connect or refer patients to high quality resources for mental health, violence prevention, substance use, housing assistance, economic support, and other medical and non-medical needs.
- Health systems should ensure postpartum care coordination and timely follow-up for women who experienced complex pregnancies or critical illness during childbirth.



Improve systems of care and ensure appropriate level of care

- Health systems should ensure that patients receive care from providers or facilities that are equipped to provide the appropriate level of medical care during childbirth, based on patient needs and risk factors. Health systems should ensure safe and streamlined transfer of critically ill patients to new facilities and providers when necessary.
- Implement a “Community Paramedicine” Model.²⁷ This healthcare model is one in which Emergency Medical Services (EMS) provide select primary care services in addition to emergency medical care.



Expand the obstetric healthcare workforce

- Health systems should work to integrate more cardiologists, psychiatrists, and addiction specialists into women's health and obstetric care.
- Health systems should employ telehealth as a strategy to improve access to obstetric care (including care for high-risk patients), especially in rural areas.



Address racial and cultural bias

- Provide implicit bias training to direct service providers, social service or public health program managers, coroners, and agency and institutional leadership across multiple systems of care.



Address substance use before, during and after pregnancy

- Educate providers and staff on the benefits of Medication Assisted Treatment (MAT) over abstinence during pregnancy as a strategy to improve patient access to MAT.
- Needle exchange programs, shelters, and substance use treatment programs should offer easy-to-access pregnancy testing.
- The legal system should explore the practice of sentencing women with drug-related charges to Substance Use Disorder (SUD) treatment or diversion programs instead of incarceration or fines.

PAMR Committee Recommendations

Systems

Systems



Promote Community Health and Safety

- The Highway Safety Commission should integrate education on appropriate seat belt use by pregnant women into existing child passenger safety training courses.
- Motor vehicle crash prevention programs and campaigns should use state-level data to inform interventions that address the risk of drowsy driving.

PAMR Committee Recommendations

Clinical Quality Improvement

Clinical Quality Improvement



Improve care coordination

- Pregnant and postpartum women can benefit from family support and coaching programs, including home visiting programs. Providers and care coordinators should be familiar with the eligibility requirements, enrollment timelines, and referral processes for these programs.
- When postpartum women are discharged from the hospital, obstetric providers should educate women and their families on warning signs by using tools, such as a post-birth checklist, to help families understand which signs might indicate a problem and require medical attention. This is especially important for postpartum women with hypertensive disorders (high blood pressure).
- Obstetric providers should ensure postpartum care coordination with cardiology services for women diagnosed with a hypertensive disorder in pregnancy, as these women have a long-term increased risk of cardiovascular disease.¹⁵
- Emergency Medical Service (EMS) providers should receive education and training to recognize and treat obstetric emergency conditions, such as hypertensive disorders of pregnancy.
- Health systems and emergency departments should create processes to ensure appropriate follow-up for pregnant and postpartum patients after emergency department visits, whether those visits are related to pregnancy or not.



Improve systems of care and ensure appropriate level of care

- Every time women interact with healthcare systems, providers (including non-obstetric providers) should offer them reproductive life planning counseling. Counseling should be informed by an assessment of an individual's risk of pregnancy complications due to chronic disease. Providers should counsel women on a full range of contraceptive options and how to access them, especially when pregnancy is contraindicated.
- Obstetric care providers should counsel patients and families around pregnancy risk factors related to family history (i.e. risks related to genetic disorders).
- Healthcare providers should screen women with a history of venous thromboembolism for thrombophilia prior to pregnancy to inform appropriate preventative measures.
- Obstetric care providers should implement the Alliance for Innovation on Maternal Health Program's Maternal Venous Thromboembolism Patient Safety Bundle.¹⁶
- Quality improvement review should occur at the facility level to ensure provider adherence to standards of care for managing hypertension and assessing cardiac risk during pregnancy.
- Facilities should implement a Maternal Early Warning Signs protocol to improve recognition and treatment of sepsis.
- Obstetric care providers should exercise shared decision-making with patients and their families regarding pregnancy management, especially when it is not medically recommended to continue the pregnancy.
- Train obstetric care providers to use a standardized tool to screen for Intimate Partner Violence (IPV), and to recognize the warning signs of IPV. For patients with a positive screen, referral pathways to services should be readily available to providers.

Clinical Quality Improvement



Improve systems of care and ensure appropriate level of care (continued)

- Obstetric care and emergency departments should coordinate to improve recognition of pregnancy and postpartum conditions diagnosed in the emergency department that require referral to obstetric care services.
- Obstetric providers and prenatal classes should teach patients/participants how to correctly use seatbelts during pregnancy. This is especially important for women with increased Body Mass Index (BMI), since they are at an increased risk for death or severe injury due to a motor vehicle crash.²⁸



Address racial and cultural bias

- Health systems should provide physicians, nurses, advanced practice providers, and other clinicians with training related to racial bias and related health outcomes.
- Obstetric care providers and other healthcare professionals should receive training to provide compassionate, quality care to people experiencing high-risk pregnancies, regardless of comorbid conditions (e.g. SUD).



Address substance use before, during and after pregnancy

- Women with SUD need prenatal and primary care that includes MAT and the full spectrum of contraceptive options. Partner with national organizations to train women's healthcare providers to integrate MAT into prenatal and primary care.
- Behavioral health screening should occur as the standard of care during each patient encounter.
- Emergency room providers should receive training to help them recognize SUD and polypharmacy (simultaneous use of multiple drugs), and to better understand their role in preventing substance use and abuse, especially for perinatal patients.
- When substance use overdose occurs, health systems should implement targeted case management.

PAMR Committee Recommendations

Social Support

Social Support



Improve care coordination

- Train a wide range of social service providers – including home visiting programs; Special Supplemental Nutrition Program for Women, Infants and Children (WIC); community behavioral health supports; and more – to counsel women around reproductive life planning and refer women to services as needed.
- Facilities should consider hiring social services navigators to coordinate services that address social determinants of health. Navigators would ensure the patient was informed about both the service and the referral, and confirm the patient was connected to the service.
- In cases of adoption, adoption facilitators should ensure birth mothers are connected to mental health services or other emotional support resources.
- When families have suffered a loss, providers should connect families to bereavement support and services.
- Women and families would benefit from hospital-based referrals to counseling and supportive services for end of life planning, home hospice and palliative care.



Improve systems of care and ensure appropriate level of care

- Ensure existing programs and services that provide social support during pregnancy (doula services, home visiting programs, etc.) are covered by all insurance providers. Review eligibility criteria and capacity limitations of existing programs, and explore ways to make these programs accessible to all women.
- Quality improvement review should occur at the health system level to identify barriers to mental health screening and referral, particularly for postpartum depression, IPV, and SUD.
- Support and fund interventions designed to stop the cycle of IPV by focusing on perpetrators. Interventions and resources include anger management counseling or classes, mental health services, and healthy relationship coaching.



Expand the obstetric healthcare workforce

- Expand mental health provider workforce to ensure pregnant and postpartum women have access to inpatient and outpatient psychiatric care. Inpatient psychiatric facilities should modify their policies to allow pregnant women to be admitted.



Address substance use during pregnancy

- Increase family awareness of how to use Narcan (naloxone), a nasal spray that can help reverse an opioid overdose.



Promote community health and safety

- Identify and integrate mental health providers that offer community-based services for pregnant and postpartum women and families into care networks. Community-based services include support for IPV survivors (including children), MAT, and depression/suicide prevention.

Social Support



Promote community health and safety (continued)

- Create or expand referral mechanisms and networks to help obstetric care providers connect pregnant and postpartum women to community-based mental health resources. This may be both particularly challenging and important in rural areas.
- Health systems should partner with community-based organizations to address social determinants of health that impact maternal outcomes, such as food insecurity, safe housing, and education.
- Develop education campaigns to teach and promote bystander CPR education.
- Conduct research to identify barriers to accessing health services through a primary care network in order to decrease the use of emergency departments as a first line method of care.
- Community programs should implement interventions or campaigns to reduce stigma towards individuals with mental health conditions, especially those who are also pregnant or parents.
- Home visiting program providers should be trained to recognize signs of IPV and warning signs for suicide.
- Employers should educate employees about the signs of fatigue and the risks of drowsy driving following long shifts or during nontraditional work hours.

PAMR Committee Recommendations

Policy

Policy



Improve care coordination

- Fear of prosecution by law enforcement can be a barrier to women seeking help for SUD or IPV. Policies are needed to ensure there are options to manage and treat IPV and SUD without involving law enforcement.



Improve systems of care and ensure appropriate level of care

- Postpartum women, especially those who are medically high-risk, can benefit from nurse home visits after delivery. Nurse home visits should be covered by insurance.
- Obstetric care providers should screen for tobacco use and integrate tobacco cessation into prenatal and postpartum care as part of the standard of care.
- All health providers should screen for IPV, substance use, depression, and other behavioral or mental health issues as part of the standard of care.



Expand the obstetric healthcare workforce

- Legislative policy should ensure insurance coverage for home visiting and doula services.



Address substance use during pregnancy

- Create or modify existing policies to support pregnant women living with Substance Use Disorder (SUD). Policies should work to reduce stigma and develop programs that prioritize treatment for pregnant women with SUD.
- Legislative policy should protect pregnant women from discrimination in publicly funded SUD treatment programs.
- Eliminate barriers related to insurance coverage and physical access that prevent citizens from carrying and using Narcan (naloxone). Ensure Narcan is available for over-the-counter purchase in all pharmacies across the state.
- Providers should receive appropriate reimbursement for methadone treatment, home visits, care coordination, and behavioral health screening for women enrolled in Medicaid.



Promote community health and safety

- Enforce existing policies that restrict access to weapons, including firearms, for those with severe mental illness, perpetrators of violent crimes, and those with a known history of IPV.



Increase Access to Data & Medical Records for Committee Review

- Healthcare systems and state agencies should work together to integrate electronic health records (EHR) with vital statistics to allow data abstractors and the PAMR committee access to information needed to perform a more accurate and comprehensive review of maternal deaths. This may require data sharing agreements.
- The PAMR committee should have access to Department of Children and Family Services records to help the committee better understand circumstances surrounding cases, including documented violence in the home.
- Performing autopsies for all maternal deaths would enhance and improve the committee's review process. More information is needed to determine the feasibility and cost of requiring autopsies.

Current Efforts to Reduce Maternal Mortality

Selected programs and activities to reduce maternal mortality and morbidity in Louisiana are outlined below.

- 1. The Louisiana Perinatal Quality Collaborative** launched coordinated quality improvement efforts across the state in August 2018. Teams participating in the collaborative work together to improve obstetric care by implementing best practices supported by the Alliance for Innovation in Maternal Health, with national mentorship from the Centers for Disease Control (CDC). Teams use quality improvement tools to implement practice changes that are aligned with national recommendations and those in this report. Quality improvement efforts thus far have focused on hemorrhage, hypertension, risk assessment and monitoring of early warning signs, appropriate escalation of care, and attention to addressing racial disparities, including through the mandated inclusion of patient and community advisors on each facility team. For further information, please visit: ldh.la.gov/LaPQC.
- 2. Act 497 (2018 Legislative Session) created the Healthy Moms, Healthy Babies Advisory Council.** The Council is made up of maternal and child health experts who are committed to addressing racial and ethnic disparities in maternal health outcomes. The Council was charged with the following:
 - Incorporate a community-engaged, equity-focused lens into Louisiana programs and campaigns focused on preventing maternal mortality and morbidity.
 - Promote safe and equitable care for all mothers and babies in the state.
 - Issue a report summarizing recommendations around key issues, such as how to collect and utilize self-reported race and ethnicity data in quality improvement efforts. This report has been published and is available [at this link](#).

To find and read Act 497 in its entirety, visit legis.la.gov.

- 3. Act 174 (2018 Legislative Session)** provided for a pilot program to expand maternal access to treatment of opioid use disorder and optimize management of neonatal opioid withdrawal syndrome. To find and read Act 174 in its entirety, visit legis.la.gov.
- 4. LA-PAMR launched its enhanced multidisciplinary review process in 2018**, in full alignment with national best practices promoted by the CDC. In 2019, Louisiana was one of 25 states to receive funding under the CDC’s Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) Program. The PAMR committee was expanded to ensure representation from a variety of geographic regions and fields of expertise – including expertise in addressing social determinants of health – and increased inclusion of women and people of color.
- 5. The Louisiana Department of Health (LDH) hosted the inaugural Maternal Mortality Summit in August 2019.** The summit was part of the response to [House Resolution \(HR\) 294](#) of the 2019 Regular Session, which called for two summits to “take immediate action to address racial disparities in maternal and child health outcomes, and the alarming rate of mortality for Black infants and mothers in Louisiana.” The Maternal Mortality Summit convened public health professionals, providers, policymakers and community leaders focused on improving childbirth outcomes. LDH Breakout sessions focused on legislative strategies to reduce maternal mortality; redesigning maternity care to meet birthing needs; strategies to address the leading causes of mortality, hemorrhage and hypertension; and recommendations for immediate and long-term action. Recommendations resulting from the Summit can be found in the [report here](#).

Appendices and References

A. Acronyms

Acronym	Definition
BFH	Bureau of Family Health
CDC	Centers for Disease Control and Prevention
ICD	International Classification of Diseases
LaHIDD	Louisiana Hospital Inpatient Discharge Database
LaPQC	Louisiana Perinatal Quality Collaborative
LDH	Louisiana Department of Health
MCH	Maternal and Child Health
MMRIA	Maternal Mortality Review Information Application
NCHS	National Center for Health Statistics
OPH	Office of Public Health
PAMR	Pregnancy-Associated Mortality Review
WHO	World Health Organization

B. History

Louisiana Maternal Mortality Review

In 1992, the Louisiana Department of Health (LDH)-Office of Public Health (OPH)-State Center for Health Statistics (SCHS) initiated the Louisiana Pregnancy Mortality Surveillance System (LPMSS) to investigate the causes of pregnancy-related maternal deaths in order to identify system-level opportunities for prevention. A check box on the Louisiana death certificate identified these deaths through a positive response to the question “If deceased was female 10-49, was she pregnant in the last 90 days?”

LPMSS partnered with the Maternal and Child Health (MCH) Program of OPH in 2000 to gain additional medical expertise in the review of causes of pregnancy-related maternal deaths occurring from 1995 through 1999. The MCH Program Medical Director completed reviews using cause of death listed on maternal death certificates. The Medical Director continued to support LPMSS through an annual review of maternal death cases using information from the death certificate along with any corresponding live birth or fetal death records.

Additional improvements in maternal death identification began in 2006 when LPMSS received technical assistance from the Pregnancy Mortality Surveillance System at the Centers for Disease Control and Prevention (CDC). In addition to using Louisiana Hospital Inpatient Discharge Data (LaHIDD) as an additional data source for identification of maternal deaths, LPMSS also expanded the case definition from **pregnancy-related deaths** to all **pregnancy-associated deaths**, or all women who died during pregnancy or within 1 year of pregnancy, irrespective of cause.

In 2007, the MCH Program conducted an evaluation of 2000-2005 LPMSS maternal death records to assess if linkage with LaHIDD data resulted in improved maternal death identification compared to linkages using only vital records death and live birth/fetal death records. The evaluation also examined differences in the number of maternal deaths identified when using different common U.S. and global definitions of maternal mortality. Results highlighted the need to make additional improvements to methodology and procedures pertaining to maternal death review in Louisiana, including the specific recommendation to abstract medical records of all maternal death cases to improve the availability of complete information during the review process.

The MCH Program introduced the Louisiana pregnancy-associated Mortality Review (LA-PAMR) Program in 2010, achieving four new improvements to the Louisiana maternal mortality review process. First, the scope of reviews beginning with 2008 records was broadened to include all pregnancy-associated maternal deaths as defined by the American College of Obstetricians and Gynecologist (ACOG) and CDC definitions.

Second, standardized case identification procedures were documented, including the recommendation to link death certificates of all Louisiana resident women ages 10-55 years with live birth, fetal death, and LaHIDD data. Third, abstraction of medical and coroner records for all maternal deaths was implemented to provide a comprehensive record for case review. And fourth, LA-PAMR became an official activity of the Louisiana Commission on Perinatal Care and the Prevention of Infant Mortality (Louisiana Perinatal Commission), thereby making LA-PAMR records confidential and protecting them from discovery in legal proceedings.

B. History (continued)

Louisiana Maternal Mortality Review

In 2017, recognizing the concern for rising rates of maternal mortality locally and nationally and new opportunities for action and prevention, the LDH-OPH-Bureau of Family Health initiated an intensive review process of maternal deaths occurring between 2011 and 2016. Only pregnancy-related deaths were reviewed for this time period. This decision was made to balance organizational capacity to review and analyze maternal deaths with an urgent need for local data in order to identify new opportunities for action and prevention. This review was needed to produce the following priority items:

- An up-to-date and usable report for public distribution
- A more accurate calculation of Louisiana’s maternal mortality ratio
- Data-informed recommendations for perinatal quality initiatives, including the Louisiana Perinatal Quality Collaborative.

The targeted review was restricted to cases of women who were pregnant at the time of death or who died within 42 days of the end of the pregnancy, and whose cause of death is consistent with the World Health Organization’s (WHO) definition of maternal death, quantified by a specific set of International Classification of Diseases 10th revision (ICD-10) codes. Data sources used to produce the case summaries presented in the review meetings included vital records death certificates, live birth or fetal death certificates related to the maternal death, coroner’s reports, hospital records, other medical records, and psychosocial records when possible.

In 2018, the review committee expanded the review process to include all pregnancy-associated deaths starting with deaths that occurred in 2017. The expanded review includes all deaths that occurred while pregnant or within 1 year of the end of pregnancy, regardless of the cause. Including pregnancy-associated cases will:

- Allow for greater understanding of medical and nonmedical contributors to death
- Prioritize interventions that may reduce maternal deaths
- Allow for the most accurate identification and comprehensive review of deaths
- Allow specific recommendations for actions to inform local, state and national prevention strategies

C. Data Sources and Methodology

Louisiana Pregnancy-Associated Mortality Review

Vital Records Data and Linkage Methodology

Louisiana Vital Records death certificates were used to identify deaths occurring from January 1, 2017 through December 31, 2017 to women ages 10-55 years old who were Louisiana residents at the time of death, and whose deaths occurred in Louisiana. All pregnancy-associated cases (see pg. 3 for definitions) were eligible for review.

Deaths were identified through a combination of linkages, the pregnancy checkbox on death certificates, and obstetric code (O-code) causes of deaths. Deaths were identified in four steps:

- 1. Data linkages:** Death certificates of women of childbearing age were linked to infant birth and fetal death certificates. Variables used to create these linkages include: mother's social security number, mother's date of birth, infant/fetal date of delivery, mother's first and last name, and child's last name (some linkages were made using soundex, a phonetic algorithm for indexing names by sound so they can be linked despite minor differences in spelling). SAS version 9.4 was used in conjunction with the LinkPro macro and Link King to complete all linkages.
- 2. Pregnancy checkbox:** Death certificates with the pregnancy checkbox filled in, indicating that the woman was pregnant at the time of death or within one year of pregnancy, were identified as maternal deaths.
- 3. O-codes:** Deaths of women where the ICD-10 code for underlying cause of death was in chapter O were identified as potential pregnancy-associated deaths.
- 4. Louisiana Hospital Inpatient Discharge Database (LaHIDD) linkages:** Linkages between death records and hospital discharge records (LaHIDD) were conducted to identify additional cases. All women between the ages of 10 and 55 who had any pregnancy-related ICD-10CM codes were included. Variables used to link the death file with the LaHIDD file included mother's social security number, mother's date of birth, and mother's first and last name. Women who were found to have a delivery, positive pregnancy test, or an ectopic pregnancy were added to the list of maternal deaths. LAHIDD linkages were conducted using Link Plus and Link King software.

Potential pregnancy-associated deaths identified using the pregnancy checkbox and O-codes required verification by the Bureau of Family Health's Maternal and Child Health (MCH) Coordinators (see Appendix F). Validation requires individuals submitting data to verify that a woman was indeed pregnant at the time of death, or within one year. Validation is designed to reduce the number of "false positive" identifications of pregnancy-associated deaths that result from the pregnancy checkbox being checked in error.

Verification of Eligibility and Record Abstraction

MCH Coordinators (nurses) received an Excel file of potential pregnancy-associated deaths identified through Vital Records data that occurred within their geographic coverage area. The file was posted to a secure server and contained each woman's first and last name, date of birth, date of death, ICD-10 cause of death, location or hospital where the death occurred, and, where available, information related to the delivery of the fetus or infant. A death was considered "verified," and therefore eligible for review, if the MCH Coordinator confirmed a pregnancy within 1 year of death based on medical records or coroner reports. MCH Coordinators then abstracted available medical records and/or coroner reports for all verified pregnancy-associated deaths using an abstraction form developed by Louisiana clinicians and including sections thought to be most relevant to the outcome of each case (See Appendix H).

C. Data Sources and Methodology

Louisiana Pregnancy-Associated Mortality Review

Methodology & Guidelines for Reviewing Maternal Deaths

A multi-disciplinary Maternal Mortality Review Committee reviewed the 65 verified cases (see Appendix D). All committee members signed a confidentiality form prior to receiving de-identified case summaries. Anyone with personal knowledge of a particular case did not share details beyond the record abstraction. A summary of each case was presented by the review committee Chair, followed by open forum, then structured discussions. The committee used the *Building U.S. Capacity to Review and Prevent Maternal Deaths* project's Maternal Mortality Review Information Application's (MMRIA) Committee Decisions Form (version 14) to classify each case (see Appendix E).

Data Limitations

Methods to identify maternal deaths on the Vital Records death certificate can lead to:

- Correct identification of a maternal death.
- Incorrect identification of maternal death due to:
 - Reporting a maternal death in error (false case): a recent pregnancy (*defined as either pregnant at the time of death; pregnant within 42 days of death; or pregnant within 43 days to 1 year prior to death*) on the death certificate that cannot be confirmed through medical records or coroner reports.
 - Failing to identify a true case (missed case): any woman who was pregnant or recently pregnant based on the definitions above at the time of death.

Potential reasons for missed cases include, but are not limited to:

- Early pregnancies that were not known or detected at the time of death.
- Recent miscarriages, other pregnancy terminations, or fetal deaths that were not known or detected at the time of death.
- Failing to identify a live birth or fetal death record associated with a woman who was pregnant or had recently delivered at the time of death.
- Missing or delayed data linkage between maternal deaths and live births for mothers whose infants were adopted.

Classification based on ICD-10 O-codes or the pregnancy checkbox alone, without full record review, are more likely to result in misclassification. The ability to classify these deaths relies heavily on the availability of medical and coroner records. Even a complete history from medical records and/or coroner reports does not guarantee that a determination can be made.

Aggregate data based on counts less than 20 are considered unstable and should be interpreted with caution; these numbers, percentages, ratios or rates may change considerably from one time period to the next.

D. 2017 PAMR Committee

Name	Role and Organization
Alfred Robichaux, MD	Maternal Fetal Medicine, Ochsner Health System
Arwen Podesta, MD	Psychiatry, Addiction Medicine, Podesta Psychiatry, Tulane University
Bridget Gardner, RN	Director, Injury Prevention Program, University Medical Center
Cheri Johnson, RNC-OB, MSN	Perinatal Health and Nursing, Woman’s Hospital
Devin George, MPA	Director, Vital Records, Louisiana Department of Health
Emily Stevens, MSW, MBA	Director of Care Management, Woman’s Hospital
Erin O’Sullivan, MD	Forensic Pathology, Orleans Parish Coroner’s Office
Eva Lessinger, MSW	Director, New Orleans Family Justice Center
Floyd Roberts, MD	Clinical Affairs, Louisiana Hospital Association
Gabriella Pridjian, MD	Maternal Fetal Medicine, Tulane Hospital
Helen Hurst, DNP, RNC, APRN	Director of Nursing, University of Lafayette
Ivory Wilson, MA	Behavioral Health, Louisiana Department of Health
Jane Martin, MD	Maternal and Fetal Medicine Fellow, Ochsner Health System
Jennifer Avegno, MD	Director, City of New Orleans Health Department Emergency Medicine, University Medical Center
Joseph Biggio, MD	Maternal Fetal Medicine, Ochsner Health System
Karli Boggs, MD	Obstetrics and Gynecology, Woman’s Hospital
Kerrie Redmond, BSN, MSN	Louisiana Perinatal Quality Collaborative, Louisiana Department of Health
Latona Giwa, BSN, MPH	Birthmark Doula Collective
Lisa Freeman, JD	Director, Louisiana Highway Safety Commission
Mariah Wineski, MS	Director, LA Coalition Against Domestic Violence
Marshall St. Amant, MD	Maternal Fetal Medicine, Woman’s Hospital
Murtuza “Zee” Ali, MD	Cardiology, Louisiana State University
Nicole Deggins, CNM, MSN, MPH	Director, Sista Midwife
Nikki Greenway, MSN, IBCLC	NOLA Breastfeeding Center

D. 2017 PAMR Committee

Name	Role and Organization
Pooja Mehta, MD, MSHP <i>(Medical Director, 2017-2018)</i>	Obstetrics and Gynecology, Louisiana State University Health Sciences Center New Orleans
Robert Maupin, MD	Maternal Fetal Medicine, Louisiana State University Health Sciences Center New Orleans
Rodney Wise, MD	Medical Officer, AmeriHealth Caritas
Scott Barrilleaux, MD	Maternal Fetal Medicine, Louisiana Commission on Perinatal Care and Prevention of Infant Mortality
Shakira Herbert, MSW, RSW	Child Welfare Programs, Department of Children and Family Services
Stephen Phillipe, MS, EMT-P	State Emergency Medical Services
Veronica Gillispie-Bell, MD, FACOG <i>(Medical Director, current)</i>	Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review

E. MMRIA Committee Decisions Form

MATERNAL MORTALITY REVIEW INFORMATION APPLICATION (MMRIA) Committee Decisions Form - Page 3



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

Additional information about MMRIA can be found at reviewtoaction.org/implement/mmria#collapseThree-mmria

E. MMRIA Committee Decisions Form

MATERNAL MORTALITY REVIEW INFORMATION APPLICATION (MMRIA) Committee Decisions Form - Page 4



CONTRIBUTING FACTOR DESCRIPTIONS

DELAY OR FAILURE TO SEEK CARE

The woman was delayed in seeking or did not access care, treatment, or follow-up care/actions (e.g. missed appointment and did not reschedule).

ADHERENCE TO MEDICAL RECOMMENDATIONS

The woman did not accept medical advice (e.g. refused treatment for religious or other reasons or left the hospital against medical advice).

KNOWLEDGE - LACK OF KNOWLEDGE REGARDING IMPORTANCE OF EVENT OR OF TREATMENT OR FOLLOW-UP

The woman 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).

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).

ENVIRONMENTAL FACTORS

Factors related to weather or terrain (e.g. the advent of a sudden storm leads to a motor vehicle accident).

VIOLENCE AND INTIMATE PARTNER VIOLENCE (IPV)

Physical or emotional abuse other than that perpetrated by intimate partner (e.g. family member or stranger); IPV: Physical or emotional abuse perpetrated by the woman's current or former intimate partner.

MENTAL HEALTH CONDITIONS

The woman carried a diagnosis of a psychiatric disorder. This includes postpartum depression.

SUBSTANCE USE DISORDER - ALCOHOL, ILLICIT/ PRESCRIPTION DRUGS

Substance use disorder is characterized by recurrent use of alcohol and/or drugs causing clinically and functionally significant impairment, such as health problems or disability. The committee may determine that substance use disorder contributed to the death when the disorder directly compromised 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

Woman's use of tobacco directly compromised the woman's health status (e.g. long-term smoking led to underlying chronic lung disease).

CHRONIC DISEASE

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

CHILDHOOD SEXUAL ABUSE/TRAUMA

Woman experienced rape, molestation, or other sexual exploitation during childhood plus persuasion, inducement, or coercion of a child to engage in sexually explicit conduct; or woman experienced physical or emotional abuse or violence other than that related to sexual abuse during childhood.

LACK OF ACCESS/FINANCIAL RESOURCES

System issues, e.g. lack or loss of healthcare insurance or other financial duress, as opposed to woman's noncompliance 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.

UNSTABLE HOUSING

Woman lived "on the street" or in a homeless shelter or lived in transitional or temporary circumstances with family or friends.

SOCIAL SUPPORT/ISOLATION - LACK OF FAMILY/ FRIEND SUPPORT SYSTEM

Social support from family, partner, or friends was lacking, inadequate, and/or dysfunctional (e.g. domestic violence, no one to rely on to ensure appointments were kept).

INADEQUATE OR UNAVAILABLE EQUIPMENT/ TECHNOLOGY

Equipment was missing, unavailable, or not functional, (e.g. absence of blood tubing connector).

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).

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

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.

CLINICAL SKILL/QUALITY OF CARE

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).

INADEQUATE COMMUNITY OUTREACH/RESOURCES

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

INADEQUATE LAW ENFORCEMENT RESPONSE

Law enforcement response was not in a timely manner or was not appropriate or thorough in scope.

LACK OF REFERRAL OR CONSULTATION

Specialists were not consulted or did not provide care; referrals to specialists were not made.

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.

LEGAL

Legal considerations that impacted outcome.

Additional information about MMRIA can be found at reviewtoaction.org/implement/mmria#collapseThree-mmria

F. Regional Maternal and Child Health Coordinators and Mortality Surveillance Team

Region	Staff
Region 1	Rosa Bustamante-Forest, APRN, MPH
Region 2	Kelly Bankston, BSN, RN
Region 3	Nicole Soudelier, BSN, RN
Region 4	Debra Feller, BSN, RN
Region 5	Jade Marler, RN, CIC
Region 6	Lisa Norman, BSN, RN
Region 7	Shelley Ryan-Gray, BSN, RN
Region 8	Sara Dickerson, RN
Region 9	Martha Hennegan, RN
Statewide	Rosaria Trichilo, MPH (current) Robin Gruenfeld, MPH (2014-2018)
Mortality Surveillance Epidemiologist	Jia Benno, MPH
Program Support	Karen Webb

G. Pregnancy Mortality Surveillance System (PMSS) Cause of Death Categorizations

PMSS Cause of Death	Explanation / Included Conditions
Amniotic Fluid Embolism	----
Autoimmune Diseases	Systemic lupus erythematosus, Other collagen vascular diseases/Not otherwise specified
Blood Disorders	Sickle cell anemia, Other hematologic conditions including thrombophilias/Thrombotic thrombocytopenic purpura/Hemolytic uremic syndrome/Not otherwise specified
Cardiomyopathy	Postpartum/peripartum cardiomyopathy, Hypertrophic cardiomyopathy, Other cardiomyopathy/Not otherwise specified
Cardiovascular and Coronary Conditions	Coronary artery disease/Myocardial infarction/Atherosclerotic cardiovascular disease, Pulmonary hypertension, Valvular heart disease, Vascular aneurysm/Dissection, Hypertensive cardiovascular disease, Marfan's syndrome, Conduction defects/Arrhythmias, Vascular malformations outside the head and coronary arteries, Other cardiovascular disease, including congestive heart failure, cardiomegaly, cardiac hypertrophy, cardiac fibrosis, and non-acute myocarditis/Not otherwise specified
Cerebrovascular Accidents	Hemorrhage/thrombosis/aneurysm/malformation, but not secondary to hypertensive disease
Conditions Unique to Pregnancy	e.g., Gestational diabetes, Hyperemesis, Liver disease of pregnancy
Embolism	Thrombotic (non-cerebral), Other embolism/Not otherwise specified
Hemorrhage	Rupture/Laceration/Intra-abdominal bleeding; Placental abruption, Placenta previa, Ruptured ectopic pregnancy, uterine atony/postpartum hemorrhage, Placenta accreta/increta/percreta, due to retained placenta, due to primary disseminated intravascular coagulation, Other hemorrhage/not otherwise specified
Infection	Postpartum genital tract (e.g., of the uterus/pelvis/perineum/necrotizing fasciitis), Sepsis/septic shock, Chorioamnionitis/antepartum infection, Non-pelvic infections (e.g., pneumonia, H1N1, meningitis, HIV), Urinary tract infection, Other infections/Not otherwise specified

G. Pregnancy Mortality Surveillance System (PMSS) Cause of Death Categorizations

PMSS Cause of Death	Explanation / Included Conditions
Liver and Gastrointestinal Conditions	Crohn's disease/Ulcerative colitis, Liver disease/failure/transplant, Other gastrointestinal diseases/Not otherwise specified
Malignancies	Gestational trophoblastic disease, Malignant melanoma, Other malignancies/Not otherwise specified
Metabolic/Endocrine Conditions	Obesity, Diabetes mellitus, Other metabolic/Endocrine disorders/Not otherwise specified
Preeclampsia and Eclampsia	----
Pulmonary Conditions (Excluding Adult Respiratory Distress Syndrome)	Chronic lung disease, Cystic fibrosis, Asthma, Other pulmonary disease/Not otherwise specified
Renal Diseases	----
Seizure Disorders	Epilepsy/seizure disorder, Other neurologic diseases/Not otherwise specified
Unknown	----

PMSS Cause of Death Categorizations available at: reviewtoaction.org/sites/default/files/national-portal-material/Report%20from%20Nine%20MMRCs%20final%20edit.pdf

H. Maternal Death Abstraction Form

Demographic Information	Abstracted Information
ID#	
Maternal Age	
Ethnicity	
Gravidity	
Parity	
Insurance status	
Pregnancy	Abstracted Information
Time between conception and diagnosis of pregnancy	
Number of prenatal appointments	
Medications	
PMH / PSH	
Family History	
Fetal Presentation	
Multiple births	
Placental location	
Pre-pregnancy weight of first booking weight	
Height (if recorded) and calculated BMI	
Lifestyle factors	
Birth attendant	
Termination of Pregnancy (TOP)	
Lowest Hb	
Glucose screen	
Research studies	

H. Maternal Death Abstraction Form

Pregnancy (continued)	Abstracted Information
Complications of pregnancy	
Interventions – early pregnancy (evacuation, laparotomy, hysterectomy, transfusion)	
Interventions – antenatal (transfusion, version)	
If death occurred antepartum; gestational age at death	
Labor / Delivery	Abstracted Information
Type of labor (spontaneous, augmented, induced, no labor, no specified)	
Interventions – intrapartum (instrument delivery, symphysiotomy, cesarean, hysterectomy, transfusion)	
Complications of delivery	
Method of delivery	
Pain relief during labor	
Live birth / still birth	
Puerperium / late maternal stage / general	Abstracted Information
Interventions – post-partum (evacuation, laparotomy, hysterectomy, transfusion, manual removal, return to OT)	
Interventions – other (general anesthetic, epidural, spinal anesthetic, local anesthetic, ICU / CCU, ventilation)	
Cause of death	Abstracted Information
If death occurred post-partum; number of days post-partum at death	
Classification of death (ICD-10)	
Avoidable factors	
<u>Additional comments</u>	

Note: The additional comments section was used to add any information not contained in any other specific section of the form that the nurse deemed relevant to complete case abstraction

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