

# **LOUISIANA PREGNANCY- ASSOCIATED MORTALITY REVIEW**

## **2018 REPORT**

**August 2021**

## Authors:

Katharine Bruce, MPH, Maternal Morbidity and Mortality Epidemiologist, Louisiana Department of Health (LDH)-Office of Public Health (OPH), Bureau of Family Health (BFH)

Rosaria Trichilo, MPH, Statewide Surveillance Manager, LDH-OPH, BFH

Veronica Gillispie-Bell, MD, Medical Director, Louisiana Perinatal Quality Collaborative and Pregnancy-Associated Mortality Review (PAMR)

Rachel Hyde, BSN, RN, MPH, PAMR Coordinator, LDH-OPH, BFH

Andrea Outhuse, MPH, Health Education and Communications Specialist, LDH-OPH, BFH

## Contributors:

Lyn Kieltyka, PhD, MPH, State MCH Epidemiologist LDH-OPH, BFH

Amy Zapata, MPH, Director, LDH-OPH, BFH

Jane Herwehe, MPH, Data to Action Team Lead, LDH-OPH, BFH

Karis Schoellmann, MPH, Communications Team Manager, LDH-OPH, BFH

Dionka Pierce, MPH, Program Manager, Data to Action Team, LDH-OPH, BFH

## Acknowledgements:

This report was made possible through detailed review of maternal death cases by a volunteer review committee. We are deeply grateful to the members of this review committee for their dedication, insight and expertise. We acknowledge the Louisiana Vital Records Office for its collaboration in providing the data used to identify cases of maternal deaths. We thank the health systems, healthcare providers and coroners who provided the records that allowed meaningful review to occur.

We recognize the Bureau of Family Health Regional Maternal and Child Health Coordinators who abstracted these medical records with care. We also thank our national partners at the U.S. Centers for Disease Control and Prevention's (CDC) Division of Reproductive Health and the Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) program. We acknowledge the Maternal and Child Health Epidemiology Program, Field Support Branch, Division of Reproductive Health, National Center for Chronic Disease Prevention and Public Health Promotion, and CDC for analytic support and contribution to this report.

Funding for the Louisiana Pregnancy-Associated Mortality Review process is provided through the federal Title V Maternal and Child Health (MCH) Block Grant and the CDC ERASE MM Initiative under Grant #NU58DP006683-02. Authorization for the Louisiana Pregnancy-Associated Mortality Review is provided through the Louisiana Commission on Perinatal Care and Prevention of Infant Mortality.

Finally, we honor the birthing people 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.

# Table of Contents

Key Definitions.....	3
Introduction.....	4
Executive Summary.....	5 – 6
<b>From Data to Review</b>	<b>7</b>
Verifying and Confirming Maternal Deaths: Review Process and Criteria.....	8
<b>Key Findings</b>	<b>9</b>
Snapshot of Pregnancy-Associated Deaths.....	10
Racial & Ethnic Disparities in Pregnancy-Associated Mortality.....	11-12
Maternal Demographics: Insurance Type and Age.....	13
Understanding Pregnancy-Associated Deaths: Timing of Deaths.....	14
Understanding Pregnancy-Associated Deaths: Medical and Autopsy Records Available for Review.....	15
<b>Pregnancy-Related Deaths</b>	<b>16-17</b>
<b>Pregnancy-Associated, but Not Related Deaths</b>	<b>18-19</b>
<b>Unable to Determine Pregnancy-Relatedness</b>	<b>20-21</b>
<b>From Review to Action</b>	<b>22</b>
PAMR Committee Recommendations: Overview.....	23 – 25
Systems Recommendations.....	26 – 28
Clinical Quality Improvement Recommendations.....	29 – 30
Social Support Recommendations.....	31
Policy Recommendations.....	32 – 33
Public Health Research and Communications .....	34
Current Efforts to Reduce Maternal Mortality.....	35-37
<b>Appendices and References</b>	<b>38</b>
Appendix A: Acronyms.....	39
Appendix B: History.....	40 – 41
Appendix C: Data Sources and Methodology.....	42 – 43
Appendix D: 2018 PAMR Committee.....	44 – 45
Appendix E: MMRIA Committee Decisions Form.....	46 – 49
Appendix F: Regional Maternal and Child Health Coordinators and Mortality Surveillance Team.....	50
Appendix G: Pregnancy Mortality Surveillance System (PMSS) Cause of Death Categorizations.....	51 – 52
Appendix H: Data Abstraction Guide.....	53 – 55
References.....	56 – 58

# Key Definitions

The following terms will be used throughout the report. All definitions come from the CDC, in collaboration with key partners in maternal mortality prevention, including the Association of Maternal and Child Health Programs (AMCHP).<sup>1</sup>

## Pregnancy-Associated Deaths<sup>1</sup>

A death 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	Pregnancy-Associated, but Not Related	Pregnancy-Associated, but Unable to Determine Relatedness
<p>A death 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>A death during pregnancy pregnancy or within one year of the end of pregnancy from a cause that is <b>not</b> 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, 2018

Maternal mortality is an indicator of healthcare quality and gender equity, nationally and internationally.<sup>2,3</sup> Studying maternal deaths can help illuminate health and social challenges that people of reproductive age experience, and systemic responsiveness to these challenges.<sup>2,3</sup> In the United States, maternal mortality is higher than any other developed country, and significant racial disparities exist.<sup>4</sup>

In 2010, LDH-OPH's BFH established the Louisiana Pregnancy-Associated Mortality Review (hereafter referred to as "PAMR") under the authorization of the Louisiana Commission on Perinatal Care and Prevention of Infant Mortality to understand and address maternal mortality in Louisiana. PAMR is intended to serve as a strong, reliable and timely maternal mortality surveillance system in order to inform, guide and evaluate strategies to prevent maternal mortality and unexpected life-threatening complications.

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. 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 December 2019 to December 2020 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 confirmed to have occurred *during pregnancy or within 1 year* of the end of a pregnancy. Recognizing that people who give birth may not identify as female, the gender-neutral term "birthing person" will be used throughout this report.

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.<sup>5</sup> For the purposes of this report, maternal mortality rate and ratio are used interchangeably. 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 years).
3. The data source for the identified cases (e.g. cases drawn only from vital records, versus those based on a committee review).

### Note on Data Comparisons

Findings from this report are not comparable to findings from the Louisiana 2011-2016 Maternal Mortality Review Report.<sup>6</sup> 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, and the 2017 PAMR Report, compile findings from a comprehensive review of **all pregnancy-associated deaths that occurred during pregnancy or within one year of the end of pregnancy** in 2018 and 2017, respectively. The 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 reports are discouraged and will likely be invalid. While the 2017 and 2018 reports used the same methodology, two years of data do not indicate a trend.

# Executive Summary

## Maternal mortality in Louisiana, 2018

### About Louisiana Pregnancy-Associated Mortality Review

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). 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 pregnancy at or within one year of death, then medical records and/or coroner reports were used to verify pregnancy at or near the time of death. After the verification process, Maternal and Child Health Coordinators abstracted and prepared a narrative for case review, and a review committee conducted in-depth review of those cases.

This report summarizes PAMR's review of 2018 pregnancy-associated deaths and resulting recommendations for prevention.

### Summary of Key Findings

1. The committee reviewed 55 confirmed pregnancy-associated deaths of Louisiana residents which occurred in-state in 2018.
  - **12 deaths were pregnancy-related.** The top cause of death in this category was **hemorrhage**.
  - **35 deaths were pregnancy-associated, but not related.** The top causes of death in this category were **accidental overdose**.
  - **8 deaths were pregnancy-associated, but unable to determine relatedness.** The top cause of death in this category was **unknown**.
2. The overall rate of all **pregnancy-associated** deaths in Louisiana was **92.5 per 100,000 births**. The rate of **pregnancy-related** deaths in Louisiana was **20.2 per 100,000 births**. The rate of **pregnancy-associated but not related** deaths in Louisiana was **58.9 per 100,000 births**.
3. For all **pregnancy-associated** deaths, **Black birthing people were more than twice as likely (2.1 times) to die as White birthing people in Louisiana**. This disparity is more prominent in pregnancy-related deaths.
  - Among **pregnancy-related** deaths, over **3 Black birthing persons (3.2)** in Louisiana died for every **1 White birthing person**.
  - Among **pregnancy-associated, but not related** deaths, almost **2 Black birthing persons (1.7)** in Louisiana died for every **1 White birthing person**.
4. Birthing people **ages 30-34 years and older were at an increased risk of pregnancy-related and pregnancy-associated, but not related death**. Birthing people **less than 25 years old were at an increased risk of pregnancy-associated, but unable to determine relatedness death**.
5. The committee deemed **67% of pregnancy-related deaths to be potentially preventable**. **83% of pregnancy-associated, but not related deaths** and **75% of pregnancy-associated, but unable to determine relatedness deaths** were deemed to be potentially preventable.

# Executive Summary

## Maternal mortality in Louisiana, 2018

### Summary of Key Findings (continued)

6. The committee identified contributing factors to deaths across the following levels: patient/family, provider, facility, systems and community. Contributing factors are not mutually exclusive — a death may have more than one of the following factors. Please refer to Appendix E for complete definitions of each level.
  - **Provider and facility level factors were the most commonly-identified contributing factors to *pregnancy-related* deaths**, including issues related to policies and procedures.
  - **System and patient/family level factors were the most commonly-identified contributing factors to *pregnancy-associated, but not related* deaths**. Systems level issues were most frequently related to policies and procedures, while patient/family level issues were most frequently related to Substance Use Disorder (SUD) and lack of adherence to motor vehicle safety recommendations.
  - **System level factors related to policies and procedures were the most commonly-identified contributing factors to *pregnancy-associated, but unable to determine relatedness* deaths**. These included violence, access/financial factors, communication, continuity of care/care coordination, lack of referrals and inadequate assessment.
7. **Autopsies were performed in about two-thirds (60%) 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 55 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, **nine overarching needs or themes emerged consistently throughout review**:

- **Improve care coordination before, during and after pregnancy**, including support for continued healthcare during the fourth trimester, the transitional period between birth and 3 months postpartum.
- **Ensure pregnant people receive the appropriate level of care** based on the complexity and severity (acuity) of their medical issues, and risk factors present.
- **Expand the obstetric healthcare workforce** to include cardiologists, psychiatric and addiction specialists.
- **Address racial and cultural bias** across the network of care that serves pregnant and postpartum people (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).
- **Improve and expand identification of and treatment for substance use during pregnancy**.
- **Promote community health through social services** that address social determinants of health and violence prevention.
- **Increase access to data and medical records** for committee review by implementing legislative policy.
- **Contribute to the public health evidence base** to increase capacity to understand and address pregnancy-associated mortality.
- **Prevent motor vehicle-related Injury**, through cross-cutting prevention and safety measures.



# From Data to Review

## Maternal Mortality in Louisiana, 2018



# 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 2018, 88 potential pregnancy-associated deaths were identified using Vital Records data alone. Bureau of Family Health Regional Maternal and Child Health (MCH) Coordinators verified that 55 of the 88 identified deaths had a documented pregnancy at the time of death or within one year of death. The remaining 33 deaths were classified as false cases and not considered eligible for review. The committee determined that **12 of the 55 confirmed deaths were pregnancy-related, 35 were pregnancy-associated, but not related, and 8 were pregnancy-associated, but unable to determine relatedness.** The committee used the Centers for Disease Control and Prevention (CDC)'s Maternal Mortality Review project's Maternal Mortality Review Information Application's (MMRIA) Committee Decisions Form to classify each case (see Appendix E).

### 88 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 one year of death 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 MCH Coordinators

### 33 False Cases

These cases met the definition of a potential pregnancy-associated death, but the MCH Coordinators found evidence that the decedent was not pregnant at the time of death or within the year prior to death, through medical records, coroner reports, obituaries and/or media. There was no record of a pregnancy within one year of the death. See "Data Limitations" in Appendix C for more details.

These cases were ineligible for further review

STOP

### 55 Confirmed Deaths

#### Pregnancy-associated deaths met the below criteria:

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

Cases abstracted by regional MCH Coordinators

### Cases Reviewed by Committee

#### Committee determinations:

- 12 pregnancy-related cases
- 35 pregnancy-associated, but not related cases
- 8 pregnancy-associated, but unable to determine relatedness cases



# Key Findings

## Maternal Mortality in Louisiana, 2018

# Snapshot of Pregnancy-Associated Deaths

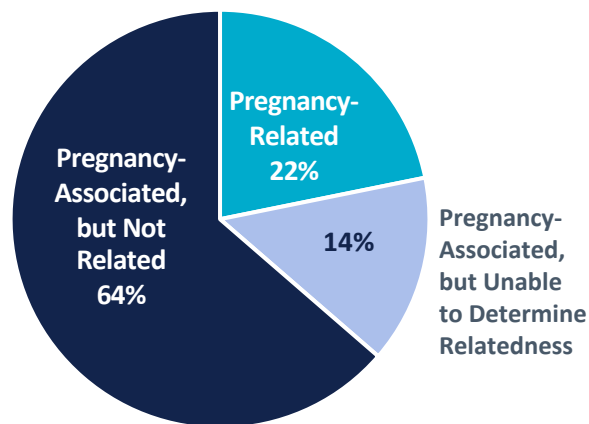
In 2018, Louisiana had 55 confirmed pregnancy-associated deaths. This represents a pregnancy-associated mortality ratio of 92.5 deaths per 100,000 births.

## Breakdown of Pregnancy-Relatedness

Of the 55 deaths reviewed, the committee determined:

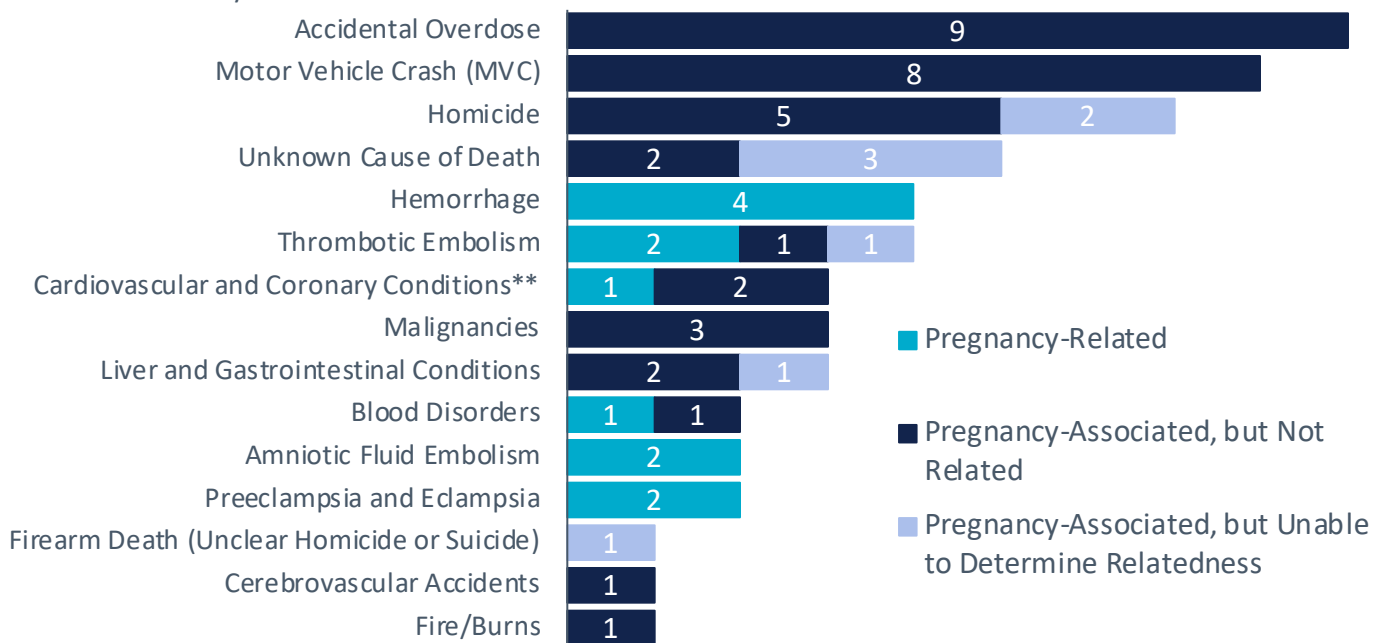
- 12 deaths (22%) were classified as **pregnancy-related**.\*
- 35 deaths (64%) were classified as **pregnancy-associated, but not related**.\*
- 8 deaths (14%) were classified as **pregnancy-associated, but the committee was unable to determine relatedness**.\*

\*See page 3 for definitions



## Causes of Death

As determined by the committee



\*\*Includes PMSS codes 90.1-90.9. For a list of specific causes included, refer to Appendix E.

## Key Points

- Nearly 1 in 4 (22%) deaths were determined to be pregnancy-related.
- **Pregnancy-associated, but not related** deaths accounted for the majority of deaths (64%).
- The leading causes of pregnancy-associated deaths were accidental overdose (16%), MVC (15%) and homicide (13%).

# Racial & Ethnic Disparities

## Pregnancy-associated deaths

### Pregnancy-Associated Mortality by Race

37% of all births in Louisiana in 2018 were to non-Hispanic Black birthing people.<sup>7</sup> However, non-Hispanic Black birthing people accounted for 58% of all pregnancy-associated deaths that occurred in 2018.

Distribution of All Births

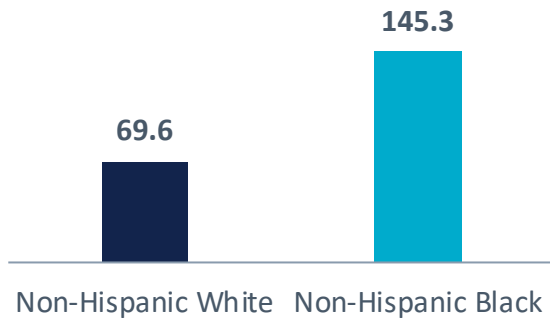


Distribution of Maternal Deaths

### Racial & Ethnic Disparities in Pregnancy-Associated Deaths

The overall rate of pregnancy-associated mortality deaths in Louisiana was 92.5 per 100,000 births.

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



More than **2 Black birthing persons** in Louisiana died...



...for every **1 White birthing person**



### Key Points

- Non-Hispanic Black birthing people represent a disproportionate number of deaths. At the root of racial disparities in maternal mortality are implicit bias and systemic and structural racism. 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 child care, poverty, and racism in policies, practices and systems.<sup>8,9,10, 11, 12</sup>

# Racial & Ethnic Disparities

## Pregnancy-related deaths and pregnancy-associated, but not related deaths

Substantial racial & ethnic disparities exist among all pregnancy-associated deaths. These disparities are **more prominent in pregnancy-related deaths**.

### Disparities in Pregnancy-Related Deaths

The overall rate of **pregnancy-related** deaths in Louisiana was 20.2 per 100,000 births.

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



Over **3 Black birthing persons** in Louisiana died...



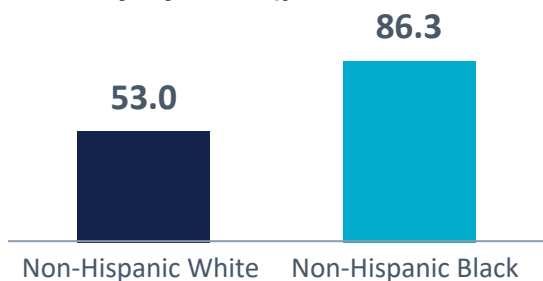
...for every **1 White birthing person**



### Disparities in Pregnancy-Associated, but Not Related Deaths

The overall rate of **pregnancy-associated, but not related** deaths in Louisiana was 58.9 per 100,000 births.

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



About **1.5 Black birthing persons** in Louisiana died...



...for every **1 White birthing person**



### Key Points

- For **pregnancy-associated, but not related** deaths, Black birthing persons died at almost twice (1.6 times) the rate of White birthing persons. Homicide was a top cause.
- For **pregnancy-related** deaths, Black birthing persons died at more than three (3.2) times the rate of White birthing persons. The top causes of **pregnancy-related** deaths among Black birthing persons were embolism and hemorrhage.
- Implicit bias and systemic racism drive racial and ethnic disparities in health and healthcare.<sup>11</sup> 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.<sup>9, 10, 11</sup>

# Maternal Demographics

## Insurance type and age

### Insurance Type

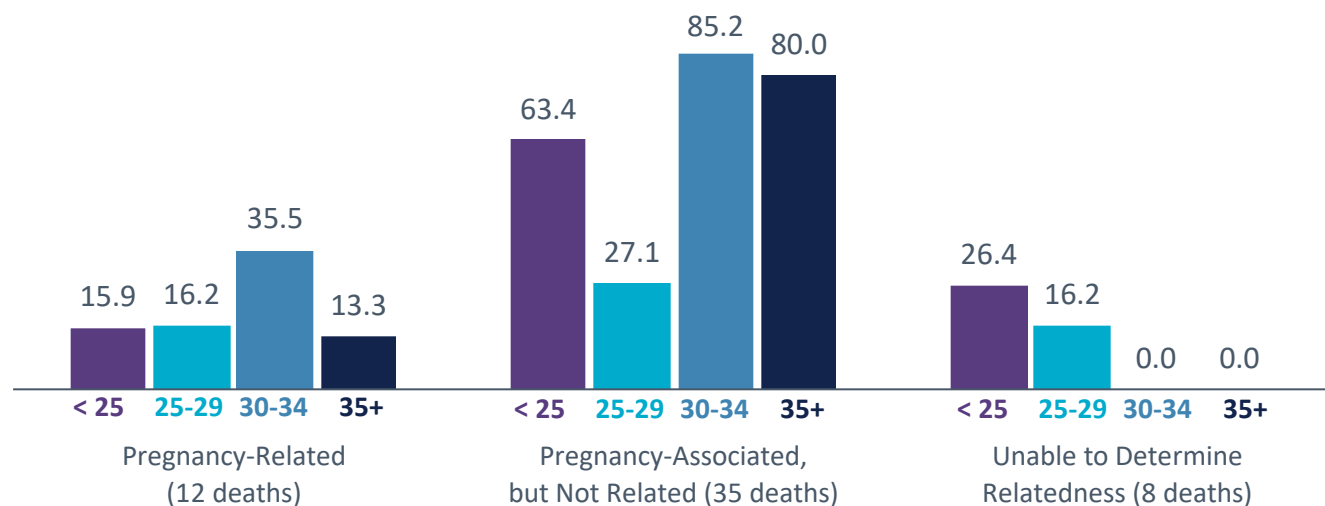
62% of birthing persons who died during or within a year of pregnancy had health insurance through **Medicaid**. The majority of Louisiana birthing persons (61%) who were pregnant or gave birth in 2018 had health insurance through Medicaid.<sup>13</sup>



### Mortality Ratios by Age

Mortality ratios below are deaths per 100,000 births.

- Birthing persons ages **30 to 34 years** had the **highest rates of pregnancy-related death**.
- Birthing persons ages **30 years and older** had the **highest rates of pregnancy-associated, but not related death**.
- Birthing persons **less than 25 years old** had the **highest rates of 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.
- The top cause of death for **pregnancy-associated, but not related** deaths among birthing persons **over 30 years old** was unintentional overdose.
- The top causes of **pregnancy-related** deaths for birthing persons **over age 30** were preeclampsia, eclampsia and amniotic fluid embolism.

# Understanding Pregnancy-Associated Deaths

## Timing of deaths

The majority (91%) of **pregnancy-related deaths** occurred during or within 42 days of pregnancy.

### Timing of *pregnancy-related* deaths



58%

While pregnant



33%

Within 42 days of pregnancy



9%

43 days to 1 year after pregnancy

- There were **12 pregnancy-related** deaths.
- Deaths occurring **during pregnancy** were most frequently due to **hemorrhage**.
- Deaths occurring **within 42 days of pregnancy** were most frequently due to **preeclampsia and eclampsia**.

### Timing of *pregnancy-associated, but not related* deaths



14%

While pregnant



3%

Within 42 days of pregnancy



83%

43 days to 1 year after pregnancy

- There were **35 pregnancy-associated, but not related** deaths.
- Deaths occurring **during pregnancy** were most frequently due to **motor vehicle crashes**.
- Deaths occurring **43 days to 1 year after pregnancy** were most frequently due to **unintentional overdose**.

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



50%

While pregnant



12%

Within 42 days of pregnancy



38%

43 days to 1 year after pregnancy

- There were **8 pregnancy-associated, but unable to determine relatedness** deaths.
- Deaths occurring **during pregnancy** were most frequently due to **homicide**.
- Deaths occurring **43 days to 1 year after pregnancy** were most frequently due to **unknown** causes.

## Key Points

- The majority (91%) of **pregnancy-related** deaths occurred during or within 42 days of pregnancy.
- 88% of **pregnancy-associated, but not related** deaths occurred 43 days to 1 year after pregnancy and were most frequently due to unintentional overdoses.
- Half (50%) of **pregnancy associated, but unable to determine relatedness** deaths occurred during pregnancy and were most frequently due to homicide.

# Understanding Pregnancy-Associated Deaths

## Medical and autopsy records available for review

About **1 in 3** of cases were **missing at least some\*** records crucial to case review.

**Autopsies** were performed in about **two-thirds (60%)** of cases.

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

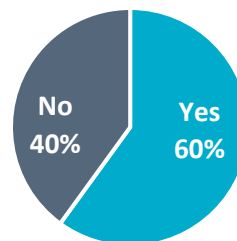
Access to complete records is critical to determine factors that contributed to pregnancy-associated deaths, and to determine their preventability. **36 out of 55 cases (65%)** were determined by the committee to have **complete records available** for review.

**\*16% (9 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 60% 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.



# Pregnancy-Related Deaths

12 deaths

The top underlying causes of pregnancy-related deaths were hemorrhage (4 deaths), preeclampsia and eclampsia (2 deaths), thrombotic embolism (2 deaths), and amniotic fluid embolism (2 deaths).

A pregnancy-related death refers to the death of a birthing person 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 Preventability" cases were considered preventable, but the degree of preventability was unable to be determined. None of the pregnancy-related cases fell into the "Unable to Determine" category.

**67% of pregnancy-related deaths were considered potentially preventable.**

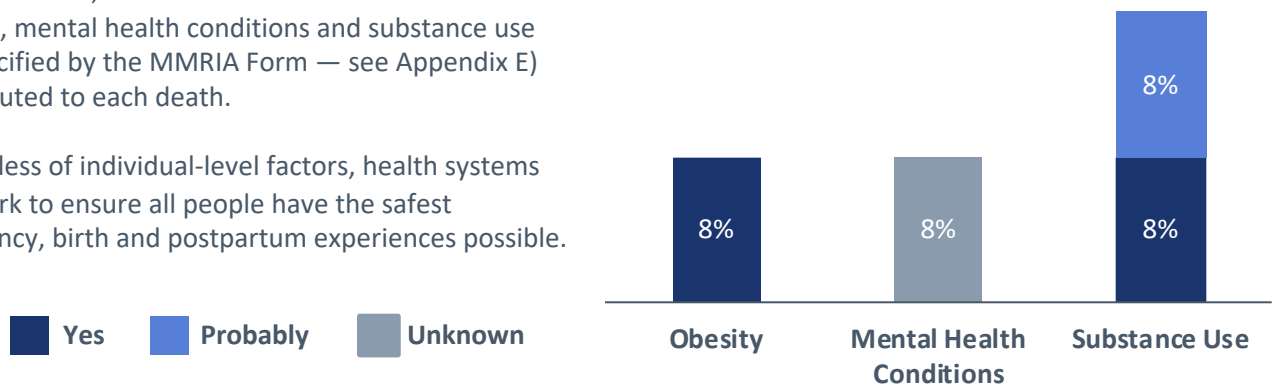


\*Any chance to alter the outcome includes the MMRIA Committee Decisions Form categories: "Some Chance," "Good Chance" and "Unable to Determine."

## Obesity, Mental Health Conditions and Substance Use

For each death, the committee determined whether obesity, mental health conditions and substance use (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

- The Review Committee determined the majority of pregnancy-related deaths were preventable, a key assessment to assist in prioritizing future areas of intervention and action.

# Contributing Factors

## Among pregnancy-related deaths

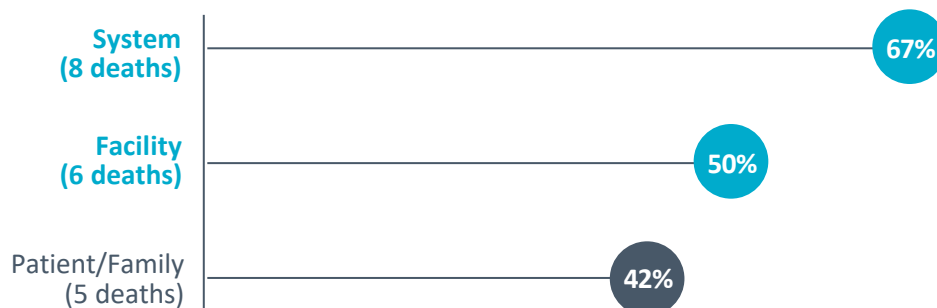
### System and facility level factors were the most commonly-identified contributing factors to pregnancy-related deaths.

Review committee members identified contributing factors to *pregnancy-related* deaths using the MMRIA Committee Decisions Form (see Appendix E). Contributing factors included any behavior or systems issue which increased the severity of morbidity or the likelihood of mortality.<sup>14</sup> 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 E for more details). Contributing factors are not mutually exclusive — a death may have more than one of the following factors.

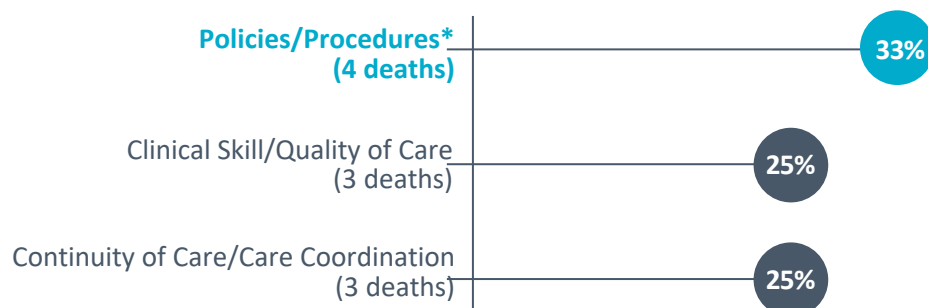
### Top Contributing Factors by Level

In **two-thirds** (67%) of pregnancy-related deaths, facility level factors contributed to the death.



### Top Contributing Factors: System and Facility Level

In **one-third** (33%) of pregnancy-related deaths, **policies and procedures** influenced the death.



\*Examples of policies and procedures that contributed to these deaths included: patient needed a higher level of care than they received; emergency room (ER) physician was unaware patient was recently pregnant, ER did not consult obstetrics for an obstetric issue; facilities lack policies/procedures to identify ectopic pregnancies; a patient may not have received information on postpartum warning signs of adverse outcomes.

# Pregnancy-Associated, but Not Related Deaths

35 deaths

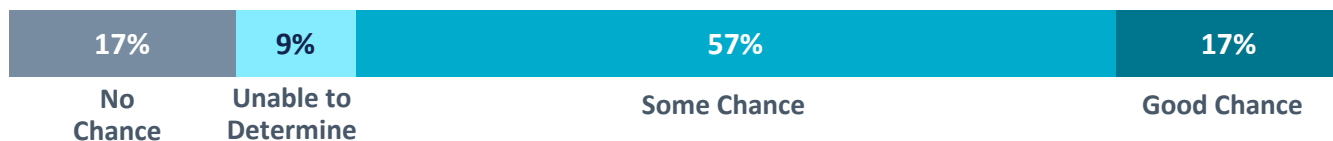
The **top underlying causes** of pregnancy-associated, but not related deaths were **unintentional overdose** (9 deaths), **motor vehicle crash** (8 deaths) and **homicide** (5 deaths).

A **pregnancy-associated, but not related** death refers to the death of a birthing person 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.**

**83% of pregnancy-associated, but not related deaths were considered potentially preventable.**



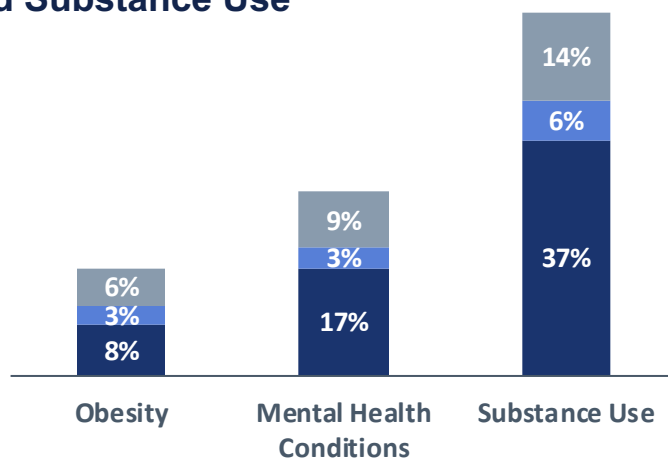
\*Any chance to alter the outcome includes the MMRIA Committee Decisions Form categories: “Some Chance,” “Good Chance” and “Unable to Determine.”

## Obesity, Mental Health Conditions and Substance Use

For each death, the committee determined whether obesity, mental health conditions and substance use (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



## Key Points

- Overdose and motor vehicle crashes were the leading causes of pregnancy-associated, but not related death.
- Substance use contributed or probably contributed to more than 1 in 3 (37%) pregnancy-associated, but not related deaths. Universal screening for mental health issues and substance use disorders is recommended as a first step to identify birthing persons who need treatment and services.<sup>15</sup>

# Contributing Factors

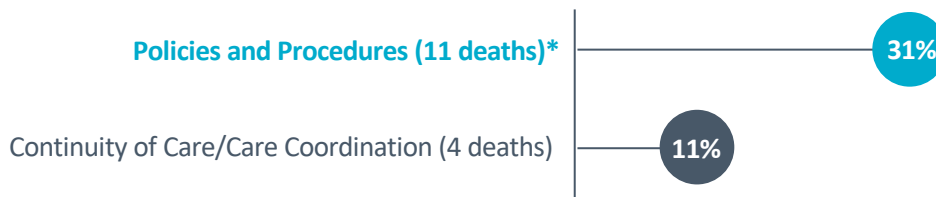
## Among pregnancy-associated, but not related deaths

**System and patient/family level factors were the most commonly-identified contributing factors to these deaths.**

*Completeness of medical records received and availability of relevant information limited the review committee's ability to assess contributing factors among some of these cases.*

### Top Contributing Factors: System Level

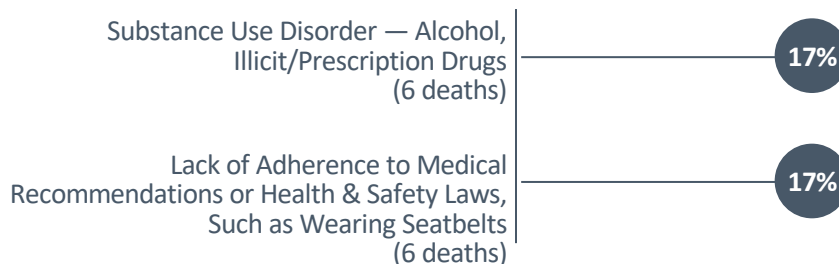
Contributing factors are not mutually exclusive — a death may have more than one of the following top contributing factors. In almost **one third (31%)** of deaths, barriers and limitations related to systems issues, lack of resources, and policies and procedures contributed to the death.



\*Examples of policies and procedures that contributed to these deaths included: correctional facilities may not have adequate resources and procedures to address substance use and mental health issues; vehicles could benefit from enhanced safety measures including speed controls and improved warning systems.

### Top Contributing Factors: Patient/Family Level

Contributing factors are not mutually exclusive — a death may have more than one of the following factors. In almost **one in five (17%)** of deaths, the birthing person or someone in their immediate family had a **Substance Use Disorder (SUD)** that influenced the death. **Lack of adherence to motor vehicle safety recommendations** also contributed to **17%** of deaths.



### Key Points

- Screening for and treatment of SUD could prevent a significant proportion of deaths.<sup>16</sup>
- Patient education around health and safety issues, such as wearing seatbelts, plays a role in preventing pregnancy-associated, but not related deaths. Education must be appropriate for all health literacy levels.
- Addressing barriers to adequate care in correctional facilities to address substance use and mental health can contribute to improving community health outcomes.<sup>17</sup>

# Unable to Determine Pregnancy-Relatedness

8 deaths

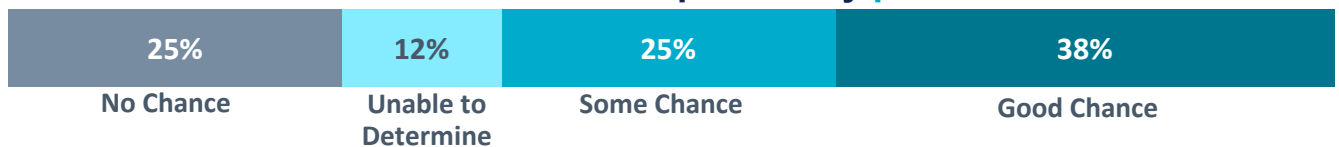
The **top underlying causes** of pregnancy-associated, but unable to determine relatedness deaths were **unknown** (3 deaths) and **homicide** (2 deaths).

For 8 out of 55 pregnancy-associated deaths, the committee was unable to determine if the cause of death was related to pregnancy. It is unknown if the death occurred due to a pregnancy complication, a 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.**

**75% of pregnancy-associated, but unable to determine relatedness deaths were considered potentially preventable.**



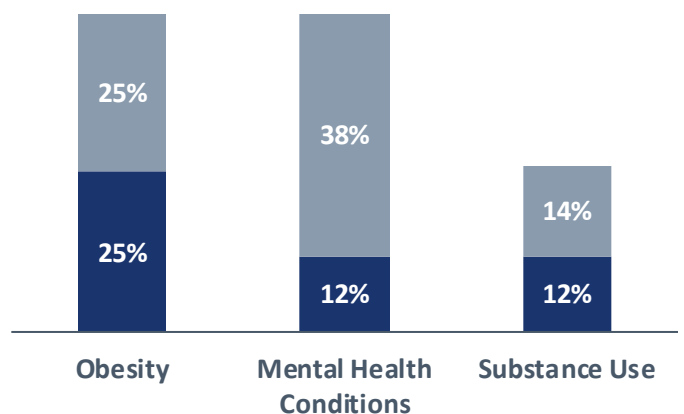
\*Any chance to alter the outcome includes the MMRIA Committee Decisions Form categories: “Some Chance,” “Good Chance” and “Unable to Determine.”

## Obesity, Mental Health Conditions and Substance Use

For each death, the committee determined whether obesity, mental health conditions and substance use (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



## Key Points

- One quarter (25%) of pregnancy-associated, but unable to determine pregnancy-relatedness deaths were homicides. Other known causes of death included thrombotic embolism, liver and gastrointestinal conditions, and a firearm incident in which the intent was unclear.

# Contributing Factors

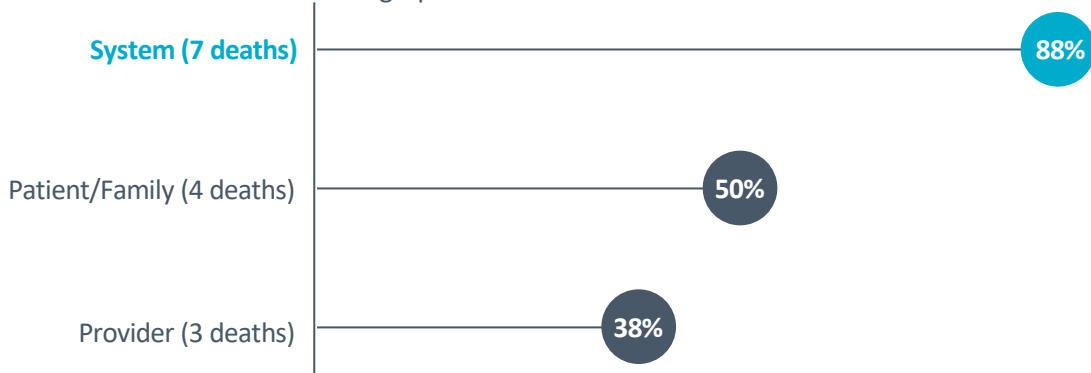
Among pregnancy-associated, but unable to determine relatedness deaths

**System, patient/family, and provider level factors were the most commonly-identified contributing factors to these deaths.**

*Completeness of medical records received and availability of relevant information limited the review committee's ability to assess contributing factors among some of these cases.*

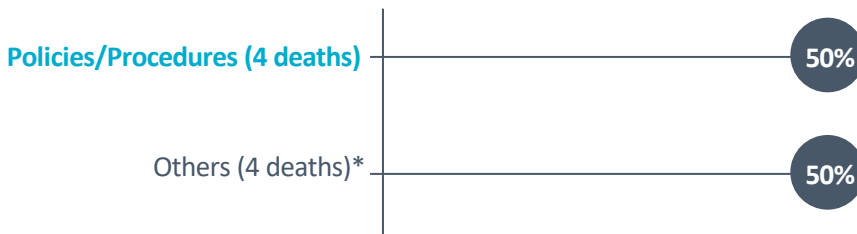
## Top Contributing Factors by Level

Contributing factors are not mutually exclusive — a death may have more than one of the following top contributing factors. In **88%** of these deaths, **system level factors** contributed to the death. The **system level factors** are broken down further in the next graph.



## Top Contributing Factors: System Level

In **half (50%)** of these deaths, issues with **policies and procedures** were identified as a contributing factor because lack of records made available to the abstractor and cases for which no autopsy was conducted meant that the committee was unable to identify other contributing factors.



\*Other contributing factors included violence, access/financial factors, communication, continuity of care/care coordination, lack of referrals and inadequate assessment.

## Key Points

- Efforts to prevent these deaths can occur on several levels, including the patient/family, provider and system level.
- Efforts to improve access to records and available information could improve the committee's ability to determine contributing factors for pregnancy-associated, but unable to determine relatedness cases.

# From Review to Action

## Maternal Mortality in Louisiana, 2018

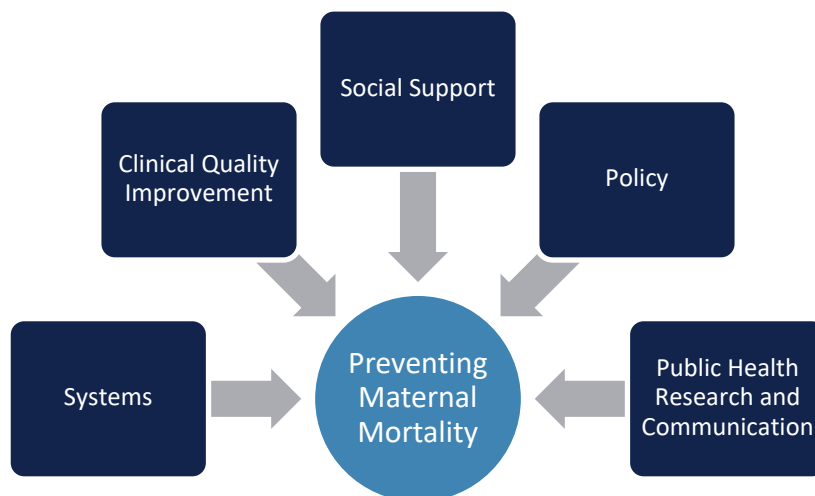
# PAMR Committee Recommendations

## Overview

Louisiana’s PAMR Committee generated the following recommendations through its review of the 2018 maternal deaths. Recommendations represent committee consensus following a critical review of each of the 55 deaths. Committee reviews were guided by the 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 55 deaths.

Recommendations are categorized by point of intervention: systems, clinical quality improvement, social support, policy, and public health research and communication. 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. For the purposes of this report, we define the above mentioned points of intervention as:

- **Systems:** Public, private and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction, including but not limited to insurance payors, hospital systems, and state and local government agencies.
- **Clinical Quality Improvement:** Individuals involved in the development of processes that are used to systematically improve the ways care is delivered to patients, based on evidence of best practice. These include facilities, providers and other allied health professionals and organizations.
- **Social Support:** Individuals and agencies aimed at improving the welfare and resilience of communities. These include but are not limited to community-based organizations, social services and schools.
- **Policy:** Entities responsible for developing federal, state, local and agency-wide policies and legislation. These include but are not limited to federal, state and local legislators, insurance payors, correctional facilities and professional licensing boards.
- **Public Health Research and Communication:** Professionals and agencies focused on investigating drivers of disease and injury and promoting healthy behaviors and environments at the population level. These include but are not limited to public safety institutions, public health researchers and media campaigns.





# PAMR Committee Recommendations

## Overview

Nine overarching needs or themes emerged consistently throughout reviews:



**Improve care coordination before, during and after pregnancy, including support for continued healthcare during the fourth trimester.** Care coordination is defined 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.”<sup>18</sup> In review of maternal deaths in Louisiana, improved care coordination could have prevented death in several cases. In some instances, referrals are made to other providers but there is no closed loop follow-up. Existing medical conditions and social determinants of health can impact pregnancy outcomes, which means that birthing people 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 to reduce preterm births,<sup>19</sup> improve use of perinatal services<sup>20</sup> and improve contraception use for the purpose of healthy birth spacing.<sup>21</sup> The fourth trimester, the 12-week period following birth, is a critical period of time for birthing persons and infants. Services and supports should be ongoing, patient-centered and tailored to an individual’s needs in order to optimize care and health outcomes.<sup>22</sup>



**Ensure pregnant people 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 to occur 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).<sup>23</sup> System changes are needed to ensure facilities have appropriate resources based on their level of care. 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. To improve readiness, birthing facilities should implement 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.<sup>24</sup> Currently Louisiana’s levels of maternal care are not consistent with national guidelines. National guidelines recommend personnel and resources at Level 3 facilities not required by statute for Louisiana maternal levels of care.



**Expand the obstetric healthcare workforce to include cardiologists, psychiatric and addiction specialists.** When left untreated, cardiac, psychiatric and SUD can negatively impact maternal and child health.<sup>25, 26</sup> 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.



**Improve and expand identification of and treatment for substance use during pregnancy.** 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,<sup>27</sup> case reviews indicated that birthing people with SUD did not receive this course of treatment.

# PAMR Committee Recommendations

## Overview



**Address racial and cultural bias across the network of care that serves pregnant and postpartum people. This includes hospitals, Emergency Medical Services, physician offices and community clinics, as well as the institutions that influence or coordinate with those network such as public health agencies, Medicaid and coroners.** Implicit bias and structural racism contribute to maternal mortality.<sup>28</sup> 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 birthing people, including but not limited to public health agencies, health insurance providers/payors and legislative or policymaking bodies.



**Promote community health and social services by addressing social determinants of health and violence prevention.** Current research shows that social determinants of health (including the social, economic and healthcare access for both the birthing person and their community) impact maternal mortality and shape health inequities.<sup>27</sup> Pregnancy-associated deaths from violence and overdose are the leading causes of death that require medical and public health attention. Addressing and improving social determinants of health is a central strategy for improving maternal safety, quality and equity.



**Increase access to data and medical records for the PAMR committee review.** Data sharing across and within systems and agencies for the purpose of maternal mortality review improves the review committee's access to needed records (e.g. records related to or from prenatal care, mental health, Medicaid, etc.). Access to and the availability of complete records, including autopsies, are vital to this process and allow for a more complete understanding of deaths. Improved understanding of the causes and circumstances surrounding pregnancy-associated deaths directs quality improvement efforts and ensures effective resource allocation to prevention efforts.



**Contribute to the public health evidence base to increase capacity and better understand and address pregnancy-associated mortality.** Taking an evidence-based approach to reviewing pregnancy-associated deaths can result in higher-quality information that can inform best practices, prevention programs, and create more efficient use of resources to reduce maternal deaths. It is imperative that stakeholders review and address the current state of evidence-based maternal health policies, clinical programs and data-driven solutions that have been shown to improve maternal health outcomes. Public health agencies, academia, and other researchers should analyze certain key drivers in maternal health outcomes.



**Prevent Motor Vehicle-Related Injury.** The committee found lack of seatbelt use to be a contributing factor for multiple deaths. Other contributing factors identified in case review were related to impaired driving, pedestrian safety and built environment. Reducing motor vehicle-related injury for pregnant and postpartum people should involve a combined approach of increasing awareness of correct seat belt positioning and use, safe driving standards, and improved pedestrian and road infrastructure.<sup>29</sup> Motor Vehicle Crashes (MVC) were the second leading cause of death among pregnancy-associated deaths in Louisiana during 2018.

# PAMR Committee Recommendations

## Systems

### Systems



#### Improve care coordination

- Facilities should provide patient navigators or social workers to improve care coordination that ensures patients have the resources (financial, social and transportation) they need before leaving the hospital, especially to address issues related to mental health and interpersonal violence (IPV). Those patient navigators should also ensure closed loop referrals.
- Emergency Departments and Urgent Care facilities should integrate social workers, case managers or community health workers into their staff to assist patients with follow up and referrals to ensure continuity of care.
- Insurance payors should provide birthing persons with patient navigators beyond 6 weeks postpartum to improve care coordination. This will ensure all postpartum birthing persons receive ongoing primary care, which is especially important for those with identified comorbidities.
- State government entities should develop a single social service system that allows pregnant people to cross enroll in multiple services through a single application process. These entities should assess the extent to which cross enrollment efforts are already underway and barriers for successfully implementing enrollment to multiple social services.
- State health departments should develop a universal referral system (such as Unite Us<sup>30</sup>) to bridge community resources including WIC, mental health, Healthy Start and others, to improve continuity of care between services. Social service agencies should have a representative who follows up with patients to ensure closed loop referrals.



#### Improve systems of care and ensure appropriate level of care

- Facilities and health systems should have processes in place to ensure effective communication and promote interdisciplinary care for medically complex patients.
- Facilities should incorporate patient safety bundles<sup>24</sup> and implement patient safety drills for high acuity low occurrence events, such as amniotic fluid embolism.
- Low acuity facilities with a low volume of pregnant patients should ensure readiness for recognition of high-risk events such as ruptured ectopic pregnancy. Additionally, these facilities need consistent protocols for escalation of care, including processes that facilitate transfer of patients to higher levels of care.
- Family planning is a key area of prevention for maternal mortality. Family planning counseling with a full range of methods should be accessible to all people of reproductive age, especially during the inter-conception period. Facilities should evaluate barriers and improve processes that prevent tubal ligations from being performed when it is the desired family planning method.
- Many postpartum patients access care through the emergency departments and urgent care facilities. Certain medical conditions, such as hypertensive disorders of pregnancy, place these patients at increased risk of death. As such, emergency departments and urgent care facilities should have processes in place to identify people who have given birth in the past 6 weeks.
- Obesity is a chronic medical condition that can cause adverse pregnancy outcomes. Insurance payors should cover perinatal nutritional services and home-based interventions to address chronic conditions, such as obesity.
- Home health agencies and insurance payors should work together to increase reimbursement and expand services for management of health conditions, such as medication and chronic disease management, through home-based healthcare.

# PAMR Committee Recommendations

## Systems

### Systems

---



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

- Homicide with Intimate Partner Violence (IPV) at the root is a leading cause of maternal mortality. Facilities should provide training for staff (including physicians, nurses, social workers and others) on risk assessment and safety planning for IPV before, during and after pregnancy.



#### Expand the obstetric healthcare workforce

- State and federal government should increase funding to initiatives that encourage providers to practice in rural and/or underserved communities to improve access to clinical care, such as the National Health Service Corps Loan Repayment Program.
- Schools of nursing, in collaboration with state funders, should increase capacity to train more forensic nurses to respond to IPV cases involving sexual assault.



#### Address substance use before, during and after pregnancy

- Providers should educate patients with history of SUD on harm reduction strategies, such as setting limits on where and when one uses drugs, avoiding driving or making important decisions while using, and making a parenting plan before using.
- Providers, including physicians, social workers and other allied health professionals, should refer patients to community-based organizations who offer SUD services, tobacco cessation programs and access to Narcan.
- Providers should use standardized tools to screen for SUD at appropriate intervals before, during and after pregnancy.
- Facilities should develop processes to ensure that during discharge planning or education, patients with SUD receive information on accessing SUD resources.
- Both publicly and privately funded correctional facilities should allocate resources to address mental health and substance use issues, such as staff in-house and telemedicine services.
- Per evidence-based guidance<sup>31</sup>, inpatient substance use treatment facilities should not restrict pregnant people from receiving care in their facility.
- National professional organizations, such as American College of Obstetricians and Gynecologists (ACOG), American Medical Association (AMA), American Society of Addiction Medicine (ASAM) and American Academy of Family Physicians (AAFP) should further educate providers on SUD harm reduction strategies.

# PAMR Committee Recommendations

## Systems

### Systems

---



#### Promote community health and social services

- Military base healthcare systems should implement standardized screening for IPV and ensure that IPV victim services are accessible and confidential.
- State and local government, in collaboration with community organizations, should increase housing resources for displaced or unhoused families.
- State and city government should increase access and funding to shelters, support and community outreach for displaced or unhoused families, especially those with children 0-3 years of age.
- Vendors should be required to request personal identification and track purchase of substances that are high risk for abuse, such as aerosol products.
- People with a history of perpetuating IPV should be offered and/or required to participate in rehabilitative programs. The legal system could require perpetrators to enter behavioral health care and rehabilitative programs as an alternative to incarceration.



#### Prevent Motor Vehicle-Related Injury

- State and local governments should consider installing pedestrian bridges to facilitate safe crossing over roadways for pedestrians.
- State and local governments should establish barriers around bodies of water near roadways.
- Local governments, ride share programs and/or alcohol companies should subsidize alternatives to driving while intoxicated, especially in rural areas where ride shares might be more expensive.
- Local governments should install growlers into all roads to alert drivers when they veer from their lane.
- State and local highway patrol should increase the use of radar speed signs to notify drivers when they have exceeded local speed limits.
- Regional DOT should review crash sites to determine whether any improvements to roadways need to be made to prevent future crashes, based on conditions of the roadway and frequency of crashes at a given location.
- The Highway Safety Commission and other state injury prevention programs should integrate proper restraint use for pregnant people into existing child passenger safety courses.
- To decrease the number of drunk driving crashes, vehicle manufacturers should install breathalyzers into all new cars.
- Vehicle manufacturers should expand excessive speed safety measures, including limiting maximum driving speeds or implementing driver notifications of speeding, in accordance with nationwide speed limits. These measures should be standardized in all new cars.
- Vehicle manufacturers should include lane departure assist in all new cars.

# PAMR Committee Recommendations

## Clinical Quality Improvement

### Clinical Quality Improvement

---



#### Improve care coordination

- Providers should use a standardized process, such as Screening, Brief Intervention and Referral to Treatment, for mental health issues, drug use, IPV and sexual abuse at appropriate intervals before, during and after pregnancy.
- Providers should use standardized screening for IPV at appropriate intervals during and after pregnancy. Hospitals should create a quality measure associated with IPV screening to create accountability.
- Providers should educate patients, especially those with chronic or high-risk conditions, on the importance of a continued course of care with a primary care physician.
- When patients are discharged from facilities after delivery, they should be provided with the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) Post Birth Warning Signs education.



#### Improve systems of care and ensure appropriate level of care

- Patients with chronic medical conditions are at the highest risk of experiencing a maternal morbidity or mortality. Providers should employ a patient-centered approach when developing plans of care to address these conditions. This includes addressing social contributors such as smoking.
- Obese patients are at increased risk of comorbidities. Providers should conduct comprehensive screening for conditions commonly linked to obesity, such as pulmonary embolism.
- Providers should be aware of and adhere to clinical guidelines<sup>32</sup> for exchange transfusions in pregnant patients with sickle cell.
- Facilities should provide education for emergency department providers, including physicians, advanced practice providers and nurses, on the signs, symptoms and treatment of postpartum preeclampsia.
- Per national guidelines<sup>33</sup>, when patients who are up to 6 weeks postpartum present to an emergency department with signs or symptoms of elevated blood pressure, emergency departments should prioritize those patients so that treatment can begin within 30-60 minutes of presentation and should consult with obstetric care providers.
- Health systems should implement patient safety bundles that address the leading causes of maternal morbidity and mortality, including venous thromboembolism.
- OB providers should screen, diagnose and treat postpartum depression including the use of anti-depressants.

# PAMR Committee Recommendations

## Clinical Quality Improvement

### Clinical Quality Improvement

---



#### Expand the obstetric healthcare workforce

- A multidisciplinary team of providers should create individualized pain medication plans based on patient's needs and medical conditions.
- Birthing persons with a history of non-fatal IPV are at increased risk for long-term health related issues. As such, obstetric care providers, social workers and mental health providers should work collaboratively to provide a holistic approach for treating those individuals.
- Facilities should implement ongoing drills and quality improvement work to evaluate system processes and policies to ensure system readiness for the management of obstetric hemorrhage and amniotic fluid embolism.
- Facilities should invest in resources to train the care team, including physicians, nurses, social workers and other allied health professionals, on assessment and referral for IPV.



#### Address racial and cultural bias

- Health care professionals at every level (provider, facility, community and system) should receive training to recognize their implicit bias towards individuals using illicit substances, in order to reduce stigma.
- Facilities should have policies and procedures in place to ensure all infants who display signs of potential substance exposure are appropriately screened. Having standardized screening protocols may reduce the biased practice of screening only certain populations.



#### Address substance use before, during and after pregnancy

- As part of continuing medical education, providers should receive clinical training on treatment of people of reproductive age with substance use disorder, including best practices for MAT.<sup>34</sup>
- Providers should consistently screen for alcohol use and misuse, using screening tools and ongoing assessment, such as Tolerance, Annoyance, Cut-down, Eye-opener (TACE) screening.<sup>35</sup>
- Facilities should invest in or explore funding options for naloxone take-home kits that can be provided to patients with known SUD at discharge.
- Facilities should have policies in place and financially support rooming-in of substance-exposed newborns and birthing parents, minimizing separation from postpartum parents with substance use disorder. These policies optimize using the parent as "medicine," keeping the parent-infant pair together and optimizing non-pharmacologic methods for managing the substance exposed newborn at risk for neonatal abstinence syndrome/neonatal withdrawal syndrome.
- State and local government entities should fund harm reduction initiatives that provide naloxone take-home kits that can be given to patients with known SUD at discharge.
- State medical boards should train providers on how to screen for use of all substances, including less common types of substance use such as huffing.
- In Louisiana, by statewide standing order, Narcan is available to any individual or organization. The Office of Behavioral Health should educate providers and facilities on policies and accessibility of Narcan statewide.
- The Department of Corrections should have equitable standards of care in treating SUD across all correctional facilities with clinical standards of care, including the provision of MAT.

# PAMR Committee Recommendations

## Social Support

### Social Support



#### Improve care coordination

- Providers and community-based organizations should refer eligible patients to community support programs including the Nurse Family Partnership program, Parents and Teachers, and other pregnancy support groups that have been shown to improve perinatal outcomes.<sup>36, 37, 38, 39</sup>
- Social service offices, or representatives from those offices, should be located within community health clinics to facilitate access to multiple services at a single point of care.
- Law enforcement agencies and coroners should develop processes to link individuals who have experienced loss to community-based bereavement resources.



#### Address substance use during pregnancy

- State and local governments should develop public messaging campaigns to educate individuals with SUD and their social networks around how to access and administer Narcan.



#### Promote community health and social services

- State and local governments should increase funding for community-based organizations that work with correctional facilities to reintegrate formerly incarcerated people into society and connect them to mental health resources.
- State and local health departments should increase funding to community organizations that provide bereavement services for parents and families who have children pass away.
- State and local health departments should increase capacity and funding to support perinatal community outreach to pregnant people and their families, especially among communities with language barriers.
- State and city leadership should establish and financially support local community outreach programs that work to decrease community violence.
- School systems should provide resources and education about de-escalation and crisis intervention training as part of an effort to decrease community violence.
- Primary and secondary schools and community-based organizations should increase evidence-based education around healthy relationships, signs of IPV and firearms safety.
- Community-based organizations in collaboration with fire departments should educate community members around the importance of fire safety and using smoke and carbon monoxide detectors.
- Literature suggests that people experiencing IPV during pregnancy may be at an increased risk for IPV homicide.<sup>40</sup> As such, community organizations should ensure that IPV resources are made available to pregnant people.
- Firearm owners should follow best practices for firearm storage safety, including separate storage of ammunition and firearm, use of locks and ensuring firearms are out of reach of children.<sup>41</sup>



#### Prevent Motor Vehicle-Related Injury

- Community-based organizations who work with pregnant people should provide education on the appropriate way to use a seatbelt during pregnancy.<sup>42</sup>
- Vehicle safety inspections should be more comprehensive to ensure vehicles are safe for driving.
- Pedestrians should use designated cross walks and pedestrian bridges, especially when crossing high speed streets.



# PAMR Committee Recommendations

## Policy

### Policy

---



#### Improve care coordination

- All insurance payors, especially Medicaid, should cover weight loss treatment and resources.
- Insurance payors should cover access to community health workers, including but not limited to licensed providers, during pregnancy and the postpartum period up to a year after pregnancy.
- Medicaid should remove 30-day wait period required for tubal ligation, while ensuring that providers still give adequate counseling regarding alternatives to permanent sterilization.



#### Improve systems of care and ensure appropriate level of care

- The Louisiana Medicaid Agency should increase reimbursement for mental health services in order to increase the number of providers who accept Medicaid plans statewide.
- High-acuity patients are at risk for serious complications, which can occur quickly. As such, policies and procedures within facilities should ensure the treatment team is aware of those risks and evaluate those patients frequently.
- Maternal levels of care in Louisiana should be revised to match national guidelines. State licensing entities should perform regular reviews to ensure hospitals are compliant with their designated level of care, based on these revised guidelines. As such, hospitals should have policies and procedures in place to ensure the treatment team is aware of those risks and evaluates those patients frequently.



#### Address racial and cultural bias

- Physicians, nursing and other allied health professional licensing boards should require implicit bias training for all healthcare providers as part of annual licensure renewal.



#### Address substance use during pregnancy

- Correctional facilities should have policies and procedures in place to monitor patients who have high-risk medical conditions or are withdrawing from substances.
- As a requirement for state funding, correctional facilities should be required to participate in quality improvement review to ensure compliance with protocols and procedures related to the management of patients who are withdrawing from substances.



#### Promote community health and safety

- Federal, state and local governments should develop a range of policies that support equitable and affordable childcare options.
- Louisiana Department of Public Safety, in conjunction with the LA State Uniform Construction Code Council, should improve and enforce building standards for mobile homes, including requirements for smoke and carbon monoxide detectors.
- State legislation should be established to increase funding for IPV services that address social determinants of health, including financial, social, and transportation services.
- State policies should require comprehensive sexual and reproductive health education in all schools.

# PAMR Committee Recommendations

## Policy

### Policy

---



#### Promote community health and safety (continued)

- State and local governments should require completion of a firearm safety training for any individual purchasing a firearm. Training should include education around gun safety, responsible gun ownership and risks of sharing guns with individuals with a history of violent behavior.
- Given the higher concentration of advertising of tobacco products in rural and minority communities, state legislation should be established to ensure tobacco companies reduce targeted advertising in these communities.<sup>41</sup>
- State legislation should adopt “Red Flag Laws” that require mandatory surrender of firearms for all persons who present to be a danger to themselves or others, including people with a documented history of domestic abuse, similar to legislation that has been passed in other states.<sup>43</sup> Additionally, legislation should prohibit these individuals from purchasing new firearms.
- State legislation should mandate violence reduction programs for perpetrators of IPV with civil orders made against them.
- State legislation should be established to increase the minimum age to purchase and possess a handgun in Louisiana from 18 to at least 21.<sup>44</sup>



#### Increase access to data and medical records for PAMR committee review

- Performing autopsies for all pregnancy-associated deaths enhances statewide maternal mortality review. Statewide legislation should be established to be consistent with national guidelines mandating that:
  - Hospitals conduct autopsies when the cause of death is unknown.
  - Autopsies be performed for all confirmed or possible overdose deaths.
  - Autopsies be performed for all motor vehicle crash deaths, unless the individual was in the hospital for a sufficient time to have proper documentation of their cause of death.<sup>45</sup>



#### Prevent Motor Vehicle-Related Injury

- To decrease the number of crashes related to impaired driving, statewide law should mandate that all first-time impaired driving offenders must have breathalyzers installed in their vehicles.

# PAMR Committee Recommendations

## Public Health Research and Communications

### Public Health Research and Communications



#### Promote community health and safety

- Media campaigns should be developed using best practices in communication science to address issues such as:
  - Risks associated with driving under the influence of any substance that could cause impairment, including but not limited to alcohol, illicit drugs and prescribed medications.
  - De-normalizing the excessive use of alcohol, especially using alcohol as a coping mechanism.
  - Intimate partner violence and promoting social-emotional learning programs to create protective relationships.<sup>46</sup>
  - Promoting firearm safety and discouraging the use of firearms by underage individuals.



#### Increase access to data and medical records for PAMR 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 committee access to information needed to perform a more accurate and comprehensive review of maternal deaths.
- State legislation should be established to protect and authorize records requests to public and private entities for the purposes of statewide maternal mortality review.
- The committee should have access to Department of Children and Family Services records to help the committee better understand circumstances surrounding cases.
- The CDC should work with military bases to ensure pregnancy-associated mortality cases that involve military personnel are identified and reviewed thoroughly.



#### Contribute to the public health evidence base

- Public health professionals should conduct analyses on the following:
  - Socio-spatial and environmental factors that lead to poor perinatal outcomes. Geocoded analyses can be used to develop targeted interventions to prevent poor outcomes.
  - Primary drivers that lead some patients to access care in the emergency room for non-emergency conditions.
  - Barriers to accessing care, especially among pregnant people who are undocumented and individuals who do not have insurance coverage during pregnancy or the postpartum period.
  - Patient-level data to investigate barriers to adherence to recommended care plans.
- Professional societies should develop more comprehensive and holistic screening guidelines for conditions, such as IPV and substance use, that promote open-ended patient-provider conversations.
- Professional societies should establish guidelines for frequency of primary care visits for patients with obesity, given that obesity increases risk for other health complications.
- CDC and the National Institute of Health should increase funding for research on prevention, diagnosis and treatment of amniotic fluid embolism.



#### Prevent Motor Vehicle-Related Injury

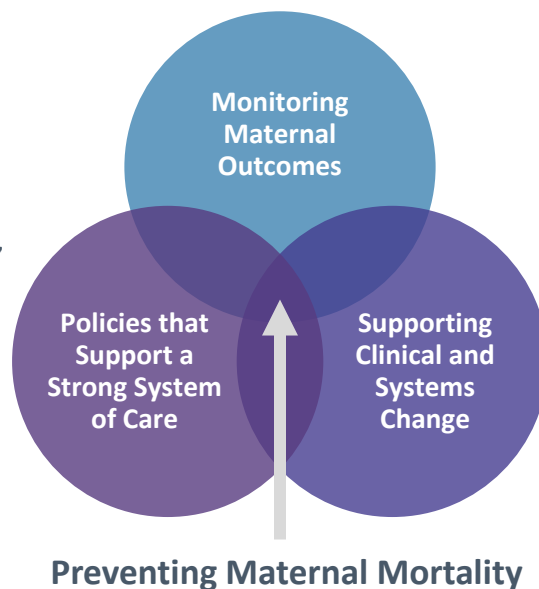
- Public safety institutions, including the Highway Safety Commission, should continue to develop and promote person-centered, culturally and linguistically appropriate public messaging strategies around seat belt use, especially during pregnancy.

# State Level Efforts to Reduce Maternal Mortality

OPH-BFH acts as the hub for the Louisiana Department of Health efforts to prevent maternal deaths. These efforts are linked to our state surveillance, informed by the Pregnancy Associated Mortality Review (PAMR) process, as well as national trends and the work from the Alliance for Innovation on Maternal Health (AIM) and the CDC. Below are selected state-level activities to reduce maternal mortality and morbidity and not inclusive of all ongoing community, facility and systems level efforts across the state.

The work within OPH has focused in three interconnected areas:

- **Ensuring effective public health systems** to monitor maternal outcomes and system improvements
- **Supporting change** within clinical care and related systems
- **Development and implementation of policies** that enable or support a strong system of care



## Monitoring Maternal Outcomes

- **LA-PAMR launched its enhanced multidisciplinary review process in 2018**, in 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 and increased inclusion of women and people of color.
- **Louisiana Pregnancy Risk Assessment Monitoring System (PRAMS)** is an ongoing, population-based surveillance system designed to describe maternal behaviors and experiences that occur before, during and immediately following pregnancy. Information collected by PRAMS is used by health professionals, policy makers and researchers to develop and modify programs and policies designed to improve the health of birthing people and infants. For more information, visit [partnersforfamilyhealth.org/prams](https://partnersforfamilyhealth.org/prams).
- **The Injury and Violence Prevention Program** works to prevent injuries and violence, which are the leading causes of death for residents ages 1–44 years. The program collects data on top causes of intentional and unintentional injuries across the state to inform program and policy initiatives. Priority areas include: traffic related crashes, sexual and Intimate Partner Violence (IPV), child abuse and neglect, traumatic brain injury (TBI), homicide, suicide, firearm, fire, drowning, older adult falls and infant sleep-related injuries. For more information, visit [partnersforfamilyhealth.org/injury](https://partnersforfamilyhealth.org/injury).



## Supporting Clinical and Systems Change

- **Louisiana Maternal, Infant and Early Childhood Home Visiting (LA MIECHV)** provides family support and coaching through two evidence-based home visiting models: Nurse-Family Partnership (NFP) and Parents as Teachers (PAT). These services pair families with registered nurses or parent educators who provide personalized education, support and coaching, and referrals to services to empower families to reach their goals. For more information, visit [partnersforfamilyhealth.org/miechv](https://partnersforfamilyhealth.org/miechv).

# State Level Efforts to Reduce Maternal Mortality



## Supporting Clinical and Systems Change (continued)

- **The Louisiana Perinatal Quality Collaborative (PQC)** launched coordinated quality improvement efforts across the state in August 2018. Participating hospital teams work together to improve obstetric care by using best practices supported by AIM, with national mentorship from the CDC. Teams use quality improvement tools to implement practice changes that are aligned with national recommendations and those in this report. One way the PQC has prioritized addressing racial disparities in outcomes is through the mandated inclusion of patient and community advisors on each facility team. Specific quality improvement initiatives include:

- Reducing Maternal Morbidity Initiative (RMMI) — focus on hemorrhage and hypertension
- Safe Births Initiative — focus on safe reduction of low-risk first-time Cesarean sections
- Louisiana Birth Ready Designation system — focus on supporting maternal mortality work by ensuring maintenance of LaPQC best practices and structures that promote readiness
- Improving Care for the Substance-Exposed Dyad (ICSED) initiative — focus on improving the identification, care and treatment of birthing persons and neonates affected by opioids and substance use

For further information, please visit: [ldh.la.gov/LaPQC](http://ldh.la.gov/LaPQC).

- **Louisiana Mental Health Perinatal Partnership (LAMHPP)** is a provider-to-provider consultation system for licensed healthcare clinicians serving pregnant and postpartum women and their families, including OB-GYNs, family physicians, pediatricians, nurse practitioners, nurse midwives, psychiatrists, psychologists, licensed clinical social workers and others. LAMHPP supports healthcare clinicians to address the needs of their patients including perinatal depression, anxiety, substance use disorders, interpersonal violence, and related health risks and conditions. For more information, visit [lamhpp.org](http://lamhpp.org).
- **Reproductive Health Program (RHP)** is the state's sole grantee of the Title X Family Planning Services Grant (Title X). Title X is the only federal program dedicated to providing access to high-quality contraceptive services, supplies and information to anyone who needs or wants them. RHP administers this program through a network of statewide service sites, including over 60 Parish Health Units and community health centers. All services are comprehensive and confidential, prioritizing patient autonomy, voluntary provision of services and patient-centered care. For more information, visit [HealthyChoicesLA.org](http://HealthyChoicesLA.org).



## Policies that Enable or Support a Strong System of Care

- **Act 497 (2018 Legislative Session)** created the **Healthy Moms, Healthy Babies Advisory Council**. This council, authorized by Louisiana Revised Statute 40:2018.5 in 2018, was formed as a call to action to ensure that state initiatives addressing maternal mortality and severe maternal morbidity include an equity focus informed by community. Key findings and recommendations are summarized in the council's [final report](#) issued in March 2021. To view Act 497, visit [legis.la.gov](http://legis.la.gov).
- **LDH hosted the inaugural Maternal Mortality Summit in August 2019**. The summit was part of the response to [House Resolution 294](#) of the 2019 Regular Session. The Maternal Mortality Summit convened public health professionals, providers, policymakers and community leaders focused on improving birth outcomes. Recommendations from the Summit can be found in the [report here](#).

# State Level Efforts to Reduce Maternal Mortality



## Policies that Enable or Support a Strong System of Care (continued)

- **LDH is addressing the realignment of Hospital Licensing Standards for Maternal Levels of Care.** These efforts include a focus on updating the licensing standards for maternal care (in Louisiana Administrative Code Title 48 – Public Health Part I Subpart 3, Chapter 93, Subpart S) to align with new national recommendations and standards.
- **Act 320 (2021 Legislative Session) created a domestic violence fatality review within LDH.** The 2017 PAMR report identified homicide as one of the leading causes of pregnancy-associated, but not related, deaths among birthing persons and IPV was identified as a leading contributing factor. To view Act 320, visit [legis.la.gov](https://legis.la.gov).
- **House Bill 301 (2021 Legislative Session) established an income tax credit** for certain funeral and burial expenses for certain pregnancy-related deaths. To view House Bill 301, visit [legis.la.gov](https://legis.la.gov).
- **Act 182 (2021 Legislative Session) passed. This will create the Louisiana Doula Registry Board.** To view Act 182, visit [legis.la.gov](https://legis.la.gov).

# Appendices and References

# A. Acronyms

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



# B. History

## Louisiana Maternal Mortality Review

In 1992, the LDH-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 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 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 individuals who died during pregnancy or within one 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 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 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, PAMR became an official activity of the Louisiana Commission on Perinatal Care and the Prevention of Infant Mortality (Louisiana Perinatal Commission), thereby making PAMR records confidential and protecting them from discovery in legal proceedings.

# B. History

## 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, BFH 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 10<sup>th</sup> 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 one 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, 2018 through December 31, 2018 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 check box 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 check box filled in, indicating that the decedent was pregnant at the time of death or within one year of pregnancy, were identified as potential pregnancy-associated 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. LaHIDD linkages:** Linkages between death records and hospital discharge records 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 potential pregnancy-associated 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 BFH's Maternal and Child Health (MCH) Coordinators (see Appendix F). Validation requires individuals submitting data to verify that a decedent 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 check box being checked in error.

### Confirmation of Eligibility and Record Abstraction

MCH Coordinators (registered 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 decedent'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 "confirmed," and therefore eligible for review, if the MCH Coordinator confirmed a pregnancy within one year of death based on medical records or coroner reports. MCH Coordinators then abstracted available medical records, coroners' reports and/or other relevant documentation for all confirmed pregnancy-associated deaths using an abstraction form (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 55 confirmed 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 *Centers for Disease Control and Prevention (CDC)'s Maternal Mortality Review project's* MMRIA Committee Decisions Form (version 14) to classify each case (see Appendix E).

### Data Limitations

Methods to identify pregnancy-associated deaths on the Vital Records death certificate can lead to:

- Correct identification of a pregnancy-associated death.
- Incorrect identification of a pregnancy-associated death due to:
  - Reporting a pregnancy-associated 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 individual 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 an individual who was pregnant or had recently delivered at the time of death.
- Missing or delayed data linkage between pregnancy-associated deaths and live births for birthing people whose infants were adopted.

Classification based on ICD-10 O-codes or the pregnancy check box 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. 2018 PAMR Committee

Name	Role and Organization
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
Gabiella Pridjian, MD	Maternal Fetal Medicine, Tulane Hospital
Heather Olivier, MS, PLPC, NCC, CCTP, PMH-C	Perinatal Counseling, Present Hope Counseling
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
Johnnay Benjamin, MPH	Patient Advocate and Representative
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. 2018 PAMR Committee

Name	Role and Organization
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
Veronica Gillispie-Bell, MD, FACOG	Louisiana Perinatal Quality Collaborative and Pregnancy Associated Mortality Review, Medical Director

# E. MMRIA Committee Decisions Form

## MATERNAL MORTALITY REVIEW INFORMATION APPLICATION (MMRIA) Committee Decisions Form – Page 1

MMRIA		MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v20		1																		
REVIEW DATE <input type="text"/> <small>Month/Day/Year</small>	RECORD ID # <input type="text"/>	<b>COMMITTEE DETERMINATION OF CAUSE(S) OF DEATH</b> IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING* CAUSE OF DEATH Refer to page 3 for PMSS-MM cause of death list.																				
<b>PREGNANCY-RELATEDNESS: SELECT ONE</b> <input type="checkbox"/> <b>PREGNANCY-RELATED</b> A death during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy  <input type="checkbox"/> <b>PREGNANCY-ASSOCIATED, BUT NOT-RELATED</b> A death during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy  <input type="checkbox"/> <b>PREGNANCY-ASSOCIATED BUT UNABLE TO DETERMINE PREGNANCY-RELATEDNESS</b>  <input type="checkbox"/> <b>NOT PREGNANCY-RELATED OR-ASSOCIATED</b> (i.e. false positive, was not pregnant within one year of death)		<table border="1"> <thead> <tr> <th>TYPE</th> <th>OPTIONAL: CAUSE (DESCRIPTIVE)</th> </tr> </thead> <tbody> <tr> <td>UNDERLYING*</td> <td></td> </tr> <tr> <td>CONTRIBUTING</td> <td></td> </tr> <tr> <td>IMMEDIATE</td> <td></td> </tr> <tr> <td>OTHER SIGNIFICANT</td> <td></td> </tr> </tbody> </table>	TYPE	OPTIONAL: CAUSE (DESCRIPTIVE)	UNDERLYING*		CONTRIBUTING		IMMEDIATE		OTHER SIGNIFICANT		<b>COMMITTEE DETERMINATIONS ON CIRCUMSTANCES SURROUNDING DEATH</b> DID <b>OBESITY</b> CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN DID <b>DISCRIMINATION</b> CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN DID <b>MENTAL HEALTH CONDITIONS OTHER THAN SUBSTANCE USE DISORDER</b> CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN DID <b>SUBSTANCE USE DISORDER</b> CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN									
TYPE	OPTIONAL: CAUSE (DESCRIPTIVE)																					
UNDERLYING*																						
CONTRIBUTING																						
IMMEDIATE																						
OTHER SIGNIFICANT																						
<b>ESTIMATE THE DEGREE OF RELEVANT INFORMATION (RECORDS) AVAILABLE FOR THIS CASE:</b>  <input type="checkbox"/> <b>COMPLETE</b> All records necessary for adequate review of the case were available  <input type="checkbox"/> <b>MOSTLY COMPLETE</b> Minor gaps (i.e. information that would have been beneficial but was not essential to the review of the case)  <input type="checkbox"/> <b>SOMEWHAT COMPLETE</b> Major gaps (i.e. information that would have been crucial to the review of the case)  <input type="checkbox"/> <b>NOT COMPLETE</b> Minimal records available for review (i.e. death certificate and no additional records)  <input type="checkbox"/> <b>N/A</b>		<b>MANNER OF DEATH</b> WAS THIS DEATH A SUICIDE? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN WAS THIS DEATH A HOMICIDE? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN  IF ACCIDENTAL DEATH, HOMICIDE, OR SUICIDE, LIST THE MEANS OF FATAL INJURY <table border="0"> <tr> <td><input type="checkbox"/> FIREARM</td> <td><input type="checkbox"/> FALL</td> <td><input type="checkbox"/> INTENTIONAL NEGLIGENCE</td> </tr> <tr> <td><input type="checkbox"/> SHARP INSTRUMENT</td> <td><input type="checkbox"/> PUNCHING/KICKING/BEATING</td> <td><input type="checkbox"/> OTHER, SPECIFY: <input type="text"/></td> </tr> <tr> <td><input type="checkbox"/> BLUNT INSTRUMENT</td> <td><input type="checkbox"/> EXPLOSIVE</td> <td><input type="checkbox"/> UNKNOWN</td> </tr> <tr> <td><input type="checkbox"/> POISONING/OVERDOSE</td> <td><input type="checkbox"/> DROWNING</td> <td><input type="checkbox"/> NOT APPLICABLE</td> </tr> <tr> <td><input type="checkbox"/> HANGING/STRANGULATION/SUFFOCATION</td> <td><input type="checkbox"/> FIRE OR BURNS</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> MOTOR VEHICLE</td> <td></td> </tr> </table>			<input type="checkbox"/> FIREARM	<input type="checkbox"/> FALL	<input type="checkbox"/> INTENTIONAL NEGLIGENCE	<input type="checkbox"/> SHARP INSTRUMENT	<input type="checkbox"/> PUNCHING/KICKING/BEATING	<input type="checkbox"/> OTHER, SPECIFY: <input type="text"/>	<input type="checkbox"/> BLUNT INSTRUMENT	<input type="checkbox"/> EXPLOSIVE	<input type="checkbox"/> UNKNOWN	<input type="checkbox"/> POISONING/OVERDOSE	<input type="checkbox"/> DROWNING	<input type="checkbox"/> NOT APPLICABLE	<input type="checkbox"/> HANGING/STRANGULATION/SUFFOCATION	<input type="checkbox"/> FIRE OR BURNS			<input type="checkbox"/> MOTOR VEHICLE	
<input type="checkbox"/> FIREARM	<input type="checkbox"/> FALL	<input type="checkbox"/> INTENTIONAL NEGLIGENCE																				
<input type="checkbox"/> SHARP INSTRUMENT	<input type="checkbox"/> PUNCHING/KICKING/BEATING	<input type="checkbox"/> OTHER, SPECIFY: <input type="text"/>																				
<input type="checkbox"/> BLUNT INSTRUMENT	<input type="checkbox"/> EXPLOSIVE	<input type="checkbox"/> UNKNOWN																				
<input type="checkbox"/> POISONING/OVERDOSE	<input type="checkbox"/> DROWNING	<input type="checkbox"/> NOT APPLICABLE																				
<input type="checkbox"/> HANGING/STRANGULATION/SUFFOCATION	<input type="checkbox"/> FIRE OR BURNS																					
	<input type="checkbox"/> MOTOR VEHICLE																					
DOES THE COMMITTEE AGREE WITH THE UNDERLYING* CAUSE OF DEATH LISTED ON DEATH CERTIFICATE? <input type="checkbox"/> YES <input type="checkbox"/> NO		IF HOMICIDE, WHAT WAS THE RELATIONSHIP OF THE PERPETRATOR TO THE DECEDENT? <input type="checkbox"/> NO RELATIONSHIP <input type="checkbox"/> PARTNER <input type="checkbox"/> EX-PARTNER <input type="checkbox"/> OTHER RELATIVE <input type="checkbox"/> ACQUAINTANCE <input type="checkbox"/> OTHER, SPECIFY: <input type="text"/> <input type="checkbox"/> UNKNOWN <input type="checkbox"/> NOT APPLICABLE																				

\*Underlying cause refers to the disease or injury that initiated the chain of events leading to death or the circumstances of the accident or violence which produced the fatal injury.

\*NOTE: The discrimination check box on committee determinations on circumstances surrounding death was added to the form after the start of 2018 case review. It was not included in 2018 data.

Additional information about MMRIA can be found at [reviewtoaction.org/implement/mmria#collapseThree-mmria](http://reviewtoaction.org/implement/mmria#collapseThree-mmria)

# E. MMRIA Committee Decisions Form

## MATERNAL MORTALITY REVIEW INFORMATION APPLICATION (MMRIA) Committee Decisions Form – Page 2



**COMMITTEE DETERMINATION OF PREVENTABILITY**

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

WAS THIS DEATH PREVENTABLE?  YES  NO

CHANCE TO ALTER OUTCOME  GOOD CHANCE  SOME CHANCE  
 NO CHANCE  UNABLE TO DETERMINE

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

**CONTRIBUTING FACTORS WORKSHEET**

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

**RECOMMENDATIONS OF THE COMMITTEE**

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

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

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

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

**DEFINITION OF LEVELS**

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

**PREVENTION TYPE**

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

**EXPECTED IMPACT**

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

Additional information about MMRIA can be found at [reviewtoaction.org/implement/mmria#collapseThree-mmria](http://reviewtoaction.org/implement/mmria#collapseThree-mmria)



# 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

\* PREGNANCY-RELATED DEATH: DEATH DURING PREGNANCY OR WITHIN ONE YEAR OF THE END OF PREGNANCY FROM A PREGNANCY COMPLICATION, A CHAIN OF EVENTS INITIATED BY PREGNANCY, OR THE AGGRAVATION OF AN UNRELATED CONDITION BY THE PHYSIOLOGIC EFFECTS OF PREGNANCY.

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

Additional information about MMRIA can be found at [reviewtoaction.org/implement/mmria#collapseThree-mmria](http://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

#### LACK OF ACCESS/FINANCIAL RESOURCES

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

#### ADHERENCE TO MEDICAL RECOMMENDATIONS

The provider or patient did not follow protocol or failed to comply with standard procedures (i.e. non adherence to prescribed medications).

#### FAILURE TO SCREEN/INADEQUATE ASSESSMENT OF RISK

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

#### CHILDHOOD SEXUAL ABUSE/TRAUMA

The patient experienced rape, molestation, or one or more of the following: sexual exploitation during childhood plus persuasion, inducement, or coercion of a child to engage in sexually explicit conduct; physical or emotional abuse or violence other than that related to sexual abuse during childhood.

#### CHRONIC DISEASE

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

#### CLINICAL SKILL/QUALITY OF CARE (PROVIDER OR FACILITY PERSPECTIVE)

Personnel were not appropriately skilled for the situation or did not exercise clinical judgment consistent with current standards of care (e.g. error in the preparation or administration of medication or unavailability of translation services).

#### POOR COMMUNICATION/LACK OF CASE COORDINATION OR MANAGEMENT/ LACK OF CONTINUITY OF CARE (SYSTEM PERSPECTIVE)

Care was fragmented (i.e. uncoordinated or not comprehensive) among or between healthcare facilities or units, (e.g. records not available between inpatient and outpatient or among units within the hospital, such as Emergency Department and Labor and Delivery).

#### LACK OF CONTINUITY OF CARE (PROVIDER OR FACILITY PERSPECTIVE)

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

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

#### DELAY

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

#### DISCRIMINATION

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

#### ENVIRONMENTAL FACTORS

Factors related to weather or social environment.

#### INADEQUATE OR UNAVAILABLE EQUIPMENT/TECHNOLOGY

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

#### INTERPERSONAL RACISM

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

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

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

#### INADEQUATE LAW ENFORCEMENT RESPONSE

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

#### LEGAL

Legal considerations that impacted outcome.

#### MENTAL HEALTH CONDITIONS

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

#### INADEQUATE COMMUNITY OUTREACH/RESOURCES

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

#### LACK OF STANDARDIZED POLICIES/PROCEDURES

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

#### LACK OF REFERRAL OR CONSULTATION

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

#### STRUCTURAL RACISM

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

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

Social support from family, partner, or friends was lacking, inadequate, and/or dysfunctional.

#### SUBSTANCE USE DISORDER - ALCOHOL, ILLICIT/ PRESCRIPTION DRUGS

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

#### TOBACCO USE

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

#### UNSTABLE HOUSING

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

#### VIOLENCE AND INTIMATE PARTNER VIOLENCE (IPV)

Physical or emotional abuse perpetrated by current or former intimate partner, family member, friend, acquaintance, or stranger.

#### OTHER

Contributing factor not otherwise mentioned. Please provide description

Additional information about MMRIA can be found at [reviewtoaction.org/implement/mmria#collapseThree-mmria](https://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 (2014-2020) Kristy Ferguson, BSN, RN (current)
Region 2	Kelly Bankston, BSN, RN (2013-2019) Rachel Purgatorio, BSN, RN (2020-current)
Region 3	Nicole Soudelier, BSN, RN (2013-2020) Danielle Mistretta, BSN, RN (current)
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
PAMR Coordinator	Rachel Hyde, BSN, RN, MPH
Maternal Mortality Epidemiologist	Katharine Bruce, MPH
Mortality Surveillance Manager	Jia Benno, MPH
Perinatal Projects Coordinator	Keshia Holmes, MA
Statewide Surveillance Manager	Rosaria Trichilo, MPH

# 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](http://reviewtoaction.org/sites/default/files/national-portal-material/Report%20from%20Nine%20MMRCs%20final%20edit.pdf)

# H. Data Abstraction Guide

## Health Prior to Sentinel Pregnancy

Height/Weight/ BMI

Medical history (including duration of preexisting conditions and medications prescribed)

Surgical and obstetric history (including any complications during prior pregnancies and/or deliveries)

Social history (use of alcohol, tobacco, illicit drugs)

Screenings (domestic violence/IPV, suicide risk, depression)

Family history

## Antepartum Course

Gestational age decedent entered prenatal care

Number of prenatal appointments

Reasons for any missed appointments

Screenings during pregnancy (substance use, domestic violence/IPV, risk of pulmonary embolism, suicide, glucose)

High risk factors

Labs and imaging (relevant bloodwork, urinalysis, glucose, ultrasound)

Placental location

Complications and/or patient complaints during pregnancy

Consults and/or referrals during pregnancy

Interventions during pregnancy (evacuation, laparotomy, D&C, cervical cerclage, hysterectomy, transfusion)

Hospital admissions, urgent care and/or emergency room visits during pregnancy

Medical specialist(s) seen during pregnancy

## Labor & Delivery

Gestational age and APGAR score

Type of labor (spontaneous, augmented, induced, no labor, no specified)

# H. Data Abstraction Guide

Route and method of delivery (instrument delivery, cesarean, hysterectomy, vaginal)
Birth attendant
Complications and/or patient complaints during delivery
Medications administered prior to and during delivery (general anesthetic, epidural, spinal anesthetic, local anesthetic)
Relevant laboratory tests and imaging results
Number of days admitted to hospital
Discharge and follow-up instructions
<b>Post Partum Care (up to 365 days post delivery, or Termination of Pregnancy (TOP))</b>
Attendance to post partum appointment/follow-up
Complications and/or complaints during postpartum period (up to one year after delivery/TOP)
Hospital Admissions, urgent care & emergency department visits during postpartum period (up to one year after delivery/TOP)
Medical specialist(s) seen during postpartum period
Relevant laboratory tests and imaging results
Referrals and consults during the postpartum course
Details on terminal event (circumstances surrounding death)
<b>Autopsy Report</b>
Cause of death
Microscopic and gross findings
Medical Examiner/Coroner's investigative narrative
Toxicology report
<b>Demographics</b>
Race
Ethnicity

# H. Data Abstraction Guide

Immigration status
Preferred language
Educational level
Martial status
Members of household
Type of insurance
Utilization of WIC and/or social support services
Distance between place of birth/death from decedent's residence
<b>Social Determinants of Health (Prior to pregnancy, during pregnancy and post-partum period)</b>
Source(s) of income
Barriers to healthcare: child care, cultural norms, distance, financial, transportation, mobility, availability of services
Barriers to communication: hearing impaired, functional illiteracy, speech impaired, language differences, vision impaired, cultural differences
Social or emotional stress: history of domestic violence/IPV, history of psychiatric hospitalizations or treatment, child protective services involvement, history of substance use, unemployment, pregnancy unwanted, recent trauma, prior suicide attempts, adverse childhood experiences, history of incarceration, housing instability, social support
<b>Additional Sources of Information</b>
Medical transport (ambulance, helicopter, other)
Police reports/interviews
Crash report for motor vehicle deaths
Vital records (birth certificate, death certificate, fetal death certificate)
Media
Maternal level of care of facility where services were obtained



# References

1. Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion (2020, February 4). *Pregnancy Mortality Surveillance System*. Retrieved from [https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Freproductivehealth%2Fmaternalinfanthealth%2Fpregnancy-mortality-surveillance-system.htm](https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Freproductivehealth%2Fmaternalinfanthealth%2Fpregnancy-mortality-surveillance-system.htm)
2. Amnesty International Publications. (2010). *Deadly delivery: the maternal healthcare crisis in the USA*. Retrieved from Amnesty International Secretariat Website: <http://www.amnestyusa.org/sites/default/files/pdfs/deadlydelivery.pdf>
3. Hunt, P., & Bueno de Mesquita., J. (2010). *Reducing maternal mortality –the contribution of the right to the highest attainable standard of health*. Retrieved from [https://www.unfpa.org/sites/default/files/pub-pdf/reducing\\_mm.pdf](https://www.unfpa.org/sites/default/files/pub-pdf/reducing_mm.pdf)
4. Tikkanen R, Gunja M, FitzGerald M, & Zephyrin L (2020). *Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries*. Retrieved from <https://www.commonwealthfund.org/publications/issue-briefs/2020/nov/maternal-mortality-maternity-care-us-compared-10-countries>
5. Building U.S. Capacity to Review and Prevent Maternal Deaths. (2018). *Report from nine maternal mortality review committees*. Retrieved from [http://reviewtoaction.org/Report from Nine MMRCs](http://reviewtoaction.org/Report_from_Nine_MMRCs)
6. Kielyka L, Mehta P, Schoellmann, K, Lake C, Zapata A, Herwehe J, Gruenfeld R, Plante L. Louisiana Maternal Mortality Review Report 2011-2016. (2018). Louisiana Department of Health. Retrieved from [http://ldh.la.gov/assets/oph/Center-PHCH/Center-PH/maternal/2011-2016\\_MMR\\_Report\\_FINAL.pdf](http://ldh.la.gov/assets/oph/Center-PHCH/Center-PH/maternal/2011-2016_MMR_Report_FINAL.pdf).
7. Martin, J. A., Hamilton, B. E., Osterman, M. J., & Driscoll, A. K. (2019). Births: Final Data for 2018. Hyattsville, MD: National Center for Health Statistics. Retrieved from [https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68\\_13-508.pdf](https://www.cdc.gov/nchs/data/nvsr/nvsr68/nvsr68_13-508.pdf)
8. Petersen, E. E., Davis, N. L., Goodman, D., Cox, S., Syverson, C., Seed, K., Shapiro-Mendoza, C., Callaghan, W. M., & Barfield, W. (2019). Racial/Ethnic Disparities in Pregnancy-Related Deaths - United States, 2007-2016. *MMWR. Morbidity and mortality weekly report*, 68(35), 762–765. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6730892/>
9. Bryant, A.S., Worjolah, A., Caughey, A.B., & Washington, A. E. (2010). Racial/ethnic disparities in obstetrical outcomes and care: prevalence and determinants. *American Journal of Obstetrics & Gynecology*, 202(4), 335–343. doi:10.1016/j.ajog.2009.10.864. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2847630/>
10. Gadson, A., Akpovi, E., & Mehta, P.K. Exploring the social determinants of racial/ethnic disparities in prenatal care utilization and maternal outcome. *Seminars in Perinatology*, 2017; 41(5), 308-317. doi:10.1053/j.semperi.2017.04.008. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/28625554/>
11. Wheeler SM, Bryant AS. Racial and Ethnic Disparities in Health and healthcare. *Obstet Gynecol Clin North Am*. 2017;44(1):1-11. doi:10.1016/j.ogc.2016.10.001. Retrieved from [https://www.obgyn.theclinics.com/article/S0889-8545\(16\)30080-8/abstract](https://www.obgyn.theclinics.com/article/S0889-8545(16)30080-8/abstract)
12. Gillispie-Bell V. (2021). The Contrast of Color: Why the Black Community Continues to Suffer Health Disparities. *Obstetrics & Gynecology*, 137(2), 220–224. <https://doi.org/10.1097/AOG.0000000000004226>
13. Louisiana PRAMS Data Report 2018. Louisiana Pregnancy Risk Assessment Monitoring System. Louisiana Department of Health. Retrieved from [https://partnersforfamilyhealth.org/wp-content/uploads/2018/12/2018PRAMSDataReport\\_9.4.2019\\_Final.pdf](https://partnersforfamilyhealth.org/wp-content/uploads/2018/12/2018PRAMSDataReport_9.4.2019_Final.pdf)
14. St. Pierre A, Zaharatos J, Goodman D, Callaghan W. Challenges and Opportunities in Identifying, Reviewing and Preventing Maternal Deaths (2018). *Obstetrics & Gynecology*, 131:138-142. doi: 10.1097/aog.0000000000002417. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/29215526/>
15. Committee on Obstetric Practice (2017). Committee Opinion No. 711: Opioid Use and Opioid Use Disorder in Pregnancy. *Obstetrics and gynecology*, 130(2), e81–e94. <https://doi.org/10.1097/AOG.0000000000002235>

# References

16. Krans, E. E., Campopiano, M., Cleveland, L. M., Goodman, D., Kilday, D., Kendig, S., Leffert, L. R., Main, E. K., Mitchell, K. T., O'Gurek, D. T., D'Oria, R., McDaniel, D., & Terplan, M. (2019). National Partnership for Maternal Safety: Consensus Bundle on Obstetric Care for Women With Opioid Use Disorder. *Obstetrics and gynecology*, 134(2), 365–375. <https://doi.org/10.1097/AOG.0000000000003381>
17. Substance Abuse and Mental Health Services Administration: Principles of Community-based Behavioral Health Services for Justice-involved Individuals: A Research-based Guide. HHS Publication No. SMA19-5097. Rockville, MD: Office of Policy, Planning, and Innovation. Substance Abuse and Mental Health Services Administration, 2019. Retrieved from: <https://store.samhsa.gov/sites/default/files/d7/priv/sma19-5097.pdf>
18. Chapter 2. What is Care Coordination?. Content last reviewed June 2014. Agency for Healthcare Research and Quality, Rockville, MD. <https://www.ahrq.gov/ncepcr/care/coordination/atlas/chapter2.html>. Last accessed on June 7, 2020.
19. Hillemeier, M. M., Domino, M. E., Wells, R., Goyal, R. K., Kum, H. C., Cilenti, D., Timothy Whitmire, J., & Basu, A. (2015). Effects of maternity care coordination on pregnancy outcomes: propensity-weighted analyses. *Maternal and child health journal*, 19(1), 121–127. <https://doi.org/10.1007/s10995-014-1502-3>
20. Hillemeier, M. M., Domino, M. E., Wells, R., Goyal, R. K., Kum, H. C., Cilenti, D., & Basu, A. (2018). Does Maternity Care Coordination Influence Perinatal healthcare Utilization? Evidence from North Carolina. *Health services research*, 53(4), 2368–2383. <https://doi.org/10.1111/1475-6773.12742>
21. Rutledge, R. I., Domino, M. E., Hillemeier, M. M., & Wells, R. (2016). The effect of maternity care coordination services on utilization of postpartum contraceptive services. *Contraception*, 94(5), 541–547. <https://doi.org/10.1016/j.contraception.2016.06.007>
22. McKinney, J., Keyser, L., Clinton, S., & Pagliano, C. (2018). ACOG Committee Opinion No. 736: optimizing postpartum care. *Obstetrics & Gynecology*, 132(3), 784–785. Retrieved from <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2018/05/optimizing-postpartum-care>
23. Clapp, M. A., James, K. E., & Kaimal, A. J. (2018). The effect of hospital acuity on severe maternal morbidity in high-risk patients. *American journal of obstetrics and gynecology*, 219(1), 111.e1–111.e7. <https://doi.org/10.1016/j.ajog.2018.04.015>
24. Patient Safety Bundles. Maternal Safety Bundles. Council on Patient Safety in Women's healthcare. 2020. Council on Patient Safety in Women's healthcare. Retrieved from: <https://safehealthcareforeverywoman.org/patient-safety-bundles/>.
25. Harrington C. Creating a High-Risk Pregnancy and Cardiovascular Clinic (2020) *Cardiology Magazine*. <https://www.acc.org/latest-in-cardiology/articles/2020/01/01/24/42/feature-creating-a-high-risk-pregnancy-and-cardiovascular-clinic>. Last accessed on June 7, 2020.
26. Vesga-López, O., Blanco, C., Keyes, K., Olfson, M., Grant, B. F., & Hasin, D. S. (2008). Psychiatric disorders in pregnant and postpartum women in the United States. *Archives of general psychiatry*, 65(7), 805–815. <https://doi.org/10.1001/archpsyc.65.7.805>
27. Wang, E., Glazer, K. B., Howell, E. A., & Janevic, T. M. (2020). Social determinants of pregnancy-related mortality and morbidity in the United States: A systematic review. *Obstetrics & Gynecology*, 135(4), 896–915. <https://pubmed.ncbi.nlm.nih.gov/32168209/>
28. Prather, C., Fuller, T. R., Marshall, K. J., & Jeffries, W. L., 4th (2016). The Impact of Racism on the Sexual and Reproductive Health of African American Women. *Journal of women's health (2002)*, 25(7), 664–671. <https://doi.org/10.1089/jwh.2015.5637>
29. National Highway Traffic Safety Administration. (n.d.). Seatbelts. Retrieved from National Highway Traffic Safety Administration Website : <https://www.nhtsa.gov/risky-driving/seat-belts>
30. Unite Louisiana. Retrieved from: <https://louisiana.uniteus.com/>
31. Committee on Obstetric Practice. (2017). Committee opinion no. 711: opioid use and opioid use disorder in pregnancy. *Obstetrics and gynecology*, 130(2), e81–e94. <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2017/08/opioid-use-and-opioid-use-disorder-in-pregnancy>

# References

32. Chou, S. T., Alsawas, M., Fasano, R. M., Field, J. J., Hendrickson, J. E., Howard, J., ... & Akl, E. A. (2020). American Society of Hematology 2020 guidelines for sickle cell disease: transfusion support. *Blood advances*, 4(2), 327-355. <https://ashpublications.org/bloodadvances/article/4/2/327/440607/American-Society-of-Hematology-2020-guidelines-for>
33. ACOG Committee on Obstetric Practice. (2019). Emergent therapy for acute-onset, severe hypertension during pregnancy and the postpartum period. Committee Opinion No. 767. *Obstet Gynecol*, 133, 409-412. <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2019/02/emergent-therapy-for-acute-onset-severe-hypertension-during-pregnancy-and-the-postpartum-period>
34. Committee on Obstetric Practice. (2017). Committee opinion no. 711: opioid use and opioid use disorder in pregnancy. *Obstetrics and gynecology*, 130(2), e81-e94. <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2017/08/opioid-use-and-opioid-use-disorder-in-pregnancy>
35. American College of Obstetricians and Gynecologists. (2011). At-risk drinking and alcohol dependence: obstetric and gynecologic implications. Committee Opinion, 496, 1-6. <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2011/08/at-risk-drinking-and-alcohol-dependence-obstetric-and-gynecologic-implications>
36. Olds, D. L. (2006). The nurse–family partnership: An evidence-based preventive intervention. *Infant Mental Health Journal*, 27(1), 5-25. <https://onlinelibrary.wiley.com/doi/abs/10.1002/imhj.20077>
37. Olds, D., Donelan-McCall, N., O'Brien, R., MacMillan, H., Jack, S., Jenkins, T., ... & Beeber, L. (2013). Improving the nurse–family partnership in community practice. *Pediatrics*, 132(Supplement 2), S110-S117. [https://pediatrics.aappublications.org/content/132/Supplement\\_2/S110.short](https://pediatrics.aappublications.org/content/132/Supplement_2/S110.short)
38. Wagner, M., Spiker, D., & Linn, M. I. (2002). The effectiveness of the Parents as Teachers program with low-income parents and children. *Topics in Early Childhood Special Education*, 22(2), 67-81. <https://journals.sagepub.com/doi/abs/10.1177/027112140220020101>
39. Pfannenstiel, J., Lambson, T., Yarnell, V., & Research and Training Associates Inc., & United States of America. (1991). Second wave study of the Parents as Teachers program: Executive summary. St. Louis, MO: Parents as Teachers National Center. <https://www.ojp.gov/ncjrs/virtual-library/abstracts/second-wave-study-parents-teachers-program-executive-summary>
40. McFarlane, J., Campbell, J. C., Sharps, P., & Watson, K. (2002). Abuse during pregnancy and femicide: urgent implications for women’s health. *Obstetrics & Gynecology*, 100(1), 27-36. <https://pubmed.ncbi.nlm.nih.gov/12100800/>
41. Widome R, Brock B, Noble P, Forster JL. (2013) The relationship of neighborhood demographic characteristics to point-of-sale tobacco advertising and marketing. *Ethnicity & Health*. 18(2):136-151. Doi: 10.1080/13557858.2012.701273. <https://pubmed.ncbi.nlm.nih.gov/22789035/>
42. National Highway Traffic Safety Administration. (n.d.). If You’re Pregnant - Seat Belt Recommendations for Drivers and Passengers. Retrieved from National Highway Traffic Safety Administration Website: <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/pregnant-seat-belt-use.pdf>
43. § 790.401 Fla. Stat. (2020). [http://www.leg.state.fl.us/statutes/index.cfm?App\\_mode=Display\\_Statute&Search\\_String=&URL=0700-0799/0790/Sections/0790.401.html](http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0700-0799/0790/Sections/0790.401.html)
44. Giffords Law Center. (2020, October 1). Minimum Age to Purchase & Possess in Louisiana. Retrieved from Giffords Law Center Website: <https://giffords.org/lawcenter/state-laws/minimum-age-to-purchase-possess-in-louisiana>
45. Peterson, G. F., & Clark, S. C. (2015). Forensic Autopsy Performance Standards. National Association of Medical Examiners. <https://www.thename.org/assets/docs/2016%20NAME%20Forensic%20Autopsy%20Standards%209-25-2020.pdf>
46. Centers for Disease Control and Prevention. (2020, October 9). Intimate Partner Violence: Prevention Strategies. Retrieved from CDC Injury Center: Violence Prevention: <https://www.cdc.gov/violenceprevention/intimatepartnerviolence/prevention.html>