**Florida's Maternal Mortality Review Committee
2019 Update**


**Prepared by:**


**Leticia Hernandez, PhD, MS**
MCH Epidemiologist
Maternal and Child Health Section

**Angela Thompson, RN, BSN**
Community Health Nursing Consultant and FLMMRC Coordinator
Maternal and Child Health Section


**Division of Community Health Promotion
Florida Department of Health**

**September 2021**

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**Executive Summary**

Florida's Maternal Mortality Review Committee (FLMMRC), formerly called Pregnancy-Associated Mortality Review, is an ongoing surveillance process that involves data collection and examination of maternal deaths to promote evidence-based actions for individual behavior changes, health care system improvements, and prevention of pregnancy-related deaths (PRDs). For additional details about the FLMMRC and process, please refer to Appendix 2.

The 2019 Update provides an overview and comparison of PRD data and trends for Florida between 2009 and 2019. Distributions of PRDs are shown by race/ethnicity, age, body mass index (BMI), timing of death, pregnancy outcome, type of delivery, cause of death, and when applicable, pregnancy-related mortality ratios (PRMRs).

The data linkage process identified 206 Florida resident pregnancy-associated deaths (PADs) from January 1, 2019 to December 31, 2019. The FLMMRC selected 64 cases to review, with priority given to those most likely to be pregnancy-related, followed by those possibly related and some not pregnancy-related. Upon full team review of the 64 PADs, the FLMMRC found that 43 (67.2%) were pregnancy-related.

The 2019 PRMR in Florida was 19.5 per 100,000 live births. Although the 2019 PRMR was lower than the 2009 ratio (26.2 per 100,000 live births), the trend for the period 2009-2019 was not statistically significant. The highest PRMR was in non-Hispanic Black women with 38.9 per 100,000 live births. This PRMR was 2.0 times that of non-Hispanic White women (19.8 per 100,000 live births).

**Key findings for 2019**:

The leading pregnancy-related causes of death in 2019 were thrombotic embolism (20.9%), hypertensive disorders (14.0%), cardiovascular problems (11.6%), infection (11.6%), and hemorrhage (7.0%).

- Of the 43 PRDs:
    - 41.9% were non-Hispanic White women
    - 41.9% were non-Hispanic Black women
    - 14.0% were Hispanic women
    - 2.3% were non-Hispanic Other Race women

- Of the 43 PRDs, 33 (76.8%) occurred during the postpartum period:
    - 41.9% of all PRDs occurred postpartum prior to hospital discharge
    - 34.9% of all PRDs occurred postpartum after hospital discharge

- PRDs by pregnancy outcome:
    - 62.7% after a live birth delivery
    - 14.0% after a stillbirth
    - 14.0% emergency delivery (an unplanned emergency C-section)
    - 4.7% after an ectopic pregnancy
    - 2.3% molar pregnancy
    - 2.3% abortion

- Of the 43 PRDs, 37(86.0%) occurred during or after delivery:
    - 58.1% (25) had C-section as a delivery method
        - 20.9% were planned C-section deliveries
        - 37.2% were unplanned C-section deliveries

- 31 PRDs (72.1%) were overweight or obese women based on their BMI classifications

The Florida Department of Health (Department) uses FLMMRC data, including contributing factors and care improvement recommendations, to prioritize areas for quality improvement changes. The Department collaborates and contracts with the Florida Perinatal Quality Collaborative (FPQC), at the University of South Florida, to develop quality improvement initiatives for Florida hospitals. This collaboration fosters the transformation of FLMMRC recommendations into actions.

Identified risks and contributing factors among clinical providers, facilities, health care systems, communities, and individuals are used to form recommendations for care improvement. The leading recommendations in 2019 were classified in the following themes:

- Improve training/education
- Enforce policies and procedures
- Improve access to quality care
- Improve patient/provider communication
- Improve procedures related to communication and coordination between providers
- Improve standards regarding assessment, diagnosis, and treatment decisions
- Improve policies regarding prevention initiatives, including screening procedures and substance use prevention or treatment programs
- Improve access to medical records
- Improve autopsy referral and acceptance

Current FPQC quality care improvement initiatives funded by the Department include:

- The Maternal Opioid Recovery Effort (MORE) Initiative that addresses women with opioid use disorder during pregnancy.
- The Promoting Primary Vaginal Deliveries (PROVIDE) 2.0 Initiative that aims to reduce the rate of primary cesarean section (C-section) deliveries in the state.

Aggregate FLMMRC findings and recommendations are also disseminated to clinical partners such as the American College of Obstetricians and Gynecologists (ACOG), Association of Women's Health, Obstetric, and Neonatal Nurses, Healthy Start, etc. via urgent messages, grand rounds presentations, newsletters, and conferences.

**Pregnancy-Related Mortality Findings—Florida, 2019**

Florida's Maternal Mortality Review Committee (FLMMRC), formerly called Pregnancy-Associated Mortality Review, is an ongoing surveillance process that involves data collection and examination of maternal deaths to promote evidence-based actions for individual behavior changes, health care system improvements, and prevention of pregnancy-related deaths. For FLMMRC processes see Appendix 2.

**Pregnancy-Associated and Pregnancy-Related Deaths**

A pregnancy-associated death (PAD) is a death of a woman from any cause, while she is pregnant or within one year of termination of pregnancy, regardless of the duration and site of the pregnancy. A pregnancy-related death (PRD) is a death of a woman directly attributed to pregnancy and/or childbirth. PRDs are subsets of PADs. Florida's pregnancy-associated mortality ratios (PAR) and pregnancy-related mortality ratios (PRMR) are shown in Figure 1.

**Figure 1. Pregnancy-Associated Mortality Ratios (PAR) and Pregnancy-Related Mortality Ratios (PRMR), Florida, 2009–2019**
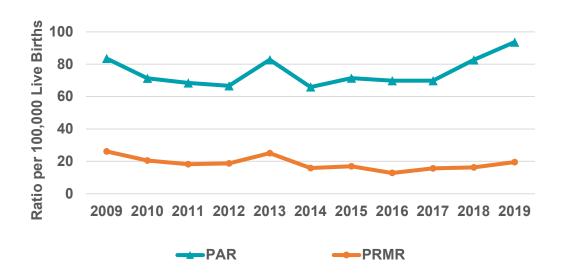


**Table 1. Total Pregnancy-Associated Deaths and Pregnancy-Related Deaths, Florida, 2009–2019**

| Year | # PAD | # PRD | % PRD | Year | # PAD | # PRD | % PRD |
|------|-------|-------|-------|------|-------|-------|-------|
| 2009 | 185 | 58 | 31.4 | 2015 | 160 | 38 | 24.0 |
| 2010 | 153 | 44 | 28.8 | 2016 | 157 | 29 | 18.5 |
| 2011 | 146 | 39 | 26.7 | 2017 | 156 | 35 | 22.4 |
| 2012 | 142 | 40 | 28.2 | 2018 | 183 | 36 | 19.7 |
| 2013 | 178 | 54 | 30.3 | 2019 | 206 | 43 | 20.9 |
| 2014 | 145 | 35 | 24.1 | | | | |

- The total number of PADs in Florida ranged from 142 to 206 per year between 2009 and 2019. The number of PADs in 2019 was 206.
- The proportion of PADs that were pregnancy-related ranged from 18.5% to 31.4% between 2009 and 2019. In 2019, 20.9% of PADs were determined to be PRDs by the FLMMRC.
- The PAR did not show a statistically significant trend during the period from 2009 to 2019, ranged for a low of 65.9 in 2014 to a high of 93.6 in 2019.
- From 2009–2019, the overall Florida PRMR fluctuated from a high of 26.2 in 2009 and a low of 12.9 in 2016. The PRMR in 2019 was 19.5 deaths per 100,000 live births. The trend for the period 2009–2019 was not statistically significant.

**Not-Pregnancy-Related Deaths**

Not-Pregnancy-Related Deaths (NPRD) are a subset of PAD. The causes of maternal death in the NPRD ratios for 2009–2019, based on documentation in the death certificates, are shown in Figure 2. These maternal deaths were identified through the case identification process described in Appendix 2. In 2019, the NPRD death ratio per 100,000 live births due to drug related causes was 20.0, followed by other causes with a ratio of 19.5, motor vehicle accidents (MVA) with a ratio of 8.6, homicides with a ratio of 6.8, and suicides with a ratio of 1.4 per 100,000 live births.
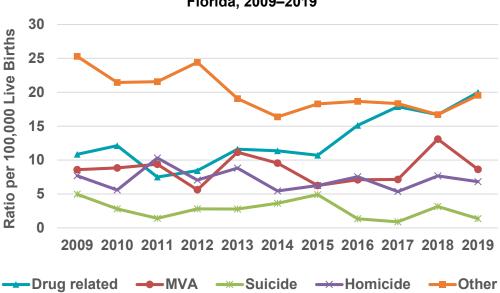


**Figure 2. Not-Pregnancy-Related Death Ratios by Cause of Death, Florida, 2009–2019**

**Pregnancy-Related Mortality Ratios (PRMR)**

A measure of PRDs is the PRMR. The PRMR is the number of PRDs per 100,000 live births. In assessing mortality, it is customary to view mortality measures over an extended period to

identify increasing or decreasing trends. Figure 3 displays PRMRs for Florida between 2009 and 2019 by race and Hispanic ethnicity.
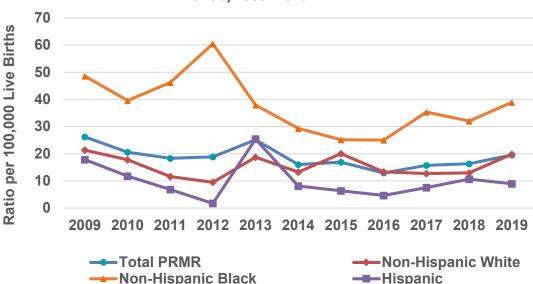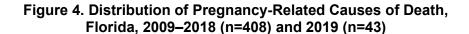
**Figure 3. Pregnancy-Related Mortality Ratios (PRMRs) by Race/Ethnicity, Florida, 2009–2019**
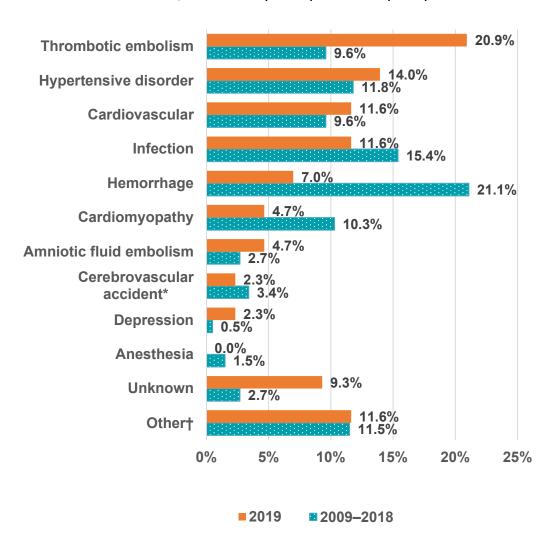


- From 2009–2019, the overall Florida PRMR fluctuated from a high of 26.2 in 2009 and a low of 12.9 in 2016. The PRMR in 2019 was 19.5 deaths per 100,000 live births. The trend for the period was not statistically significant.
- As evidenced in Figure 3, Florida PRMRs exhibited consistent racial disparities but the gap between non-Hispanic Blacks and non-Hispanic Whites between 2009 and 2019 decreased from 6.4 in 2012 to 2.0 in 2019. Throughout this study period, non-Hispanic Black women exhibited higher PRMRs than non-Hispanic White or Hispanic women.
- In 2012, the PRMR for non-Hispanic Black women was 60.5, an all-time high.
- In 2019, the PRMR per 100,000 live births was 38.9 for non-Hispanic Black women, 19.9 for non-Hispanic White women, and 8.9 for Hispanic women.

**Cause of Pregnancy-Related Deaths**

The FLMMRC determines a primary underlying cause of death for each PRD reviewed.
- In 2019, the leading underlying causes of PRDs were thrombotic embolism (20.9%), hypertensive disorder (14.0%), cardiovascular problems (11.6%), infection (11.6%), and hemorrhage (7.0%).
- Figure 4 and Table 2 show how the percentage of deaths for thrombotic embolism, hypertensive disorder, cardiovascular problems, amniotic fluid embolism, other remaining causes and unknown were higher in 2019 compared with the period 2009–2018. Also, Figure 4 and Table 2 show decreases in the percentage of deaths in 2019 due to hemorrhage, infection, cardiomyopathy, and cerebrovascular accident. Depression was identified for the first time as an underlying cause of death in 2018.

**Figure 4. Distribution of Pregnancy-Related Causes of Death, Florida, 2009–2018 (n=408) and 2019 (n=43)**

| Cause | 2019 | 2009–2018 |
|---|---|---|
| Thrombotic embolism | 20.9% | 9.6% |
| Hypertensive disorder | 14.0% | 11.8% |
| Cardiovascular | 11.6% | 9.6% |
| Infection | 11.6% | 15.4% |
| Hemorrhage | 7.0% | 21.1% |
| Cardiomyopathy | 4.7% | 10.3% |
| Amniotic fluid embolism | 4.7% | 2.7% |
| Cerebrovascular accident* | 2.3% | 3.4% |
| Depression | 2.3% | 0.5% |
| Anesthesia | 0.0% | 1.5% |
| Unknown | 9.3% | 2.7% |
| Other† | 11.6% | 11.5% |

■ 2019   ■ 2009–2018

*Cerebrovascular accident with no known hypertensive disorders.
†Other comprises various causes of deaths not easily captured with enough numbers in a homogeneous category.

**Table 2. Distribution of Causes of Pregnancy-Related Death, Florida, 2009–2018 and 2019**

| Causes of Deaths | 2009–2018 | 2019 | Change in Percentage |
|---|---|---|---|
| | N (%) | | |
| Thrombotic embolism | 39 (9.6) | 9 (20.9) | 117.7 |
| Hypertensive disorder | 48 (11.8) | 6 (14.0) | 18.6 |
| Infection | 63 (15.4) | 5 (11.6) | -24.7 |
| Cardiovascular | 39 (9.6) | 5 (11.6) | 20.8 |
| Other† | 47 (11.5) | 5 (11.6) | 0.8 |
| Hemorrhage | 86 (21.1) | 3 (7.0) | -66.8 |
| Cardiomyopathy | 42 (10.3) | 2 (4.7) | -54.4 |
| Amniotic fluid embolism | 11 (2.7) | 2 (4.7) | 74.1 |
| Cerebrovascular accident* | 14 (3.4) | 1 (2.3) | -32.4 |
| Depression | 2 (0.5) | 1 (2.3) | 360.0 |
| Anesthesia | 6 (1.5) | 0 (0.0) | - |
| Total | 408** | 43** | |

†Other remaining causes include hematopoietic, collagen vascular diseases, metabolic (pregnancy related or not related), injury, cancer, pulmonary problems, neurologic/neurovascular problems, multiple organ/system failure, gastrointestinal disorders, and other conditions.
*Cerebrovascular accident no known hypertensive disorders.
**Total includes unknowns.

## Pregnancy-Related Deaths by Age

Examination of age at death can point toward the presence and types of PRD protective or risk factors among age groups, such as biological effects of the aging process. PRD distribution and PRMRs (number of PRDs per 100,000 live births) by age group are shown in Figures 5a and 5b.
- In 2019, no maternal deaths for young women less than 20 years old were observed. The highest percentage of maternal deaths (34.9%) occurred in women 35+ years old. In contrast, fewer mothers ages 20-24 and 25-29 died in 2019 compared with 2009–2018 as shown in Figure 5a.

**Figure 5a. Distribution of Pregnancy-Related Deaths by Age, Florida, 2009–2018 (n=408) and 2019 (n=43)**
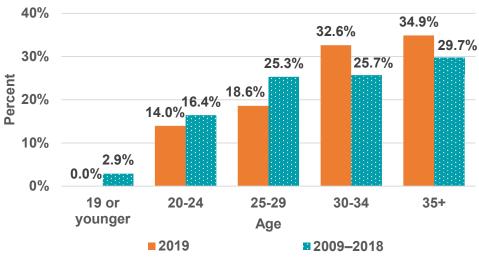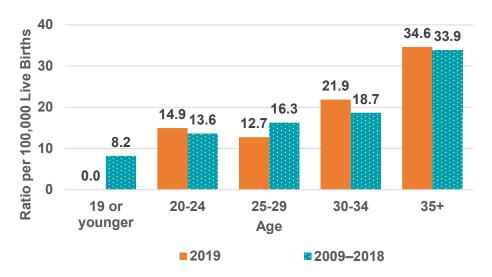


**Figure 5b. Pregnancy-Related Mortality Ratios by Age, Florida, 2009–2018 (n=408) and 2019 (n=43)**



- In 2019, the PRMR of mothers age 35 or older (34.6 per 100,000 live births) was almost 2 times (1.6) the PRMR of mothers 30-34 years old (21.9), shown in Figure 5b.

**Pregnancy-Related Deaths by Timing of Death**

The FLMMRC process classifies timing of death into categories defined by the three perinatal periods in which PRDs can occur: prenatal, labor and delivery, and postpartum. The postpartum period is divided into two subcategories: postpartum not discharged from the hospital and postpartum discharged from the hospital. [See Appendix 1 for detailed definitions]. PRDs by timing of death between 2009–2018 and 2019 are shown in Figure 6.
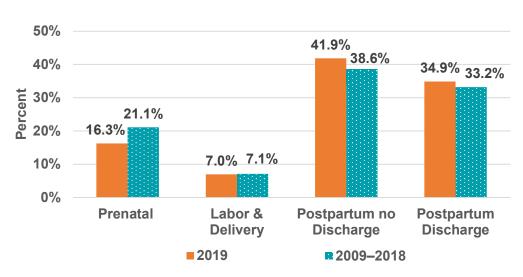
**Figure 6. Distribution of Pregnancy-Related Deaths by Timing of Death, Florida, 2009–2018 (n=408) and 2019 (n=43)**



- In 2019, the percentage of deaths during postpartum no discharge and postpartum discharge were higher than the percentage from 2009–2018. In 2019, 41.9% of deaths occurred before hospital discharge. It is necessary to mention that this category contains deaths even when the initiating adverse event may have happened either prenatally or during labor and delivery.
- Thirty-five of PRDs occurred after discharge from the hospital.
- In 2019, most PRDs (76.8%) occurred during the postpartum period. There are differences between the causes of death in the postpartum period by hospital discharge status.
    - Of the postpartum PRD cases who were not discharged from the hospital, the causes were: hemorrhage (three deaths), hypertensive disorder (three deaths), infection (two deaths), thrombotic embolism (two deaths), amniotic fluid embolism (one death), cerebrovascular accident (one death), other remaining causes (three deaths), and unknown cause (three deaths).
    - Of the women who died after hospital discharge, the PRDs that occurred during the first six weeks postpartum were due to cardiovascular problems (four deaths), thrombotic embolism (three deaths), hypertensive disorder (two deaths), cardiomyopathy (one death), other remaining causes (one death), and unknown cause (one death).
    - For women who died after six-weeks postpartum and were discharged from the hospital, the causes of deaths were cardiomyopathy (one death), infection (one death), and depression (one death).

**Pregnancy-Related Deaths by Pregnancy Outcome**

In the FLMMRC process, pregnancy outcomes are classified as live birth, emergency delivery, undelivered, ectopic, abortion, and stillbirth. [See Appendix 1 for detailed pregnancy outcome definitions]. Figure 7 below shows PRDs by pregnancy outcome in Florida for 2019 versus 2009–2018.
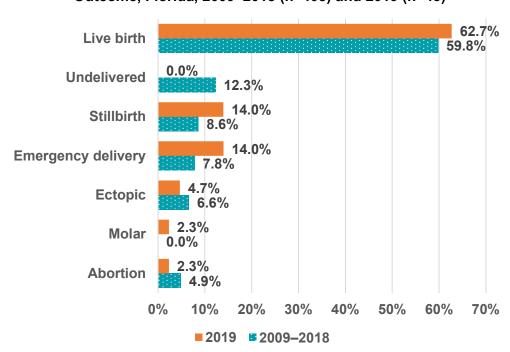
**Figure 7. Distribution of Pregnancy-Related Deaths by Pregnancy Outcome, Florida, 2009–2018 (n=408) and 2019 (n=43)**

| Outcome | 2019 | 2009–2018 |
|---|---|---|
| Live birth | 62.7% | 59.8% |
| Undelivered | 0.0% | 12.3% |
| Stillbirth | 14.0% | 8.6% |
| Emergency delivery | 14.0% | 7.8% |
| Ectopic | 4.7% | 6.6% |
| Molar | 2.3% | 0.0% |
| Abortion | 2.3% | 4.9% |

■ 2019  ▦ 2009–2018

*There were six emergency deliveries in 2019, all were live births.

- In 2019, the majority of PRDs (72.1%) occurred after a live birth and 14.0% were stillbirth or emergency delivery.
- In 2019, there were 95 surviving children of mothers who died of PRDs.

**Pregnancy-Related Deaths by Type of Delivery**

Type of delivery is classified by the FLMMRC as either vaginal or C-section. C-section deliveries are further defined as planned and unplanned. [See Appendix 1 for type of delivery definitions]. Figure 8 illustrates the PRD distribution by type of delivery for the women who died during the labor and delivery or postpartum period.
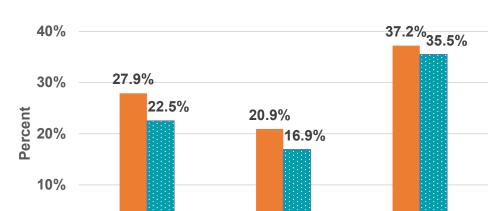
**Figure 8. Distribution of Pregnancy-Related Deaths by Type of Delivery, Florida, 2009–2018 (n=408), 2019 (n=43)**



- In 2019, 58.1% of PRD cases that occurred during the labor and delivery or postpartum periods were by C-section deliveries. Of the C-section cases (25) 84% were performed in response to an adverse event. In comparison, 36.5% of all live births in Florida were C-section deliveries in 2019 (not shown in figure 8) [1].
- Thirty-seven percent of the C-section deliveries among the PRD cases that occurred in 2019 were unplanned and 37% of those were emergency deliveries.

**Pregnancy-Related Death by Pre-pregnancy Body Mass Index**

Body mass index (BMI) is a calculated measure of the relative percentage of body fat based on height and weight. FLMMRC uses the following six BMI categories to examine associations between weight before pregnancy and PRD: underweight, normal weight, overweight, and obese Class I, obese Class II, and obese Class III. [See Appendix 1 for detailed definitions of BMI calculations and BMI categories]. Distributions of PRDs and PRMRs by BMI category are shown in Figures 9a and 9b, respectively.

**Figure 9a. Distribution of Pregnancy-Related Deaths by Pre-pregnancy BMI, Florida, 2009–2018 (n=408) and 2019 (n=43)**



- In 2019, 72.1% of women who experienced a PRD had overweight/obese (overweight plus the three obese categories) pre-pregnancy BMIs (Figure 9a). In contrast, during the same year, 54.7% of all Florida women who had a live birth were in the overweight/ obese pre-pregnancy category (not shown in figure 9a) [1].

**Figure 9b. Pregnancy-Related Mortality Ratios by Pre-pregnancy BMI, Florida, 2009–2018 (n=408) and 2019 (n=43)**



- As shown in Figure 9b, in 2019, there were 13.1 maternal deaths per 100,000 live births at the underweight category. The PRMR per 100,000 live births was 12.6 with normal pre-pregnancy BMIs, 19.0 with overweight, and 15.7, 46.8, and 78.9 with obese Class I, Class II, and Class III pre-pregnancy BMIs, respectively.

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**Assessing Preventability of Maternal Deaths in Florida in 2019**

Since 2017, FLMMRC has been using the Maternal Mortality Review Information Application (MMRIA) [2]. MMRIA is an electronic data system designed to support standardized data collection and help Maternal Mortality Review committees organize available data and begin the critical steps necessary to comprehensively identify, access, and abstract cases. MMRIA developed the following definition 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 in patient care. MMRIA allows the committee to document their decision using two approaches: 1) determining preventability as yes or no, and/or 2) determining the chance to alter outcomes using a scale that indicates good chance, some chance, no chance, or unable to determine. Preventability happens at many levels, at the system level, provider level, community, or individual level.

- Good chance: A case with a good chance for an altered outcome would likely have one or more identified factors that contributed to the death (e.g., misdiagnosis, wrong drug, or patient action) so that if the correct diagnosis had been made (or correct drug given or patient action had been different), the fatal course would have been reversed. For a good chance to alter outcomes, there are often obvious deficiencies for which there are clear alternative actions that can be identified retrospectively. The alternative actions would likely target precipitating conditions or actions that either set in motion a cascade of unsuccessful catch-up or salvage actions or were critical tipping points after which little could have been done.
- Some chance: A case with some chance for an altered outcome would have fewer or weaker contributing factors and fewer or less specific identified quality improvement areas. These cases may parallel cases of women with similar conditions who survived, in that there may be a multitude of factors and actions that could have been reversed. However, in these cases, it would have required actions that were beyond what could feasibly be accomplished in that setting or required an uncommon synchronization of corrective actions to have occurred. So, while there is usually something that could have been done to have improved care, and possibly reversed the fatal trajectory, the specific actions and their impact are less clear.
- No chance: A case with no chance to alter outcome has no clear point of prevention or intervention identified. In such cases, no intervenable risks were presented and there were no instances where improved care or alternative actions might have changed the outcome.
- Unable to determine: A case when it is not possible to ascertain if there was a good chance or some chance to alter an outcome.

**Results**

Overall, in 2019, 37.2% of PRDs had a good chance to alter the outcome, 16.2% had some chance to alter the outcome, and 14.0% were unable to determine if the PRD had good or some chance to alter the outcome for a total of 67.4% of deaths considered to be preventable (Table 3a).

In 2019, four causes of death (infection, hemorrhage, depression, and other remaining causes) were deemed to be 100% preventable, they were followed by hypertensive disorders (83.3%), cardiomyopathy (50.0%), amniotic fluid embolism (50.0%), unknown (50.0%), thrombotic embolism (44.4%), and cardiovascular problems (40.0%), shown in Table 3a.

Also, deaths determined to be preventable varied by timing of death in relation to pregnancy.

Women who died during pregnancy, within 42 days, and 43 days to 1 year had 57.1%, 67.7%, and 80.0% of preventability, respectively (Table 3b).

**Table 3a. Distribution of Preventability among Pregnancy-Related Death by Cause, Florida, 2019 (n=43)**

| Cause of PRDs | Total | % Preventable | PRDs by Chance to Alter Outcome | | | |
|---|---|---|---|---|---|---|
| | | | Good | Some | Unable to Determine | None |
| Thrombotic embolism | 9 | 33.3% | 2 | 1 | 1 | 5 |
| Hypertensive disorder | 6 | 83.3% | 4 | 1 | 0 | 1 |
| Cardiovascular | 5 | 40.0% | 1 | 0 | 1 | 3 |
| Infection | 5 | 100.0% | 4 | 0 | 1 | 0 |
| Hemorrhage | 3 | 100.0% | 3 | 0 | 0 | 0 |
| Cardiomyopathy | 2 | 50.0% | 0 | 1 | 0 | 1 |
| Amniotic fluid embolism | 2 | 50.0% | 0 | 1 | 0 | 1 |
| Cerebrovascular accident | 1 | 0.0% | 0 | 0 | 0 | 1 |
| Depression | 1 | 100.0% | 1 | 0 | 0 | 0 |
| Other remaining causes* | 5 | 100.0% | 1 | 3 | 1 | 0 |
| Unknown | 4 | 50.0% | 0 | 0 | 2 | 2 |
| Total | 43 | 67.4% | 16 | 7 | 6 | 14 |

*Other remaining causes comprises various causes of deaths not easily captured with enough numbers in a homogeneous category.

**Table 3b. Distribution of Preventability among Pregnancy-Related Deaths by Timing in Relation to Pregnancy, Florida 2019 (n=43)**

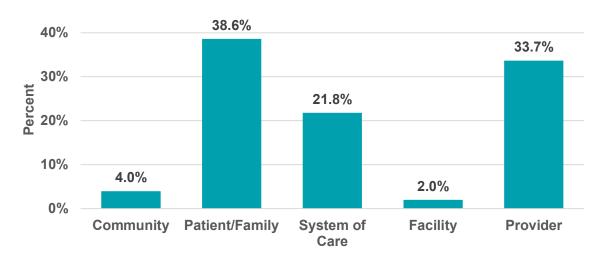| Timing | Total | % Preventable | PRDs by Chance to Alter Outcome | | | |
|---|---|---|---|---|---|---|
| | | | Good | Some | Unable to Determine | None |
| While pregnant | 7 | 57.1% | 2 | 0 | 2 | 3 |
| Within 42 days | 31 | 67.7% | 11 | 6 | 4 | 10 |
| 43 days to 1 year | 5 | 80.0% | 3 | 1 | 0 | 1 |
| Total | 43 | 67.4% | 16 | 7 | 6 | 14 |

**FLMMRC Identified Factors for PRDs**

After reviewing PRD cases, the FLMMRC identifies relevant factors related to each death and makes recommendations to promote system improvements. The FLMMRC identifies factors that contributed to the death. These factors form the basis for the FLMMRC recommendations and are categorized into five prevention categories: community, patient/family, system of care, facility, and provider. The following narrative outlines how the FLMMRC used the five categories to classify the recommendations during the 2019 review. A consistent message that has been established is that a woman's health prior to her pregnancy (preconception health) can greatly affect birth outcomes, as well as her health status after birth.

**Factor Results**

In 2019, the FLMMRC identified 101 contributing factors among 43 PRDs; on average, 2.3 contributing factors were identified for each PRD. The largest proportion of factors were classified under the patient/family category, followed by the provider category and then system of care category (Figure 10).

**Figure 10. Distribution of Contributing Factors among Pregnancy-Related Deaths, Florida, 2019 (n=43)**



The categories and numbers of contributing factors vary by cause of PRD (Table 4). The causes of death with the most contributing factors per death were depression, infection, and hypertensive disorders.

**Table 4. Cause of Death by Contributing Factor Category, Florida, 2019 (n=43)**

| Cause of Death | Total Factors | Contributing Factors | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Pregnancy-Related Deaths | Factors per Death | Patient or Family | Provider | System of Care | Community | Facility |
| Infection | 17 | 5 | 3.4 | 4 | 6 | 4 | 1 | 2 |
| Hypertensive disorder | 15 | 6 | 2.5 | 6 | 8 | 1 | | |
| Thrombotic embolism | 14 | 9 | 1.6 | 6 | 3 | 5 | | |
| Cardiovascular | 12 | 5 | 2.4 | 6 | 3 | 2 | 1 | |
| Hemorrhage | 8 | 3 | 2.7 | 2 | 5 | 1 | | |
| Cardiomyopathy | 5 | 2 | 2.5 | 2 | 2 | | 1 | |
| Depression | 4 | 1 | 4.0 | | 1 | 3 | | |
| Cerebrovascular accident | 2 | 1 | 2.0 | 2 | | | | |
| Amniotic fluid embolism | 1 | 2 | 0.5 | 1 | | | | |
| Other remaining causes* | 17 | 5 | 3.4 | 8 | 5 | 3 | 1 | |
| Unknown | 6 | 4 | 1.5 | 2 | 1 | 3 | | |
| Total | 101 | 38 | 2.7 | 39 | 34 | 22 | 4 | 2 |

*Other comprises causes of deaths not easily captured with enough numbers in a homogeneous category.

For each of the leading causes of PRDs, a summary of the most common contributing factor categories and the most common contributing factor classes is presented.

Thrombotic Embolism:
- Patient/family factors comprised 42.9% of the total contributing factors for thrombotic embolism deaths. The most common class category for patient/family contributing factors was significant chronic diseases.
- System of care factors accounted for 35.7% of the total contributing factors for thrombotic embolism deaths. The most common class categories for system of care contributing factors was lack of standardized policies and procedures.
- Provider factors comprised 21.4% of the total contributing factors for thrombotic embolism deaths. The most common class category for provider factors was knowledge/skill/assessments.

Hypertensive Disorders:
- Provider factors comprised 53.3% of the total contributing factors for hypertensive disorder deaths. The most common class category for provider contributing factors was knowledge/skill/assessment.
- Patient/family factors comprised 40.0% of the total contributing factors for hypertensive disorder deaths. The most common class categories for patient/family contributing factors were chronic diseases and personal decisions.

Infection:
- Provider factors accounted for 35.3% of the total contributing factors for infection deaths. The most common class categories for provider contributing factors were knowledge/ skill/assessment, delay of diagnosis, and delay of treatment.
- Patient/family factors comprised 23.5% of the total contributing factors for infection deaths. The most common class categories for patient/family contributing factors were chronic diseases, substance abuse, and delay in seeking care.
- System of care factors comprised 23.5% of the total contributing factors for infection deaths. The most common class categories for system of care contributing factors were lack of standardized policies and procedures and inadequate records.

Cardiovascular (Excluding Cardiomyopathy):
- Patient/Family factors comprised 50.0% of the total contributing factors for deaths due to cardiovascular problems. The most common class categories for patient/family contributing factors were chronic diseases and personal decisions.
- Provider factors comprised 25.0% of the total contributing factors for deaths due to cardiovascular problems. The most common class category was knowledge/skill/ assessment.
- System of care factors comprised 16.7% of the total contributing factors for cardiovascular deaths. The most common class categories for system of care contributing factors were lack of standardized policies and procedures and lack of care coordination.

Hemorrhage:
- Provider factors accounted for 62.5% of the total contributing factors for hemorrhage deaths. The most common class categories for provider contributing factors were knowledge/skill/assessments and delay of treatment.
- Patient/family factors comprised 25.0 % of the total contributing factors for hemorrhage deaths. The most common class categories for patient/family contributing factors were chronic diseases and delay in seeking care.

Disclaimers:
- The purpose of identifying contributing factor categories and classes is not to assign blame but rather to identify areas where improvements can be made.
- The contributing factors decisions are largely dependent upon information abstracted from medical records. Such records lend themselves to the perspective of the provider, facility, and system of care categories. However, the patient/family perspective is often interpreted through the provider lens which limits full understanding. Future incorporation of geospatial coding can enhance our understanding of the patient/family and community contexts by taking into consideration predominant social determinants of health in the community in which the woman lived and received care.

**FLMMRC Recommendations and Actions that Address the Contributing Factors**

The FLMMRC identified 107 recommendations among 43 pregnancy-related deaths; on average, almost three recommendations were identified for every PRD. Additionally, it is imperative to mention that 21 (20%) of all recommendations are dedicated to the importance of preconception health. "Women of reproductive age should be at optimal health and at optimal weight before becoming pregnant."

This report uses the themes included in the "Report from Nine Maternal Mortality Review Committees," to address the recommendations [3]. Next are the most common themes and their recommendations.

**Improve training/education:**

- Providers should follow ACOG guidelines on postpartum management.
- Providers should provide education on the risk of home births.
- Providers should be educated on how to communicate and work with women who use substances or refer to another provider with expertise.
- Providers should impart education to patients about the potential for a pregnancy to exacerbate chronic health conditions.
- It is important to promote education of patients and providers about Medicaid eligibility.
- Providers should be educated on Medicaid eligibility for undocumented immigrants.

**Enforce policies and procedures:**

- Providers should use a maternal early warning system (MEWS) to monitor and assess patient's status to provide prompt treatment.
- Obstetric (OB) providers should get guidance on how to collaborate and provide quality health care to women with substance use disorders.
- Providers should follow recommendations of MEWS protocol during postpartum care.
- It is important to develop protocols and guidelines for emergency departments (ED) and OB providers that address referrals and care coordination of high-risk women.
- Providers should follow standard chemoprophylaxis guidelines for post-operative patients.
- Facilities should improve access and assistance with payment for mental health services.

**Improve access to quality care:**

- OB providers should ensure that high-risk women of reproductive age receive preconception and interconception care for family planning.
- It is necessary to raise awareness among the public that women with chronic health conditions should see a provider before pregnancy for counseling and minimizing risks of pregnancy.
- Postpartum women, with known mental health issues, should receive frequent visits and screening for risks.
- Providers should offer pregnancy risk assessment to mothers with pre-existing chronic health conditions.
- Reproductive life planning is critically important for women of childbearing age with chronic health conditions.

- It is important for women with underlying health conditions to obtain preconception care.
- Women should be at optimal health and at an optimal weight before becoming pregnant.
- Florida prenatal risk screen should be initiated in emergency departments when pregnant women present with no history of prenatal care.
- Encourage women with underlying chronic health illness to manage the condition prior to pregnancy.
- Women should seek prenatal care in the first trimester of pregnancy.
- Women with underlying chronic health conditions need interconception care.
- Women should understand the importance of obtaining early and consistent prenatal care.
- High risk pregnant women should have care coordination.
- It is important to consider a referral to Healthy Start to follow-up on high risk women who signed out against medical advice.
- Women with chronic diseases should adhere to smoking cessation recommendations.
- It is important to include a complete set of vital signs for the postpartum visits.

**Improve patient/provider communication:**

- Pregnant women should adhere to medical care, treatment, and recommendations made by their health care provider.
- Pregnant women who sign out against medical advice should have shared decision-making planning.
- Providers should ensure that patients understand their diagnosis.
- Appropriate translators should be available.
- Providers should deliver patient centered care and education to address risks.

**Improve standards regarding assessment, diagnosis, and treatment decisions:**

- Transplant centers should add documentation of family planning assessment and referral to their long-term care checklist.
- It is important to explore if ED providers can perform the prenatal screen when a pregnant woman presents to the ED with high risk pregnancy and no prenatal care.
- It is important for providers to implement a multidisciplinary approach for women with multiple underlying medical conditions.
- Health care options for high-risk women, undocumented women, and uninsured women should be implemented.
- Providers should give and document appropriate risk assessments and follow-up of women with underlying medical conditions.
- Providers should investigate family history of postoperative deaths.
- Providers should promote the coordination of care and sharing of resources.
- Providers should perform risk assessment screenings throughout the entire pregnancy.
- Providers should not place cerclage in first trimester pregnant women when they are severely ill.
- Providers should treat hyperemesis of pregnancy to prevent it from progressing to liver failure and liver function tests should be among baseline labs done with hyperemesis.

**Improve policies regarding prevention initiatives including screening procedures and substance use prevention or treatment programs:**

- Systems need to explore the need to keep critically ill incarcerated women in shackles when in the hospital.
- Women of childbearing age with a history of substance use disorder should have access to family planning services.
- OB providers should refer women with substance use disorder to clinicians with expertise in dealing with substance use condition.

**Improve access to medical records:**

- The FLMMRC team should review the evidence regarding the timing and occurrence of postpartum depression.
- The FLMMRC should develop a method to facilitate delivery of electronic records.

**Improve autopsy referral/acceptance:**

- Medical examiners' investigational information should include more details on prenatal history.
- All maternal deaths should have an autopsy performed.

### Committee Recommendations Related to the Leading Causes of Death

Also outlined are the FLMMRC specific recommendations related to the five leading causes of PRD for 2019: thrombotic embolism, hypertensive disorders, infection, cardiovascular problems, and hemorrhage.

**Thrombotic Embolism**

Improve standards regarding assessment, diagnosis, and treatment decisions:
- OB providers should consider higher doses of aspirin for morbidly obese patients at high risk.
- Providers should be educated about no longer implementing bedrest for pregnant women.
- Providers should follow ACOG guidelines and consider deep vein thrombosis (DVT) chemoprophylaxis in women who are obese and have high-risk factors for developing thromboembolism.
- Providers should have high clinical suspicion for postpartum complications such as abdominal distension, DVT, and urinary retentions.

**Hypertensive Disorders**

Enforce policies and procedures:
- Providers should follow ACOG guidelines for treatment of preeclampsia.
- Providers should follow the FPQC hypertension in pregnancy toolkit guidelines.

Improve training:
- Promote community education to women that hypertension during pregnancy may lead to risk of heart disease later in life.

Improve procedures related to communication and coordination between providers:
- Emergency room providers should perform prompt assessment, diagnosis, treatment, and referral to OB services for women presenting with increased blood pressure.
- Emergency room physicians should consult an OB provider and treat elevated blood pressure according to FPQC and ACOG national guidelines.
- The OB provider should be consulted by ED physician to coordinate assessment and stabilization when a pregnant woman presents high blood pressure.
- The OB provider should be notified by ED physician when a pregnant or postpartum woman with blood pressure > 160 systolic or >110 diastolic presents to ED for linkage to appropriate care.

Improve standards regarding assessment, diagnosis, and treatment decisions:
- Emergency room providers should have elevated suspicion for postpartum women presenting with increased blood pressure.
- Providers should stabilize elevated blood pressure before delivery.
- Women of childbearing age with a history of hypertension should have follow-up care between pregnancies to monitor hypertension.

**Infection**

Improve training:
- Public education is essential for dangers of flu and pregnancy, recommended flu vaccine, and early medical care.

Enforce policies and procedures:
- Universal payment for flu vaccine for pregnant women including Medicare and Medicaid plans.
- Facilities should have a sepsis protocol in place.

Improve standards regarding assessment, diagnosis, and treatment decisions:
- Pregnant women should seek care with signs and symptoms of flu-like illness.
- Providers should follow appropriate protocol for treating sepsis.
- Providers need to provide information on benefits of flu vaccine and follow-up with repeated offer if previously declined.
- Correctional facility providers should have a high level of suspicion for potential respiratory illness during influenza season.
- Caregivers of incarcerated pregnant women must be aware of signs and symptoms of flu and understand the risk for rapid deterioration.
- Pregnant women should go to the hospital immediately when their membranes rupture to decrease the risk of sepsis.

**Cardiovascular Problems**

Improve training:
- Women with severe chronic heart disease should be offered extensive counseling on risks of pregnancy.
- Providers should educate women on the significance of cardiovascular conditions on their health.

Enforce policies and procedures:
- Providers should follow the ACOG guidelines for treating cardiovascular conditions.

Improve standards regarding assessment, diagnosis, and treatment decisions:
- Providers should perform a full cardiac workup and assessment when women experience syncopal episodes during pregnancy.
- Patients should consider consultation with unexplained tachycardia.

**Hemorrhage**

Improve training:

- Academic simulation training is needed for education on treatment of an inverted uterus.

Enforce policies and procedures:
- Providers should follow FPQC Obstetric Hemorrhage initiative toolkit for protocol on consenting Jehovah's Witness patients regarding transfusions and alternative treatment.

Improve standards regarding assessment, diagnosis, and treatment decisions:
- Providers should follow the FPQC Obstetric Hemorrhage initiative guidelines for the treatment of hemorrhage and perform a hysterectomy prior to the patient going into disseminate intravascular coagulation.
- Providers should correct an inverted uterus immediately.

**Anticipated Impact of Actions if Implemented**

The FLMMRC captures information in MMRIA in two ways related to the level of impact that the recommendations would reach if they are implemented. First, the FLMMRC assigns a specific level of prevention to each recommendation. The FLMMRC determines whether, if implemented, the action would result as primary prevention (actions that prevent the contributing factor before it occurs), secondary prevention (actions that reduce the impact of a contributing factor once it has occurred), or tertiary prevention (actions that reduce the impact or progression of what has become an ongoing contributing factor).

Second, the FLMMRC determines for each recommendation an expected level of impact if the recommendations are implemented, with the categories none, small, medium, large, extra-large and giant.

There were 92 responses related to the level of prevention, and 92 responses to the level of impact. Most of the recommendations were identified as primary prevention (43.5%), followed by secondary prevention (37.0%), and 19.6% of recommendations were identified as tertiary prevention (Figure 11).

The level of impact if the recommendation is implemented was estimated to be small in 43.5% of the recommendations, 31.5% were medium, and 12.0% were large. There were some PRDs recommendations where the level of impact was none (13.0%). In 2019 there were no recommendations in the extra-large or giant levels of impact (Figure 12).

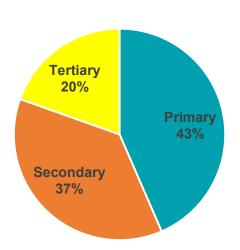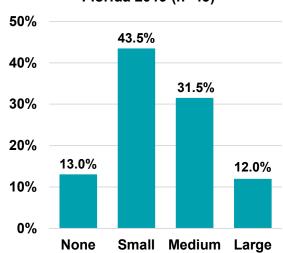**Figure 11. Level of Prevention, Florida 2019 (n=43)**



**Figure 12. Level of Impact, Florida 2019 (n=43)**



## Conclusion

The death of a woman due to pregnancy is a loss to the family, community, state, and nation. Florida has been actively conducting ongoing surveillance of maternal mortality cases since 1996. To date, a multidisciplinary FLMMRC of maternal child specialists has reviewed almost 3,500 pregnancy-associated cases. The FLMMRC carefully and respectfully considers each case before they identify issues and make recommendations.

Non-Hispanic Black women were two times as likely to have PRDs compared to non-Hispanic White women. Although not statistically significant, this 2019 report shows a continuous decrease in the disparity in PRDs between non-Hispanic Black and non-Hispanic White women.

The Healthy People 2030 goal is to reduce the ratio of maternal mortality to 15.7 maternal deaths per 100,000 live births [4]. Florida's pregnancy-related ratio from 2010–2019 averaged 17.9 deaths per 100,000 live births; therefore, much work is still needed to meet the Healthy People 2030 goal.

After many years of FLMMRC review, one recommendation has been commonly mentioned: "the need for preconception care." Addressing the health of a woman of reproductive age when she is not pregnant is an important strategy to improve maternal health [5].

**Current Actions Implemented**

The FLMMRC findings and recommendations are proposed to address risk factors among individuals, communities, clinical, and health care systems not only to reduce maternal deaths but to ultimately improve maternal morbidity. The Department collaborates with diverse public and private organizations to pursue multifaceted approaches to moving recommendations into tangible actions.

*Community, Patient/Family, Provider, and System of Care*
In response to the increasing number of pregnancy-associated deaths related to substance use, the Department contracted with the FPQC in 2019 to implement the Maternal Opioid Recovery Effort (MORE) quality improvement initiative. The goal of the MORE Initiative is to increase the percentage of pregnant women with opioid use disorder (OUD) who receive recommended screening, prevention, and treatment services by standardizing OUD screening, treatment, comprehensive discharge planning, and hospital policies and procedures. Twenty-three Florida birthing hospitals agreed to participate in the MORE Initiative in 2019. In 2021, under direction of the Department, the FPQC expanded the MORE Initiative and recruited an additional thirteen hospitals. The expanded initiative will continue through June 2022.

In 2017, the FPQC, in partnership with the Department, launched the Promoting Primary Vaginal Deliveries (PROVIDE) Initiative to address the primary C-section delivery rate among nulliparous, term, singleton, vertex (NTSV) pregnancies in Florida. The PROVIDE Initiative aimed to improve maternal and newborn outcomes by applying evidence-based interventions to promote primary vaginal deliveries and reduce NTSV rates. Primary C-section deliveries are a major contributor to the large increase in C-section delivery rates over the past two decades. A C-section birth increases the risk of hemorrhage, infection, uterine rupture, abnormal placentation, cardiac events, and psychological stress. C-section deliveries are also associated with longer hospital stays, increased pain, and increased postpartum hospital re-admissions. Forty-five Florida hospitals signed up to participate in the initiative. The first round of the PROVIDE Initiative ended in June 2019. Due to overwhelming demand from the majority of participating hospitals, upcoming changes in Medicaid Managed Care Plans, and the Joint Commission's plan to publish hospital NTSV C-section rates, the FPQC expanded the initiative and launched PROVIDE 2.0. The PROVIDE 2.0 Initiative began in September 2019 and will continue through June 2022. There are currently 77 hospitals participating in the initiative, including over 40 hospitals from the first round.

From 2017-2019, the FPQC, with support from the Department, implemented the Birth Certificate Accuracy Initiative to improve the accuracy of data reported on Florida birth certificates. Birth certificates are an invaluable source of information for assessing the risks of maternal and infant health outcomes; having complete and accurate data is necessary. The FPQC provided training materials, tools, and resources to support hospitals in implementing best practices to improve data reporting and accuracy. The FPQC will continue to host regional birth certificate training workshops for interested hospitals through June 2023.

*Community and Patient/Family*
A recurring recommendation from the FLMMRC is the importance of women achieving optimal health and control of chronic diseases prior to pregnancy. Florida's Healthy Start program, administered by the Department statewide, provides support services for pregnant women, infants, and children to age three. Healthy Start continues to implement interconception care services (ICC), a core component to the program. ICC services are provided to women who have had a pregnancy and are at high risk of having a poor birth outcome for a subsequent

pregnancy. Reasons for a high-risk determination may be a previous fetal or infant loss; a low birth weight or pre-term baby; a chronic maternal disease such as hypertension, obesity, or diabetes; previous pre-eclampsia or eclampsia; previous gestational diabetes; substance use or abuse; depression; or any other condition that could result in a poor birth outcome.

To help address maternal mental health and substance use, and as part of the Florida Families First Act of 2018, the Department established a toll-free hotline for perinatal mental health care, which allows callers to seek individual support and guidance related to mental health concerns. The Department also partnered with the Florida State University (FSU) College of Medicine, the FSU Center for Behavioral Health Integration, and the Florida Maternal Mental Health Collaborative to implement the Florida Behavioral Health Impact Project (FL BH IMPACT). The FL BH IMPACT is an ongoing project that seeks to enhance accessibility of resources for women and children in need of mental health and substance use supports by providing a statewide directory of active and qualified maternal and pediatric behavioral health providers. The project expands screening for: depression, anxiety, and substance abuse; and access to needed services for prenatal, pregnant, and postpartum women.

*Provider*
The FLMMRC Action Subcommittee continues to focus on fine tuning and widely distributing Urgent Maternal Mortality Messages (UMMMs) on topics that are relevant to preventing maternal deaths to professional, clinical, and community organizations. The FLMMRC Action Subcommittee periodically reviews and updates the UMMMs to keep aligned with any relevant changes in ACOG guidelines. In 2020, members of the subcommittee and the FPQC developed a new UMMM on maternal opioid use. It is common for OB providers and hospitals to be the first and sometimes only health care contact for most mothers with OUD. The Opioid Use During Pregnancy UMMM emphasizes the need for OB providers to lead the effort to screen, assess, and refer women for appropriate treatment, while continuing to provide OB care. The Opioid Use During Pregnancy UMMM, as well as the previous UMMMs on hemorrhage and placental disorders, peripartum cardiomyopathy, and the need for the implementation of a maternal early warning system are available on the Department's website at: http://www.floridahealth.gov/statistics-and-data/PAMR/index.html.

The mixture of these efforts highlights the FLMMRC's emphasis on actively improving maternal outcomes through the evaluation of maternal mortality cases, the development of expert recommendations, and the innovative translation of recommendations into effective actions.

**Appendix 1 – Definitions**

- *Body mass index (BMI)* - a calculated measure of the relative percentage of body fat based on height and weight.
    - *Formula for BMI calculation: BMI = (weight (pounds)/height (inches) $^2$) x 703*
    - *BMI Classifications and Value Ranges for Adults (ages 20 or older):*
        - Underweight: BMI < 18.5
        - Normal Weight: BMI 18.5 - 24.9
        - Overweight: BMI 25.0 - 29.9
        - Obese Class I:  BMI 30.0 - 34.9
        - Obese Class II:  BMI 35.0 - 39.9
        - Obese Class III: BMI $\geq$ 40.0

- *Pregnancy-associated death (PAD)* - a death of a woman from any cause, while she is pregnant or within one year of termination of pregnancy, regardless of the duration and site of pregnancy.

- *Pregnancy-related death (PRD)* - a death of a woman that is directly attributed to pregnancy and/or childbirth.

- *Pregnancy-related mortality ratio (PRMR)* - number of pregnancy-related deaths per 100,000 live births; a measure of maternal mortality.

- *Pregnancy outcome*
    - *Spontaneous abortion or miscarriage* – the loss of a pregnancy without outside intervention before 20 weeks of gestation.
    - *Abortion* – a procedure to end a pregnancy. Medicinal and surgical methods are used to remove an embryo or fetus and placenta from the uterus [7].
    - *Ectopic pregnancy* – occurs when the fertilized egg grows in an abnormal place outside the uterus, usually in the fallopian tubes [7].
    - *Emergency delivery* – an unplanned, emergency C-section delivery due to deteriorating maternal or fetal status. The outcome could be a live birth or fetal death/stillbirth [8].
    - *Postmortem/perimortem C-section* – an unplanned, emergency C-section delivery that is conducted shortly after a maternal death or during the maternal death process [9].
    - *Live birth* – the complete expulsion or extraction from the mother of a product of human conception that shows evidence of life after expulsion/extraction [8].
    - *Molar (also known as hydatidiform mole)* – a noncancerous (benign) tumor that develops in the uterus. A molar pregnancy starts when an egg is fertilized, but instead of continuing to the stages of a viable pregnancy, the placenta develops into an abnormal mass of cysts [10].
    - *Stillbirth* – the death of a fetus before the complete expulsion or extraction from the mother irrespective of the duration of pregnancy; the death is indicated by the fact that after expulsion or extraction, the fetus does not show any evidence of life [7].
    - *Undelivered* – a woman that dies before delivering or the extraction of her fetus [7].

- *Timing of death* - perinatal period in which PRDs occur; three main classifications:
    - *Prenatal PRD* – occurs between conception and birth.

- o *Labor and Delivery PRD* – occurs between the start of the delivery process and ends when the mother leaves the delivery room.
- o *Postpartum PRD* – occurs during the period after labor and delivery and up to one year after delivery or termination of pregnancy. The postpartum PRD classification has two sub classifications:
  - ▪ *Postpartum – Not discharged from the Hospital/Health Facility PRD* – occurs in the postpartum period after delivery or termination of pregnancy and before discharge from the hospital/birth facility.
  - ▪ *Postpartum – Discharged from Hospital/Health Facility PRD* – occurs in the postpartum period after delivery/termination of pregnancy and after discharge from a hospital or health facility up to one year after the delivery/termination event.

- *Type of delivery*
  - o *Cesarean Section (C-section)* – an assisted delivery procedure where an infant or fetus is delivered through surgical incisions made in the abdomen and the uterus [11].
  - o *Vaginal* – delivery of an infant or fetus through the vaginal canal.

## Appendix 2 – FLMMRC Case Selection Process for Committee Review

The FLMMRC process begins with collecting data for all Florida resident deaths associated with pregnancy. A pregnancy-associated death (PAD) is defined as the death of a woman from any cause, while she is pregnant or within one year of termination of pregnancy, regardless of the duration and site of pregnancy.

The Florida Department of Health (Department), Bureau of Family Health Services has implemented a process of data linkages to maximize the identification of PADs. This enhanced surveillance system fosters improved case identification when compared with a more limited process utilized by the Department's Bureau of Vital Statistics.

Cases are included in the listing of PADs if any of the following four criteria are met:
1)  The response on the death certificate is yes to the question: "If female, was she pregnant in the past year?"
2)  The International Classification of Diseases (ICD) diagnosis code indicates a death classified as being due to Pregnancy, Childbirth, and the Puerperium.
3)  There is a matching birth or fetal death record within the 365 days prior to the woman's death.
4)  There is a matching Florida universal prenatal screening tool, which is used to identify and assess pregnant women at risk for adverse birth outcomes, within the 365 days prior to the woman's death.

A pregnancy-related death (PRD) is a PAD which resulted from 1) complications of the pregnancy itself, 2) the chain of events initiated by the pregnancy that led to death, or 3) aggravation of an unrelated condition by the physiologic or pharmacologic effects of the pregnancy that subsequently caused death. A possible PRD is a PAD where determination of the death could not be conclusively classified as either related or not related to the pregnancy. Pregnancy-associated deaths due to a cause deemed unrelated to pregnancy are classified as not pregnancy-related.

Quarterly, the FLMMRC case selection committee, composed of FLMMRC members (an obstetrician, a nurse, data manager, and the FLMMRC coordinator), reviews ascertained pregnancy-associated cases by cause of death and timing of the death in relation to the ending of the pregnancy, to categorize the cases as pregnancy-related, possibly pregnancy-related, or not pregnancy-related. The pregnancy-associated cases categorized as either pregnancy-related or possibly pregnancy-related are submitted for record abstraction and subsequent review by the full FLMMRC. Abstraction and review preference is given to death cases categorized as pregnancy-related. If there are fewer than 15 PRDs in a given quarter to review, case selection, abstraction, and review of possibly pregnancy-related and not pregnancy-related cases may occur.

*For additional details of the FLMMRC case ascertainment process, see the following:*
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**Appendix 3 – Florida Maternal Mortality Review Committee Members, 2020**

*FLMMRC Committee Co-Chairs*
**Shay Chapman, BSN, MBA** – Chief, Bureau of Family Health Services, Title V Maternal and Child Health (MCH) Director, Florida Department of Health (FDOH)

**Robert Yelverton Sr., MD** – Florida District XII American College of Obstetricians and Gynecologists (ACOG)

*FLMMRC Coordinator*
**Angela Thompson, RN, BSN** – Nursing Consultant, MCH Section, FDOH

*FLMMRC Lead Abstractor*
**Danielle Noell, APRN, NNP, BC, MSN** – FLMMRC Facilitator & Abstractor, FDOH

**Zara Babayan, MD** – Cardiologist, St. Joseph's Hospital Heart Institute

**Estrellita "Lo" Berry, MA, LTFP** – President, REACHUP Inc.

**Deborah Burch, DNP, RN** – FLMMRC Abstractor, FDOH

**Gene Burkett, M.D** – Professor, University of Miami, Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology

**Mary Kaye Collins, CNM, MN, JD, FACNM** – Assistant Professor, Nursing, Indian River State College; American College of Nurse-Midwives

**Carol Cox, MD** – Hospitalist, St. Joseph's Women's Hospital

**Isaac Delke, MD** – Professor and Medical Director, University of Florida (UF), College of Medicine; ACOG

**Cole Greves, MD** – Maternal Fetal Medicine, Winnie Palmer Hospital, Orlando Health

**Christine Hackshaw, CNM, APRN** – American College of Nursing-Midwives

**Karen Harris, MD**, **MPH** – Ob/Gyn Program Director, HCA/University of Central Florida Consortium Gainesville

**Leticia Hernandez, PhD**, **MS** – MCH Epidemiologist, MCH Section, FDOH

**Washington Hill, MD** – Maternal Fetal Medicine, Sarasota Memorial Hospital

**Carolyn Holland, MD, MEd** – Department of Emergency Medicine, UF Health, Shands' Hospital Gainesville

**Jane Murphy, MPA** – Executive Director, Healthy Start Coalition of Hillsborough County

**Candace Rouse, RNC, DNP, CNS-BC** – Clinical Nurse Specialist, UF Shands' Hospital

**Kay Roussos-Ross, MD** – Assistant Professor, Department of Obstetrics and Gynecology and Psychiatry, UF Health

**William Sappenfield, MD, MPH** – Professor & Chair, College of Public Health, Chair Lawton and Rhea Chiles Center/University of South Florida

**Anna Varlamov, MD** – Ob/Gyn Hospitalist, Winne Palmer Hospital; Maternal Mortality Committee Chair, ACOG

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