

# New Jersey Maternal Mortality Report 2016-2018



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### Note on Language and Grammar

In alignment with the Nurture NJ Maternal and Infant Health Strategic Plan and other recent publications, this document uses language conventions that are intended to be universal and inclusive. We use the phrases and terms "maternal health", "maternal mortality", "woman", "she" and "her" to refer to a person who is pregnant and the health and mortality of pregnant individuals. We recognize that not all people who become pregnant identify as women; these terms are meant to include cisgender females, non-binary individuals, and transgender men.

In keeping with APA guidance, all racial and ethnic groups are capitalized as they are considered proper nouns.

## Executive Summary

- The New Jersey Maternal Mortality Review Committee (NJMMRC) identified a total of 125 pregnancy-associated deaths that have a temporal relationship to pregnancy (within 365 days) between 2016-2018. Of the 125 pregnancy-associated deaths, the NJMMRC determined 44 (35%) were pregnancy-related, 74 (59%) were pregnancy-associated, but not related, and 7 (6%) were unable to be determined.
- In New Jersey, the maternal mortality outcomes for Black, non-Hispanic (NH) women continue to be largely disparate when compared to White, NH women. The pregnancy-related mortality ratio (PRMR, number of pregnancy-related deaths per 100,000 live births) for Black, NH women (39.2 deaths per 100,000 live births) was 6.6 times higher than the PRMR for White, NH women (5.9 per 100,000 live births). The PRMR for Hispanic women, 20.6 per 100,000 live births, was 3.5 times higher than the PRMR for White, NH women.
- The maternal mortality ratios in the Southern region are approximately twice that of the state average across all categories of maternal death classifications (all pregnancy-associated, pregnancy-related, and pregnancy-associated, but not related). The Central region of the state has the lowest maternal mortality ratios across all categories of maternal death classifications; notably, the pregnancy-related mortality ratio in the Central region is half that of the state average. Regions are defined by the counties covered by the three Maternal and Child Health (MCH) Consortia (Page 19).
- Timing of death among cases of maternal mortality are categorized into three periods: deaths that occurred during pregnancy, the early postpartum period (within 42 days of the end of pregnancy), and the late postpartum period (43 days up to one year of the end of pregnancy). Among these categories, the largest number of pregnancy-related deaths occurred during pregnancy (40.9%, n=18), while 79.7% of pregnancy-associated, but not related deaths occurred in the late postpartum period (n=59).

### Leading Causes of Death

- Among the 44 cases of pregnancy-related deaths, the leading underlying causes of death were attributed to cardiovascular conditions (22.7%), hemorrhage (18.2%), thrombotic, non-cerebral embolism (11.4%), and hypertensive pregnancy disorders (preeclampsia, eclampsia, or chronic hypertension with superimposed preeclampsia, 11.4%). Pregnancy-related deaths due to cardiovascular conditions, hemorrhage, and thrombotic embolism occurred primarily during pregnancy, while deaths due to hypertensive pregnancy disorders occurred primarily within 42 days of pregnancy.
- The leading underlying causes of death among the 74 pregnancy-associated, but not related deaths were attributed to substance use disorder (SUD, 58.1%), injury consisting of unknown intent/suicide, homicide, or unintentional injury (12.1%), and cancer (whereby pregnancy was determined to not contribute to the disease

progression, 10.8%). Deaths attributed to SUD are overdose deaths that are a result of substance use and nearly all of the overdose deaths that the NJMMRC reviewed were due to SUD.

- Most deaths attributed to one of the top three underlying causes of death for pregnancy-associated, but not related deaths, occurred in the late postpartum period (43 days up to 1 year).

#### Preventability

- Among the 44 pregnancy-related deaths from 2016-2018, 43 were assessed for preventability, which is defined as a death having at least some chance of being averted by one or more reasonable changes to patient/family, provider, facility, system, and/or community factors. One death was reviewed prior to 2018 when New Jersey started assessing for preventability. The NJMMRC determined 39 (91%) of the 43 deaths to be preventable, among which 18% had good chance to alter the outcome while 79% had some chance to alter the outcome. For one death, the committee was unable to determine between some chance and good chance.
- When assessing preventability by race/ethnicity among pregnancy-related deaths, 16 of the 39 preventable deaths were Hispanic women, while 13 were Black, non-Hispanic (NH) women. White, non-Hispanic women accounted for 8 of preventable, pregnancy-related deaths.
- Among the 74 pregnancy-associated, but not related deaths, 63 were assessed for preventability. Eleven pregnancy-associated, but not related cases were not assessed for preventability as they were reviewed prior to 2018. The NJMMRC determined that over 90% or 57 of these 63 deaths were preventable. Almost all of the 57 preventable pregnancy-associated, but not related deaths (95%) had some chance of being prevented.

#### Contributing Factors

- Leading contributing factor classes among pregnancy-related cases are lack of provider/patient knowledge, lack of continuity of care/care coordination, lack of standardized policies and procedures, substandard clinical skill/quality of care, and lack of assessment.
- Leading contributing factor classes among pregnancy-associated, but not related cases are lack of continuity of care/care coordination, complications of substance use disorder, complications of mental health conditions, lack of provider/patient knowledge, and lack of standardized policies and procedures.

#### Recommendations

- Five themes emerged from the analysis of recommendations for pregnancy-related deaths. The five themes based on frequency of codes included: 1. Ensure high quality care, 2. Build patient knowledge, 3. Address barriers to care, 4. Implement a holistic approach to care, and 5. Share patient records and information about care provided. The most common theme, ensure high quality care, comprised a set of codes that reflected safe, effective, patient-centered, timely, efficient, and equitable care that can prevent maternal deaths. The most common code for this theme centered on providers across facilities ensuring patients are connected with comprehensive care/appropriate level of care as soon as needed.
- The analysis of pregnancy-associated, but not related deaths revealed the following four key themes represented the data based on frequency of codes: 1. Implement a holistic approach to care, 2. Ensure high quality care, 3. Address barriers to care, and 4. Share patient records and information about care provided. The most common theme, implement a holistic approach to care, included codes focusing on integrating physical and mental health comorbidities as part of whole patient care. These codes emphasized actions that providers and facilities could take to identify and address substance use disorder and mental health conditions as part of patient care.

# Introduction to the New Jersey Maternal Mortality Review Committee

Maternal mortality remains at the forefront of public health initiatives nationally and in New Jersey. Although this topic has had long-standing prominence in the public health arena, its salience has increased in the last 30 years due to the more than two-fold increase in the pregnancy-related mortality ratio in the United States and the persistent inequity in mortality rates for Black, non-Hispanic (NH) women (CDC, 2021c). Nationwide, rates of pregnancy-related deaths increased from 7.2 per 100,000 births in 1987 to 17.3 per 100,000 births in 2017 (CDC, 2021c). According to the CDC, the increase in maternal deaths may be related to both the increased quality of data collection through the electronic identification of deaths from multiple sources and to the increase in chronic conditions that are linked to pregnancy complications (CDC, 2021c). New Jersey trends mirror and outpace national statistics as a state with one of the highest disparities in maternal mortality ratios between White, NH and Black, NH women (AHR, 2021). In New Jersey, Black, NH women experience a pregnancy-related maternal mortality ratio nearly seven times that of their White, NH counterparts, whereas nationwide, Black, NH women are three to four times more likely than White, NH women to experience pregnancy-related mortality (Howell, 2018). To address increasing rates of maternal mortality, as well as the racial gap in deaths, continued focus on maternal mortality as a public health priority is required.

## Background

For nearly 100 years, New Jersey has been a national leader in maternal mortality review. New Jersey was the second state in the nation to institute a maternal mortality review team in 1932. Since then, New Jersey has continued to prioritize cross-sector and interdisciplinary collaboration to improve the health of pregnant people. The current work of the New Jersey Maternal Mortality Review Committee is part of a longstanding commitment among healthcare professionals, community program leaders, State agencies, and New Jersey residents to reduce the number of preventable deaths occurring during pregnancy or within one year of the end of pregnancy.

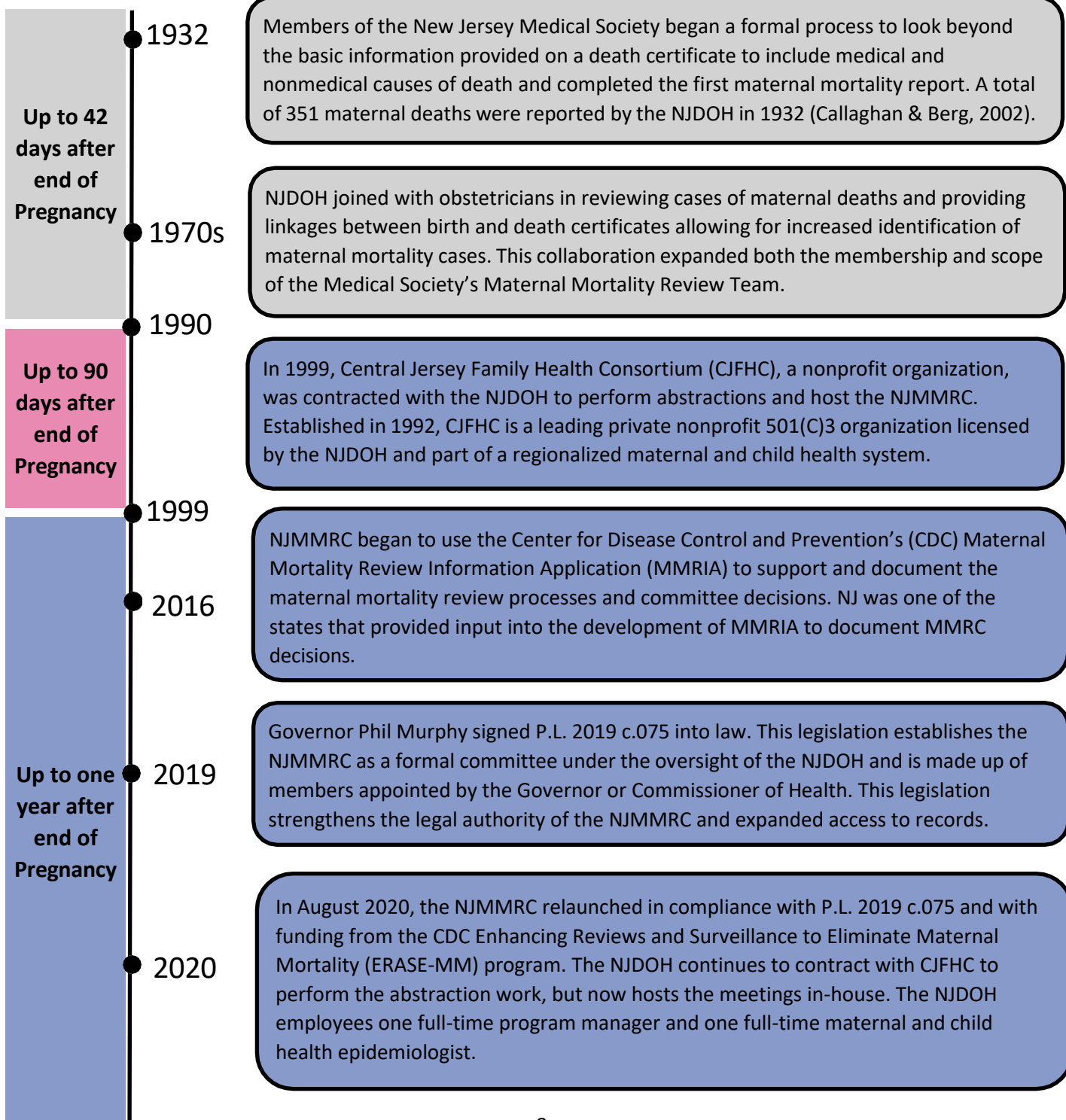
The New Jersey Department of Health (NJDOH) in collaboration with numerous experts in the field have reviewed over 900 cases of maternal death since 1999. This review has aided in the implementation of numerous quality improvement initiatives that have improved the safety of pregnant women throughout the state.



## History

### Scope of Review

#### Deaths during pregnancy or



## New Jersey Maternal Mortality Review Committee Structure

Pursuant to P.L. 2019 c.075 the New Jersey Maternal Mortality Review Committee (NJMMRC) is tasked with annually reviewing and reporting on maternal death rates and the causes of maternal death in the State and providing recommendations to improve maternal care and reduce severe adverse outcomes related to, or associated with, pregnancy. The committee replaces and supersedes the Maternal Mortality Case Review Team that was constituted in the department. The committee is composed of 24 members, including 4 ex officio members and 20 public members who serve four-year terms.

The ex officio members of the committee include the following persons, or their designees:

- The State Medical Examiner
- The Director of the Office of Emergency Medical Services in the Department of Health
- The Director of the Maternal Data Center
- The Medical Director of the Division of Medical Assistance and Health Services in the Department of Human Services

Seven of the public members are appointed by the Governor to represent the following groups:

- The New Jersey section of the American College of Obstetricians and Gynecologists (ACOG)
- The New Jersey Affiliate of the American College of Nurse Midwives
- The New Jersey Section of the Association of Women's Health Obstetric and Neonatal Nurses (AWHONN)
- The New Jersey Chapter of the American College of Emergency Physicians
- The Partnership for Maternal and Child Health of Northern New Jersey
- The Central Jersey Family Health Consortium
- The Southern New Jersey Perinatal Cooperative

The additional 13 public members of the committee are appointed by the Commissioner of Health, to reflect the diversity in the state's geographic regions and perinatal designations and include 7 licensed and practicing health care practitioners:

- Specialist in obstetrics or gynecology
- Specialist in maternal and fetal medicine
- Specialist in critical care medicine
- Specialist in perinatal pathology
- Two clinicians who provide pre- or post-natal care at Federally Qualified Health Centers operating in the State
- Anesthesiologist
- Licensed and practicing health care practitioner or mental health care practitioner
- Specialist in perinatal addiction
- Certified nurse midwife
- Registered professional nurse or advanced practice nurse who specializes in hospital-based obstetric nursing
- Licensed practical nurse, registered professional nurse, or advanced practice nurse who participates in, and represents, the Nurse-Family Partnership operating in New Jersey
- Certified Midwife or Certified Professional Midwife.

The work of the NJMMRC is part of a longstanding commitment among healthcare professionals and other concerned citizens to reduce and prevent the number of deaths related to pregnancy and childbearing in New Jersey. The New Jersey Maternal Mortality Review Committee is an interdisciplinary team of 24 experts from across the state that, during the time period of this report (October 2016 to November 2021), met quarterly (prior to August 2020) and then monthly. After the NJMMRC members review each case summary, they identify all factors that they feel contributed in some way to the woman's death. Finally, the committee develops recommendations for improving outcomes and disseminates this

information through a variety of systems including clinical practice settings, community advisory boards, and committees (Establishes Maternal Mortality Review Committee., 2019).

## Nurture New Jersey

Governor Phil Murphy and First Lady Tammy Snyder Murphy of New Jersey are champions of policies and programs that aim to reduce rates of maternal mortality, severe maternal morbidity, and racial and ethnic disparities and are committed to making New Jersey the safest place to give birth in the country. To achieve this vision, First Lady Murphy established the Nurture NJ campaign in 2019 and released the Nurture NJ Strategic Plan in 2021 to develop and coordinate statewide actions to reduce maternal morbidity and mortality and racial disparities in birth outcomes for mothers and children. In New Jersey, there is a need to coordinate and expand the multiple fractionalized maternal mortality and morbidity reduction efforts being conducted by caring and committed individuals and organizations across the state. The New Jersey Department of Health, the State-designated agency responsible for public health protection and services, uniquely leverages its position to impact critical changes in the delivery of care and the implementation of statewide strategies to reduce maternal mortality and morbidity and to eliminate the racial and ethnic disparities in maternal outcomes (Hogan, et al., 2021).

### Nurture NJ Primary Objectives

1. Ensure all women are healthy and have access to care before pregnancy, whether or not an individual is actively seeking parenthood.
2. Build a safe, high-quality, equitable system of care and services for all women during prenatal, labor and delivery, and postpartum care.
3. Ensure supportive community environments and contexts during every other period of a woman's life so that the conditions and opportunities for health are always available (Hogan, et al., 2021).

### Nurture NJ Goals

1. Reduce pregnancy-associated mortality ratio by 50% in five years.
2. Reduce pregnancy-related mortality ratio by 50% in five years.
3. Reduce severe maternal morbidity (SMM) rates by 50% in five years.
4. Reduce racial and ethnic inequities in maternal morbidity and mortality by 50% in five years (Hogan, et al., 2021).

## New Jersey Maternal Care Quality Collaborative

In May 2019, P.L. 2019 c.075 was signed into law by Governor Murphy to establish a New Jersey Maternal Care Quality Collaborative (NJMCQC), New Jersey Maternal Mortality Review Committee (NJMMRC), and New Jersey Maternal Data Center (NJMDC). The NJMCQC oversees the work of NJMMRC and coordinates efforts and strategies to reduce maternal mortality and morbidity in the state. The newly established NJMCQC launched in June 2021 and consists of public members engaged in maternal health advocacy, health equity advocacy, and healthcare consumer advocacy; cabinet level officials; maternal and child health consortia; representatives of relevant professional organizations and medical societies (e.g., AWHONN, ACOG); and clinical leaders from hospital associations accountable care organizations (Appendix C). The NJMCQC meets on a quarterly basis and collaborates under the banner of the First Lady's Nurture NJ campaign and her work to bring attention to maternal deaths, severe maternal morbidity, and ethnic and racial disparities. The NJMCQC developed and adopted a statewide strategic plan to reduce maternal mortality and morbidity and racial and ethnic disparities, in alignment with the Nurture NJ Strategic Plan.

In addition, to improve data collection and to improve and assist quality improvement efforts by health care facilities and the State, a NJMDC was established within NJDOH's Healthcare Quality and Informatics Unit. Maternal morbidity indicators, including racial and ethnic disparity in these indicators, are identified from matched records of inpatient

delivery hospitalizations and birth certificates using an algorithm of identifying variables. Each matched record represents a delivery hospitalization during which at least one live birth occurred at each of the birthing hospitals in NJ. Demographic data and rates of complications and other morbidities are made available via a public facing dashboard and disseminated to relevant stakeholders including health care facilities, in fulfillment of an annual Report Card of Hospital Maternity Care mandated in P.L. 2018, c.082. Pursuant to P.L. 2019 c.075, further expansion of the MDC will include active reporting of indicators to the DOH from participating facilities, including mortality data, rapid-cycle analytics, and dissemination of reports to the NJMCQC and other stakeholders (Establishes Maternal Mortality Review Committee., 2019).

## Partners

Central Jersey Family Health Consortium (CJFHC) has been the NJDOH's contracted agency to perform abstractions since 1999. CJFHC employs several staff devoted to the MMRC. Established in 1992, CJFHC is a leading private non-profit 501(C)3 organization licensed by the NJ Department of Health and part of a regionalized maternal and child health system. CJFHC's mission is to promote an equitable and healthy future for families through service, advocacy, education, and collaboration. This is accomplished by implementing a variety of programs based on the needs of the community.

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## Key Definitions

**Pregnancy-Associated:** A death during or within one year of pregnancy, regardless of the cause. These deaths make up the universe of maternal mortality; within that universe are pregnancy-related deaths and pregnancy-associated, but not related deaths.

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

**Pregnancy-Associated, but Not Related:** A death during or within one year of pregnancy, from a cause that is not related to pregnancy.

**Pregnancy-Associated but unable to determine relatedness:** A death during or within one year of pregnancy, from a cause that the Maternal Mortality Review Committee is unable to determine was related to pregnancy or not.

## Case Review Process

### Case Identification

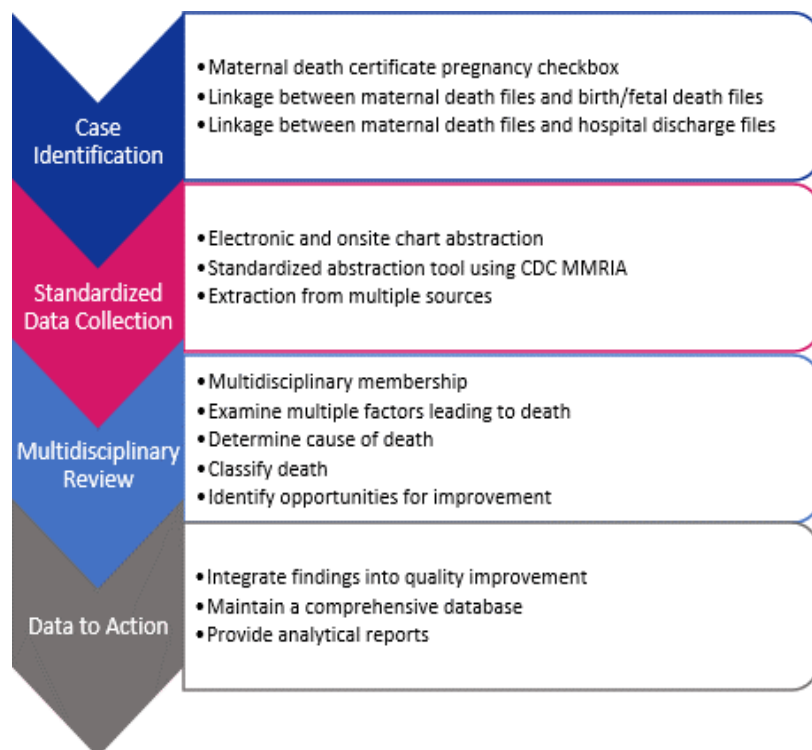
The NJMMRC programmatic staff primarily identify cases for review by conducting deterministic and probabilistic linkages of the maternal death certificate to birth/fetal death certificates and hospital discharge data, both from the year of death and the year prior to death. In addition to data linkages, sources of identification include utilizing the maternal death certificate to select for deaths in which any of the following are identified: pregnancy-related terms listed in the literal cause of death field, ICD-10 codes related to pregnancy, and the pregnancy checkbox field for cases that were pregnant at the time of death, within 42 days of deaths, or within 1 year of death. Social media, news articles, autopsy records, and obituaries also serve as secondary sources of confirmation.

## Data Collection for Committee Review

After the final list of maternal deaths is produced, information on the medical and non-medical factors that led to the deaths is collected by the nurse abstractors. The abstractors use a standardized data abstraction tool to collect information on over 1,200 variables. Data is obtained from all sources including but not limited to: Birth certificates, death certificates, autopsy reports, hospitalization records, medical examiner reports, prenatal care records, emergency room and outpatient visit reports, emergency medical services (EMS) transport records, and New Jersey Perinatal Risk Assessment (PRA) submissions.

### Case Review

The NJMMRC reviews all pregnancy-associated mortality cases. Committee members represent diverse specialties and professions, including State departments, clinical medicine, social work, and community groups. If the MMRC determines a need for additional expertise, subject matter experts are invited to provide this information on a case-by-case basis.



During the review, each case is individually assessed for the medical and non-medical factors that led to the death. Through a secure, online voting system, group consensus is established and the MMRC completes the standardized Committee Decisions Form provided by the CDC (Appendix A). On the Committee Decisions Form, the members make the following key decisions:

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

The committee also captures:

1. Did obesity contribute to the death?
2. Did discrimination contribute to the death?
3. Did mental health conditions contribute to the death?
4. Did substance use disorder contribute to the death?
5. Was the death a suicide?
6. Was the death a homicide?
  - a. If this death was a homicide, suicide, or accidental death, list the means of fatal injury.
  - b. If this death was a homicide, what was the relationship of the perpetrator to the decedent?

## Data to Action

This report is part of the NJMMRC's process to move its findings to action. Government, clinical, and community groups will use the qualitative and quantitative information provided in this report to apply for grants, support programs, and influence strategic planning discussions. In particular, the NJ Maternal Care Quality Collaborative will utilize the recommendations established by the NJMMRC to steer their work.

## Maternal Mortality Review Committee Data Compared to Other Maternal Mortality Data Sources

There are several different sources for maternal mortality data in the United States. There are two sources of National maternal mortality data, Center for Disease Control and Prevention's (CDC) National Center for Health Statistics' National Vital Statistics System (NVSS) and The Pregnancy Mortality Surveillance System (PMSS). Maternal Mortality Review Committees (MMRCs) report state- or local-level pregnancy-related mortality ratios and are the most accurate source for state- or local-level data. It is important to understand which surveillance system is being referenced for maternal mortality data because the timeframe and scope of each system differ.

	National (CDC) – National Vital Statistics System (NVSS)	National (CDC) – Pregnancy Mortality Surveillance System (PMSS)	State and Local Maternal Mortality Review Committees (MMRCs)
Data Source	Death records	Death records, and death records linked birth or fetal death records, additional information as available	Death records, and death records linked birth or fetal death records, medical records, social service records, autopsy, informant interviews, etc.
Time Frame	During pregnancy – 42 days	During pregnancy – 1 year	During pregnancy – 1 year
Source of Classification	ICD-10 codes	Medical epidemiologists	Multidisciplinary committees
Terms	Maternal death	Pregnancy associated, (Associated and) Pregnancy related, (Associated but) Not pregnancy related	Pregnancy associated, (Associated and) Pregnancy related, (Associated but) Not pregnancy related
Measure	Maternal Mortality Rate - # of Maternal Deaths per 100,000 live births	Pregnancy Related Mortality Ratio - # of Pregnancy Related Deaths per 100,000 live births	Pregnancy Related Mortality Ratio - # of Pregnancy Related Deaths per 100,000 live births
Purpose	Show national trends and provide a basis for international comparison	Analyze clinical factors associated with deaths, publish information that may lead to prevention strategies	Understand medical and non-medical contributors to deaths, inform prioritization of interventions that effectively reduce pregnancy-related deaths

(adapted from St. Pierre, A., et al., 2018)

The CDC's NVSS reports the national maternal mortality rate: the number of maternal deaths (within 42 days of the end of pregnancy) per 100,000 live births. NVSS uses two fields on the death record to identify maternal death, the pregnancy checkbox on the death certificate, and the certified recording of the cause of death to assign maternal mortality ICD-10 codes. This automated identification process relies on the assumption that the documentation on the death certificates is complete and accurate (CDC, 2021c).

The CDC's PMSS reports the national maternal pregnancy-related mortality ratio: the number of maternal deaths (within 365 days from any cause related to or aggravated by the pregnancy) per 100,000 live births. Like NVSS, PMSS uses vital records for identification of deaths, including descriptions of causes of death and pregnancy status information on death



records. However, PMSS uses a more rigorous process than NVSS to identify cases and is a slower process as a result. PMSS uses linkages of death records of women of reproductive age to birth and fetal death records within one year of the death, media searches, and reporting from public health agencies, health care providers and the public in the identification process (CDC, 2021c).

The state- and local-level MMRCs are the most complete and accurate source for state- and local-level maternal mortality data because they have access to multiple sources of information, including detailed medical records and key informant interviews, that can provide a deeper understanding of the circumstances surrounding a death. State and local MMRCs perform comprehensive reviews of deaths using information beyond what is available in vital records, including medical and non-medical data sources which supports their ability to make specific recommendations for prevention. This also allows MMRCs to make determinations of pregnancy-relatedness on a broader set of deaths than is possible for PMSS, such as deaths due to injury (CDC, 2021c).

## Report Methodology

### Data Sources

Women whose deaths occurred from years 2016-2018 are included in this report and were entered into the Maternal Mortality Review Information Application (MMRIA) or migrated into MMRIA from its predecessor, the Maternal Mortality Review Data System (MMRDS). For each death reviewed by the MMRC, abstraction forms are available in the MMRIA database to retrieve elements from the death certificate, birth/fetal death certificate, autopsy reports, case narratives, and multiple forms for emergency room and hospital encounters. Upon completion of committee review, decisions are also entered into its respective MMRIA form. The data included in this report include information pulled from the maternal death certificate, birth or fetal death certificate, and Committee Decisions Form in the MMRIA database.

### Variables

#### Race and Ethnicity

To identify the race and ethnicity of the women whose cases were reviewed, the race and ethnicity categories of the maternal death certificate and infant birth certificate (as applicable) were used. Due to the sample size of the data included in this report, race and ethnicity was limited to: Black (non-Hispanic), White (non-Hispanic), Hispanic, and Asian/Multiracial/Other/Unknown. The primary source for race and ethnicity groupings was the infant birth certificate, while death certificates served as a secondary source whenever birth certificate information was not available.

#### Age at the time of death

The current case identification restricts the age range of deaths from 10-60 years of age. The age of the decedent at the time of death is collected in the dataset as a continuous variable, but was categorized into four categories for this report:

- 24 years of age and under
- 25 to 29 years of age
- 30 to 34 years of age
- Over 35 years of age

#### Timing of death in relation to pregnancy

The pregnancy checkbox on a death certificate provides information about a woman's timing of death in relation to her pregnancy and is typically categorized into five standard categories defined by the National Center for Health Statistics:

- Not pregnant within the past year
- Pregnant at the time of death
- Not pregnant at the time of death, but pregnant within 42 days of death

- Not pregnant at the time of death, but pregnant within 43 days up to 1 year of death
- Unknown if pregnant at the time of death

For this report, calculations for the number of days between the end of pregnancy and death were conducted for death certificates that were successfully linked to birth or fetal death certificates. The days for timing of pregnancy were then grouped into categories that are consistent with the NCHS checkbox options on the death certificate. When birth or fetal death information was not available, manual review of the timing of death by the abstraction team was used.

## Data cleaning

Data retrieved from MMRIA for this report were assessed for duplicates, errors, and quality issues prior to analysis. Since 7 cases from the data sample were determined by the NJ MMRC as “unable to determine relatedness,” information for these cases will not be included in tables and figures to protect confidentiality and use of potential identifiers.

Recommendations and associated data in the Committee Decisions Form were reviewed and checked for accuracy in the MMRIA system, prior to data export. NJDOH staff checked that the pregnancy-relatedness status indicator was complete. The data were exported from the MMRIA system via SAS programming into an Excel workbook. Numerical case identification numbers were created for all cases and excel formulas executed to connect all data across spreadsheets. The NJDOH team reviewed all recommendations, recommendation levels (i.e., patient/family, community, provider, system, facility, community), and contributing factors to determine which data were complete and could be included in our analyses. Blank or incomplete recommendations were not included analysis. A case needed to have at least one complete recommendation to be included. The NJDOH team filled in missing data for recommendation levels and contributing factors for a small number of cases where feasible.

The analytic Excel file was reorganized to enable summary of data for all cases together, as well as separate analyses for pregnancy-related cases and pregnancy-associated, but not related cases. Descriptive summaries of the available recommendations and associated data were summarized through calculation of counts and frequencies.

Thematic analyses were conducted on the subset of cases with complete recommendations to understand common actions suggested by the NJMMRC to address contributing factors attributed to these of maternal death. All recommendations for preventable, pregnancy-related deaths were sorted by cause of death and common contributing factors before completing thematic analyses; similarly, recommendations for pregnancy-associated, but not related deaths were also sorted by common contributing factors. Thematic analyses were conducted separately for any preventable, pregnancy-related deaths and pregnancy-associated, but not related deaths with at least one recommendation. The grounded theory approach to qualitative analysis (Glaser & Strauss, 2017) was used to assign codes to the data and identify themes and supporting quoted text. This qualitative analysis approach is iterative, as the process of reviewing data and assigning codes is repeated until a final set of themes are identified to summarize all available data. In section 5 of this report, key themes that emerged from analysis of recommendations, along with exemplary recommendations developed during NJMMRC meetings, are reported for pregnancy-related and pregnancy-associated, but not related cases.



# Question 1: Was the Death Pregnancy-Related?

## Background

All cases reviewed by the NJMMRC are considered pregnancy-associated deaths as they include deaths that have a temporal relationship to pregnancy (occurring during pregnancy or within 365 days of the end of pregnancy); however, only through committee review can the casual relationship of a woman's pregnancy be determined. Upon review of a case, committee determinations of pregnancy-relatedness can fall into three subset categories: (1) pregnancy-related, (2) pregnancy-associated, but not related, or (3) pregnancy-associated but unable to determine relatedness.

Women whose cases are confirmed to not meet review criteria are recorded as a false positive (i.e., pregnancy checkbox error, unable to confirm timing of pregnancy) or out of scope (i.e., out of state resident) in the CDC MMRIA system and are not reviewed by the NJMMRC. Pregnancy-associated deaths occurring from 2016-2018 were reviewed between 2016 and 2021.

## Key Definitions

Pregnancy-related and pregnancy-associated, but not related are defined on the Committee Decisions Form (Appendix A) as:

- **Pregnancy-Related:** A death during or within one year of pregnancy, from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.
- **Pregnancy-Associated, but Not Related:** A death during or within one year of pregnancy, from a cause that is not related to pregnancy.

## Results

### Number of deaths

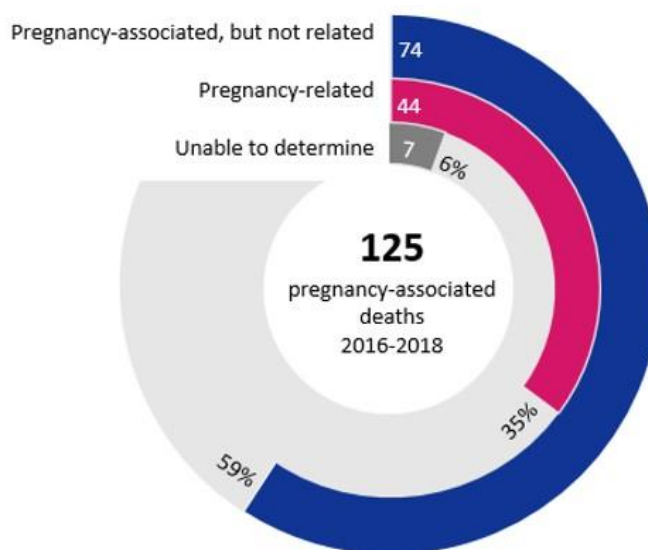
Among the 125 pregnancy-associated deaths occurring between 2016 and 2018, 44 (35.2%) were determined to be pregnancy-related while 74 (59.2%) were determined to be pregnancy-associated, but not related (Figure 1). Additionally, 7 cases (5.6%) were pregnancy-associated but unable to determine relatedness. These 7 cases are included in the total count for all-pregnancy-associated cases but have been excluded from all further analyses in this report.

Among all pregnancy-associated deaths, the majority of women were between 30-34 years of age (29.6%), had completed a high school degree or GED equivalent (51.2%), and had Medicaid as a payor source (56.8%). Most cases determined to be pregnancy-related were over the age of 35 (38.6%), had completed a high school degree or GED equivalent (47.7%), and did not have Medicaid as their payor source (40.9%). Women whose deaths were determined to be pregnancy-associated, but not related were primarily between the ages of 30-

Figure 1

**35% of all pregnancy-associated deaths in New Jersey between 2016-2018 were determined to be pregnancy-related.**

Distribution of Pregnancy-Relatedness, New Jersey, 2016-2018



Source: New Jersey Maternal Mortality Review Committee

34 (32.4%), had completed a high school degree or GED equivalent (55.4%), and had Medicaid as their payor source (68.9%) (Table 1).

Table 1

**Demographics of NJ MMRC pregnancy-associated deaths by relatedness, 2016-2018 (n=125)**

	All live births (2016-2018)	All pregnancy- associated	Pregnancy- related	Pregnancy-associated, but not related
		Count (%)	Count (%)	Count (%)
<b>All</b>	304,803	125 (100.0)	44 (35.2)	74 (59.2)
<b>Race/Ethnicity</b>				
Black, non-Hispanic	40,822	25 (20.0)	16 (36.4)	7 (9.5)
White, non-Hispanic	134,947	54 (43.2)	8 (18.2)	43 (58.1)
Hispanic	82,568	37 (29.6)	17 (38.6)	18 (24.3)
Other/Multiracial/Unknown	153,766	9 (7.2)	*	*
<b>Age, years</b>				
24 and under	48,507	22 (17.6)	*	19 (25.7)
25-29	75,852	30 (24.0)	13 (29.6)	14 (18.9)
30-34	102,951	37 (29.6)	11 (25.0)	24 (32.4)
Over 35	74,722	36 (28.8)	17 (38.6)	17 (23.0)
Unknown	2,771	-	-	-
<b>Education</b>				
Less than high school	32,746	11 (8.8)	*	8 (10.8)
High school graduate/GED	70,934	64 (51.2)	21 (47.7)	41 (55.4)
Some college or above	199,308	50 (40.0)	20 (45.5)	25 (33.8)
Unknown	1,815	-	-	-
<b>Insurance Status</b>				
Medicaid	93969	71 (56.8)	16 (36.3)	51 (68.9)
Not Medicaid <sup>1</sup>	210697	39 (31.2)	18 (40.9)	18 (24.3)
Unknown	137	15 (12.0)	10 (22.7)	*

**Note:** Other/Multiracial/Unknown denotes individuals whose race/ethnicity was recorded as: Asian (non-Hispanic), Native Hawaiian/Pacific Islander (non-Hispanic), American Indian/Alaska Native (non-Hispanic), Other Single Race, Two or More Races, or Unknown Race. \*Counts where n<7 were suppressed due to small sample size. Additionally, 7 deaths were pregnancy-associated but unable to determine relatedness.<sup>1</sup> For all pregnancy-associated deaths, count includes women who had private insurance/self-pay.

**Sources:** Live birth counts -New Jersey Birth Certificate Database, Office of Vital Statistics and Registry, New Jersey Department of Health; Committee determinations and race/ethnicity counts – Electronic Birth Record/Death Certificate captured in CDC Maternal Mortality Review Information Application

## Disparities in Race/Ethnicity

When assessing variations in pregnancy-related mortality across race/ethnicity over time in New Jersey, mortality outcomes for Black, non-Hispanic (NH) and all Hispanic women continue to be largely disparate compared to their White, NH counterparts. Among the 44 pregnancy-related deaths of women in NJ occurring from 2016-2018, 38.6% were Hispanic, 36.4% were Black, NH, and 18.2% were White, NH. However, when assessing the pregnancy-related mortality ratio (PRMR, number of deaths per 100,000 live births), the PRMR for the Black NH women (39.2 deaths per 100,000 live births) was 6.6 times higher than the PRMR for White, NH women (5.9 per 100,000 live births). Additionally, the PRMR for Hispanic women (20.6 deaths per 100,000 live births) was 3.5 times higher when compared to White, NH women (Table 2, Figure 2). The difference in pregnancy-related mortality for Black NH women compared to their Hispanic and White NH

counterparts has continued to persist since 2010-2012. In addition, the PRMR for Hispanic women has increased since 2013-2015 (Figure 3). Due to the historically small number of pregnancy-related deaths among Hispanic women in New Jersey, it is difficult to draw conclusions on the increase of pregnancy-related deaths among Hispanic women in recent years.

Table 2

**The pregnancy-related mortality ratio (PRMR) for Black, non-Hispanic women was 6.6 times higher compared to White, NH women, while the PRMR for Hispanic women was 3.5 times higher compared to White, NH women.**

New Jersey pregnancy-related mortality ratios, 2016-2018

	All pregnancy-associated	Pregnancy-related	Pregnancy-associated, but not related
	MR	MR	MR
<b>All</b>	41.0	14.4	24.3
<b>Race/Ethnicity</b>			
Black, non-Hispanic	61.2	39.2	17.1
White, non-Hispanic	40.0	5.9	31.9
Hispanic	44.8	20.6	21.8
Other/Multiracial/Unknown	5.9	**	**

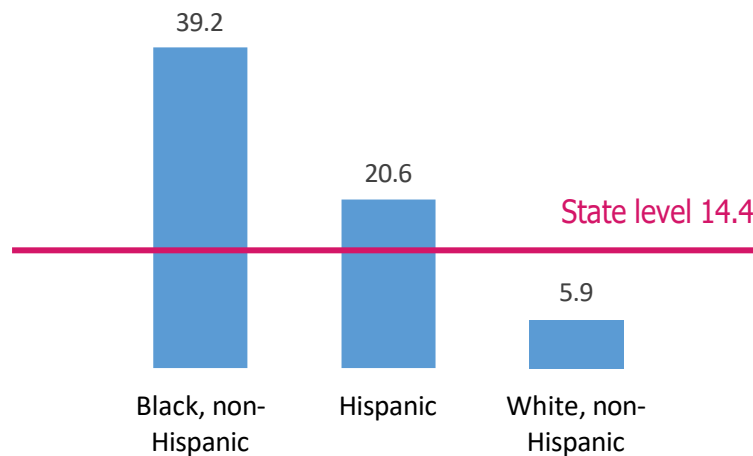
MR = mortality ratio; \*\* suppressed due to small number values

Source: Live birth counts - New Jersey Birth Certificate Database, Office of Vital Statistics and Registry, New Jersey Department of Health; New Jersey Maternal Mortality Review Committee

Figure 2

**Black, non-Hispanic and Hispanic women were more likely to experience a pregnancy-related death compared to White, NH women in New Jersey.**

Pregnancy-Related Mortality Ratio by Race/Ethnicity, New Jersey, 2016-2018 (Deaths Per 100,000 Live Births)

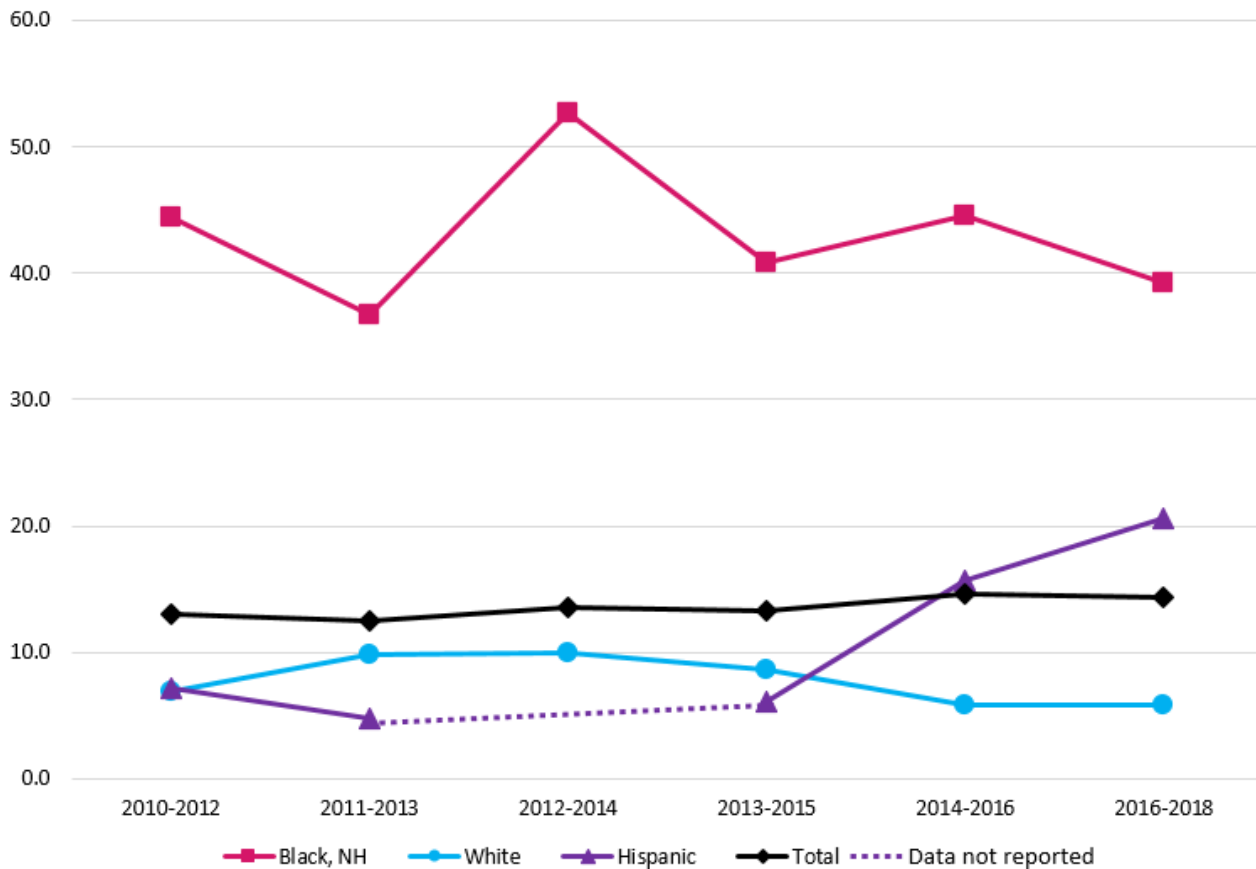


Source: New Jersey Birth Certificate Database, Office of Vital Statistics and Registry, NJDOH; New Jersey Maternal Mortality Review Committee

Figure 3

**Black, non-Hispanic women and Hispanic women were more likely to experience a pregnancy-related death compared to White women in New Jersey.**

3-Year Rolling Average, Pregnancy-Related Mortality Ratio by Race/Ethnicity, New Jersey, 2010-2018



Note: Hispanic pregnancy-related mortality ratio (PRMR) from 2012-2014 and PRMRs from 2015-2017 not reported due to small sample size.

Source: New Jersey Birth Certificate Database, Office of Vital Statistics and Registry, NJDOH; New Jersey Maternal Mortality Review Committee

## Geographic Location of Residence

To assess the geographic distribution of maternal mortality cases throughout NJ, the counties of the catchment areas of the three Maternal and Child Health Consortia within NJ were classified into North, Central, and South. The county-level catchment areas for each consortium are as follows:

- **North** (Partnership for Maternal and Child Health of Northern New Jersey): Bergen, Essex, Hudson, Morris, Passaic, Sussex, Union, and Warren
- **Central** (Central Jersey Family Health Consortium): Hunterdon, Mercer, Middlesex, Monmouth, Ocean, and Somerset
- **South** (Southern New Jersey Perinatal Cooperative): Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Salem

Among maternal mortality deaths from 2016-2018, a majority of women had a residence located in the Northern region of the state (44.0%), which also had the highest number of total live births (Table 3). Among pregnancy-related deaths, 47.7% of women lived in the Northern region of NJ, 36.4% lived in the Southern region, and 15.9% lived in the Central region (Table 3). Additionally, a majority of women whose deaths were determined to be pregnancy-associated, but not related lived in the Southern region at the time of their death (40.5%). The mortality ratios in the Southern region are approximately twice that of the state average across all categories of maternal death classifications (all pregnancy – associated, pregnancy-related, and pregnancy-associated, but not related). The Central region of the state has the lowest mortality ratios across all categories of maternal death classifications; notably, the pregnancy-related mortality ratio in the Central region is half that of the state average (Table 3, Figure 4).

The high pregnancy-related mortality ratio in the Southern region highlights a need to address medically underserved areas and the need for better access to comprehensive care. In New Jersey in 2022, the Southern region of the state has the highest amount of medically underserved areas (MUAs) in the state, according to data from the Human Resources and Services Administration (HRSA, 2021a). HRSA designated MUAs as having too few primary care providers, high infant mortality, high poverty, and/or a high elderly population (HRSA, 2021b). Additionally, the Southern region of the state is more rural than the rest of the state, which may impact appropriate access to care and medical attention given the limited number of designated birthing facilities and centers in the region (12, compared to 15 and 26 in the Central and Northern regions, respectively).

The Southern region had the highest pregnancy-associated, but not related mortality ratio in New Jersey from 2016-2018. Given that many pregnancy-associated, but not related cases were due to substance use disorder (as described later in the report), the findings here are in alignment with state-level data regarding the impacts of the drug overdose crisis in New Jersey and nationally. According to 2018 data from the CDC, counties in the Southern region of New Jersey had among the highest rates of deaths due to opioid overdose in the entire state (31.7 or greater deaths per 100,000 people) (Rossen et. al, 2022).

Table 3

**Pregnancy-associated deaths by region of last residence at the time of death, New Jersey, 2016-2018**

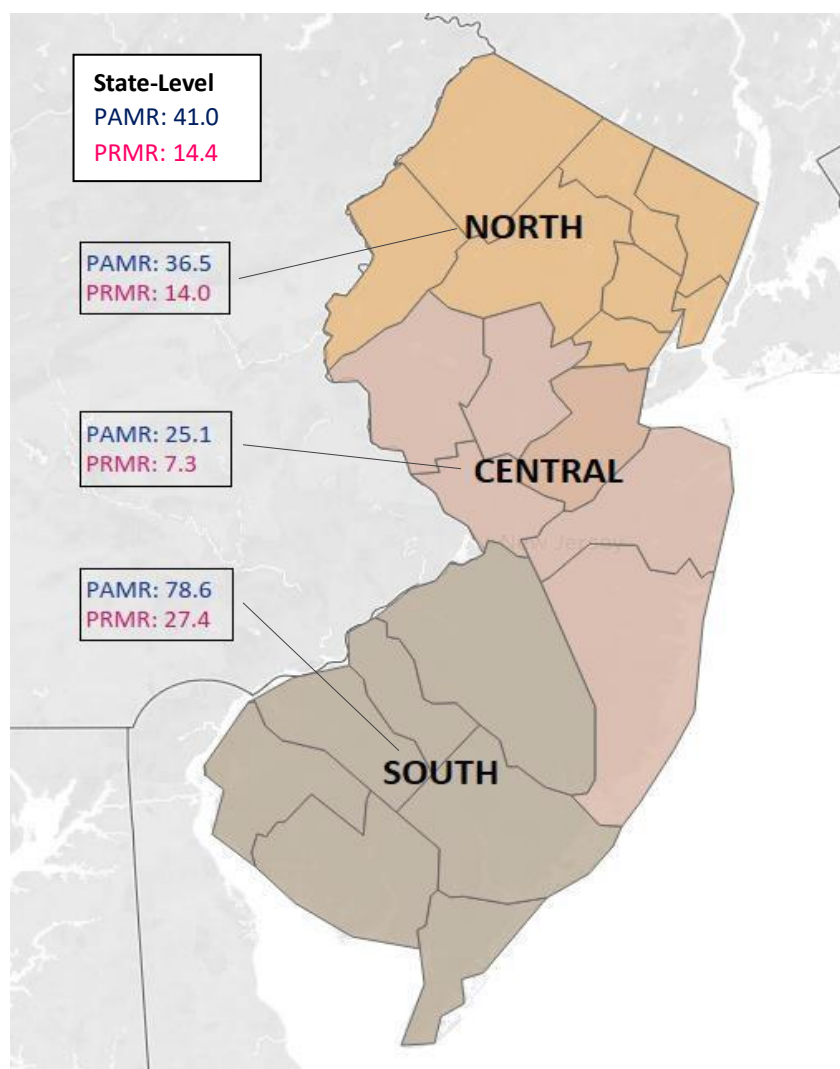
	All live births (2016-2018)	All pregnancy- associated deaths		Pregnancy-related deaths		Pregnancy- associated, but not related deaths	
	Count (%)	Count (%)	MR	Count (%)	MR	Count (%)	MR
<b>All</b>	304,803 (100.0)	125 (100.0)	41.0	44 (100.0)	14.4	74 (100.0)	24.3
North	150,543 (49.4)	55 (44.0)	36.5	21 (47.7)	14.0	29 (39.2)	19.3
Central	95,761 (31.4)	24 (19.2)	25.1	7 (15.9)	7.3	15 (20.3)	15.7
South	58,499 (19.2)	46 (36.8)	78.6	16 (36.4)	27.4	30 (40.5)	51.3

**Note:** 7 deaths were unable to determine pregnancy-relatedness. MR = mortality ratio

Source: Live birth counts - New Jersey Birth Certificate Database, Office of Vital Statistics and Registry, NJDOH; New Jersey Maternal Mortality Review Committee

Figure 4

The pregnancy-related mortality ratio (PRMR) and pregnancy-associated mortality ratio (PAMR) were highest among women who lived in the Southern region of the state.



PAMR: pregnancy-associated mortality ratio; number of pregnancy-associated deaths per 100,000 live births

PRMR: pregnancy-related mortality ratio; number of pregnancy-related deaths per 100,000 live births

Source: Live birth counts: New Jersey Birth Certificate Database, Office of Vital Statistics and Registry, NJDOH; New Jersey Maternal Mortality Review Committee

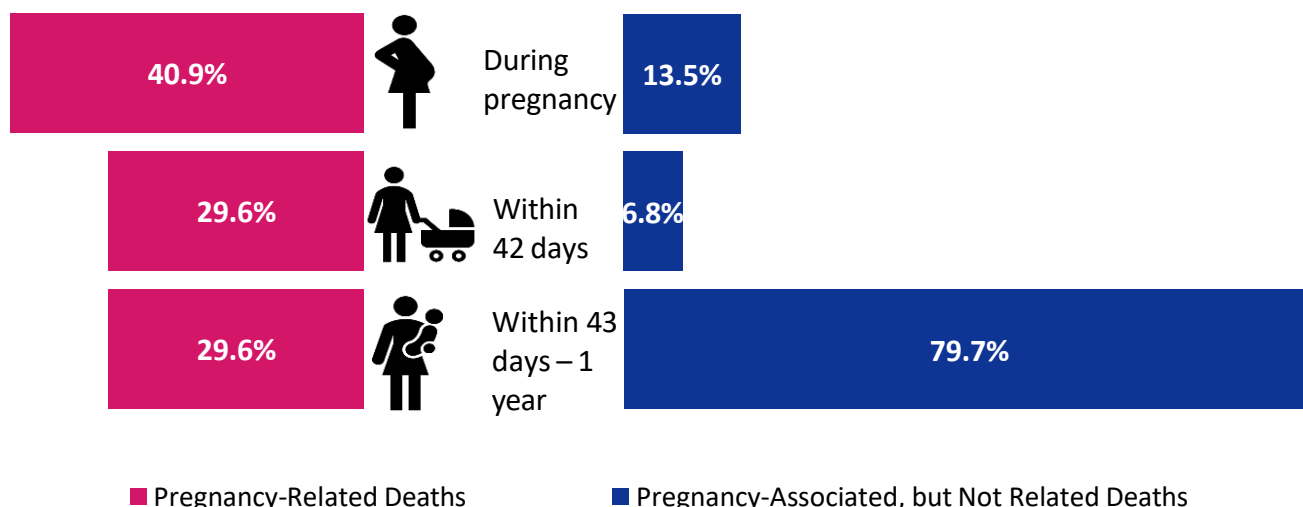
## Timing of Deaths

Timing of death among cases of maternal mortality are categorized into three periods: deaths that occurred during pregnancy, the early postpartum period (within 42 days of the end of pregnancy), and the late postpartum period (43 days up to one year of the end of pregnancy). For deaths that occurred between 2016-2018, 40.9% of pregnancy-related deaths occurred during pregnancy (n=18) while 79.7% of pregnancy-associated, but not related deaths occurred in the late postpartum period (n=59) (Figure 5).

Figure 5

**Over 40% of pregnancy-related deaths occurred during pregnancy while nearly 80% of pregnancy-associated, but not related deaths occurred during the late postpartum period (43 days to 1 year).**

Timing of New Jersey Pregnancy-Associated Deaths, 2016-2018



Source: New Jersey Maternal Mortality Review Committee

## National Perspective

The Pregnancy Mortality Surveillance System (PMSS) assesses national pregnancy-related mortality among women who died during pregnancy or within one year of the end of pregnancy. While MMRC data provides a more comprehensive assessment of pregnancy-related mortality at the state-level given expanded access to medical records and committee review, PMSS allows for us to assess how pregnancy-related mortality is impacted at the national level. State-level maternal mortality review committees are able to report on a broader set of deaths than is possible for PMSS, such as deaths due to injury. As of 2017, the PMSS national pregnancy-related mortality ratio (PRMR) was 17.3 deaths per 100,000 live births (CDC, 2021c).

When stratified by race/ethnicity, the PRMR for Black, non-Hispanic women was 41.7 deaths per 100,000 live births compared to 13.4 and 11.6 deaths per 100,000 live births for White, non-Hispanic and Hispanic women, respectively. While increased surveillance and mortality case identification methods has increased over time, the PRMR demonstrates a continually disparate outcome for maternal mortality for Black non-Hispanic women across the country. Targeted efforts to reduce maternal mortality among Black, non-Hispanic women should be aimed at addressing racial inequities stemming from unconscious bias and racial discrimination in provider care to enhanced and accessible support programs within the community (CDC, 2021c).

## Moving Forward

**Timeliness of review.** Since the committee's relaunch in August 2020, the NJMMRC has worked diligently to review cases of maternal mortality to attain more timely data analysis and reporting. Between September 2020 and December 2021, the committee reviewed 83 cases, 61% of which were deaths that occurred in 2017 and 2018. With funding from the CDC and increased program staff capacity, the NJMMRC has been able to review more cases within two years of the time of death. These improvements help to increase state-wide surveillance as well as drive the action of many state-wide programs and initiatives aimed at reducing maternal mortality in New Jersey.



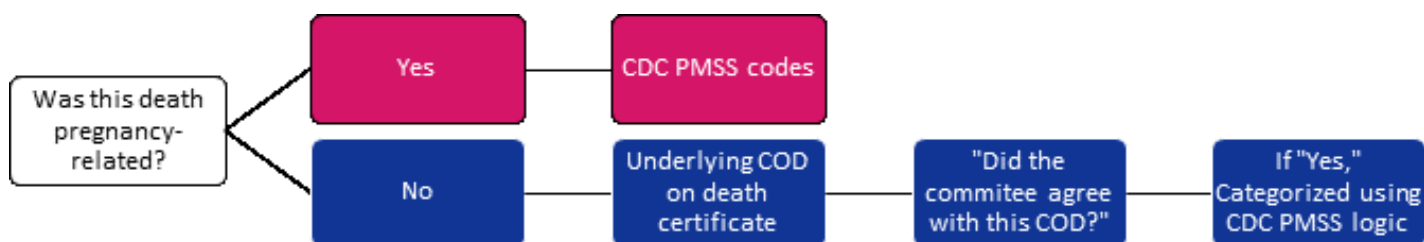
## Question 2: What Were the Underlying Causes of Death?

### Background

Underlying causes of death among pregnancy-associated cases from 2016-2018 were determined using two processes. For cases that were determined to be pregnancy-related, the underlying cause of death was determined using Pregnancy Mortality Surveillance System (PMSS) codes assigned by the committee at the time of review. The specific definitions of PMSS codes, which were developed by the CDC and American College of Obstetricians and Gynecologists (ACOG), can be found in Appendix B. For cases that were pregnancy-associated, but not related, the underlying causes of death were retrieved from the death certificate and validated by the MMRIA committee decision form question: "Does the committee agree with the underlying cause of death?". Upon validation that the committee agreed with the underlying cause of death, the causes of death were then categorized using similar logic to CDC PMSS codes (Figure 6). In this data from 2016-2018, the committee agreed with the underlying cause of death for all pregnancy-associated, but not related cases.

Figure 6

**Flow Chart for Determination of Causes of Pregnancy-Associated Deaths, New Jersey, 2016-2018**



### Results

#### Pregnancy-Related Underlying Causes of Death

Among the 44 cases of pregnancy-related deaths, the leading underlying causes of death were attributed to cardiovascular conditions (n=10), hemorrhage (n=8), hypertensive pregnancy disorders (preeclampsia, eclampsia, or chronic hypertension with superimposed preeclampsia, n=5), and thrombotic, non-cerebral embolism (n=5) (Table 4). Additional causes of pregnancy-related deaths include: cancer (whereby pregnancy complicated the disease progression), cardiomyopathy, infection (e.g., sepsis, chorioamnionitis), amniotic fluid embolism, metabolic/endocrine factors (e.g., diabetes mellitus), non-substance use related mental health disorders, and conditions unique to pregnancy (e.g., gestational diabetes, hyperemesis, liver disease of pregnancy). The results indicate a decrease in pregnancy-related deaths in New Jersey due to hemorrhage, infection, and hypertensive pregnancy disorders and an increase in deaths due to cardiovascular conditions and thrombotic, non-cerebral embolism compared to 2014-2016 data (McFarland, et al., 2021).

For the top 4 underlying causes of pregnancy-related deaths, the NJMMRC determined that the majority of them were preventable, which is defined as a death having at least some chance of being averted (Figure 8). 80% of deaths due to cardiovascular conditions, 87.5% of deaths due to hemorrhage, all deaths due to hypertensive pregnancy disorders, and 80% of deaths due to thrombotic, non-cerebral embolism were preventable.



Table 4

**Leading Underlying Causes of Pregnancy-Related Deaths, New Jersey, 2016-2018**

	Count
<b>Total</b>	<b>44</b>
Cardiovascular Conditions	10
Hemorrhage	8
Hypertensive Pregnancy Disorders	5
Embolism (Thrombotic, Non-Cerebral)	5
Cancer	4
Cardiomyopathy	3
Infection	3
Amniotic Fluid Embolism	2
Metabolic/Endocrine	2
Other Pregnancy-Related Causes*	2

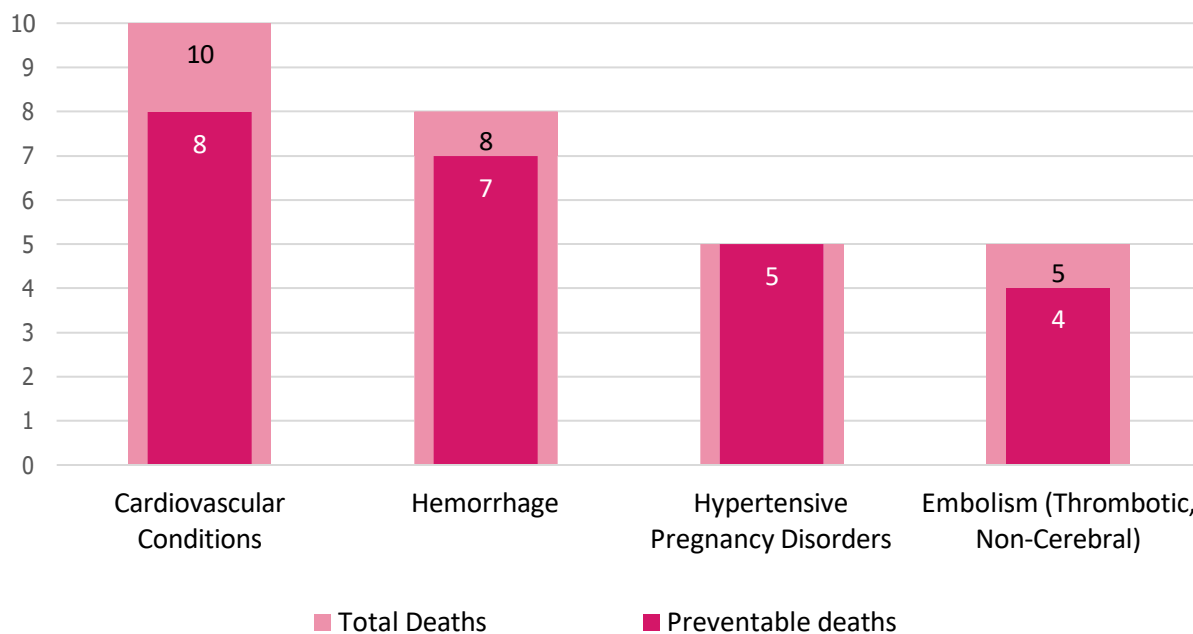
\*Note: Other pregnancy-related causes of death include non-substance use related mental health disorders and conditions unique to pregnancy (e.g., gestational diabetes, hyperemesis, or liver disease of pregnancy)

Source: New Jersey Maternal Mortality Review Committee

Figure 7

**More than 80% of the top 4 pregnancy-related underlying causes of death were determined to be preventable.**

Leading Underlying Causes of Pregnancy-Related Deaths, New Jersey, 2016-2018



Source: New Jersey Maternal Mortality Review Committee

## Pregnancy-Associated, but Not Related Underlying Causes of Death

The leading underlying causes of death among the 74 pregnancy-associated, but not related deaths were attributed to substance use disorder (SUD, 58.1%), injury consisting of unknown intent/suicide, homicide, or unintentional injury (12.1%), and cancer (whereby pregnancy was determined to not contribute to the disease progression, 10.8%) (Table 5). Additional underlying causes of pregnancy-associated, but not related causes of death included cardiovascular conditions, thrombotic, non-cerebral embolism, cardiomyopathy, infection, and cerebrovascular accidents. It should be noted that deaths attributed to SUD are overdose deaths that are a result of substance use and nearly all of the overdose deaths that the NJMMRC reviewed were due to SUD.

The majority of the 3 leading underlying causes of pregnancy-associated, but not related deaths were also determined to be preventable (Figure 8). Eighty four percent of pregnancy-associated, but not related deaths due to SUD, 78% of deaths due to injury, and 50% of deaths due to cancer had at least some chance of being averted.

Table 5

### Leading Underlying Causes of Pregnancy-Associated, but Not Related Deaths, New Jersey, 2016-2018

	Count
Total	74
Substance Use Disorder (SUD)	43
Injury	9
Unknown Intent or Suicide	4
Unintentional Injury	3
Homicide	2
Cancer	8
Other Pregnancy-Associated, but Not Related Causes*	5
Cardiomyopathy	3
Infection	3
Cerebrovascular Accident	3

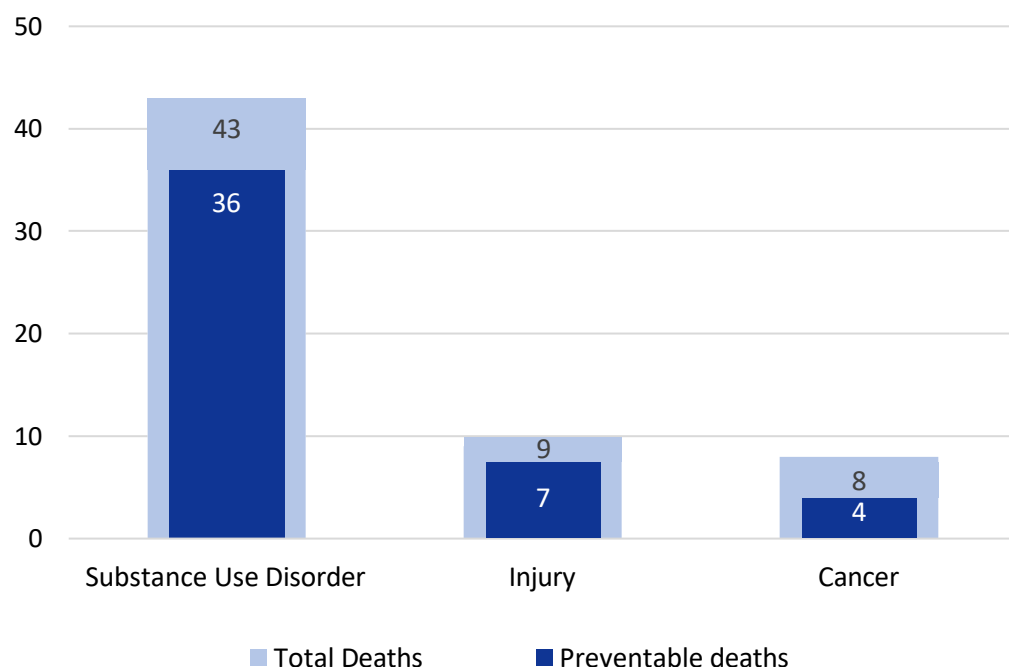
\*Note: Other pregnancy-associated, but not related causes of death include cardiovascular conditions, thrombotic, non-cerebral embolism, and metabolic/endocrine factors (e.g., diabetes mellitus) (count for each cause <2)

Source: New Jersey Maternal Mortality Review Committee

Figure 8

**More than 75% of the top 3 pregnancy-associated, but not related underlying causes of death were determined to be preventable.**

Top Underlying Causes of Pregnancy-Associated, but Not Related Deaths, New Jersey, 2016-2018



Source: New Jersey Maternal Mortality Review Committee

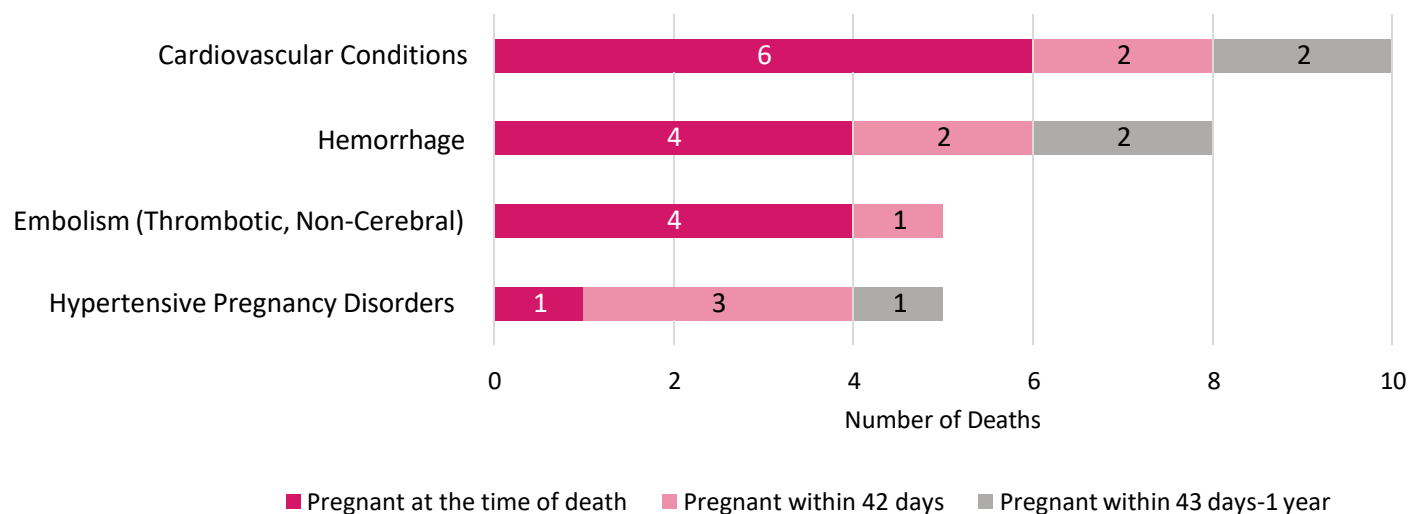
## Leading Underlying Causes of Death by Timing of Death

Figure 9 depicts the timing of death in relation to the top four underlying causes of pregnancy-related deaths. Most of this subset of pregnancy-related deaths occurred either at the time of pregnancy or within 42 days (6 weeks) of pregnancy. Pregnancy-related deaths due to cardiovascular conditions, hemorrhage, and thrombotic, non-cerebral embolism occurred primarily during pregnancy, while deaths due to hypertensive pregnancy disorders primarily occurred within 42 days of pregnancy. In contrast, among the top three underlying causes of death for pregnancy-associated, but not related deaths, most deaths occurred most in the late postpartum period (43 days up to 1 year) (Figure 10). Since many deaths due to substance use disorder (SUD) occurred in the late postpartum period, this highlights the need for a warm hand-off from OB-GYN providers to primary care providers, psychiatrists, SUD treatment specialists, and peer recovery programs.

Figure 9

**Among the top four pregnancy-related underlying causes of death, a majority of deaths took place during pregnancy.**

Leading Underlying Causes of Pregnancy- Related Deaths by Timing of Death, New Jersey, 2016-2018

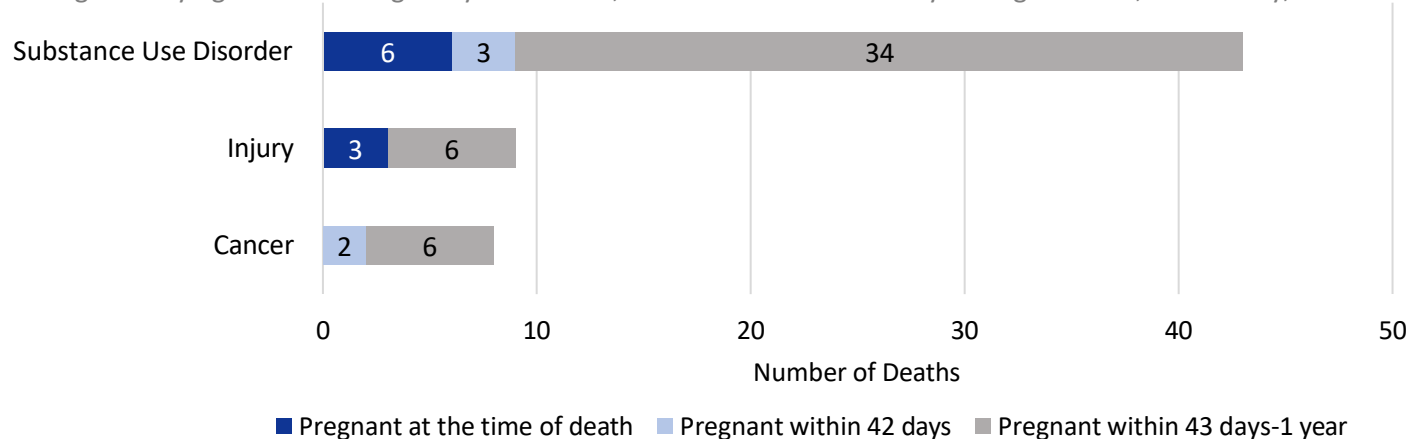


Source: New Jersey Maternal Mortality Review Committee

Figure 10

**Among the top three pregnancy-associated, but not related underlying causes of death, a majority of deaths took place during the late post-partum period (43 days – 1 year).**

Leading Underlying Causes of Pregnancy-Associated, but Not Related Deaths by Timing of Death, New Jersey, 2016-2018



Source: New Jersey Maternal Mortality Review Committee

## National Perspective

According to CDC's Pregnancy Mortality Surveillance System (PMSS) data from 2014-2017, the leading causes of pregnancy-related mortality in the United States were cardiovascular conditions (15.5%), infection/sepsis (12.7%), cardiomyopathy (11.5%), hemorrhage (10.7%), and thrombotic pulmonary or other forms of embolism (9.6%) (CDC,

2021c). Nationally, the percentage of deaths due to hemorrhage, preeclampsia/eclampsia, and anesthesia complications have declined while the percentage of death due to cardiovascular and cerebrovascular accidents have increased (CDC, 2021c).

## Limitations

***Underlying cause of death on the death certificate.*** Studies have shown the inadequacies of reporting on the underlying cause of death retrieved from the death certificate (Alipour & Payandeh, 2021). For pregnancy-associated, but not related deaths, the underlying cause of death was pulled from the death certificate; however, each case was validated by the committee decision form question “Does the committee agree with the underlying cause of death?”. As a result, the results reported in alignment with the determinations of the committee and therefore, are valid for inclusion in this data report.

## Moving Forward

When assessing pregnancy-related deaths that occurred from 2016-2018, targeted clinical approaches and patient education should be focused on addressing the risk factors and deaths due to cardiac conditions, such as, coronary artery disease, myocardial infection, and atherosclerotic cardiovascular disease, hemorrhage, thrombotic embolism, and hypertensive pregnancy disorders. Some complications related to cardiac disease in pregnancy include excess weight gain during pregnancy, preeclampsia, preterm birth, and hemorrhage, so it is essential that providers are able to address patient comorbidities and patients are able to identify and receive appropriate care to manage their risk factors and complications (Iftikhar and Biswas, 2021).

## Question 3: Was the Death Preventable?

### Background

During committee review, death preventability is determined. Preventability is defined on the Committee Decisions Form (Appendix A) as, “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.” Deaths that are deemed to be preventable are then assessed by a chance to alter the outcome (some chance, good chance, or unable to determine). Deaths that are deemed not preventable would have no chance to alter the outcome. The committee identifies contributing factors and recommendations for all preventable, pregnancy-associated deaths to find strategies aimed at reducing maternal mortality across the state.

A subset of pregnancy-related and pregnancy-associated, but not related deaths (n=12) that occurred in 2016 were not assessed for preventability at the time of review (prior to 2018). As a result, preventability was assessed for 106 of the 118 (89.8%) pregnancy-related and pregnancy-associated, but not related cases.

### Results

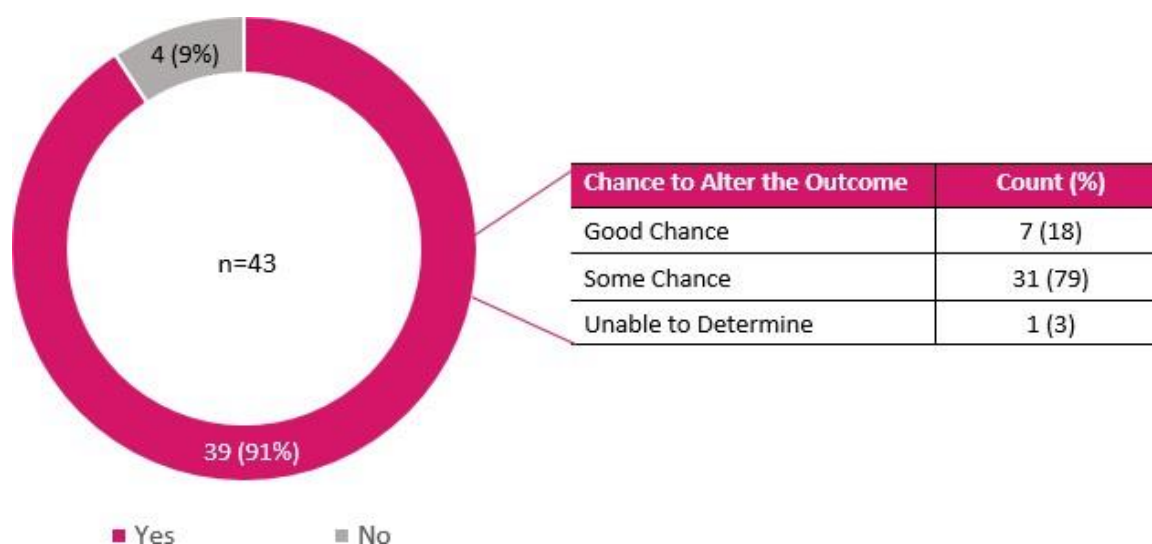
#### Pregnancy-Related

Among the 44 pregnancy-related deaths from 2016-2018, 43 were assessed for preventability. One death was reviewed prior to 2018 when New Jersey started assessing for preventability. The NJMMRC determined 39 (91%) of the 43 deaths to be preventable. Among the preventable pregnancy-related deaths, 18% had good chance to alter the outcome while 79% had some chance to alter the outcome. For one death, the committee was unable to determine between some chance and good chance. (Figure 11).

Figure 11

**More than 90% of pregnancy-related deaths were preventable. Among these preventable deaths, 18% had a good chance to alter the outcome and 79% had some chance to alter the outcome.**

Preventability among Pregnancy-Related Deaths, New Jersey, 2016-2018



Note: One pregnancy-related death was not assessed for preventability at the time of review.

Source: New Jersey Maternal Mortality Review Committee

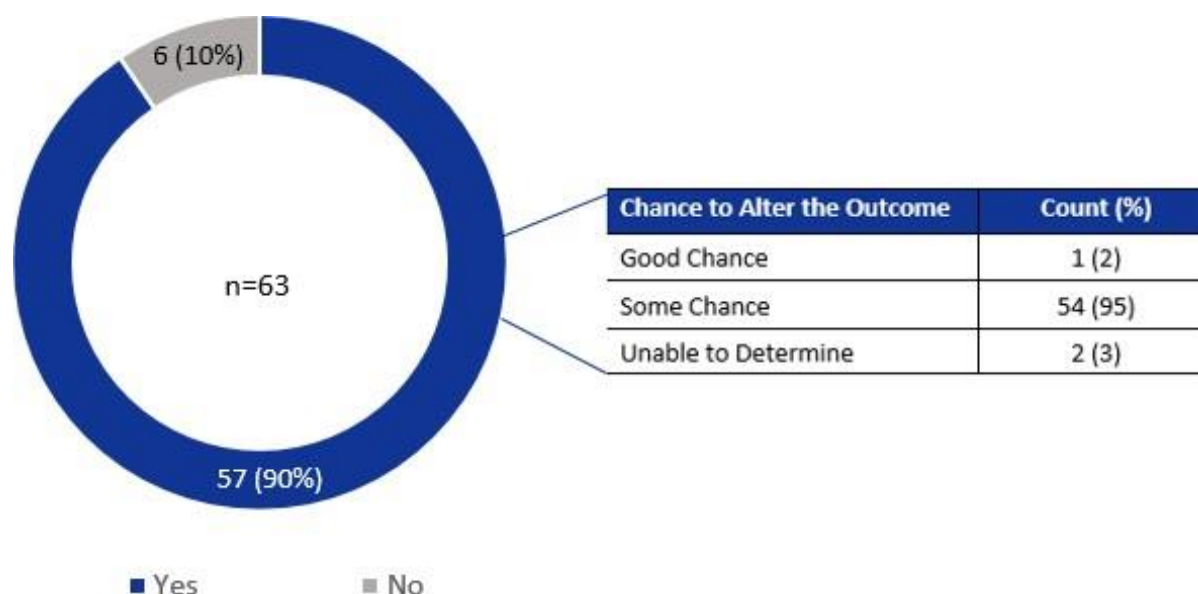
## Pregnancy-Associated, but Not Related

Among the 74 pregnancy-associated, but not related deaths from 2016-2018, 63 were assessed for preventability. Eleven pregnancy-associated, but not related cases were not assessed for preventability as they were reviewed prior to 2018. The NJMMRC determined that over 90% or 57 of these 63 deaths were preventable. Almost all of the 57 preventable pregnancy-associated, but not related deaths (95%) had some chance of being prevented (Figure 12).

Figure 12

**90% of pregnancy-associated, but not related deaths were preventable. Among these deaths, 95% had some chance to alter the outcome.**

Preventability Among Pregnancy-Associated, but Not Related Deaths, New Jersey, 2016-2018



Note: 11 pregnancy-associated, but related deaths were not assessed for preventability at the time of review.

Source: New Jersey Maternal Mortality Review Committee

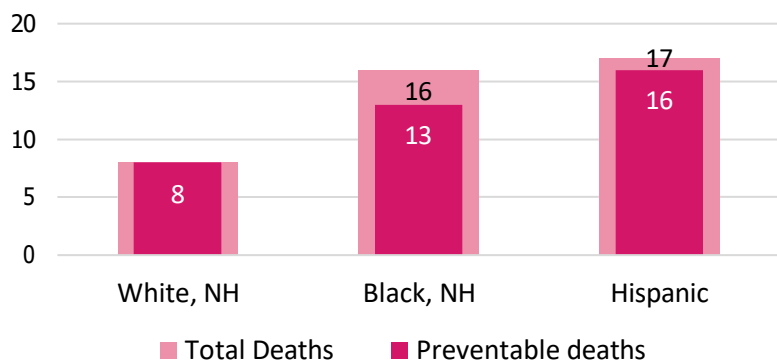
## Preventability by Race/Ethnicity

When assessing preventability by race/ethnicity among pregnancy-related deaths, 16 of the 39 preventable deaths were Hispanic women, while 13 were Black, non-Hispanic (NH) women. White, NH women accounted for 8 of preventable, pregnancy-related deaths (Figure 13). Based on the total number of deaths, we see that most of the deaths among Black, NH and Hispanic women were preventable, while 100% of White, NH pregnancy-related deaths were preventable. Similarly, for preventability among pregnancy-associated, but not related deaths, White, NH women accounted for 33 of 63 deaths assessed, while Hispanic women and Black, NH women accounted for 15 and 5 of preventable, pregnancy-associated, but not related deaths, respectively (Figure 14). These deaths also indicate that across race/ethnicity most deaths were preventable.

Figure 13

**Most of the deaths among Black, NH and Hispanic women were preventable, while 100% of White, NH pregnancy-related deaths were preventable.**

Preventability by Race/Ethnicity among Pregnancy-Related Deaths, New Jersey, 2016-2018



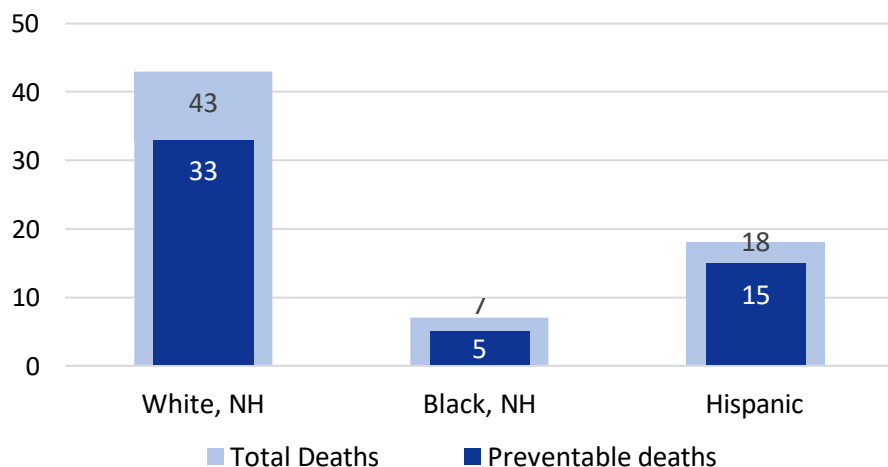
Note: 1 pregnancy-related death was not assessed for preventability at the time of review.

Source: New Jersey Maternal Mortality Review Committee

Figure 14

**Across race/ethnicity, most pregnancy-associated, but not related deaths were preventable.**

Preventability by Race/Ethnicity among Pregnancy-Associated, but Not Related Deaths, New Jersey, 2016-2018



Note: 11 pregnancy-associated, but not related deaths were not assessed for preventability at the time of review.

Source: New Jersey Maternal Mortality Review Committee

## Preventability by Age

Among the 39 pregnancy-related deaths deemed to be preventable, 41.0% were women who were over the age of 35. Women who were 30-34 years of age and under 29 years of age accounted for 25.6% and 33.3% of preventable, pregnancy-related deaths, respectively. Among preventable, pregnancy-associated, but not related deaths, a majority of women, 27 out of 57 (47.4%), were under the age of 29. Additionally, women who were 30-34 years of age and 35 years

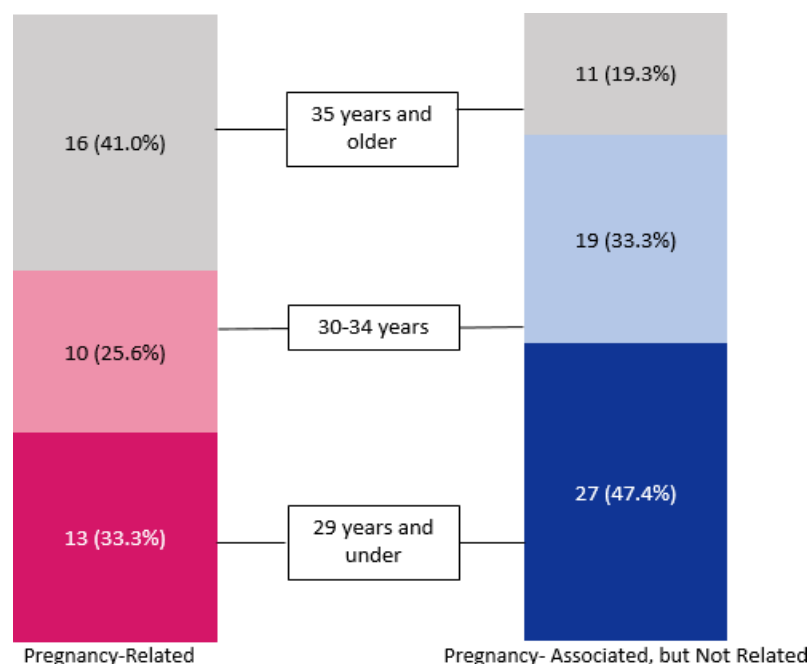


and older accounted for 33.3% and 19.3% of preventable, pregnancy-associated, but not related deaths, respectively (Figure 15).

Figure 15

**Most preventable, pregnancy-related deaths occurred among women aged 35 and older, while most preventable, pregnancy-associated, but not related deaths occurred among women aged 29 and younger.**

Preventability by Age, New Jersey, 2016-2018



Note: 12 deaths were not assessed for preventability at the time of review (n=106).

Source: New Jersey Maternal Mortality Review Committee

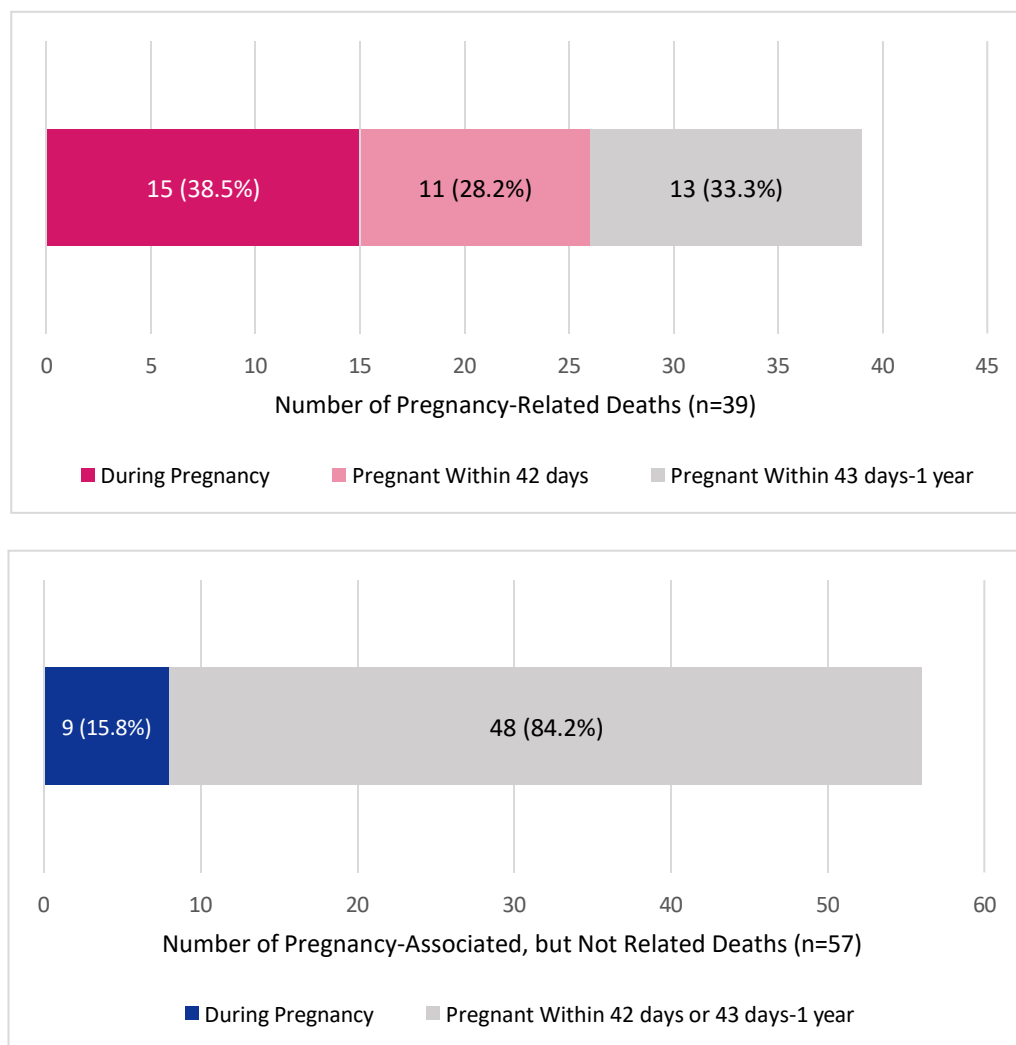
## Preventability by Timing of Death

For preventable, pregnancy-related deaths (n=39), 15 (38.5%) occurred during pregnancy, while 28.2% and 33.3% occurred within 42 days postpartum and 43 days-1 year postpartum, respectively (Figure 16). In contrast, a majority of preventable, pregnancy-associated, but not related deaths (n=57) took place during the postpartum period (84.2%). Due to the small sample of women who died within 42 days (n<7), Figure 16 shows the combined period of “within 42 days” and “43 days up to 1 year;” however, most of these deaths can be attributed to the late postpartum period (43 days up to 1 year).

Figure 16

**Most preventable pregnancy-related deaths occurred during pregnancy (38.5%), while 84.2% of pregnancy-associated deaths took place postpartum.**

Preventability by Timing of Death, New Jersey, 2016-2018



Note: 12 deaths were not assessed for preventability at the time of review. For pregnancy-associated, but not related deaths, “within 42 days” and “43 days up to 1 year” are combined to due to small sample size for “within 42 days” (n<7).

Source: New Jersey Maternal Mortality Review Committee

## Limitations

**Incomplete data.** Since assessment for preventability was not implemented until 2018, a subset of cases from deaths occurring in 2016 were reviewed prior to its implementation on the MMRIA committee decision form. In turn, there were some incomplete data for preventability and the chance to alter the outcomes. All cases reviewed after 2018 were assessed for preventability. Such data gap will not impact future reports.

## Moving Forward

The NJMMRC was able to identify that most pregnancy-associated cases reviewed for preventability had at least some chance of being preventable if a change was made to the identified factors that impacted their deaths. This data will be essential for driving actionable steps in programming and policy that can support reducing cases of maternal mortality in the state of New Jersey.

## Question 4: What Were the Factors That Contributed to this Death?

### Background

Upon committee determination of preventability, the committee identifies contributing factors that led to all preventable, pregnancy-associated cases to accompany and inform recommendations. Prior to creating the recommendations, the committee identifies the specific issue or factor that contributed to a woman's death (e.g., she was uninsured during the prenatal period). One of the 28 corresponding contributing factor classes from the Committee Decisions Form (e.g., access/financial) are then attributed to the factor. The 29 contributing factor classes, which includes an "Other" category, and their definitions can be found in Appendix C. Lastly, the committee determines one of the five associated levels of the contributing factor (patient/family, provider, facility, community, or system) before creating an actionable recommendation ("Building U.S. Capacity", 2018).

This section highlights the number of times a contributing factor class was identified at least once in a specific case (Figure 17). This sample was restricted to distinct counts by which any contributing factor class was only counted once per case. Contributing factor classes were assessed across pregnancy-relatedness and race/ethnicity.

### Results

#### Pregnancy-Related

Contributing factor classes were identified across 34 preventable, pregnancy-related cases. Among this sample, knowledge was identified as the major contributing factor class, where 22 cases (64.7%) were impacted by lack of provider/patient knowledge in an important event, treatment, or follow-up. Lack of continuity of care/care coordination was identified in 19 preventable, pregnancy-related cases (55.9%). The remaining top three contributing factor classes consisted of lack of standardized policies and procedures (50.0%), clinical skill/quality of care (44.1%), and lack of assessment (44.1%) (Figure 18).

Figure 17

**Flow Chart for Assessment of Contributing Factor Classes Among Pregnancy-Associated Cases, New Jersey, 2016-2018**

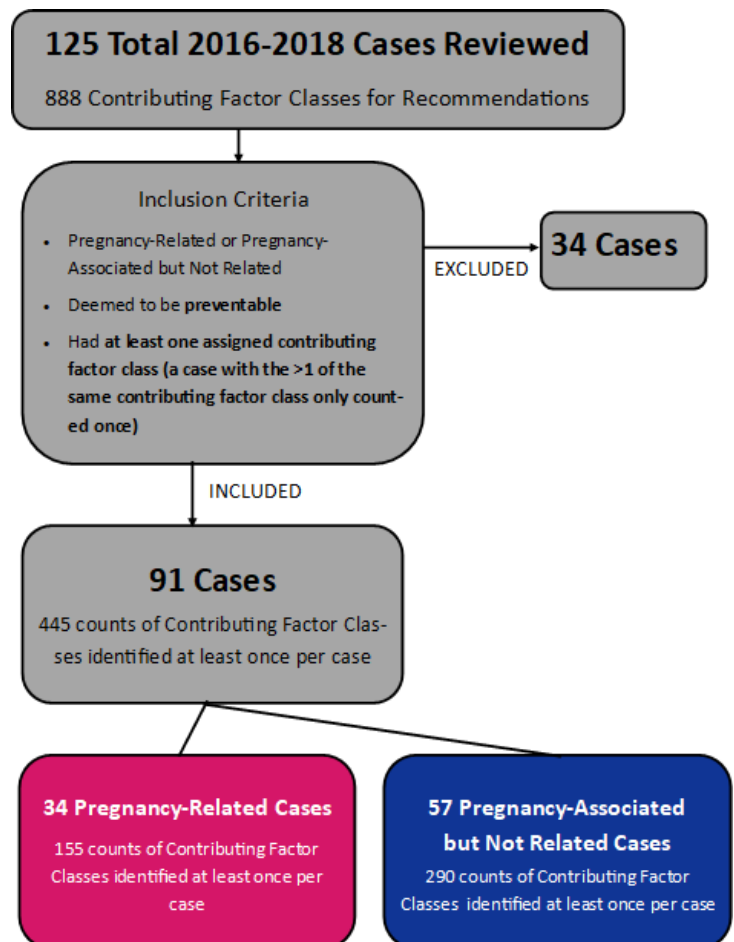







Figure 18

**Lack of knowledge by either a patient or provider, lack of continuity of care/care coordination, and lack of standardized policies and procedures were contributing factor classes identified in more than 50% of preventable, pregnancy-related deaths.**

Pregnancy-Related Top Contributing Factor Classes, New Jersey, 2016-2018

Contributing Factor Class		Count (%)
	Knowledge	22 (64.7%)
	Continuity of Care/Care Coordination	19 (55.9%)
	Policies/Procedures	17 (50.0%)
	Clinical Skill/Quality of Care	15 (44.1%)
	Assessment	15 (44.1%)

Note: Percent values indicate the percentage of cases that identify the contributing factor class at least once.







Source: New Jersey Maternal Mortality Review Committee

When assessing contributing factor classes by race/ethnicity, a lack of continuity of care/proper care coordination was identified as the top contributing factor class among 12 Black, non-Hispanic women whose deaths were determined to be preventable and pregnancy-related. Additionally, lack of standardized policies and procedures was identified as a top contributing factor class for the 13 Hispanic women whose deaths were determined to be preventable and pregnancy-related. Top contributing factor classes were not reported for White, non-Hispanic and Asian/Other/Multiracial women whose deaths were preventable and pregnancy-related due to small sample size ( $n < 7$ ) (Figure 19).

Figure 19

**Lack of continuity of care/care coordination was the top contributing factor class identified in 75% of Black, NH women who experienced a preventable, pregnancy-related death. A lack of standardized policies and procedures was identified in nearly 70% of Hispanic women who experienced a preventable, pregnancy-related death.**

Pregnancy-Related Top Contributing Factor Classes by Race/Ethnicity, New Jersey, 2016-2018

Black, non-Hispanic (n=12)		Hispanic (n=13)	
	Continuity of Care/Care Coordination (75.0%)		Policies/Procedures (69.2%)
	Knowledge (58.3%)		Knowledge (61.5%)
	Clinical Skill/Quality of Care (50.0%) Access/Financial (50.0%)		Clinical Skill/Quality of Care (46.2%)

Note: Percent values indicate the percentage of cases that identify the contributing factor class at least once. White non-Hispanic (NH), Asian NH, Other/Multiracial not included due to small sample size.

Source: New Jersey Maternal Mortality Committee

## Pregnancy-Associated, but Not Related

Across 57 preventable, pregnancy-associated, but not related cases, the major contributing factor class was a lack of continuity of care/care coordination, in which 45 (78.9%) cases were impacted by providers not having access to complete patient medical records or sufficiently communicating a patient's status. Substance use disorder (as a contributing factor class) was identified in 39 preventable, pregnancy-associated, but not related cases (68.4%). The remaining top three contributing factor classes consisted of mental health conditions (38.6%), lack of patient/provider knowledge (31.6%), and lack of standardized policies/procedures (31.6%) (Figure 20) (Appendix C).

Figure 20

**Lack of continuity of care/care coordination and substance use disorder were identified as a contributing factor class in a majority of preventable, pregnancy-associated, but not related deaths.**

Pregnancy-Associated, but Not Related Top Contributing Factor Classes, New Jersey, 2016-2018

Contributing Factor Class		Count (%)
	Continuity of Care/Care Coordination	45 (78.9%)
	Substance Use Disorder	39 (68.4%)
	Mental Health Conditions	22 (38.6%)
	Knowledge	18 (31.6%)
	Policies/Procedures	18 (31.6%)

Note: Percent values indicate the percentage of cases that identify the contributing factor class at least once.







Source: New Jersey Maternal Mortality Review Committee

Among the 33 White, non-Hispanic women whose deaths were preventable and pregnancy-associated, but not related, substance use disorder was identified as the top contributing factor class. Additionally, lack of continuity of care/proper care coordination was identified as the top contributing factor class among 13 Hispanic women whose deaths were determined to be preventable and pregnancy-associated, but not related (Figure 21). Additionally, top contributing factor classes were not reported for Black, non-Hispanic and Asian/Other/Multiracial women whose deaths were preventable and pregnancy-associated, but not related due to small sample size (Figure 21).

Figure 21

**Substance use disorder and lack of continuity of care/care coordination were top contributing factor classes identified in more than 75% of White, NH women and 50% of Hispanic women who experienced a preventable, pregnancy-associated, but not related death.**

Pregnancy-Associated, but Not Related Top Contributing Factor Classes by Race/Ethnicity, New Jersey, 2016-2018

White, non-Hispanic (n=33)		Hispanic (n=15)	
	Substance Use Disorder (81.8%)		Continuity of Care/Care Coordination (80.0%)
	Continuity of Care/Care Coordination (75.8%)		Substance Use Disorder (58.3%)
	Mental Health Conditions (48.5%)		Adherence (33.3%) Mental Health Conditions (33.3%) Assessment (33.3%)

Note: Percent values indicate the percentage of cases that identify the contributing factor class at least once. Black non-Hispanic (NH), Asian NH, Other/Multiracial not included due to small sample size

Source: New Jersey Maternal Mortality Committee

## Moving Forward

The contributing factor classes identified among preventable, pregnancy-related deaths illustrate a need for improved patient and provider knowledge as a top priority. Many pregnant patients should be educated on handling pre-existing risk factors during the prenatal, perinatal, and postpartum period, while providers should improve on identifying gaps in their patient's medical history and ensuring culturally competent care. Additionally, the results from this section highlight a need for providers and facilities to ensure appropriate care continuity and coordination for their patients across transitional stages of pregnancy to ensure the most comprehensive care. Among preventable, pregnancy-associated, but not related cases, it is essential for providers to best address substance use disorder and mental health conditions, in addition to ensuring care continuity, during the pregnancy and postpartum period and connecting pregnant women to community resources and centers that can help support them and their families.

# Question 5: What Are the Recommendations and Actions That Address Those Contributing Factors?

## Background

Following the determination of a case's pregnancy-relatedness and preventability, the committee is tasked with creating case-specific, actionable recommendations that address factors the committee indicated contributed to the death. The committee creates recommendations for any cases that were deemed preventable with at least some chance to alter the outcome. An actionable recommendation specifies the following:

- WHO - the entity responsible for carrying out the recommended action or intervention.
- WHAT – detail about the recommended action or change.
- WHEN – at which point during the reproductive lifecycle, during pregnancy, or in the postpartum period.

During NJMMRC committee review, NJDOH staff record each written recommendation and its specific level of impact, along with a description of the issue, and contributing factor classes. These data, along with the level of impact of contributing factors (i.e., patient/family, provider, facility, system, or community), the expected impact (i.e., small to giant), and type of impact (i.e., primary, secondary, tertiary) if the recommendation is put into action are documented by NJDOH staff following the meeting. All recommendations are reviewed and approved by the NJMMRC committee at the following meeting, prior to entry into the MMRIA system by the program staff (CDC, 2021b).

## Key Definitions

Definitions for the five recommendation levels, as listed in the MMRC Committee Decisions Form (Appendix A):

**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, or after a pregnancy- ranges from healthcare systems and payors to public services and programs.

**COMMUNITY:** A grouping based on a shared sense of places or identity- ranges from physical neighborhoods to a community based on common interests and shared circumstances.

## Results

The results summarized in this section focus on the analysis of written recommendations for cases the NJMMRC deemed preventable. Contributing factor classes, recommendation level, and cause of death were considered for these analyses. First, we provide an overview of available recommendations for any preventable, 2016-2018 maternal death. Second, results from the analyses of preventable, pregnancy-related maternal deaths and preventable, pregnancy-associated, but not related maternal deaths are presented.



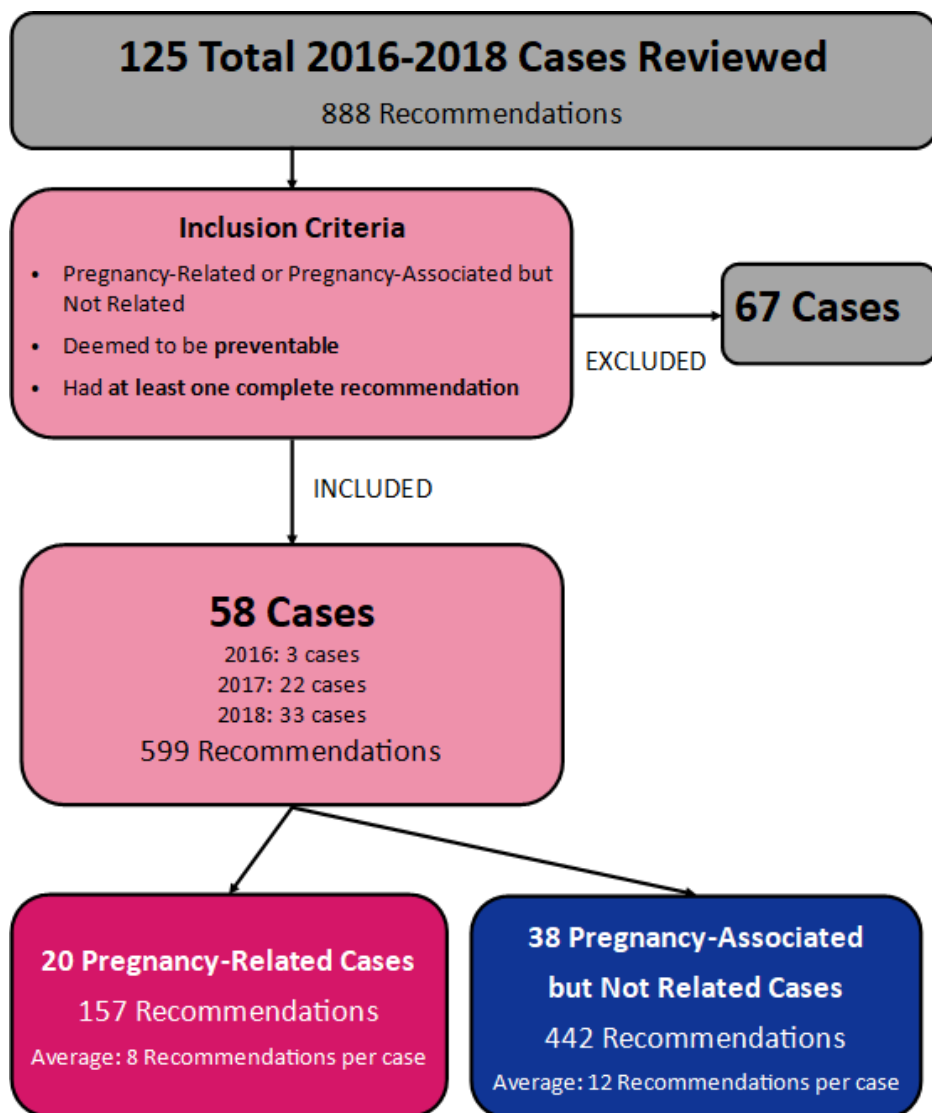
A total of 888 recommendation data entries were exported from MMRIA into Excel for analysis. Through additional review of the data, we identified 599 recommendation data entries across 58 cases that could be included in analyses. Included cases needed to meet the following three criteria: deemed pregnancy-related or pregnancy-associated, but not related through case review; deemed a preventable death through case review; and had at least one complete recommendation meeting the “who, what, when” criteria. For the 58 cases with recommendation data, 2016<sup>1</sup> was the year of death for three cases (5%), 2017 was the year of death for 22 cases (38%), and 2018 was the year of death for 33 cases (57%). Most of the 2016 case recommendations were excluded from these analyses because they did not meet the “who, what, when” criteria.

The 58 cases with recommendations included 20 cases that were pregnancy-related and 38 cases that were pregnancy-associated, but not related. Of the 599 recommendations available for analyses, 157 recommendations pertained to the 20 cases of pregnancy-related deaths and 442 recommendations pertained to the 38 cases of pregnancy-associated, but not related deaths. There was an average of 8 recommendations across the 20 pregnancy-related cases and an average of 12 recommendations across the 38 pregnancy-associated, but not related cases.

Across the 599 recommendations for the entire cohort of 58 cases included in the analyses, 49 (8%) were categorized at the patient/family level, 277 (46%) were categorized at the provider level, 133 (22%) were categorized at the facility level, and 120 (20%) were categorized at the system level, and 20 (3%) were categorized at the community level.<sup>2</sup>

Figure 22

### Flow Chart for Assessment of Recommendations Data, New Jersey, 2016-2018



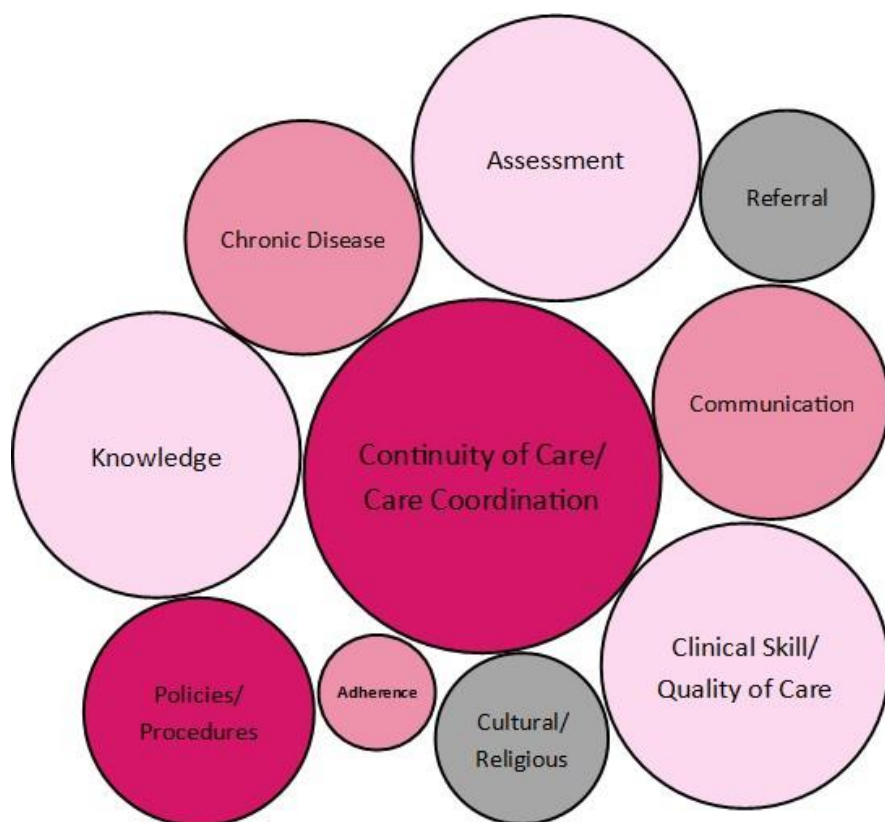
<sup>1</sup> Most recommendations for 2016 data were blank or incomplete and could not be included in analyses.

<sup>2</sup> The five values as presented sum to 99% due to rounding. If unrounded, the values sum to 100%.

## Pregnancy-Related

Figure 23

### Key Contributing Factor Classes for Preventable, Pregnancy-Related Deaths in New Jersey, 2016-2018



A total of 242 recommendations were exported from MMRIA for the 37 preventable, pregnancy-related deaths in NJ between 2016-2018. As illustrated in Figure 22, a total of 157 recommendations for 20 cases were retained for thematic analyses. Only recommendations suitable for coding were included in the analysis.

Initial review and thematic analysis were conducted on all 157 recommendations. Each recommendation was assigned a code. Common codes needed to be represented in at least two separate cases to be used in this analysis. Similar codes emerged across themes and a variety of contributing factors. The final set of codes were grouped by key themes and aligned with the following 10 contributing factor classes: Adherence, assessment, chronic disease, clinical skill/quality of care, communication, continuity of care/care coordination, cultural/religious, knowledge, policies/procedures, and referral (Figure 23).

Recommendations were most likely to suggest provider-level changes, followed by a focus on facility- or system-level changes. Two contributing factor classes, assessment and continuity of care/care coordination were most often cited across recommendations.

The final list of key themes, related codes, associated contributing factor classes, and example recommendations developed by the NJMMRC are displayed in Table 6. Five, key themes emerged from the analysis of recommendations, including: (1) Ensure high quality care, (2) Build patient knowledge, (3) Address barriers to care, (4) Implement a holistic approach to care, and (5) Share patient records/information about care provided (Figure 24).

**Ensure high quality care** was the most common theme to emerge from analysis of complete recommendations for preventable, pregnancy-related deaths. In this analysis, ensuring high quality care needed to include recommended actions that reflect one of the following six domains of health care quality: Safe, Effective, Patient-centered, Timely, Efficient, and Equitable care (Agency for Healthcare Research and Quality, 2018). Ten recommended changes emerged for the theme ensure high quality care. The most common codes centered on providers coordinating care to connect patients with comprehensive or the appropriate next of care as needed, providers assessing patients' need for culturally sensitive resources to aid communication and understanding care plan, and providers taking a thorough history and reviewing all patient data to inform the plan of care. In turn, the ensure high quality care codes suggested various actions that providers across facilities could implement to change how they provide care and prevent pregnancy-related maternal deaths in New Jersey.

Figure 24

### Key Themes to Address Pregnancy-Related Deaths in New Jersey, 2016-2018



The theme **build patient knowledge** had the next highest number of codes to emerge from analysis. The three codes for this theme focused on educating patients about their health status and how to manage their care. Educating patients about appropriately taking medications emerged as the most common code.

Address barriers to care, implement a holistic approach to care, and share patient records/information about care provided were less salient themes in the recommendations. For **address barriers to care**, codes reflected aiding patients in ways that enable them to access care as needed. The two codes for this theme were similar in their frequency across the recommendation data. They centered on eliminating or addressing barriers to care by providers referring patients for community resources to address a lack of transportation or continuous health coverage and facilities providing patients with a care coordinator or navigator to enable their adherence to the care plan. The theme **implement holistic approach to care** included codes that focus on whole patient care or on physical and mental health comorbidities as an important part of patient care. The most common of the two codes for implement holistic approach to care focused on providers

assessing and referring patients for additional care for mental or other physical comorbid conditions. Finally, the theme **share patient records/information about care provided** comprised recommendations about communicating patient care and the need to share patient information. The most common of the two final codes for share patient records/information about care provided focused on all points of care across the system communicating care they provided to a patient to ensure continuity of care.

Table 6

### Results of Thematic Analysis of Recommendations to Address Preventable, Pregnancy-Related Deaths in New Jersey, 2016-2018

Key Theme #1 - Ensure High Quality Care		
Recommendation Codes	Example Recommendations from NJMMRC	Primary Contributing Factor Class
<b>Facilities</b> should ensure access to educational materials/health information translated into multiple languages	As soon as possible, facilities should have educational materials in multiple languages.	Cultural/Religious
<b>Providers across facilities</b> should ensure patients are connected with comprehensive care/level of care needed as soon as possible	There should be coordination of more intensive prenatal care to meet patients' needs during pregnancy.	Continuity of Care/ Care Coordination
<b>Providers</b> should follow-up with patients about taking medications as prescribed	Providers should follow up to make sure patients are taking medications as prescribed and if they are having difficulty following a treatment plan, providers should ascertain why.	Adherence

When risk indicated, <b>providers</b> should implement prevention protocol for pre-eclampsia	As patient gives history, providers should initiate low-dose aspirin preeclampsia prevention protocol and monitor for pregnancy-induced hypertension signs/symptoms.	Assessment
<b>Providers</b> should conduct a thorough assessment to understand and address patient pain	Providers should take complaints of pain seriously and conduct a thorough assessment to determine cause.	Assessment
<b>Providers</b> should prioritize vaginal birth over c-section whenever possible	Members of Obstetrics (OB) Department should promote vaginal birth for twin pregnancy when safe and appropriate.	Clinical Skill/ Quality of Care
<b>Providers</b> need to be educated about complete and accurate documentation	Providers should minimize gaps in documentation records (aim for completeness) during prenatal course.	Continuity of Care/ Care Coordination
<b>Providers</b> should assess the need for culturally-sensitive resources (e.g., interpreter) to aid patients' understanding of care plan and communication whenever needed	Providers should assess needs for interpreter and patient's understanding of the information at all points that the patient has interactions with the health care system.	Cultural/Religious
<b>Providers</b> should follow protocol/ best practices for treating severe hypertension	Providers should utilize the AIM bundle on severe hypertension in pregnancy to improve readiness, recognition, response, and reporting.	Policies/Procedures
<b>Providers</b> need to take a thorough history and review all relevant data to inform care plan	Hospital staff should follow-up to obtain the prenatal record and accurate prenatal history at the time of admission.	Assessment

## Key Theme #2 - Build Patient Knowledge

Recommendation Codes	Example Recommendations from NJMMRC	Primary Contributing Factor Class
<b>Providers</b> should educate patients about taking medications as prescribed	Provider should provide education on/support for medication compliance and address underlying concerns about side effects throughout care.	Chronic Disease
	When a provider prescribes a medication, they should be providing education to their patient on the importance of not self-discontinuing that medication.	Communication
<b>Providers</b> should educate patients about weight management throughout care	Providers should educate patient that weight reduction may have improved overall health pre-pregnancy or at every visit.	Chronic Disease
<b>Providers</b> should educate patients about warning signs of complications during and after pregnancy, so they promptly seek care	Education is needed on signs/symptoms of ectopic pregnancy, what is "normal" early pregnancy "pain" versus what are pain/symptoms that would require a visit to the Emergency Room (ER) or clinic.	Knowledge

Key Theme #3 - Address Barriers to Care		
Recommendation Codes	Example Recommendations from NJMMRC	Primary Contributing Factor Class
<b>Facilities across the system</b> should provide patients with a care coordinator or navigator to ensure compliance and adherence to complete care plan	A patient, who is identified as high risk, needs a care coordinator who is following her individually, throughout the course of care, to assure she goes back to the same care provider each time and helps her to navigate information and the system. This person would also coordinate her appointments, help her with mental health referrals and encourage compliance with medical recommendations.	Continuity of Care/ Care Coordination
<b>Providers</b> should connect patients with resources that address barriers to care (social determinants of health)	Providers and case workers should understand and refer patients to resources for insurance coverage when they lose coverage or do not have insurance.	Referrals
Key Theme #4 - Implement Holistic Approach to Care		
Recommendation Codes	Example Recommendations from NJMMRC	Primary Contributing Factor Class
<b>Providers</b> should assess for comorbid physical or mental health conditions and refer for additional treatment/services when history reported/condition suspected	As early as possible, providers should assess for mental health conditions early when there is a history and consider follow up with counseling and potential medication.	Assessment
<b>Providers</b> should counsel patients to optimize health before pregnancy	Patients should have preconception counseling to address health issues before pregnancy.	Knowledge
Key Theme #5 - Share Patient Records/Information About Care Provided		
Recommendation Codes	Example Recommendations from NJMMRC	Primary Contributing Factor Class
<b>Providers</b> need to make patient records accessible so they can be reviewed by others to inform care plan	The patient should inform, and the health care provider should facilitate transfer of medicals records prior to initial visit with new provider.	Continuity of Care/ Care Coordination
All points of care <b>across the system</b> need to communicate care provided to patient	Thorough report should be given by provider from facility of origination to receiving facility.	Communication

Note: Thematic analyses of recommendations with the following contributing factors did not yield themes to report: Access/financial, delay, discrimination, environmental, equipment & technology, other, outreach, and violence. Recommendation level is in bold.

Additional exploratory thematic analysis was conducted to identify any salient themes for preventable, pregnancy-related cases with top causes of death. **The most common causes of death among pregnancy-related cases were cardiovascular conditions (n=10), hemorrhage (n=8), hypertensive pregnancy disorders (n=5), and thrombotic, non-**



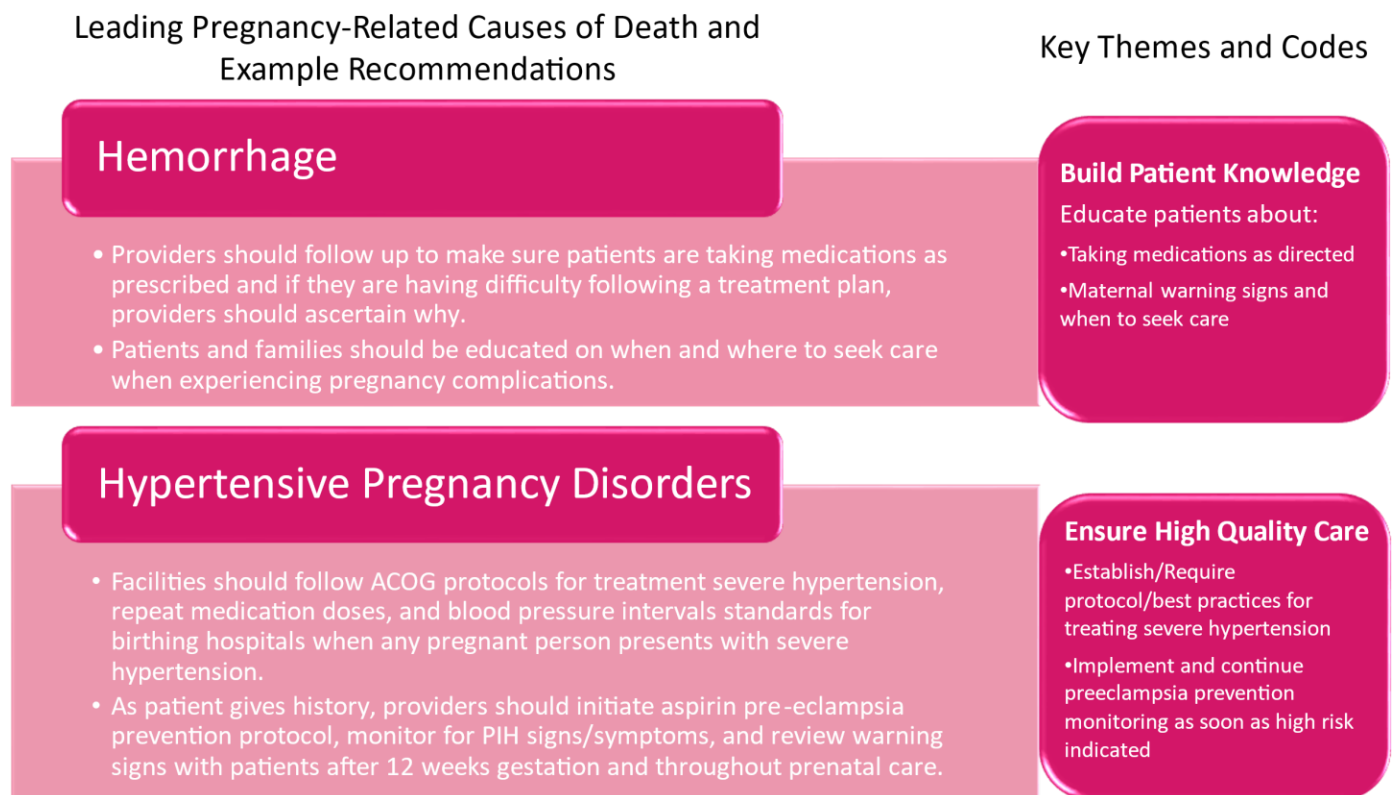
**cerebral embolism (n=5)** (Table 4). Over 80% or most of these cases were also preventable deaths (Figure 7). The large number of missing recommendations data across 2016-2018 preventable, pregnancy-related deaths limited these analyses. Among the top four causes of death for preventable, pregnancy-related cases, there were enough cases with recommendations to conduct exploratory thematic analysis on cases of hemorrhage and hypertensive pregnancy disorders. There were not enough data to code deaths from cardiovascular conditions and embolism.

Thematic analyses of cases with hemorrhage as the cause of death indicated that **building patient knowledge** was the key theme across recommendations (Figure 25). Specifically, results suggested that to build patient knowledge, providers need to educate patients about taking medications as directed and educate patients about maternal warning signs to inform when they seek care. Example recommendations the NJMMRC developed are presented to illustrate support for the final codes.

For cases with hypertensive pregnancy disorders, as the cause of death, **ensure high quality care** emerged as the key theme across recommendations (Figure 25). Results indicated that providers should implement preeclampsia monitoring throughout care as soon as need is indicated, and facilities should require that best practices/protocol for treating severe hypertension be followed. Example recommendations the NJMMRC developed are displayed to illustrate support for these final codes.

Figure 25

### Key Theme, Codes, and Example Recommendations to Address Hemorrhage and Hypertensive Pregnancy Disorders – Two of the Four Top Causes of Pregnancy-Related Deaths in New Jersey, 2016-2018



## Pregnancy-Associated, but Not Related

A total of 442 recommendations across 38 cases were included in this analysis of preventable, pregnancy-associated, but not related deaths from 2016-2018. Each recommendation was assigned a code. Given that this analysis included more than double the number of recommendations compared to the pregnancy-related cases, codes needed to be represented in at least four separate cases to be included in the results. Similar codes emerged across themes and a variety of contributing factor classes. The final set of codes were grouped by key themes and aligned with the following 8 contributing factor classes: Access/financial, assessment, continuity of care/care coordination, mental health conditions, outreach, policies/procedures, referral, and substance use disorder (Figure 26).

Recommendations were most likely to suggest provider- or facility-level changes, followed by a focus on system-level changes. Continuity of care/care coordination and substance use disorder were the two most common contributing factors cited across recommendations.

The final list of key themes and codes, associated contributing factor classes, and example recommendations developed by the NJMMRC are displayed in Table 7. Four of the five key themes that emerged in the analysis of recommendations for pregnancy-related deaths also resulted for the pregnancy-associated, but not related cases. The four themes ordered by frequency in the recommendations data included (1) Implement a holistic approach to care, (2) Ensure high quality care, (3) Address barriers to care, and (4) Share patient records/information about care provided (Figure 27).

**Implement holistic approach to care** was the most common theme to emerge from analysis of complete recommendations for preventable, pregnancy-associated, but not related deaths. Six codes representing this theme emerged with a focus on integrating physical and mental health comorbidities as part of whole patient care. The two most common codes for implement holistic approach to care indicated the need for facilities to establish best practices for universal screening for substance use disorder (SUD) along with referral and treatment of identified use and for providers to assess patients for mental health conditions using validated tools and to refer for services when indicated. In turn, the implement holistic approach to care codes suggested various actions that providers and facilities could implement to identify and address SUD, and mental health conditions to prevent pregnancy-associated, but not related maternal deaths in New Jersey.

**Ensure high quality care** was the next most common theme with four identified codes to emerge from analysis of complete recommendations for preventable, pregnancy-associated, but not related maternal deaths. The most common recommended change that emerged for the theme ensure high quality care centered on facilities leveraging resources

Figure 26

**Key Contributing Factor Classes for Preventable, Pregnancy-Associated, but not Related Deaths in NJ, 2016-2018**

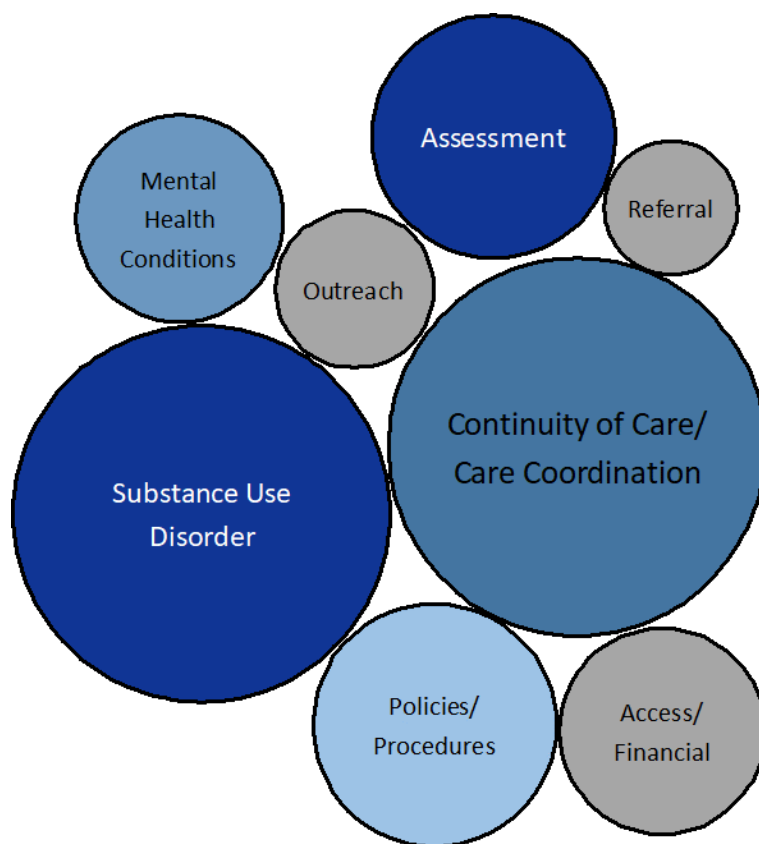
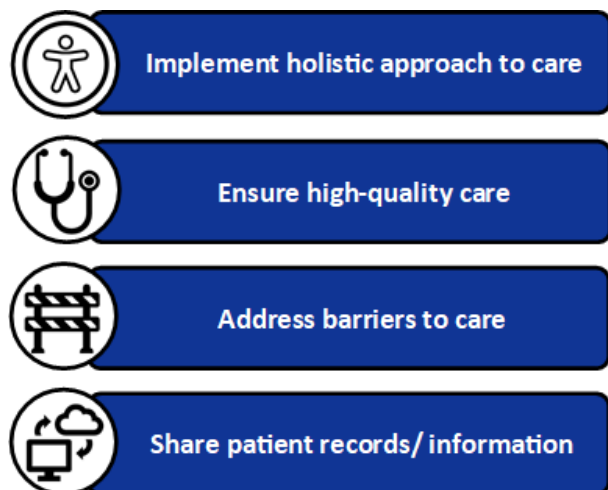


Figure 27

**Key Themes to Address Pregnancy-Associated, but not Related Deaths in New Jersey, 2016-2018**



such as navigators and Connecting NJ (formerly known as Central Intake) to connect patients with needed services prior to discharge. The next most common code recommended providers across the system receive training or education to properly screen and refer patients with SUD.

Address barriers to care and share patient records/information about care provided were less salient themes in the recommendations with two identified codes for each theme. The most code for **address barriers to care** emphasized the need for the system to provide access to case management services to birthing people who lack a medical home and need assistance adhering to a care plan. Finally, two codes for the theme **share patient records/information about care provided** were similar in their frequency across the data. These codes emphasized the need for an infrastructure that can support record sharing and coordinated care among shared patients across facilities in the system and all providers involved in a patient's care should communicate about recent care provided and participate in ongoing care planning.

Table 7

**Results of Thematic Analysis of Recommendations to Address Preventable, Pregnancy- Associated, but Not Related Deaths in New Jersey, 2016-2018**

<b>Key Theme #1 - Implement Holistic Approach to Care</b>		
<b>Recommendation Codes</b>	<b>Example Recommendations from NJMMRC</b>	<b>Primary Contributing Factor Class</b>
Facilities across the system should establish best practices (i.e., Screening, brief intervention, and referral to treatment (SBIRT)) to guide universal screening of substance use with validated tools and how to address current use	Facilities should ensure that universal screening is necessary for all patients and not just risk-based patients upon admission and prior to discharge.	Assessment
	At each encounter, the facility leaders will have standard incorporation of SBIRT in care for all perinatal persons to assess for and address alcohol use/misuse.	Policies/Procedures
	Facilities should have policies in place to screen with a validated tool and make referrals for substance use during entry into prenatal care and before discharge from the Emergency Department (ED).	Substance Use Disorder- Alcohol, Illicit/Prescription Drugs



<b>Facilities</b> should ensure patients at risk for substance use disorder (SUD) are connected to community resources prior to discharge	All patients who are at risk due to SUD should be connected with community and outreach services prior to discharge from ED.	Outreach
<b>Providers</b> should assess for mental health conditions at every visit using validated tools and refer for services when indicated	Providers need to screen patients for mental health conditions as part of the ED assessment.	Assessment
	Providers should utilize a standard tool to assess past mental health history, complete community health screening, screening tool (e.g., ACE's), and refer patient to mental health specialist when patient discloses.	Mental Health Conditions
<b>Providers</b> should refer patients at risk for substance use and mental health conditions for additional treatment	All patients with a history of substance use, especially in the presence of a history of mental health disorders, need to be referred for follow up care.	Referral
<b>Providers</b> should follow best practices (i.e., SBIRT) when identifying and addressing substance use at any visit in any patient	OB care providers should screen all pregnant women in NJ for SUD as a Standard of Care at the initial visit and all ongoing visits.	Substance Use Disorder-Alcohol, Illicit/Prescription Drugs
<b>Providers</b> should give naloxone and instructions for use to any patient with identified substance use	Discharging providers and facilities should assure that people with SUD leave with naloxone at end of ER visit or hospital stay/provider visit.	Substance Use Disorder-Alcohol, Illicit/Prescription Drugs
<b>Key Theme #2 - Ensure High Quality Care</b>		
<b>Recommendation Codes</b>	<b>Example Recommendations from NJMMRC</b>	<b>Primary Contributing Factor Class</b>
<b>Facilities across the system</b> should leverage resources (i.e., social workers/patient navigators, Connecting NJ) to ensure patients receive referrals to needed services prior to discharge	Patients at risk for SUD should receive a transitional navigator to help coordinate care prior to ED discharge.	Continuity of Care/Care Coordination
	Facility leadership should collaborate with community systems to develop routine ways to increase access to community-based services (i.e., Central Intake is an easy way to help anyone access supportive community resources when discharged from ED).	Substance Use Disorder-Alcohol, Illicit/Prescription Drugs
<b>Providers</b> should receive training on screening and referring for SUD	Providers should be educated regarding best practice for screening for SUD at each visit.	Substance Use Disorder-Alcohol, Illicit/Prescription Drugs

<b>Facilities</b> should establish standard, validated process for screening, referral to community services, and follow-up	As soon as possible, facilities should have policies for: screening and referral in place and adhered to, quality improvement to assure enforcement, and appropriate referral/follow-up such as community involvement for services.	Policies/Procedures
Key <b>system</b> stakeholders (i.e., NJ MCH Consortia and hospital leadership) should ensure ongoing education about available community resources and central intake for providers	On an ongoing basis, MCH Consortia should ensure that providers are aware of community resources to refer patients to.	Continuity of Care/Care Coordination
<b>Key Theme #3 - Address Barriers to Care</b>		
<b>Recommendation Codes</b>	<b>Example Recommendations from NJMMRC</b>	<b>Primary Contributing Factor Class</b>
<b>Providers</b> should refer patients to community resources to address social determinants of health that impede care (i.e., insurance & transportation)	All providers should refer to transportation services available (i.e., LogistiCare) via Medicaid insurance and provide contact information upon discharge.	Access/Financial
The <b>system</b> should provide access to case management services to birthing people who lack a medical home and need assistance adhering to a care plan	Providers, facility, systems, and communities must develop/implement case management program, protocol, or process for patients with complex needs and educate providers/helpers on how to access as soon as possible.	Continuity of Care/Care Coordination
<b>Key Theme #4 - Share Patient Records/Information About Care Provided</b>		
<b>Recommendation Codes</b>	<b>Example Recommendations from NJMMRC</b>	<b>Primary Contributing Factor Class</b>
<b>Facilities across the system</b> need an infrastructure that can support record sharing and coordinated care among shared patients	As possible, patients, providers, facilities, and systems should develop system of care that has shared responsibility to coordinate care (e.g., info exchange network).	Continuity of Care/Care Coordination
All <b>providers</b> involved in a patients' care should communicate about recent care provided and ongoing care planning	Facilities and providers should ensure integrated care among all providers to share needed information and work in coordination at all times.	Continuity of Care/Care Coordination

Note: Thematic analyses of recommendations for the following contributing factor classes did not yield themes to report: Adherence, chronic disease, clinical skill/quality of care, communication, cultural/religious, delay, discrimination, environmental, knowledge, other, social support/isolation, tobacco use, unstable housing, and violence. Recommendation level is in bold

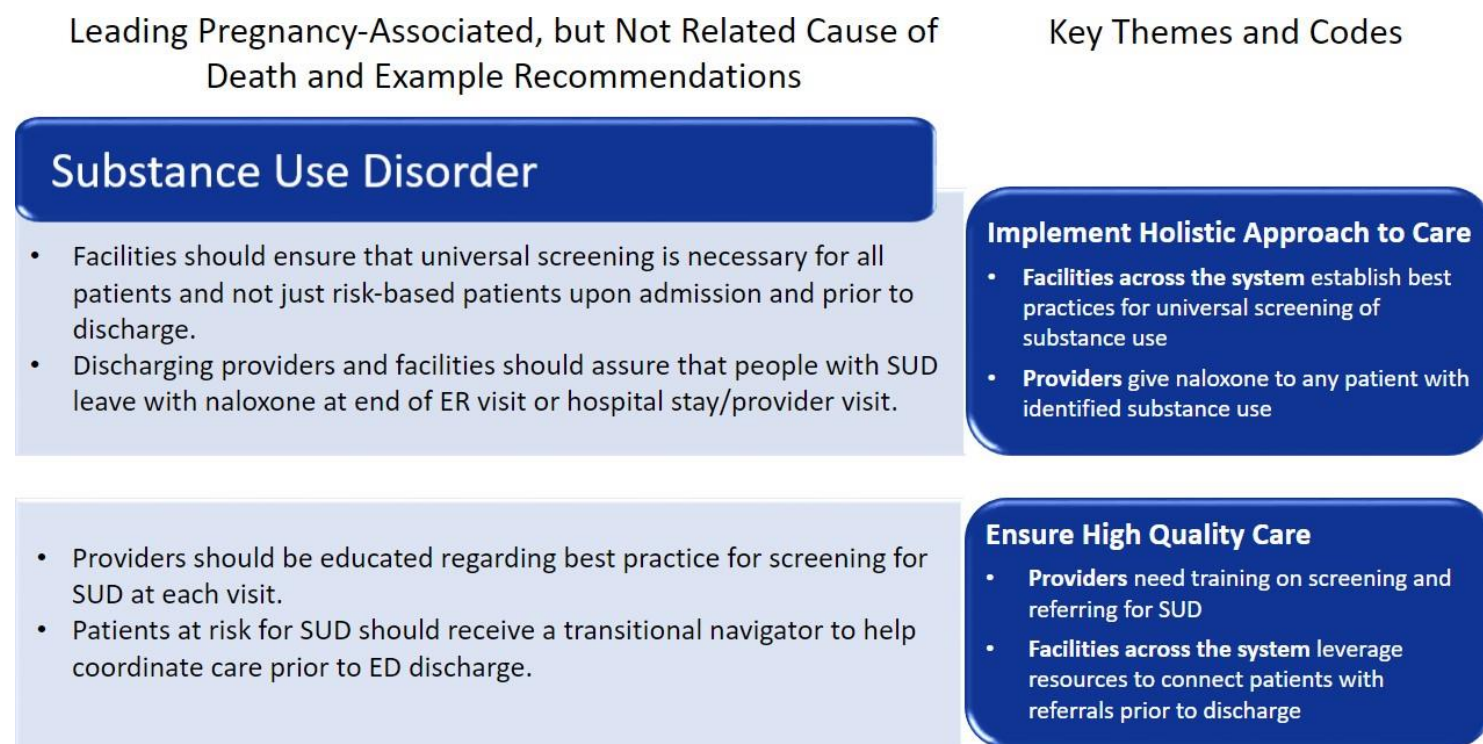
Sufficient data were available to complete thematic analysis on the most common pregnancy-associated, but not related cause of death, substance use disorder (SUD), which accounted for 58.1% of all pregnancy-associated, but not related deaths (Table 5). Most results were already represented in the overall analysis of all preventable, pregnancy-associated,

but not related cases. Common themes and codes for SUD cases, along with example recommendations, are displayed (Figure 28).

**Implement holistic approach to care** and **ensure high quality care emerged** as the two salient themes for addressing deaths from SUD. Common codes for the theme implement holistic approach to care (i.e., focusing on whole patient care or on physical and mental health comorbidities as part of patient care) included universal screening for SUD within facilities and providers giving naloxone and instructions for its use to any patients with identified substance use. Two common codes for ensure high quality care (i.e., reflecting safe, effective, patient-centered, timely, efficient, and equitable care) focused on providers receiving training about best practices for screening and referring patients for SUD and facilities using resources such as navigators and Connecting NJ to coordinate care and refer patients for services prior to discharge.

Figure 28

### Key Theme, Codes, and Example Recommendations to Address SUD – The Top Cause of Pregnancy-Associated, but Not Related Deaths in NJ, 2016-2018



## Limitations

The main limitation for analyses of recommendations data pertained to the large amount of missing or incomplete data that could not be included. For preventable, pregnancy-related cases, few data from 2016 were included in analyses. Results were skewed towards deaths that occurred in 2017-2018 for all thematic analyses.

## Moving Forward

We are hopeful that the next report including 2017-2019 data will provide a robust and sufficient set of data to complete thematic analyses of recommendations. In line with the goal of putting data into action, we may share recommendations from the 2017-2019 NJMMRC report with the NJMCQC. These data can support the committee's efforts to inform next steps for preventing maternal deaths in NJ.

## Question 6: What Is Already Being Done State-Wide to Address Maternal Deaths in NJ?

While maternal mortality review committees provide the most comprehensive and detailed data on maternal mortality, the data they produce is inherently delayed due to the case identification process and may not fully represent the current or emerging issues in maternal health today. There have been a number of new or enhanced initiatives in New Jersey that aim to address issues that align with the recommendations from the NJMMRC in this report.

Departments across the state, including but not limited to the Department of Health, Department of Human Services, and Department of Children and Families, continue to support programs that expand access to services for pregnant and postpartum women, facilitate referrals to community services, provide doula and home visiting services, and work to better support the intersection of mental health, substance use, and pregnancy. Additionally, since 2018 the New Jersey Legislature adopted and Governor Murphy enacted numerous laws to support new and existing programs in the state and align with contributing factors and recommendations created by the NJMMRC. There are dozens of additional bills that remain under consideration and would impact family planning, health data, Medicaid, and harm reduction; reflecting the whole-of-government focus on maternal mortality and morbidity.

Table 8

### Legislative Initiatives in New Jersey that Align with Contributing Factors and Recommendations Created by the NJMMRC

Topic	New Jersey Legislation	Description	Signed Into Law by Governor
<b>Family Planning</b>	<b>P.L. 2019, c. 236</b>	Requires DOH to establish “My Life, My Plan” program to promote and support reproductive life planning for all women of childbearing age and their families through dissemination of interactive online educational materials that promote physical and mental health and planning tools	August 2019
	<b>P.L. 2019, c. 361</b>	Revises law requiring health benefits coverage for certain contraceptives	January 2020
	<b>P.L.2021, c.375</b>	Codifies constitutional right to freedom of reproductive choice	January 2022
	<b>P.L.2021, c.376</b>	Expands contraception coverage required under private insurance and Medicaid from a 6-month supply to a 12-month supply	January 2022
<b>Data</b>	<b>P.L. 2018, c. 82</b>	Establishes the NJ Report Card of Hospital Maternity Care.	August 2018
	<b>P.L. 2019, c. 75</b>	Establishes the New Jersey Maternal Care Quality Collaborative (NJMCQC), New Jersey Maternal Mortality Review Committee (NJMMRC), and New Jersey Maternal Data Center (NJMDC)	May 2019
<b>Medicaid</b>	<b>P.L. 2018, c. 1</b>	Provides Medicaid coverage for family planning services to individuals with incomes up to 200 percent of the federal poverty level	February 2018
	<b>P.L. 2019, c. 85</b>	Provides Medicaid coverage for doula care	May 2019
	<b>P.L. 2019, c. 86</b>	Establishes a perinatal episode of care pilot	May 2019
	<b>P.L. 2019, c. 87</b>	Prohibits health benefits coverage for certain non-medically indicated early elective deliveries under Medicaid program,	May 2019

		the State Health Benefits Program, and the School Employees Health Benefits Program	
	<b>P.L. 2019, c. 88</b>	Codifies current practice regarding completion of Perinatal Risk Assessment for by Medicaid providers	May 2019
	<b>P.L. 2019, c. 237</b>	Requires Medicaid coverage for group prenatal care services under certain circumstances	August 2019
	<b>1115 Waiver</b>	Expands coverage for postpartum care covered by Medicaid from 60 to 365 days	CMS approved 1115 Waiver March 2022
<b>Health Equity</b>	<b>AR219/SR121</b>	Encourages DOH to develop set of standards for respectful care at birth and to conduct public outreach initiative	March 2019
	<b>P.L. 2019, c. 133</b>	Establishes maternal health care pilot program to evaluate shared decision-making tool developed by DOH and used by hospitals providing maternity services and by birthing centers	June 2019
	<b>P.L. 2019, c. 497</b>	Requires New Jersey Office on Minority and Multicultural Health to study racial disparities on sexual and reproductive health of African-American women	January 2020
	<b>P.L. 2021, c. 79</b>	Requires certain health care professionals to undergo explicit and implicit bias training	May 2021
	<b>P.L. 2021, c. 187</b>	Requires that New Jersey residents have access to one cost-free postpartum home visit	July 2021
<b>Substance Use Disorder</b>	<b>P.L. 2021, c.152</b>	Expands access to anyone who wants to obtain opioid antidotes through a pharmacy	July 2021
	<b>P.L. 2021, c.155</b>	Requires the state Division of Consumer Affairs to publish the retail price of opioid antidotes on the “New Jersey Prescription Drug Retail Price Registry,” located on its website	July 2021
	<b>P.L. 2021, c.157</b>	Requires state-regulated health insurers, such as Medicaid, NJ FamilyCare, the State Health Benefits Plan, and School Employees’ Health Benefits Plan to cover naloxone without imposing prior authorization requirements	July 2021
<b>Other</b>	<b>P.L. 2019, c. 498</b>	Requires hospital emergency departments to ask person of childbearing age about recent pregnancy history	January 2020
	<b>P.L.2021, c.120</b>	Requires DOH and DHS to identify and take appropriate steps to secure federal sources of funding to support maternal mental health	June 2021

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# Appendix A: Maternal Mortality Review Committee Forms

MIRIA		MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v21		1
REVIEW DATE Month/Day/Year	RECORD ID #	COMMITTEE DETERMINATION OF CAUSE(S) OF DEATH		
		IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING* CAUSE OF DEATH Refer to page 3 for PMSS-MM cause of death list.		
PREGNANCY-RELATEDNESS: SELECT ONE		TYPE		
<input type="checkbox"/> PREGNANCY-RELATED A death during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy		OPTIONAL: CAUSE (DESCRIPTIVE)		
		UNDERLYING*		
		CONTRIBUTING		
		IMMEDIATE		
		OTHER SIGNIFICANT		
<input type="checkbox"/> PREGNANCY-ASSOCIATED, BUT NOT-RELATED A death during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy				
<input type="checkbox"/> PREGNANCY-ASSOCIATED BUT UNABLE TO DETERMINE PREGNANCY-RELATEDNESS				
ESTIMATE THE DEGREE OF RELEVANT INFORMATION (RECORDS) AVAILABLE FOR THIS CASE:		COMMITTEE DETERMINATIONS ON CIRCUMSTANCES SURROUNDING DEATH		
<input type="checkbox"/> COMPLETE All records necessary for adequate review of the case were available		DID OBESITY CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN DID DISCRIMINATION** CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN DID MENTAL HEALTH CONDITIONS OTHER THAN SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		
<input type="checkbox"/> SOMEWHAT COMPLETE Major gaps (i.e. information that would have been crucial to the review of the case)		DID SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH? <input type="checkbox"/> YES <input type="checkbox"/> PROBABLY <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN		
<input type="checkbox"/> NOT COMPLETE Minimal records available for review (i.e. death certificate and no additional records)		MANNER OF DEATH		
<input type="checkbox"/> MOSTLY COMPLETE Minor gaps (i.e. information that would have been beneficial but was not essential to the review of the case)		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		
<input type="checkbox"/> N/A		IF ACCIDENTAL DEATH, HOMICIDE, OR SUICIDE, LIST THE MEANS OF FATAL INJURY <input type="checkbox"/> FIREARM <input type="checkbox"/> FALL <input type="checkbox"/> INTENTIONAL <input type="checkbox"/> SHARP INSTRUMENT <input type="checkbox"/> PUNCHING/ KICKING/BEATING <input type="checkbox"/> NEGLIGENCE <input type="checkbox"/> BLUNT INSTRUMENT <input type="checkbox"/> EXPLOSIVE <input type="checkbox"/> OTHER, SPECIFY: <input type="checkbox"/> POISONING/ OVERDOSE <input type="checkbox"/> DROWNING <input type="checkbox"/> UNKNOWN <input type="checkbox"/> HANGING/ STRANGULATION/ SUFFOCATION <input type="checkbox"/> FIRE OR BURNS <input type="checkbox"/> NOT APPLICABLE <input type="checkbox"/> MOTOR VEHICLE		
DOES THE COMMITTEE AGREE WITH THE UNDERLYING* CAUSE OF DEATH LISTED ON DEATH CERTIFICATE?		IF HOMICIDE, WHAT WAS THE RELATIONSHIP OF THE PERPETRATOR TO THE DECEDENT? <input type="checkbox"/> NO RELATIONSHIP <input type="checkbox"/> ACQUAINTANCE <input type="checkbox"/> UNKNOWN <input type="checkbox"/> PARTNER <input type="checkbox"/> OTHER, SPECIFY: <input type="checkbox"/> EX-PARTNER <input type="checkbox"/> OTHER RELATIVE <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.  
 \*\*Encompasses Discrimination, Interpersonal Racism, and Structural Racism as described on page 4.



### COMMITTEE DETERMINATION OF PREVENTABILITY

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

WAS THIS DEATH PREVENTABLE?

☐ YES

☐ NO

CHANCE TO ALTER OUTCOME

☐ GOOD CHANCE

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

#### DEFINITION OF LEVELS

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

#### PREVENTION TYPE

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

#### EXPECTED IMPACT

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

# Appendix B: Underlying Cause of Death Groupings

MATERIA		MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v21	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 COMPLICATION, A CHAIN OF EVENTS INITIATED BY PREGNANCY, OR THE AGGRAVATION OF AN UNRELATED CONDITION BY THE PHYSIOLOGIC EFFECTS OF PREGNANCY.			
<b>Hemorrhage (Excludes Aneurysms or CVA)</b>	<b>Hematologic</b>	<b>Neurologic/Neurovascular Conditions (Excluding CVA)</b>	
10.1 - Hemorrhage - Uterine Rupture	82.1 - Sickle Cell Anemia	92.1 - Epilepsy/Seizure Disorder	
10.2 - Placental Abruptio	82.9 - Other Hematologic Conditions including Thrombophilias/TTP/HUS/NOS	92.9 - Other Neurologic Disease/NOS	
10.3 - Placenta Previa			
10.4 - Ruptured Ectopic Pregnancy		<b>Renal Disease</b>	
10.5 - Hemorrhage - Uterine Atony/Postpartum Hemorrhage		93.1 - Chronic Renal Failure/End-Stage Renal Disease (ESRD)	
10.6 - Placenta Accreta/Increta/Percreta	<b>Collagen Vascular/Autoimmune Diseases</b>	93.9 - Other Renal Disease/NOS	
10.7 - Hemorrhage due to Retained Placenta	83.1 - Systemic Lupus Erythematosus (SLE)		
10.10 - Hemorrhage - Laceration/Intra-Abdominal Bleeding	83.9 - Other Collagen Vascular Diseases/NOS		
10.9 - Other Hemorrhage/NOS		<b>Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy</b>	
	<b>Conditions Unique to Pregnancy</b>	95.1 - Cerebrovascular Accident (Hemorrhage/Thrombosis/Aneurysm/Malformation) not Secondary to Hypertensive Disorders of Pregnancy	
<b>Infection</b>	85.1 - Conditions Unique to Pregnancy (e.g., Gestational Diabetes, Hyperemesis, Liver Disease of Pregnancy)		
20.1 - Postpartum Genital Tract (e.g., of the Uterus/ Pelvis/Perineum/Necrotizing Fasciitis)		<b>Metabolic/Endocrine</b>	
20.2 - Sepsis/Septic Shock	88.1 - Intentional (Homicide)	96.2 - Diabetes Mellitus	
20.4 - Chorioamnionitis/Antepartum Infection	88.2 - Unintentional	96.9 - Other Metabolic/Endocrine Disorder/NOS	
20.6 - Urinary Tract Infection	88.9 - Unknown intent/NOS		
20.7 - Influenza		<b>Gastrointestinal Disorders</b>	
20.8 - COVID-19		97.1 - Crohn's Disease/Ulcerative Colitis	
20.10 - Pneumonia	89.1 - Gestational Trophoblastic Disease (GTD)	97.2 - Liver Disease/Failure/Transplant	
20.11 - Other Non-Pelvic Infection (e.g., TB, Meningitis, HIV)	89.3 - Malignant Melanoma	97.9 - Other Gastrointestinal Disease/NOS	
20.9 - Other Infection/NOS	89.9 - Other Malignancy/NOS		
	<b>Cancer</b>	<b>Mental Health Conditions</b>	
	89.1 - Gestational Trophoblastic Disease (GTD)	100.1 - Depressive Disorder	
	89.3 - Malignant Melanoma	100.2 - Anxiety Disorder (including Post-Traumatic Stress Disorder)	
	89.9 - Other Malignancy/NOS	100.3 - Bipolar Disorder	
		100.4 - Psychotic Disorder	
	<b>Cardiovascular Conditions</b>	100.5 - Substance Use Disorder	
	90.1 - Coronary Artery Disease/Myocardial Infarction (MI)/Atherosclerotic Cardiovascular Disease	100.9 - Other Psychiatric Condition/NOS	
	90.2 - Pulmonary Hypertension		
	90.3 - Valvular Heart Disease Congenital and Acquired	<b>Unknown COD</b>	
	90.4 - Vascular Aneurysm/Dissection (Non-Cerebral)	999.1 - Unknown COD	
	90.5 - Hypertensive Cardiovascular Disease		
	90.6 - Marfan Syndrome		
	90.7 - Conduction Defects/Arrhythmias		
	90.8 - Vascular Malformations Outside Head and Coronary Arteries		
	90.9 - Other Cardiovascular Disease, including CHF, Cardiomegaly, Cardiac Hypertrophy, Cardiac Fibrosis, Non-Acute Myocarditis/NOS		
		<b>Pulmonary Conditions (Excludes ARDS-Adult Respiratory Distress Syndrome)</b>	
	<b>Embolism - Thrombotic (Non-Cerebral)</b>	91.1 - Chronic Lung Disease	
30.1 - Embolism - Thrombotic (Non-Cerebral)		91.2 - Cystic Fibrosis	
30.9 - Other Embolism (Excludes Amniotic Fluid Embolism)/NOS		91.3 - Asthma	
		91.9 - Other Pulmonary Disease/NOS	
<b>Amniotic Fluid Embolism</b>			
31.1 - Embolism - Amniotic Fluid			
<b>Hypertensive Disorders of Pregnancy</b>			
40.1 - Preeclampsia			
50.1 - Eclampsia			
60.1 - Chronic Hypertension with Superimposed Preeclampsia			
<b>Anesthesia Complications</b>			
70.1 - Anesthesia Complications			
<b>Cardiomyopathy</b>			
80.1 - Postpartum/Peripartum Cardiomyopathy			
80.2 - Hypertrophic Cardiomyopathy			
80.9 - Other Cardiomyopathy/NOS			

## Appendix C: Glossary of Terms

### **Committee Decisions Form**

Serves as a standard guide and site of documentation for the discussion and decision-making phase of the committee deliberation process

### **Equality**

Each individual or group of people is given the same resources or opportunities

### **Equity**

recognizes that each person has different circumstances and allocates the exact resources and opportunities needed to reach an equal outcome

### **Healthcare Cost and Utilization Project (HCUP)**

Includes the largest collection of longitudinal hospital care data in the United States

### **Maternal Death**

Deaths from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy

### **Maternal Mortality**

Deaths from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 365 days of termination of pregnancy, irrespective of the duration and site of the pregnancy

### **Maternal Mortality Review Information Application (MMRIA or “Maria”)**

A data system available to all Maternal Mortality Review Committees (MMRC) to support essential review functions

### **NurtureNJ**

A statewide awareness campaign led by First Lady Tammy Murphy that is committed to reducing maternal and infant mortality and ensuring equitable care among women and children of all races and ethnicities

### **Postpartum (period defined)**

Occurring in or being the period following childbirth, by which the early postpartum period is defined as the time from delivery up to 42 days and the postpartum period is defined as 43 days up to 1 year

### **Pregnancy-associated death**

The death of a woman while pregnant or within one year of the termination of pregnancy, regardless of the cause. These deaths make up the universe of maternal mortality; within that universe are pregnancy-related deaths and pregnancy-associated, but not related deaths

**Pregnancy-associated, but not related death**

The death of a woman during pregnancy or within one year of the end of pregnancy, from a cause that is not related to pregnancy (e.g., a pregnant woman dies in an earthquake)

**Pregnancy-associated but unable to determine relatedness**

A death during or within one year of pregnancy, from a cause that the Maternal Mortality Review Committee is unable to determine was related to pregnancy or not

**Pregnancy-related death**

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

**Pregnancy Related Maternal Mortality Ratio**

The number of maternal deaths during a given time period per 100,000 live births during the same time period

**Pregnancy Risk Assessment Monitoring System (PRAMS)**

A joint research project between the state, territorial, or local health departments and the Centers for Disease Control and Prevention, Division of Reproductive Health. The Pregnancy Risk Assessment Monitoring System (PRAMS) was developed in 1987 to reduce infant morbidity and mortality by influencing maternal behaviors before, during, and immediately after pregnancy. It is the only surveillance system that provides data about pregnancy and the first few months after birth

**Severe Maternal Morbidity**

Unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health

**Social Determinants of Health**

The conditions in the environments where people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks

**Contributing Factor and Recommendation Levels MMRIA Committee Decisions Form**

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



## **Contributing Factor Classes from MMRIA Committee Decisions Form**

**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., nonadherence 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 Ortique)

**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.

# Appendix D: Maternal Care Quality Collaborative Legislation

The New Jersey Maternal Care Quality Collaborative (NJMCQC) was also established by P.L. 2019 c.075 (C.26:6C-3)

3. a. There is hereby established in the Department of Health the New Jersey Maternal Care Quality Collaborative (NJMCQC) that shall work with the Governor's office to coordinate all efforts and strategies to reduce maternal mortality, morbidity, and racial and ethnic disparities in the State, including supervision and oversight of the Maternal Mortality Review Committee.

b. The NJMCQC shall work collaboratively with current organizations that are developing and implementing maternal mortality and morbidity reduction strategies, including the New Jersey Hospital Association's Perinatal Quality Care Collaborative.

The NJMCQC is composed of 34 members, including nine ex-officio members and 25 public members appointed by the Governor.

The ex officio members of the collaborative include the following persons, or their designees:

- The Commissioner of Health
- The Commissioner of Human Services
- The Commissioner of Banking and Insurance
- The Commissioner of Children and Families
- The Deputy Commissioner of Health Systems in the Department of Health
- The Deputy Commissioner of Public Health Services in the Department of Health
- The Director of the Office of Minority and Multicultural Health in the Department of Health
- The Director of the Division of Medical Assistance and Health Services in the Department of Human Services
- The Assistant Commissioner of Health and Life Insurance Plans in the Department of Banking and Insurance.

The public members appointed by the Governor include members representing each of the following groups:

- The New Jersey Hospital Association
- The New Jersey Health Care Quality Institute
- The Catholic HealthCare Partnership of New Jersey
- The Hospital Alliance of New Jersey
- The Fair Share Hospitals Collaborative
- The New Jersey section of the American College of Obstetricians and Gynecologists
- The New Jersey Affiliate of the American College of Nurse Midwives
- The New Jersey Medical Society
- Three medical directors of health plans in the State, as recommended to the commissioner by the President of the New Jersey Association of Health Plans
- The New Jersey Section of the Association of Women's Health Obstetric and Neonatal Nurses
- The New Jersey Chapter of the American College of Emergency Physicians
- Planned Parenthood of New Jersey
- The New Jersey Association of Osteopathic Physicians and Surgeons
- The New Jersey Primary Care Association
- The Partnership for Maternal and Child Health of Northern New Jersey
- The Central Jersey Family Health Consortium
- The Southern New Jersey Perinatal Cooperative
- Each of the three Accountable Care Organizations established pursuant to P.L.2011, c.114 or any successor organization to that Accountable Care Organization

- Three additional public members appointed on the recommendation of the Commissioner of Health, one who is engaged in maternal health advocacy; one who is engaged in health equity advocacy; and one who is engaged in healthcare consumer advocacy.

e. The NJMCQC shall adopt and implement the strategic plan for the State of New Jersey to reduce maternal mortality, morbidity, and racial and ethnic disparities. The NJMCQC shall meet quarterly to coordinate activities that forward the strategic plan, strategize on future activities, solicit funding opportunities, focus on translating the data collected by, the Maternal Data Center, the Healthcare Quality and Informatics Unit, the Maternal Mortality Review Committee, the Department of Health, and its partners into action items, and communicate goals and achievement of these goals with stakeholders.

f. The NJMCQC shall:

(1) Employ an Executive Director, a Program Manager, and any other personnel as authorized by the Commissioner of Health. The Department of Health shall provide such administrative staff support to the NJMCQC as shall be necessary for the NJMCQC to carry out its duties. The director shall be appointed by the commissioner and shall serve at the pleasure of the commissioner during the commissioner's term of office and until the appointment and qualification of the director's successor;

(2) Apply for and accept any grant of money from the federal government, private foundations or other sources, which may be available for programs related to maternal mortality, morbidity and racial and ethnic disparities;

(3) Serve as the designated State entity for receipt of federal funds specifically designated for programs concerning maternal mortality, morbidity and racial and ethnic disparities;

(4) Enter into contracts with individuals, organizations, and institutions necessary for the performance of its duties under P.L.2019, c.75 (C.26:6C-1 et al.); and

(5) Work with the Center for Healthcare Quality and Informatics to develop and publicize statistical information on maternal mortality, morbidity and racial and ethnic disparities and information as provided for pursuant to P.L.2018, c.82 (C.26:2H-5j).





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