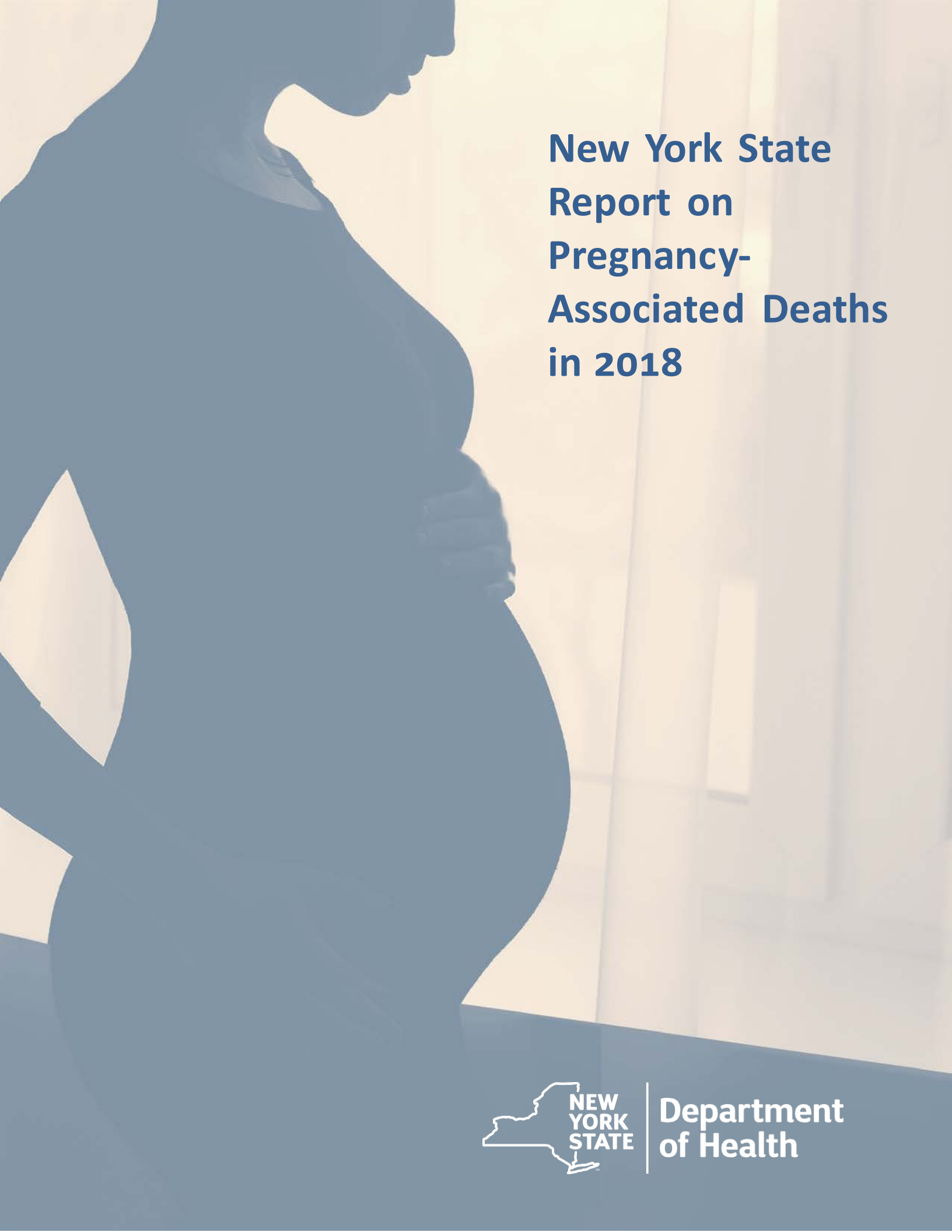

New York State Report on Pregnancy-Associated Deaths in 2018

NEW YORK STATE | Department of Health

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The New York State Department of Health (Department) would like to acknowledge the 117 New York women who died in 2018 within one year of being pregnant, forever affecting their families, friends, and communities. The Department is dedicated to learning from their stories and applying the lessons learned to help prevent future deaths.

SECTION 1: EXECUTIVE SUMMARY

PURPOSE OF REPORT

Maternal deaths are devastating events with profound and prolonged effects on families and other survivors, as well as a public health issue of critical importance. The United States (US) is one of the only countries in the world that has seen a rise in maternal mortality rate since 2000. Black birthing women in the US die at more than double the rate of White women.[1] The number of maternal deaths in New York State (NYS) and the persistent disparities in maternal mortality rate between Black and White women are both of urgent concern.

In response to this public health issue, the New York State Department of Health (Department) created the Maternal Mortality Review Initiative (MMRI) in 2010 to perform a comprehensive review of maternal deaths. When the MMRI was created, New York ranked 46th among US states for maternal mortality rate, a measure based on obstetric deaths codes that indicate a pregnancy within 42 days prior to death. NYS improved to 23rd in the most recent ranking,[2] and the 2016-2018 maternal mortality rate of 18.1 deaths per 100,000 live births was an improvement over the rate of 24.4 for 2008-2010. Troublingly, the 2016-2018 maternal mortality rate for Black women was over 4 times that for White women.[3]

Public Health Law Section 2509, enacted in 2019, established a state maternal mortality review board to review each pregnancy-associated death and issue a biennial report to the Commissioner of Health.[4] Public Health Law also allows the city of New York to establish their own board. In NYS, pregnancy-associated death reviews are performed by two boards (a.k.a. committees), a NYS and New York City (NYC) committee. Section 2509 also established the Maternal Mortality and Morbidity Advisory Council (MMMAC) comprised of multidisciplinary experts and lay persons knowledgeable in the field of maternal mortality, women's health and public health and includes members who serve and are representative of the racial, ethnic, and socioeconomic diversity of the women and mothers of the state. The MMMAC may review findings of the MMRB and may develop their own recommendations on policies, best practices, and strategies to prevent maternal mortality and morbidity.

These efforts are consistent with the objectives of the *Prevention Agenda 2019-2024: New York's State Health Improvement Plan* which aims to reduce maternal mortality in the state by 22% to 16.0 per 100,000 live births and to improve the racial and ethnic disparities in the state maternal death rate by 34% by the end of 2024.

The maternal mortality review process has 3 main steps. **First**, deaths of NYS women that occurred while pregnant or within a year of pregnancy are identified. **Second**, medical record and other sources of information are abstracted into a de-identified case summary. **Finally**, the committees' members review the case summary to determine if the death was preventable,

[1] Roosa Tikkanen et al., Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries (Commonwealth Fund, Nov. 2020)

[2] https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality_a/state/NY

[3] New York State Vital Statistics Tables (https://www.health.ny.gov/statistics/vital_statistics/vs_reports_tables_list.htm)

[4] New York State Public Health Law; Article 25 Maternal and Child Health; Title 1 General Provisions; 2509 Maternal Mortality Review Board, http://public.leginfo.state.ny.us/lawssrch.cgi?NVLWO:

identify the contributing factors, and, if the death was preventable, develop actionable recommendations for the prevention of future deaths.

The statewide report is designed to share the findings and recommendations from the comprehensive review of the 2018 New York State pregnancy-associated death cohort. This report includes recommendations for action to reduce maternal mortality and describes current actions the Department has taken to address this public health issue.

KEY FINDINGS

Key Findings: All Pregnancy-Associated Deaths

- Statewide, 117 pregnancy-associated deaths of NYS residents occurring in 2018 were identified.
- Of the 117 pregnancy-associated deaths, 41 were found to be pregnancy-related, 56 were found to be pregnancy-associated but not related, and 20 were found to be pregnancy-associated but unable to determine relatedness.
- The majority (62.4%) of these deaths occurred in individuals aged 30 years and older.
- White, non-Hispanic women comprised 49.6% of these deaths, while Black, non-Hispanic women comprised 32.5%.
    - Black, non-Hispanic women comprised 32.5% of all pregnancy-associated deaths, while accounting for 14.3% of all live births.
    - White, non-Hispanic women comprised 49.6% of all pregnancy-associated deaths, while accounting for 48.2% of all live births.
- Education levels were evenly split between women who completed at least some college or higher and those who had a high school education or less.
- The majority (60.7%) of these deaths occurred to individuals with Medicaid as their health insurance.

Key Findings: Pregnancy-Related Deaths

- There were 41 pregnancy-related deaths in 2018.
- The pregnancy-related mortality ratio in NYS was 18.2 per 100,000 live births in 2018.
- The leading causes of pregnancy-related deaths were embolism (8, 20%), hemorrhage (8, 20%), and mental health conditions (6, 15%).
- Black, non-Hispanic women had a pregnancy-related mortality rate 5 times higher than White, non-Hispanic women (65.4 vs 12.9 deaths per 100,000 live births).
    - Black, non-Hispanic women comprised 51.2% of pregnancy-related deaths, while accounting for 14.3% of all live births.
    - White, non-Hispanic women comprised 34.2% of pregnancy-related deaths, while accounting for 48.2% of all live births.
- Over half (51.2%) of pregnancy-related deaths occurred within 42 days of the end of pregnancy.
- There was a slightly higher proportion of pregnancy-related deaths with vaginal delivery than cesarean delivery (34.1% vs 29.3%).

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- The pregnancy-related mortality rate for cesarean delivery was 1.7 times that of vaginal delivery (15.8 vs 9.4 deaths per 100,000 live births).
    - Women with cesarean deliveries comprised 42.9% of deliveries among pregnancy-related deaths, while accounting for 33.8% of all NYS live births.
    - Women with vaginal deliveries comprised 50.0% of deliveries among pregnancy-related deaths, while accounting for 66.0% of all NYS live births.
- It was determined that 78.0% of pregnancy-related deaths were preventable.
    - Pregnancy-related deaths due to hemorrhage, mental health conditions and cardiomyopathy were determined to be 100% preventable.
- Discrimination was a probable or definite circumstance surrounding 46% of pregnancy-related deaths.
- Obesity was considered a likely or certain circumstance in 22% of pregnancy-related deaths.
- The committees identified 155 contributing factors among 41 pregnancy-related deaths.
- For every pregnancy-related death, on average four factors were identified that contributed to the death. These factors were grouped into 5 levels: community, patient/family, provider, facility, and system. Representative factors for these levels include:
    - Community factors included lack of knowledge regarding urgent maternal warning signs; stigma surrounding mental health conditions; and slower Emergency Medical Service response in disadvantaged communities.
    - Facility factors included lack of appropriate policies and procedures or poor adherence to existing policies and procedures; poor and conflicting treatment documentation; inadequate communication between facilities and lack of follow-up with patient; lack of care standards or documentation; computerized risk assessment failed to consider relevant factors; and lack of needed equipment.
    - Patient/family factors are often due to circumstances beyond the control of the patient or their family and should not be interpreted as assigning blame or responsibility. Common factors included inadequate education on urgent maternal warning signs and available resources affected patient outcomes; chronic conditions placed patient at higher risk for less favorable pregnancy outcomes; depression, anxiety, or history of substance use and their impact on the patient seeking necessary medical or behavioral intervention; and existence of language barriers impacted medical management.
    - Provider level factors included gaps in provider knowledge; inadequate assessment of risk and screening for mental health conditions, substance abuse, or other reproductive health needs; lack of follow up for effective management of chronic and acute conditions; lack of coordination between providers; patient's concerns dismissed due to race, gender, or weight; and refusal to prescribe certain drugs in pregnancy due to provider's biases.
    - System factors included lack of standardized policies and procedures; lack of adequate patient education efforts; common provider knowledge gaps and training needs; punitive child services interactions contributing to mental health decline; care and services are harder to access for people living in poverty and a

lack of living wage makes seeking care more difficult; and adequate mental health care is not readily accessible to patients on Medicaid.

- Factors at the provider level (36.8%), facility level (21.9%), and system level (19.4%) together comprised most of the factors identified that contributed to pregnancy-related deaths.
- For leading causes of death with highly disproportionate impacts on Black, non-Hispanic women, factors fell into different levels:
  - Hemorrhage: facility factors comprised 35.7% of the total contributing factors, followed by provider (23.8%) and systems of care factors (23.8%).
  - Embolism: provider factors comprised 52% of the total contributing factors.
  - Cardiomyopathy: facility and system factors each comprised 44.4% of the total contributing factors.

Key Findings: Other Pregnancy-Associated Deaths

- The term 'other pregnancy-associated deaths' refers to deaths that were determined to be pregnancy-associated but not related (for example, a death from a motor vehicle accident while pregnant) or that lacked enough information to make a determination on whether the death was related to pregnancy.
- There were 76 other pregnancy-associated deaths in 2018, including 56 pregnancy-associated, but not related deaths and 20 unable to determine relatedness.
- The mortality ratio for other pregnancy-associated deaths in NYS was 33.8 per 100,000 live births in 2018.
- Black, non-Hispanic women comprised 22.4% of other pregnancy-associated deaths, while accounting for 14.3% of all live births.
- White, non-Hispanic women comprised 57.9% of other pregnancy-associated deaths, while accounting for 48.2% of all live births.
- The leading causes of other pregnancy-associated deaths were mental health conditions (37, 48.7%), cardiovascular conditions (9, 11.8%) and injury (8, 10.5%).
- Substance use disorder (SUD) was a factor in 86.5% of the other pregnancy-associated deaths due to mental health conditions.

KEY RECOMMENDATIONS

There were 236 recommendations developed by the committees for the 2018 maternal death cohort. Through a review and ranking process, the committee proposed 14 key recommendations which were shared with the Maternal Mortality and Morbidity Advisory Council for their input.

Key Recommendations

- The Department should implement a maternity medical home model of care and convene a multi-stakeholder group to develop standard guidance about additional psychosocial services and coordination of care which includes trauma and social determinants of health.

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- The Department should develop a systemic approach to reduce structural racism.
- The Department should expand Medicaid coverage to include one year postpartum.
- The Department, American College of Obstetricians and Gynecologists District II (ACOG DII), and partners should develop an emergency room bundle for the care of pregnant women.
- NYS should offer all families at least one home visit from a nurse or paraprofessional within 2 weeks postpartum to educate families about signs and symptoms of potential complications.
- Hospital networks should implement the AIM bundle to reduce cesarean delivery rates.
- Hospitals should ensure anesthesiologists and obstetricians follow a standard protocol for massive transfusion in hemorrhage during pregnancy, delivery, and postpartum.
- All facilities should implement screening for venous thromboembolism and chemoprophylaxis during intrapartum and postpartum care.
- All facilities should implement universal systems for quantification of blood loss and anesthesia during delivery and postpartum.
- The Department, ACOG DII, and partners should develop a cardiac bundle to assist with provider education.
- The Department, ACOG DII, and partners should develop an issue brief on the importance of the involvement of multidisciplinary specialists in chronic care management during antenatal, intrapartum, and postpartum care.
- Obstetricians and other providers should utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period.
- The Office of Mental Health, ACOG DII, and partners should develop materials to educate providers on behavioral health evaluation, treatment and understanding of patient barriers to seeking care.
- Obstetrical providers and hospitals should engage community resources during prenatal and hospital discharge planning (e.g., doulas, visiting nurses, community health workers/patient navigators, telehealth, and remote monitoring) to help support and link high risk mothers with chronic conditions and difficult access (e.g., rural areas) to follow-up care and community resources.

WHAT NYS IS DOING TO ADDRESS MATERNAL MORTALITY

NYS has implemented the following actions to reduce maternal deaths and improve outcomes of women and families of color.

SECTION 1: EXECUTIVE SUMMARY

Promote awareness of maternal mortality recommendations

The Department has shared the maternal mortality recommendations of this report with the Maternal Mortality and Morbidity Advisory Council (MMMAC). The findings and recommendations related to the 2018 maternal death cohort will be disseminated broadly to professionals, professional organizations, and community-based organizations involved in the care of pregnant and postpartum women via the Department's already established communications channels with its partners, such as the American College of Obstetricians and Gynecologists District II (ACOG DII), Greater New York Hospital Association (GNYHA) and the Hospital Association of New York State (HANYS) . The report will be posted on the Department's website.

Ensure appropriate level of care determination

Since 2017, the NYSDOH's Division of Family Health has worked to update these regulations for perinatal regionalization and designation to reflect current national standards of obstetrical, neonatal, and perinatal levels of care; changes in health care systems and reimbursements, as well as hospital restructuring and other corporate structural changes. The changes proposed place a greater emphasis on quality care and patient safety, particularly for obstetrical patients.

Improve widespread adoption of patient safety bundles and policies that reflect the highest standard of care

New York State Perinatal Quality Collaborative

Through the New York State Perinatal Quality Collaborative (NYSPQC), the Department works with birthing hospitals to translate evidence-based guidelines into clinical practice via quality improvement projects. The Department's three-year NYSPQC Obstetric Hemorrhage Project that ended in June 2021 incorporated the use of ACOG's Safe Motherhood Initiative *Obstetric Hemorrhage Bundle*. The Department's is currently leading two quality improvement projects that aim to provide the best and safest care for mothers and infants in NYS: The Opioid Use Disorder (OUD) in Pregnancy and Neonatal Abstinence Syndrome Project and the Birth Equity Improvement Project (BEIP), as well as planning to launch a Neonatal Equity Improvement Project. The NYS BEIP project is working with NYS birthing hospitals and centers to identify how individual and systemic racism impacts birth outcomes at their facility and to take actions to address these inequities.

Improve provider training

In 2020-2021, the Department contracted with Association of Women's Health, Obstetrical and Neonatal Nurses (AWOHNN) to obtain and distribute site licenses for all NYS birthing hospitals for the POST-BIRTH Warning Signs Education Program.

The NYSPQC, in collaboration with partners, held four webinars in 2020 and 2021 for providers on maternal mental health. Additionally, the NYSPQC held a webinar on patient centered care for individuals with substance use disorders.

SECTION 1: EXECUTIVE SUMMARY

Improve public education and awareness

In 2020-2021, the Department conducted three consumer media campaigns aimed at improving the health of pregnant and postpartum women and those individuals contemplating pregnancy. These campaigns are the Hear Her Campaign, Perinatal Mood and Anxiety Disorders Campaign, and the COVID-19 Maternity Care Campaign. The Department also developed consumer education materials about pregnancy complications, translated these materials into the top ten spoken languages in NYS, and posted these materials to the Department's website. Educational materials related to preterm labor and premature birth, as well as infertility-related conditions, are in development and will be translated and made available in early 2022.

Improve access to care

The Department expanded contracts for the period of 2019-2022 to the 23 established Maternal and Infant Community Health Collaborative (MICHC) agencies throughout NYS. The funding will support 50-60 additional Community Health Workers to address key disparities, including providing more childbirth education and support, assisting in the development of collaborative childcare and social support networks, assisting with the development of a birth plan, and supporting increased health literacy among communities around the state. The funding will help serve an additional 2,400 prenatal and postpartum women and families.

In 2021, the Department announced the availability of approximately $14 million annually for 5 years to support implementation of the Perinatal and Infant Community Health Collaboratives (PICHC) initiatives. Funds will be awarded to approximately 25 programs to support the development, implementation, and coordination of collaborative community-based strategies to improve perinatal and infant health outcomes and eliminate racial, ethnic, and economic disparities. Funds are anticipated to be awarded in 2022.

The Department, in collaboration with partners and stakeholders, will continue to employ a multi-pronged approach toward reducing racial disparities and addressing maternal mortality and morbidity, in accordance with the NYS Prevention Agenda 2019-2024 objectives. The efforts of the Department and its partners will additionally include addressing the key recommendations for action to improve perinatal health.

SECTION 2: OVERVIEW

KEY DEFINITIONS

The following definitions will be used throughout this report. Additional terms are defined in the Glossary of acronyms included in Appendix A.

Pregnancy-associated death: A death during pregnancy or within one year of the end of pregnancy.

> **Pregnancy-related death:** 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.
>
> **Pregnancy-associated, not related death:** A death during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy
>
> **Pregnancy-associated, unable to determine relatedness death:** A death during pregnancy or within one year of the end of pregnancy where it cannot be determined from the available information whether the cause of death was related to pregnancy.

Maternal mortality: the death of a woman while pregnant or within 42 days of the end of pregnancy, excluding deaths from accidental or incidental causes.

Maternal mortality ratio: number of maternal mortalities per 100,000 live births in a given year.

Pregnancy-related mortality ratio: number of pregnancy-related deaths per 100,000 live births in a given year.

Termination of pregnancy: end of a pregnancy regardless of the site of the pregnancy or the process that led to it; this term includes live births (vaginal deliveries and cesarean sections), stillbirths, spontaneous abortions, and induced abortions.

Preventable death: a death is considered preventable if the Board 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.

Contributing factor: the factors that the MMRB judged to have contributed to the death.

Chance to alter outcome: the likelihood that the death could have been averted by reasonable changes to one or more contributing factors.

SECTION 2: OVERVIEW

BACKGROUND

Maternal deaths are devastating events with profound and prolonged effects on surviving family members, friends, communities, and healthcare workers. The United States (US) is one of the only countries in the world that has seen a rise in maternal mortality rate since 2000. A 2020 Commonwealth Fund report comparing the US to ten other wealthy nations revealed that the US rate was twice as high as any of the comparison countries, and ten times as high as the country with the lowest rate. The US maternal mortality rate of 17.4 deaths per 100,000 live births would place it at roughly 55th among all countries, according to the World Health Organization's latest report, adjacent to Russia, Saudi Arabia, and Uruguay. Nationwide, Black birthing women die at more than double the rate of White women (37.1 and 14.7 deaths per 100,000 live births, respectively).[1, 2]

In response to these trends, New York State Department of Health (NYSDOH) created the Maternal Mortality Review Initiative in 2010 to systematically review all New York State (NYS) maternal deaths and seek sufficient information to develop strategies and interventions to decrease the risk of these deaths. When the Initiative was created, New York ranked 46th among US states for maternal mortality. NYS improved to 23rd in the most recent ranking, but the number of maternal deaths in New York remains high, and the continued disparities in the maternal mortality rate between Black and White women are of urgent concern.[3]

The NYS 2016-2018 maternal mortality rate of 18.1 deaths per 100,000 live births is 1.6 times the Healthy People 2020 target of 11.4. Racial disparities remained significant, with recent data (2016-2018) showing NYS State Black women are over four times more likely to die in childbirth than White women.

In 2019, the NYSDOH established the Maternal Mortality Review Board (MMRB or Board) to examine information related to pregnancy-associated deaths and to issue findings and recommendations to advance the prevention of maternal mortality. The Board's multidisciplinary members volunteer their time to develop recommendations to improve maternal outcomes and prevent future deaths.

MATERNAL MORTALITY IN NEW YORK STATE

The maternal mortality rate in NYS peaked at 24.4 per 100,000 live births in 2008-2010 but decreased to 18.1 per 100,000 live births in 2016-2018 (Figure 1). The 2016-2018 maternal mortality rate for New York City (NYC) is 18.3 deaths per 100,000 live births while the Rest of State (ROS) rate is 17.8 deaths, each showing improvement. The maternal mortality rate for NYS has remained consistently below the national rate since 2011.

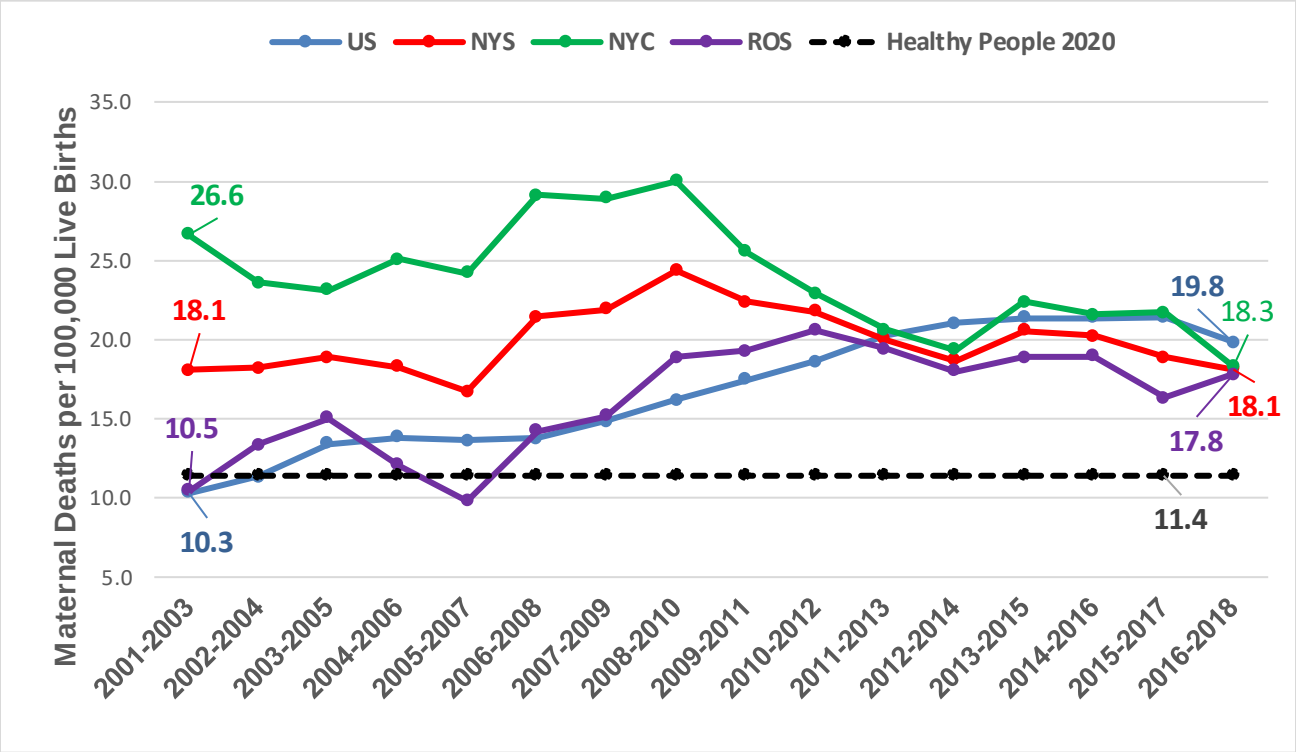
[1] Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019. Licence: CC BY-NC-SA 3.0 IGO.

[2] Source: Roosa Tikkanen et al., Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries (Commonwealth Fund, Nov. 2020)

[3] https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality_a/state/NY

SECTION 2: OVERVIEW

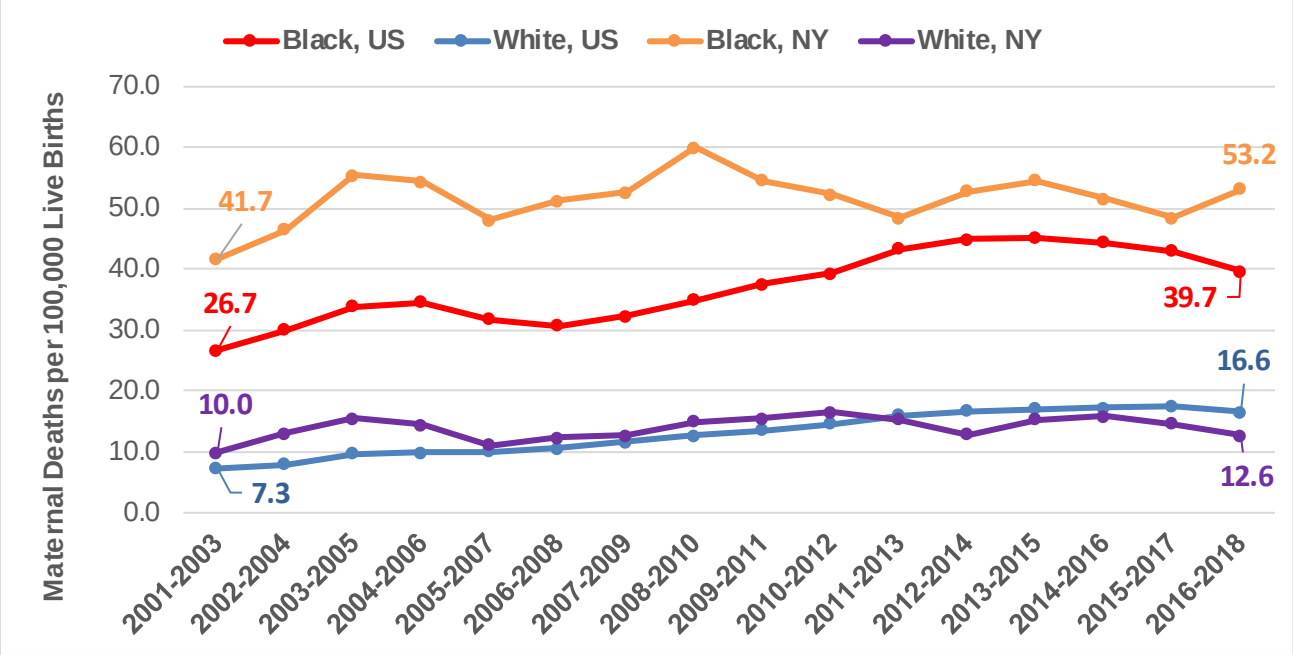
Figure 1. NYS Three-Year Rolling Average Maternal Mortality Rate



Source: NYS Vital Statistics, CDC Wonder Database

Racial disparities in maternal mortality rates are persistent and have fluctuated over time. The statewide Black to White mortality ratio in New York for 2016-2018 was 4.2 to 1 (Figure 2).

Figure 2. NYS Three-Year Rolling Average Maternal Mortality Rate by Race



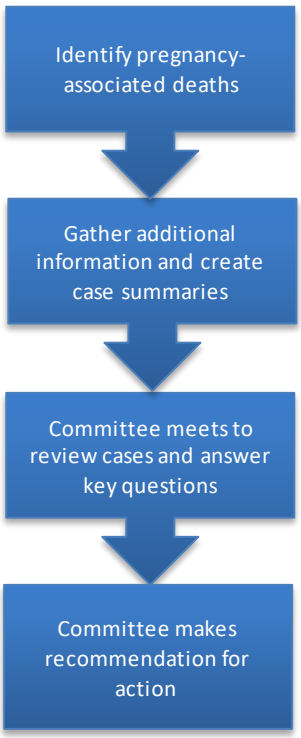
Source: NYS Vital Statistics, CDC Wonder Database

SECTION 3: ORGANIZATION AND METHODS

ORGANIZATION

Public Health Law Section 2509, enacted in 2019, established a state maternal mortality review board and allowed New York City (NYC) to establish its own board. In NYS, two boards (a.k.a. committees) review pregnancy-associated deaths. The NYS Maternal Mortality Review Board (MMRB), led by NYSDOH, reviews all pregnancy-associated deaths in NYS that occur outside of NYC. The NYC Maternal Mortality and Morbidity Review Committee (M3RC) led by the New York City Department of Health and Mental Hygiene, reviews pregnancy-associated deaths that occur within NYC. These committees' collective efforts form a comprehensive review of pregnancy-associated deaths in NYS. The information in this report reflects the combined work of both committees.

METHODS



- Pregnancy-associated deaths are identified from death records, birth records, and hospital discharge records.
- Additional records are obtained from a variety of sources to create a detailed, de-identified case summary. The following data sources are commonly included, when available:
  - Fetal death certificates
  - Autopsy reports
  - Hospital records, both inpatient and outpatient
  - Police reports
  - Hospital adverse-event reports
  - Social media
  - Community indicators
  - Prescription drug records

Each committee meets multiple times per year to review and discuss the cases, with the goal of answering these key questions:

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

Following each meeting, the details of each case, including committee decisions and associated recommendations, are entered into the Maternal Mortality Review Information Application (MMRIA), a secure, online application that is provided by the Centers for Disease Control and Prevention (CDC). MMRIA provides a standardized platform for storing maternal mortality data

and facilitating analyses that inform public health actions and initiatives to improve maternal outcomes.

SECTION 4: FINDINGS FROM THE 2018 COHORT

I. ALL PREGNANCY-ASSOCIATED DEATHS

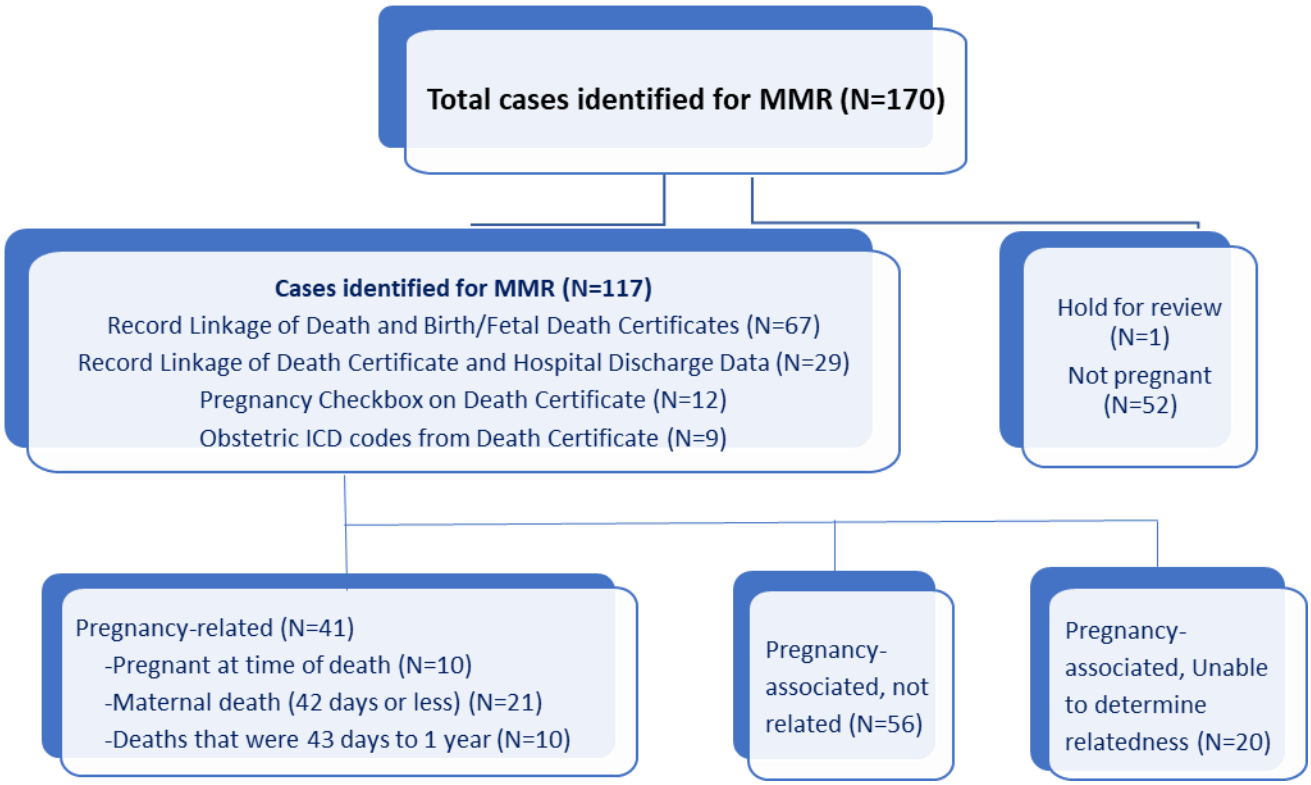
Using the case identification methods previously described, 170 potential cases were identified with 121 from ROS and 49 in NYC. One hundred seventeen cases (68.8%) were verified pregnancy-associated deaths; the remaining 52 (30.6%) were not pregnancy associated; and one NYC case has not yet been reviewed at the time of this report.

Among all verified pregnancy-associated deaths (n=117), more than half (n=67, 57.3%) were identified through record linkage of death and birth/fetal death certificates, followed by linkage of death certificate and hospital discharge data (N=29, 24.8%), pregnancy checkbox on death certificate (n=12, 10.3%), and obstetric ICD codes from death certificates (n=9, 7.7%).

The reviews of these 117 cases, from the work of both NYS and NYC, identified a total of 41 pregnancy-related deaths; 56 pregnancy-associated, not related deaths; and 20 pregnancy-associated, but unable to determine pregnancy-relatedness deaths.

Please note that rates based on small numbers are inherently unreliable and should therefore be interpreted with caution.

Figure 3. NYS Surveillance of Pregnancy-Associated Deaths



Source: NYS MMR

SECTION 4: FINDINGS FROM THE 2018 COHORT

Demographics

Table 1 describes the demographic characteristics of these 117 individuals. Most deaths occurred among women aged 30 years or older (62.4%), about half of the deaths were non-Hispanic White (49.6%), most were never married (58.1%), and most had Medicaid as their health insurance (60.7%). Education levels were evenly split between women who completed at least some college and those with a high school education or less.

Table 1. NYS Pregnancy-Associated Deaths: Maternal Demographic Characteristics

Demographic characteristics	Count (%)
Age at death (years)	
24 or younger	18 (15.4%)
25-29	26 (22.2%)
30-34	23 (19.7%)
35-39	29 (24.8%)
40 or older	21 (17.9%)
Race/Ethnicity	
Black, Non-Hispanic	38 (32.5%)
White, Non-Hispanic	58 (49.6%)
Hispanic	13 (11.1%)
Other, Non-Hispanic	8 (6.8%)
Marital status	
Married	36 (30.8%)
Divorced	10 (8.5%)
Widowed	1 (0.9%)
Domestic Partnership	1 (0.9%)
Never married	68 (58.1%)
Unknown	1 (0.9%)
Education	
12th Grade or Less; No Diploma	16 (13.7%)
High School Grad or GED Completed	43 (36.8%)
Some College Credit, but No Degree	26 (22.2%)
Associate or bachelor's degree	26 (22.2%)
Advanced degree	6 (5.1%)
Health insurance	
Medicaid	71 (60.7%)
Private insurance	31 (26.5%)
Self-pay	5 (4.3%)
Medicare	3 (2.6%)
Other Government Program/ Child Health Plus	4 (3.4%)
Other Non-Federal Program	2 (1.7%)
Unknown	1 (0.9%)
Total	**117 (100%)**

Source: NYS MMR

SECTION 4: FINDINGS FROM THE 2018 COHORT

II. PREGNANCY-RELATED DEATHS

Pregnancy-related deaths are deaths to women 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 deaths are the most preventable subset of pregnancy-associated deaths and are often characterized by issues, challenges, and missed opportunities to potentially avert the death. For example, signs and symptoms of serious complications might be missed by medical providers, the woman's complaints might be dismissed as normal discomfort, or the woman may not have ready access to care due to economic or logistical factors. Pregnancy-related deaths are a major focus of the committees' reviews and analyses because they provide the greatest opportunity for preventing future deaths. Of 117 pregnancy-associated deaths identified for the 2018 cohort, 41 (35%) were determined to be pregnancy-related.

Demographics

Table 2 describes the demographic characteristics of the 2018 pregnancy-related cohort at the time of their deaths, including the age, race/ethnicity, marital status, employment status, occupation, educational level, and insurance type. Most of the pregnancy-related deaths were of women aged 35 years or older (70.7%). Black, non-Hispanic women accounted for 51.2% of pregnancy-related deaths, despite accounting for only 14.3% of all live births. About the same percentage of the women were married as those who never married. The majority of the women were not employed, and the most common occupational category for those with employment was professional/management, followed by service/housekeeper/childcare and sales/administration. Sixty-one percent of the pregnancy-related deaths occurred among women who had attended at least some college. The majority of the women were enrolled in Medicaid (58.5%), while an additional 36.6% were covered by private insurance.

SECTION 4: FINDINGS FROM THE 2018 COHORT

Table 2. Demographic Characteristics of Pregnancy-Related Deaths

Demographic characteristics	Count (%)
Age at death (years)	
25-29	6 (14.6%)
30-34	6 (14.6%)
35-39	16 (39.0%)
40 or older	13 (31.7%)
Race/Ethnicity	
Black, Non-Hispanic	21 (51.2%)
White, Non-Hispanic	14 (34.1%)
Hispanic	3 (7.3%)
Other, Non-Hispanic	3 (7.3%)
Marital status	
Married	20 (48.8%)
Divorced	2 (4.9%)
Never married	19 (46.3%)
Employment status	
Employed	16 (39.0%)
Unemployed	19 (46.3%)
Unknown	6 (14.6%)
Education	
12th Grade or Less; No Diploma	4 (9.8%)
High School Grad or GED Completed	12 (29.3%)
Some College Credit, but No Degree	9 (22.0%)
Associate or bachelor's degree	13 (31.7%)
Advanced degree	3 (7.3%)
Health insurance	
Medicaid	24 (58.5%)
Private insurance	15 (36.6%)
Self-pay	2 (4.9%)
Total	**41 (100%)**

Source: NYS MMR

Preexisting Medical Conditions

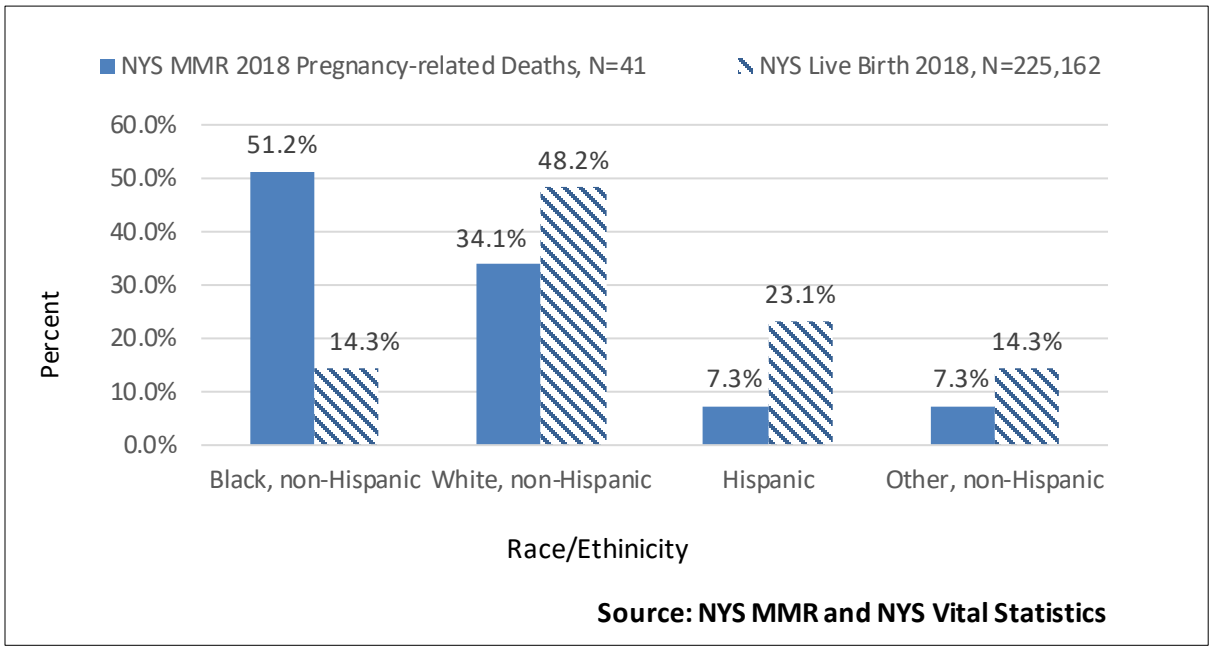
Twenty-five (61%) of these women in the pregnancy-related death cohort had documented pre-existing medical conditions. Among these 25 women, 40% (10) had one pre-existing medical condition, 12% (3) had two, 8% (2) had three, and the rest had 4 or more pre-existing conditions (10). The most common pre-existing medical conditions were asthma (8), followed by obesity (6), diabetes (6), and hypertension (5).

Twelve (29.3%) of these women had documented mental health conditions during pregnancy. Nine (22%) women had documented substance use. Among them, three patients completed screening and education.

Racial and Other Disparities

The racial distributions of live births and pregnancy-related deaths show that Black, non-Hispanic women were overrepresented in the pregnancy-related death cohort, given that the births to Black, non-Hispanic women represented only 14.3% of the live births in NYS while the deaths to Black, non-Hispanic women represented 51.2% of the pregnancy-related death cohort. The births to White, non-Hispanic women represented 48.2% of the live births in NYS while the deaths were 34.1% of the pregnancy-related death cohort. This indicates the racial disparity in the pregnancy-related mortality rates between Black, non-Hispanic and White, non-Hispanic women observed at the state level (Figure 4).

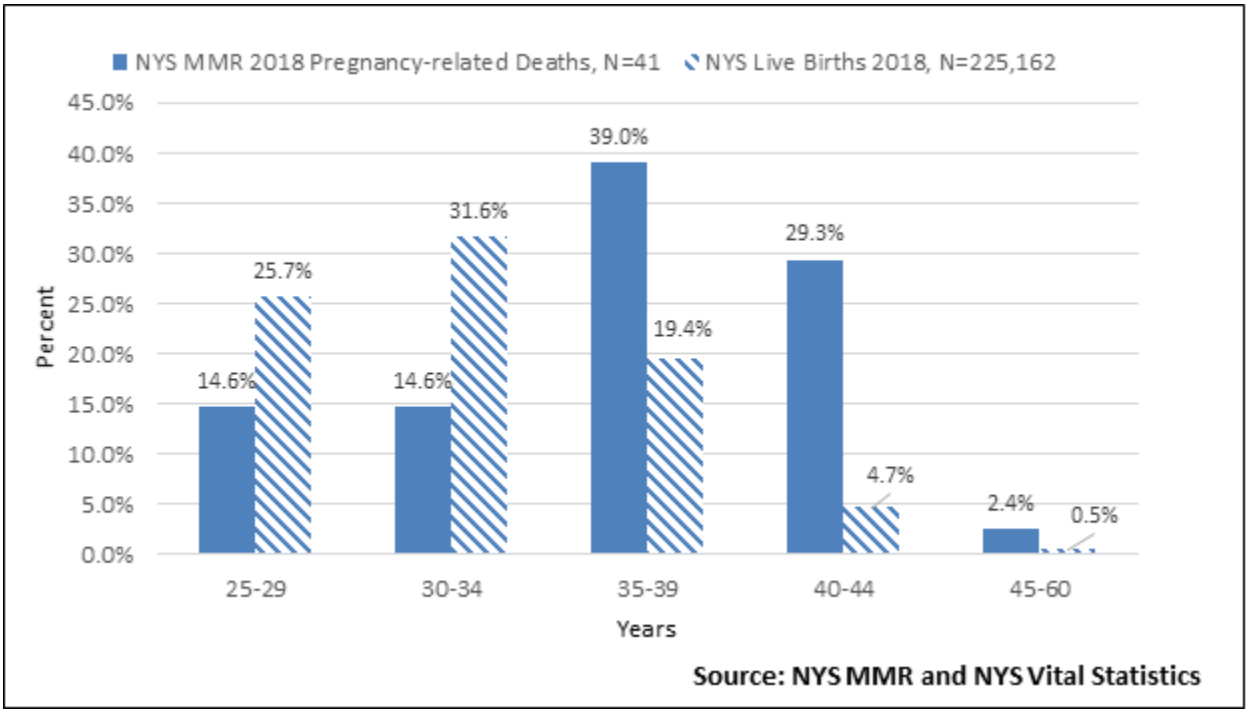
Figure 4. Proportion of Pregnancy-Related Deaths and Live Births by Race/Ethnicity



Women aged 35 years and older were overrepresented in the pregnancy-related death cohort. About 39% of pregnancy-related deaths were in women between 35 and 39 years old, while only 19.4% of the births were to women in that age group; women over 40 years old comprised about 31.7% of pregnancy-related deaths but only 5.2% of births (Figure 5).

Figure 5. Proportion of Pregnancy-Related Deaths and Live Births by Age

SECTION 4: FINDINGS FROM THE 2018 COHORT



Among the 41 pregnancy-related deaths, 28 women delivered. Vaginal deliveries comprised 50.0% of these deliveries compared to 66.0% of NYS live births; cesarean deliveries comprised 42.9% of these deliveries compared to 33.8% of NYS live births (Figure 6).

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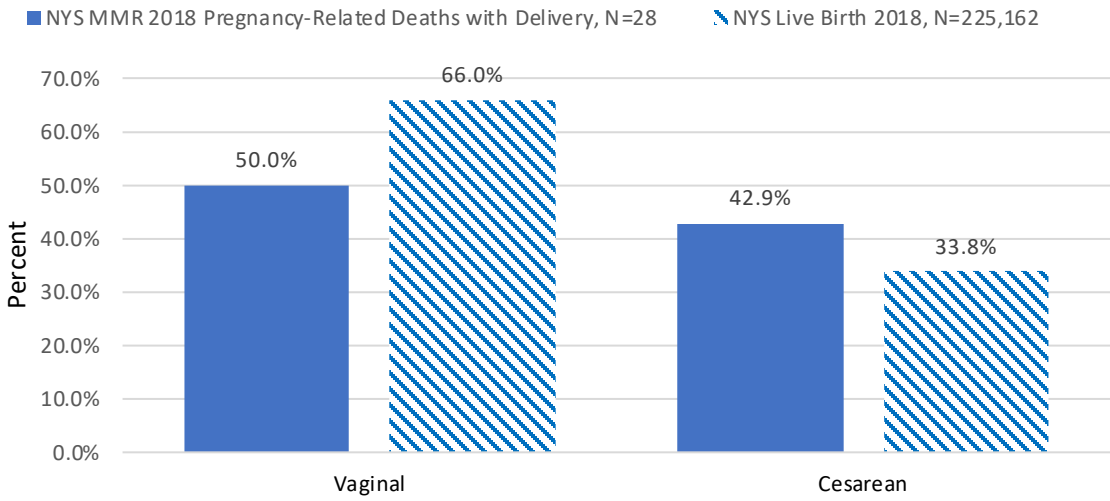
Figure 6. Proportion of Pregnancy-Related Deaths and Live Births by Type of Delivery



Source: NYS MMR and NYS Vital Statistics

Distribution of Pregnancy-Related Deaths by Certain Characteristics

Pregnancy-Related Deaths by Timing of Death in Relation to Pregnancy

The majority of pregnancy-related deaths (51.2%) occurred within 42 days of the end of pregnancy, with the remainder evenly divided between women who were pregnant at the time of death and women who died 43 days to one year after the end of their pregnancy (Figure 7).

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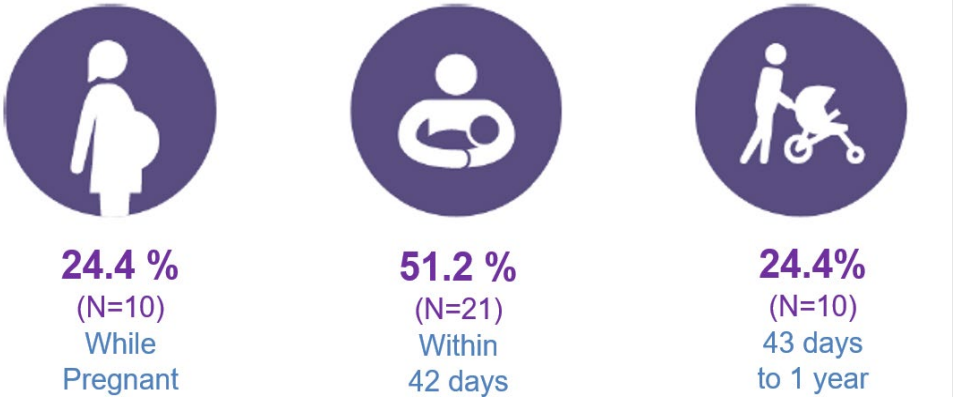
Figure 7. Distribution of Pregnancy-Related Deaths by Timing of Death in Relation to Pregnancy



Source: NYS MMR

Deaths occurring within 42 days after the end of pregnancy represented the largest proportion of deaths for Black, non-Hispanic (47.6%), White, non-Hispanic (57.1%), and other, non-Hispanic (66.7%) groups, while deaths occurring from 43 to 365 days after the end of pregnancy represented the largest proportion of deaths for the Hispanic (66.7%) group. In addition, a larger portion of Black, non-Hispanic died during pregnancy than White, non-Hispanic (33.3% vs 14.3%), while a larger portion of White, non-Hispanic died within 43 to 365 days after the end of pregnancy than Black, non-Hispanic (28.6% vs 19.1%) (Table 3).

Table 3. Distribution of Timing of Pregnancy-Related Deaths in Relation to Pregnancy by Race/Ethnicity

Race/Ethnicity	Timing of Death in Relation to Pregnancy Count (%)			
	Pregnant	Within 42 days	Within 43 to 365 days	Total
Black, non-Hispanic	7 (33.3%)	10 (47.6%)	4 (19.1%)	21 (100%)
White, non-Hispanic	2 (14.3%)	8 (57.1%)	4 (28.6%)	14 (100%)
Hispanic	0 (0%)	1 (33.3%)	2 (66.7%)	3 (100%)
Other, non-Hispanic	1 (33.3%)	2 (66.7%)	0 (0%)	3 (100%)

Source: NYS MMR

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Timing of pregnancy-related deaths varied somewhat by cause of death (Table 4). All the deaths due to embolism or hemorrhage occurred during pregnancy or within 42 days after the end of pregnancy, while most deaths due to mental health conditions (67.7%) occurred within 43 to 365 days after the end of pregnancy

Table 4. Distribution of Timing of Pregnancy-Related Deaths by Underlying Cause of Death

Cause of Death	Timing of Death in relation to Pregnancy Count (%)			
	Pregnant	Within 42 days	Within 43 to 365 days	Total
Embolism - Thrombotic (Non-Cerebral)	3 (37.5%)	5 (62.5%)	0	8(100%)
Hemorrhage (Excludes Aneurysms or CVA)	4 (50.0%)	4 (50.0%)	0	8 (100%)
Mental Health Conditions	0	2 (33.3%)	4 (67.7%)	6(100%)
Cardiomyopathy	0	1 (33.3%)	2 (67.7%)	3(100%)
Amniotic Fluid Embolism	0	2 (100%)	0	2(100%)
Cancer	0	0	2 (100%)	2(100%)
Cardiovascular Conditions	0	0	2 (100%)	2(100%)
Hematologic	0	2 (100%)	0	2(100%)
Hypertensive Disorders of Pregnancy	0	2 (100%)	0	2(100%)
Cerebrovascular Accident	1 (100%)	0	0	1 (100%)
Gastrointestinal Disorders	0	1 (100%)	0	1 (100%)
Infection	0	1 (100%)	0	1 (100%)
Metabolic/Endocrine	1 (100%)	0	0	1 (100%)
Unknown	1 (50.0%)	1 (50.0%)	0	2 (100%)
Total	**10 (24.4%)**	**21 (51.2%)**	**10 (24.4%)**	**41(100%)**

Source: NYS MMR

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Pregnancy-Related Deaths by Manner of Death

Manner of death provides a general categorization of a death as either natural or unnatural, based on the circumstances of the death. Unnatural deaths are further classified as accidental, homicide, suicide, or undetermined.

Table 5 below displays the manners of death as recorded on the death certificate. Among 41 pregnancy-related deaths, a substantial majority (78%) were deemed to be of a natural manner.

Table 5. Distribution of Manner of Deaths Among Pregnancy-Related Deaths

Manner of Death	N (%)
Natural	32 (78.0%)
Suicide	5 (12.2%)
Accident	4 (9.8%)
Total	**41 (100%)**

Source: NYS MMR

Pregnancy-Related Deaths by Place of Death

The place of death classifies the physical location of the death as one of the following: hospital inpatient, hospital outpatient/emergency room, home, or other. The majority of deaths occurred in hospitals during an inpatient stay (70.7%) or at an outpatient/ER visit (14.6%). The remaining deaths occurred at home (Table 6).

Table 6. Distribution of Location of Death Among Pregnancy-Related Deaths

Place of Death	N (%)
Hospital Inpatient	29 (70.7%)
Hospital Outpatient/Emergency Department	6 (14.6%)
Home	6 (14.6%)
Total	**41 (100%)**

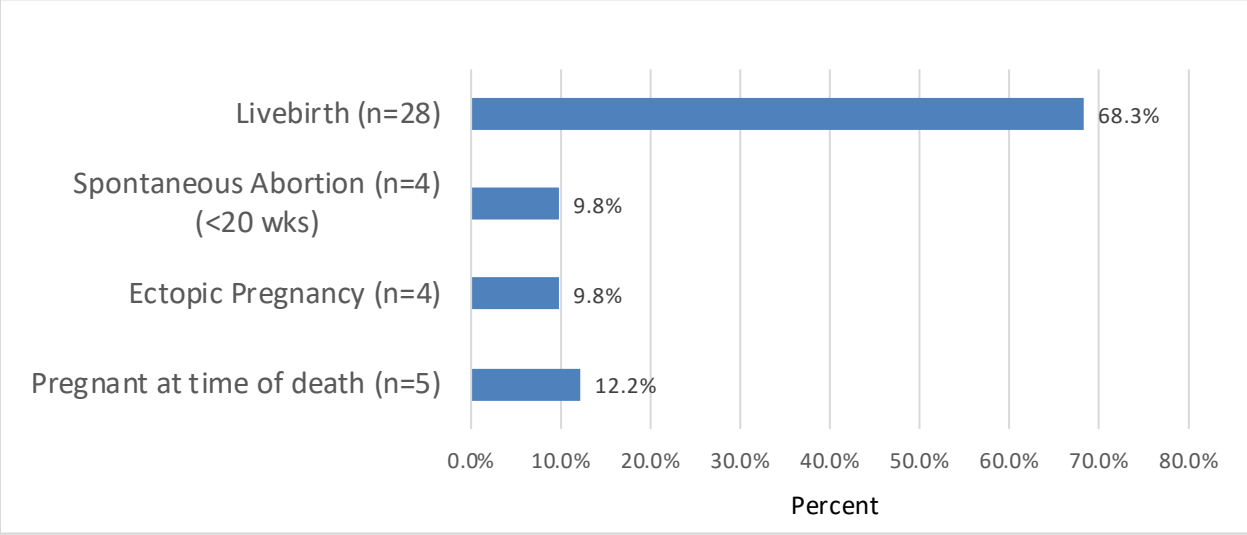
Source: NYS MMR

SECTION 4: FINDINGS FROM THE 2018 COHORT

Pregnancy-Related Deaths by Pregnancy Outcome

Pregnancy outcomes are classified as live birth, stillbirth, spontaneous abortion, induced abortion, and ectopic pregnancy. Figure 8 below shows the pregnancy outcomes associated with 2018 pregnancy-related deaths in NYS. The majority (68.3%) of pregnancy-related deaths occurred after a live birth. Additionally, five women (12.2%) were pregnant at the time of their death.

Figure 8. Distribution of Pregnancy-Related Deaths by Pregnancy Outcome



Source: NYS MMR

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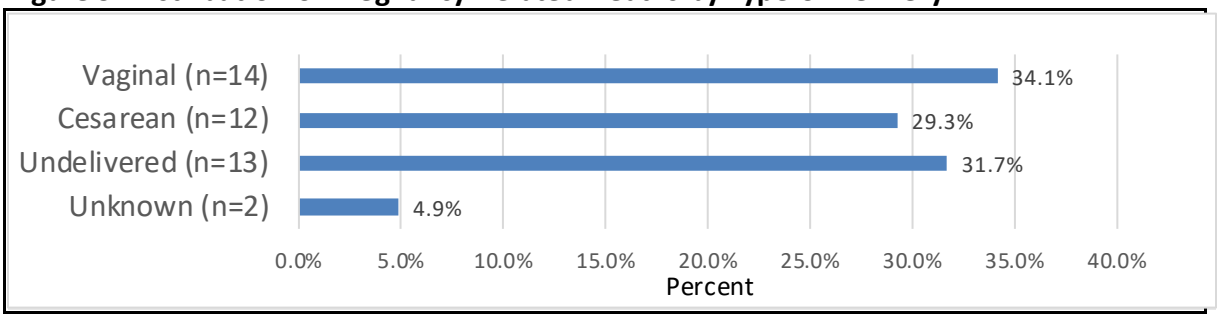
Pregnancy-Related Deaths by Type of Delivery

Type of delivery is classified as either vaginal or cesarean. Cesarean deliveries include both planned and unplanned. Figure 9 illustrates the distribution by type of delivery for the women who died during the labor and delivery or postpartum periods. Of these 41 women, 14 (34.1%) had vaginal deliveries and 12 (29.3%) had cesarean deliveries. Thirteen of these women (31.7%) didn't deliver a baby due to abortion, ectopic pregnancy or they were pregnant at time of death. Medical records to confirm the delivery method were unavailable for two women who delivered outside of NYS.

Figure 9. Distribution of Pregnancy-Related Deaths by Type of Delivery



Source: NYS MMR

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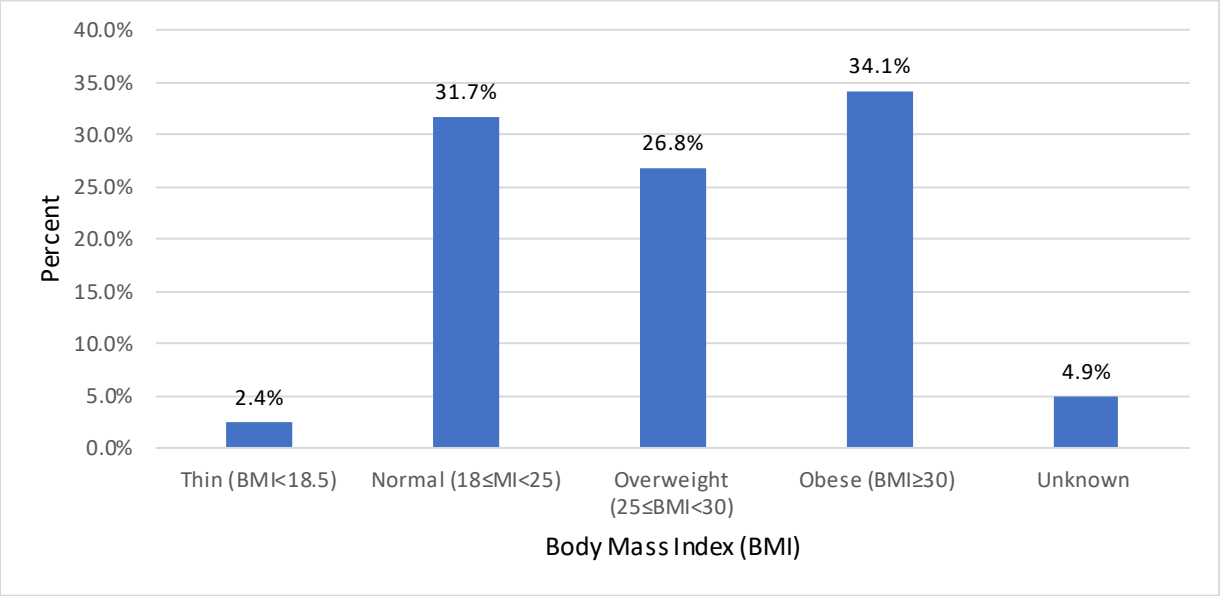
Pregnancy-Related Deaths by Pre-pregnancy Body Mass Index

Body mass index (BMI) is calculated based on an individual's weight and height. A high BMI can indicate an unhealthy body fat percentage. The following four BMI categories are used to examine associations between pre-pregnancy weight and pregnancy-related deaths: thin (BMI<18.5), normal weight (18.5≤BMI<25), overweight (25≤BMI< 30), and obese (BMI≥30). The majority of women who died of pregnancy-related causes (61.0%) were overweight or obese (Figure 10).

Figure 10. Distribution of Pregnancy-Related Deaths by Pre-Pregnancy Body Mass Index



Source: NYS MMR

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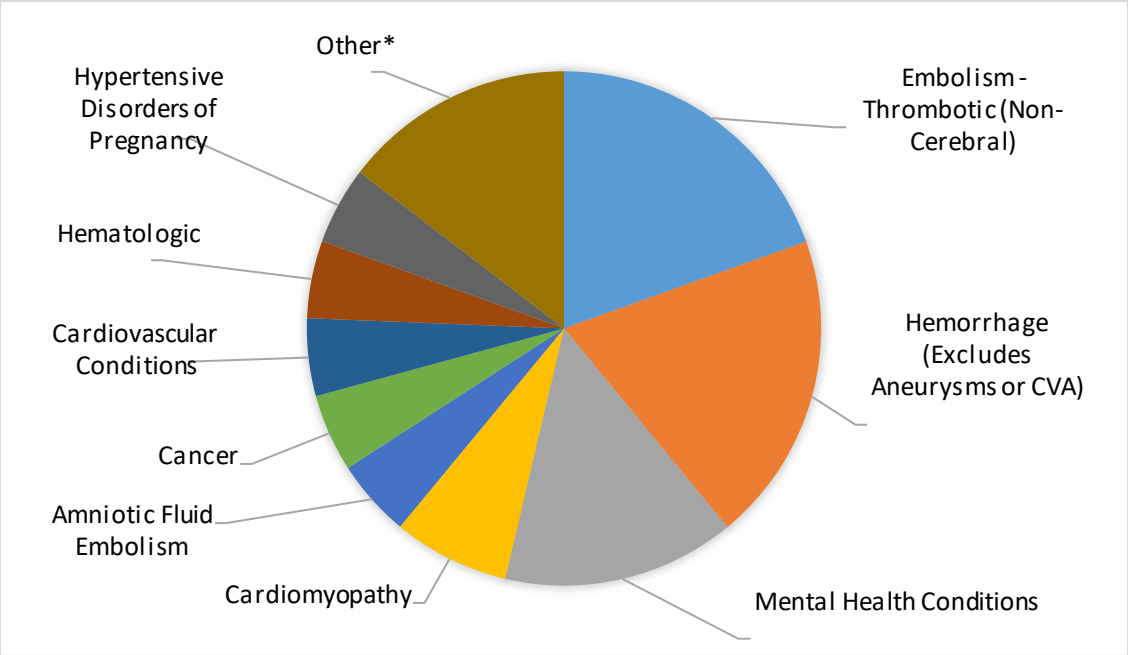
Cause of Death

The underlying cause of death, as defined by the World Health Organization (WHO), is "disease or injury that initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury." Among 41 pregnancy-related deaths, the most common underlying causes of death, as determined by the committees, were embolism-thrombotic (non-cerebral) and hemorrhage (excluding aneurysms or CVA), followed by mental health conditions. Other causes included cerebrovascular accident not secondary to hypertensive disorders of pregnancy, gastrointestinal disorders, infection, and metabolic/endocrine (Table 7). The distribution of causes of death varied by race/ethnicity. Notably, a higher percentage of Black, non-Hispanic women died from embolism and hemorrhage, while a higher proportion of White, non-Hispanic women died from mental health conditions.

Figure 11. Underlying Causes of Pregnancy-Related Deaths



Source: NYS MMR

*Other includes Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy, Gastrointestinal Disorders, Infection, Metabolic/Endocrine, and Unknown.

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Table 7. Distribution of Underlying Cause of Pregnancy-Related Deaths

Cause of Death	Total
Embolism – Thrombotic (Non-Cerebral)	8 (20%)
Hemorrhage (Excludes Aneurysms or CVA)	8 (20%)
Mental health conditions	6 (15%)
Cardiomyopathy*	SS
Cardiovascular Conditions*	SS
Cancer*	SS
Amniotic Fluid Embolism*	SS
Hematologic*	SS
Hypertensive Disorders of Pregnancy*	SS
Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy*	SS
Gastrointestinal Conditions*	SS
Infection*	SS
Metabolic/Endocrine Conditions*	SS
Unknown*	SS
Total	**41 (100%)**

*: Causes of death with small numbers have been suppressed and noted as SS (small size).

Source: NYS MMR

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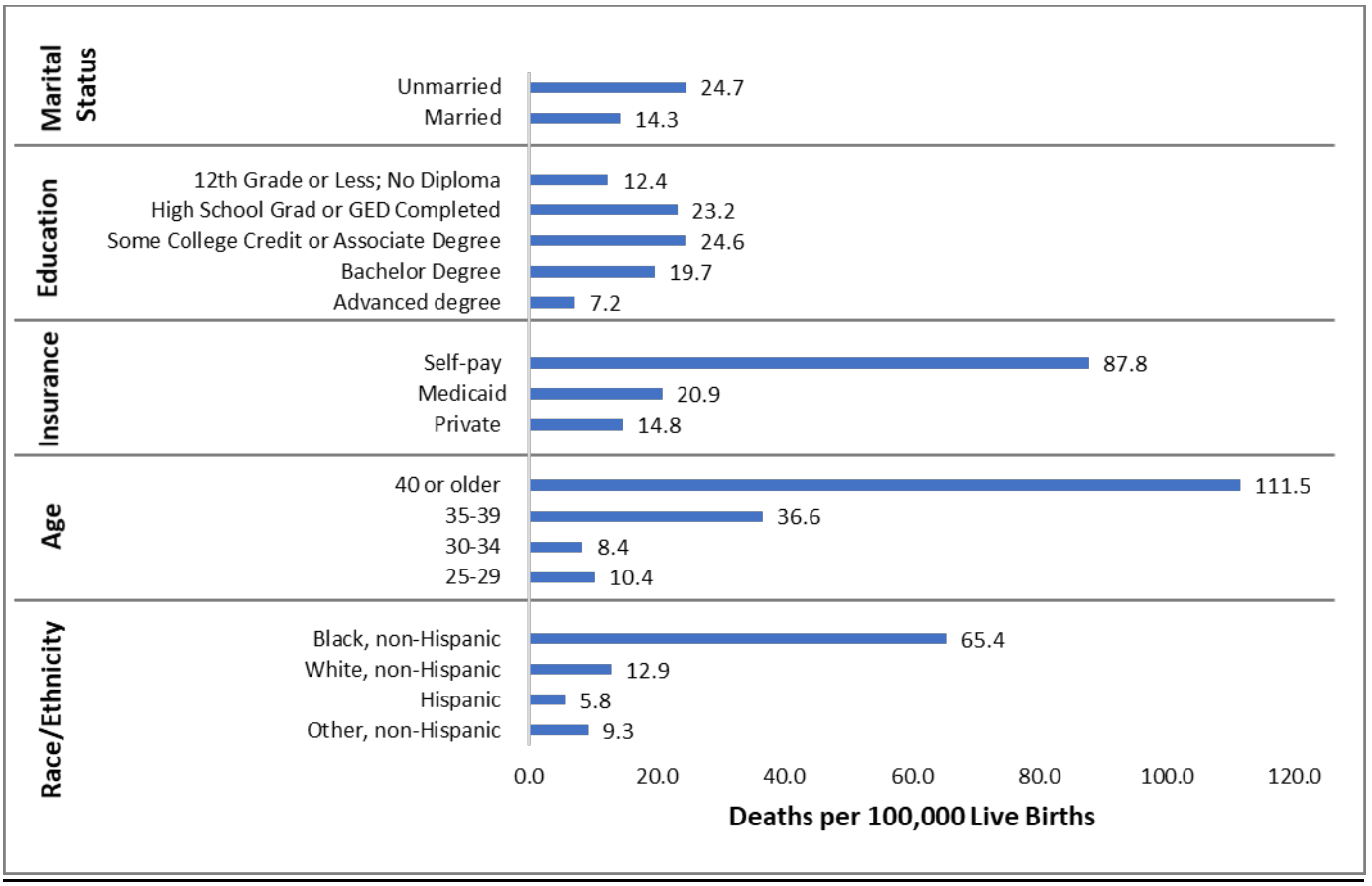
Pregnancy-Related Mortality Ratio (PRMR)

The pregnancy-related mortality ratio (PRMR) is a measure of the risk of death once a woman has become pregnant, which is the number of pregnancy-related deaths per 100,000 live births. New York State's overall PRMR for 2018 was 18.2 deaths per 100,000 live births. In other words, for every 100,000 babies born alive in 2018, 18.2 women died of pregnancy-related causes who were pregnant within one year of their death.

PRMR by Maternal Demographics

Using the same methodology, it is possible to calculate a PRMR for any group where the number of pregnancy-related deaths and live births are known. One of the most powerful uses of PRMR is to directly compare the likelihood of pregnancy-related death for different groups of women. In addition to the large disparity between Black, non-Hispanic and White, non-Hispanic women, markedly higher mortality ratios are also observed among women who were aged 40 years or older at the time of their death. Pregnancy-related mortality ratios by maternal demographics are shown in Figure 12.

Figure 12. Pregnancy-Related Mortality Ratio by Maternal Demographics



Source: NYS MMR

PRMR Racial Disparity

The PRMR for Black, non-Hispanic women was **65.4**, i.e., the number of Black, non-Hispanic women who died of pregnancy-related causes per 100,000 babies born alive to Black, non-Hispanic women. Expanding the PRMR calculation to other races and ethnicities, we can see that Black, non-Hispanic women were over 5 times more likely to die of a pregnancy-related cause than were White, non-Hispanic women (Table 8).

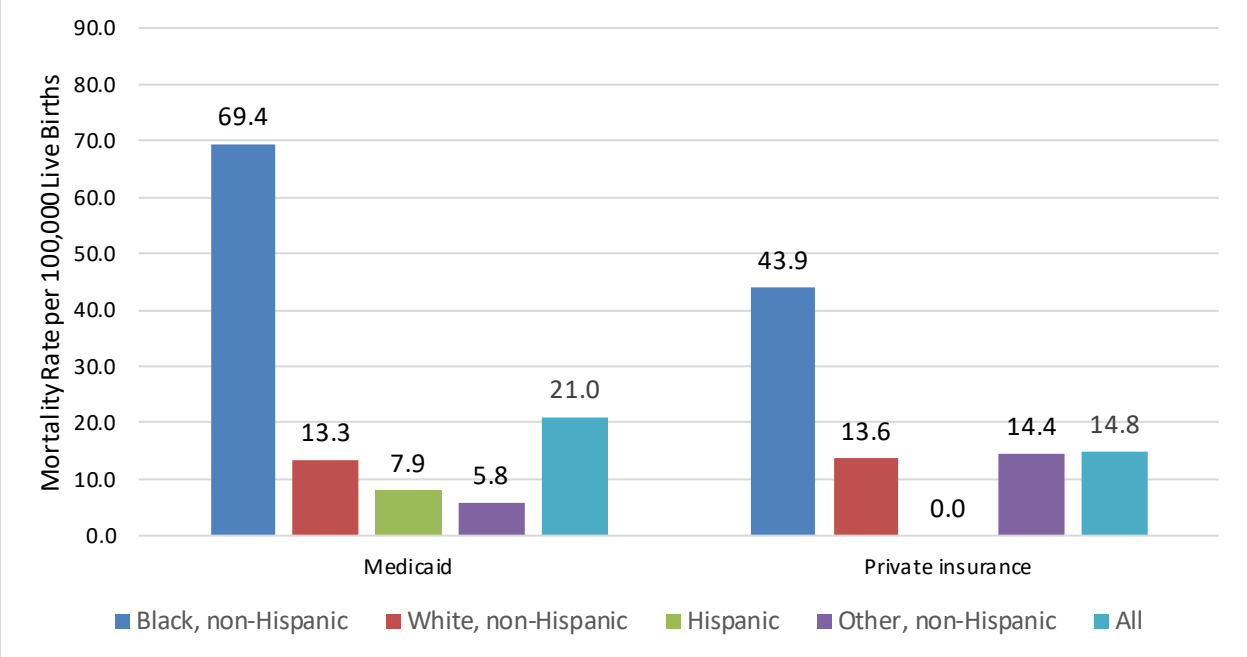
Table 8. Pregnancy-Related Mortality Ratio (PRMR) by Race/Ethnicity

Race/Ethnicity	PRMR
Black, non-Hispanic	65.4
White, non-Hispanic	12.9
Hispanic	5.8
Other, non-Hispanic	9.3
All Races/Ethnicities	**18.2**

Source: NYS MMR

In Figure 13, we see that the PRMR for Black, non-Hispanic women is much higher than that for other races/ethnicities, regardless of whether their care was covered by Medicaid or private insurance. Black, non-Hispanic women with private insurance had a PRMR three times that of White, non-Hispanic women on Medicaid.

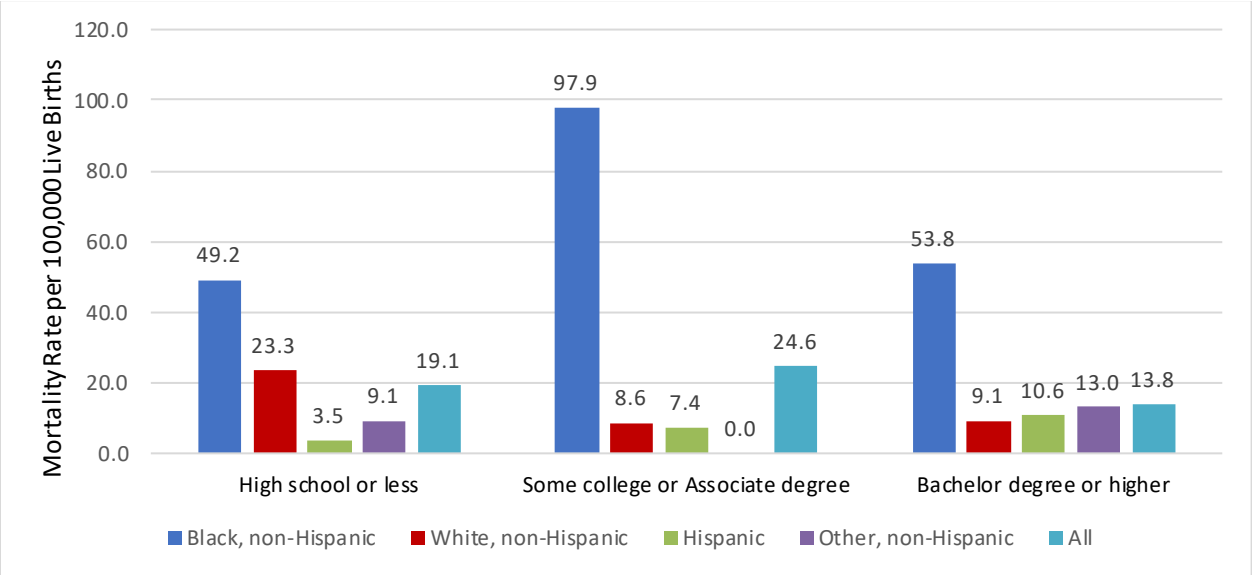
Figure 13. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Insurance Type



Note: Due to the small number of cases in the cohort, rates may be unreliable and must be cautiously interpreted.

Similarly, the PRMR by race/ethnicity and education level demonstrates that there is a higher risk of death for Black, non-Hispanic women than any other group, no matter the level of education attained (Figure 14).

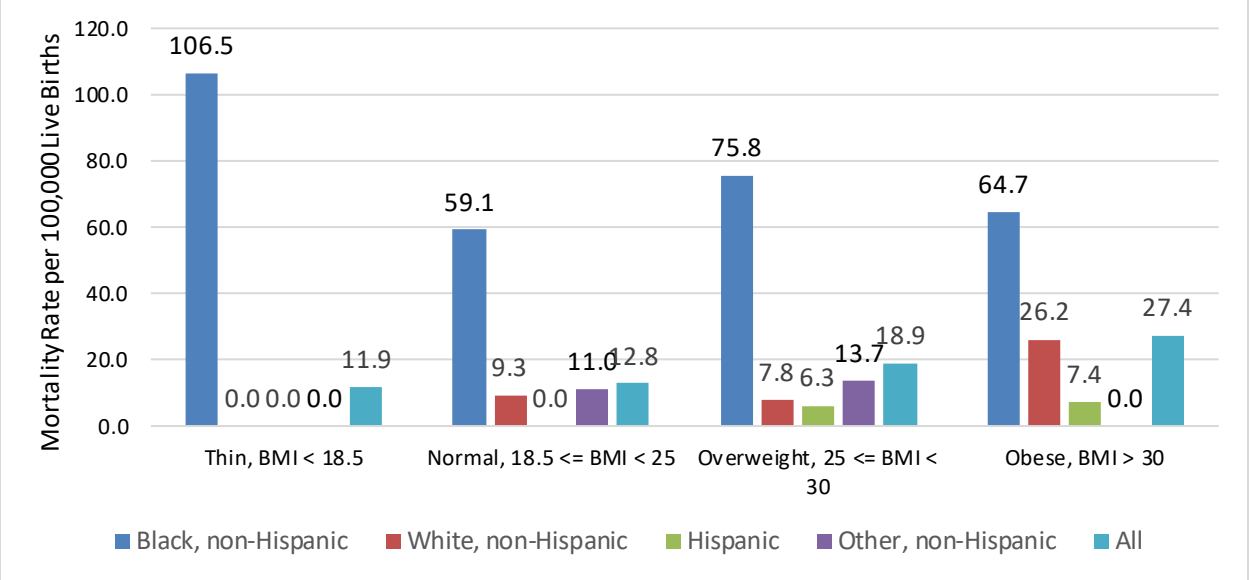
Figure 14. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Education Level



Note: Due to the small number of cases in the cohort, rates may be unreliable and must be cautiously interpreted.

Further examining PRMR by race/ethnicity and pre-pregnancy BMI, we again see that Black, non-Hispanic women die at a much higher rate than any other group at all levels of BMI (Figure 15).

Figure 15. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Pre-Pregnancy BMI



Note: Due to the small number of cases in the cohort, rates may be unreliable and must be cautiously interpreted.

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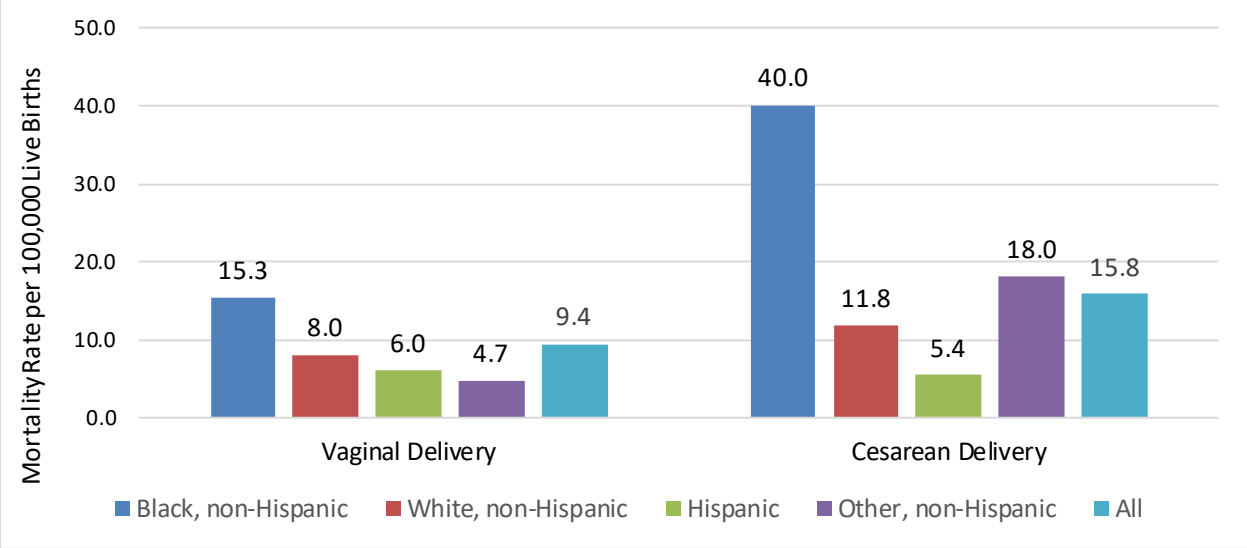
White, non-Hispanic women who deliver via cesarean section have a marginally higher PRMR than those who deliver vaginally, whereas the PRMR for Black, non-Hispanic women with cesarean deliveries is more than two and a half times higher than the PRMR for vaginal deliveries (Figure 16).

Figure 16. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Type of Delivery



Note: Due to the small number of cases in the cohort, rates may be unreliable and must be cautiously interpreted.

Each PRMR breakdown by race/ethnicity plus another condition is necessarily based on small numbers since the total number of pregnancy-related deaths is 41, so these results must be interpreted with caution. Nevertheless, Black, non-Hispanic women are consistently more likely to die of pregnancy-related causes across all categories.

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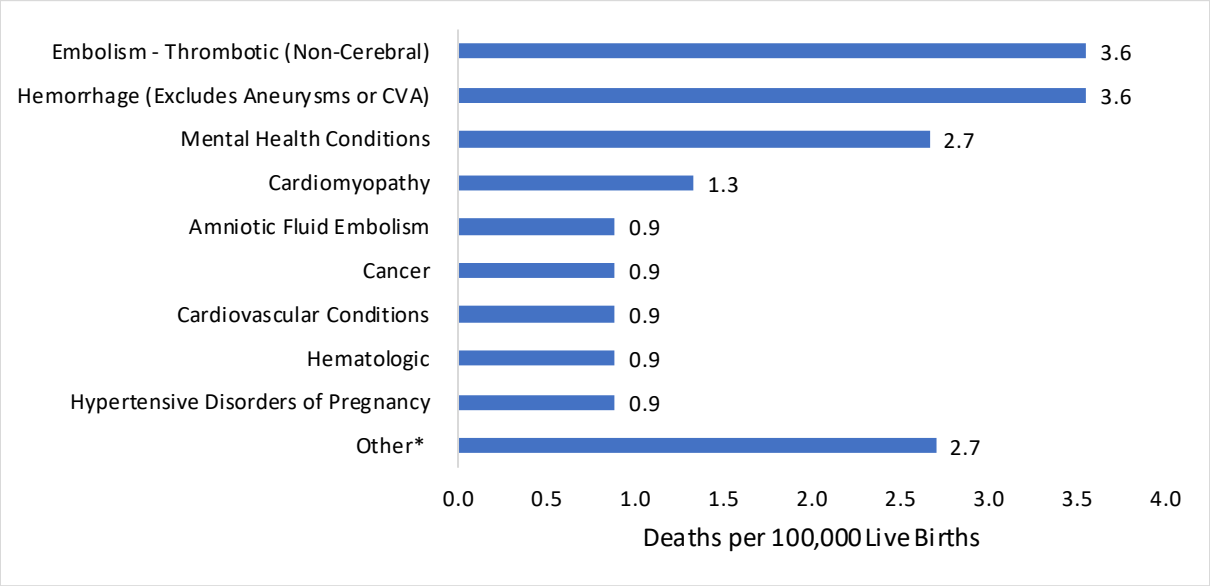
PRMR by Leading Underlying Causes of Deaths

Figure 17 displays the cause-specific pregnancy-related mortality ratio for leading underlying causes of deaths using all 2018 live births as the denominator.

Figure 17. PRMR by Leading Underlying Causes of Death



Source: NYS MMR

*Other includes Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy, Gastrointestinal Disorders, Infection, Metabolic/Endocrine, and Unknown

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Preventability and Chance to Alter Outcome

A death is considered preventable if the committees determined 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[4]. If the chance to alter the outcome is unable to be determined by the committees, then the preventability of the death is considered 'unable to determine'. Overall, 78% the pregnancy-related deaths in 2018 were deemed preventable. Among the pregnancy-related deaths considered preventable, 13 (40.6%) had a good chance to alter the outcome and 19 (59.4%) had some chance to alter the outcome (Table 9).

Table 9. Preventability of the Death and Chance to Alter the Outcome among Pregnancy-Related Deaths

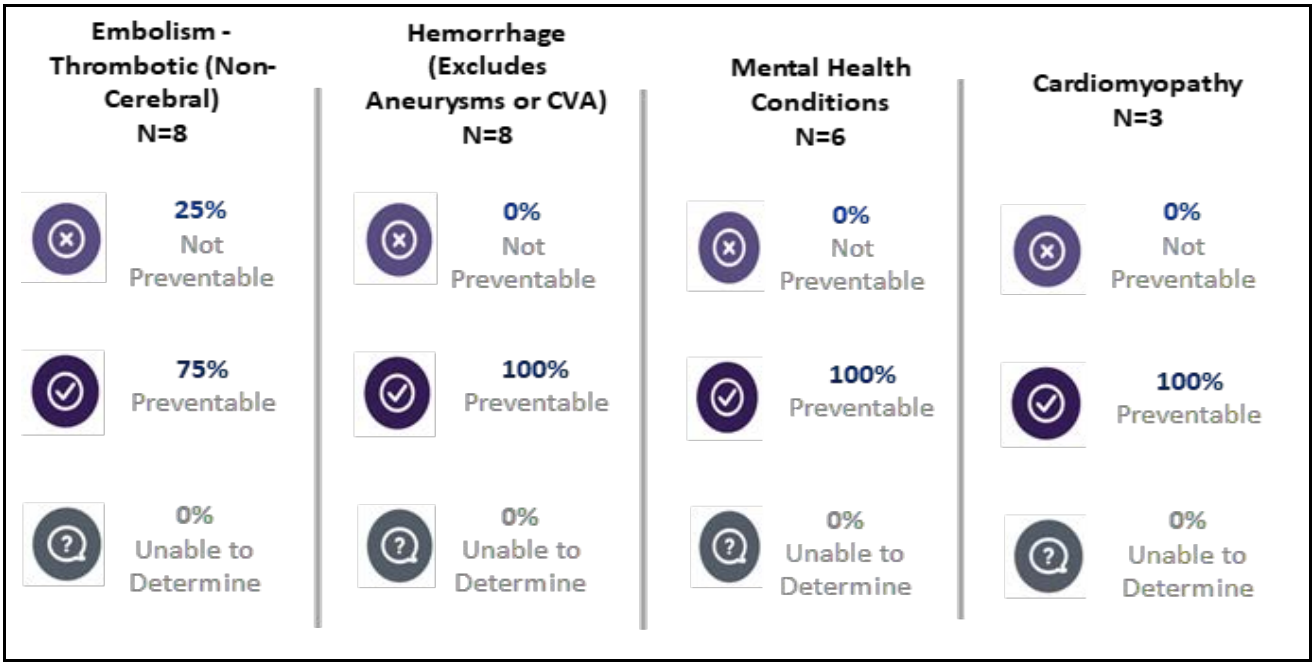
Preventability	N (%)	Chance to Alter Outcome			
		Good	Some	None	Unable to determine
Preventable	32 (78.0%)	13	19	0	0
Not preventable	5 (12.2%)	0	0	5	0
Unable to determine	4 (9.8%)	0	0	0	4
Total	**41**	**13**	**19**	**5**	**4**

Source: NYS MMR

Preventability by Underlying Causes of Deaths

Preventability varied across underlying causes of death. Among the leading causes of death, 75% of pregnancy-related deaths caused by embolism were deemed preventable, while 100% of deaths due to hemorrhage, mental health conditions, and cardiomyopathy were judged preventable (Figure 18).

Figure 18. Preventability among Pregnancy-Related Deaths by Leading Underlying Causes of Death



Source: NYS MMR

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A detailed list of preventability and chance to alter outcome by all the causes of death is displayed in the table below (Table 10).

Table 10. Distribution of Preventability Among Pregnancy-Related Deaths by Underlying Cause of Death

Cause of Death	Chance to Alter Outcome				Total N	% Preventable
	Good	Some	None	Unable to Determine		
Embolism - Thrombotic (Non-Cerebral)	4	2	2	0	8	75.0%
Hemorrhage (Excludes Aneurysms or CVA)	5	3	0	0	8	100.0%
Mental Health Conditions	2	4	0	0	6	100.0%
Cardiomyopathy	0	3	0	0	3	100.0%
Amniotic Fluid Embolism	0	1	1	0	2	50.0%
Cancer	0	2	0	0	2	100.0%
Cardiovascular Conditions	0	0	1	1	2	0.0%
Hematologic	0	2	0	0	2	100.0%
Hypertensive Disorders of Pregnancy	1	1	0	0	2	100.0%
Cerebrovascular Accident	0	0	1	0	1	0.0%
Gastrointestinal Disorders	0	1	0	0	1	100.0%
Infection	0	0	0	1	1	0.0%
Metabolic/Endocrine	1	0	0	0	1	100.0%
Unknown	0	0	0	2	2	0.0%
Total	**13**	**19**	**5**	**4**	**41**	**78.0%**

Source: NYS MMR

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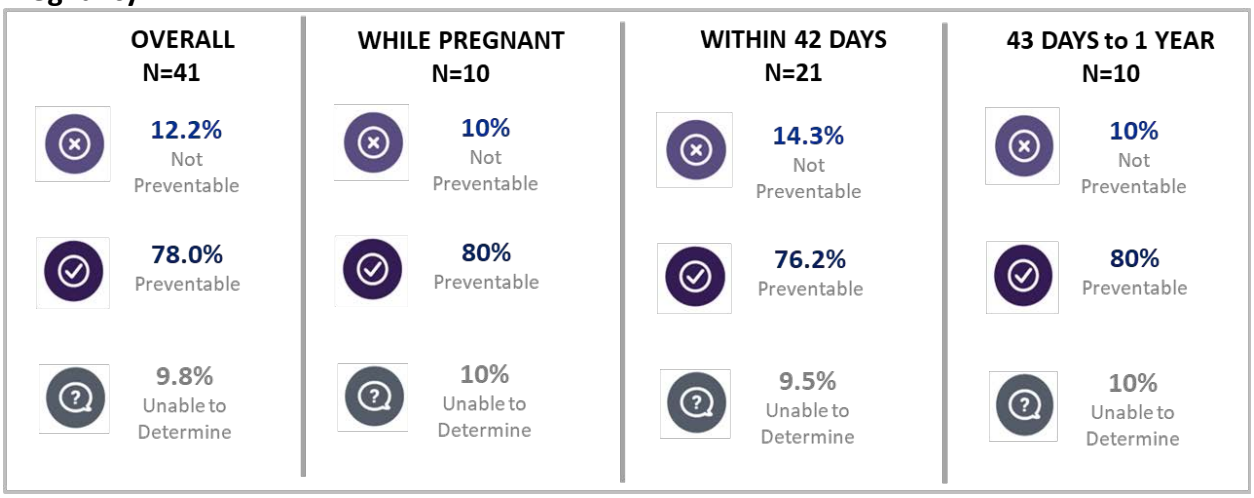
Preventability by Timing in Relation to Pregnancy

Preventability varied by timing of death in relation to pregnancy. Eighty percent of pregnancy-related deaths that occurred during pregnancy or from 43 to 365 days after the end of pregnancy were deemed preventable, while 76.2% of deaths within 42 days after the end of pregnancy were deemed preventable (Figure 19).

Figure 19. Preventability Among Pregnancy-Related Deaths by Timing in Relation to Pregnancy



Source: NYS MMR

A detailed list of preventability and chance to alter outcome by timing in relation to pregnancy is displayed in Table 11.

Table 11. Distribution of Preventability Among Pregnancy-Related Deaths by Timing in Relation to Pregnancy

Timing	Chance to Alter Outcome				N	% Preventable
	Good	Some	None	Unable to Determine		
While pregnant	4	4	1	1	10	80.0%
Within 42 days	7	9	3	2	21	76.2%
43 to 365 days	2	6	1	1	10	80.0%
Total	**13**	**19**	**5**	**4**	**41**	**78.0%**

Source: NYS MMR

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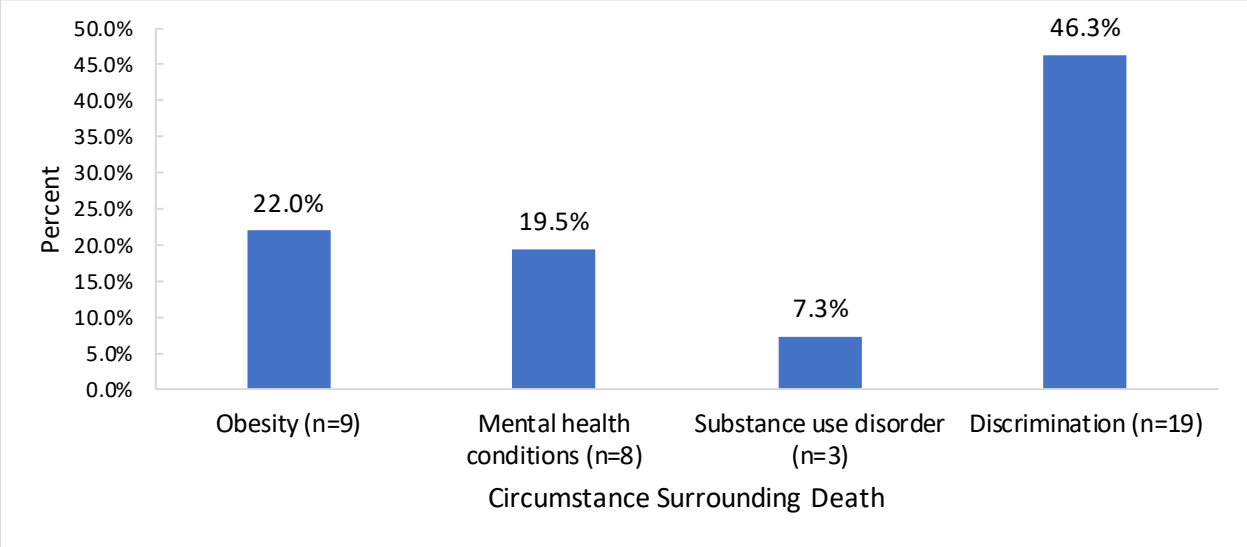
Preventability by Circumstances Surrounding Death

The committees identified the circumstances surrounding death, including obesity, mental health conditions other than substance use disorder, substance use disorder, and discrimination. An individual can have multiple circumstances. Among the pregnancy-related deaths in 2018, the committees determined that obesity contributed to 21.9% (9) of the deaths, mental health conditions other than substance use disorder 19.5% (8), substance use disorder 7.3% (3), and discrimination 46.3% (19) of the deaths (Figure 20).

Figure 20. Distribution of Circumstances Surrounding Death for Pregnancy-Related Deaths



Source: NYS MMR

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Preventability varied across this committee determination of circumstances surrounding Death. Among these circumstances, 88.9% of pregnancy-related deaths with obesity as a possible or certain circumstance were deemed preventable 94.7% of deaths with discrimination as a possible or certain circumstance were deemed preventable, while 100% of deaths with mental health conditions and substance use disorder as a as a possible or certain circumstance were judged preventable (Table 12).

Table 12. Distribution of Preventability Among Pregnancy-Related Deaths by Circumstance Surrounding Death

Circumstance Surrounding Death (Yes and probably)	Chance to Alter Outcome				N	% Preventable
	Good	Some	None	Unable to Determine		
Obesity	4	4	1	0	9	88.9%
Mental Health Conditions	4	4	0	0	8	100.0%
Substance Use Disorder	0	3	0	0	3	100.0%
Discrimination	6	12	0	1	19	94.7%

Source: NYS MMR

Contributing Factors

Once the committee reviews each case, identifies the underlying cause of death and determines the preventability of the case, the committee then identifies factors that contributed to the death. The factors are sorted into one of 28 specific contributing factor classes such as discrimination, structural racism, unstable housing, social support or isolation, violence, clinical skills/quality of care, etc. A complete list of contributing factor classes and definitions can be found in the MMRIA Committee Decisions Form in Appendix 3. In addition, each factor is categorized into one of the five levels:

- 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.*
- Facility*: A physical location where direct care is provided - ranges from small clinics and urgent care centers to hospitals with trauma centers.*
- 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.*
- System: *Interacting entities that support services before, during, or after a pregnancy - ranges from healthcare systems and payors to public services and program.*

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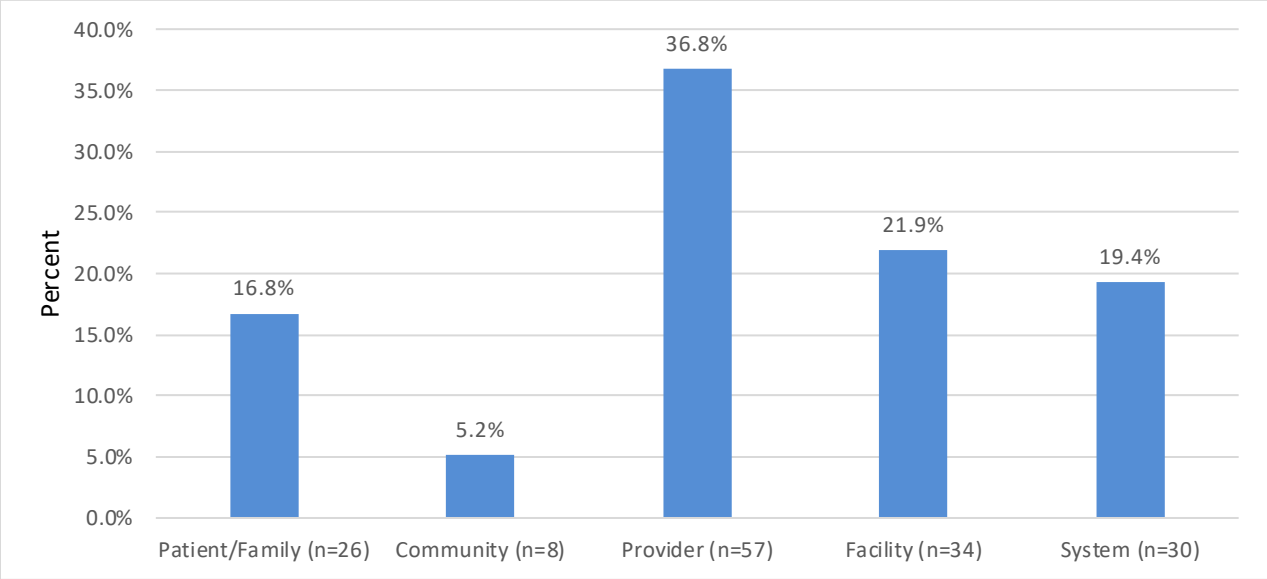
Overall Results for Contributing Factors

The committees identified 155 contributing factors among 41 pregnancy-related deaths. On average, four contributing factors were identified for every pregnancy-related death. For three deaths, no factors were identified since the deaths were not preventable. Factors at the provider level (36.8%), facility level (21.9%), and system level (19.4%) together comprised most of the factors identified that contributed to pregnancy-related deaths. Factors at the patient or family level accounted for 16.8% of the identified factors, while the community level accounted for 5.2% (Figure 21). Factors at the patient/family level are often due to circumstances beyond the control of the patient or their family and should not be interpreted as assigning blame or responsibility.

Figure 21. Distribution of Level of Contributing Factors Among Pregnancy-Related Deaths



Source: NYS MMR

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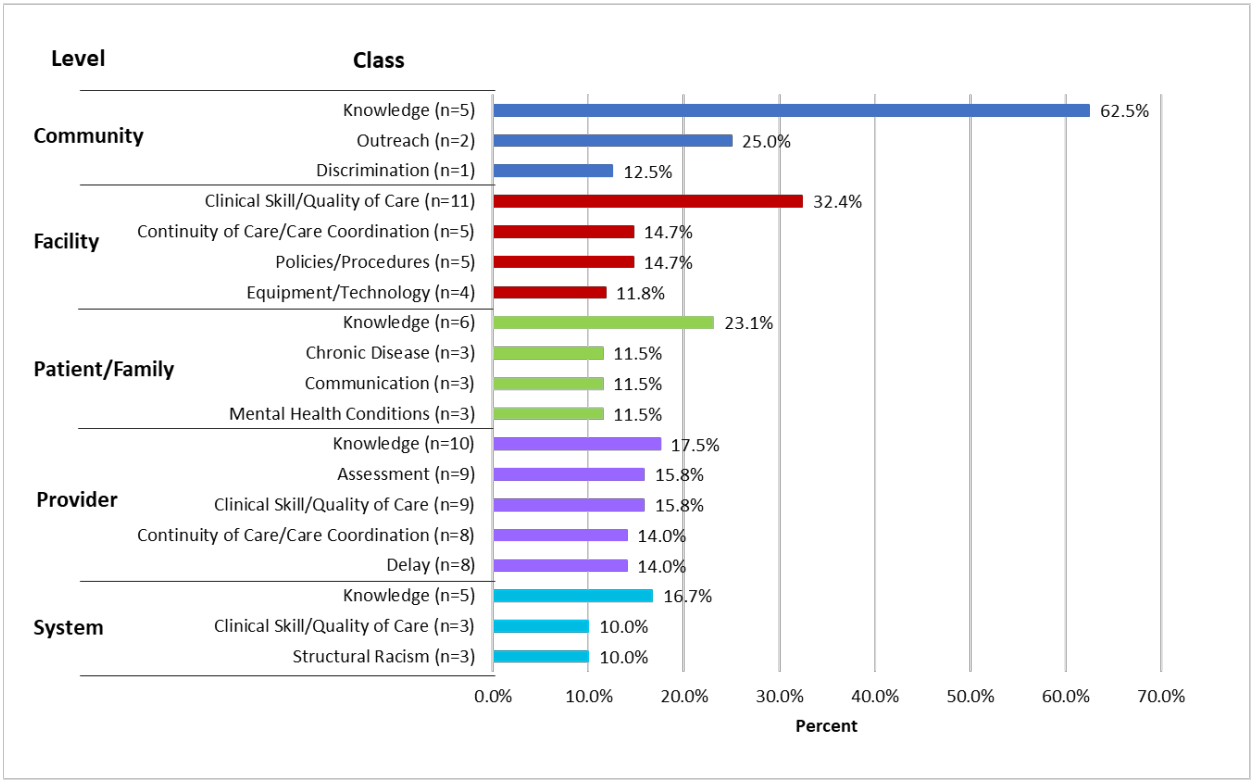
Contributing Factors by Level

The graph below displays the most common factor classes at each factor level. Knowledge is the most common class at all levels, except for at the facility level (Figure 22).

Figure 22. Most Common Factor Classes Associated with Pregnancy-Related Deaths by Level



Source: NYS MMR

Contributing factors were further examined by the factor class and issue description to better understand the specific concerns contributing to each factor level. Factor-level summaries of the most prevalent factor classes and common themes are displayed below.

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Communiy Level

Community level factors are based on a shared sense of place or identity and can range from physical neighborhoods to communities defined by common interests and shared circumstances. Eight community level factors were identified as contributing to the pregnancy-related deaths (Table 13).

Table 13. Contributing Factors to Pregnancy-Related Deaths - Community Level

Class of Contributing Factors	Count (%)	Common Themes
Knowledge	5 (62.5%)	Lack of knowledge regarding urgent maternal warning signs
Outreach	2 (25.0%)	Stigma surrounding mental health conditions
Discrimination	1 (12.5%)	Slower EMS response in disadvantaged communities

Source: NYS MMR

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Facility Level

Facility level factors are tied to a physical location where direct care is provided, which can range from small clinics and urgent care centers to large hospitals with trauma centers. The committees identified 34 facility-level factors contributing to the pregnancy-related deaths (Table 14).

Table 14. Contributing Factors to Pregnancy-Related Deaths - Facility Level

Class of Contributing Factors	Count (%)	Common Themes
Clinical Skill/Quality of Care	11 (32.4%)	Lack of hospital policies and procedures or poor adherence to existing policies and procedures; poor and conflicting treatment documentation
Continuity of Care/Care Coordination	5 (14.7%)	Inadequate communication between facilities and lack of follow-up with patient
Policies/Procedures	5 (14.7%)	Lack of care standards or documentation
Equipment/Technology	4 (11.8%)	Computerized risk assessment failed to consider relevant factors; lack of needed equipment
Communication	3 (8.8%)	Lack of communication during patient care which included transfers, records, and prenatal care between providers as well as facilities.
Structural Racism	2 (5.9%)	Disrespectful care led to poor experience and seeking further care
Assessment	1 (2.9%)	Inadequate assessment resulting in poor care
Delay	1 (2.9%)	Delayed recognition of and response to hemorrhage
Knowledge	1 (2.9%)	Failure to recognize risks associated with procedure history
Referral	1 (2.9%)	Failure to consult specialists when necessary

Source: NYS MMR

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Patient/Family Level

Patient/family-level factors are related to the circumstances of an individual before, during or after a pregnancy, as well as family members with influence on the individual, whether they live in the same household or not. The committees identified 26 patient/family-level factors contributing to the pregnancy-related deaths (Table 15).

Table 15. Contributing Factors to Pregnancy-Related Deaths - Patient/Family Level

Class of Contributing Factors	Count (%)	Common Themes
Knowledge	6 (23.1%)	Inadequate education on urgent maternal warning signs and available resources affected patient outcomes
Chronic Disease	3 (11.5%)	Chronic conditions placed patient at higher risk for less favorable pregnancy outcomes
Communication	3 (11.5%)	Existence of language barriers impacted medical management
Mental Health Conditions	3 (11.5%)	Depression or anxiety and its impact on the patient seeking necessary medical or behavioral intervention
Continuity of Care/Care Coordination	2 (7.7%)	Referral appointments were not kept for unknown reasons
Cultural/Religious	2 (7.7%)	Religious objections raised by the patient to needed medical interventions impacted care delivery
Social Support/Isolation	2 (3.5%)	Lack of childcare during hospital stay resulted in negligence report to child services
Substance Use Disorder - Alcohol, Illicit/Prescription Drugs	2 (7.7%)	History of substance use and its impact on the patient seeking necessary medical or behavioral intervention
Adherence	1 (1.8%)	Not getting or taking prescribed medications for unknown reasons affected patient outcomes
Referral	1 (1.8%)	Referral appointments not kept for unknown reasons
Unstable Housing	1 (1.8%)	Shelter rules interfered with necessary care

Source: NYS MMR

Provider Level

Provider-level factors are related to individuals with training and expertise who provide care, treatment, and/or advice, such as doctors, nurses, and midwives. The committees identified 57 provider-level factors contributing to the pregnancy-related deaths (Table 16).

Table 16. Contributing Factors to Pregnancy-Related Deaths - Provider Level

Class of Contributing Factors	Count (%)	Common Themes
Knowledge	10 (17.5%)	Gaps in provider knowledge gaps
Assessment	9 (15.8%)	Inadequate assessment of risk and screening for mental health conditions, substance use, or other reproductive health needs
Clinical Skills/Quality of Care	9 (15.8%)	Lack of follow-up for effective management of chronic and acute conditions
Continuity of Care/Care Coordination	8 (14.0%)	Lack of coordination between providers, failure to assist high-risk patients with navigating referrals and appointments
Delay	8 (14.0%)	Delayed diagnosis and treatment due to not recognizing the severity of the situation, delaying needed non-obstetric treatment due to the pregnancy
Discrimination	4 (7.0%)	Patient concerns dismissed due to patient's race, gender, or weight; delayed diagnostic procedures because patient was pregnant; refusal to prescribe certain drugs in pregnancy due to provider's religious biases.
Communication	3 (5.3%)	Lack of communication between providers or poor documentation; failure to consult appropriate specialists or document their input
Mental Health Conditions	2 (3.5%)	Missed signs that depression was impacting patient's care, providers unaware of treatment options
Chronic Disease	1 (1.8%)	Provider failing to consider the risk implications of the patient's chronic disease
Interpersonal Racism	1 (1.8%)	Not taking patient complaints seriously due to race
Referral	1 (1.8%)	Failure to consider a higher level of care when called for.
Social Support/Isolation	1 (1.8%)	Lack of acceptable childcare during hospital stay led to child services removing the children from the mother

Source: NYS MMR

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System Level

System-level factors deal with interactions between entities supporting services before, during, or after a pregnancy. These entities range from healthcare systems and payors to public services and programs. The committees identified 26 system-level factors for the pregnancy-related deaths (Table 17).

Table 17. Contributing Factors to Pregnancy-Related Deaths - System Level

Class of Contributing Factors	Count (%)	Common Themes
Knowledge	5 (16.7%)	Lack of standardized policies and procedures; common provider knowledge gaps and training needs; lack of adequate patient education efforts
Clinical Skill/Quality of Care	3 (10.0%)	Type of EMS used was not certified to perform needed procedures, including starting an IV
Structural Racism	3 (10.0%)	Care and services are harder to access for people living in poverty; lack of a living wage makes seeking care more difficult
Continuity of Care/Care Coordination	2 (6.7%)	Lack of a primary provider to coordinate care
Communication	2 (6.7%)	Lack of ready access to care records from other providers and facilities prevents providers from spotting patterns
Delay	2 (6.7%)	EMS did not arrive in a timely manner
Discrimination	2 (6.7%)	Adequate mental health care is not readily accessible to patients on Medicaid; incorrect assumptions regarding mental health status based on class and race
Equipment/Technology	2 (6.7%)	Electronic records system was not well suited to OB records
Social Support/Isolation	2 (6.7%)	Punitive child services interactions can contribute to mental health declines
Unstable Housing	2 (6.7%)	Unstable housing exacerbates mental and medical issues; restrictive shelter rules increase burdens on homeless mothers
Access/Financial	1 (3.3%)	Lack of access to care
Assessment	1 (3.3%)	Inadequate assessment of risk for adverse events could impact recognition of urgent situation
Cultural/Religious	1 (3.3%)	Inadequate use of interpreter services to overcome language barriers
Policies/Procedures	1 (3.3%)	Lack of choice and continuity of providers and services
Mental Health Conditions	1 (3.3%)	Lack of care coordination around substance use disorder and mental health conditions

Source: NYS MMR

SECTION 4: FINDINGS FROM THE 2018 COHORT

Contributing Factors by Cause of Death

The number of contributing factors at each level varies by cause of death. On average, there were 4.1 contributing factors per pregnancy-related death. The causes with the most contributing factors per death were amniotic fluid embolism (5.5 factors per death), hemorrhage (5.3 factors per death), mental health conditions (4.5 factors per death) and hematologic conditions (4.5 factors per death) (Table 18).

Table 18. Contributing Factor Level by Leading Causes of Pregnancy-Related Deaths

Cause of Death	Contributing Factors					Number of Pregnancy-related Deaths*	Factors Per Death
	Patient/ Family	Community	Provider	Facility	System		
Hemorrhage	4	3	10	15	10	8	5.3
Embolism - Thrombotic (Non-Cerebral)	3	3	13	3	3	7	3.6
Mental Health Conditions	7	2	8	1	9	6	4.5
Cardiomyopathy	--	--	1	4	4	3	3.0
Amniotic Fluid Embolism	2	--	5	4	--	2	5.5
Cancer	1	--	7	--	--	2	4.0
Hematologic	3	--	4	2	--	2	4.5
Hypertensive Disorders of Pregnancy	2	--	3	--	1	2	3.0
Cardiovascular Conditions	--	--	1	--	--	1	1.0
Gastrointestinal Disorders	3	--	--	1	--	1	4.0
Infection	--	--	2	--	--	1	2.0
Metabolic/Endocrine	1	--	1	--	1	1	3.0
Unknown	--	--	2	4	2	2	4.0
Total	**26**	**8**	**57**	**34**	**30**	**38**	**4.1**

Source: NYS MMR

* Only includes pregnancy-related deaths that had at least one recommendation identified.

Contributing factors were further examined by the factor class and issue description to better understand the specific contributors among the leading causes of pregnancy-related deaths. For the top three leading causes of pregnancy-related death, the most common factor levels, factor classes, and themes are summarized below:

Hemorrhage

- Provider factors comprised 23.8% of the total contributing factors for hemorrhage deaths. The most common classes of provider factors were knowledge and delay, which combined to represent 60.0% of all provider factors. The common themes for the knowledge class were lack of provider knowledge regarding treatment of hemorrhagic shock in reproductive aged women and insufficient provider knowledge regarding risk factors and evaluation for placenta accreta. The most common theme for the delay class

was delay caused by an inability or failure to accurately estimate blood loss, which resulted in delayed recognition of the severity of the hemorrhage, as well as delayed treatment response.

- Facility factors comprised 35.7% of the total contributing factors for hemorrhage deaths. The most common class of facility factors was clinical skills/quality of care (60%). The most common themes among clinical skills/quality of care were lack of adherence to hospital policies and procedures, insufficient documentation, failure to recognize warning signs, and failure to quantify blood loss.
- System level factors comprised 23.8% of the total contributing factors for hemorrhage deaths. The most common class was clinical skills/quality of care at 30.0%, followed by continuity of care/care coordination at 20.0%, and knowledge at 20.0%. Common themes included, lack of hospital policies and procedures, lack of care coordination, ER personnel failing to evaluate women of reproductive age for pregnancy, and lack of community engagement to assist high-risk patients with language barriers during the prenatal period.

Embolism

- Provider factors comprised 52% of the total contributing factors for embolism deaths. The most common factor classes were continuity of care/care coordination at 30.8% and knowledge at 23.1%. Common themes that emerged included lack of follow up, lack of communication between inpatient and outpatient providers, and failure to engage specialists in the treatment of patients with chronic conditions.

Mental Health

- System factors comprised 33.0% of the total contributing factors for mental health deaths. The most common classes were discrimination, social support/isolation, and unstable housing, all at 22.2%. The themes for systems of care included lack of adequate mental health care for Medicaid patients; race and social class may have influenced decision for referral for treatment, removal of children from the patient, and shelter rules preventing family from assisting with childcare.
- Provider factors comprised 30.0% of the total contributing factors for mental health deaths. The most common classes of provider factors were provider assessment and continuity of care/care coordination at 25.0% each. The dominant theme that emerged related to provider assessment was failure to screen for mental health concerns. The most common themes for continuity of care/care coordination were a lack of follow up after missing a referral appointment, and lack of care coordination between providers at different facilities.
- Patient/Family factors comprised 26.0% of the total contributing factors for mental health deaths. The most common classes were continuity of care/care coordination and mental health conditions at 28.6% each. Themes that emerged from these classes included missed appointments due to lack of patient support, depression, overly aggressive child services intervention, and history of attempted suicide.

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III. OTHER PREGNANCY-ASSOCIATED DEATHS

There was a total of 76 other pregnancy-associated deaths, which included 56 pregnancy-associated but not related deaths, and 20 pregnancy-associated but unable to determine relatedness deaths.

Demographics

Table 19 describes the demographic characteristics of the other pregnancy-associated cases at the time of their deaths, including the age, race/ethnicity, marriage status, educational level, and insurance type. The majority of these women were aged 34 years or younger (72.4%). White, non-Hispanic women accounted for 57.9% of the other pregnancy-associated deaths. The majority of this cohort were never married (64.5%). More than half of this cohort had an education level at high school/GED or less (56.6 %). The majority of the women were enrolled in Medicaid (61.8%), while an additional 21.1% were covered by private insurance.

Table 19. Demographic Characteristics of Other Pregnancy-Associated Deaths

Demographic characteristics	Count (%)
Age at death (years)	
24 or younger	18 (23.7%)
25-29	20 (26.3%)
30-34	17 (22.4%)
35-39	13 (17.1%)
40 or older	8 (10.5%)
Race	
Black, non-Hispanic	17 (22.4%)
White, non-Hispanic	44 (57.9%)
Hispanic	10 (13.2%)
Other, non-Hispanic	5 (6.6%)
Marital status	
Married	16 (21.1%)
Divorced	8 (10.5%)
Widowed	1 (1.3%)
Domestic Partnership	1 (1.3%)
Never married	49 (64.5%)
Unknown	1 (1.3%)
Education	
12th Grade or Less; No Diploma	12 (15.8%)
High School Grad or GED Completed	31 (40.8%)
Some College Credit, but No Degree	17 (22.4%)
Associate or Bachelor's Degree	13 (17.1%)
Advanced Degree	3 (4.0%)
Health insurance	
Medicaid	47 (61.8%)
Private insurance	16 (21.1%)
Self-pay	3 (3.9%)
Medicare	3 (3.9%)
Other government/ Child Health Plus	4 (5.3%)
Other non-federal program	2 (2.6%)
Unknown	1 (1.3%)
Total	**76 (100%)**

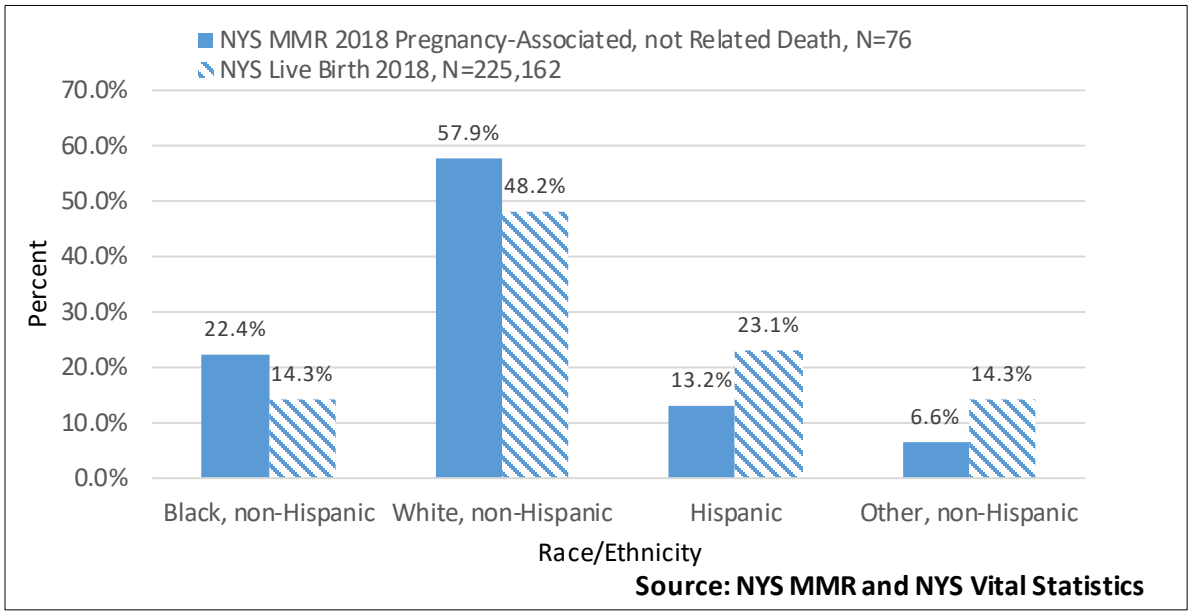
Source: NYS MMR

SECTION 4: FINDINGS FROM THE 2018 COHORT

Racial and Other Disparities

When compared to women with live births in 2018, both Black, non-Hispanic women and White, non-Hispanic women were overrepresented in the other pregnancy-associated cohort. About 22% of the other pregnancy-associated deaths were Black, non-Hispanic women while births to Black, non-Hispanic women represented 14.3% of all births. About 58% of other pregnancy-associated deaths were White, non-Hispanic women while births to White, non-Hispanic women represented 48.2 % of all births (Figure 23).

Figure 23. Proportion of Other Pregnancy-Associated Deaths and Live Births by Race/Ethnicity



Source: NYS MMR and NYS Vital Statistics

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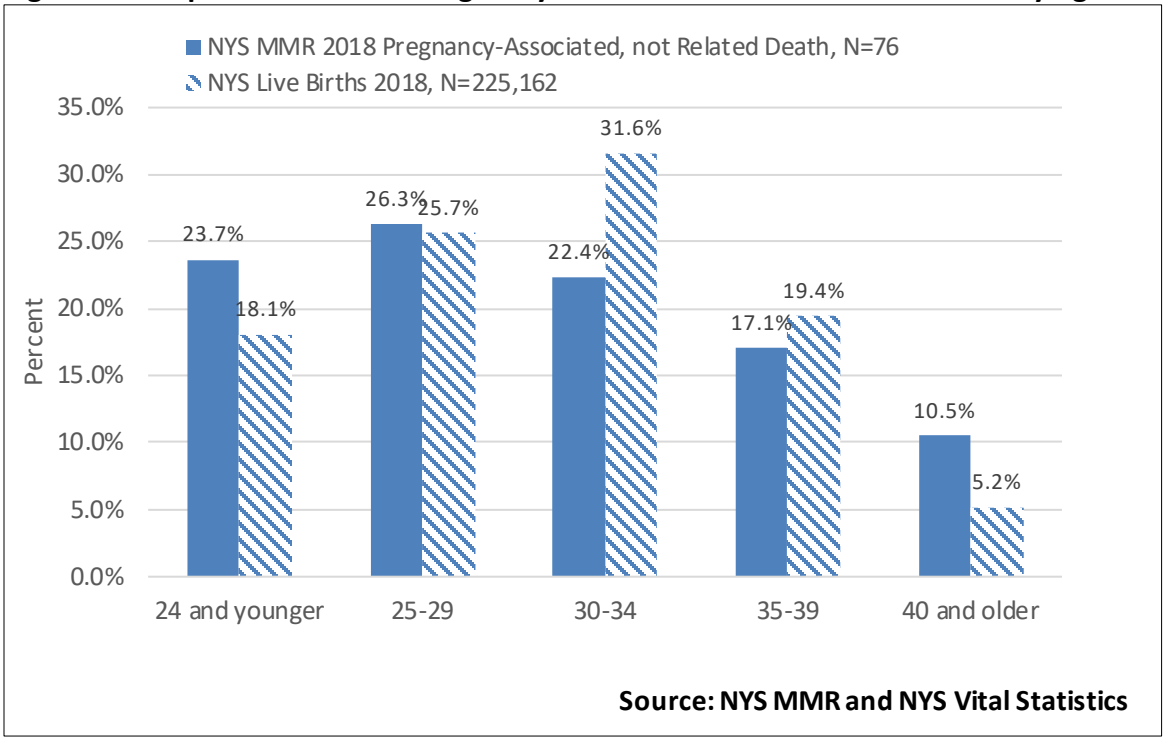
A comparison of distribution of age between people in the pregnancy-associated, but not related death cohort and those with live births in 2018 shows that the other pregnancy-associated death cohort has a higher percentage of individuals in age group 24 years old and younger (23.7% vs 18.1%) as well as in age group 40 years and older (10.5% vs 5.2%), compared to those in the age groups with live births in 2018 (Figure 24).

Figure 24. Proportion of Other Pregnancy-Associated Deaths and Live Births by Age



Source: NYS MMR and NYS Vital Statistics

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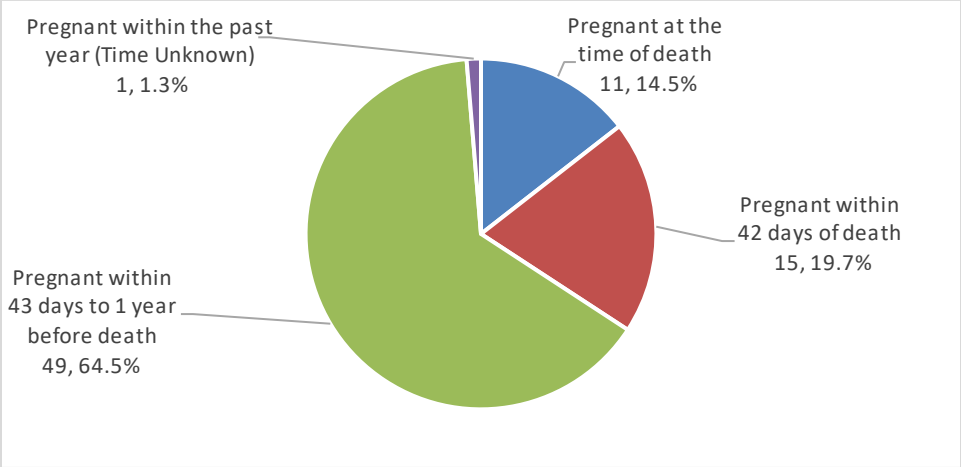
Distribution of Deaths by Certain Characteristics

Other Pregnancy-Associated Deaths by Timing of Death in Relation to Pregnancy

Over half of the other pregnancy-associated deaths occurred from 43 days to one year after the end of pregnancy (64.5%). About a fifth (19.7%) occurred within 42 days of pregnancy and 14.5% occurred during pregnancy (Figure 25). In contrast, among pregnancy-related deaths, the majority of deaths (51.2%) occurred within 42 days after the end of pregnancy (see page 24). The timing of death in relation to pregnancy were unknown for one death and no additional information available to confirm.

Figure 25. Distribution of Timing of Death in Relation to Pregnancy among Other Pregnancy-Associated Deaths



Source: NYS MMR

Other Pregnancy-Associated Deaths by Manner of Death

Table 20 displays the manner of death based on the death certificate. Among 76 deaths, the most common manner of deaths was natural (43.4%) followed by accident (42.1%).

Table 20. Distribution of Manner of Deaths Among Other Pregnancy-Associated Deaths

Manner of Death	Count (%)
Natural	33 (43.4%)
Accident	32 (42.1%)
Homicide	3 (3.9%)
Suicide	3 (3.9%)
Pending Investigation	3 (3.9%)
Could Not Be Determined	2 (2.6%)
Total	**76 (100%)**

Source: NYS MMR

SECTION 4: FINDINGS FROM THE 2018 COHORT

Cause of Death

The top five causes of death representing 80.3% of the other pregnancy-associated cases were mental health condition (48.7%), cardiovascular conditions (11.8%), injury (10.5%), cancer (5.3%), and cerebrovascular accident (3.9%). Among mental health conditions, the majority of them were related to substance use disorder (SUD); 43.2% were SUD only, 5.4% were SUD and bipolar, 10.8% were SUD and depression, and 27.0% were SUD and other psychiatric conditions such as anxiety, personality disorder, post-traumatic stress disorder (PTSD), panic, attention deficit hyperactivity disorder (ADHD) (Table 21).

Table 21. Cause of Death for Other Pregnancy-Associated Deaths

MMR Cause of Death	Count (%)
Mental health conditions	37 (48.7%)
Depression only	4 (10.8%)
Depression and Anxiety	1 (2.7%)
Substance use disorder (SUD) only	16 (43.2%)
SUD and Bipolar	2 (5.4%)
SUD and Depression	4 (10.8%)
SUD and Other Psychiatric Conditions*	10 (27.0%)
Cardiovascular Conditions	9 (11.8%)
Injury	8 (10.5%)
Intentional injury	4 (50.0%)
Homicide	3 (37.5%)
Motor vehicle accident	1 (12.5%)
Cancer	4 (5.3%)
Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy	3 (3.9%)
Embolism - Thrombotic (Non-Cerebral)	2 (2.6%)
Pulmonary Conditions (Excludes ARDS)	2 (2.6%)
Hematologic	2 (2.6%)
Infection	2 (2.6%)
Hemorrhage (Excludes Aneurysms or CVA)	1 (1.3%)
Collagen Vascular/Autoimmune Diseases	1 (1.3%)
Liver and Gastrointestinal Conditions	1 (1.3%)
Metabolic/Endocrine	1 (1.3%)
Unknown	3 (3.9%)
Total	**76 (100%)**

Source: NYS MMR

***Note:** Other includes anxiety, personality disorder, PTSD, panic, ADHD, or combination of those conditions.

Other Pregnancy-Associated Mortality Ratio

The other pregnancy-associated mortality ratio is the number of other pregnancy-associated deaths per 100,000 live births. New York State's ratio for 2018 was 33.8 deaths per 100,000 live births. In other words, for every 100,000 babies born alive in 2018, 33.8 women died of other pregnancy-associated causes who were pregnant within one year of their death.

Using the same methodology, it is possible to calculate a mortality ratio for any group where the number of other pregnancy-associated deaths and live births are known, and to directly compare the likelihood of other pregnancy-associated deaths for different groups of women. By calculating the mortality ratio of different races and ethnicities, we can see that Black, non-Hispanic women were 1.3 times more likely to die of a pregnancy-associated cause than were White, non-Hispanic women (Table 22).

Table 22. Other Pregnancy-Associated Mortality Ratio by Race/Ethnicity

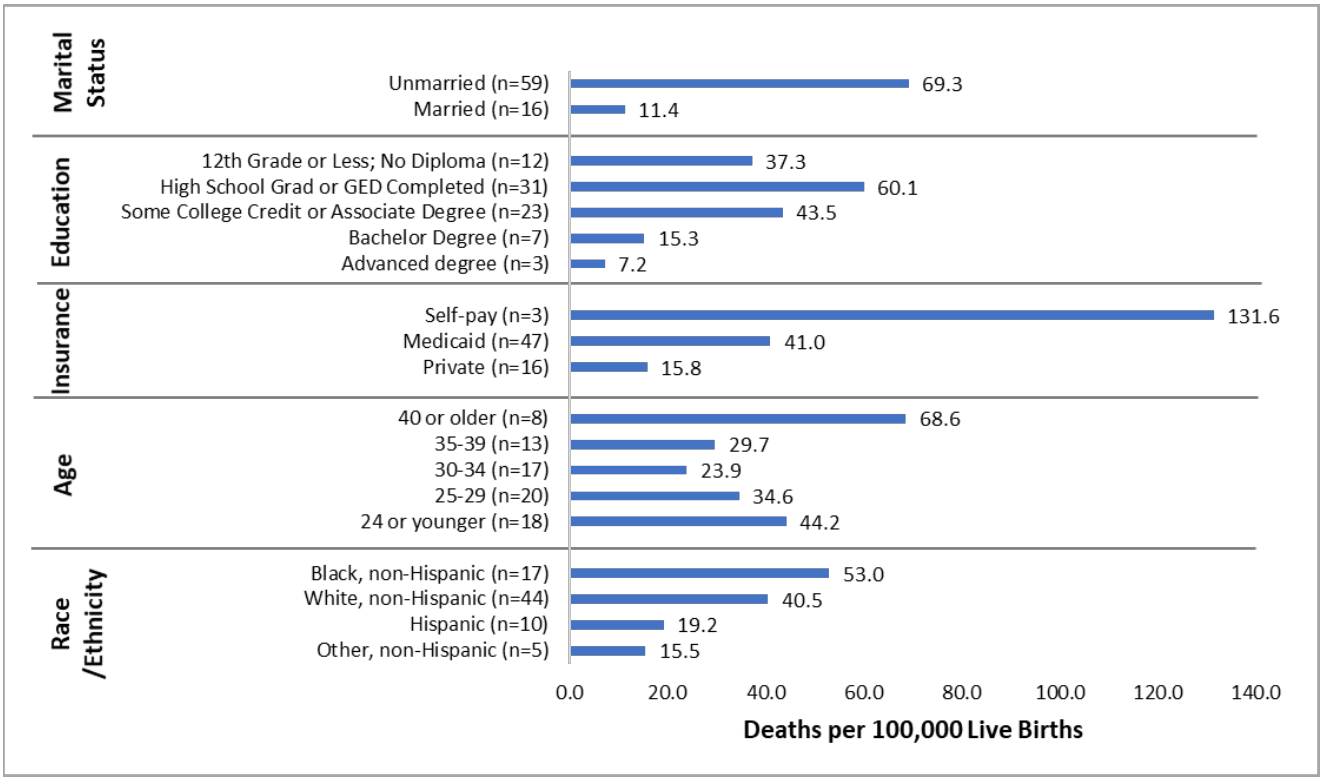
Race/Ethnicity	Mortality Ratio
Black, non-Hispanic	53.0
White, non-Hispanic	40.5
Hispanic	19.2
Other, non-Hispanic	15.5
All Races/Ethnicities	33.8

Source: NYS MMR

Other Pregnancy-Associated Mortality Ratio by Maternal Demographics

Pregnancy-related mortality ratios by maternal demographics are shown in Figure 26. In addition to the disparity between Black, non-Hispanic and White, non-Hispanic women, markedly higher mortality ratios are also observed among women who were not married, had education level of high school graduate or GED or less, were aged 40 years or older at the time of their death, and women without insurance.

Figure 26. Other Pregnancy-Associated Mortality Ratios by Maternal Demographics



Source: NYS MMR

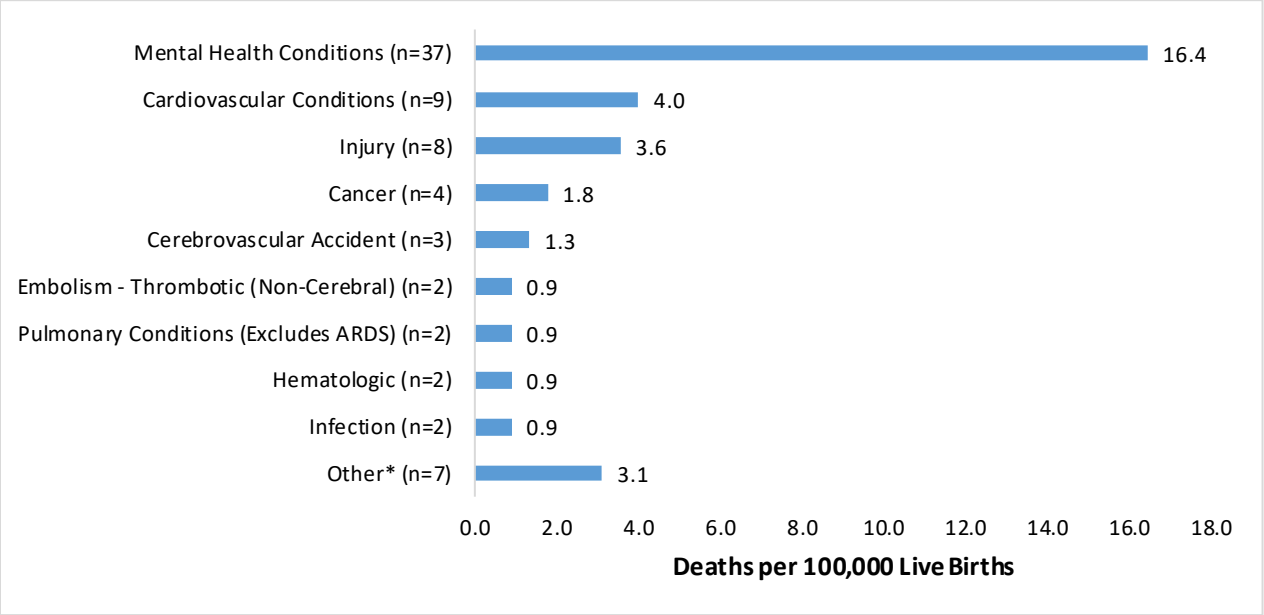
Only categories for which mortality ratios could be accurately calculated are included in this figure.

SECTION 4: FINDINGS FROM THE 2018 COHORT

Other Pregnancy-Associated Mortality Ratio by Leading Underlying Causes of Deaths

Figure 27 displays the cause-specific other pregnancy-associated mortality ratio for leading underlying causes of deaths using all 2018 live births as the denominator.

Figure 27. Other Pregnancy-Associated Mortality Ratio by Leading Underlying Causes of Death



Source: NYS MMR

*Other Includes hemorrhage (excludes aneurysms or CVA), collagen vascular/autoimmune diseases, liver and gastrointestinal conditions, metabolic/endocrine, and unknown cause of death.

Preventability and Chance to Alter Outcome for Reviewed Cases

Among the 76 other pregnancy-associated deaths, 33 were reviewed by the committees. Among these reviewed deaths, approximately 54.5% of these deaths were found to be preventable (either some chance or good chance to alter outcome) (Table 23).

Table 23. Preventability and Chance to Alter Outcome Among Reviewed Other Pregnancy-Associated Deaths

Preventability	Chance to Alter Outcome	N (%)
Preventable	Good Chance (N=7) Some Chance (N=11)	18 (54.5%)
Not preventable	No Chance (N=8) Unable to Determine (N=1)	9 (27.3%)
Unable to Determine	Unable to Determine	6 (18.2%)
Total		**33 (100%)**

Source: NYS MMR

Preventability and Chance to Alter Outcome by Manner of Death for Reviewed Cases

Table 24 shows the preventability and chance to alter outcome by manner of death for reviewed other pregnancy-associated deaths. Among 33 deaths, half of them (54.5%) were

preventable. The preventability was 59.1% for natural manner of death. It was 42.9% or 33.3% for the manner of death as accident or suicide, respectively.

Table 24. Preventability and Chance to Alter Outcome Among Other Pregnancy-Associated Deaths by Manner of Death for Reviewed Cases

Manner of Death	Chance to Alter Outcome				N	% Preventable
	Good	Some	None	Unable to Determine		
Natural	5	8	6	3	22	59.1%
Accident	2	1	2	2	7	42.9%
Suicide	0	1	0	2	3	33.3%
Could Not Be Determined	0	1	0	0	1	100.0%
Total	**7**	**11**	**8**	**7**	**33**	**54.5%**

Source: NYS MMR

Preventability and Chance to Alter Outcome by Leading Cause of Death for Reviewed Cases

Among the other pregnancy-associated deaths reviewed by the committees, 75% of deaths caused by cardiovascular conditions or mental health conditions were deemed preventable, while 50% of deaths caused by cerebrovascular accident were preventable (Table 25).

Table 25. Preventability Among Other Pregnancy-Associated Deaths by Selected Leading Causes of Death for Reviewed Cases

Cause of Death	Chance to Alter Outcome				N	% Preventable
	Good	Some	None	Unable to Determine		
Cardiovascular Conditions	3	3	2	0	8	75.0%
Mental Health Conditions	1	5	0	2	8	75.0%
Injury	0	0	2	1	3	0.0%
Cancer	0	0	1	1	2	0.0%
Infection	0	0	0	2	2	0.0%
Cerebrovascular Accident	0	1	1	0	2	50.0%
Others*	3	2	2	1	8	62.5%
Total	**7**	**11**	**8**	**7**	**33**	**54.5%**

Source: NYS MMR

* Others include collagen vascular/autoimmune diseases, embolism - thrombotic (non-cerebral), hematologic, hemorrhage (excludes aneurysms or CVA), metabolic/endocrine, pulmonary conditions (excludes ARDS), and unknown.

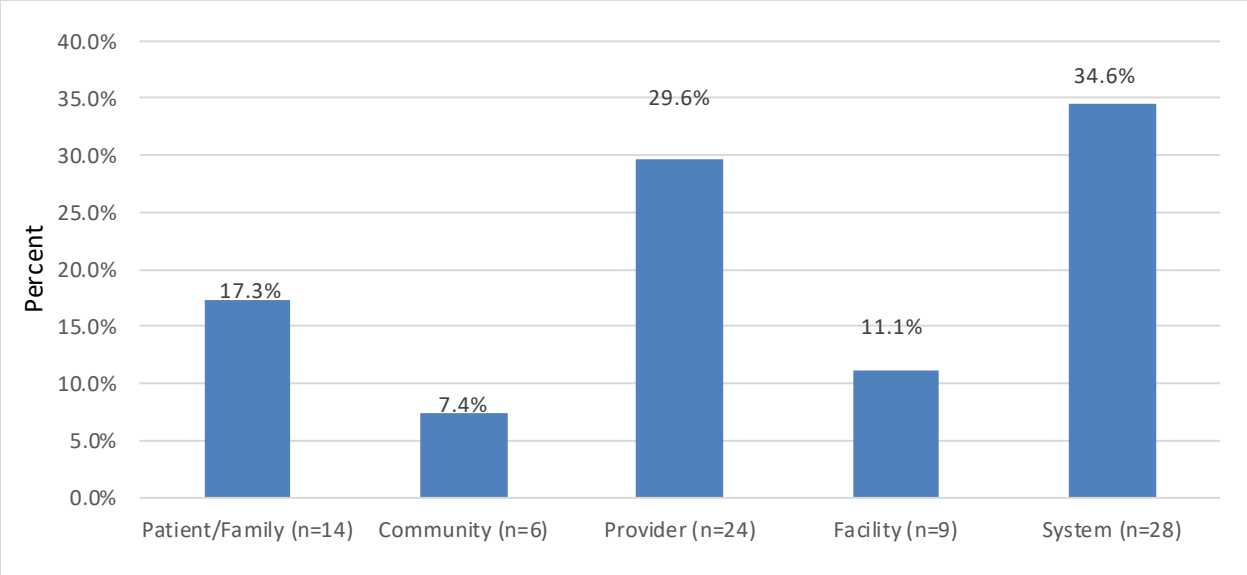
SECTION 4: FINDINGS FROM THE 2018 COHORT

Contributing Factors for Reviewed Cases

There were 81 contributing factors identified among 24 other pregnancy-associated deaths. No factors were identified for eight deaths that were not preventable and one death where preventability was unable to be determined. On average, three contributing factors were identified for these deaths.

Factors at the system level (34.6%) and provider level (29.6%) together comprised most of the factors identified that contributed to other pregnancy-associated deaths. Factors at the patient or family level accounted for the 17.3% of the identified factors, facility level accounted for 11.1%, and community level accounted for 7.4% (Figure 28).

Figure 28. Distribution of Level of Contributing Factors Among Other Pregnancy-Associated Deaths



Source: NYS MMR

Contributing Factors by Manner of Death and Level for Reviewed Cases

For each manner of death, at each factor level, a summary of the most common factor classes and when possible, the most common themes that emerged from the factor descriptions, is displayed below.

Among other pregnancy-associated deaths:

- Continuity of Care/Care Coordination was the most common contributing factor for deaths due to natural manner at facility level, provider level and system level (Table 26).
- Substance use disorder was the most common contributing factor for deaths due to accidental manner at patient/family level (Table 27).
- Mental health condition was the most common contributing factor for deaths due to suicide as the manner of death (Table 28).

Table 26. Contributing Factors to Other Pregnancy-Associated Deaths with Natural Manner of Death for Reviewed Cases

Class of Contributing Factors	Count (%)	Common Themes
Community Level		
Culture/Religious	1 (2%)	None identified by the committees
Environmental	1 (2%)	Lack of access to healthy foods in the patient's community (e.g., a food desert)
Structural Racism	1 (2%)	Lack of access to heart-healthy foods and nutritional counselling in the patient's community
Subtotal	**3 (6%)**	
Facility Level		
Chronic Disease	1 (2%)	None identified by the committees
Continuity of Care/Care Coordination	3 (6%)	Lack of care coordination
Clinical Skill/Quality of Care	1 (2%)	Inadequate diagnosis of mental health condition
Outreach	1 (2%)	The Emergency Department used as a source of primary care
Referral	1 (2%)	Smoking cessation services were not offered.
Assessment	1 (2%)	Barriers caused by Adverse Childhood Experiences (ACES) and Social Determinants of Health (SDOH) were not assessed
Subtotal	**8 (16%)**	
Patient/Family Level		
Adherence	2 (4%)	For reasons unknown, the patient did not report her symptoms to the provider, leading to a delay in diagnosis
Knowledge	3 (6%)	Lack of patient education on cardiovascular health resulted in a delay in accessing care
Chronic Disease	3 (6%)	Pregnant patients with chronic conditions are at higher risk for poor pregnancy outcomes and need continuity of care
Access/Financial	1 (2%)	Lack of access to healthcare services affected the patient's ability to obtain necessary care
Social Support/Isolation	1 2%)	Lack of childcare services prevented the patient from obtaining necessary care
Continuity of Care/Care Coordination	1 (2%)	Ineffective provider communication affected the continuity of care for a patient with multiple psychiatric conditions
Subtotal	**11 (22%)**	

Provider Level		
Delay	2 (4%)	None identified by the committees
Knowledge	1 (2%)	Specialist recommendations were not followed resulting in poor outcome
Substance Use Disorder-Alcohol, Illicit/Prescription Drugs	1 (2%)	Lack of education on addiction treatment
Communication	2 (4%)	Ineffective communication and poor documentation impacts care
Continuity of Care/Care Coordination	4 (8%)	Lack of communication and a lack of care coordination between the patient's OB/GYN and the patient's midwife
Clinical Skill/Quality of Care	2 (4%)	Lack of knowledge on how to treat complex infections
Referral	1 (2%)	Missed specialist referral for appropriate cardiac management.
Discrimination	1 (2%)	Diagnostic procedures were delayed
Subtotal	**14 (28%)**	
System Level		
Knowledge	1 (2%)	None identified by the committees
Social Support/Isolation	1(2%)	None identified by the committees
Policies/Procedures	1 (2%)	The employer did not offer paid sick leave
Continuity of Care/Care Coordination	5 (10%)	There was a lack of care coordination and follow-up among providers.
Clinical Skill/Quality of Care	1 (2%)	Inadequate protocols led to a misdiagnosis of anxiety.
Assessment	1 (2%)	Failure to screen the patient resulted in an inadequate assessment of risk.
Discrimination	2 (4%)	Marginalized communities have barriers to accessing services and supports secondary to structural racism.
Structural Racism	2 (4%)	Lack of stable housing
Subtotal	**14 (28%)**	
Total	**50 (100%)**	

Source: NYS MMR

Table 27. Contributing Factors to Other Pregnancy-Associated Deaths with Accident as the Manner of Death for Reviewed Cases

Class of Contributing Factors	Count (%)	Common Themes
Community Level		
Knowledge	3 (14%)	Lack of knowledge on urgent maternal warning signs.
Subtotal	**3 (14%)**	
Patient/Family Level		
Chronic Disease	2 (10%)	Lack of appropriate evaluation of chronic conditions and or counseling and counseling in prenatal care visits.
Subtotal	**2 (10%)**	
Provider Level		
Continuity of Care/Care Coordination	3 (14%)	Lack of appropriate discussions for substance use disorder treatments, and appropriate follow-up with warm hand off.
Clinical Skill/Quality of Care	3 (14%)	Pulmonary function was not optimized during the pregnancy.
Discrimination	1 (5%)	Interpersonal racism was suspected because of a report to the NYC Administration for Children's Services (ACS).
Subtotal	**7 (33%)**	
System Level		
Delay	1 (5%)	Delay in accessing emergency care.
Substance Use Disorder-Alcohol, Illicit/Prescription Drugs	3 (14%)	Lack of resources in the community for people with substance use disorder.
Trauma	1 (5%)	None identified by the committees.
Access/Financial	1 (5%)	Lack of NYS Medicaid coverage for needed medical equipment.
Policies/Procedures	1 (5%)	Facilities reported substance use in the absence of other risks to the child, resulting in inappropriate referrals to ACS.
Continuity of Care/Care Coordination	1 (5%)	Lack of care coordination for a patient with a history of trauma and substance use
Structural Racism	1 (5%)	ACS does not provide feedback to the hospital/provider on patients who were referred to them during the delivery hospitalization.
Subtotal	**9 (43%)**	
Total	**21 (100%)**	

Source: NYS MMR

Table 28. Contributing Factors to Other Pregnancy-Associated Deaths with Suicide as the Manner of Death for Reviewed Cases

Class of Contributing Factors	Count (%)	Common Themes
Facility Level		
Policies/Procedures	1 (14%)	Lack of adequate information on social services options for patients
Subtotal	**1 (14%)**	
Patient/Family Level		
Mental Health Conditions	1 (14%)	Depression, anxiety, and bipolar disorder complicated pregnancy.
Subtotal	**1 (14%)**	
Provider Level		
Mental Health Conditions	1 (14%)	Difficulty managing patients with substance use disorder and alcoholism
Social Support/Isolation	2 (29%)	Missed assessment for social support needs during the initial prenatal care visit.
Subtotal	**3 (43%)**	
System Level		
Mental Health Conditions	1 (14%)	The patient did not disclose her mental health conditions.
Clinical Skill/Quality of Care	1 (14%)	Substance Use Disorder screening questions not answered truthfully, impacting care
Subtotal	**2 (28%)**	
Total	**7 (100%)**	

Source: NYS MMR

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During the committee meetings, multidisciplinary members discuss individual cases to determine if there was at least some chance that the death was preventable. For deaths that are determined preventable, there is a discussion of interventions to address the issues and factors that contributed to the death. For each case, one or more recommendations which address who is responsible to act, what the action is, and where and when the action should take place are developed.

Throughout the meetings, recommendations are developed and recorded during the case review discussion. There were 236 recommendations proposed by the committees for the 2018 maternal death cohort of which 155 recommendations were identified for pregnancy-related deaths. Through a review and ranking process, the Executive Committee and MMRB members proposed 14 key recommendations for the NYS 2018 death cohort. The key recommendations offer opportunities for prevention at the system, facility, and provider levels. Recommendations at these levels would have the greatest impact on reducing maternal mortality and morbidity and avoid placing responsibility on the individual or their family for factors that often are impacted by social determinants of health. Discussions included topics related to patient, family and community, and recommendations were made that could be implemented at these levels to promote health and reduce morbidity and mortality.

KEY RECOMMENDATIONS

Key Recommendations by Factor Level

Key recommendations were categorized into different levels of action: community, family/patient, facility, provider, and system. The following recommendations are categorized by level.

Facility Level

- Hospital networks should implement the AIM bundle to reduce cesarean delivery rates.
- Hospitals should ensure anesthesiologists and obstetricians follow a standard protocol for massive transfusion in hemorrhage during pregnancy, delivery, and postpartum.
- All facilities should implement screening for venous thromboembolism and chemoprophylaxis during intrapartum and postpartum care.
- All facilities should implement universal systems for quantification of blood loss and anesthesia during delivery and postpartum.

Provider Level

- The Department, American College of Obstetricians and Gynecologists (ACOG) District II (DII), and partners should develop a cardiac bundle to assist with provider education.
- The Department, ACOG DII, and partners should develop an issue brief on the importance of the involvement of multidisciplinary specialists in chronic care management during antenatal, intrapartum, and postpartum care.

- Obstetricians and other providers should utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period.
- The Office of Mental Health, ACOG DII, and partners should develop materials to educate providers on behavioral health evaluation, treatment and understanding of patient barriers to seeking care.
- Obstetrical providers and hospitals should engage community resources during prenatal and hospital discharge planning (e.g., doulas, visiting nurses, community health workers/patient navigators, telehealth, and remote monitoring) to help support and link high risk mothers with chronic conditions and difficult access (e.g., rural areas) to follow-up care and community resources.

System Level

- The Department should implement a maternity medical home model of care and convene a multi-stakeholder group to develop standard guidance about additional psychosocial services and coordination of care which includes trauma and social determinants of health.
- The Department should develop a systemic approach to reduce structural racism.
- The Department should expand Medicaid coverage to include one year postpartum.
- The Department, ACOG DII, and partners should develop an emergency room bundle for the care of pregnant women.
- NYS should offer all families at least one home visit from a nurse or paraprofessional within 2 weeks postpartum to educate families about signs and symptoms of potential complications.

Key Recommendations by Leading Causes of Deaths

The fourteen key recommendations were closely aligned with preventing the four leading causes of pregnancy-related death as demonstrated below.

Embolism

- All facilities should implement screening for venous thromboembolism and chemoprophylaxis during intrapartum and postpartum care. (Facility Level)
- Obstetrical providers and hospitals should engage community resources during prenatal and hospital discharge planning (e.g., doulas, visiting nurses, community health workers/patient navigators, telehealth, and remote monitoring) to help support and link high risk mothers with chronic conditions and difficult access (e.g., rural areas) to follow-up care and community resources. (Provider Level).
- The Department and partners should develop a systemic approach to reduce structural racism. (System Level)
- The Department should implement a maternity medical home model of care and convene a multi-stakeholder group to develop standard guidance about

additional psychosocial services and coordination of care which includes trauma and social determinants of health. (System Level)
- Obstetricians and other providers should utilize a multi-disciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (Provider Level)
- The Office of Mental Health, ACOG DII and partners should develop materials to educate providers on behavioral health evaluation, treatment and understanding of patient barriers to seeking care. (Provider Level)

Hemorrhage
- All facilities should implement universal systems for quantification of blood loss during delivery and anesthesia involvement in the treatment period. (Facility Level)
- Hospitals should ensure that anesthesiology and obstetricians follow a protocol for massive transfusion in hemorrhage during pregnancy, delivery, and postpartum. (Facility Level)
- The Office of Mental Health, ACOG DII, and partners should develop materials to educate providers on behavioral health evaluation, treatment and understanding of patient barriers to seeking care. (Provider Level)
- Obstetrical providers and hospitals should engage community resources during prenatal and hospital discharge planning (e.g., doulas, visiting nurses, community health workers/patient navigators, telehealth, and remote monitoring) to help support and link high risk mothers with chronic conditions and difficult access (e.g., rural areas) to follow-up care and community resources. (Provider Level)
- The Department should expand Medicaid coverage to include one year postpartum. (System Level)
- The Department, ACOG DII, and partners should develop an emergency room bundle for the care of pregnant women. (System Level)

Mental Health
- The Department should implement a maternity medical home model of care and convene a multi-stakeholder group to develop standard guidance about additional psychosocial services and coordination of care which includes trauma and social determinants of health. (System Level)
- The Office of Mental Health, ACOG DII and partners will work together to educate providers on behavioral health evaluation, treatment and understanding of patient barriers to seeking care. (Provider Level)

Cardiomyopathy
- The Department, ACOG DII, and partners will develop an issue brief on the importance of involvement of multidisciplinary specialists in chronic care management during antenatal, intrapartum, and postpartum care. (Provider Level)

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- Obstetricians and other providers should utilize a multi-disciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (Provider Level)
- The Department and partners should develop a systemic approach to reduce structural racism. (System Level)
- Obstetricians and other providers should utilize a multi-disciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (Provider Level)
- The Department and partners should develop a systemic approach to reduce structural racism. (System Level)

Anticipated Impact if Recommendation is Implemented

Each recommendation is categorized in two ways, e.g., by its level of prevention and by its level of impact. Prevention levels include *primary prevention* – the action prevents the contributing factor before it occurs; *secondary prevention* – the action reduces the impact of a contributing factor once it has occurred or *tertiary prevention*- the action reduces the impact or progress of what has become an ongoing contributing factor. For the assignment of 14 key recommendations by prevention level, 4 (29%) were identified as primary prevention, 10 (71%) were identified as secondary prevention, and 0 were identified as tertiary prevention.

The MMRB assigns an expected level of impact if the recommendation was implemented; the categories are small, medium, large, extra-large, and giant (Figure 29). The expected impact is determined by the activities associated with it and described as follows: *small* – education/counseling (community or provider-based health promotion and education; *medium* – clinical intervention and coordination of care across the continuum of well women visits; *large* – long lasting protective interventions (improve readiness, recognition and response to obstetric emergencies; *extra-large* – changes in context (promote environments that support healthy living/ensure available and accessible services); and *giant* – address social determinants of health.

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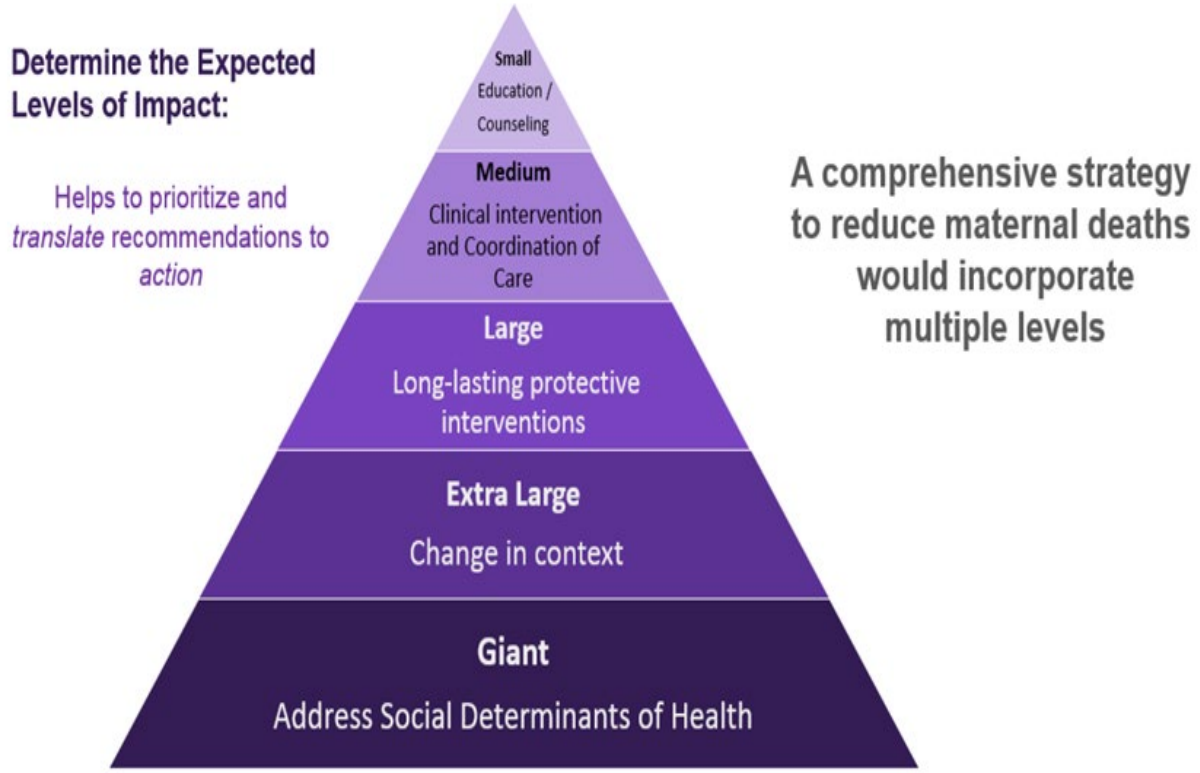
Figure 29. Expected Levels of Impact of Recommendations



Source: NYS MMR

For the 2018 key recommendations, if all 14 were implemented, the impact level would be estimated to be small in 7 percent of the recommendations, medium in 29 percent, large in 43 percent, extra-large in 14 percent, and giant in 7 percent (Table 29).

Table 29. Key Recommendations by Prevention Type and Expected Impact Level

No.	Level	Recommendation	Prevention Type	Expected Impact Level
1	Facility	Hospitals should implement the AIM bundle to reduce cesarean delivery rates.	Primary	Extra large
2	Facility	Hospitals should ensure that anesthesiologists and obstetricians follow a standard protocol for massive transfusion in hemorrhage during pregnancy, delivery, and postpartum period.	Secondary	Large
3	Facility	All facilities should implement screening for venous thromboembolism and chemoprophylaxis during intrapartum and postpartum care.	Secondary	Large
4	Facility	All facilities should implement universal systems for quantification of blood loss and anesthesia involvement during delivery and postpartum.	Secondary	Large

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5	Provider	The Department, ACOG DII, and partners, should develop a cardiac bundle to assist with provider education.	Secondary	Large
6	Provider	The Department, ACOG DII, and partners should develop an issue brief on the importance of involvement of multidisciplinary specialists in chronic care management during antenatal, intrapartum, and postpartum care.	Secondary	Medium
7	Provider	Obstetricians and other providers should utilize a multi-disciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period.	Secondary	Medium
8	Provider	The Office of Mental Health, ACOG DII and partners should develop materials to educate providers on behavioral health evaluation, treatment and understanding of patient barriers to seeking care.	Primary	Small
9	Provider	Obstetrical providers and hospitals should engage community resources during prenatal and hospital discharge planning (e.g., doula, visiting nurses, community health workers/patient navigators, telehealth, and remote monitoring) to help support and link high risk mothers with chronic conditions and difficult access (e.g., rural areas) to follow-up care and community resources.	Secondary	Medium
10	System	The Department should implement a maternity medical home model of care and convene a multi-stakeholder group to develop standard guidance about additional psychosocial services and coordination of care which includes trauma and social determinants of health.	Secondary	Extra Large
11	System	The Department and partners should develop a systemic approach to reduce structural racism.	Primary	Giant
12	System	The Department should expand Medicaid coverage to include one year postpartum.	Secondary	Large
13	System	The Department, ACOG DII, and partners should develop an emergency room bundle for the care of pregnant women.	Secondary	Large
14	System	NYS should offer all families at least one home visit from a nurse or paraprofessional within 2 weeks postpartum to educate patients and families about signs and symptoms of potential complications.	Primary	Medium

Source: NYS MMR

SECTION 5: RECOMMENDATIONS

PREVENTABILITY THEMES

As part of the Committee meetings, the following preventability themes emerged from the case review discussions and recommendations development process. The preventability themes often are applicable across more than one leading cause of death.

Expand Care Coordination

For women experiencing chronic medical or behavioral conditions during pregnancy and postpartum, the importance of timely follow up cannot be underestimated. Scheduling, traveling to and attending multiple appointments during pregnancy and postpartum may be difficult for even healthy women to complete, and much more so for those experiencing illness. Seeking follow up care becomes more challenging when caring for an infant or when there are other children. Some pregnant and postpartum women, especially those impacted adversely by social determinants of health, may need care coordination supports and community services to enable them to schedule and keep their appointments.

New York should consider new and existing models of care to better coordinate care for pregnant and postpartum women. One such model is the maternity medical home model of care. A medical home model includes care coordination services to comprehensively address all medical and psychosocial issues while also addressing the associated social determinants of health.

DOH Strategies
The Department should implement a maternity medical home model of care and convene a multi-stakeholder group to develop standard guidance about additional psychosocial services and coordination of care which includes trauma and social determinants of health.
Local Strategies
Obstetrical providers and hospitals should engage community resources during prenatal and hospital discharge planning (e.g., doulas, visiting nurses, community health workers/patient navigators, telehealth, and remote monitoring) to help support and link high risk mothers with chronic conditions and difficult access (e.g., rural areas) to follow-up care and community resources.

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Optimize Screening for Social Determinants of Health

Understanding how a patient's lived experience impacts their ability to obtain care is crucial to improving health outcomes. Lack of transportation and childcare, unstable housing, and food insecurity are challenges faced by many pregnant and postpartum women and affects their ability to follow a medical plan of care and/or access quality care.

New York should promote provider awareness of the importance of assessing and understanding economic and social conditions that influence health status. It is recommended that obstetrical providers engage community resources during the prenatal and postnatal period to help support and link high risk mothers to community services that help address their needs impacted by social determinants of health.

DOH Strategies
The Department should expand Medicaid coverage to include one year postpartum.
Local Strategies
Community agencies and providers should inform pregnant and postpartum women about options for childcare during hospitalization and treatment.
County and community-based organizations should make pregnant and postpartum women aware of locations of affordable food and safe places to exercise.

Optimize Chronic Disease Management in Well Woman Care and During Pregnancy and Postpartum

In women of childbearing age with chronic disease, it is important to optimize health in preparation for pregnancy as well as during pregnancy and postpartum. There is a need to recognize the importance of all providers in discussing pregnancy intention with women who have chronic conditions to help them be as healthy as possible in preparation for pregnancy or to delay pregnancy until the chronic condition is most favorable to a healthy pregnancy and baby. It is recommended that that all providers help to educate pregnant women and those individuals contemplating pregnancy about healthy behaviors such as those to decrease obesity and smoking.

Following case reviews, it was noted that pregnancy could have a profound effect on congenital and chronic conditions impacting both the mother and baby. For example, congenital cardiac or brain malformations could impact the mother during pregnancy and delivery. Specialty providers have a critical role in discussing the impact that pregnancy may have on the chronic conditions with the patient and sharing that information with obstetrical providers.

There is a need for increased multidisciplinary communication and collaboration between specialists and obstetrical providers to minimize risk to patients and their fetuses. The engagement of community-based organizations can assist clinical providers in optimizing continuity of care for pregnant and postpartum women with chronic conditions. Community based organizations and their staff, such as Community Health Workers, can help support and

educate pregnant and postpartum women with chronic diseases and help support seamless systems of care.

DOH Strategies
The Department, ACOG DII, and partners should develop an issue brief on the importance of involvement of multidisciplinary specialists in chronic care management during antenatal, intrapartum, and postpartum care.
Local Strategies
Obstetricians and other providers should utilize a multi-disciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period.
Community-based organizations can provide and reinforce education to pregnant and postpartum women about the need for follow up of chronic conditions.

Optimize Emergency Care of Pregnant and Postpartum Women

Through the case reviews, it was noted that pregnant and postpartum women seek care in an Emergency Room (ER) for non-obstetrical conditions (overdose, trauma, suicide etc.) or from obstetrical complications during pregnancy and postpartum. It is understood that critical conditions of pregnancy and postpartum require emergent triage and intervention that necessitates special education, training and competencies that may not have been acquired by emergency medical or nursing personnel. There is a need for standardized emergency protocols for assessment, timely initiation of response and management to optimize the health of the mother and fetus and provide appropriate care.

New York should consider the development of a new ER bundle to address this need for standardized protocols for caring for pregnant or recently pregnant women. After development of the bundle, its dissemination will be planned with the help of partner professional organizations and hospital associations to educate providers.

It is important for providers to understand the barriers to seeking emergency care that pregnant and postpartum women may experience. The reasons may be varied, ranging from not understanding the urgent maternal warning signs to systemic barriers to accessing this care. There is a need for increased education about urgent maternal warning signs and provider training once the ER bundle is rolled out.

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DOH Strategies
The Department, ACOG DII, and partners, should develop a cardiac bundle to assist with provider education.
The Department, ACOG DII, and partners should develop an Emergency Room bundle for the care of pregnant women.
NYS should offer all families at least one home visit from a nurse or paraprofessional within 2 weeks postpartum to educate patients and families about signs and symptoms of potential complications.
Local Strategies
Hospitals should implement the AIM bundle to reduce cesarean delivery rates.
Hospitals should ensure that anesthesiologists and obstetricians follow a standard protocol for massive transfusion in hemorrhage during pregnancy, delivery, and postpartum period.
All facilities should implement screening for venous thromboembolism and chemoprophylaxis during intrapartum and postpartum care.
All facilities should implement universal systems for quantification of blood loss and anesthesia involvement during delivery and postpartum.

Recognize and Reduce Racism and Discrimination

Communication gaps between individual providers and patients may result in patients not always feeling heard. Moving to a shared provider-patient decision-making approach will aide in addressing bias, racism and discrimination and reducing disparities in maternal health outcomes.

In 2018, the Department conducted seven community listening sessions led by the Commissioner, or his designee, in partnership with NYSDOH funded Maternal and Infant Community Health Collaboratives. A common barrier expressed across all listening sessions is that women of color who were pregnant or postpartum sometimes felt disrespected during their interactions with health professionals[8]. New York needs to continue to engage health care providers about birth equity and involve them in quality improvement efforts to reduce implicit bias, racism, and discrimination.

[8]New York State Taskforce on Maternal Mortality and Disparate Racial Outcomes, 2019; p10. https://health.ny.gov/community/adults/women/task_force_maternal_mortality/docs/maternal_mortality_report.pdf#:~:text=Governor%20Andrew%20M.%20Cuomo%20created%20the%20Taskforce%20on,New%20York%20City%20Health%20and%20Hospitals%2C%20Kings%20County.

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DOH Strategies
The Department and partners should develop a systemic approach to reduce structural racism.
Local Strategies
Birthing hospitals and centers should be involved in the Birth Equity Improvement Project.
Birthing hospitals and centers should measure the patient reported experience with care.
Birthing hospitals and centers should collect and analyze perinatal data by race and ethnicity.
Birthing hospitals and centers should consider engaging doulas to provide support for birthing women to improve the experience of care.

Optimize the Treatment of Pregnant and Postpartum Women with Mental Health Conditions and/or Substance Use Disorders

The impact of mental health conditions on maternal deaths in NYS is significant. Mental health conditions, especially those including substance use disorders, were the cause of death in 15% of NYS pregnancy related deaths and almost 50% of pregnancy associated deaths and were considered a contributing factor in many more deaths.

It is well known that pregnant women with substance use disorders often suffer from co-occurring mental health conditions. The pause in drug use during pregnancy by some women with substance use disorder represents an important opportunity for intervention and continued support postpartum. The postpartum period is a time of increased vulnerability when individuals who remain abstinent during pregnancy may relapse and/or experience postpartum depression. There is a need to acknowledge this vulnerable postpartum period and provide women with close postpartum support and follow up (earlier than a 6-week visit) and care by a multidisciplinary team of specialists including addiction and mental health providers.

A central issue is that mental health and addiction care are often siloed from obstetrical and primary care. The need for communication amongst multidisciplinary care providers, including social workers and addiction specialists as essential to improved outcomes for both mother and infant. The need for provider education about the care of pregnant women who have a mental health condition or substance use disorder was noted. There is a need for provider education regarding continuance of behavioral health medications during pregnancy and medication assisted treatment for opioid addiction during pregnancy.

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DOH Strategies
The Office of Mental Health, ACOG DII and partners should develop materials to educate providers on behavioral health evaluation, treatment and understanding of patient barriers to seeking care.
Local Strategies
Health care providers caring for patients affected by substance use should educate the patient and their families about the availability of Naloxone for treatment of overdose.
Local agencies should educate providers about the assertive community treatment services and SPOA (Single point of access) referral (as well as services available) for complex high-risk patients with psychiatric conditions.

MATERNAL MORTALITY AND MORBIDITY ADVISORY COUNCIL (MMMAC)

Review of 2018 Preventability Themes, Findings and Recommendations

In August 2019, Public Health Law 2509 authorized the Commissioner to establish a MMMAC. The MMMAC is comprised of multidisciplinary experts and lay persons knowledgeable in the field of maternal mortality, women's health and public health and includes members who serve and are representative of the racial, ethnic, and socioeconomic diversity of the women and mothers of the state. The MMMAC may review findings of the MMRB and may develop their own recommendations on policies, best practices, and strategies to prevent maternal mortality and morbidity.

The Department shared the maternal mortality recommendations with the MMMAC. This was an opportunity for the MMMAC to review the recommendations and contribute their perspectives on the impact the recommendations might have if adopted and share additional ideas for best practices to reduce maternal mortality and racial disparities.

Advisory Council members emphasized the need to support and develop recommendations aimed at improving systems of care. They pointed out that individual or family level recommendations can often fail to account for system and other external factors that impact an individual's ability to access necessary care. Council member suggestions included focusing on practical steps to improve people's ability to access prenatal or postpartum care (e.g., transportation assistance, evening hours, telehealth visits). Council members felt that recommendations focusing primarily on patient education, awareness etc. are not sufficient to address the true barriers pregnant and birthing people face in accessing high quality care.

Advisory Council members stressed the importance of ensuring that providers understand how systems of care and external barriers present challenges to patient's obtaining wanted and needed health care services. Through this understanding, patients and providers can better engage in a shared - decision making approach to identify strategies and supports to help patients obtain care. Through this discussion, Council members cautioned the Department on the need for using language within the recommendations that did not inadvertently shame or blame patients for outcomes related systemic or structural barriers. As an example, the council members suggested that the Department reframe the use of the term "non-adherence to care" to "patient barriers to seeking care".

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Council members also emphasized the importance of addressing the impact of racism and discrimination on maternal health outcomes. In particular, they stressed the need to center this work on making systemic and/or institution level changes as they contribute to inequitable distribution of resources, gaps in services, and continued disparities experienced by many birthing people. Council members also mentioned that some birthing people continue to feel disrespected or experience discrimination when accessing care, a barrier which can make obtaining care or following provider advice even more challenging. Continuing to proactively address the impact of racism and bias on not only birth outcomes, but the experience of care was seen as an ongoing need. Council members suggested the use of doulas during the labor and delivery process may improve the experience of care by supporting and empowering women.

MMMAC members recommended finding ways to ensure that more providers and birthing facilities take advantage of existing resources and supports including the New York State Perinatal Quality Collaborative (NYSPQC) quality improvement projects. Council members thought all facilities would benefit from participating in learning collaborative and quality improvement work and suggested ways to hold facilities accountable for this kind of participation. Members suggested "scorecards" for each facility showing their participation in these kinds of activities or the use of "incentives" tied to participating in quality improvement projects. They saw these projects and resources as key components of larger efforts to improve quality and birth outcomes and wanted to see all birthing facilities take advantage of these opportunities.

Finally, Council Members expressed overall support for increased access to the midwifery model of care, especially to address hemorrhage. Recognizing this model as often being associated with less intervention in labor and birth and a very patient centered approach throughout prenatal care, this strategy was suggested to help avoid some complications and hopefully, unnecessary cesarean birth. To that end, Council Members suggested that New York State further expand available pathways to midwifery certification to expand and diversify the profession as well as increased support for midwifery birth centers in New York.

Moving forward, MMMAC members will continue working in collaboration with the MMRB to share their insights in the development of recommendations. Future plans include increased opportunities for MMMAC and MMRB members to work collaboratively in meetings and the development of recommendations or strategies.

SECTION 6: NEW YORK STATE ACTIONS TO ADDRESS MATERNAL MORTALITY AND REDUCE RACIAL DISPARITIES

NYS has implemented the following actions to reduce maternal deaths and improve outcomes of women and families of color. The NYS actions are aggregated under the most common themes for recommended action identified among pregnancy-related deaths that were cited in a Centers for Disease Control and Prevention report entitled "Report from Nine Maternal Mortality Review Committees."[9] These actions include:

PROMOTE AWARENESS OF MATERNAL MORTALITY RECOMMENDATIONS

The findings and recommendations related to the 2018 maternal death cohort will be disseminated broadly to professionals, professional organizations, and community-based organizations involved in the care of pregnant and postpartum women via the Department's communications channels. The report will also be posted on the Department's website. The Department will partner with ACOG DII, Greater New York Hospital Association (GNYHA) and the Hospital Association of New York State (HANYS) to inform their membership of the 2018 results. It is anticipated that a virtual presentation will be provided to birthing hospitals involved in one or more of the NYSPQC projects and other partners who work in the field of perinatal health.

ENSURE APPROPRIATE LEVEL OF CARE DETERMINATION

NYS has been a longstanding national leader in implementing statewide systems of regionalized perinatal care. NYS's regulations for perinatal regionalization and designation, as well as perinatal care services, were last updated in 2000 and 2005, respectively. It is imperative for NYS to ensure all perinatal hospitals are functioning in accordance with current standards of care for both obstetrical and neonatal outcomes. Since 2017, the NYSDOH's Division of Family Health has worked to update these regulations to reflect current national standards of obstetrical, neonatal, and perinatal levels of care; changes in health care systems and reimbursements, as well as hospital restructuring and other corporate structural changes. As part of the regulation development process, the Department conducted an extensive review of current standards, in consultation with a 49-member multi-disciplinary expert panel and other topical expert consultants. Additionally, the proposed regulations further integrate recently established midwifery birth centers, along with physician-led birth centers, into the perinatal regional system, and place a greater emphasis on quality care and patient safety, particularly for obstetrical patients. Current efforts to strengthen this public health system includes increased efforts to address maternal morbidity and mortality, integration of physician- and midwifery-led birth centers into the regional systems, and increased access to ancillary services such as alcohol and substance use and mental health services, directly and/or through referral and commensurate with the birthing facility's level of care. In May 2021, legislation that passed both houses (A259A/S-1414) would allow midwifery-led birth centers (MBCs) that demonstrate

[9] Building U.S. Capacity to Review and Prevent Maternal Deaths. (2018). Report from nine maternal mortality review committees. Retrieved from http://reviewtoaction.org/Report_from_Nine_MMRCs; p.29

intent to become credentialed to receive an operating certificate. The comprehensive regulatory package (10 NYCRR 795) has not yet been sent forward for approval while the Department discusses options that address inclusion of midwifery-led birth centers.

IMPROVE WIDESPREAD ADOPTION OF PATIENT SAFETY BUNDLES AND POLICIES THAT REFLECT THE HIGHEST STANDARD OF CARE

New York State Perinatal Quality Collaborative

Through the NYSPQC, the Department aims to provide the best and safest care for mothers and infants in NYS by working with birthing hospitals to translate evidence-based guidelines to clinical practice.

The NYSPQC's projects incorporate the use of patient safety bundles and policies that are available through professional organizations such as national ACOG. The Department's three-year NYSPQC Obstetric Hemorrhage Project that ended in June 2021 incorporated the use of ACOG's Safe Motherhood Initiative *Obstetric Hemorrhage Bundle*. Project data showed that the percentage of pregnant people who received a hemorrhage risk assessment on admission to the birth hospitalization met the project goal of 85% in November 2018 and remained above 85% through the project close. Additionally, during the project period, the percent of birthing people receiving a hemorrhage risk assessment during the postpartum period improved by 97% from baseline. By the close of the project:

- 100% of participating hospitals had obstetric hemorrhage supplies readily available, typically in a cart or mobile box
- 99% of participating hospitals had a unit policy and procedures on obstetric hemorrhage
- 78% of participating hospitals reported completing at least one drill in the past year
- 76.3% of births represented the number of birthing hospitals participating.

The data demonstrates that through participating in the project, hospitals successfully implemented the patient safety bundle for hemorrhage into their flow of patient care in accordance with current standards of practice.

Current intervention projects of the NYSPQC focus on reducing maternal morbidity and mortality by improving the identification and management of women with opioid use disorder (OUD) in pregnancy, and improving the identification, standardization of therapy and coordination of aftercare of infants with neonatal abstinence syndrome (NAS) and the birth equity improvement project (BEIP).

The OUD/NAS project is led by the NYSPQC and conducted in collaboration with the ACOG DII, HANYS, and GNYHA. The OUD/NAS project began in 2018 with 14 participating hospitals and was expanded in 2020 to an additional 28 hospitals.

The Birth Equity Improvement Project (BEIP), led by the NYSPQC, began in 2020 and will continue through 2022. The NYS BEIP project is working with NYS birthing hospitals and centers to identify how individual and systemic racism impacts birth outcomes at their facility and to take actions to address these inequities. Seventy-three birthing facilities are

currently enrolled in this project and these facilities account for 76% of all NYS births. The project will assist birthing hospitals and centers to take actions to improve both the experience of care and perinatal outcomes of Black birthing people in the communities they serve.

IMPROVE PROVIDER TRAINING

In 2020-2021, the Department contracted with Association of Women's Health, Obstetrical and Neonatal Nurses (AWOHNN) to obtain site licenses for all NYS birthing hospitals for the POST-BIRTH Warning Signs Education Program. Informational webinars for all birthing hospitals were held to inform hospital contacts how to distribute the licenses that would give their staff access to the POST-BIRTH training. The Department purchased a one-year supply of post-birth maternal warning signs magnets that were distributed to birthing hospitals. Hospitals provide patients a magnet for home use that displays urgent maternal warning signs to reinforce educational messages given prior to hospital discharge.

The NYSPQC, through its NYS Obstetric Hemorrhage Project and NYS OUD in Pregnancy & NAS Project, has hosted a variety of Coaching Call and educational webinars, including one focused on the "Respectful Care of Patients with OUD" in July 2021. This call implemented a MMRB recommendation to educate providers about reflective patient centered care for individuals with substance abuse disorder. Over 28 hospitals participated with over 60 individual participants. This webinar is archived for viewing on the NYSPQC website at www.nyspqc.org.

Additionally, the NYSPQC, in collaboration with ACOG District II and Project TEACH, have hosted a series of four webinars focused on maternal mental health. The first webinar took place on August 10, 2020 and focused on mental health access and benefits. The second webinar, on September 22, 2020, highlighted the beginning phases of integrating maternal mental health into OB/GYN practices. The third webinar, in February 2021, focused on the later phases of integrating maternal mental health into obstetrics. The fourth webinar took place on October 6, 2021 and focused on the impact of social determinants of health on maternal mental health, and specifically, a collaborative multidisciplinary approach to maternal mental health with a focus on Black and Latinx populations. The panelist of speakers included staff from NYS birthing hospitals and community-based organizations. Announcement of these webinar opportunities were shared with all NYS birthing facilities and MICHC Program Managers directly, as well as on the MICHC listserv, on which recipients include (but are not limited to) broader MICHC program staff (e.g., CHWs and CHW Supervisors); staff of Healthy Start home visiting programs; and local/regional DOH personnel.

The NYS Obstetric Hemorrhage Project encouraged and assisted NYS birthing hospitals in implementing clinical quantification of blood loss (QBL). The NYSPQC hosted multiple Coaching Call webinars and Learning Session discussions that focused on QBL, including on July 23, 2018, September 11, 2019, and October 13, 2020. During these educational opportunities, project teams and members of the clinical advisory work group presented on their experience with implementing and refining QBL.

SECTION 6: NEW YORK STATE ACTIONS TO ADDRESS MATERNAL MORTALITY AND REDUCE RACIAL DISPARITIES

To further assist hospital teams in implementing QBL, NYSPQC staff spent time working with AWHONN's NYS leadership to develop an in-person QBL training for hospitals participating in the NYS Obstetric Hemorrhage Project. Training included the evidence based for using QBL as opposed to visual estimation of blood loss, demonstration of how to perform QBL, and discussion of potential barriers to implementation and strategies for success. The training was scheduled to be held in May 2020. Due to the COVID-19 pandemic, the in-person training event was indefinitely put on hold. Despite this barrier, the NYSPQC team continued to work to identify hospital teams that would benefit from targeted QBL training based on NYSPQC project data. The NYSPQC facilitated and hosting virtual meetings between these teams, AWHONN's NYS leadership, and NYSDOH staff. Based on hospital's expressed need, NYS' AWHONN leadership has offered to: host teams on an individual basis, at their hospital (e.g., NYU); to visit hospital teams at their facility for a day of QBL training; or to host virtual QBL training to individual teams. To date, meetings have taken place with five hospital teams. All teams elected to have virtual discussions as opposed to site visits. The NYSPQC will continue to facilitate training opportunities with new teams as appropriate.

IMPROVE PUBLIC EDUCATION AND AWARENESS

Hear Her Public Awareness Campaign

The MMRB suggested consideration of the CDC Hear Her Campaign for possible promotion in this state. In response, the NYSDOH implemented a statewide media campaign in Fall 2021 to build public awareness of the importance of recognizing early urgent maternal warning signs for pregnant and recently pregnant people. The simple message is that listening and acting quickly could save a life.

The goal of the CDC's Hear Her Campaign is to raise awareness of potentially life-threatening warning signs during and after pregnancy and improve communication between patients and their healthcare providers. The campaign objectives are to:

- Increase awareness of serious pregnancy-related complications and their warning signs.
- Empower women to speak up and raise concerns.
- Encourage women's support systems to engage in important conversations with her.
- Provide tools for women and providers to better engage in life-saving conversations.

The NYSDOH utilized social media platforms (i. e., Facebook, and Instagram) to convey information to pregnant people and their partners, friends, and family about pregnancy-related complications. The NYSDOH employed two palm cards developed by CDC – one for pregnant and recently pregnant persons and one for partners, friends, and family. These palm cards were co-branded, printed, and distributed to home visiting agencies in NYS to disseminate to their clients. These palm cards were translated into the ten most common languages spoken in NYS and are housed on the NYSDOH website for downloading and printing at www.health.ny.gov/hearher

SECTION 6: NEW YORK STATE ACTIONS TO ADDRESS MATERNAL MORTALITY AND REDUCE RACIAL DISPARITIES

Perinatal Mood and Anxiety Disorder Campaign

In the fall of 2021, the NYSDOH conducted a public awareness campaign about Perinatal Mood Disorders to educate birthing people about this condition and to highlight the resources available for help. Following the campaign, the Department continued to make resources available through the Department's website at: Perinatal Mood and Anxiety Disorders (ny.gov). Individuals can connect to a helpline by phone or email 7 days a week from 9:00 am to 5:00 pm. The help line utilizes Language Line for non-English speakers other than Spanish.

COVID-19 Maternity Care Campaign

In April 2020, the Department convened a COVID-19 Maternity Task Force, comprised of 15 key state and local stakeholders across perinatal disciplines. The Task Force issued a report to NYS which included six recommendations for action to promote safe maternity care and increased patient choice during the COVID-19 Pandemic. Among these recommendations was the development and implementation of an educational campaign designed to:

- Emphasize the safety and rebuild confidence in maternity care at all certified birthing hospitals;
- Explain infection control practices in each type of birthing facility; and
- Increase patient understanding of different levels of maternity care and types of birthing facilities, as well as how to work with providers to select the appropriate patient-centered delivery.

The Department brought together a working group of Task Force members and other community partners, and developed a multimedia campaign, featuring social media and banner advertisements, streaming video, and audio statewide. Video, audio, and banner ads were available in both English and Spanish. Search optimization on Google and Bing were used to promote campaign resources and credible health information. Additionally, out-of-home posters were placed in urban centers near laundromats, corner stores, barbershops, and hair salons.

In addition to the topics outlined by the Task Force, the Department included information and messaging to support and provide resources related to mental health and wellbeing related to COVID-19, including sharing state emotional support hotlines and text/chat programs. The campaign launched in December 2020, with paid advertisements running in waves between January 25 and May 9, 2021.

Consumer Education Materials – Pregnancy Complications; Preterm Labor and Premature Birth; Infertility-related Conditions

Based on laws passed in 2019 through 2021, the Division of Family Health was charged with developing consumer materials on three pregnancy-related topics. These include:

- Pregnancy Complications (Public Health Law, §266(2))
- Preterm Labor and Premature Birth (PHL §2803(W); and
- Infertility-related Conditions - Polycystic Ovary Syndrome/PCOS, Endometriosis (PHL §207(1)(p))

SECTION 6: NEW YORK STATE ACTIONS TO ADDRESS MATERNAL MORTALITY AND REDUCE RACIAL DISPARITIES

These materials are to be distributed by prenatal care providers, birthing hospitals, and birth centers at appropriate times (such as at first prenatal visit, or at pre-booking) and when medically indicated. Community-based organizations that serve pregnant and postpartum clients can also distribute these materials to clients.

Materials related to pregnancy complications have been published to the Department's website and translated into the top ten spoken languages in New York State, in accordance with the state's Language Access Plan. The other educational materials are in development and will be translated and made available in early 2022. To promote these materials, the Department will issue letters to all birthing hospitals and prenatal care providers through its Health Commerce System and will collaborate with key stakeholders and medical organizations to further promote availability and the provider's distribution requirements under Public Health Law.

IMPROVE ACCESS TO CARE

Community Health Worker Expansion (CHWE) Project

Through the Maternal and Infant Community Health Collaborative (MICHC) program, Community Health Workers (CHWs) focus on educating women on improved birth spacing, adherence to the postpartum visit, and use of an effective contraceptive method. As per the recommendations of the Task Force on Maternal Mortality and Disparate Racial Outcomes, the scope and breadth of work of the MICHC program were enhanced via the CHW Expansion grant. The goal of the CHWE project is to expand CHW services in key communities across the state to reduce maternal mortality and racial disparities in outcomes. In August 2019, CHWE contracts were awarded to the 23 established MICHC agencies throughout NYS to address key disparities, including providing more childbirth education and support, assisting in the development of collaborative childcare and social support networks, assisting with the development of a birth plan, and supporting increased health literacy among communities around the state. Funding for this project supports expansion of the MICHC CHW services for 23-months from August 1, 2019 – June 30, 2022. Funding will support approximately 50-60 additional CHWs and serve an additional 2,400 prenatal and postpartum women and families. To date, 30 new CHWs were hired statewide to provide services for prenatal and postpartum women.

Perinatal and Infant Community Health Collaboratives

In August 2021, the Department announced the availability of approximately $14 million annually to support implementation of the Perinatal and Infant Community Health Collaboratives (PICHC) initiatives. Funds will be awarded to approximately 25 programs throughout NYS to support the development, implementation, and coordination of collaborative community-based strategies to improve perinatal and infant health outcomes and eliminate racial, ethnic, and economic disparities in those outcomes. The anticipated funding is for five years and will be awarded in July 2022.

SECTION 7: OTHER MMR RELATED REPORTS AND WEBSITES

The Department began publishing NYS Maternal Mortality Review Reports in 2016. The previous reports are available on the Department's website.

NEW YORK STATE MATERNAL MORTALITY REVIEW REPORT: A COMPREHENSIVE REVIEW OF THE 2014 COHORT

https://www.health.ny.gov/community/adults/women/docs/maternal_mortality_review_2014.pdf

NEW YORK STATE MATERNAL MORTALITY REVIEW REPORT *2012-2013*

https://www.health.ny.gov/community/adults/women/docs/maternal_mortality_review_2012-2013.pdf

NEW YORK STATE MATERNAL MORTALITY REVIEW REPORT *2006-2008*

https://www.health.ny.gov/community/adults/women/docs/maternal_mortality_review_2006-2008.pdf

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SECTION 9: APPENDIX

APPENDIX A - GLOSSARY OF ACRONYMS

ACOG: American Congress of Obstetricians and Gynecologists

ARDS: acute respiratory distress syndrome

BMI: body mass index

HELLP: hemolysis, elevated liver enzymes and low platelet count.

ICD9: International Statistical Classification of Diseases and Related Health Problems 9th Revision. A publication, 9th revision, from the World Health Organization comprising of a set of codes that are used worldwide to classify diseases and injuries.

ICD10: 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD), a medical classification list by the World Health Organization (WHO). The WHO copyrighted ICD-10 in 1990. Since then, countries around the world have adopted it to report mortality and morbidity. The United States began using it in 1999 to report mortality only. It codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases.

Maternal mortality: Defined by the World Health Organization as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes."

MMRI: Maternal Mortality Review Initiative led by the New York State Department of Health.

NYC: five boroughs of New York City.

ROS: All the counties in New York State except the five boroughs of New York City.

SPARCS: Statewide Planning and Research Cooperative System. A comprehensive data reporting system established in 1979 as a result of cooperation between the health care industry and government. Initially created to collect information on discharges from hospitals, SPARCS currently collects patient-level detail on patient characteristics, diagnoses and treatments, services, and charges for every hospital discharge, ambulatory surgery patient, and emergency department admission in New York State.

SPDS: Statewide Perinatal Data System. An electronic maternal and newborn data collection and analysis system established and maintained by the Department of Health which includes the data elements, organized in modules, which comprise the New York State Certificate of Live Birth for births occurring in New York State outside of New York City, or the New York City Certificate of Live Birth for births occurring in New York City, and other data elements which relate to maternal and newborn health and care in hospitals and freestanding birthing centers.

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APPENDIX B - CASE IDENTIFICATION AND ABSTRACTION

Cases are identified on an ongoing basis from information on maternal death certificates; birth certificates or fetal death certificates linked to maternal death certificates; and hospital discharge records. To qualify for review, a death must have been pregnancy-associated. Additionally, the death must have occurred in New York State, or the decedent must have been a New York State resident.

The identification process begins when NYS Vital Records (VR) notifies MMRI staff that new death record files are available to download from the National Center for Health Statistics (NCHS), typically at the beginning of each month. NCHS compiles these files from death certificate information uploaded by VR, to which NCHS assigns ICD-10 codes for the causes of death reported on the death certificates. Each death file contains the cumulative reported deaths for a single calendar year, and a file is created for any year with new information (either newly reported deaths or updates to previously reported deaths). These files include deaths within a month of the initial report, resulting in many incomplete records, especially when the death has been referred to a coroner or medical examiner's office for an autopsy.

MMRI staff download the death files to secure servers and load the information into SAS datasets. Staff then run a SAS procedure to filter on females of reproductive age (10-60 years old). Further SAS procedures are used to identify deaths where either the pregnancy checkbox or ICD-10 cause of death codes indicate a pregnancy within one year of death (ICD-10 codes O00-O99 and A34). To identify additional cases, death records are linked to hospital discharge records and examined for any diagnosis or procedure codes that may indicate a pregnancy within one year of death. Results are loaded into the Maternal Mortality Review database (MMRDB), either updating existing case records with the latest information or creating records for new cases.

These files are also examined for potential errors and incongruities, which are then reported to VR for further investigation and, if warranted, correction. For example, VR would be notified of a death record where the pregnancy checkbox indicates no pregnancy within one year of death that simultaneously includes an obstetric cause of death code that only applies if the decedent was pregnant within 42 days of death. Correcting these errors and uploading the new information to NCHS helps ensure that New York's maternal mortality information is as accurate as possible in published national statistics.

Additional cases are identified using birth and fetal death certificates linked to death records. These files are received on a quarterly basis from the Office of Quality and Patient Safety. Any cases that have not been previously identified are added to the MMRDB, and existing cases are updated with any new information.

Once cases are identified, additional records are requested to facilitate thorough reviews. Public Health Law Section 2509 grants the Commissioner of Health and their designees the authority to obtain records from government entities at the state level and below, as well as from hospitals. Some of the records requested for 2018 cases included: hospital charts, including prenatal care records for labor and delivery admissions; coroner and medical examiner reports, including autopsy, toxicology results, and other related information; law enforcement reports and corrections records; prescription drug information; treatment

summaries from the NYS Office of Mental Health; and hospital adverse event reports.

The types of records requested depends on the details of each case, and the process of gathering them requires identification of what is available, requesting the information from the source and follow-up until documents are received. MMR staff work closely with local health departments throughout the state to obtain necessary information, and each county has its own coroner or medical examiner, as well as law enforcement organizations. Records are generally maintained locally, so record requests must be sent to numerous organizations throughout the state.

Obituaries, social media, and community indicators are also examined to give context to each decedent's life and death. Community indicators are specific to the decedent's community of residence and are collected from publicly available sources, such as the American Community Survey. Examples of the community indicators include percentage of births delivered prematurely, percentage of people with health insurance, and percentage of the population below the poverty line. While not necessarily descriptive of the decedent's specific circumstances, these indicators help provide information about the community environment in which the decedent lived.

The available information for each case is examined by clinical case abstractors, who then enter the relevant details into the Maternal Mortality Review Information Application (MMRIA), a CDC-hosted application that provides a standardized platform for the storage and analysis of pregnancy-associated deaths. Once the abstraction is complete, MMRIA generates a de-identified case summary that is provided to the committees for review.

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APPENDIX C - CASE REVIEW PROCESS

Each committee meets multiple times per year to review and discuss the cases, with the goal of answering these key questions:

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

Approximately 9 cases are scheduled for review during each day-long meeting, and the exact number of meetings each year varies with the number of cases to be reviewed. Some meetings may focus on cases of a particular type (deaths caused by drug overdose, for example), but most cases are reviewed roughly as their abstractions are completed. Due to the Sars-Cov-2 pandemic, meetings reviewing 2018 cases were held virtually.

For the first stage of the review, a primary reviewer is assigned to the case. They receive the de-identified case narrative, a summary template to help standardize the case presentations, the de-identified case abstraction from MMRIA, a blank Committee Decision form, and a checklist of items to return once they complete their review. The primary reviewers are given several weeks to complete their reviews and return the materials. In addition to the information they receive, reviewers can ask questions of the abstractors, who will answer, if possible; otherwise, they will inform the reviewer that the requested information is not available.

Returned case materials are then compiled by staff and reviewed by the co-chairs who will be facilitating the meeting. In the days before the meeting, materials are shared with the committee membership, though not the conclusions of the primary reviewer.

On the day of the meeting, each primary reviewer spends about 10 minutes presenting their case to the committee. The next 10 minutes are spent asking questions and discussing each case, followed by roughly 20 minutes of answering the questions on the decision form and forming recommendations. Any questions not answered by consensus are put to a vote, with a simple majority carrying the question.

Other activities vary by meeting, but always include readings of the vision, mission, and goals of the committee, recording member attendance, and a moment of silence out of respect for the deceased.

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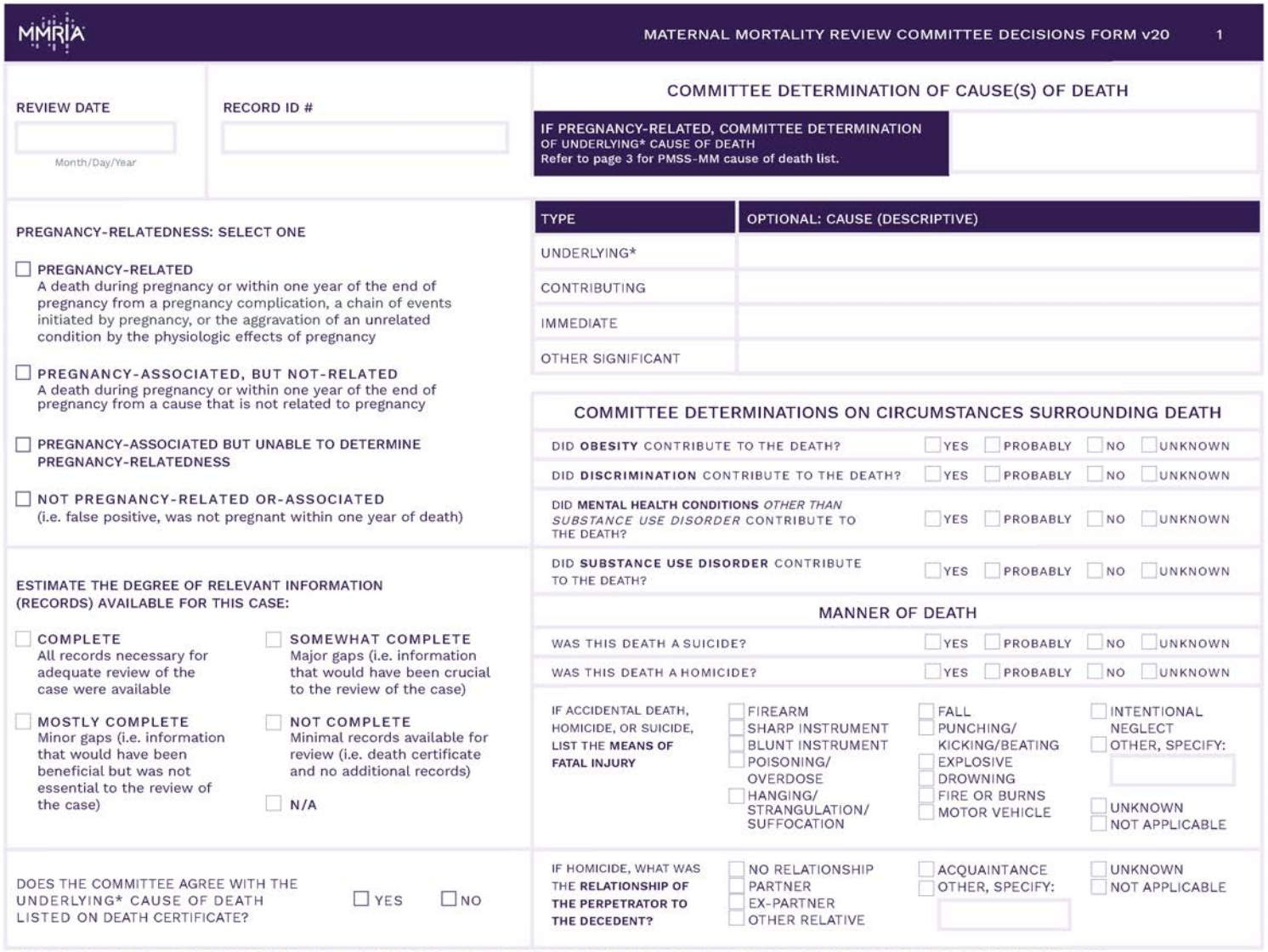
APPENDIX D - MMRIA COMMITTEE DECISIONS FORM



MMRIA

MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v20 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.

TYPE	OPTIONAL: CAUSE (DESCRIPTIVE)
UNDERLYING*	
CONTRIBUTING	
IMMEDIATE	
OTHER SIGNIFICANT	

PREGNANCY-RELATEDNESS: SELECT ONE

- ☐ **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
- ☐ **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
- ☐ **PREGNANCY-ASSOCIATED BUT UNABLE TO DETERMINE PREGNANCY-RELATEDNESS**
- ☐ **NOT PREGNANCY-RELATED OR-ASSOCIATED**
  (i.e. false positive, was not pregnant within one year of death)

COMMITTEE DETERMINATIONS ON CIRCUMSTANCES SURROUNDING DEATH

DID **OBESITY** CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN
DID **DISCRIMINATION** CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN
DID **MENTAL HEALTH CONDITIONS** *OTHER THAN SUBSTANCE USE DISORDER* CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN
DID **SUBSTANCE USE DISORDER** CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN

ESTIMATE THE DEGREE OF RELEVANT INFORMATION (RECORDS) AVAILABLE FOR THIS CASE:

- ☐ **COMPLETE**
  All records necessary for adequate review of the case were available
- ☐ **MOSTLY COMPLETE**
  Minor gaps (i.e. information that would have been beneficial but was not essential to the review of the case)
- ☐ **SOMEWHAT COMPLETE**
  Major gaps (i.e. information that would have been crucial to the review of the case)
- ☐ **NOT COMPLETE**
  Minimal records available for review (i.e. death certificate and no additional records)
- ☐ **N/A**

MANNER OF DEATH

WAS THIS DEATH A SUICIDE?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN
WAS THIS DEATH A HOMICIDE?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN

IF ACCIDENTAL DEATH, HOMICIDE, OR SUICIDE, LIST THE **MEANS OF FATAL INJURY**

- ☐ FIREARM
- ☐ SHARP INSTRUMENT
- ☐ BLUNT INSTRUMENT
- ☐ POISONING/ OVERDOSE
- ☐ HANGING/ STRANGULATION/ SUFFOCATION
- ☐ FALL
- ☐ PUNCHING/ KICKING/BEATING
- ☐ EXPLOSIVE
- ☐ DROWNING
- ☐ FIRE OR BURNS
- ☐ MOTOR VEHICLE
- ☐ INTENTIONAL NEGLECT
- ☐ OTHER, SPECIFY:
- ☐ UNKNOWN
- ☐ NOT APPLICABLE

DOES THE COMMITTEE AGREE WITH THE UNDERLYING* CAUSE OF DEATH LISTED ON DEATH CERTIFICATE? ☐ YES ☐ NO

IF HOMICIDE, WHAT WAS THE **RELATIONSHIP OF THE PERPETRATOR TO THE DECEDENT?**

- ☐ NO RELATIONSHIP
- ☐ PARTNER
- ☐ EX-PARTNER
- ☐ OTHER RELATIVE
- ☐ ACQUAINTANCE
- ☐ OTHER, SPECIFY:
- ☐ UNKNOWN
- ☐ 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.

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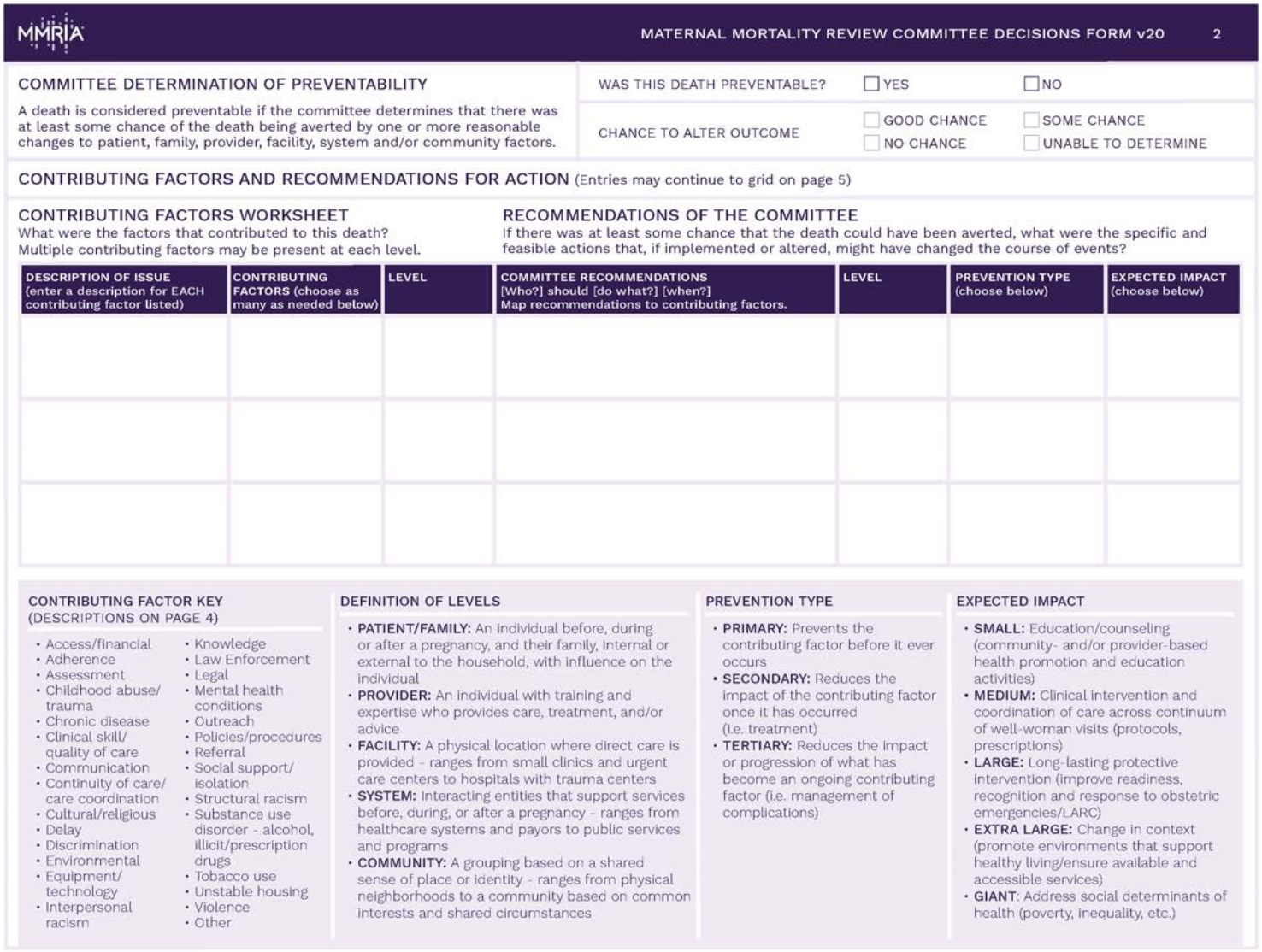

MMRIA

MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v20 2

COMMITTEE DETERMINATION OF PREVENTABILITY

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

WAS THIS DEATH PREVENTABLE? ☐ YES ☐ NO

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

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

CONTRIBUTING FACTORS WORKSHEET

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

RECOMMENDATIONS OF THE COMMITTEE

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

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

CONTRIBUTING FACTOR KEY (DESCRIPTIONS ON PAGE 4)

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

DEFINITION OF LEVELS

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

PREVENTION TYPE

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

EXPECTED IMPACT

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

SECTION 9: APPENDIX

IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING CAUSE OF DEATH* PMSS-MM

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

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

SECTION 9: APPENDIX

CONTRIBUTING FACTOR DESCRIPTIONS

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

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

FAILURE TO SCREEN/INADEQUATE **ASSESSMENT** OF RISK
Factors placing the individual at risk for a poor clinical outcome recognized, and they were not transferred/transported to a provider able to give a higher level of care.

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

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

CLINICAL SKILL/QUALITY OF CARE (PROVIDER OR FACILITY PERSPECTIVE)
Personnel were not appropriately skilled for the situation or did not exercise clinical judgment consistent with current standards of care (e.g. error in the preparation or administration of medication or unavailability of translation services).

POOR **COMMUNICATION**/LACK OF CASE COORDINATION OR MANAGEMENT/ LACK OF CONTINUITY OF CARE (SYSTEM PERSPECTIVE)
Care was fragmented (i.e. uncoordinated or not comprehensive) among or between healthcare facilities or units, (e.g. records not available between inpatient and outpatient or among units within the hospital, such as Emergency Department and Labor and Delivery).

LACK OF **CONTINUITY OF CARE** (PROVIDER OR FACILITY PERSPECTIVE)
Care providers did not have access to individual's complete records or did not communicate their status sufficiently. Lack of continuity can be between prenatal, labor and delivery, and postpartum providers.

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

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

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

ENVIRONMENTAL FACTORS
Factors related to weather or social environment.

INADEQUATE OR UNAVAILABLE **EQUIPMENT/TECHNOLOGY**
Equipment was missing, unavailable, or not functional, (e.g. absence of blood tubing connector).

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

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

INADEQUATE **LAW ENFORCEMENT** RESPONSE
Law enforcement response was not in a timely manner or was not appropriate or thorough in scope.

LEGAL
Legal considerations that impacted outcome.

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

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

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

LACK OF **REFERRAL** OR CONSULTATION
Specialists were not consulted or did not provide care; referrals to specialists were not made.

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

OTHER
Contributing factor not otherwise mentioned. Please provide description

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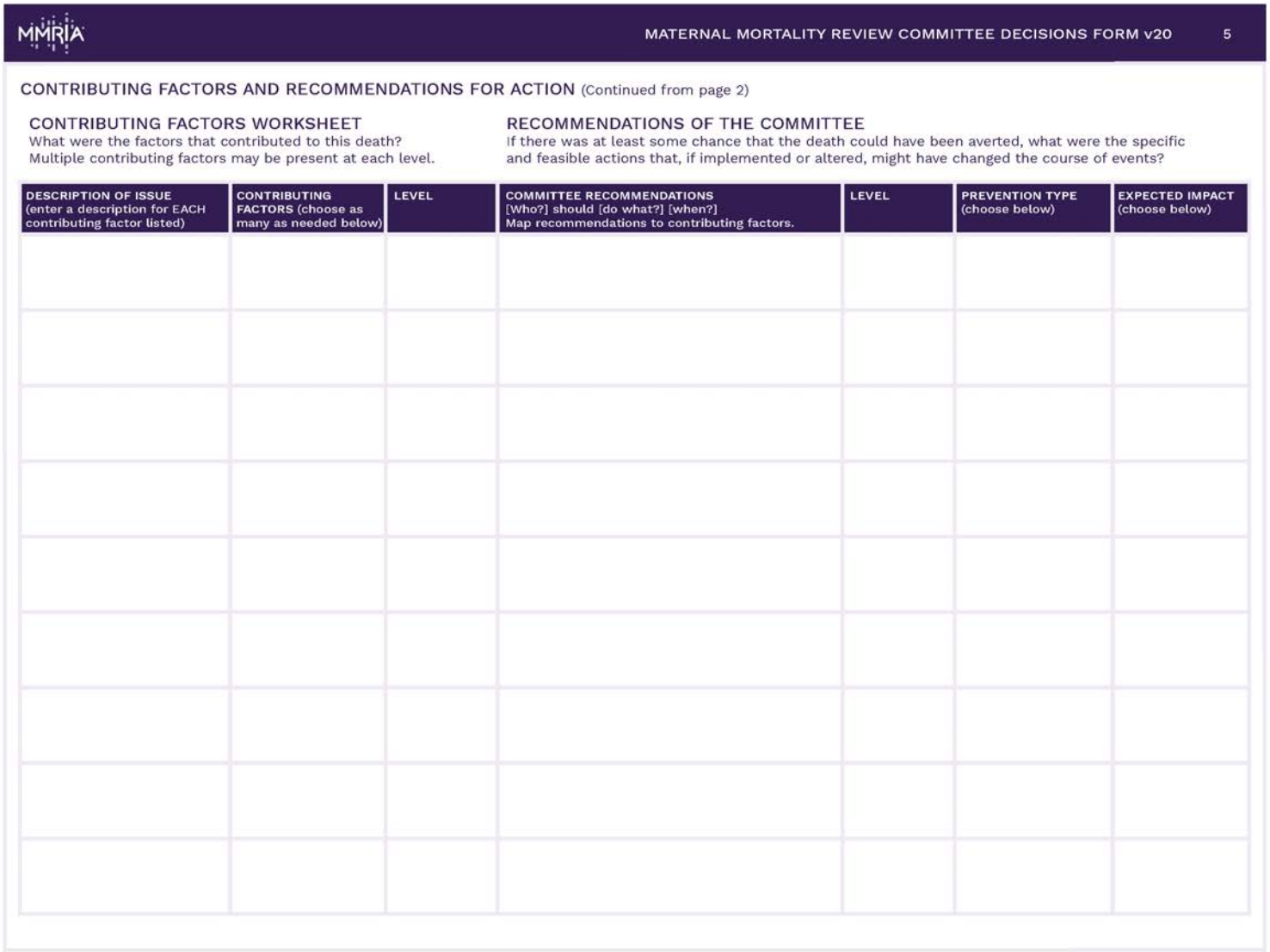

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CONTRIBUTING FACTORS AND RECOMMENDATIONS FOR ACTION (Continued from page 2)

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