New York State Report on Pregnancy-Associated Deaths in 2018-2020

NEW YORK STATE | Department of Health | Maternal Mortality Review Board

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The New York State Department of Health (Department) would like to acknowledge the 386 New York women who died in the years 2018, 2019, and 2020 within one year of being pregnant, forever affecting their families, friends, and communities.

The Department would also like to acknowledge that pregnant people express many different gender identities. The Department is dedicated to learning from their stories and applying the lessons learned to help prevent future deaths for all pregnant people.

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 is one of the only countries in the world that has seen a rise in the maternal mortality ratio since 2000. Black women in the United States die at more than double the rate of White women.[1] The number of maternal deaths in New York State and the persistent disparities in the maternal mortality ratio between Black and White women are urgent concerns.

In response to this public health issue, the New York State Department of Health (the Department) created the Maternal Mortality Review Initiative in 2010 to perform a comprehensive review of maternal deaths. When the Maternal Mortality Review Initiative was created, New York ranked 46th out of 50 U.S. states for its maternal mortality ratio, a standard measure from the World Health Organization that is based on obstetric death codes indicating a pregnancy within 42 days prior to death. New York State improved to 15th out of 50 states in the most recent ranking.[2] According to New York State vital statistics, the 2018-2020 maternal mortality ratio of 19.3 deaths per 100,000 live births was an improvement over the ratio of 24.4 for 2008-2010; the 2018-2020 maternal mortality ratio for Black women was over four times that of White women.[3]

Public Health Law Section 2509, enacted in 2019, established a Maternal Mortality Review Board, in the Department, to review each pregnancy-associated death.[4] Public Health Law also allows the city of New York to establish their own board. The reviews covered by this report were performed by two boards (also known as committees): the New York State Maternal Mortality Review Board reviewed cases of pregnancy-associated deaths that occurred outside of New York City, and the New York City Maternal Mortality and Morbidity Review Committee reviewed cases of pregnancy-associated deaths that occurred within New York City. Section 2509 also established the Maternal Mortality and Morbidity Advisory Council, which is comprised of multidisciplinary experts and lay persons knowledgeable in the fields of maternal mortality, women's health, and public health. Maternal Mortality and Morbidity Advisory Council members serve and are representative of the racial, ethnic, and socioeconomic diversity of the women and mothers of the state. The Advisory Council may review findings of the boards and develop their own recommendations on policies, best practices, and strategies to prevent maternal mortality and morbidity.

The committees' case review efforts are consistent with the objectives of the Prevention Agenda 2019-2024: New York's State Health Improvement Plan. The Plan aims to implement public health approaches and cross-sector partnerships to reduce, and eventually eliminate, maternal mortality and the associated racial and ethnic disparities in the state.

[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_c/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:

SECTION 1: EXECUTIVE SUMMARY

The Maternal Mortality Review Initiative's pregnancy-associated death review process has three main steps. First, pregnancy-associated deaths (deaths that occurred while pregnant or within one year of the end of pregnancy) of New York State residents are identified. Second, medical records and other sources of information are abstracted into de-identified case summaries. Finally, the committee members review each case summary to determine if the death was preventable, identify factors contributing to the death, and develop actionable recommendations for the prevention of future deaths.

In 2019, the Department received a five-year grant award from the Centers for Disease Control and Prevention (CDC) to provide support and guidance for the review process. The grant targets timely reviews in which cases are identified, investigated, and reviewed within two years of death. This CDC grant and technical assistance have accelerated the review timeline and thereby significantly reduced the lag between each death and its review. Following CDC guidance, the committees completed timely review of 2020 cases throughout 2022, with the aggregate data analysis beginning in 2023.

This statewide report summarizes findings and recommendations from the comprehensive review of New York State pregnancy-associated deaths that occurred in 2018, 2019, and 2020. Additionally, this report describes the work that is underway in the Department to address this public health issue.

KEY FINDINGS

Key Findings: All Pregnancy-Associated Deaths

- Statewide, 386 pregnancy-associated deaths of New York State residents occurring in 2018-2020 were identified.
- Of the 386 pregnancy-associated deaths, 121 were found to be pregnancy-related, 202 were found to be pregnancy-associated but not related, and 63 were found to be pregnancy-associated but unable to determine relatedness.
- The majority (60.1%) of these deaths occurred in individuals aged 30 years and older, while 57.0% of all live births were among individuals in that age group.
- Severe racial disparities exist in pregnancy-associated deaths:
    - Black, non-Hispanic women comprised 29.0% of all pregnancy-associated deaths, while accounting for 14.3% of all live births.
    - White, non-Hispanic women comprised 47.7% of all pregnancy-associated deaths, while accounting for 49.1% of all live births.
- More than half (59.9%) of these women had a high school education or less, while 36.9% of all live births were among individuals with a high school education or less.
- The majority (66.1%) of these deaths occurred to individuals with Medicaid as their health insurance, while 50.0% of all live births were among individuals with Medicaid.

Key Findings: Pregnancy-Related Deaths

- A total of 121 pregnancy-related deaths occurred from 2018-2020, which include 41 pregnancy-related deaths in 2018, 42 in 2019, and 38 in 2020.
- The overall pregnancy-related mortality ratio in New York State was 18.5 deaths per 100,000 live births from 2018 to 2020.

SECTION 1: EXECUTIVE SUMMARY

- The leading causes of pregnancy-related deaths were hemorrhage (23, 19.0%), embolism (18, 14.9%), and mental health conditions (18, 14.9%).
- Black, non-Hispanic women had a pregnancy-related mortality ratio five times higher than White, non-Hispanic women (54.7 vs 11.2 deaths per 100,000 live births).
    - Black, non-Hispanic women comprised 42.1% of pregnancy-related deaths, while accounting for 14.3% of all live births.
    - White, non-Hispanic women comprised 29.8% of pregnancy-related deaths, while accounting for 49.1% of all live births.
- Approximately half (48.8%) of pregnancy-related deaths occurred within 42 days of the end of pregnancy.
- The pregnancy-related mortality ratio for cesarean delivery was 3.1 times that of vaginal delivery (23.8 vs 7.6 deaths per 100,000 live births).
    - Women with cesarean deliveries comprised 61.2% of deliveries among pregnancy-related deaths, while accounting for 33.5% of all New York State live births.
    - Women with vaginal deliveries comprised 38.8% of deliveries among pregnancy-related deaths, while accounting for 66.3% of all New York State live births.
- It was determined that 73.6% of pregnancy-related deaths were preventable.
    - Pregnancy-related deaths due to metabolic/endocrine conditions, injury, gastrointestinal disorders, hematologic conditions, hypertensive disorders of pregnancy, anesthesia complications, and pulmonary conditions were determined to be 100% preventable.
- Discrimination was a probable or definite circumstance surrounding 47.1% of pregnancy-related deaths.
- Both mental health conditions and obesity were considered likely or certain circumstances in 24.0% of pregnancy-related deaths.
- The committees identified 395 contributing factors among 121 pregnancy-related deaths.
- For every pregnancy-related death, on average 3.9 factors were identified that contributed to the death. These factors have been grouped into five levels: community, patient/family, provider, facility, and system. Representative factors for each level included:
    - Community factors included lack of knowledge regarding urgent maternal warning signs, stigma surrounding mental health conditions, and slower Emergency Medical Service response in some communities.
    - Facility factors included lack of appropriate policies and procedures or poor adherence to existing policies and procedures, conflicting treatment documentation, inadequate communication during patient transfers 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 affecting patient outcomes; chronic conditions placing 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; existence of language barriers impacting medical management; and hesitance to receiving COVID-19 vaccination during pregnancy.
    - Provider factors included gaps in provider knowledge; inadequate assessment of risk and screening for mental health conditions, substance use, or other reproductive health needs; lack of collaborative chronic care management; lack of coordination between providers; dismissal of patient's concerns due to race; and delay in diagnosis and response to acute conditions (e.g., hemorrhage, pulmonary hypertension, and sepsis).
    - System factors included lack of referrals and follow up for chronic care management, provider knowledge gaps and delays in response to emergency situations; lack of standardized policies and procedures; punitive child services interactions contributing to mental health decline, difficulty accessing care and services for people living in poverty, and unstable housing exacerbating mental and medical issues.
- Factors at the provider level (35.7%), system level (29.2%), and patient/family level (21.3%) together comprised most of the factors identified that contributed to pregnancy-related deaths.
- For leading causes of deaths, factors fell into different levels:
    - Hemorrhage: facility factors comprised 32.1% of the total contributing factors, followed by provider (29.5%) and systems of care factors (23.1%).
    - Embolism: provider factors comprised 39.7% of the total contributing factors, followed by facility (17.5%), system (17.5%), and patient/family (17.5%).
    - Mental Health Conditions: provider factors comprised 36.9% of the total contributing factors, followed by systems of care factors (27.7%) and patient/family (26.2%).

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 (e.g., death from a motor vehicle accident while pregnant) or that lacked enough information to determine whether the death was related to pregnancy.
- There were 265 other pregnancy-associated deaths in the 2018-2020 cohort, including 202 pregnancy-associated, but not related, deaths and 63 deaths for which relatedness was unable to be determined.
- The mortality ratio for other pregnancy-associated deaths in New York State was 40.6 per 100,000 live births over 2018-2020.
- Black, non-Hispanic women comprised 23.0% of other pregnancy-associated deaths, while accounting for 14.3% of all live births.
- White, non-Hispanic women comprised 55.8% of other pregnancy-associated deaths, while accounting for 49.1% of all live births.
- The leading causes of other pregnancy-associated deaths were mental health conditions (133, 50.2%), injury (34, 12.8%) and cardiovascular and coronary conditions (27, 10.2%).

- Substance use disorder was a factor in 89.5% of the other pregnancy-associated deaths due to mental health conditions.

KEY RECOMMENDATIONS

There were 685 recommendations developed by the committees for the 2018-2020 maternal death cohort. Through a review and ranking process, the committee proposed 18 key recommendations, some of which were previous recommendations.

Key Recommendations:

- All birthing hospitals should ensure full implementation of the American College of Obstetricians and Gynecologists' Safe Motherhood Initiative Hemorrhage Bundle, including: following a standard protocol for massive transfusion; implementing universal system for quantification of blood loss and anesthesia protocols during delivery and postpartum; working with anesthesia teams to follow their facility's emergency management plan for response to hemorrhage during delivery and postpartum; utilizing checklists and algorithms to assist with clinical decision-making; and conducting trainings/drills on bundle implementation. (2018, 2019, 2020)
- American College of Obstetricians and Gynecologists District II, the Department, and partners should develop an emergency room bundle for the care of pregnant and postpartum people, including a plan for dissemination and provider education. (2018, 2019, 2020)
- American College of Obstetricians and Gynecologists District II, the Department, and partners should use or modify the Alliance for Innovation on Maternal Health Cardiac Bundle and should assist with provider education. (2018, 2019, 2020)
- All birthing hospitals should implement a system to ensure obstetricians and other providers caring for obstetrical patients utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (2018, 2019, 2020)
- The Department should convene a multidisciplinary group of key interested parties to develop standard guidance on implementation of a maternity medical home model that prioritizes people with chronic conditions. In addition, New York State should provide funding to support a pilot project of the maternity medical home model. (2018, 2020)
- The Department should develop an anti-racism and anti-discrimination framework in health care systems, with a focus on eliminating inequities in maternal mortality among those most impacted by disparities, particularly Black and Native American communities. (2018, 2019)
- All birthing hospitals should implement the Alliance for Innovation on Maternal Health Bundle for Safe Reduction of Primary Cesarean Birth, with a goal of reducing low-risk cesarean deliveries. (2018, 2019)
- Hospital systems and obstetrical providers 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 people with chronic conditions (including those

with mental conditions or substance use disorders), and those with difficult access (e.g., rural areas) to follow-up care and community resources. (2018, 2019)
- All birthing hospitals should adopt the venous thromboembolism bundle, including audits of the quality of implementation and compliance. (2018, 2019)
- New York State should offer all families at least one home visit from a nurse or paraprofessional within two weeks postpartum to educate families about signs and symptoms of potential complications. (2018, 2020)
- The Department should require hospitals to provide ongoing education, including simulation drills for common obstetric emergencies (e.g., cardiac arrest, obstetric hemorrhage, and preeclampsia) for all providers caring for obstetrical patients. (2019, 2020)
- The New York State Office of Temporary and Disability Assistance should guarantee safe stable housing for pregnant and postpartum people experiencing homelessness, prioritizing those with chronic health conditions (including mental health conditions). (2019)
- The American College of Obstetricians and Gynecologists District II and partners should develop an obesity bundle to improve care among birthing people of reproductive age. (2019)
- Facilities should implement the maternal early warning signs protocol to facilitate care escalation following a significant change in patient status. (2019)
- New York State Medicaid should increase Medicaid reimbursements for care of pregnant and postpartum people. (2020)
- New York State Office of Children and Family Services should develop an equitable system for pregnant and postpartum people who use substances that avoids family separation and supports timely reunification of families and their children. (2020)
- Perinatal care providers should routinely screen for perinatal or postpartum mood and anxiety disorders at least once during both pregnancy and up to one year postpartum and should make timely referral for positive screens to mental health care providers and/or programs (e.g., Project TEACH, Postpartum Resource Center of New York). (2020)
- The New York State Legislature should require birthing facility participation in New York State Perinatal Quality Collaborative projects and provide funding to birthing facilities to support participation. Project participation should be reported as part of the New York State Maternity Information Scorecard (Hospital Maternity-Related Procedures and Practices Statistics (ny.gov)) (2020)

WHAT NEW YORK STATE IS DOING TO ADDRESS MATERNAL MORTALITY

New York State has implemented the following actions to reduce maternal deaths and improve outcomes for birthing people and families of color.

Recognize and reduce racism and discrimination

Effective June 22, 2023, the Department requires a Health Equity Impact Assessment to be filed with a Certificate of Need application for the establishment, ownership, construction, renovation, and change in service of health care facilities across New York State. The

assessment will provide information on whether the proposed project impacts the delivery of or access to services for the service area, particularly medically underserved groups.

The New York State Department of Health's Division of Family Health leads the New York State Perinatal Quality Collaborative which engages a statewide network of birthing hospitals and centers that seek to provide the best, safest, and most equitable care for New York State's birthing people and infants. Through the New York State Perinatal Quality Collaborative Birth Equity Improvement Project, the Department is working with 73 birthing hospitals to identify how individual and systemic racism impact birth outcomes and to take action to improve systems of care, as well as the experience of care for Black birthing people.

The Department's Office of Health Insurance Programs, New York's Medicaid Administration, issued the New York State Medicaid Perinatal Care Standards, effective August 1, 2022. This policy is applicable to Medicaid Managed Care Plans and all Medicaid perinatal care providers who provide prenatal/antepartum care, intrapartum care, and/or postpartum care. With the issuing of this updated foundational policy, Medicaid provided clarifying guidance with an explicit focus on health equity, health disparities, and racial bias.

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

Through the New York State Perinatal Quality Collaborative, the Department works with birthing hospitals to translate evidence-based guidelines into clinical practice via quality improvement projects. The New York State Perinatal Quality Collaborative projects incorporate the use of patient safety bundles and policies that are available through professional organizations such as the American College of Obstetricians and Gynecologists. The Department's three-year New York State Perinatal Quality Collaborative Obstetric Hemorrhage Project that ended in June 2021, incorporated use of the American College of Obstetricians and Gynecologists' District II Safe Motherhood Initiative Obstetric Hemorrhage Bundle. Results of a 2023 Department survey of New York State birthing hospitals showed that 94.1% of birthing hospitals had a standard protocol in place for massive transfusion, and 85.6% had a standardized system for the quantification of cumulative blood loss. The American College of Obstetricians and Gynecologists' District II patient safety bundle on venous thromboembolism is available for use by all New York State birthing facilities. Results of the 2023 Department's birthing facility survey showed that 74.6% of New York State birthing facilities had implemented screening for venous thromboembolism and chemoprophylaxis during the intrapartum and postpartum periods.

The New York State Medicaid program is implementing a Quality Incentive Payment for labor and delivery hospitals. Performance payments will be earned by eligible labor and delivery hospital if they reduce low-risk Cesarean section delivery rates as defined by the Joint Commission Nulliparous, Term, Singleton, Vertex (NTSV) measure.

Improve the health of pregnant and postpartum people

In 2023, Medicaid postpartum coverage was expanded from 60 days to 12 months for all eligible Medicaid recipients, regardless of immigration status or how the pregnancy ended. This expansion is anticipated to provide opportunities for preventive care, as well as chronic

care management, and is a critical step towards preventing maternal deaths and illness and fortifying health equity.

Additionally, to improve and expand access to prenatal and postnatal care, new or expanded Medicaid reimbursement was implemented in 2022-2023 to include: addition of coverage for nutrition services provided by Registered Dietitians, increase in midwifery service reimbursement rate, expansion of remote patient monitoring service coverage for pregnant/postpartum people, expansion of reimbursement of Noninvasive Prenatal Screening to include coverage for all pregnant Medicaid members, expansion of Coverage for Spinal Muscular Atrophy Carrier Screening, and the addition of lactation counselor certifications covered by Medicaid.

All persons insured by Medicaid are eligible for one postpartum home visit after they give birth. This visit includes education on the urgent maternal warning signs and supports healthy outcomes for parents and children.

Coordinate care for pregnant and postpartum people

The Department has made a five-year (2022-2027) investment in 26 Perinatal and Infant Community Health Collaborative programs statewide. These programs coordinate collaborative community-based strategies to improve perinatal and infant health outcomes and use community health workers to implement individual-level strategies as well.

The Department continues to invest in ten Nurse-Family Partnership programs in nine counties. These programs provide home visits to people who will-be first time parents and are enrolled before the 29th week of pregnancy, with the goals of improving maternal and infant health, increasing family self-sufficiency, and reducing child maltreatment.

New York State Medicaid added coverage for Community Health Worker services for pregnant and postpartum individuals in October 2023.

Optimize management of mental health conditions and substance use disorders

The New York State Perinatal Quality Collaborative Opioid Use Disorder in Pregnancy and Neonatal Abstinence Syndrome Project, which began in 2018 and concluded in 2020, worked with 39 birthing facilities to improve early identification of opioid use disorder, standardization of therapy, and coordination of aftercare of infants with neonatal abstinence syndrome. The New York State Perinatal Quality Collaborative, in collaboration with the New York State Office of Mental Health's Project TEACH and the American College of Obstetricians and Gynecologists District II hosted four webinars on maternal mental health for New York State's birthing facilities and perinatal providers.

In 2023, New York State Medicaid added coverage of Licensed Clinical Social, Licensed Marriage and Family Therapist, and Licensed Mental Health Counselor services.

Ensure appropriate level of care determination

Since 2017, the Department's Division of Family Health has worked to update 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. The Department is working to assess the comments received following the close of the comment period on July 31, 2023.

Improve Public Education

The Department implemented two statewide *Hear Her* social media campaigns, in Fall 2021 and Summer 2022, to build public awareness of the importance of recognizing early urgent maternal warning signs for pregnant and recently pregnant people. The Department utilized Facebook, Instagram, and Snapchat to convey information to pregnant and postpartum people and their partners, friends, and family about pregnancy-related complications and tips for talking about their concerns with health care providers.

Additionally, the Department launched a multimedia, multi-phase campaign to address COVID-19 vaccine hesitancy and promote vaccination among pregnant people. The campaign ran statewide, from January 16 – March 19, 2023. Media included testimonials from Dr. Tieg Beazer, DO, MS, an obstetrician from University of Rochester Medical Center, and Dr. Sarah Pachtman, MD, a maternal-fetal medicine specialist at Northwell Health. Dr. Pachtman's testimonial was particularly relevant, as she was pregnant when she received the COVID-19 vaccine.

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 New York State 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.

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 Board 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

Underlying cause of death: defined by the World Health Organization as "the 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."

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).

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 is one of the only countries in the world that has seen a rise in its maternal mortality ratio since 2000. A 2020 Commonwealth Fund report comparing the United States to ten other wealthy nations revealed that the United States' ratio was twice as high as any of the comparison countries, and ten times as high as the country with the lowest ratio. The United States maternal mortality ratio 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 birthing 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 (the Department) created the Maternal Mortality Review Initiative in 2010 to systematically review all New York State maternal deaths and to develop strategies and interventions to decrease the risk of these deaths. When the initiative was created, New York ranked 46th among all the states for maternal mortality, a standard measure from the World Health Organization that is based on obstetric death codes indicating a pregnancy within 42 days prior to death. New York State improved to 15th in the most recent ranking, but the number of maternal deaths in New York remains high, and the continued disparity in the maternal mortality ratio between Black and White women is of urgent concern.[3]

Public Health Law Section 2509, enacted in 2019, established a Maternal Mortality Review Board, in the Department, to review each pregnancy-associated death.[4] Public Health Law also allows the city of New York to establish their own board. The reviews covered by this report were performed by two boards (also known as committees): the New York State Maternal Mortality Review Board reviewed cases of pregnancy-associated deaths that occurred outside of New York City, and the New York City Maternal Mortality and Morbidity Review Committee reviewed cases of pregnancy-associated deaths that occurred within New York City. The Board's multidisciplinary members develop recommendations to improve maternal outcomes and prevent future deaths.

The New York State Board's and the New York City Committee's case review efforts are consistent with the objectives of the *Prevention Agenda 2019-2024: New York's State Health Improvement Plan* which aims to implement public health approaches and cross sector partnerships to reduce maternal mortality in the state by 22% to 16.0 per 100,000 live births and to reduce the racial and ethnic disparities in the state maternal death ratio by 34% by the end of 2024.

Section 2509 also established the Maternal Mortality and Morbidity Advisory Council, which is comprised of multidisciplinary experts and lay persons knowledgeable in the fields of maternal

[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. License: 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_c/state/NY

[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:

mortality, women's health, and public health. Maternal Mortality and Morbidity Advisory Council members serve and are representative of the racial, ethnic, and socioeconomic diversity of the women and mothers of the state. The Advisory Council may review findings of the boards and develop their own recommendations on policies, best practices, and strategies to prevent maternal mortality and morbidity.

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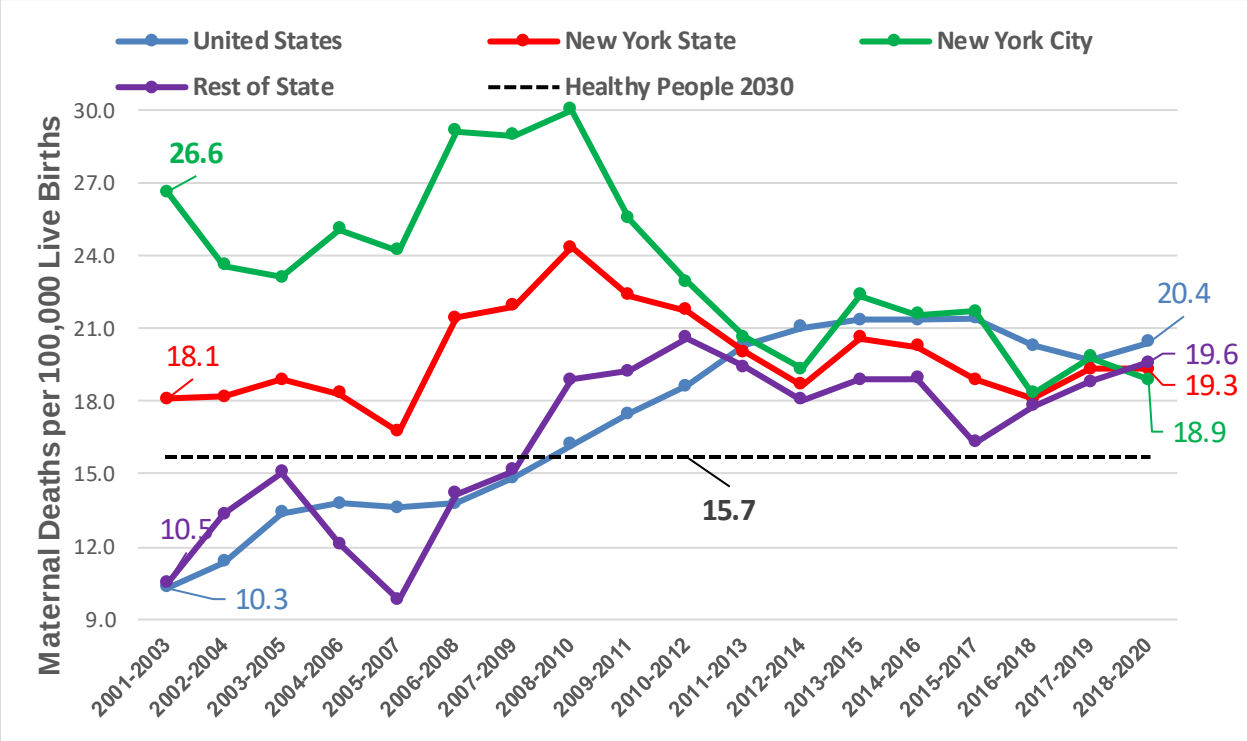
MATERNAL MORTALITY IN NEW YORK STATE

The maternal mortality ratio in New York State peaked at 24.4 per 100,000 live births in 2008-2010 but decreased to 19.3 per 100,000 live births in 2018-2020 (Figure 1). The 2018-2020 maternal mortality ratio for New York City is 18.9 deaths per 100,000 live births, while the Rest of State ratio is 19.6 deaths, each showing improvement. The maternal mortality ratio for New York State has remained below the national ratio since 2011.

Figure 1. New York State Three-Year Rolling Average Maternal Mortality Ratio



Source: New York State Vital Statistics, Centers for Disease Control and Prevention Wonder Database

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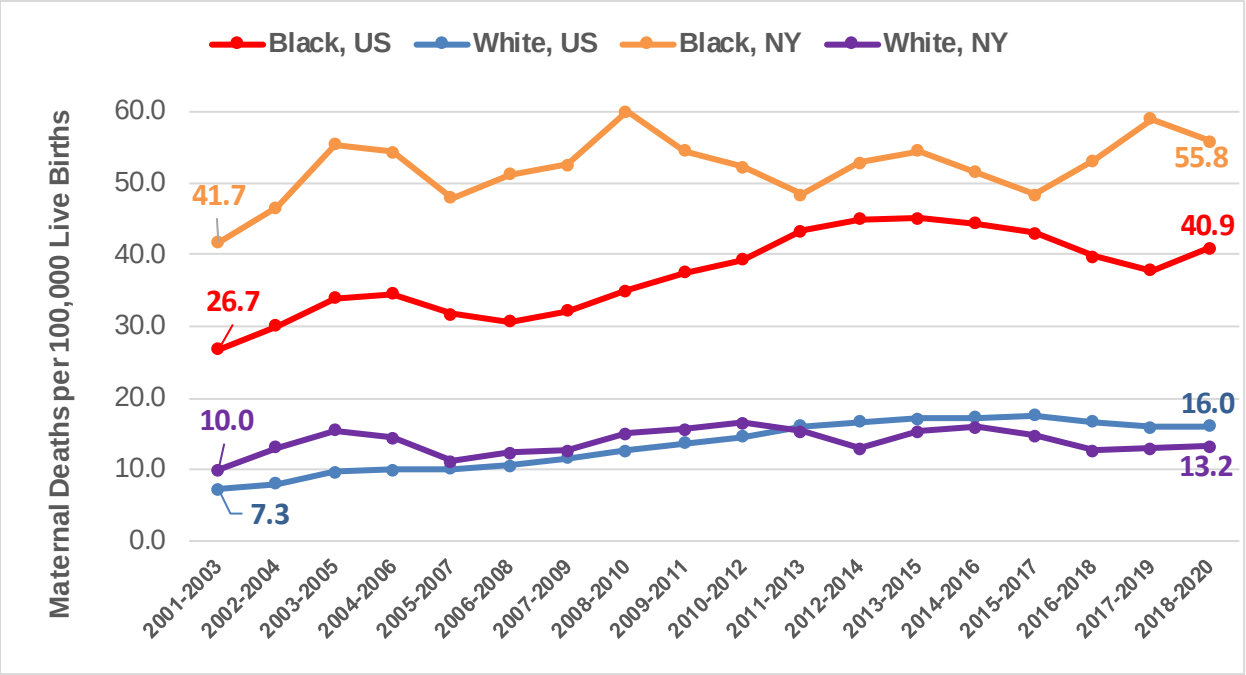
Racial disparities in maternal mortality ratios have persisted over time, despite fluctuations between individual three-year rolling periods. For 2018-2020, the statewide maternal mortality ratio for Black women was 55.8 deaths per 100,000 live births, while the maternal mortality ratio for White women during the same period was 13.2 deaths per 100,000 live births. The Black to White mortality ratio in New York State for 2018-2020 was 4.2 to 1 (Figure 2).

Figure 2. New York State Three-Year Rolling Average Maternal Mortality Ratio by Race



Source: New York State Vital Statistics, Centers for Disease Control and Prevention Wonder Database

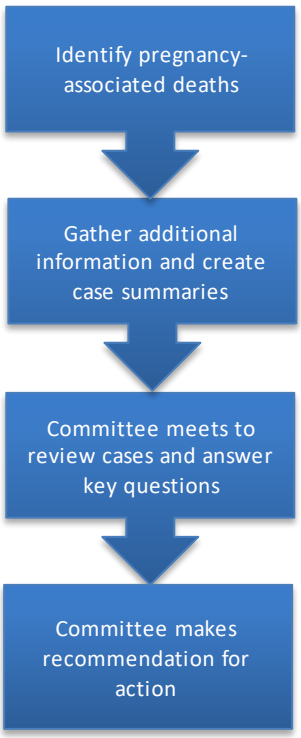
SECTION 3: ORGANIZATION AND METHODS

ORGANIZATION

Under Public Health Law Section 2509, enacted in 2019, the Department established the Maternal Mortality Review Board to review all pregnancy-associated deaths in New York State that occur outside of New York City. The New York City Department of Health and Mental Hygiene established the New York City Maternal Mortality and Morbidity Review Committee to review pregnancy-associated deaths that occur within New York City. These committees' collective efforts form a comprehensive review of pregnancy-associated deaths in New York State. 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 platforms
  - Community indicators
  - Prescription drug records
  - Incarceration history
  - Psychiatric Services and Clinical Knowledge for Medicaid Members
  - Emergency Medical Services
  - Regional Health Information Organizations



Each committee meets multiple times per year to review and discuss 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. The Maternal Mortality Review Information Application 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 2018-2020 COHORT

I. ALL PREGNANCY-ASSOCIATED DEATHS

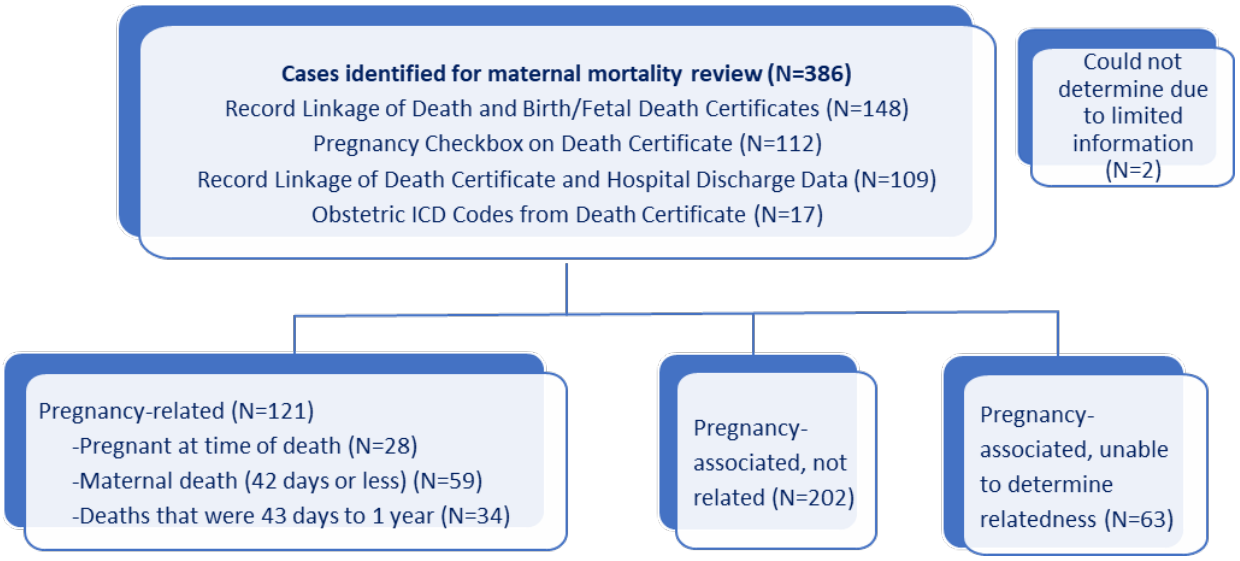
Using the case identification methods previously described, 539 potential cases were identified for the 2018-2020 cohort, with 373 from Rest of State and 166 from New York City. Three hundred eighty-six cases (71.6%) were verified pregnancy-associated deaths; the remaining 150 (27.8%) were not pregnancy-associated. Two Rest of State cases had limited information and could not be reviewed because those deaths occurred outside of New York State, and the Department was unable to obtain enough records to complete case review.

Among all verified pregnancy-associated deaths (386), more than one-third (148, 38.3%) were identified through the linkage of death and birth/fetal death certificates, followed by pregnancy checkbox on death certificates (112, 29.0%), the linkage of death certificate and hospital discharge data (109, 28.2%), and obstetric International Classification of Diseases codes from death certificates (17, 4.4%). In two cases, pregnancy-relatedness could not be determined due to limited information.

Reviews of these 386 cases, from both the New York State and New York City committees, identified a total of 121 pregnancy-related deaths; 202 pregnancy-associated, but not related deaths; and 63 pregnancy-associated, but unable to determine pregnancy-relatedness deaths.

Please note that throughout the report, ratios based on small numbers are inherently unreliable and should therefore be interpreted with caution.

Figure 3. New York State Surveillance of Pregnancy-Associated Deaths, 2018-2020

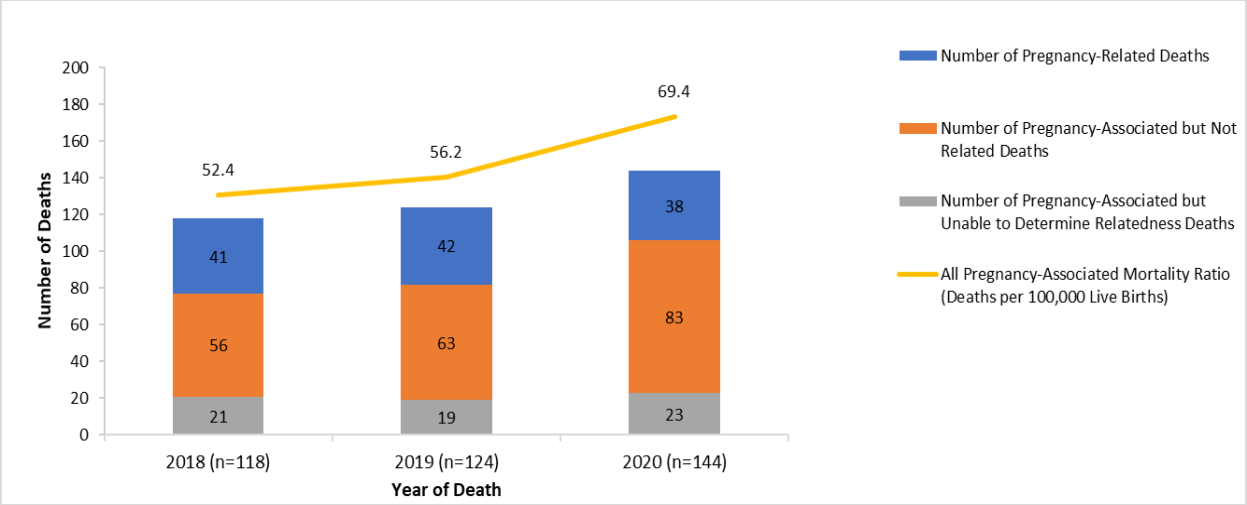


Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Compared to 2018, the total number of pregnancy-associated deaths increased 5.1% in 2019 and 22.0% in 2020, largely due to increasing numbers of pregnancy-associated, but not-related deaths. The percentage of pregnancy-associated, but not related deaths was 47.5% in 2018, 50.8% in 2019, and 57.6% in 2020 (Figure 4). The notable increase in pregnancy-associated, but not related deaths in 2020 was due to an increase in deaths caused by substance use disorder.

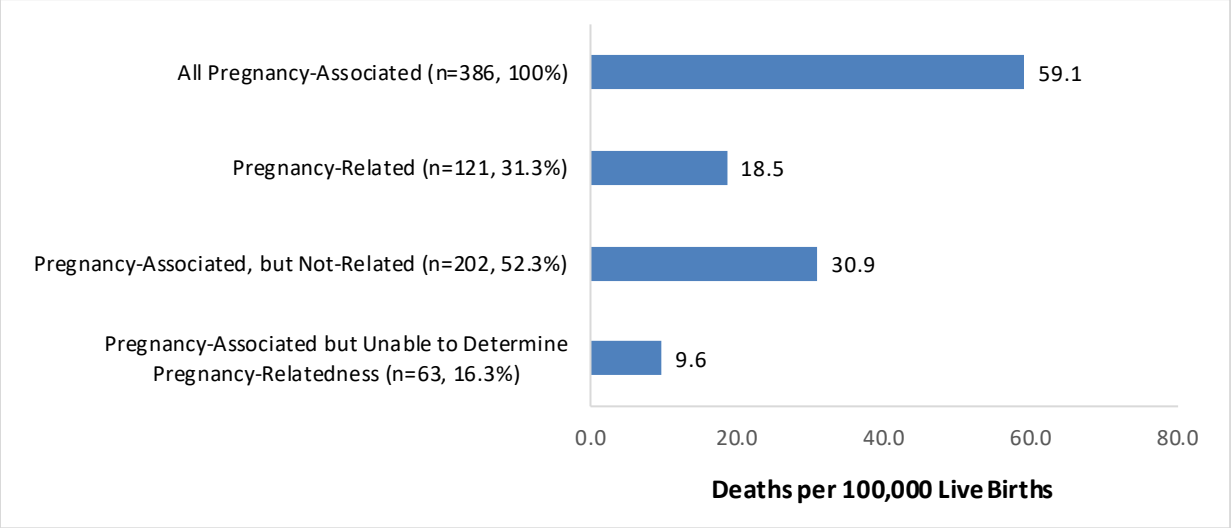
Figure 4. Number of Pregnancy-Associated Deaths and Mortality Ratio by Pregnancy Relatedness by Year, 2018-2020



Source: New York State Maternal Mortality Review

During 2018-2020, the overall pregnancy-associated mortality ratio was 59.1 deaths per 100,000 live births. More than a half of deaths (52.3%) were pregnancy-associated, but not-related, which represented the highest mortality ratio (30.9 deaths per 100,000 live births) in the group. In addition, about one third of deaths (31.3%) were pregnancy-related with a mortality ratio of 18.5 deaths per 100,000 live births (Figure 5).

Figure 5. Pregnancy-Associated Mortality Ratio by Relatedness, 2018-2020



Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Demographics

Table 1 describes the demographic characteristics of these 386 individuals. Most deaths occurred among women aged 30 years or older (60.1%); about half of the deaths occurred among non-Hispanic White women (47.7%); most of the deaths occurred among women who were not married (71.5%); and most of the decedents had Medicaid as their primary health insurance (66.1%). More than half (59.9%) of these deaths occurred among women with a high school education or less, and over one-third (37.3%) of these deaths occurred among women living in New York City. The majority of these deaths (89.4%) occurred in urban or suburban areas.

Table 1. New York State Pregnancy-Associated Deaths: Maternal Demographic Characteristics, 2018-2020

Demographic Characteristics	Count (%)
Age at Death (Years)	
24 or younger	69 (17.9%)
25-29	85 (22.0%)
30-34	92 (23.8%)
35-39	89 (23.1%)
40 or older	51 (13.2%)
Race/Ethnicity	
Black, non-Hispanic	112 (29.0%)
White, non-Hispanic	184 (47.7%)
Hispanic	67 (17.4%)
Other, non-Hispanic*	23 (6.0%)
Marital Status	
Married	109 (28.2%)
Unmarried	276 (71.5%)
Unknown	1 (0.3%)
Education	
12th Grade or Less; No Diploma	79 (20.5%)
High School or General Educational Development (GED) Graduate	152 (39.4%)
Some College Credit, but No Degree	68 (17.6%)
Associate or Bachelor's Degree	63 (16.3%)
Advanced Degree	23 (6.0%)
Unknown	1 (0.3%)
Health Insurance	
Medicaid	255 (66.1%)
Private Insurance	94 (24.4%)
Self-Pay	14 (3.6%)
Other Government Program/Child Health Plus	7 (1.8%)
Other Non-Federal Program	2 (0.5%)
Medicare	5 (1.3%)
Unknown	9 (2.3%)

Health Service Area (HSA)**	
Central New York + New York-Pennsylvania***	48 (12.4%)
Finger Lakes	34 (8.8%)
Mid-Hudson	43 (11.1%)
Nassau-Suffolk	39 (10.1%)
New York City	144 (37.3%)
Northeastern New York	30 (7.8%)
Western New York	48 (12.4%)
Urbanicity****	
Urban	278 (72.0%)
Suburban	67 (17.4%)
Rural	41 (10.6%)
Total	**386 (100%)**

*Other, non-Hispanic includes American Indian/Alaska Native, Asian, Old Order Amish, and bi-racial individuals.
**See Appendix C for Health Service Area descriptions
***Central NY was combined with the contiguous NY-Pennsylvania due to the latter's small cell size
****Urban/suburban/rural locale designations derived from the 2013 Urban Rural Classification Scheme for Counties (based on OMB Metropolitan/Nonmetropolitan statistical areas)

- Urban - counties in large central areas with one million+ populations or in their large fringe metropolitan areas
- Suburban - counties within medium metropolitan areas with 250,000-999,999 populations and small metropolitan areas with 50,000 – 249,999 populations
- Rural - counties with micropolitan urban cluster populations of 10,000-49,999 and counties with fewer than 10000 populations

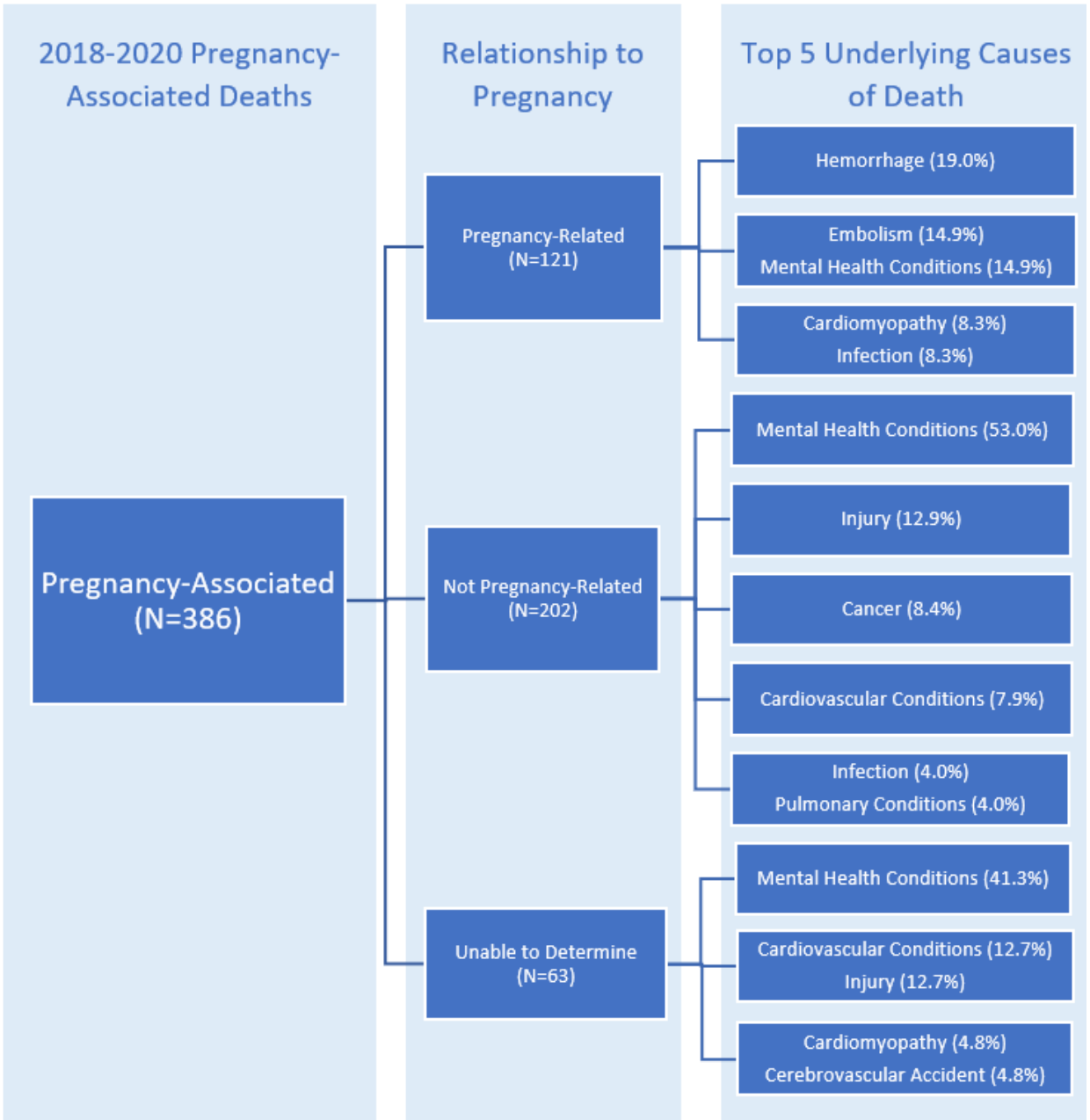
Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Cause of Death

Figure 6 lists the top five underlying causes of pregnancy-associated deaths by relationship to pregnancy. The only cause of death in the top five for each relationship category was Mental Health Conditions.

Figure 6. Top Five Leading Underlying Causes of Death for Pregnancy-Associated Deaths by Relationship to Pregnancy, 2018-2020



Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 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 birthing persons complaints might be dismissed as normal discomfort, or the birthing person may not have ready access to care due to economic or logistical factors. Pregnancy-related deaths are a major focus of the committee reviews because they provide the greatest opportunity for preventing future deaths. Of the 386 pregnancy-associated deaths identified for the 2018-2020 cohort, 121 (31.3%) were determined to be pregnancy-related.

Demographics

Table 2 describes the demographic characteristics of the 2018-2020 pregnancy-related death cohort at the time of their deaths, including age, race/ethnicity, marital status, education level, employment status, insurance type, and region by Health Service Area (HSA). Most of the pregnancy-related deaths were among women aged 35 years or older (54.6%). Black, non-Hispanic women accounted for 42.1% of pregnancy-related deaths, despite accounting for only 14.3% of all live births. Most of the women were unmarried (60.3%). Approximately half of these women (47.1%) were employed. Approximately 73% of the pregnancy-related deaths occurred among women who had attended at least some college. The majority of the women were enrolled in Medicaid (64.5%), while an additional 28.9% were covered by private insurance. Almost two-thirds (63.6%) of these women lived in New York City. The majority of these women (95.9%) lived in urban/suburban areas.

Table 2. Demographic Characteristics of Pregnancy-Related Deaths, 2018-2020

Demographic Characteristics	Count (%)
Age at Death (Years)	
24 or younger	12 (9.9%)
25-29	21 (17.4%)
30-34	22 (18.2%)
35-39	37 (30.6%)
40 or older	29 (24.0%)
Race/Ethnicity	
Black, non-Hispanic	51 (42.1%)
White, non-Hispanic	36 (29.8%)
Hispanic	25 (20.7%)
Asian, non-Hispanic	9 (7.4%)
Marital Status	
Married	48 (39.7%)
Unmarried	73 (60.3%)

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Education	
12th Grade or Less; No Diploma	20 (16.5%)
High School or General Educational Development (GED) Graduate	40 (33.1%)
Some College Credit, but No Degree	28 (23.1%)
Associate or Bachelor's Degree	24 (19.8%)
Advanced Degree	9 (7.4%)
Employment Status	
Employed	57 (47.1%)
Unemployed	56 (46.3%)
Unknown	8 (6.6%)
Health Insurance	
Medicaid	78 (64.5%)
Private Insurance	35 (28.9%)
Self-Pay	5 (4.1%)
Unknown	3 (2.5%)
Health Service Area *	
Central New York + New York-Pennsylvania**	7 (5.8%)
Finger Lakes	6 (5.0%)
Mid-Hudson	10 (8.3%)
Nassau-Suffolk	10 (8.3%)
New York City	77 (63.6%)
Northeastern New York	3 (2.5%)
Western New York	8 (6.6%)
Urbanicity* **	
Urban	106 (87.6%)
Suburban	10 (8.3%)
Rural	5 (4.1%)
Total	**121 (100%)**

* See Appendix C for Health Service Area descriptions

** Central New York was combined with the contiguous New York-Pennsylvania due to the latter's small cell size

*** Urban/suburban/rural locale designations derived from the 2013 Urban Rural Classification Scheme for Counties (based on Office of Management and Budget Metropolitan/Nonmetropolitan statistical areas)

- Urban - counties in large central areas with one million+ populations or in their large fringe metropolitan areas
- Suburban - counties within medium metropolitan areas with 250,000-999,999 populations and small metropolitan areas with 50,000 – 249,999 populations
- Rural - counties with micropolitan urban cluster populations of 10,000-49,999 and counties with fewer than 10000 populations

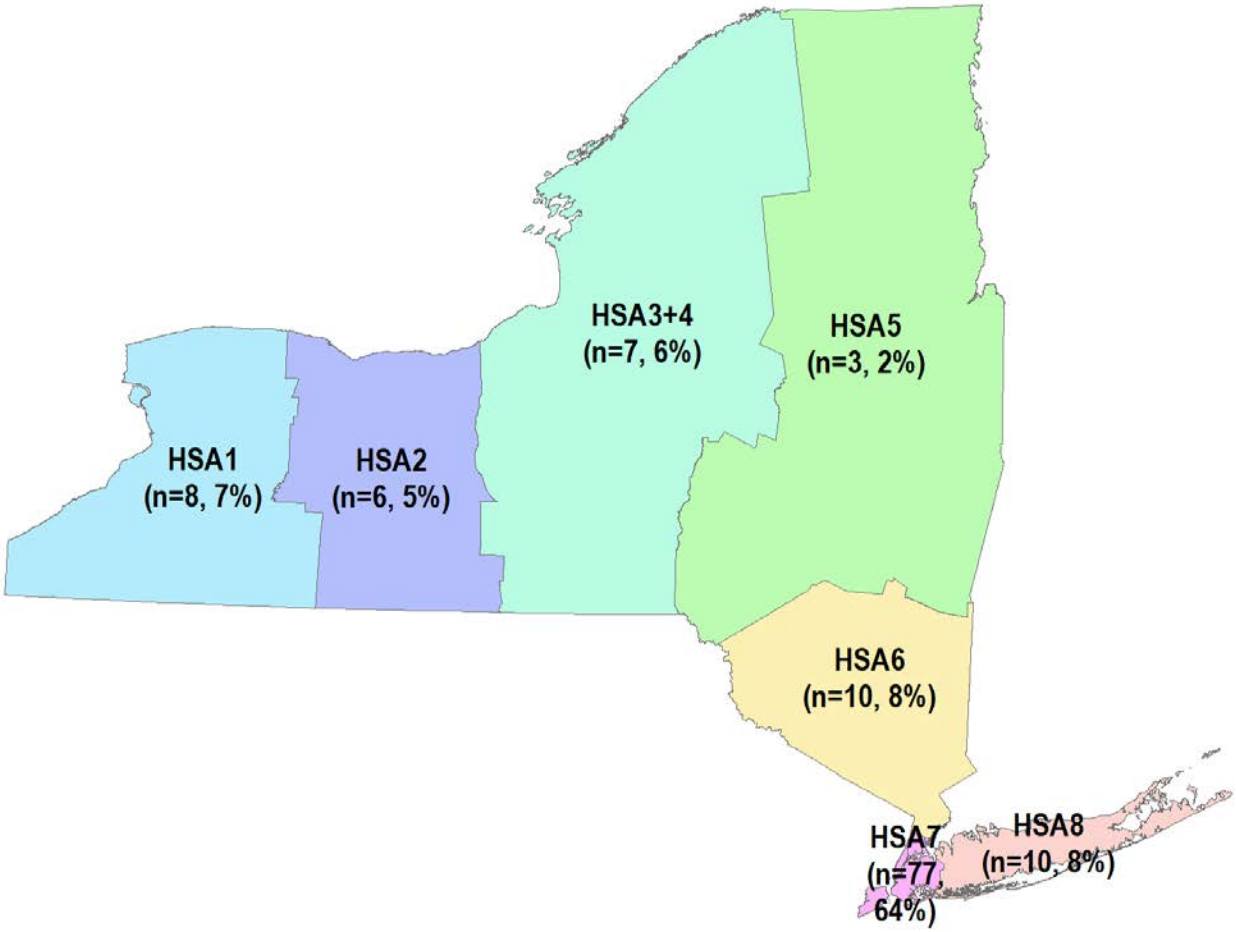
Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Geographic Distribution

Pregnancy-related deaths occurred in every Health Service Area of New York State. New York City had the highest number of pregnancy-related deaths (77, 63.6%), followed by Nassau Suffolk (10, 8.3%), Mid-Hudson (10, 8.3%), Western New York (8, 6.6%), Central New York/New York-Pennsylvania (7, 5.8%), Finger Lakes (6, 5.0%), and Northeastern New York (3, 2.5%) (Table 2, Figure 7). Note that the Central New York area was combined with the contiguous New York-Pennsylvania area due to the latter's small cell size. Please refer to Appendix C for a listing of the counties that make up each Health Service Area.

Figure 7. Geographic Distribution of Pregnancy-Related Deaths by Health Service Area, 2018-2020



HSA Number	HSA Name	HSA Number	HSA Name
HSA 1	Western New York	HSA 5	Northeastern New York
HSA 2	Finger Lakes	HSA 6	Mid-Hudson
HSA 3	Central New York	HSA 7	New York City
HSA 4	New York-Pennsylvania	HSA 8	Nassau-Suffolk

Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Preexisting Medical Conditions

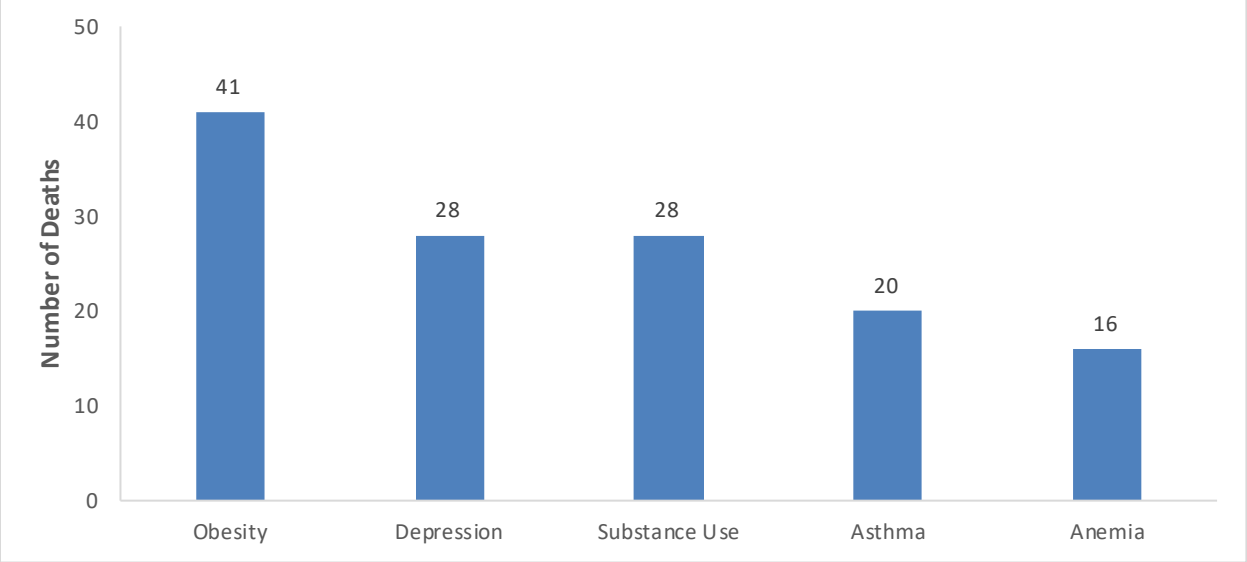
Among the women in the pregnancy-related death cohort, 104 (86.0%) had documented pre-existing medical conditions, including 29.8% with one pre-existing medical condition, 19.8% with two, 12.4% with three, and 24% with four or more pre-existing conditions; 10 had no pre-existing medical conditions (8.3%); and the remaining seven were unknown (5.8%) (Table 3). The most common pre-existing medical conditions were obesity, followed by depression, substance use, asthma, and anemia (Figure 8).

Table 3. Distribution of Pregnancy-Related Deaths with Documented Preexisting Medical Conditions by Number of Conditions, 2018-2020

Number of Preexisting Conditions	Number of Deaths (%)
0	10 (8.3%)
1	36 (29.8%)
2	24 (19.8%)
3	15 (12.4%)
≥ 4	29 (24.0%)
Unknown	7 (5.8%)
Total	**121 (100%)**

Source: New York State Maternal Mortality Review

Figure 8. Number of Pregnancy-Related Deaths with Most Common Documented Preexisting Conditions, 2018-2020



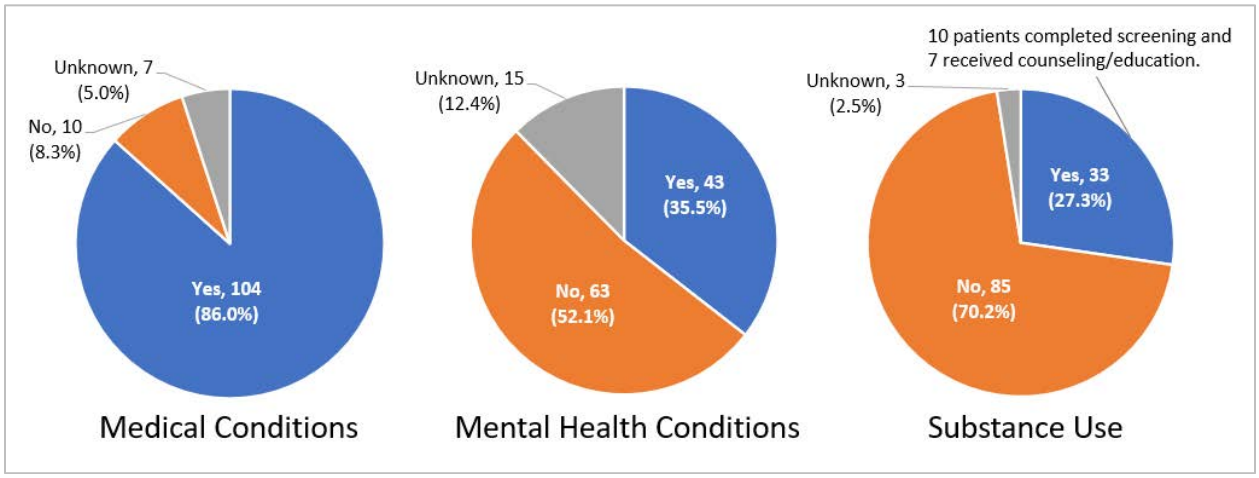
Note: An individual can have multiple conditions.

Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

A total of 104 (86.0%) women had documented preexisting medical conditions; 43 (35.5%) had documented preexisting mental health conditions and 33 (27.3%) had documented preexisting substance use (Figure 9). Among those with documented substance use, 10 had documented information indicating they completed substance use screening and seven had documented information indicating they received substance counseling/education (Figure 9).

Figure 9. Distribution of Pregnancy-Related Deaths by Documented Preexisting Conditions, 2018-2020



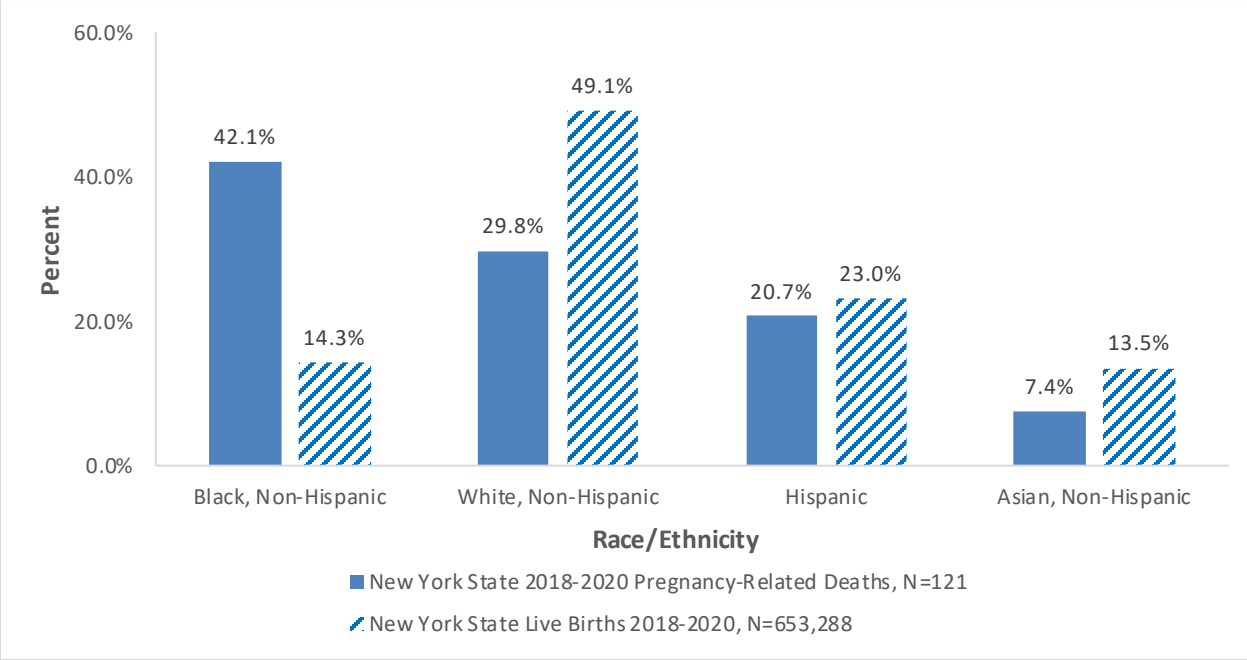
Source: New York State Maternal Mortality Review

Racial and Other Disparities

The racial and ethnic distributions of live births and pregnancy-related deaths show that Black, non-Hispanic women were overrepresented in the pregnancy-related death cohort, given that births among Black, non-Hispanic women represented 14.3% of live births in New York State, while they contributed to 42.1% of the pregnancy-related death cohort. Births among White, non-Hispanic women represented 49.1% of live births in New York State, while deaths represented 29.8% of the pregnancy-related death cohort. This illustrates the racial disparity in pregnancy-related mortality rates between Black, non-Hispanic and White, non-Hispanic women in New York State (Figure 10).

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

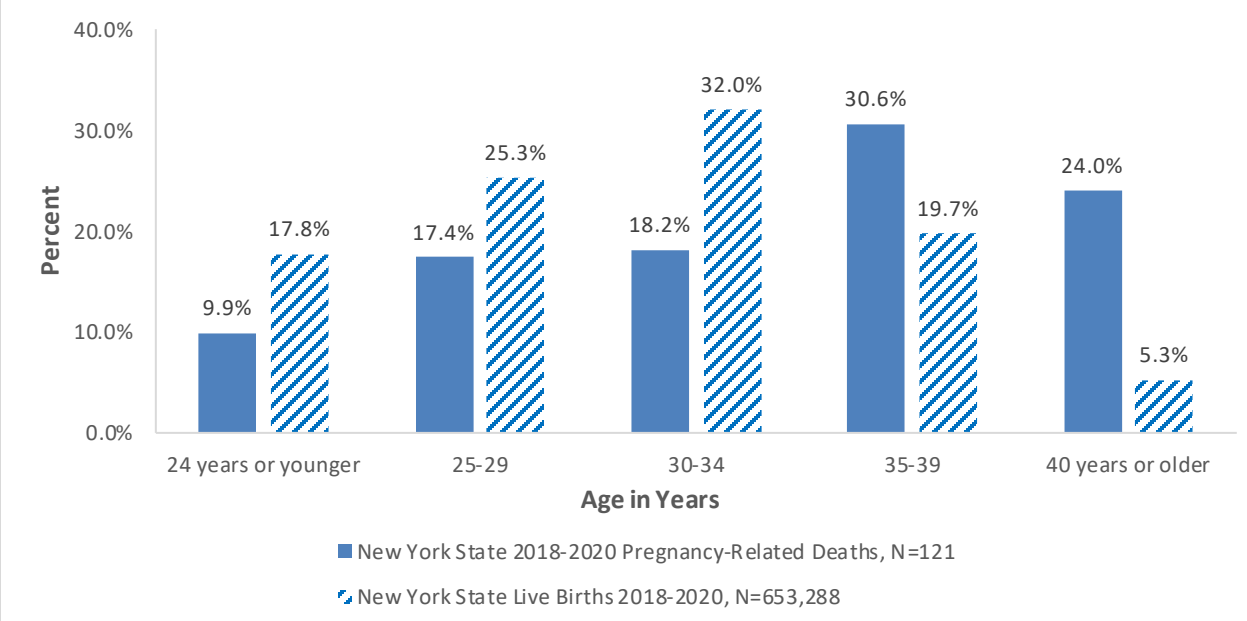
Figure 10. Proportion of Pregnancy-Related Deaths and Live Births by Race/Ethnicity, 2018-2020



Source: New York State Maternal Mortality Review and New York State Vital Statistics

Women aged 35 years and older were overrepresented in the pregnancy-related death cohort. About 30.6% of pregnancy-related deaths were among women between 35 and 39 years old, while only 19.7% of the births were to women in that age group. Women over 40 years old comprised 24.0% of pregnancy-related deaths, but only 5.3% of births (Figure 11).

Figure 11. Proportion of Pregnancy-Related Deaths and Live Births by Age, 2018-2020

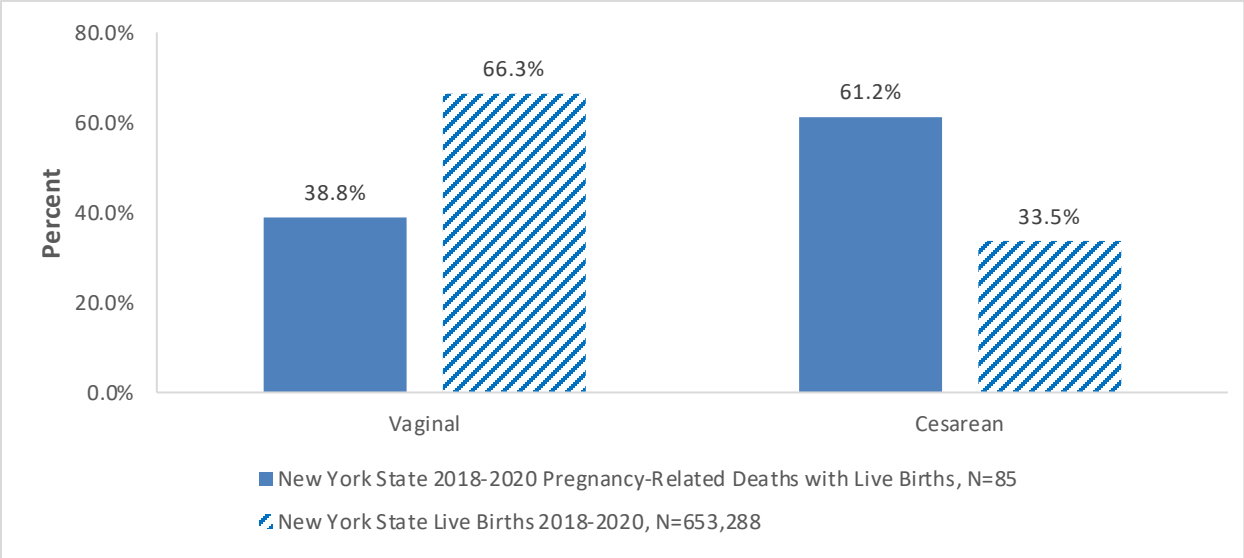


Source: New York State Maternal Mortality Review and New York State Vital Statistics

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Among the 121 pregnancy-related deaths, 85 had a live birth. Vaginal deliveries comprised 38.8% of live births in the pregnancy-related death cohort in New York State and 66.3% of overall live births in New York State. Cesarean deliveries comprised 61.2% of live births in the pregnancy-related death cohort in New York State and 33.5% of overall live births in New York State (Figure 12).

Figure 12. Proportion of Pregnancy-Related Deaths with Live Births by Type of Delivery, 2018-2020



Source: New York State Maternal Mortality Review and New York State Vital Statistics

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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 (48.8%) occurred within 42 days of the end of pregnancy, with the remainder occurring among women who were pregnant at the time of death (23.1%) and women who died 43 days to one year after the end of their pregnancy (28.1%) (Figure 13).

Figure 13. Distribution of Pregnancy-Related Deaths by Timing of Death in Relation to Pregnancy, 2018-2020

Source: New York State Maternal Mortality Review

Deaths occurring within 42 days of the end of pregnancy represented the largest proportion of deaths for all racial/ethnic groups. A larger proportion of Black, non-Hispanic women died during pregnancy compared to White, non-Hispanic women (23.5% vs 19.4%) (Table 4). The proportion of Black, non-Hispanic women and White, non-Hispanic women who died 43 to 365 days after the end of pregnancy is comparable (27.5% vs 25.0%) (Table 4).

Table 4. Distribution of Timing of Pregnancy-Related Deaths in Relation to Pregnancy, by Race/Ethnicity, 2018-2020

Race/Ethnicity	Timing of Death in Relation to Pregnancy Count (%)			
	While Pregnant	Within 42 days	Within 43 to 365 days	Total
Black, non-Hispanic	12 (23.5%)	25 (49.0%)	14 (27.5%)	51 (100%)
White, non-Hispanic	7 (19.4%)	20 (55.6%)	9 (25.0%)	36 (100%)
Hispanic	7 (28.0%)	10 (40.0%)	8 (32.0%)	25 (100%)
Asian, non-Hispanic	2 (22.2%)	4 (44.4%)	3 (33.3%)	9 (100%)

Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Timing of pregnancy-related deaths varied somewhat by cause of death (Table 5). Most deaths due to hemorrhage (43.5%) and embolism (72.2%) occurred within 42 days after the end of pregnancy, and the majority of deaths due to mental health conditions (72.2%) occurred within 43 to 365 days after the end of pregnancy.

Table 5. Distribution of Timing of Pregnancy-Related Deaths by Underlying Causes of Death, 2018-2020

Cause of Death	Timing of Death in Relation to Pregnancy Count (%)			
	While Pregnant	Within 42 days	Within 43 to 365 days	Total
Hemorrhage (Excludes Aneurysms and Cerebrovascular Accidents)	12 (52.2%)	10 (43.5%)	1 (4.3%)	23 (19.0%)
Embolism - Thrombotic (Non-Cerebral)	4 (22.2%)	13 (72.2%)	1 (5.6%)	18 (14.9%)
Mental Health Conditions	1 (5.6%)	4 (22.2%)	13 (72.2%)	18 (14.9%)
Cardiomyopathy	0	4 (40.0%)	6 (60.0%)	10 (8.3%)
Infection	0	8 (80.0%)	2 (20.0%)	10 (8.3%)
Amniotic Fluid Embolism	2 (22.2%)	7 (77.8%)	0	9 (7.4%)
Cardiovascular Conditions	2 (28.6%)	2 (28.6%)	4 (42.9%)	7 (5.8%)
Metabolic/Endocrine Disorders	2 (33.3%)	1 (16.7%)	3 (50.0%)	6 (5.0%)
Cancer	0	1 (25.0%)	3 (75.0%)	4 (3.3%)
Injury	3 (100.0%)	0	0	3 (2.5%)
Hematologic Conditions	0	2 (100%)	0	2 (1.7%)
Hypertensive Disorders of Pregnancy	0	2 (100%)	0	2 (1.7%)
Gastrointestinal Disorders	0	1 (50.0%)	1 (50.0%)	2 (1.7%)
Anesthesia Complications	0	1 (100.0%)	0	1 (0.8%)
Cerebrovascular Accidents	1 (100%)	0	0	1 (0.8%)
Pulmonary Conditions (Excludes Acute Respiratory Distress Syndrome)	0	1 (100%)	0	1 (0.8%)
Unknown	1 (25.0%)	2 (50.0%)	1 (25.0%)	4 (3.3%)
Total	**28 (23.1%)**	**59 (48.8%)**	**34 (28.1%)**	**121 (100%)**

Source: New York State Maternal Mortality Review

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Pregnancy-Related Deaths by Manner of Death

Manner of death provides a general categorization of death. The manner of death can be natural or unnatural, based on the circumstances of the death. Unnatural deaths are further classified as accident, homicide, suicide, or manner undetermined.

Table 6 below displays manners of death, as recorded on death certificates and/or committee decisions forms. Among 121 pregnancy-related deaths, a substantial majority (71.9%) were deemed to be natural.

Table 6. Distribution of Manner of Death Among Pregnancy-Related Deaths, 2018-2020

Manner of Death	Count (%)
Natural	87 (71.9%)
Accident	19 (15.7%)
Suicide	11 (9.1%)
Homicide	2 (1.7%)
Undetermined	2 (1.7%)
Total	**121 (100%)**

Source: New York State Maternal Mortality Review

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 (61.2%) or at an outpatient/ER visit (20.7%). The remaining deaths occurred at home (17.4%) and hospice (0.8%) (Table 7).

Table 7. Distribution of Location of Death Among Pregnancy-Related Deaths, 2018-2020

Place of Death	Count (%)
Hospital Inpatient	74 (61.2%)
Hospital Outpatient/Emergency Department	25 (20.7%)
Home	21 (17.4%)
Hospice	1 (0.8%)
Total	**121 (100%)**

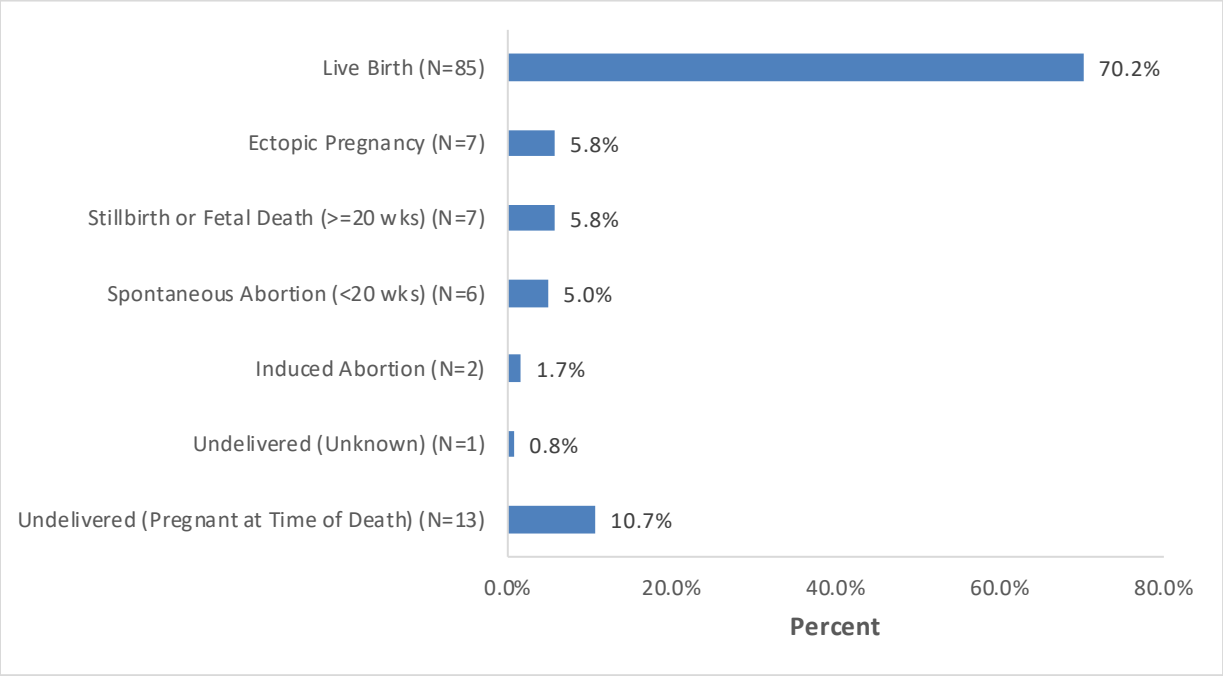
Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Pregnancy-Related Deaths by Pregnancy Outcome

Pregnancy outcomes are classified as live birth, stillbirth, spontaneous abortion, induced abortion, and ectopic pregnancy. Figure 14 below shows the pregnancy outcomes associated with 2018-2020 pregnancy-related deaths in New York State. The majority (70.2%) of pregnancy-related deaths occurred after a live birth. Fourteen deaths were categorized as undelivered (11.5%). Among the undelivered, 13 deaths occurred during pregnancy, and pregnancy outcome status was unknown for one individual.

Figure 14. Distribution of Pregnancy-Related Deaths by Pregnancy Outcome, 2018-2020



Source: New York State Maternal Mortality Review

Pregnancy-Related Deaths by Type of Delivery

Type of delivery is classified as either vaginal or cesarean. Cesarean deliveries may be planned or unplanned. Figure 15 illustrates the distribution of pregnancy-related deaths by type of delivery for women who died during labor and delivery or during the postpartum period. Of the 121 pregnancy-related deaths, 85 had live births. Thirty-three women (38.8%) had vaginal deliveries and 52 (61.2%) had cesarean deliveries. Thirty-six women did not deliver a baby due to abortion, ectopic pregnancy, still birth, fetal death, or were pregnant at time of death.

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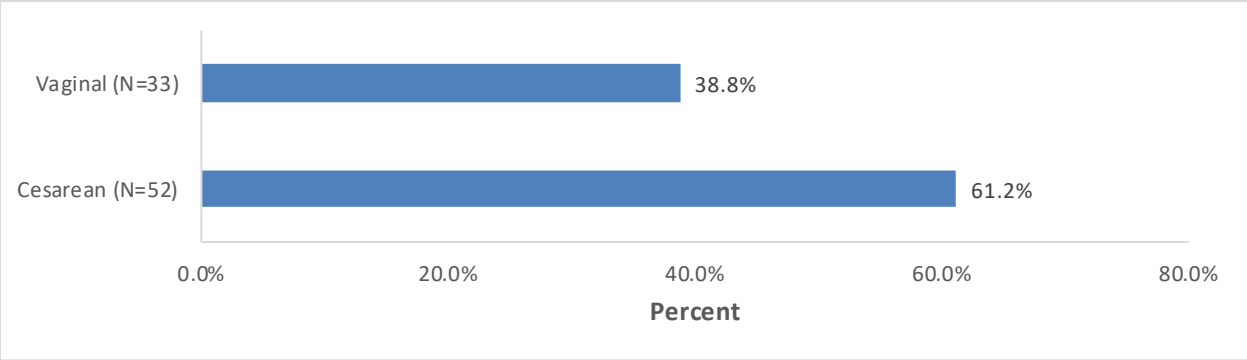
Figure 15. Distribution of Pregnancy-Related Deaths with Live Births by Type of Delivery, 2018-2020

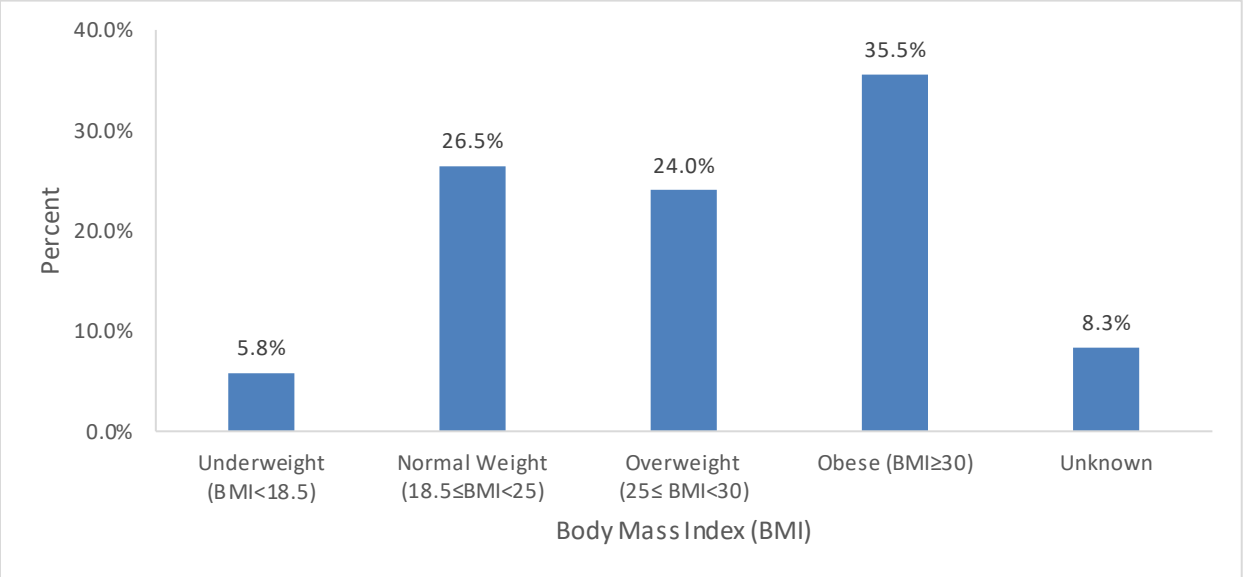


Source: New York State Maternal Mortality Review

Pregnancy-Related Deaths by Pre-Pregnancy Body Mass Index

Body mass index (BMI) is calculated based on an individual's height and weight. A high body mass index can indicate an unhealthy body fat percentage. The following four body mass indexes are categorized to examine associations between pre-pregnancy weight and pregnancy-related deaths: underweight (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 (59.5%) during 2018-2020 were overweight or obese (Figure 16).

Figure 16. Distribution of Pregnancy-Related Deaths by Pre-Pregnancy Body Mass Index, 2018-2020



Source: New York State Maternal Mortality Review

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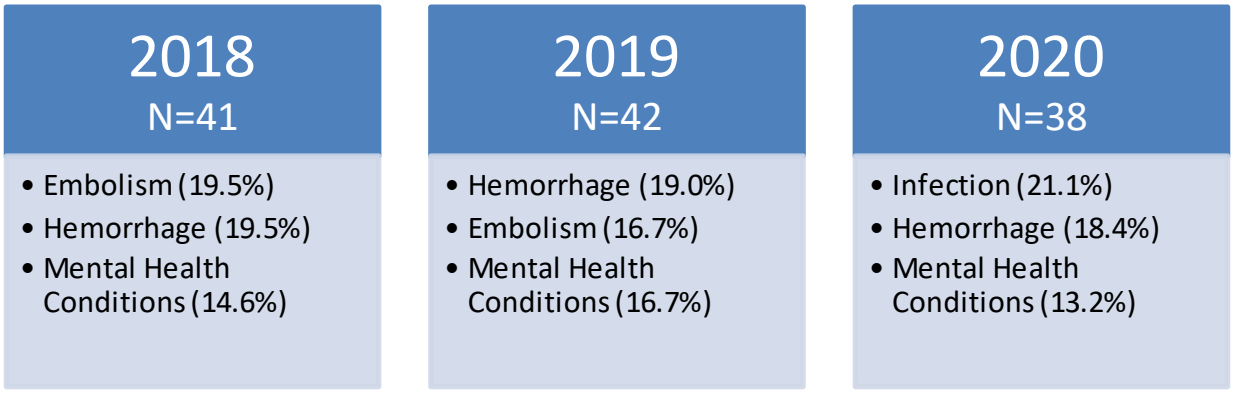
Cause of Death

For 2018, 2019, and 2020, hemorrhage and mental health conditions were two of the three most common causes of pregnancy-related deaths. While embolism was one of the top-three causes in 2018 and 2019, infection became the most common cause of pregnancy-related death in 2020. Six of the eight deaths due to infection (75%) were attributed to COVID-19, most of which occurred within 42 days of delivery. Five of the six individuals that died from COVID-19 were Hispanic and Black, non-Hispanic. The two non-COVID-19 deaths due to infection were classified as septic shock (12.5%) and antepartum infection (12.5%) (Figure 17).

Figure 17. Top Three Leading Underlying Causes of Death for Pregnancy-Related Deaths by Year, 2018-2020



Source: New York State Maternal Mortality Review

Among 121 pregnancy-related deaths in 2018-2020, the most common underlying causes of death, determined by the committees, were hemorrhage (excludes aneurysms or cerebrovascular accidents) (19.0%), followed by embolism – thrombotic (non-cerebral) (14.9%) and mental health conditions (14.9%) (Figure 18). Other underlying causes included gastrointestinal disorders, hematologic conditions, hypertensive disorders of pregnancy, anesthesia complications, cerebrovascular accidents not secondary to hypertensive disorders of pregnancy, pulmonary conditions (excludes acute respiratory distress syndrome) and unknown (Table 8).

The distribution of causes of pregnancy-related deaths varied by race/ethnicity. The most common causes of pregnancy-related deaths among Black, non-Hispanic women were non-cerebral thrombotic embolism (19.6%), hemorrhage (17.6%), cardiomyopathy (11.8%), metabolic/endocrine conditions (9.8%), and infection (7.8%), while the most common causes of pregnancy-related deaths among White, non-Hispanic women were mental health conditions (25.0%), infection (12.5%), non-cerebral thrombotic embolism (10.0%), hemorrhage (10.0%), amniotic fluid embolism (10.0%), and cardiovascular conditions (10.0%). Notably, a higher percentage of Black, non-Hispanic women died from hemorrhage, embolism, cardiomyopathy, and metabolic/endocrine conditions, while a higher percentage of White, non-Hispanic women died from mental health conditions.

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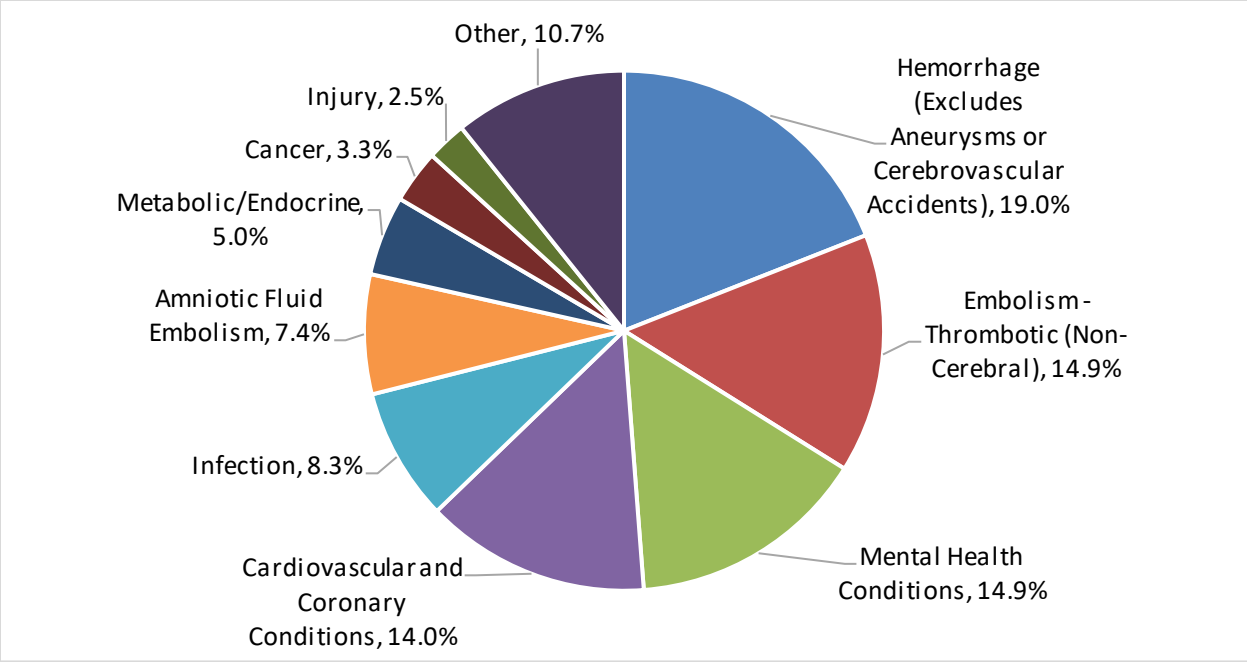
Figure 18. Underlying Causes of Pregnancy-Related Deaths, 2018-2020



*Other includes Gastrointestinal Disorders, Hematologic Conditions, Hypertensive Disorders of Pregnancy, Anesthesia Complications, Cerebrovascular Accidents not Secondary to Hypertensive Disorders of Pregnancy, Pulmonary Conditions (excludes Acute Respiratory Distress Syndrome), and Unknown Causes.

Source: New York State Maternal Mortality Review

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Table 8. Distribution of Underlying Causes of Pregnancy-Related Deaths, 2018-2020

Cause of Death	Count (%)
Hemorrhage (Excludes Aneurysms or Cerebrovascular Accidents)	23 (19.0%)
Embolism - Thrombotic (Non-Cerebral)	18 (14.9%)
Mental Health Conditions	18 (14.9%)
Cardiovascular and Coronary Conditions Cardiomyopathy Postpartum/Peripartum Cardiomyopathy Other Cardiomyopathy/Not Otherwise Specified Cardiovascular Conditions Coronary Artery Disease/Myocardial Infarction/Atherosclerotic Cardiovascular Disease Pulmonary Hypertension Hypertensive Cardiovascular Disease Conduction Defects/Arrhythmias Other Cardiovascular Diseases*	**17 (14.0%)** 10 (58.8%) 6 (60.0%) 4 (40.0%) 7 (41.2%) 1 (14.3%) 2 (28.6%) 1 (14.3%) 1 (14.3%) 2 (28.6%)
Infection	10 (8.3%)
Amniotic Fluid Embolism	9 (7.4%)
Metabolic/Endocrine Conditions	6 (5.0%)
Cancer**	SS
Injury**	SS
Gastrointestinal Disorders**	SS
Hematologic Conditions**	SS
Hypertensive Disorders of Pregnancy**	SS
Anesthesia Complications**	SS
Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy**	SS
Pulmonary Conditions (Excludes Acute Respiratory Distress Syndrome)**	SS
Unknown Cause**	SS
Total	**121 (100%)**

* Other Cardiovascular Diseases include congestive heart failure, cardiomegaly, cardiac hypertrophy, cardiac fibrosis, cardiogenic shock, and non-acute myocarditis and not otherwise specified.

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

Source: New York State Maternal Mortality Review

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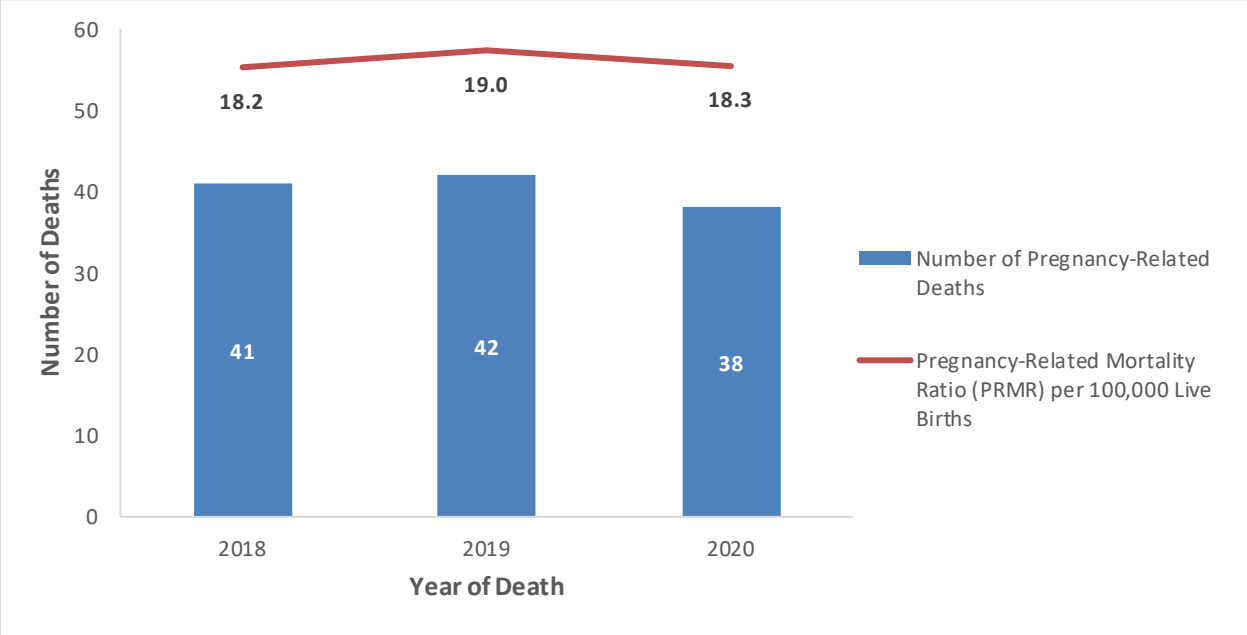
Pregnancy-Related Mortality Ratio

The pregnancy-related mortality ratio 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 pregnancy-related mortality ratio for 2018-2020 was 18.5 deaths per 100,000 live births. In other words, for every 100,000 babies born alive in New York State in 2018-2020, 18.5 women died of a pregnancy-related cause, during pregnancy or within one year of pregnancy.

Pregnancy-Related Mortality Ratio by Year

During 2018-2020, there were a total of 121 pregnancy-related deaths. The overall pregnancy-related mortality ratio was 18.5 deaths per 100,000 live births. The pregnancy-related mortality ratio by year was fairly consistent, with the lowest pregnancy-related mortality ratio in 2018 (18.2 deaths per 100,000 live births) and the highest pregnancy-related mortality ratio in 2019 (19.0 deaths per 100,000 live births) (Figure 19).

Figure 19. Number of Pregnancy-Related Deaths and Pregnancy-Related Mortality Ratio by Year, 2018-2020



Source: New York State Maternal Mortality Review

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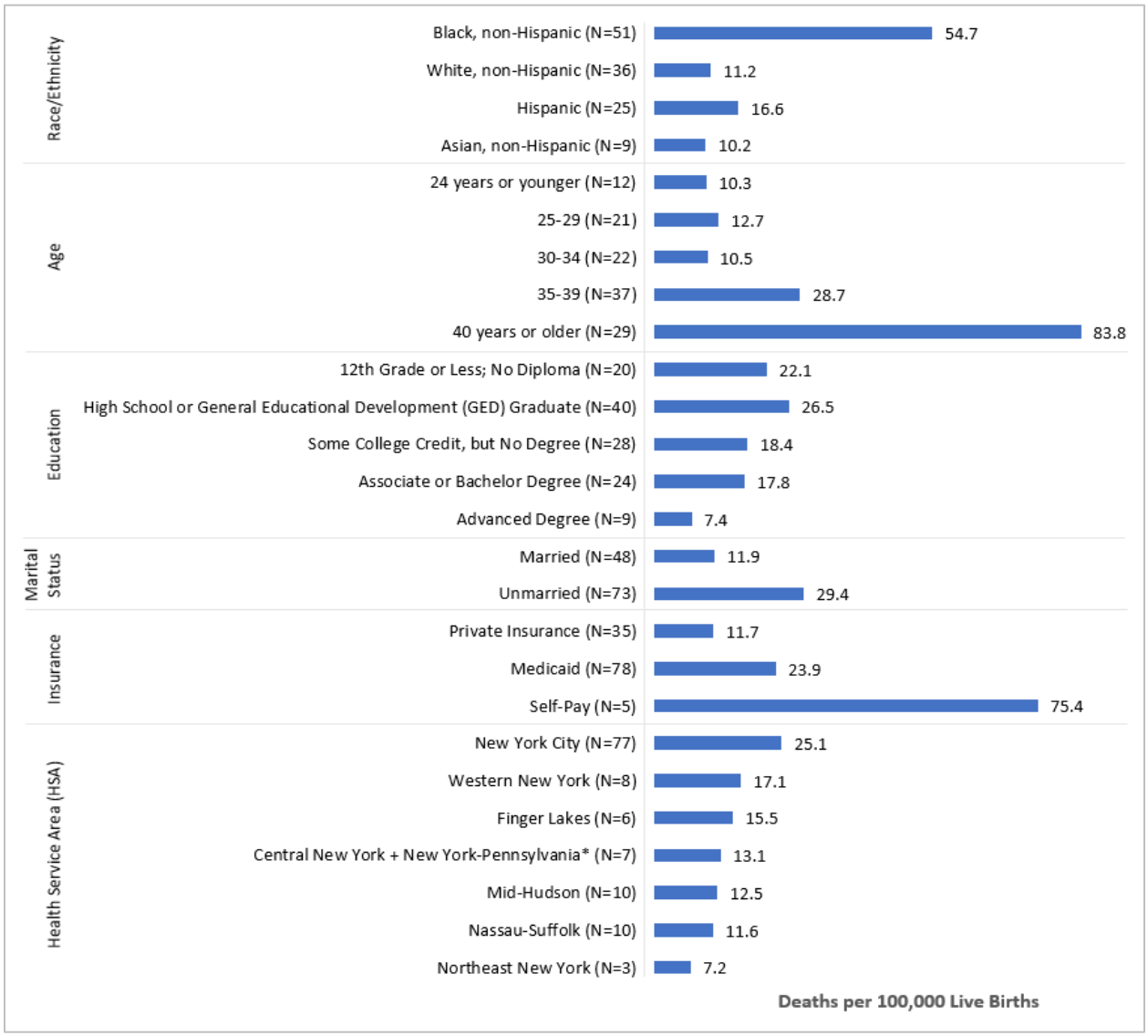
Pregnancy-Related Mortality Ratio by Maternal Demographics

Using the same methodology, it is possible to calculate a pregnancy-related mortality ratio for any group where the numbers of pregnancy-related deaths and live births are known. One of the most powerful uses of the pregnancy-related mortality ratio is to directly compare the likelihood of pregnancy-related death for different sub-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 unmarried, aged 40 years or older at the time of their death, without insurance or lived in New York City. Pregnancy-related mortality ratios by maternal demographics are shown in Figure 20.

Figure 20. Pregnancy-Related Mortality Ratio by Maternal Demographics, 2018-2020



*Central New York was combined with the contiguous New York-Pennsylvania due to the latter's small cell size.
Note: Pregnancy-Related Mortality Ratio by urbanicity is not displayed due to small number in rural area.

Source: New York State Maternal Mortality Review

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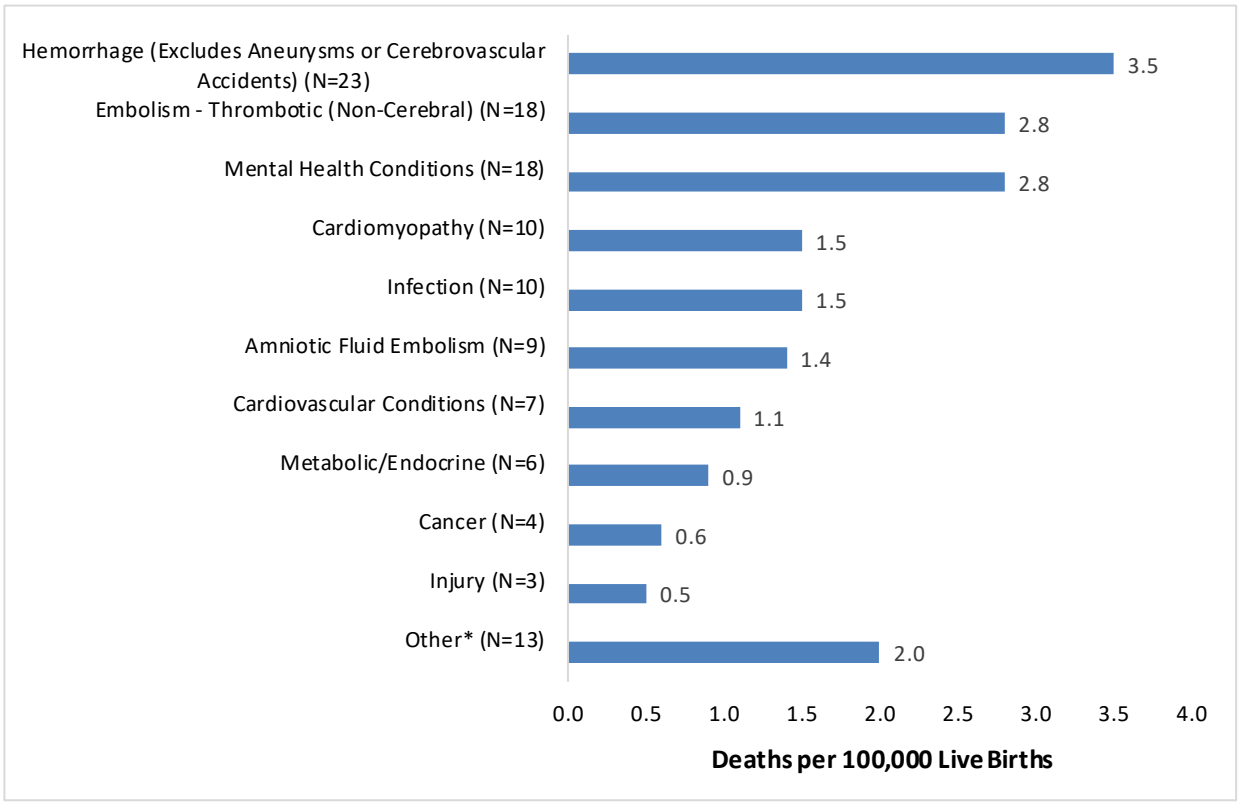
Pregnancy-Related Mortality Ratio by Leading Underlying Causes of Death

Figure 21 displays the cause-specific pregnancy-related mortality ratio for leading underlying causes of death per 100,000 2018-2020 live births. The underlying cause of pregnancy-related death with the highest pregnancy-related mortality ratio was Hemorrhage (excludes aneurysms or cerebrovascular accidents) at 3.5 deaths per 100,000 live births. Embolism – thrombotic (non-cerebral) and Mental Health Conditions were the causes of death with the next-highest pregnancy-related mortality ratios, with each at 2.8 deaths per 100,000 live births.

Figure 21. Pregnancy-Related Mortality Ratio by Leading Underlying Causes of Death, 2018-2020



*Other includes Cerebrovascular Accidents not Secondary to Hypertensive Disorders of Pregnancy, Gastrointestinal Disorders, Hematologic Conditions, Hypertensive Disorders of Pregnancy, Anesthesia Complications, Pulmonary Conditions (excludes Acute Respiratory Distress Syndrome), and Unknown Causes.

Source: New York State Maternal Mortality Review

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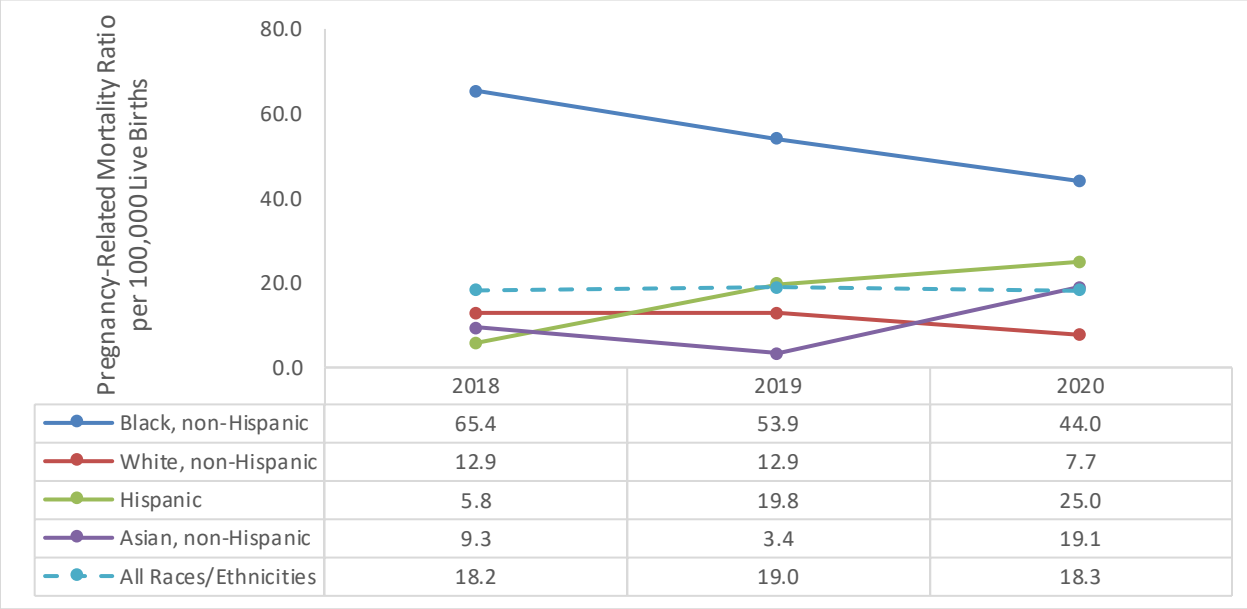
Pregnancy-Related Mortality Ratio Racial Disparity

Across all three years, Black, non-Hispanic women had the highest ratio of pregnancy-related mortality (Figure 22). In 2018, the pregnancy-related mortality ratio among Black, non-Hispanic women was 5.1 times higher than that of White, non-Hispanic women. In 2019, the pregnancy-related mortality ratio for Black, non-Hispanic women was 4.2 times higher and in 2020, the pregnancy-related mortality ratio was 5.7 times higher. The overall 2018-2020 pregnancy-related mortality ratio for Black, non-Hispanic women was 54.7, which was 4.9 times the ratio for White, non-Hispanic women which was 11.2 (Figure 23).

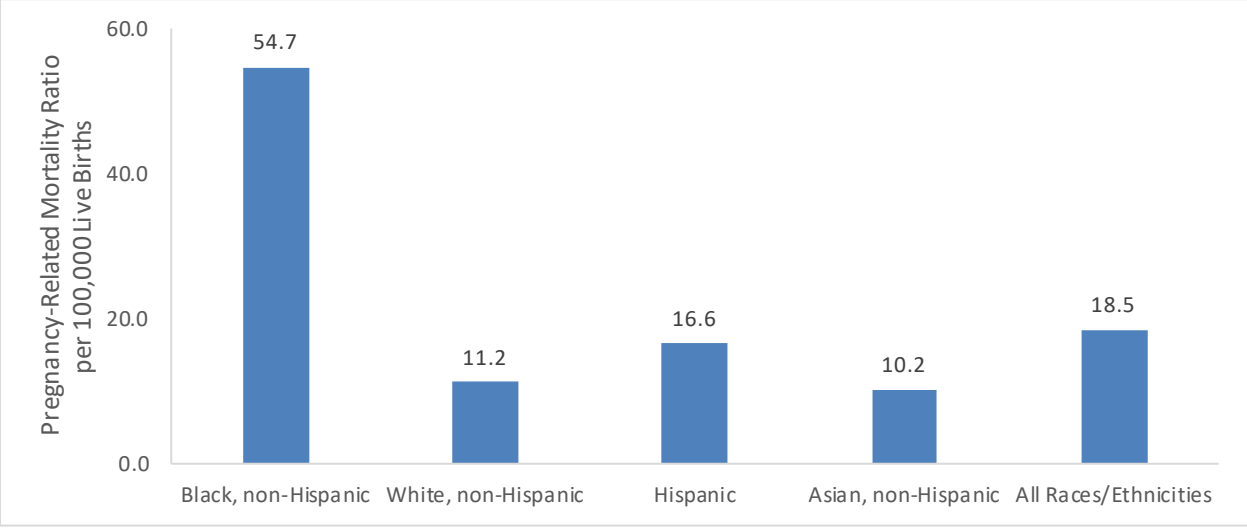
Figure 22. Yearly Trends in Pregnancy-Related Mortality Ratio by Race/Ethnicity, 2018-2020



	2018	2019	2020
Black, non-Hispanic	65.4	53.9	44.0
White, non-Hispanic	12.9	12.9	7.7
Hispanic	5.8	19.8	25.0
Asian, non-Hispanic	9.3	3.4	19.1
All Races/Ethnicities	18.2	19.0	18.3

Source: New York State Maternal Mortality Review

Figure 23. Pregnancy-Related Mortality Ratio by Race/Ethnicity, 2018-2020



Source: New York State Maternal Mortality Review

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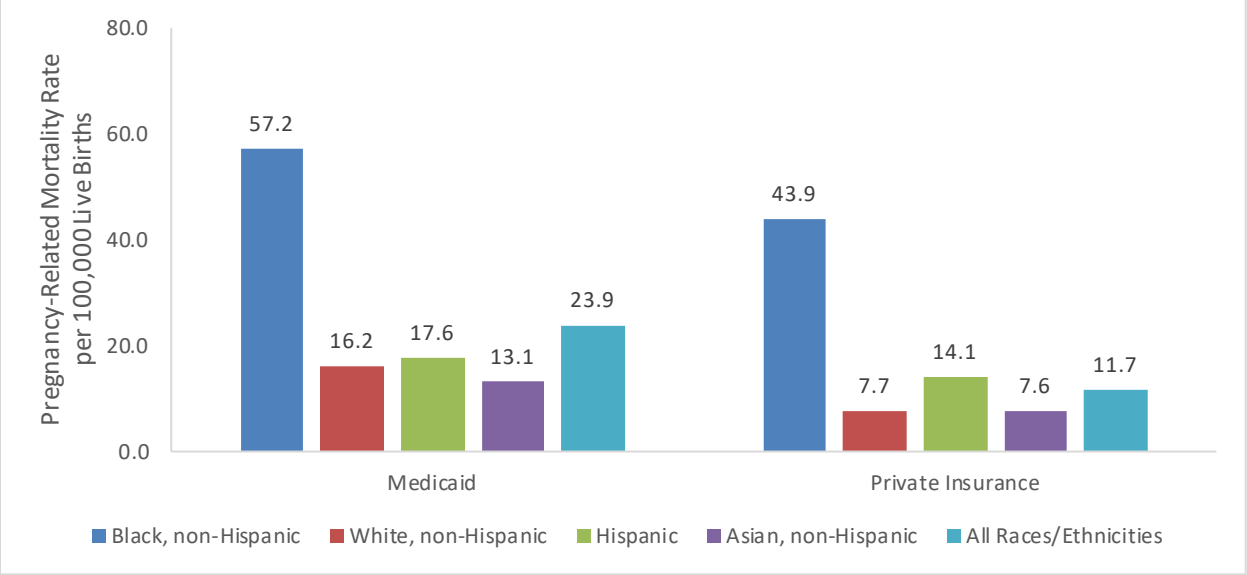
Figure 24 shows that the overall 2018-2020 pregnancy-related mortality ratio for Black, non-Hispanic women was much higher than that of other races/ethnicities, regardless of whether their care was covered by Medicaid or private insurance. The overall 2018-2020 pregnancy-related mortality rates among Black, non-Hispanic women with private insurance were 2.7 times higher than that of White, non-Hispanic women on Medicaid.

Figure 24. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Insurance Type, 2018-2020



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

Source: New York State Maternal Mortality Review

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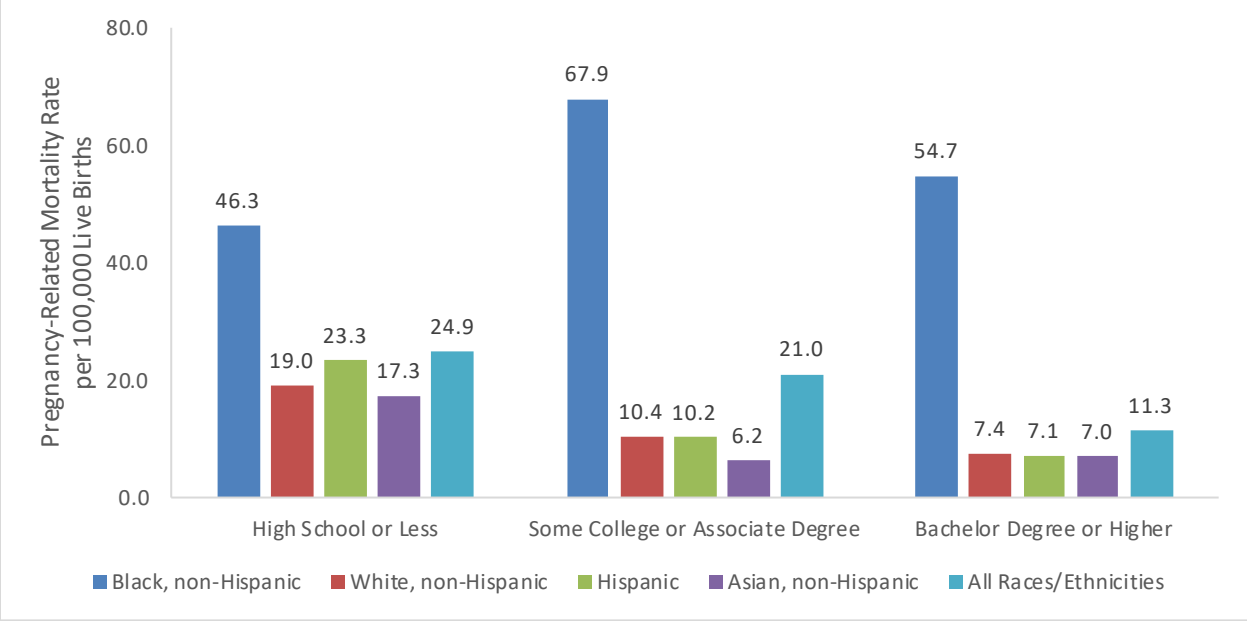
Similarly, the overall 2018-2020 pregnancy-related mortality ratio by race/ethnicity and education level demonstrates that there is a higher risk of death for Black, non-Hispanic women than any other group, no matter the level of education attained. The largest disparity can be seen in the group with some college or an associate degree, where Black, non-Hispanic women had a mortality ratio over seven times higher than White, non-Hispanic women (Figure 25).

Figure 25. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Education Level, 2018-2020



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

Source: New York State Maternal Mortality Review

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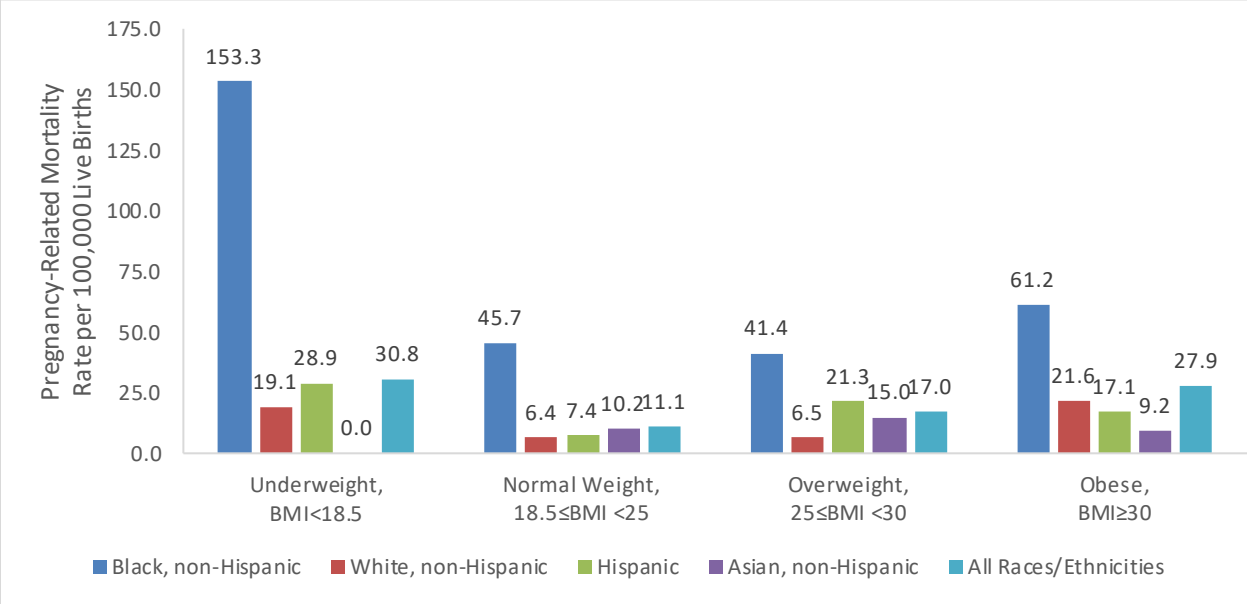
Figure 26 displays the further examination of pregnancy-related mortality ratio by race/ethnicity and pre-pregnancy body mass index (BMI), and again, during 2018-2020, Black, non-Hispanic women died at a much higher rate than any other group at all levels of pre-pregnancy body mass indexes. The greatest difference can be seen in the Underweight, BMI<18.5 group, where Black, non-Hispanic women had a mortality ratio eight times higher than that of White, non-Hispanic women.

Figure 26. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Pre-Pregnancy BMI, 2018-2020



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

Source: New York State Maternal Mortality Review

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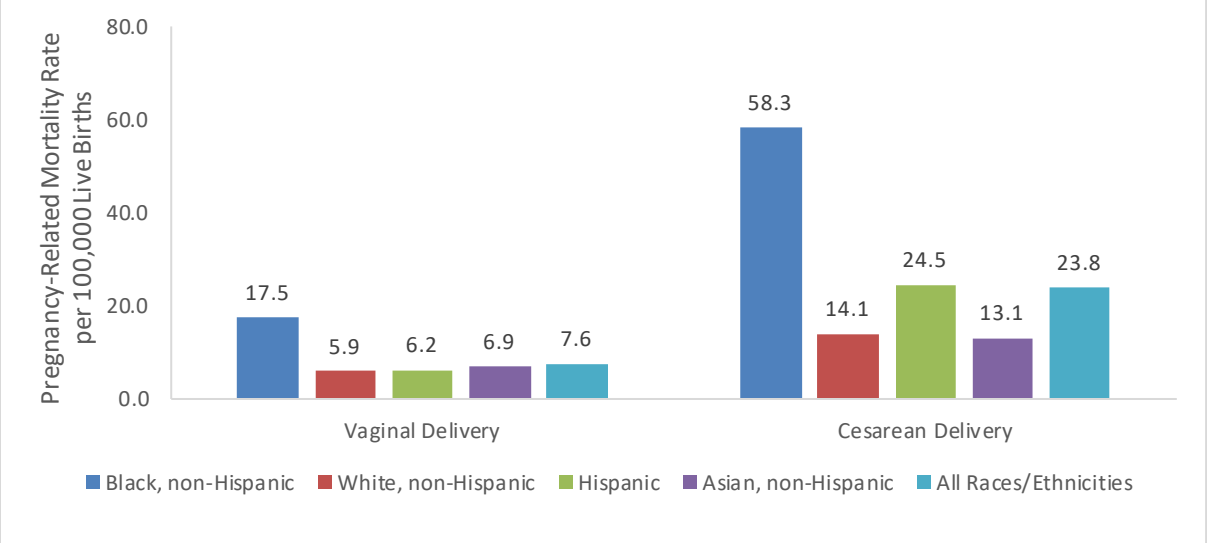
Overall, women who delivered via cesarean section had a higher pregnancy-related mortality ratio compared to women who delivered vaginally during 2018-2020. White, non-Hispanic women who delivered via cesarean section died at a rate 2.4 times higher than those who delivered vaginally, whereas Black, non-Hispanic women who delivered via cesarean section died at a rate 3.3 times higher than those who delivered vaginally (Figure 27).

Figure 27. Pregnancy-Related Mortality Ratio by Race/Ethnicity and Type of Delivery, 2018-2020



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

Source: New York State Maternal Mortality Review

In summary, each pregnancy-related mortality ratio breakdown by race/ethnicity plus another condition is based on small numbers for some categories, since the total number of pregnancy-related deaths is 121. Therefore, these results must be interpreted with caution. Nevertheless, Black, non-Hispanic women were consistently more likely to die of pregnancy-related causes across all categories during 2018-2020.

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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, 73.6% of pregnancy-related deaths in 2018-2020 were deemed preventable. Among the pregnancy-related deaths considered preventable, 36 (40.4%) had a good chance to alter the outcome and 53 (59.6%) 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, 2018-2020

Preventability	Count (%)	Chance to Alter Outcome (Count)			
		Good	Some	None	Unable to Determine
Preventable	89 (73.6%)	36	53	0	0
Not Preventable	22 (18.2%)	0	0	20	2
Unable to Determine	10 (8.3%)	0	0	0	10
Total	**121 (100%)**	**36**	**53**	**20**	**12**

Source: New York State Maternal Mortality Review

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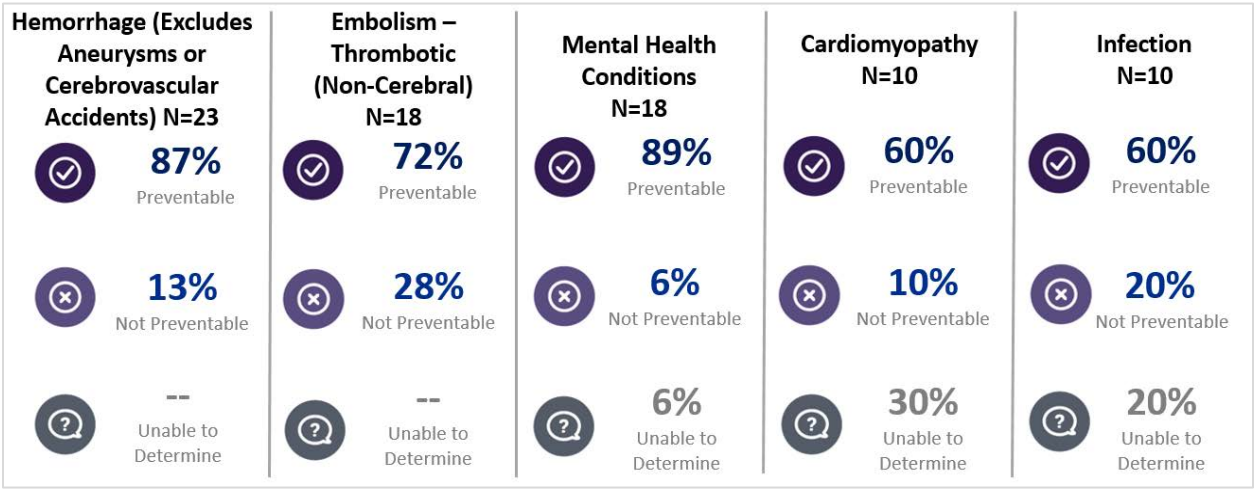
Preventability by Underlying Causes of Death

Preventability varied across underlying causes of death. Among the leading causes of death, 60% of pregnancy-related deaths caused by cardiomyopathy and infection, 72% of pregnancy-related deaths caused by embolism, 87% of pregnancy-related deaths due to hemorrhage, and 89% of pregnancy-related deaths due to mental health conditions were deemed to be preventable (Figure 28).

Figure 28. Preventability among Pregnancy-Related Deaths by Leading Underlying Causes of Death, 2018-2020



Source: New York State Maternal Mortality Review

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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 Causes of Death, 2018-2020

Cause of Death	Chance to Alter Outcome				Total Count	% Preventable
	Good	Some	None	Unable to Determine		
Hemorrhage (Excludes Aneurysms or Cerebrovascular Accidents)	14	6	2	1	23	87.0%
Embolism - Thrombotic (Non-Cerebral)	7	6	5	0	18	72.2%
Mental Health Conditions	4	12	1	1	18	88.9%
Cardiomyopathy	0	6	1	3	10	60.0%
Infection	2	4	2	2	10	60.0%
Amniotic Fluid Embolism	0	4	4	1	9	44.4%
Cardiovascular Conditions	1	4	1	1	7	71.4%
Metabolic/Endocrine Conditions	5	1	0	0	6	100.0%
Cancer	0	2	2	0	4	50.0%
Injury	1	2	0	0	3	100.0%
Gastrointestinal Disorders	0	2	0	0	2	100.0%
Hematologic Conditions	0	2	0	0	2	100.0%
Hypertensive Disorders of Pregnancy	1	1	0	0	2	100.0%
Anesthesia Complications	1	0	0	0	1	100.0%
Cerebrovascular Accident not Secondary to Hypertensive Disorders in Pregnancy	0	0	1	0	1	0.0%
Pulmonary Conditions (Excludes Acute Respiratory Distress Syndrome)	0	1	0	0	1	100.0%
Unknown Cause	0	0	1	3	4	0.0%
Total	**36**	**53**	**20**	**12**	**121**	**73.6%**

Source: New York State Maternal Mortality Review

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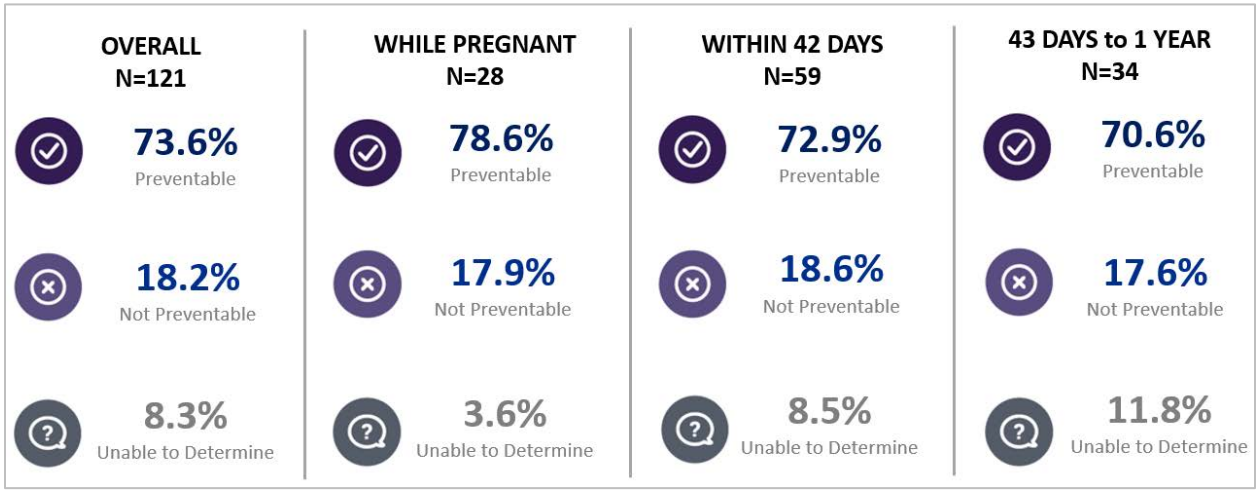
Preventability by Timing in Relation to Pregnancy

Preventability varied by timing of death in relation to pregnancy. Figure 29 shows that 78.6% of pregnancy-related deaths that occurred during pregnancy were deemed preventable, 72.9% of deaths within 42 days after the end of pregnancy were deemed preventable, and 70.6% of deaths from 43 to 365 days after the end of pregnancy were deemed preventable.

Figure 29. Preventability Among Pregnancy-Related Deaths by Timing in Relation to Pregnancy, 2018-2020



Source: New York State Maternal Mortality Review

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

Table 11. Distribution of Preventability Among Pregnancy-Related Deaths by Timing in Relation to Pregnancy, 2018-2020

Timing in Relation to Pregnancy	Chance to Alter Outcome				Total Count	% Preventable
	Good	Some	None	Unable to Determine		
While Pregnant	10	12	4	2	28	78.6%
Within 42 Days	19	24	10	6	59	72.9%
43 to 365 Days	7	17	6	4	34	70.6%
Total	**36**	**53**	**20**	**12**	**121**	**73.6%**

Source: New York State Maternal Mortality Review

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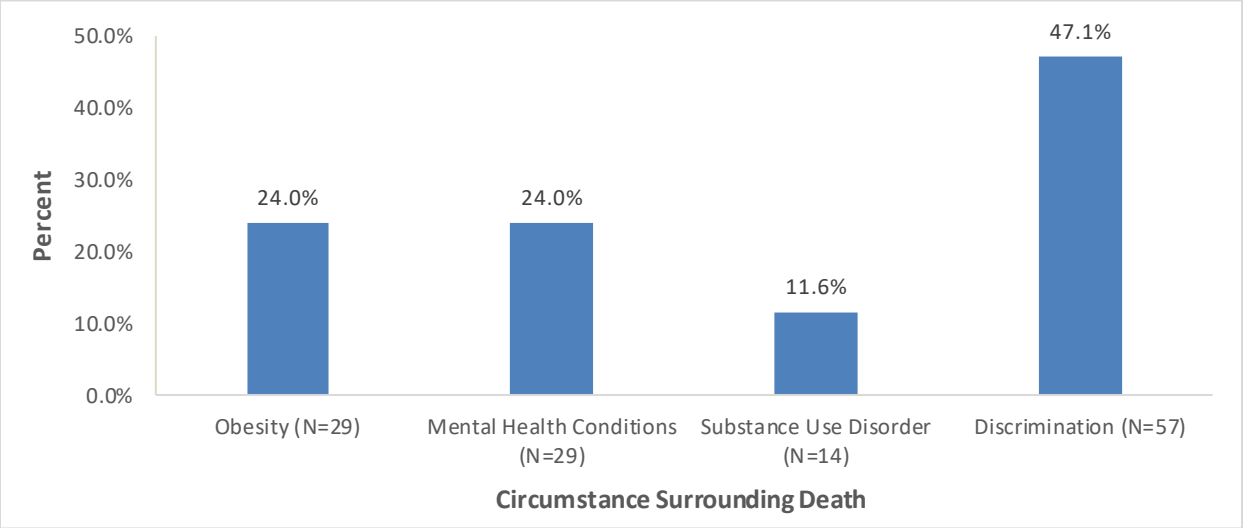
Preventability by Circumstances Surrounding Death

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 2018-2020, the committees determined that both obesity and mental health conditions (other than substance use disorder) each contributed to 24.0% of the deaths, substance use disorder contributed to 11.6% of the deaths, and discrimination contributed to 47.1% of the deaths (Figure 30).

Figure 30. Distribution of Circumstances Surrounding Death for Pregnancy-Related Deaths, 2018-2020



Source: New York State Maternal Mortality Review

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Preventability varied across the committees' determinations of possible or certain circumstances surrounding death. For cases with obesity as a circumstance, 79.3% of pregnancy-related deaths were deemed preventable. In cases where discrimination was a circumstance, 89.5% of deaths were preventable. Similarly, death was judged to be preventable for 89.7% of cases with mental health conditions as a circumstance, as well as 92.9% of deaths with substance use disorder as a circumstance (Table 12).

Table 12. Distribution of Preventability Among Pregnancy-Related Deaths by Circumstance Surrounding Death, 2018-2020

Circumstance Surrounding Death (Yes and Probably)	Chance to Alter Outcome				Count	% Preventable
	Good	Some	None	Unable to Determine		
Obesity	9	14	6	0	29	79.3%
Mental Health Conditions	13	13	2	1	29	89.7%
Substance Use Disorder	3	10	1	0	14	92.9%
Discrimination	23	28	2	4	57	89.5%

Source: New York State Maternal Mortality Review

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Contributing Factors

Once the committees review each case, identify the underlying cause of death, and determine the preventability of each death, the committees then identify the 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 on the MMRIA Committee Decisions Form in Appendix D. In addition, each factor is categorized into one of the five levels below:

- **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 programs

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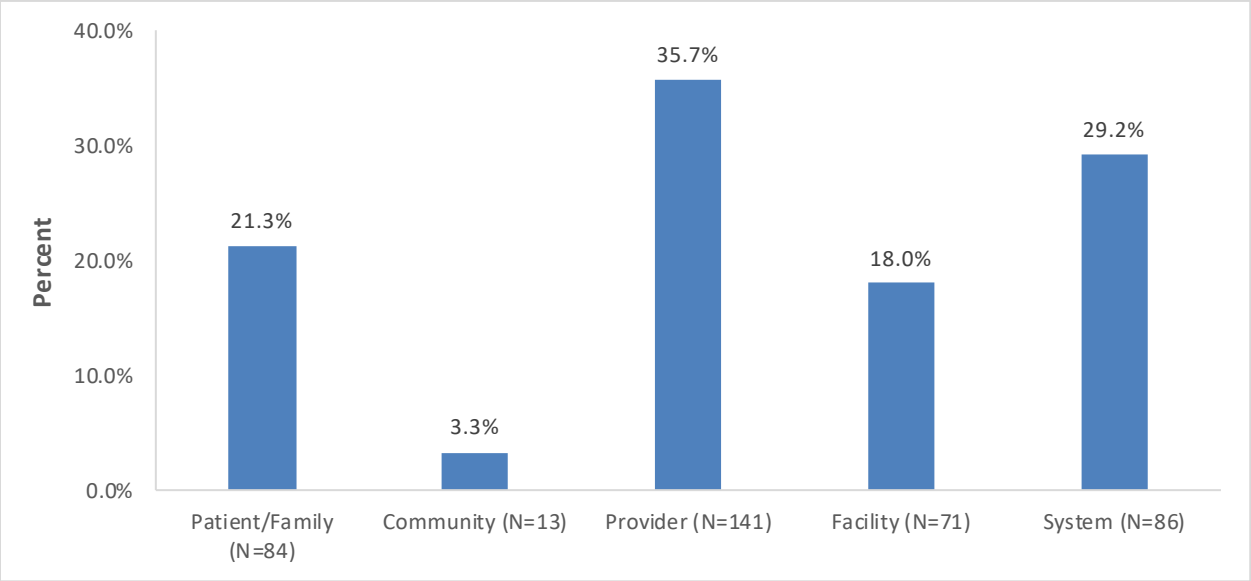
Overall Results for Contributing Factors

The committees identified 395 contributing factors among 121 pregnancy-related deaths. On average, 3.9 contributing factors were identified for every pregnancy-related death. For 19 deaths, no factors were identified since 16 of the deaths were not preventable. For the three remaining deaths, preventability was unable to be determined for one. The other two deaths were deemed preventable, but no recommendations were made by the committees. Factors at the provider level (35.7%), system level (29.2%), and patient or family level (21.3%) together comprised most of the factors identified that contributed to pregnancy-related deaths. Factors at the facility level accounted for 18.0% of the identified factors, while the community level accounted for 3.3% (Figure 31). 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 31. Distribution of Level of Contributing Factors Among Pregnancy-Related Deaths, 2018-2020



Source: New York State Maternal Mortality Review

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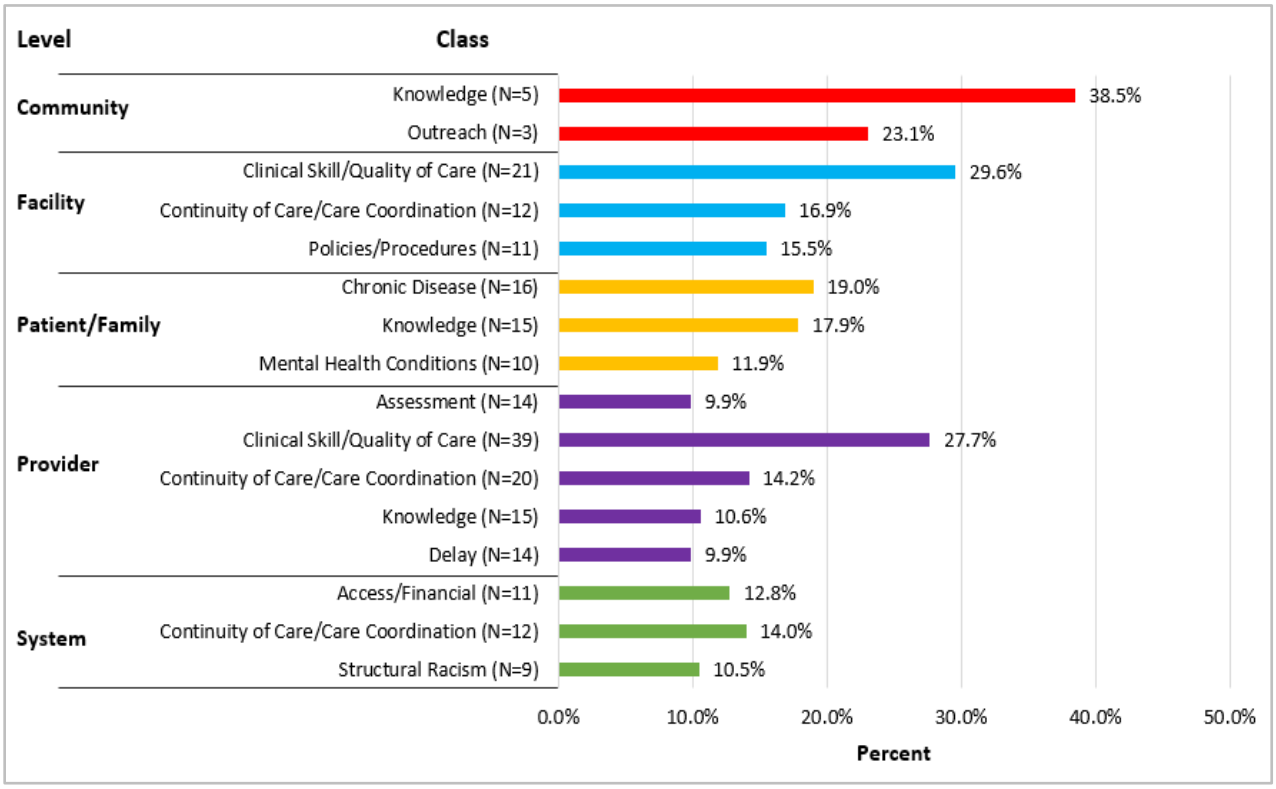
Contributing Factors by Level

The figure below displays the most common factor classes at each factor level. Knowledge and Continuity of Care/Care Coordination are the two most common factor classes across all factor levels (Figure 32).

Figure 32. Most Common Factor Classes Associated with Pregnancy-Related Deaths by Level, 2018-2020



Source: New York State Maternal Mortality Review

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Contributing factors were further examined by 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.

Community 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. Thirteen community level factors were identified as contributing to pregnancy-related deaths (Table 13).

Table 13. Contributing Factors to Pregnancy-Related Deaths - Community Level, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Knowledge	5 (38.5%)	Lack of awareness of warning signs indicating serious complications
Outreach	3 (23.1%)	Stigma in community surrounding mental health concerns, lack of provider engagement in community resources
Chronic Disease	1 (7.7%)	Poor access to healthy food options in low-income communities
Cultural/Religious	1 (7.7%)	Lack of access and outreach to insular communities
Discrimination	1 (7.7%)	Slower Emergency Medical Services response in some communities
Environmental	1 (7.7%)	Exposure to COVID-19
Structural Racism	1 (7.7%)	Less access to resources on chronic condition management in low-income communities

Source: New York State Maternal Mortality Review

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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 71 facility-level factors contributing to pregnancy-related deaths (Table 14).

Table 14. Contributing Factors to Pregnancy-Related Deaths - Facility Level, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Clinical Skill/Quality of Care	21 (29.6%)	Poor adherence to hospital policies and procedures, lack of appropriate policies and procedures, unclear and conflicting treatment documentation, failure to respond adequately to hemorrhage, patient did not receive complete and adequate postpartum care, failure to recognize warning signs and lack of access to necessary resources
Continuity of Care/Care Coordination	12 (16.9%)	Lack of follow-up with patient, lack of coordination and case management of postpartum care, mental health or substance use issues, poor or nonexistent communication between multiple hospitals
Policies/Procedures	11 (15.5%)	Lack of care standards or documentation, insufficient obtainment of medical records, failure to perform necessary screenings, inadequate policy for medical staff accountability
Communication	7 (9.9%)	Lack of communication during patient transfers, confusing records, lack of communicating prenatal care discussions with the facility
Equipment/Technology	6 (8.5%)	Computerized risk assessment failed to consider relevant factors, lack of needed equipment
Delay	3 (4.2%)	Delayed recognition of and response to hemorrhage, delayed emergency procedures
Discrimination	2 (2.8%)	Nursing home staff personal bias prevented patient from receiving support and care
Knowledge	2 (2.8%)	Lack of provider knowledge
Structural Racism	2 (2.8%)	Inability for patient to access well-organized and respectful patient care
Adherence	1 (1.4%)	Inadequate protocol/guidelines for hemorrhage
Assessment	1 (1.4%)	Missed diagnosis even after multiple ED visits
Other	1 (1.4%)	Lack of access to preferred method of family planning
Referral	1 (1.4%)	Failure to consult specialists when necessary
Violence	1 (1.4%)	Lack of support for victims of domestic violence

Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

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 84 patient/family-level factors contributing to pregnancy-related deaths (Table 15).

Table 15. Contributing Factors to Pregnancy-Related Deaths - Patient/Family Level, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Chronic Disease	16 (19.0%)	Obesity, diabetes, anemia, sickle cell disease, lack of access to primary care treatment and management for chronic conditions, lack of care coordination to improve engagement
Knowledge	15 (17.9%)	Unaware of medication safety during pregnancy, symptoms, and warning signs of complications
Mental Health Conditions	10 (11.9%)	Lack of resources to help manage depression, inadequate response to a history of suicide attempts, untreated bipolar disorder, unawareness of acuity of diabetes, stigma around mental health and substance use
Adherence	5 (6.0%)	Distrust of providers leading to non-compliance, not getting, or taking prescribed medications for unknown reasons affected patient outcomes
Access/Financial	5 (6.0%)	No childcare support or difficulty finding transportation leading to delay in seeking medical care and treatment, immigration policies interrupting prenatal care, delay in receiving postpartum care
Substance Use Disorder - Alcohol, Illicit/Prescription Drugs	5 (5.0%)	Depression, history of substance use or suicide attempt, nonadherence to psychiatric care
Communication	4 (4.8%)	Inadequate interpretation services, patient's concerns were not taken seriously, reluctance and hesitance towards receiving COVID-19 vaccination during pregnancy
Continuity of Care/Care Coordination	4 (4.8%)	Lack of social support leads to missed referral appointments, lack of follow-up for patients leaving against medical advice
Cultural/Religious	3 (3.6%)	Language barriers, religious objections to needed medical interventions
Delay	3 (3.6%)	No childcare, inability to miss work, or failure to acknowledge warning signs leading to delay in seeking medical care
Discrimination	3 (3.6%)	Reluctance to access healthcare services, characterizations as non-compliant, nonadherence to medical advice
Social Support/Isolation	3 (3.6%)	Lack of childcare support
Violence	3 (3.6%)	Lack of support and resources for victims of Intimate Partner Violence
Referral	2 (2.4%)	Lack of postpartum follow up with high-risk patients

Other	1 (1.2%)	Lack of access to community resources for prenatal care
Tobacco Use	1 (1.2%)	No documentation of ED addressing patient's smoking status
Unstable Housing	1 (1.2%)	Strict shelter rules interfered with necessary care

Source: New York State Maternal Mortality Review

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 141 provider-level factors contributing to pregnancy-related deaths (Table 16).

Table 16. Contributing Factors to Pregnancy-Related Deaths - Provider Level, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Clinical Skill/Quality of Care	39 (27.7%)	Poor clinical decisions, knowledge gaps in rare surgical complications, de-escalation and alternative methods to non-compliance, and emergency response, poor management of high-risk patients; delay in addressing symptoms or diagnosis, transfer of care, failure to follow up on positive screenings and recognize clinical severity and complexity of patient, inadequate risk assessment and evaluations
Continuity of Care/ Care Coordination	20 (14.2%)	Lack of follow up from providers on high-risk/high priority patients, patient discharged without follow up plan, limited care coordination between providers, nonexistent communication between facilities on transfer of care
Knowledge	15 (10.6%)	Knowledge gaps in obstetric complications, chronic conditions, and mental health conditions; lack of understanding regarding the impact of social determinants of health
Assessment	14 (9.9%)	Inadequate risk assessment, failure to screen for mental health conditions and reproductive needs, failure to diagnosis and provide treatment
Delay	14 (9.9%)	Delay in diagnosis and response of hemorrhage, pulmonary hypertension, sepsis, other complications; failure to conduct comprehensive medical examination; delay in escalating patients to higher-level of care
Discrimination	9 (6.4%)	Providers' personal bias towards mental health conditions, substance use disorder, and complicated chronic conditions leading to poor outcomes (lack of evaluation, poor quality of care, delay in diagnosis or transfer of care, referral to incorrect services)
Communication	8 (5.7%)	Lack of trust and communication between providers and patients; nonexistent communication between specialists, inpatient and outpatient providers, and medical staff
Chronic Disease	6 (4.3%)	Insufficient approach to treating cardiac disease, lack of collaborative care chronic care management, failure to recognize clinical complexity of patients

Mental Health Conditions	6 (4.3%)	Gaps in provider knowledge, incorrect diagnosis of mental health conditions, inadequate treatment for depression
Referral	4 (2.8%)	Delay in referral to specialist or higher level of care due to religious affiliation, failure to refer patient for treatment and counseling for substance use or mental health condition
Substance Use Disorder - Alcohol, Illicit/ Prescription Drugs	2 (1.4%)	Failure to prescribe medication refill when requested, lack of evaluation due to provider discrimination
Cultural/Religious	1 (0.7%)	Inadequate pool of mental health providers for culturally sensitive care
Interpersonal Racism	1 (0.7%)	Not taking patient complaints seriously due to race
Outreach	1 (0.7%)	Insufficient care coordination between providers and community surrounding mental health conditions and substance use disorders
Social Support/ Isolation	1 (0.7%)	Lack of acceptable childcare during hospital stay led to child services removing the children from mother

Source: New York State Maternal Mortality Review

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 86 system-level factors for pregnancy-related deaths (Table 17).

Table 17. Contributing Factors to Pregnancy-Related Deaths - System Level, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Continuity of Care/Care Coordination	12 (14.0%)	Lack of a primary provider to coordinate care; lack of referrals and follow up for chronic conditions
Access/Financial	11 (12.8%)	Barriers to accessing care, especially for patients on Medicaid
Structural Racism	9 (10.5%)	Care and services are harder to access for people living in poverty
Discrimination	7 (8.1%)	Care and services are harder to access for people living in poverty; parents' fear of removal of child due to lack of protections for those experiencing substance use disorder or intimate partner violence
Unstable Housing	7 (8.1%)	Unstable housing exacerbates mental and medical issues; restrictive shelter rules increase burdens on homeless mothers; difficulty maintaining postpartum care in shelter system
Clinical Skill/Quality of Care	6 (7.0%)	Gaps in provider knowledge and delays in response to emergency situations
Assessment	5 (5.8%)	Delays in seeking care; delays in performing emergency procedures; failure to recognize emergent care needs

Knowledge	5 (5.8%)	Lack of standardized policies and procedures; common provider knowledge gaps and training needs; lack of adequate patient education efforts
Social Support/Isolation	4 (4.7%)	Punitive child services interactions can contribute to mental health declines
Chronic Disease	3 (3.5%)	Lack of care coordination for chronic illness
Communication	3 (3.5%)	Lack of ready access to care records from other encounters prevents providers from identifying patterns
Delay	3 (3.5%)	Emergency Medical System did not arrive in a timely manner; delay in escalation of high-risk situation
Equipment/Technology	3 (3.5%)	Electronic records system was not well-suited for OB records; lack of access to necessary equipment
Policies/Procedures	2 (2.3%)	Inadequate informed consent policy for toxicology testing; lack of choice and continuity of providers and services
Cultural/Religious	1 (1.2%)	Inadequate use of interpreter services to overcome language barriers
Law Enforcement	1 (1.2%)	Inadequate guidelines for care of pregnant people who are incarcerated
Legal	1 (1.2%)	Loss of parental rights impacted disengagement with treatment
Mental Health Conditions	1 (1.2%)	Lack of coordination around substance use disorder and mental health conditions
Outreach	1 (1.2%)	Lack of follow up during postpartum period
Substance Use Disorder (including Alcohol and Illicit/Prescription Drugs	1 (1.2%)	Lack of access to consistent substance use disorder care

Source: New York State Maternal Mortality Review

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Contributing Factors by Causes of Death

The number of contributing factors at each level varies by cause of death. On average, there were 3.9 contributing factors per pregnancy-related death. The causes with the most contributing factors per death were injury, metabolic/endocrine conditions, pulmonary conditions (5.0 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, 2018-2020

Cause of Death	Contributing Factors (Count)					Number of Pregnancy-Related Deaths*	Factors per Death
	Patient/ Family	Provider	Community	Facility	System		
Hemorrhage (Excludes Aneurysms and Cerebrovascular Accidents)	9	23	3	25	18	18	4.3
Mental Health Conditions	17	24	2	4	18	16	4.1
Embolism - Thrombotic (Non-Cerebral)	11	25	5	11	11	15	4.2
Infection	6	14	1	4	5	10	3.0
Cardiomyopathy	8	5	--	6	11	9	3.3
Amniotic Fluid Embolism	3	8	--	11	3	7	3.6
Cardiovascular Conditions	2	10	2	--	1	6	2.5
Metabolic/Endocrine Disorders	13	8	--	--	9	6	5.0
Cancer	1	7	--	--	--	2	4.0
Injury	4	--	--	1	5	2	5.0
Gastrointestinal Disorders	3	--	--	2	1	2	3.0
Hematologic Conditions	3	4	--	2	--	2	4.5
Hypertensive Disorders of Pregnancy	2	3	--	--	1	2	3.0
Anesthesia Complications	--	2	--	1	--	1	3.0
Pulmonary Conditions (Excludes Acute Respiratory Distress Syndrome)	1	3	--	--	1	1	5.0
Unknown	1	5	--	4	2	3	4.0
Total	**84**	**141**	**13**	**71**	**86**	**102**	**3.9**

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

Source: New York State Maternal Mortality Review

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Contributing factors were further examined by 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 deaths, the most common factor levels, factor classes, and themes are summarized below:

Hemorrhage

- Facility factors comprised 32.1% of the total contributing factors for hemorrhage deaths. The most common class of facility factors was clinical skills/quality of care (52.0%). 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, failure to quantify blood loss, inadequate access to resources, and failure to adequately respond to high-risk situations.
- Provider factors comprised 29.5% of the total contributing factors for hemorrhage deaths. The most common classes of provider factors were clinical skill/quality of care at 39.1%, followed by continuity of care/care coordination and delay, both at 17.4%. The common themes for the clinical skill/quality of care class were inadequate provider training and poor clinical decisions. The most common themes for the continuity of care/care coordination class were lack of coordination between providers and failure to assist high-risk patients with navigating referrals and appointments following discharge. The common theme for the delay class was delayed recognition of the severity of a situation leading to delayed clinical response.
- System level factors comprised 23.1% of the total contributing factors for hemorrhage deaths. The most common classes were clinical skill/quality of care and structural racism, both at 22.2%. 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 safe and stable housing for people with disabilities.

Mental Health

- Provider factors comprised 36.9% of the total contributing factors for mental health deaths. The most common classes of provider factors were continuity of care/care coordination and mental health conditions at 16.7% each. The dominant themes that emerged related to mental health conditions were inadequate provider training and gaps in provider knowledge. The most common themes for continuity of care/care coordination were a lack of care coordination between providers at different facilities and a lack of follow-up with patients after discharge or missed referral appointments.
- System factors comprised 27.7% of the total contributing factors for mental health deaths. The most common classes were discrimination and social support/isolation, both at 16.7%, followed by policies/procedures and unstable housing, both at 11.1%. The themes for systems of care included lack of adequate mental health care for Medicaid patients. Race and social class may have influenced decisions for referral for treatment, removal of children from the patient, shelter rules preventing family from assisting with childcare, and protocol on obtaining consent for toxicology testing not in place.

- Patient/Family factors comprised 26.2% of the total contributing factors for mental health deaths. The most common classes were mental health conditions at 41.2%, followed by substance use disorder, including alcohol and illicit/prescription drugs at 23.5%. Themes that emerged from these classes included depression, history of attempted suicide, nonadherence to psychiatric care, and a lack of follow-up and referral for treatment.

Embolism

- Provider factors comprised 39.7% of the total contributing factors for embolism deaths. The most common factor classes were continuity of care/care coordination at 28.0%, followed by clinical skill/quality of care and knowledge, at 20.0% each. Common themes that emerged included lack of follow-up, provider knowledge gaps on chronic conditions, and failure to recognize warning signs of high-risk patients.

III. Other Pregnancy-Associated Deaths

A total of 265 other pregnancy-associated deaths occurred in 2018-2020, which included 202 pregnancy-associated, but not related deaths and 63 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, insurance type, and health service area. The majority of these women were aged 34 years or younger (72.1%). White, non-Hispanic women accounted for 55.8% of other pregnancy-associated deaths. The majority of this cohort were not married (76.6%). More than half of this cohort completed high school or received a graduate education diploma or less (64.6%). The majority of the women were enrolled in Medicaid (66.8%), while an additional 22.3% were covered by private insurance. In addition, one fourth of this cohort lived in New York City (25.3%), followed by those in Central New York + New York-Pennsylvania (15.5%) and Western New York (15.1%).

Table 19. Demographic Characteristics of Other Pregnancy-Associated Death, 2018-2020

Demographic Characteristics	Count (%)
Age at Death (Years)	
24 or younger	57 (21.5%)
25-29	64 (24.2%)
30-34	70 (26.4%)
35-39	52 (19.6%)
40 or older	22 (8.3%)
Race/Ethnicity	
Black, Non-Hispanic	61 (23.0%)
White, Non-Hispanic	148 (55.8%)
Hispanic	42 (15.8%)
Other, Non-Hispanic*	14 (5.3%)
Marital Status	
Married	61 (23.0%)
Unmarried	203 (76.6%)
Unknown	1 (0.4%)
Education	
12th Grade or Less; No Diploma	59 (22.3%)
High School or General Educational Development Graduate	112 (42.3%)
Some College Credit, but No Degree	40 (15.1%)
Associate or Bachelor's Degree	39 (14.7%)
Advanced Degree	14 (5.3%)

Unknown	1 (0.4%)
Health Insurance	
Medicaid	177 (66.8%)
Private Insurance	59 (22.3%)
Self-Pay	9 (3.4%)
Other Government Program/Child Health Plus	7 (2.6%)
Other Non-Federal Program	2 (0.8%)
Medicare	5 (1.9%)
Unknown	6 (2.3%)
Health Service Area**	
Central New York + New York-Pennsylvania***	41 (15.5%)
Finger Lakes	28 (10.6%)
Mid-Hudson	33 (12.5%)
Nassau-Suffolk	29 (10.9%)
New York City	67 (25.3%)
Northeastern New York	27 (10.2%)
Western New York	40 (15.1%)
Urbanicity****	
Urban	172 (64.9%)
Suburban	57 (21.5%)
Rural	36 (13.6%)
Total	**265 (100%)**

* Other, Non-Hispanic includes American Indian/Alaska Native, Asian, Old Order Amish, and bi-racial individuals.
** See Appendix C for Health Service Area descriptions
*** Central New York was combined with the contiguous New York-Pennsylvania due to the latter's small cell.
****Urban/suburban/rural locale designations derived from the 2013 Urban Rural Classification Scheme for Counties (based on OMB Metropolitan/Nonmetropolitan statistical areas)

- Urban - counties in large central areas with one million+ populations or in their large fringe metropolitan areas
- Suburban - counties within medium metropolitan areas with 250,000-999,999 populations and small metropolitan areas with 50,000 – 249,999 populations
- Rural - counties with micropolitan urban cluster populations of 10,000-49,999 and counties with fewer than 10000 populations

Source: New York State Maternal Mortality Review

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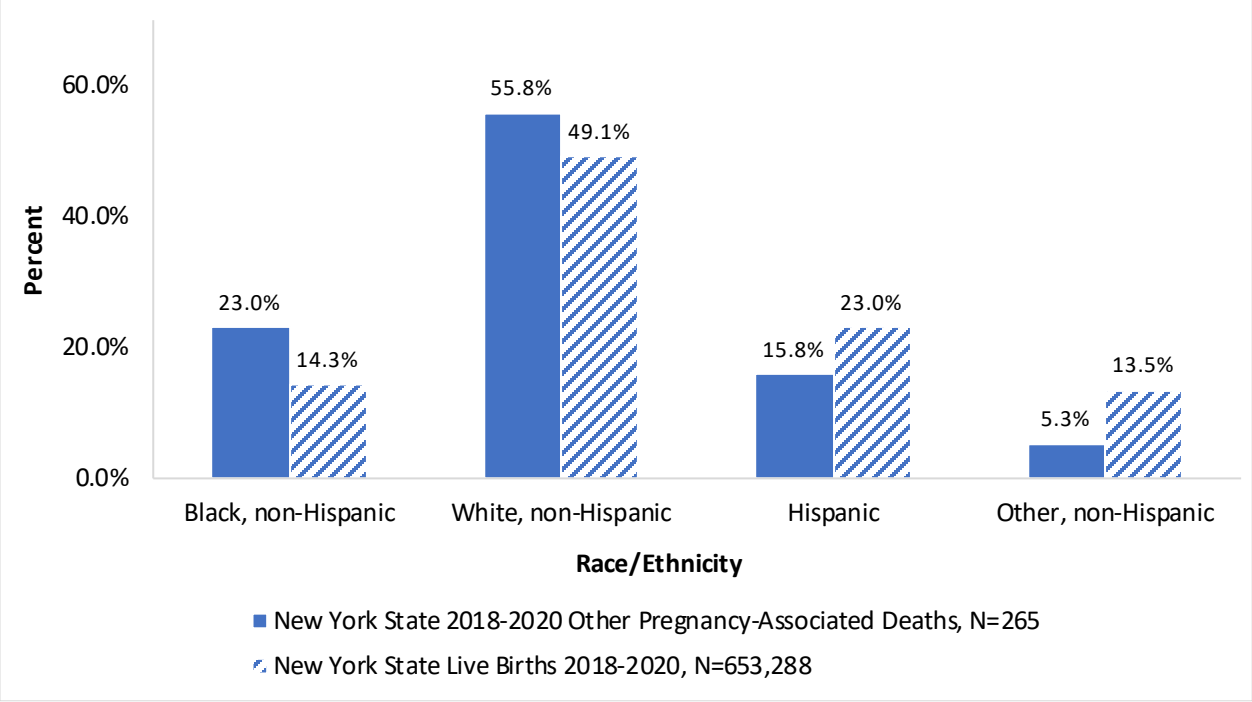
Racial and Other Disparities

When compared to women with live births in 2018-2020, both Black, non-Hispanic women and White, non-Hispanic women were overrepresented in the other pregnancy-associated death cohort. Figure 33 shows that 23.0% of other pregnancy-associated deaths occurred among Black, non-Hispanic women, while births to Black, non-Hispanic women represented 14.3% of all births; 55.8% of other pregnancy-associated deaths occurred among White, non-Hispanic women, while births to White, non-Hispanic women represented 49.1% of all births.

Figure 33. Proportion of Other Pregnancy-Associated Deaths and Live Births by Race/Ethnicity, 2018-2020



Source: New York State Maternal Mortality Review and New York State Vital Statistics

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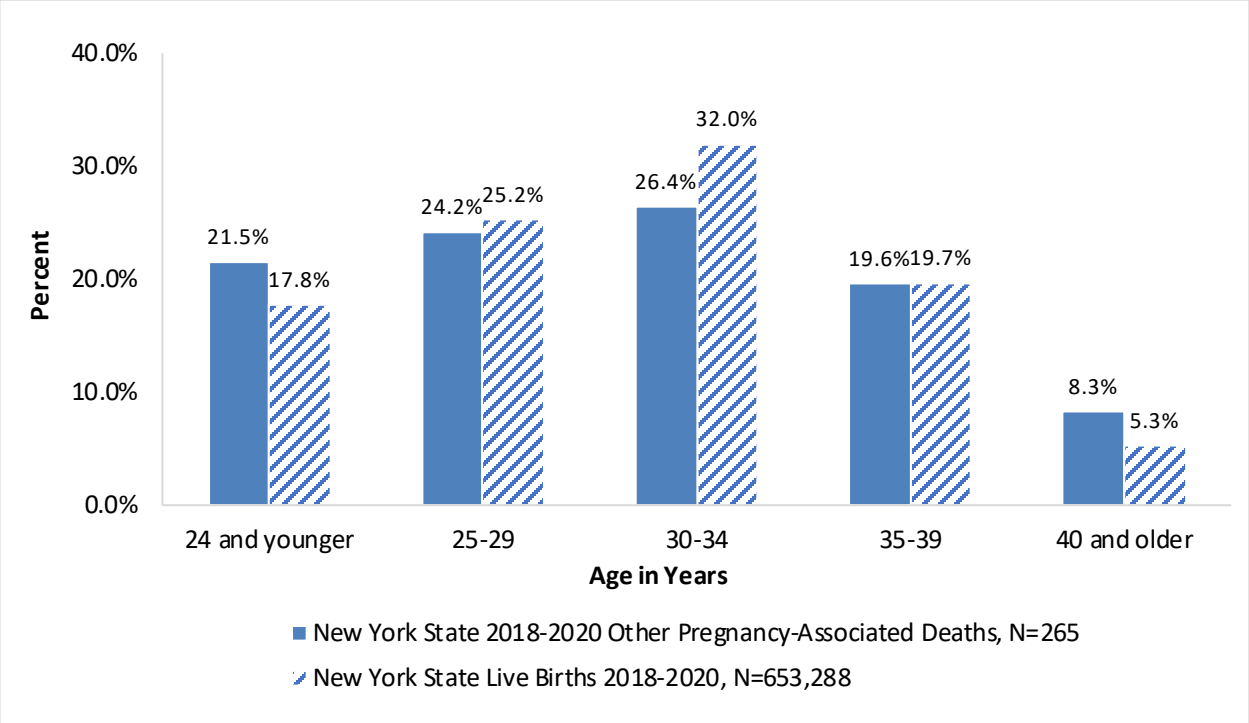
A comparison of the distribution of age between people in the other pregnancy-associated cohort and those with live births in 2018-2020 shows that the other pregnancy-associated death cohort has a higher percentage of individuals 24 years old and younger (21.5% vs 17.8%) as well 40 years and older (8.3% vs 5.3%), compared to those in the age groups with live births in 2018-2020 (Figure 34).

Figure 34. Percent of Other Pregnancy-Associated Deaths and Live Births by Age, 2018-2020



Source: New York State Maternal Mortality Review and New York State Vital Statistics

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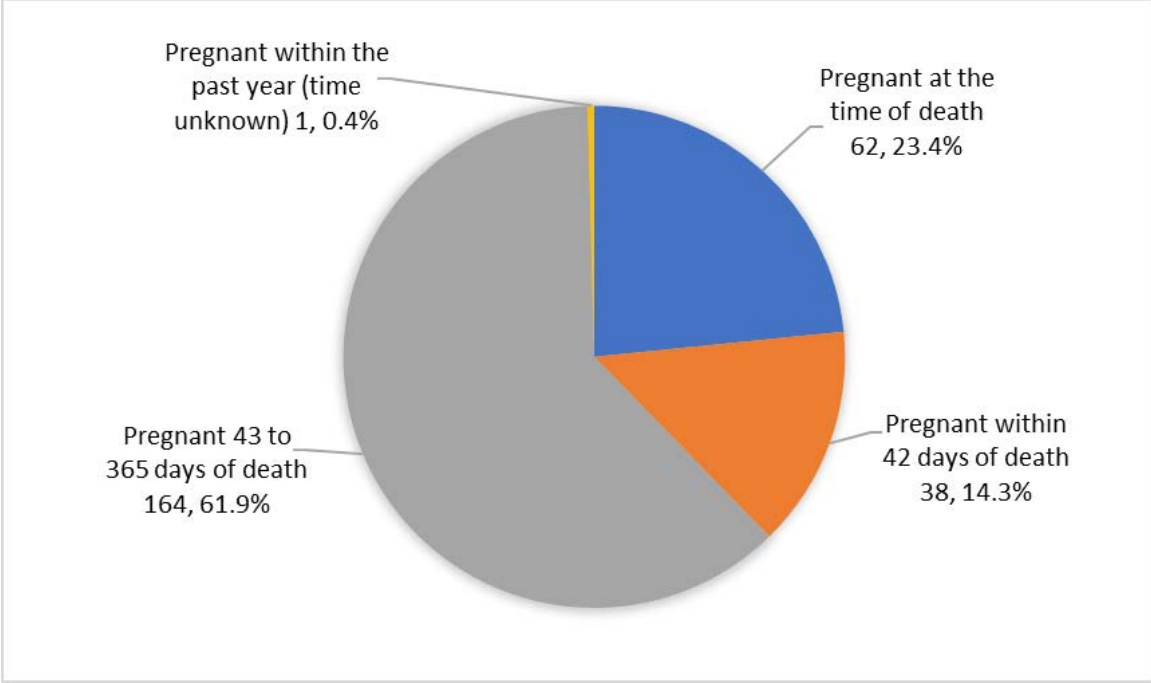
Distribution of Deaths by Certain Characteristics

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 (61.9%). Over one fifth (23.4%) occurred during pregnancy and 14.3% occurred within 42 days of the end of pregnancy (Figure 35). In contrast, among pregnancy-related deaths, about a half of deaths (48.8%) occurred within 42 days of the end of pregnancy (see Figure 13 on page 27). The timing of death in relation to pregnancy was unknown for one death, and no additional information was available to confirm.

Figure 35. Distribution of Timing of Death in Relation to Pregnancy among Other Pregnancy-Associated Deaths, 2018-2020



Source: New York State Maternal Mortality Review

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Other Pregnancy-Associated Deaths by Manner of Death

Table 20 displays the manner of death based on the death certificate and the committees' decisions. Among 265 deaths, the most common manner of deaths was accident (43.0%), followed by natural (39.6%).

Table 20. Distribution of Manner of Death Among Other Pregnancy-Associated Deaths, 2018-2020

Manner of Death	Count (%)
Accident	114 (43.0%)
Natural	105 (39.6%)
Homicide	15 (5.7%)
Suicide	12 (4.5%)
Pending Investigation	7 (2.6%)
Could Not Be Determined	12 (4.5%)
Total	**265 (100%)**

Source: New York State Maternal Mortality Review

Cause of Death

The top five causes of death, representing 82.3% of the other pregnancy-associated cases, were mental health conditions (50.2%), injury (12.8%), cardiovascular and coronary conditions (10.2%), cancer (6.8%), and pulmonary conditions (excludes Acute Respiratory Distress Syndrome) (3.4%) (Table 21). Among mental health conditions, the majority were related to substance use disorder; 68.4% were related to substance use disorder only, and 21.1% were related to substance use disorder and other psychiatric conditions, such as depression, anxiety, and bipolar disorder.

Table 21. Causes of Death for Other Pregnancy-Associated Deaths, 2018-2020

Cause of Death	Count (%)
Mental Health Conditions	**133 (50.2%)**
Substance Use Disorder	91 (68.4%)
Substance Use Disorder and Other Psychiatric Conditions*	28 (21.1%)
Depression	10 (7.5%)
Anxiety	1 (0.8%)
Bipolar Disorder	1 (0.8%)
Other Mental Health Conditions	1 (0.8%)
Psychiatric Disorders	1 (0.8%)
Injury	**34 (12.8%)**
Homicide	16 (47.1%)
Motor Vehicle Accident	11 (32.4%)

Unintentional Injury	6 (17.7%)
Unknown Intent	1 (2.9%)
Cardiovascular and Coronary Conditions	**27 (10.2%)**
Cardiovascular Conditions	24 (88.9%)
Coronary Artery Disease/Myocardial Infarction/ Atherosclerotic Cardiovascular Disease	5 (20.8%)
Valvular Heart Disease, Congenital and Acquired	3 (12.5%)
Hypertensive Cardiovascular Disease	5 (20.8%)
Conduction Defects/Arrhythmias/Sinoatrial Node Dysfunction	5 (20.8%)
Other Cardiovascular Diseases**	6 (25.0%)
Cardiomyopathy	3 (11.1%)
Hypertrophic Cardiomyopathy	1 (33.3%)
Other Cardiomyopathy/Not Otherwise Specified	2 (66.7%)
Cancer	18 (6.8%)
Pulmonary Conditions (excludes Acute Respiratory Distress Syndrome)	9 (3.4%)
Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy	8 (3.0%)
Infection	8 (3.0%)
Metabolic/Endocrine	4 (1.5%)
Neurologic/Neurovascular Conditions (excluding Cerebrovascular Accidents)	4 (1.5%)
Embolism - Thrombotic (Non-Cerebral)	3 (1.1%)
Hemorrhage (excludes Aneurysms or Cerebrovascular Accidents)	3 (1.1%)
Collagen Vascular/Autoimmune Diseases	2 (0.8%)
Hematologic Conditions	2 (0.8%)
Liver and Gastrointestinal Disorders	1 (0.4%)
Unknown Cause	9 (3.4%)
Total	**265 (100%)**

*Other Psychiatric Conditions include anxiety, personality disorders, Post-Traumatic Stress Disorder (PTSD), panic disorder, Attention-Deficit/Hyperactivity Disorder (ADHD), or a combination of these conditions.

**Other Cardiovascular Diseases include congestive heart failure, cardiomegaly, cardiac hypertrophy, cardiac fibrosis, cardiogenic shock, and non-acute myocarditis not otherwise specified

Source: New York State Maternal Mortality Review

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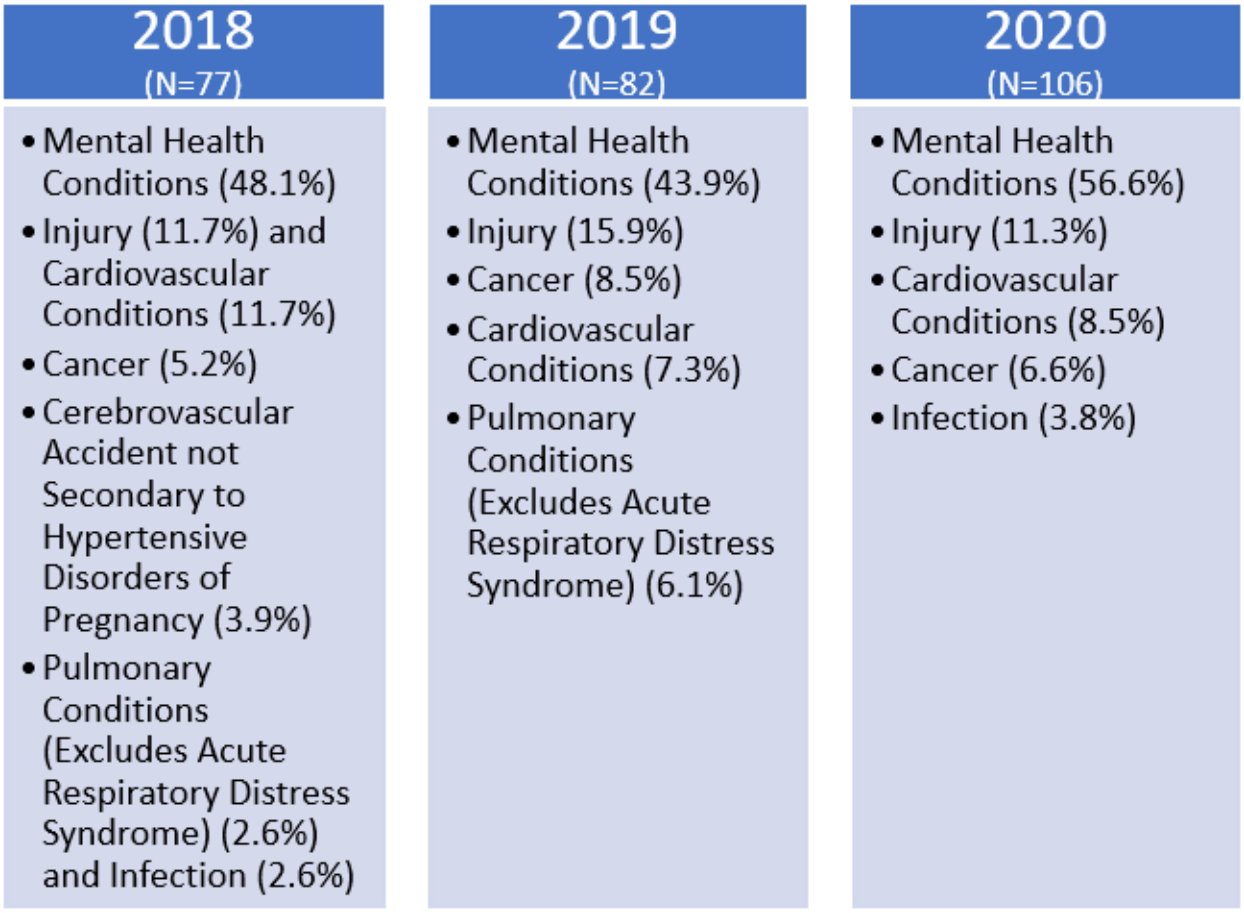
Mental health conditions, injury, cardiovascular conditions, and cancer were consistently among the five most common underlying causes of death throughout 2018-2020. In particular, the proportion of deaths caused by mental health conditions rose from 48.1% in 2018 to 56.6% in 2020 (Figure 36).

Figure 36. Top Five Leading Underlying Causes of Death for Other Pregnancy-Associated Deaths by Year, 2018-2020



Source: New York State Maternal Mortality Review

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 other pregnancy-associated mortality ratio for 2018-2020 was 40.6 deaths per 100,000 live births. In other words, for every 100,000 babies born alive in 2018-2020, 40.6 women, who were pregnant within one year of their death, died of other pregnancy-associated causes.

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 for different races and ethnicities, we can see that Black, non-Hispanic women were 1.4 times more likely to die of a pregnancy-associated cause than were White, non-Hispanic women (Table 22).

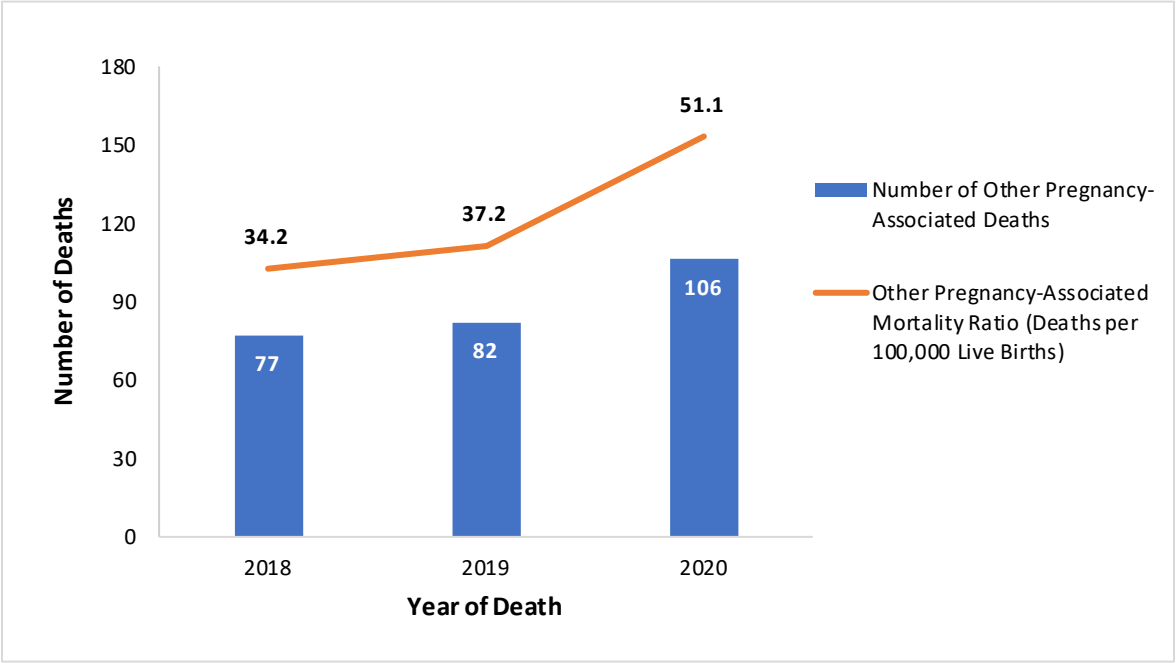
Table 22. Other Pregnancy-Associated Mortality Ratio by Race/Ethnicity, 2018-2020

Race/Ethnicity	Mortality Ratio
Black, non-Hispanic	65.5
White, non-Hispanic	46.2
Hispanic	27.9
Other, non-Hispanic	15.9
All Races/Ethnicities	**40.6**

Source: New York State Maternal Mortality Review

Figure 37 presents the number of other pregnancy-associated deaths over time, as well as the mortality ratio from 2018 to 2020. The number of other pregnancy-associated deaths trended higher over the reporting period. The number of other pregnancy-associated deaths in 2020 was 37.7% higher than it was in 2018 (106 versus 77) and 29.3% higher than it was in 2019 (106 versus 82). Additionally, the other pregnancy-associated mortality ratio in 2020 was 49.4% higher than it was in 2018 (51.1 versus 34.2) and 37.4% higher than it was in 2019 (51.1 versus 37.2). The increase in other pregnancy-associated mortality ratio in 2020 was largely attributed to an increase in deaths caused by substance use disorder.

Figure 37. Number and Mortality Ratio Trends in Other Pregnancy-Associated Deaths by Year, 2018-2020



Source: New York State Maternal Mortality Review

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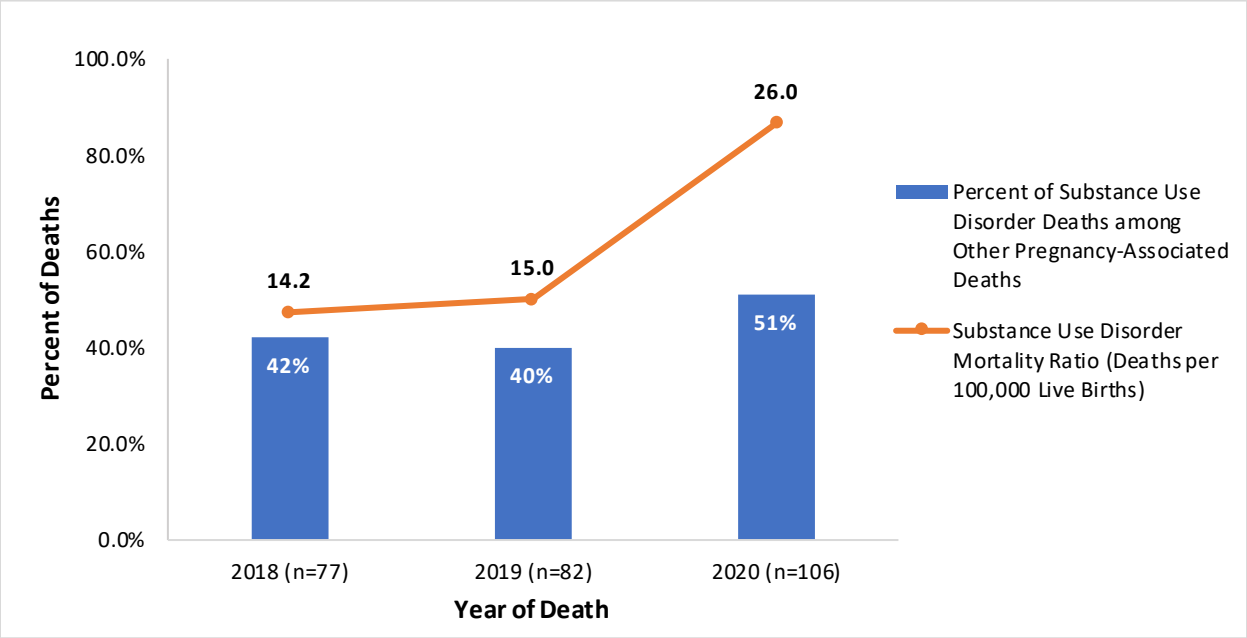
Mental health conditions, such as substance use disorder, have caused an increasing number of other pregnancy-associated deaths. Figure 38 illustrates that yearly deaths caused by substance use disorder have increased as a proportion of other pregnancy-associated deaths from 2018 to 2020. Substance use disorder deaths rose from 42% of other pregnancy-associated deaths in 2018 to over half (51%) of such deaths in 2020. The other pregnancy-associated mortality ratio for substance use disorder deaths rose from 14.2 deaths per 100,000 live births in 2018, to 26.0 deaths per 100,000 live births in 2020.

Figure 38. Percentage and Mortality Ratio Trends in Substance Use Disorder Deaths by Year, 2018-2020



Source: New York State Maternal Mortality Review

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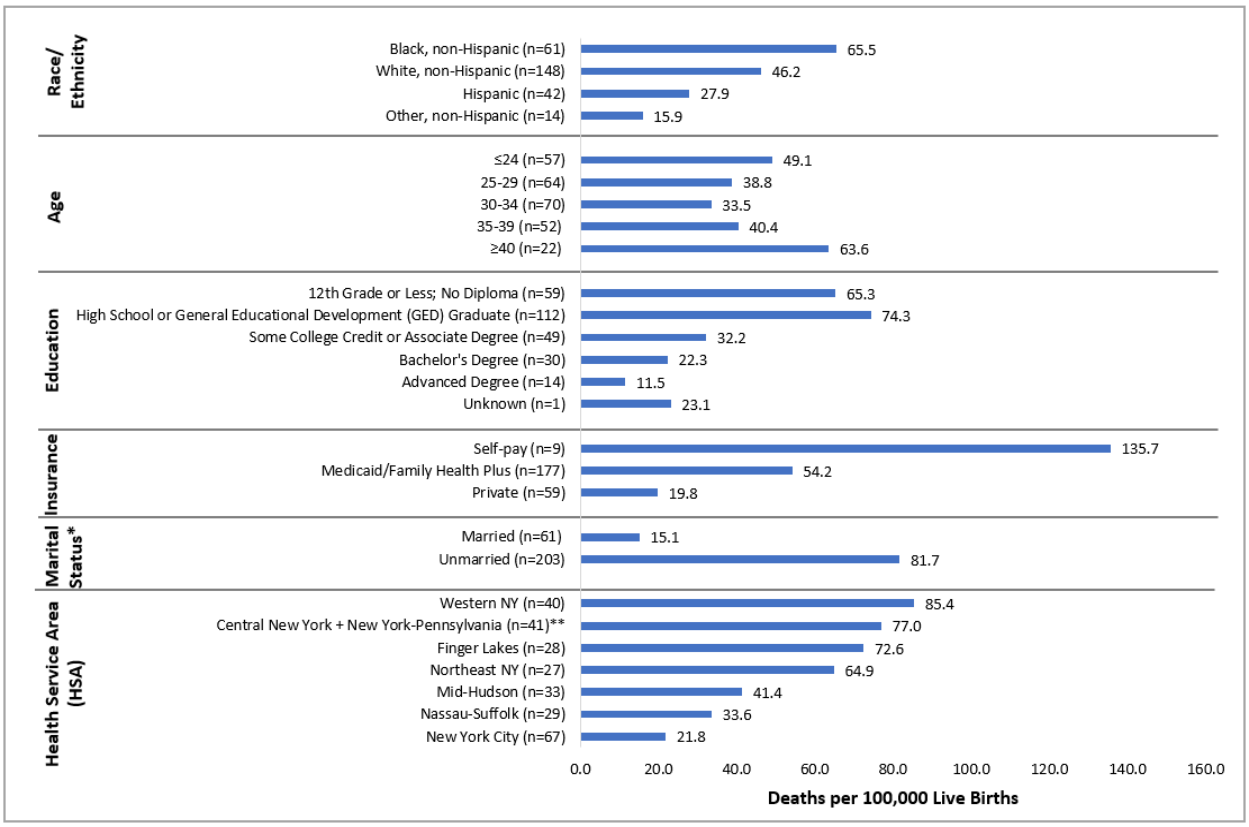
Other Pregnancy-Associated Mortality Ratio by Maternal Demographics

Other pregnancy-associated mortality ratios by maternal demographics are shown in Figure 39. 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 unmarried, had education level of high school graduate or GED or less, were aged 40 years or older at the time of their death, lived in Western New York, or lacked health insurance.

Figure 39. Other Pregnancy-Associated Mortality Ratios by Maternal Demographics, 2018-2020



*Excluded one death with unknown marital status.

**Central New York was combined with the contiguous New York-Pennsylvania due to the latter's small cell size.

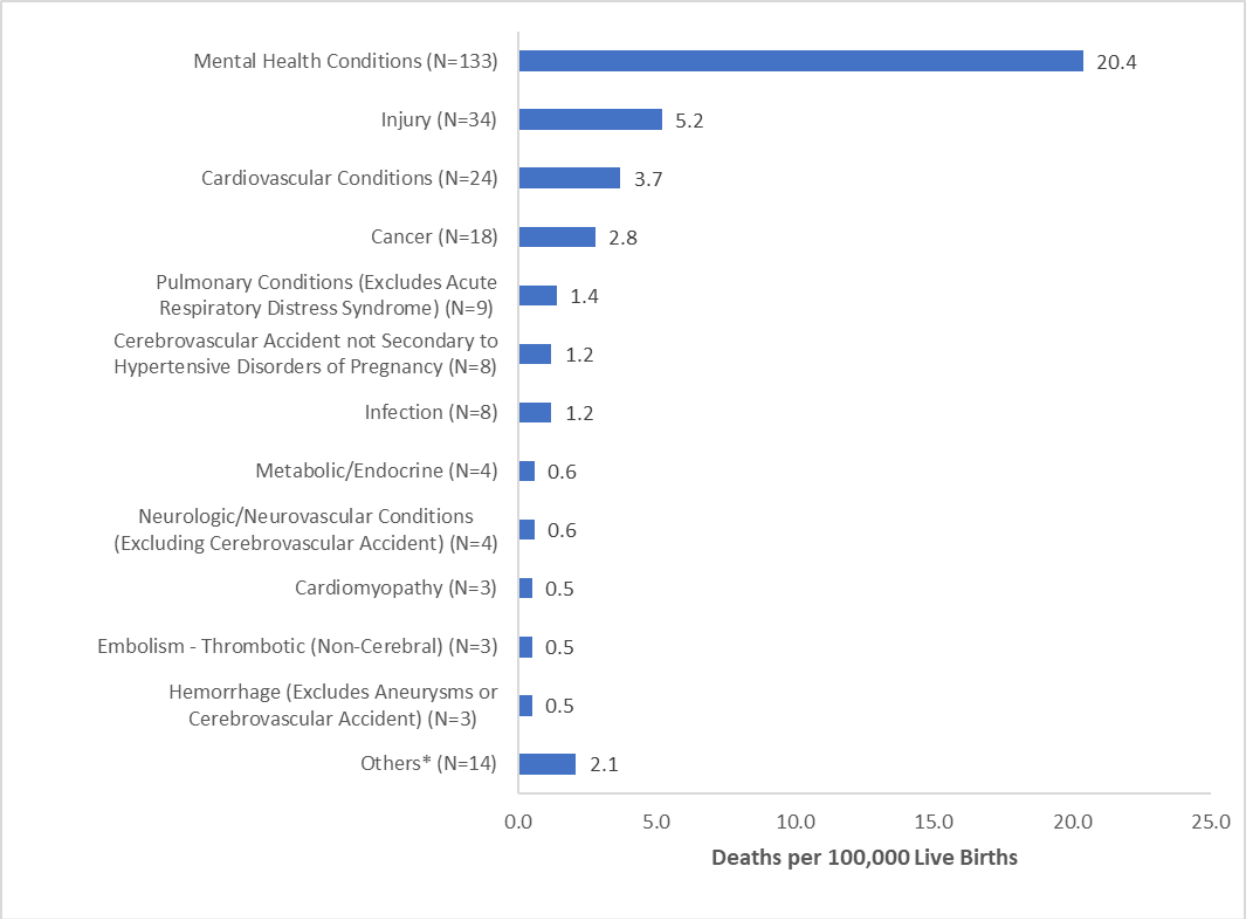
Note: Only categories for which mortality ratios could be accurately calculated are included in this figure.

Source: New York State Maternal Mortality Review

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

Figure 40 displays the cause-specific other pregnancy-associated mortality ratio for leading underlying causes of death, using all 2018-2020 live births as the denominator.

Figure 40. Other Pregnancy-Associated Mortality Ratio by Leading Underlying Causes of Death, 2018-2020



*Others include collagen vascular/autoimmune diseases, hematologic conditions, liver and gastrointestinal conditions, and unknown causes of death.

Source: New York State Maternal Mortality Review

Preventability and Chance to Alter Outcome for Reviewed Cases

Among the 265 other pregnancy-associated deaths, 137 were reviewed by the committees. Among the deaths reviewed, 54.0% were found to be preventable (Table 23). Among preventable deaths, 98.6% of them had either some chance or a good chance to alter the outcome.

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Table 23. Preventability and Chance to Alter Outcome Among Reviewed Other Pregnancy-Associated Deaths, 2018-2020

Preventability	Chance to Alter Outcome	Count (%)
Preventable	Good Chance (N=23) Some Chance (N=50) Unable to Determine (N=1)	74 (54.0%)
Not Preventable	No Chance (N=40) Unable to Determine (N=3)	43 (31.4%)
Unable to Determine	Unable to Determine (N=20)	20 (14.6%)
Total		**137 (100%)**

Source: New York State Maternal Mortality Review

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 committee-reviewed other pregnancy-associated deaths. Among 137 deaths, more than half of them (54.0%) were preventable. The preventability was 70.5% for accidental deaths, 57.1% for homicides, and 50.0% for suicides. In addition, 44.4% of natural deaths were determined to be preventable.

Table 24. Preventability and Chance to Alter Outcome Among Other Pregnancy-Associated Deaths by Manner of Death for Reviewed Cases, 2018-2020

Manner of Death	Chance to Alter Outcome (Count)				Count	% Preventable
	Good	Some	None	Unable to Determine		
Natural	15	17	24	16	72	44.4%
Accident	5	25	11	3	44	70.5%
Homicide	2	2	1	2	7	57.1%
Suicide	1	2	1	2	6	50.0%
Pending Investigation	0	1	0	0	1	100.0%
Could Not Be Determined	0	3	3	1	7	42.9%
Total	**23**	**50**	**40**	**24**	**137**	**54.0%**

Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

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

Among the other pregnancy-associated deaths reviewed by the committees, 72.5% of deaths caused by mental health conditions and 71.4% pulmonary conditions were deemed preventable, while 58.8% of deaths caused by cardiovascular conditions were preventable (Table 25).

Table 25. Preventability Among Other Pregnancy-Associated Deaths by Select Leading Causes of Death for Reviewed Cases, 2018-2020

Cause of Death	Chance to Alter Outcome				Count	% Preventable
	Good	Some	None	Unable to Determine		
Mental Health Conditions	4	32	12	3	51	72.5%
Cardiovascular Conditions	5	5	5	2	17	58.8%
Injury	3	3	3	5	14	42.9%
Cancer	0	1	7	4	12	8.3%
Cerebrovascular Accidents not Secondary to Hypertensive Disorders of Pregnancy	1	2	4	0	7	42.9%
Infections	1	2	1	3	7	42.9%
Pulmonary Conditions (Excludes Acute Respiratory Distress Syndrome)	3	2	1	1	7	71.4%
Other Causes*	6	3	7	6	22	40.9%
Total	**23**	**50**	**40**	**24**	**137**	**54.0%**

*Other Causes include Metabolic/Endocrine Disorders, Cardiomyopathy, Neurologic/Neurovascular Conditions (excluding Cerebrovascular Accidents), Collage Vascular/Autoimmune Diseases, Embolism – Thrombotic (Non-Cerebral), Hematologic Conditions, Hemorrhage (excludes Aneurysms or Cerebrovascular Accidents), and Unknown Causes of Death

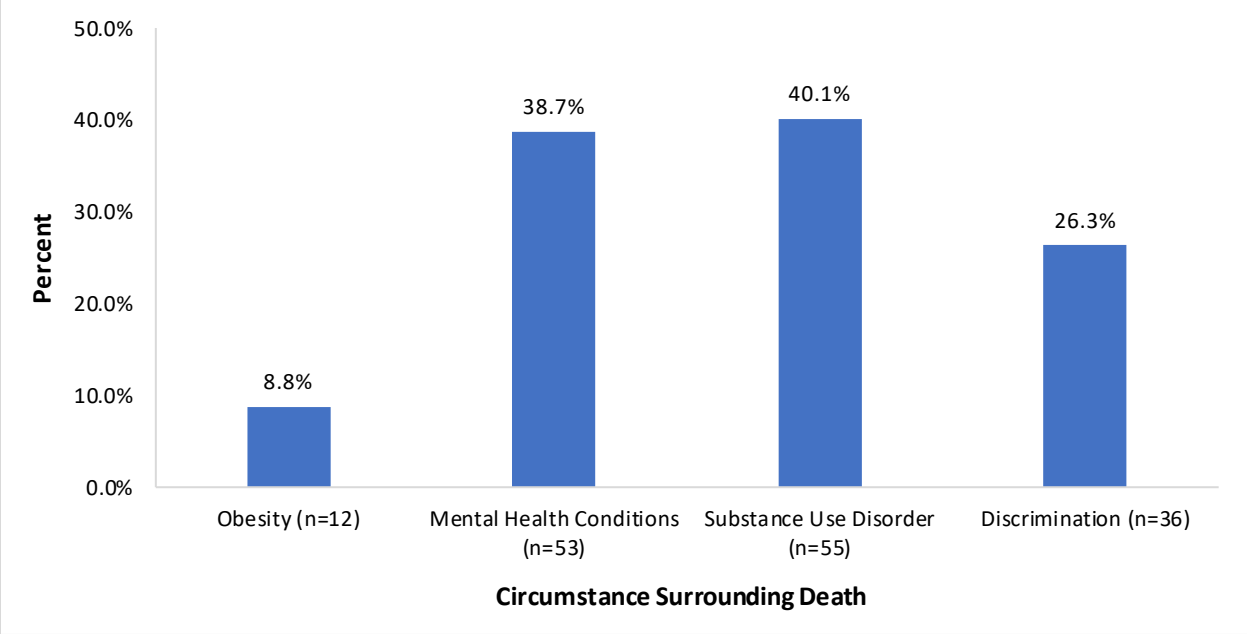
Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Circumstances Surrounding Death for Reviewed Cases

Among the other pregnancy-associated deaths in 2018-2020, obesity, mental health conditions other than substance use disorder, substance use disorder, and discrimination contributed to 8.8% (12), 38.7% (53), 40.1% (55), and 26.3% (36) of the deaths, respectively (Figure 41). An individual can have multiple circumstances surrounding their death.

Figure 41. Distribution of Circumstances Surrounding Death for Other Pregnancy-Associated Deaths, 2018-2020



Source: New York State Maternal Mortality Review

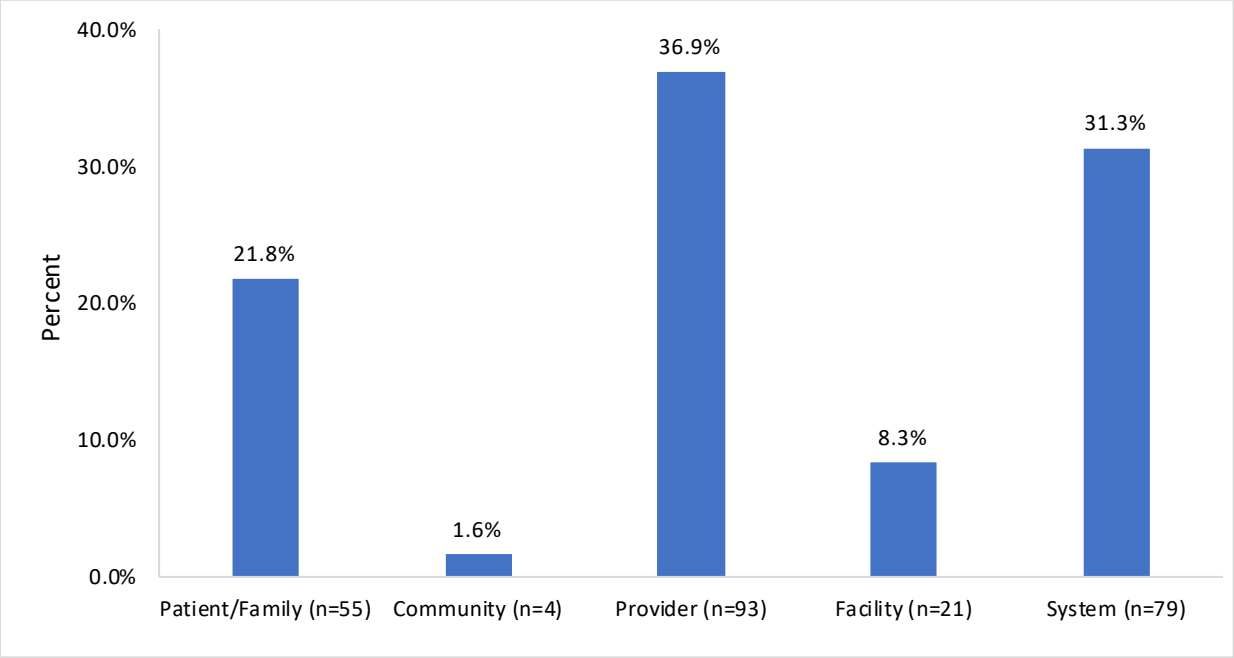
SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

Contributing Factors for Reviewed Cases

There were 252 contributing factors identified among 74 other pregnancy-associated deaths that were preventable. On average, 3.4 contributing factors were identified for each death.

Factors at the provider level (36.9%) and system level (31.3%) together comprised most of the factors identified that contributed to other pregnancy-associated deaths. Factors at the patient or family level accounted 21.8%, facility level factors accounted for 8.3%, and community level factors accounted for 1.6% of other pregnancy associated deaths (Figure 42).

Figure 42. Distribution of Level of Contributing Factors Among Other Pregnancy-Associated Deaths, 2018-2020



Source: New York State Maternal Mortality Review

SECTION 4: FINDINGS FROM THE 2018-2020 COHORT

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, are displayed below.

Among other pregnancy-associated deaths:

- **For natural deaths:** Continuity of Care/Care Coordination was the most common contributing factor at the facility and system levels (Table 26).
- **For accidental deaths:** Substance use disorder was the most common contributing factor at the patient/family and system levels. On the other hand, Continuity of Care/Care Coordination was the most common contributing factor for deaths at the provider level (Table 27).
- **For deaths due to suicide:** Mental health condition and Social Support/Isolation were the most common contributing factors (Table 28).

Table 26. Contributing Factors to Other Pregnancy-Associated Deaths with Natural Manner of Death for Reviewed Cases, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Community Level		
Culture/Religious	1 (1.0%)	None identified by the committees
Environmental	1 (1.0%)	Lack of access to healthy foods in the patient's community (e.g., food deserts)
Structural Racism	1 (1.0%)	Lack of access to heart-healthy foods and nutritional counselling in the patient's community
Subtotal	**3 (3.1%)**	
Facility Level		
Chronic Disease	2 (2.0%)	Insufficient management of chronic diseases during pregnancy
Communication	1 (1.0%)	Incomplete or poorly designed electronic medical records system hindered care
Continuity of Care/Care Coordination	6 (6.1%)	Lack of care coordination
Clinical Skill/Quality of Care	1 (1.0%)	Inadequate diagnosis of mental health conditions
Outreach	2 (2.0%)	Emergency Department used as a source of primary care
Referral	1 (1.0%)	Smoking cessation services not offered
Assessment	1 (1.0%)	Barriers caused by Adverse Childhood Experiences and Social Determinants of Health were not assessed
Subtotal	**14 (14.3%)**	

Patient/Family Level		
Adherence	5 (5.1%)	For reasons unknown, patient did not report symptoms to provider, leading to a delay in diagnosis
Knowledge	3 (3.1%)	Lack of patient education on cardiovascular health resulted in a delay in accessing care
Mental Health Conditions	1 (1.0%)	Lack of support to cope with mental health conditions
Substance Use Disorder- Alcohol, Illicit/Prescription Drugs	1 (1.0%)	Challenges to adhering to treatment
Chronic Disease	3 (3.1%)	Pregnant patients with chronic conditions are at higher risk for poor pregnancy outcomes and need continuity of care
Access/Financial	3 (3.1%)	Lack of access to healthcare services, including for financial reasons, affected the patient's ability to obtain necessary care
Social Support/Isolation	1 (1.0%)	Lack of childcare services prevented patient from obtaining necessary care
Continuity of Care/Care Coordination	1 (1.0%)	Ineffective provider communication affected continuity of care for patient with multiple psychiatric conditions
Subtotal	**18 (18.4%)**	
Provider Level		
Delay	1 (1.0%)	Missed diagnosis resulted in delay of necessary treatment
Adherence	1 (1.0%)	Lack of transportation and/or childcare resulted in canceled appointments
Knowledge	8 (8.2%)	Specialist recommendations were not followed resulting in poor outcome; lack of knowledge regarding best practices for patient care
Mental Health Conditions	3 (3.1%)	Treatment challenges in the presence of mental health conditions
Substance Use Disorder- Alcohol, Illicit/Prescription Drugs	1 (1.0%)	Lack of education on addiction treatment
Chronic Disease	1 (1.0%)	Lack of recognition regarding the severity and impact of chronic disease
Communication	3 (3.1%)	Ineffective communication and poor documentation impacting care; failure to inquire about pregnancy intention
Continuity of Care/Care Coordination	5 (5.1%)	Lack of communication and a lack of care coordination between OB/GYNs and

		midwives; failure to solicit specialist opinions
Clinical Skill/Quality of Care	3 (3.1%)	Failure to recognize and investigate symptoms leading to incorrect treatment
Outreach	1 (1.0%)	Lack of outreach to connect new parents to community supports
Referral	2 (2.0%)	Lack of follow-up to ensure patient connects to specialist care
Assessment	1 (1.0%)	Poor assessment of symptoms leading to delayed/incorrect diagnosis
Other	1 (1.0%)	Lack of appropriate follow-up for patients with a family history of breast cancer
Discrimination	2 (2.0%)	Dismissive attitude towards patients who frequently seek care in emergency departments
Subtotal	**33 (33.7%)**	
System Level		
Knowledge	2 (2.0%)	Lack of knowledge regarding the treatment of patients with complex comorbidities
Chronic Disease	2 (2.0%)	Inadequate access to long-term care
Access/Financial	4 (4.1%)	Lack of access to healthcare services for financial reasons, including due to immigration status, affecting patient's ability to obtain necessary care
Social Support/Isolation	2 (2.0%)	Lack of social supports for obstetric patients
Policies/Procedures	1 (1.0%)	Employer did not offer paid sick leave
Continuity of Care/Care Coordination	12 (12.2%)	Lack of care coordination and follow-up among providers hindered the delivery of appropriate care
Clinical Skill/Quality of Care	1 (1.0%)	Inadequate protocols resulting in misdiagnosis of anxiety
Outreach	1 (1.0%)	Lack of social supports for obstetric patients
Assessment	1 (1.0%)	Failure to screen patient resulting in inadequate assessment of risk
Discrimination	2 (2.0%)	Barriers to accessing services and supports, secondary to structural racism, for marginalized communities; warning signs of heart disease ignored due to gender
Structural Racism	2 (2.0%)	Lack of stable housing

Subtotal	**30 (30.6%)**	
Total	**98 (100%)**	

Source: New York State Maternal Mortality Review

Table 27. Contributing Factors to Other Pregnancy-Associated Deaths with Accident as the Manner of Death for Reviewed Cases, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Community Level		
Substance Use Disorder-Alcohol, Illicit/Prescription Drugs	1 (0.8%)	Polysubstance use
Subtotal	**1 (0.8%)**	
Facility Level		
Policies/Procedures	1 (0.8%)	Insufficient policies to prevent overdose deaths in domestic violence shelters
Continuity of Care/Care Coordination	1 (0.8%)	Inadequate assessment for postpartum mental health conditions
Clinical Skill/Quality of Care	1 (0.8%)	Inadequate policies to screen/refer patients, who frequent the emergency department, for substance use disorder
Referral	1 (0.8%)	Lack of referrals to home-based community services for monitoring and connecting patients to ongoing care and resources
Discrimination	1 (0.8%)	Stigma/bias against patients with substance use disorder
Subtotal	**14 (14.3%)**	
Patient/Family Level		
Adherence	1 (0.8%)	Polysubstance use disorder and mental health conditions impacting patient's ability to participate in treatment
Knowledge	3 (2.4%)	Lack of knowledge on Urgent Maternal Warning Signs
Violence	2 (1.6%)	Intimate partner violence
Mental Health Conditions	3 (2.4%)	Mental health conditions impacting care
Substance Use Disorder-Alcohol, Illicit/Prescription Drugs	8 (6.5%)	Substance use disorder due to possible self-medication
Chronic Disease	8 (6.3%)	Lack of appropriate evaluation and treatment of chronic conditions
Unstable Housing	1 (0.8%)	History of unstable housing
Continuity of Care/Care Coordination	1 (0.8%)	Substance use disorder impacting participation in care

Legal	1 (0.8%)	Lack of support for mothers referred to child protective services
Subtotal	**28 (22.6%)**	
Provider Level		
Knowledge	11 (8.7%)	Failure to recognize signs of serious conditions; lack of knowledge on how to treat mental health conditions in the pre-, peri-, and postpartum periods
Mental Health Conditions	1 (0.8%)	Failure to hand off to mental health specialists upon discharge
Substance Use Disorder-Alcohol, Illicit/Prescription Drugs	4 (3.2%)	Lack of referral to substance use treatment upon discharge
Chronic Disease	2 (1.6%)	Appointments for chronic disease management resulting in missed work and reduced pay for patients
Policies/Procedures	1 (0.8%)	Social work assessment leading to drug testing without consent and referral to child protective services
Continuity of Care/Care Coordination	18 (14.2%)	Lack of mental health provider access/continuity; lack of appropriate discussions for substance use disorder treatments and appropriate follow-up with warm hand-offs
Clinical Skill/Quality of Care	8 (6.3%)	Lack of appropriate care for chronic conditions during pregnancy; failure to consider reproductive health when treating unrelated conditions
Outreach	1 (0.8%)	Inadequate community outreach
Referral	2 (1.6%)	Lack of needed referrals to mental health or substance use treatment
Assessment	5 (3.9%)	Failure to assess comorbid conditions during pregnancy; failure to assess for pregnancy when treating patients of reproductive age
Discrimination	1 (0.8%)	Interpersonal racism resulting in inappropriate/unnecessary reports to Child Protective Services
Subtotal	**54 (43.5%)**	
System Level		
Violence	1 (0.8%)	Prevalence of intimate partner violence
Mental Health Conditions	4 (3.1%)	Inadequate mental health care
Substance Use Disorder-Alcohol, Illicit/Prescription Drugs	7 (5.5%)	Lack of resources to assist patients with substance use disorder
Chronic Disease	1 (0.8%)	Presence of depression
Trauma	1 (0.8%)	None identified by the committees
Access/Financial	4 (3.1%)	Lack of resources/coverage for needed medical treatment or equipment

Policies/Procedures	3 (2.4%)	Substance use, in the absence of other risks to the child, resulting in inappropriate referrals to Child Protective Services; lack of childcare resources in domestic violence shelters
Communication	1 (0.8%)	Lack of referral and follow-up for patients with substance use disorder
Continuity of Care/Care Coordination	5 (3.9%)	Lack of care coordination for patients with a history of trauma and substance use
Referral	2 (1.6%)	Lack of referral for mental health conditions; release from jail without referral to appropriate care
Legal	4 (3.1%)	Child removal leading to poor outcomes for patients with existing mental health conditions or substance use disorder
Other	2 (1.6%)	Lack of reproductive behavioral health workforce
Structural Racism	1 (0.8%)	Child Protective Services not providing feedback to the hospital/provider on patients who were referred to them during the delivery hospitalization; referrals influenced by discrimination
Subtotal	**36 (28.3%)**	
Total	**124 (100%)**	

Source: New York State Maternal Mortality Review

Table 28. Contributing Factors to Other Pregnancy-Associated Deaths with Suicide as the Manner of Death for Reviewed Cases, 2018-2020

Class of Contributing Factors	Count (%)	Common Themes
Facility Level		
Policies/Procedures	1 (10.0%)	Lack of adequate information on social services options for patients
Assessment	1 (10.0%)	Lack of mental health screening at prenatal office and hospital visits
Subtotal	**2 (20.0%)**	
Patient/Family Level		
Violence	1 (10.0%)	Intimate partner violence likely occurred, but hospital screens were negative
Mental Health Conditions	1 (10.0%)	Depression, anxiety, and bipolar disorder complicated pregnancy
Unstable Housing	1 (10.0%)	Lived with friends; family not involved
Subtotal	**3 (30.0%)**	
Provider Level		
Social Support/Isolation	2 (20.0%)	Missed assessment for social support needs during initial prenatal care visit
Continuity of Care/Care Coordination	1 (10.0%)	Lack of continuity between mental health and obstetric providers
Subtotal	**3 (30.0%)**	
System Level		
Mental Health Conditions	1 (10.0%)	Mental health conditions not disclosed, possibly due to stigma
Clinical Skill/Quality of Care	1 (10.0%)	Substance use disorder screening questions not answered truthfully, possibly to avoid stigma
Subtotal	**2 (20.0%)**	
Total	**10 (100%)**	

Source: New York State Maternal Mortality Review

SECTION 5: RECOMMENDATIONS

During New York State Maternal Mortality Review Board and New York City Maternal Mortality and Morbidity Review Committee meetings, multidisciplinary members discuss individual cases to determine if there was at least some chance the death could have been averted. For deaths deemed preventable, the committees discuss possible interventions to prevent similar events from occurring in the future. Then, the committees make specific recommendations for action. The recommendations endorse actions to reduce postpartum complications and prevent maternal deaths. For each recommendation made by the committees, a responsible party is assigned (system, facility, provider, etc.). Recommendations are compiled annually from both the New York State and New York City review committees.

For the 2018-2020 maternal death cohort, there were 685 recommendations proposed by the committees, of which 395 recommendations were identified for pregnancy-related deaths. For the 2019-2020 maternal death cohort, 214 recommendations were identified for pregnancy-related deaths. Through a review and ranking process, the New York State and New York City Maternal Mortality Review Committees proposed 18 key recommendations for the New York State 2018-2020 death cohort. These recommendations offer opportunities for prevention at the system, facility, and provider levels.

The 18 key recommendations include ten recommendations that have been proposed by the committees repeatedly, in 2018, 2019, and 2020. Since these recommendations for action remain a priority, the committees chose to continue them. Therefore, ten of the 18 key recommendations for 2020 have been carried over from 2018.

KEY RECOMMENDATIONS

Continuing Key Recommendations from the New York State Report on Pregnancy-Associated Deaths in 2018

- All birthing hospitals should ensure full and up-to-date implementation of the American College of Obstetricians and Gynecologists' Safe Motherhood Initiative Hemorrhage Bundle, including: following a standard protocol for massive transfusion; implementing a universal system for quantification of blood loss; working with anesthesia teams to follow their facility's emergency management plan for response to hemorrhage during delivery and postpartum; utilizing checklists and algorithms to assist with clinical decision-making; and conducting trainings/drills on bundle implementation. (2018, 2019, 2020)
- The American College of Obstetricians and Gynecologists District II, the Department, and partners should develop an emergency room bundle for the care of pregnant and postpartum people, including a plan for dissemination and provider education. (2018, 2019, 2020)
- The American College of Obstetricians and Gynecologists District II, the Department, and partners should use or modify the Alliance for Innovation on Maternal Health's Cardiac Bundle and should assist with provider education. (2018, 2019, 2020)

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- All birthing hospitals should implement a system to ensure obstetricians and other providers, caring for obstetrical patients, utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients, including the postpartum period. (2018, 2019, 2020)
- The Department should convene a multidisciplinary group of key interested parties to develop standard guidance on the implementation of a maternity medical home model that prioritizes people with chronic conditions. In addition, the Department should provide funding to support a pilot project of the maternity medical home model. (2018, 2020)
- The Department should develop an anti-racism and anti-discrimination framework in health care systems, with a focus on eliminating inequities in maternal mortality among those most impacted by disparities, particularly Black and Native American communities. (2018, 2019)
- All birthing hospitals should implement the Alliance for Innovation on Maternal Health Bundle for Safe Reduction of Primary Cesarean Birth, with a goal of reducing low-risk cesarean deliveries. (2018, 2019)
- Hospital systems and obstetrical providers 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 people with chronic conditions (including those with mental health conditions or substance use disorders), and those with difficult access (e.g., rural areas) to follow-up care and community resources. (2018, 2019)
- All birthing hospitals should adopt the venous thromboembolism bundle, including audits of the quality of implementation and compliance. (2018, 2019)
- New York State should offer all families at least one home visit from a nurse or paraprofessional within two weeks postpartum to educate families about signs and symptoms of potential complications. (2018, 2020)

New Recommendations from the 2019-2020 Maternal Death Cohort

- The Department should require hospitals to provide ongoing education, including simulation drills for common obstetric emergencies (e.g., cardiac arrest, obstetric hemorrhage, and preeclampsia) for all providers caring for obstetrical patients. (2019, 2020)
- The New York State Office of Temporary and Disability Assistance [New York State Housing Support Services] should guarantee safe, stable housing for pregnant and postpartum people experiencing homelessness, prioritizing those with chronic health conditions (including mental health conditions). (2019)
- The American College of Obstetricians and Gynecologists District II and partners should develop an obesity bundle to improve care among birthing people of reproductive age. (2019)
- Facilities should implement the maternal early warning signs protocol to facilitate care escalation following a significant change in patient status. (2019)
- New York State Medicaid should increase Medicaid reimbursements for care of pregnant and postpartum people. (2020)

SECTION 5: RECOMMENDATIONS

- The New York State Office of Children and Family Services should develop an equitable system for pregnant and postpartum people who use substances that avoids family separation and supports timely reunification of families and their children. (2020)
- Perinatal care providers should routinely screen for perinatal or postpartum mood and anxiety disorders at least once during both pregnancy and up to one year postpartum and should make timely referrals for positive screens to mental health care providers and/or programs (e.g., Project TEACH, Postpartum Resource Center of New York). (2020)
- The New York State Legislature should require birthing facility participation in New York State Perinatal Quality Collaborative projects and provide funding to birthing facilities to support participation. Project participation should be reported as part of the New York State Maternity Information Scorecard (Hospital Maternity-Related Procedures and Practices Statistics (ny.gov)). (2020)

Key Recommendations by Factor Level

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

System Level

- The Department, American College of Obstetricians and Gynecologists District II, and partners should develop an emergency room bundle for the care of pregnant and postpartum people, including a plan for dissemination and provider education. (2018, 2019, 2020)
- American College of Obstetricians and Gynecologists District II, the Department, and partners should use or modify the Alliance for Innovation on Maternal Health cardiac bundle and should assist with provider education. (2018, 2019, 2020)
- The Department should convene a multidisciplinary group of key interested parties to develop standard guidance on implementation of a maternity medical home model that prioritizes people with chronic conditions. In addition, New York State should provide funding to support a pilot project of the maternity medical home model. (2018, 2020)
- The Department should develop an anti-racism and anti-discrimination framework in health care systems, with a focus on eliminating inequities in maternal mortality among those most impacted by disparities, particularly Black and Native American communities. (2018, 2019)
- Hospital systems and obstetrical providers 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 people with chronic conditions (including those with mental conditions or substance use disorders), and those with difficult access (e.g., rural areas) to follow-up care and community resources. (2018, 2019)

- New York State should offer all families at least one home visit from a nurse or paraprofessional within two weeks postpartum to educate families about signs and symptoms of potential complications. (2018, 2020)
- The Department should require hospitals to provide ongoing education, including simulation drills for common obstetric emergencies (e.g., cardiac arrest, obstetric hemorrhage, and preeclampsia) for all providers caring for obstetrical patients. (2019, 2020)
- New York State Office of Temporary and Disability Assistance [New York State Housing Support Services] should guarantee safe stable housing for pregnant and postpartum people experiencing homelessness, prioritizing those with chronic health conditions (including mental health conditions). (2019)
- ACOG District II and partners should develop an obesity bundle to improve care among birthing people of reproductive age. (2019)
- New York State Medicaid should increase Medicaid reimbursements for care of pregnant and postpartum people. (2020)
- New York State Office of Children and Family Services should develop an equitable system for pregnant and postpartum people who use substances that avoids family separation and supports timely reunification of families with their children. (2020)
- The New York State Legislature should require birthing facility participation in New York State Perinatal Quality Improvement Collaborative projects and provide funding to birthing facilities to support participation. Project participation should be reported as part of the New York State Maternity Information Scorecard.

Facility Level

- All birthing hospitals should ensure full implementation of the American College of Obstetricians and Gynecologists' Safe Motherhood Initiative Hemorrhage Bundle, including: following a standard protocol for massive transfusion; implementing a universal system for quantification of blood loss; working with anesthesia teams to follow their facility's emergency management plan for response to hemorrhage during delivery and postpartum; utilizing checklists and algorithms to assist with clinical decision-making; and conducting trainings/drills on bundle implementation. (2018, 2019, 2020)
- All birthing hospitals should implement a system to ensure obstetricians and other providers caring for obstetrical patients utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (2018, 2019, 2020)
- All birthing hospitals should implement the Alliance for Innovation on Maternal Health Bundle for Safe Reduction of Primary Cesarean Birth, with a goal of reducing low-risk cesarean deliveries. (2018, 2019)
- All birthing hospitals should adopt the venous thromboembolism bundle, including audits of the quality of implementation and compliance. (2018, 2019)
- Facilities should implement the maternal early warning signs protocol to facilitate care escalation following a significant change in patient status. (2019)

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Provider Level

- Perinatal care providers should routinely screen for perinatal or postpartum mood and anxiety disorders at least during both pregnancy and up to one year postpartum, including timely referral for positive screens to mental health care providers and/or programs (e.g., Project TEACH, Postpartum Resource Center of New York). (2020)

Key Recommendations by Leading Causes of Death

The 18 key recommendations were closely aligned with preventing the four leading causes of pregnancy-related deaths as demonstrated below.

Embolism

- The Department, the American College of Obstetricians and Gynecologists District II, and partners should develop an emergency room bundle for the care of pregnant and postpartum people and should develop a plan for dissemination and provider education. (2018, 2019, 2020)
- All birthing hospitals should implement a system to ensure obstetricians and other providers caring for obstetrical patients utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (2018, 2019, 2020)
- The Department should convene a multidisciplinary group of key interested parties to develop standard guidance on implementation of a maternity medical home model that prioritizes people with chronic conditions. In addition, New York State should provide funding to support a pilot project of the maternity medical home model. (2018, 2020)
- The Department should develop an anti-racism framework in health care systems. (2018, 2019)
- Hospital systems and obstetrical providers 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 people with chronic conditions (including those with mental health conditions or substance use disorders), and those with difficult access (e.g., rural areas) to follow-up care and community resources. (2018, 2019)
- All birthing hospitals should adopt the venous thromboembolism bundle, including audits of the quality of implementation and compliance. (2018, 2019)
- New York State should offer all families at least one home visit from a nurse or paraprofessional within two weeks postpartum to educate families about signs and symptoms of potential complications. (2018, 2020)
- The American College of Obstetricians and Gynecologists District II and partners should develop an obesity bundle to improve care among birthing people of reproductive age. (2019)
- New York State Medicaid should increase Medicaid reimbursements for care of pregnant and postpartum people. (2020)

Hemorrhage

- All birthing hospitals should ensure full and up-to-date implementation of the American College of Obstetricians and Gynecologists' Safe Motherhood Initiative Hemorrhage Bundle, including: following a standard protocol for massive transfusion; implementing a universal system for the quantification of blood loss; working with anesthesia teams to follow their facility's emergency management plan for response to hemorrhage during delivery and postpartum; utilizing checklists and algorithms to assist with clinical decision-making; and conducting trainings/drills on bundle implementation. (2018, 2019, 2020)
- The Department, American College of Obstetricians and Gynecologists District II, and partners should develop an emergency room bundle for the care of pregnant and postpartum people and should develop a plan for dissemination and provider education. (2018, 2019, 2020)
- All birthing hospitals should implement the Alliance for Innovation on Maternal Health Bundle for Safe Reduction of Primary Cesarean Birth, with a goal of reducing low-risk cesarean deliveries. (2018, 2019)
- Hospital systems and obstetrical providers 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 people with chronic conditions (including those with mental conditions or substance use disorders), and those with difficult access (e.g., rural areas) to follow-up care and community resources. (2018, 2019)
- Facilities should implement the maternal early warning signs protocol to facilitate care escalation following a significant change in patient status. (2019)

Mental Health Conditions

- All birthing hospitals should implement a system to ensure obstetricians and other providers caring for obstetrical patients utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (2018, 2019, 2020)
- The Department should convene a multidisciplinary group of key interested parties to develop standard guidance on implementation of a maternity medical home model that prioritizes people with chronic conditions. In addition, New York State should provide funding to support a pilot project of the maternity medical home model. (2018, 2020)
- Hospital systems and obstetrical providers 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 people with chronic conditions (including those with mental conditions or substance use disorders), and those with difficult access (e.g., rural areas) to follow-up care and community resources. (2018, 2019)
- The New York State Office of Temporary and Disability Assistance [New York State Housing Support Services] should guarantee safe stable housing for

pregnant and postpartum people experiencing homelessness, prioritizing those with chronic health conditions (including mental health conditions). (2019)

Cardiomyopathy

- The Department, the American College of Obstetricians and Gynecologists District II, and partners should develop an emergency room bundle for the care of pregnant and postpartum people, including a plan for dissemination and provider education. (2018, 2019, 2020)
- The American College of Obstetricians and Gynecologists District II, the Department, and partners should use or modify the Alliance for Innovation on Maternal Health cardiac bundle and should assist with provider education. (2018, 2019, 2020)
- All birthing hospitals should implement a system to ensure obstetricians and other providers caring for obstetrical patients utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period. (2018, 2019, 2020)
- The Department should convene a multidisciplinary group of key interested parties to develop standard guidance on implementation of a maternity medical home model that prioritizes people with chronic conditions. In addition, New York State should provide funding to support a pilot project of the maternity medical home model. (2018, 2020)
- The Department should develop an anti-racism and anti-discrimination framework in health care systems, with a focus on eliminating inequities in maternal mortality among those most impacted by disparities, particularly Black and Native American communities. (2018, 2019)
- The American College of Obstetricians and Gynecologists District II and partners should develop an obesity bundle to improve care among birthing people of reproductive age. (2019)

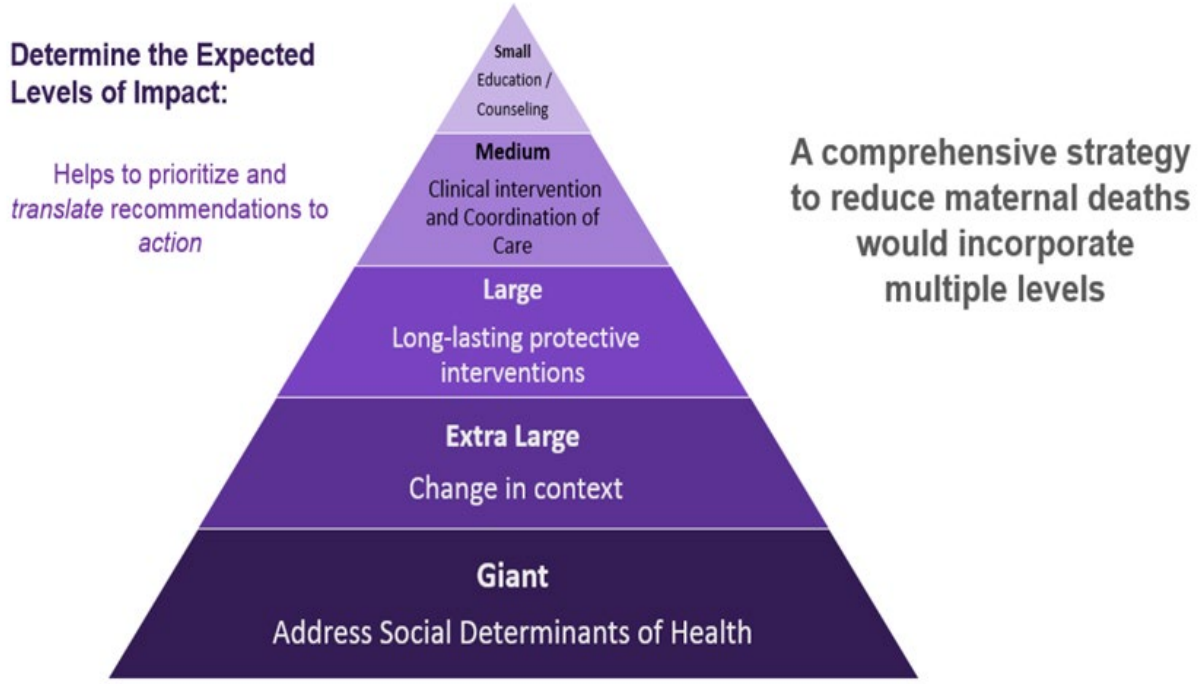
Anticipated Impact if Recommendation is Implemented

Each recommendation is categorized in two ways - 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 on what has become an ongoing contributing factor. For the assignment of 18 key recommendations by prevention level, five (27.8%) were identified as primary, nine (50.0%) were identified as secondary, and four (22.2%) were identified as tertiary.

The New York State Maternal Mortality Review Board assigns an expected level of impact if the recommendation was implemented; the categories are small, medium, large, extra-large, and giant (Figure 43). The expected level of impact is determined by the activities associated with it and is 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.

Figure 43. Expected Levels of Impact of Recommendations



Source: Centers for Disease Control and Prevention – Review to Action

If all 18 of the 2018-2020 recommendations were implemented, the impact level is estimated to be small in 5.6%, medium in 38.9%, large in 33.3%, extra-large in 16.7%, and giant in 5.6% of the recommendations, respectively. (Table 29).

Table 29. Key Recommendations by Prevention Type and Expected Impact Level, 2018-2020

No.	Level	Recommendation	Prevention Type	Expected Impact Level
1	Facility	All birthing hospitals should ensure full implementation of the American College of Obstetricians and Gynecologists Safe Motherhood Initiative Hemorrhage Bundle, including: following a standard protocol for massive transfusion; implementing a universal system for the quantification of blood loss; working with anesthesia teams to follow their facility's emergency management plan for response to hemorrhage during delivery and postpartum; utilizing checklists and algorithms to assist with clinical decision-making; and conducting trainings/drills on bundle implementation.	Secondary	Large

2	System	The New York State Department of Health, the American College of Obstetricians and Gynecologists District II, and partners should develop an emergency room bundle for the care of pregnant and postpartum people, including a plan for dissemination and provider education.	Secondary	Large
3	System	The American College of Obstetricians and Gynecologists District II, the Department, and partners should use or modify the Alliance for Innovation on Maternal Health cardiac bundle and should assist with provider education.	Tertiary	Large
4	Facility	All birthing hospitals should implement a system to ensure obstetricians and other providers caring for obstetrical patients utilize a multidisciplinary approach for collaborative chronic care management of obstetrical patients including the postpartum period.	Secondary	Medium
5	System	The Department should convene a multidisciplinary group of key interested parties to develop standard guidance on implementation of a maternity medical home model that prioritizes people with chronic conditions. In addition, New York State should provide funding to support a pilot project of the maternity medical home model.	Secondary	Medium
6	System	The Department should develop an anti-racism and anti-discrimination framework in health care systems, with a focus on eliminating inequities in maternal mortality among those most impacted by disparities, particularly Black and Native American communities.	Primary	Giant
7	Facility	All birthing hospitals should implement the Alliance for Innovation on Maternal Health bundle to reduce cesarean delivery rates.	Primary	Large
8	System	Hospital systems and obstetrical providers 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 people with chronic conditions (including those with mental conditions or substance use disorders), and those with difficult access (e.g., rural areas) to follow-up care and community resources.	Secondary	Medium
9	Facility	All birthing hospitals should adopt the venous thromboembolism bundle, including audits of the quality of implementation and compliance.	Secondary	Medium

10	System	New York State should offer all families at least one home visit from a nurse or paraprofessional within two weeks postpartum to educate families about signs and symptoms of potential complications.	Primary	Small
11	System	The Department should require hospitals to provide ongoing education, including simulation drills for common obstetric emergencies (e.g., cardiac arrest, obstetric hemorrhage, and preeclampsia) for all providers caring for obstetrical patients.	Primary	Large
12	System	The New York State Office of Temporary and Disability Assistance [New York State Housing Support Services] should guarantee safe stable housing for pregnant and postpartum people experiencing homelessness, prioritizing those with chronic health conditions (including mental health conditions).	Tertiary	Extra Large
13	System	The American College of Obstetricians and Gynecologists District II and partners should develop an obesity bundle to improve care among birthing people of reproductive age.	Secondary	Medium
14	Facility	Facilities should implement the maternal early warning signs protocol to facilitate care escalation following a significant change in patient status.	Tertiary	Medium
15	System	New York State Medicaid should increase Medicaid reimbursements for the care of pregnant and postpartum people.	Primary	Extra Large
16	System	The New York State Office of Children and Family Services should develop an equitable system for pregnant and postpartum people who use substances that avoids family separation and supports timely reunification of families and their children.	Secondary	Extra Large
17	Provider	Perinatal care providers should routinely screen for perinatal or postpartum mood and anxiety disorders throughout pregnancy and up to one year postpartum, including timely referral for positive screens to specialized perinatal mental health care providers.	Secondary	Medium
18	System	The New York State Legislature should require birthing facility participation in New York State Perinatal Quality Collaborative projects, and this should be reported as part of the New York State Maternity Information Scorecard (Hospital Maternity-Related Procedures and Practices Statistics (ny.gov))	Tertiary	Large

Source: New York State Maternal Mortality Review

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

Following the review of the 2018 pregnancy-associated death cohort, the New York State Maternal Mortality Review Board identified **14 Key Recommendations** to reduce the risk of maternal mortality and morbidity, which were published in the New York State Report on Pregnancy-Associated Deaths in 2018. In order to make a sustainable impact on maternal mortality and morbidity and reduce racial and ethnic disparities in New York State, the Department has been working with a wide range of partners at the system, facility, provider, and community levels to implement the Maternal Mortality Review Board's recommendations. These partners often work directly with individuals and communities, and serve individuals disproportionately affected by disparities.

Additionally, to assess implementation of the Maternal Mortality Review Board's four facility-level recommendations, as well as two of the provider-level recommendations, the Department conducted a brief, six-question survey of New York State birthing facilities in February - March 2023. The response rate was 100%, with all 118 birthing hospitals completing a survey. The results of the survey are presented below within the applicable subsections.

RECOGNIZE AND REDUCE RACISM AND DISCRIMINATION

Effective June 22, 2023, Public Health Law 2802-b requires health care facilities across New York State to submit a Health Equity Impact Assessment when filing a Certificate of Need application for the establishment, ownership, construction, renovation, or change in service. The assessment will provide information on whether the proposed project impacts the delivery of or access to services, particularly for medically underserved groups, and ensures that community voices are considered as well.

The Department's Division of Family Health leads the New York State Perinatal Quality Collaborative which engages a statewide network of birthing hospitals and centers that seek to provide the best, safest, and most equitable care for New York State's birthing people and infants. The New York State Perinatal Quality Collaborative has developed the New York State Birth Equity Improvement Project which seeks to assist New York State birthing hospitals and centers in identifying individual and systemic racism and to take action to improve systems of care, as well as the experience of care for Black birthing people. The project, which launched to all New York State birthing hospitals and centers in January 2021, includes a comprehensive education and training program to raise awareness on and reduce implicit bias in health care institutions. Coaching calls and learning sessions featured national experts on equity and focused on such equity topics as the experience of Black birthing people, the impact of racism on perinatal health, staff experience of racism, authentic patient engagement, and shared decision making. The New York State Perinatal Quality Collaborative has engaged multidisciplinary teams in 73 birthing hospitals that are responsible for the delivery of approximately 75% of the state's births.

The Department's Office of Health Insurance Programs, New York's Medicaid Administration, issued the New York State Medicaid Perinatal Care Standards, effective August 1, 2022. This policy is applicable to Medicaid Managed Care Plans and all Medicaid perinatal care providers

who provide prenatal/antepartum care, intrapartum care, and/or postpartum care. With the issuing of this updated foundational policy, Medicaid provided clarifying guidance with an explicit focus on health equity, health disparities, and racial bias. The "Guiding Principles" outlined for providers within the standards dictate that "all providers who deliver care to pregnant/postpartum persons must adopt…a clinical practice philosophy that" is consistent with current evidence-based practice; "applies a health equity framework to eliminate racial and ethnic inequities, implicit bias, and racism; engages with stakeholders, including but not limited to pregnant/postpartum persons, families, and community partners, to improve racial and ethnic equity, trust, and quality of care; and demonstrates cultural humility with and sensitivity to all pregnant/postpartum persons, including but not limited to those with limited English proficiency and diverse cultural and ethnic backgrounds, sexual orientations, gender identities, and faith communities".

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

The New York State Perinatal Quality Collaborative, in collaboration with the American College of Obstetricians and Gynecologists District II, Healthcare Association of New York State and Greater New York Hospital Association, is leading a project centered on the Alliance for Innovation on Maternal Health's Safe Reduction of Primary Cesarean Birth Patient Safety Bundle. This project will focus on implementation efforts within New York State birthing facilities, providing an educational curriculum, technical and quality improvement assistance, access to clinical and quality improvement faculty, site visits, and consultations on an annual basis. Results of the Department's 2023 birthing facility survey indicated that 32.2% of New York State birthing facilities had implemented the Alliance for Innovation on Maternal Health's bundle to reduce cesarean delivery rates, 55.9% were in the process of implementing it, and 11.9% had not begun implementation efforts yet.

Through the New York State Perinatal Quality Collaborative, the Department works with birthing facilities to translate evidence-based guidelines into clinical practice via quality improvement projects. The New York State Perinatal Quality Collaborative projects incorporate the use of patient safety bundles and policies that are available through professional organizations such as the American College of Obstetricians and Gynecologists. As part of the New York State Perinatal Quality Collaborative's New York State Obstetric Hemorrhage Project, which took place from 2017 through 2021, 83 participating birthing facility teams focused on improving the assessment, identification, and management of obstetric hemorrhage. This project incorporated the use of the American College of Obstetricians and Gynecologists DistrictII Safe Motherhood Initiative Obstetric Hemorrhage Bundle. Two of the project's key structure measures focused on implementing a standardized protocol for massive transfusion and implementing a standardized system for the quantification of cumulative blood loss during delivery and postpartum. Both were key strategies for hospitals to improve readiness to manage an obstetric hemorrhage, and both were topics of educational webinars and provider

trainings. Additionally, the New York State Perinatal Quality Collaborative partnered with the Association of Women's Health, Obstetric, and Neonatal Nurses to provide select hospitals with direct technical assistance in implementing and overcoming barriers to blood loss quantification. In March 2023, results of the Department's New York State birthing facility survey indicated that 94.1% of birthing facilities had a standard protocol for massive transfusion in place, 5.1% were in the process of implementing a standard protocol, and 0.8% had not begun implementation efforts yet. Survey results also indicated that 85.6% of birthing facilities had implemented a standardized system for the quantification of cumulative blood loss during delivery and postpartum, 12.7% were in the process of implementing one, and 1.7% had not begun implementation efforts yet.

Venous thromboembolism, which includes deep vein thrombosis and pulmonary embolism, is a leading cause of preventable maternal mortality and severe maternal morbidity in New York State. Research shows that systemic changes in practice can lead to substantial reductions in venous thromboembolism. Consequently, the American College of Obstetricians and Gynecologists District II developed a patient safety bundle on venous thromboembolism, which focuses on risk assessment on admission and pharmacologic prophylaxis for high-risk patients. The venous thromboembolism patient safety bundle is available for use by all New York State birthing facilities. In March 2023, results of the Department's birthing facility survey showed that 74.6% of New York State birthing facilities had implemented screening for venous thromboembolism and chemoprophylaxis during the intrapartum and postpartum periods, 20.3% were in the process of implementing it, and 5.1% had not begun implementation efforts yet.

Two of the causes of pregnancy-related deaths in New York State in 2018-2020 were cardiomyopathy (fifth leading cause) and cardiovascular conditions (seventh leading cause). Currently, the American College of Obstetricians and Gynecologists Alliance for Innovation on Maternal Health Cardiac Conditions in Obstetric Care Bundle is available for use by New York State birthing facilities. In 2019, the American College of Obstetricians and Gynecologists published Practice Bulletin No. 212: Pregnancy and Heart Disease, which, 1) describes the prevalence and effect of heart disease among pregnant and postpartum women; 2) provides guidance for early antepartum and postpartum risk factor identification and modification; 3) outlines common cardiovascular disorders that cause morbidity and mortality during pregnancy and postpartum; 4) describes recommendations for care for pregnant and postpartum women with preexisting or new-onset acquired heart disease; and 5) presents a comprehensive interpregnancy care plan for women with heart disease. The American College of Obstetricians and Gynecologists District II, the Department, and partners plan to review and modify (if necessary) the recently released the Alliance for Innovation on Maternal Health Cardiac Conditions in Obstetric Care Bundle. Subsequently, birthing hospitals will be urged to implement the bundle.

The New York State Medicaid program is implementing a Quality Incentive Payment for labor and delivery hospitals in New York State with over 500 Medicaid Managed Care (MMC) deliveries. Performance payments will be earned if eligible labor and delivery hospital reduce

their low-risk Cesarean section delivery rates as defined by their performance on the Joint Commission Nulliparous, Term, Singleton, Vertex (NTSV) measure.

IMPROVE THE HEALTH OF PREGNANT AND POSTPARTUM PEOPLE

The Department's Offices of Public Health and Health Insurance Programs revised the Medicaid Perinatal Care Standards. The revised standards became effective August 1, 2022, for Fee-for-Service Medicaid and October 1, 2022, for Medicaid Managed Care. Aspects of care addressed in the updated Medicaid Perinatal Care Standards include access to care, provider training and credentialling, eligibility and coverage, comprehensive prenatal care risk assessment, care plans, care coordination, home visits, initial and comprehensive postpartum visits, and breastfeeding/chest feeding. These standards apply to all Medicaid providers of prenatal/antepartum, intrapartum, and/or postpartum services, all medical care facilities, public and private not-for-profit organizations, physicians, licensed nurse practitioners, licensed midwives practicing on an individual or group basis, and all Medicaid Managed Care plans that contract with these providers.

Medicaid Perinatal Care Standards require coordination of care by the principal maternity care provider. The principal maternity care provider must ensure the exchange of relevant information with other health care providers, human service and community-based service providers, health plan case managers, and sites of care including the anticipated delivery site. Likewise, the maternity care provider must refer patients to appropriate specialists or community resources.

On March 1, 2023, the Department expanded New York State Medicaid postpartum coverage from 60 days to 12 months for all eligible Medicaid recipients, regardless of immigration status or how the pregnancy ended. It is anticipated that the extension will provide opportunities for connections to treatment for individuals with chronic conditions, including heart disease, hypertension, diabetes, mental health, and substance use disorders; and opportunities for the utilization of preventive services, including screenings and referrals for new or acute conditions. The expansion of Medicaid is a critical step towards preventing maternal deaths and illness and fortifying health equity.

All postpartum persons insured by Medicaid are now eligible for one initial postpartum home visit after they give birth. Additional postpartum home visits may be covered depending on the person's unique medical, obstetrical, and/or psychosocial profile. The Medicaid reimbursable visit is a skilled nursing home visit provided by agencies that are certified or licensed under Article 36 of the Public Health Law and are either a Certified Home Health Agency or a Licensed Home Care Service Agency. Other home visiting providers may include, but are not limited to, Nurse-Family Partnership Programs, local health departments, and community health worker programs, which may or may not be covered as a Medicaid benefit. All principal maternity care providers and/or birthing hospitals must offer and arrange for the initial postpartum home visit, which should take place 36 to 72 hours after discharge. Birthing hospitals must have a system in place to arrange and schedule the birthing person's initial postpartum home visit. The

postpartum visit must include guidance regarding the identification and treatment of early urgent maternal warning signs that can occur up to one year postpartum.

To improve and expand access to prenatal and postnatal care, the State Fiscal Year 2023-24 Enacted Budget includes coverage of support services for pregnant or postpartum people provided by community health workers/peer family navigators, nutrition services for pregnant or postpartum people provided by Registered Dieticians, an increase in midwife fee schedule rates to 95% of the physician fee schedule (previously 85%), expansion of remote patient monitoring service coverage for pregnant/postpartum people, expansion of reimbursement of Noninvasive Prenatal Screening to include coverage for all pregnant Medicaid members, and expansion of Coverage for Spinal Muscular Atrophy Carrier Screening. Additionally, a Medicaid Doula Services pilot program is being implemented in Erie County (New York State Doula Pilot Program), and the Office of Health Insurance Programs is developing a Medicaid State Plan Amendment to expand doula service coverage statewide by January 2024.

According to the Department's birthing facility survey implemented in February - March 2023, 95.7% of New York State birthing facilities are utilizing a multidisciplinary approach for collaborative chronic care management of obstetrical patients, including during the postpartum period.

COORDINATE CARE FOR PREGNANT AND POSTPARTUM PEOPLE

Through the Maternal and Infant Community Health Collaborative program, which has ended and been replaced with the Perinatal and Infant Community Health Collaborative program, community health workers are focused 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 Maternal and Infant Community Health Collaborative program were enhanced via the Community Health Worker Expansion grant. The goal of the Community Health Worker Expansion project was to expand community health worker services in key communities across the state to reduce maternal mortality and racial disparities in outcomes. In August 2019, Community Health Worker Expansion program contracts were awarded to the 23 established Maternal and Infant Community Health Collaborative programs in New York State 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 supported expansion of the Maternal and Infant Community Health Collaborative community health worker services for 23 months, from August 1, 2019 to June 30, 2022. The intended goal of the funding was to support approximately 50-60 additional community health workers and serve an additional 2,400 prenatal and postpartum women and families. However, in large part due to the onset of the COVID-19 pandemic, only 30 new community health workers were hired statewide to serve approximately 1,200 additional prenatal and postpartum families.

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

The Department is funding 26 Perinatal and Infant Community Health Collaborative programs (July 1, 2022 – June 30, 2027) statewide to support the development, implementation, and coordination of collaborative community-based strategies, with a goal of improving perinatal and infant health outcomes (preterm birth, low birth weight, infant/maternal mortality) and eliminating racial, ethnic, and economic disparities in outcomes. Perinatal and Infant Community Health Collaborative programs utilize community health workers to implement individual-level strategies that address perinatal and infant health behaviors and community-level strategies using a collective impact approach.

Effective October 1, 2023, for New York State Medicaid fee-for-service, and for New York State Medicaid Managed Care Plans, Medicaid members are eligible for CHW services during pregnancy and up to 12 months after the end of pregnancy, regardless of how the pregnancy ends. Covered CHW services include health advocacy, health education, and health navigation supports aimed at improving health outcomes, overall health literacy, and preventing the development of adverse health conditions, injury, illness, or the progression thereof.

The Department continues to invest in Nurse-Family Partnership Programs. Nurse-Family Partnership is an evidence-based home visiting program which provides education, screening, and referral services to high-risk, low-income pregnant individuals who are enrolled before the 29th week of pregnancy and who will be first time parents. Nurse-Family Partnership programs utilize registered nurses to improve maternal and child health, increase family self-sufficiency, and reduce child maltreatment. The Department supports 10 Nurse-Family Partnership programs in nine counties (Chautauqua, Chemung, Erie, Bronx, Onondaga, Monroe, Kings, Queens, and Nassau). The Department has identified and shared several promising practices from the field of home visiting programs and intends to further support collaboration and bidirectional referrals between birthing facilities and state-funded home visiting programs. Home visiting programs must collaborate with local birthing hospitals to ensure individuals with a high-risk pregnancy are connected to supportive community services.

According to the Department's birthing facility survey implemented in February - March 2023, 68.6% of birthing facilities are routinely engaging community resources when appropriate, and 31.4% are sometimes engaging community resources when appropriate. Facilities that indicated that they engage community resources only sometimes, noted a lack of staff to make referrals and a lack of referral resources in the community as barriers.

Optimize Management of Mental Health Conditions and Substance Use Disorders

The Maternal Mortality Review Board prioritized perinatal mental health conditions and substance use disorder for issue brief development. In 2022, the Maternal Mortality Review Board published an issue brief entitled, Spotlight on Perinatal Mental Health, which underscores the importance of managing mental health conditions in the perinatal period. Three recommendations were identified to improve the management of mental health conditions in the perinatal period: 1) psychiatric medications should not be automatically discontinued due to pregnancy; 2) screening for depression should be conducted during all

pregnancies and is considered the standard of care; 3) enhanced care coordination is needed between prenatal and mental health providers. The issue brief was distributed widely, which assisted the Maternal Mortality Review Board in their efforts to educate providers on the factors that contribute to mental health-related maternal deaths. In 2023, the Board developed an issue brief entitled, *Spotlight on Perinatal Substance Use Disorder,* which is anticipated to be released in 2023. The *Spotlight on Perinatal Substance Use Disorder* issue brief highlights the need for providers to ensure patients with a substance use disorder receive enhanced support during the first year postpartum, including warm hand offs and engagement with medical and other providers that treat substance use disorder, including but not limited to New York State Office of Addiction Services and Supports certified providers.

The New York State Perinatal Quality Collaborative Opioid Use Disorder in Pregnancy and Neonatal Abstinence Syndrome Project, which began in 2018 and concluded in 2023, seeks to improve early identification of opioid use disorder, standardization of therapy, and coordination of aftercare (i.e., plan of safe care) for infants with neonatal abstinence syndrome. This initiative is based on the Alliance for Innovation on Maternal Health Care For Pregnant and Postpartum People with Substance Use Disorder Patient Safety Bundle. Between January 2019 and June 2020, the percentage of participating facilities that implemented a universal screening protocol for opioid use disorder increased from 21% to 64%. The percentage of women with opioid use disorder who received medication-assisted treatment or behavioral health treatment during pregnancy increased from 72% to 81%. The New York State Perinatal Quality Collaborative assisted the New York State Opioid Use Disorder in Pregnancy and Neonatal Abstinence Syndrome Project with birthing facility enrollment, webinars, podcasts, and quality improvement support. The project assisted in improving collaborative, chronic care management by delivering provider and patient education; implementing universal verbal screening; improving the management of patients during labor, delivery, and immediately postpartum; coordinating discharge care; and collaborating across hospital teams to share and learn. Thirty-nine New York State birthing hospitals from diverse geographic areas, and representing all levels of perinatal designations, participated in the project. Teams from these hospitals learned and applied key principles to improve care and implement the core interventions, and associated measures. These core interventions are based on currently available scientific evidence. As part of the improvement process, teams also learned quality improvement strategies and collected data that is sensitive to the changes they tested and implemented, to track performance and results. Analysis of final project data is underway.

The New York State Perinatal Quality Collaborative hosted a series of webinars in collaboration with the New York State Office of Mental Health's Project TEACH Maternal Mental Health Initiative and the American College of Obstetricians and Gynecologists District II. The four webinars, promoted widely to New York State birthing facilities and perinatal providers, focused on: early stages of developing an integrated maternal mental health/obstetric practice; late stages of developing an integrated maternal mental health/obstetric practice and putting maternal mental health into action; integration of maternal mental health into obstetric care using an employee-based insurance model; the impact of social determinants of health on

maternal mental health care; and, a collaborative multidisciplinary approach to maternal mental health with a focus on Black and Latinx populations.

ENSURE APPROPRIATE LEVELS OF CARE DETERMINATION

Since 2017, the Department has worked to update the statewide system of regionalized perinatal care to reflect current national standards of obstetrical and neonatal care 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, Department staff conducted an extensive review of current standards in consultation with a 49-member multidisciplinary Expert Panel and other subject matter expert consultants. The proposed regulations further integrate recently established midwifery birth centers, along with freestanding birth centers, into the regional perinatal system, and place a greater emphasis on quality care and patient safety, particularly for obstetrical patients. Additionally, the Midwifery Birth Center Accreditation Act was signed by Governor Hochul on December 30, 2021, with a subsequent Chapter Amendment to incorporate accreditation into the Certificate of Need process and require additional perinatal regionalization-related requirements beyond the scope of birth center accreditation, was signed into law in early March 2022. A comprehensive package of proposed regulations to update requirements for perinatal care, perinatal regionalization, freestanding birth centers, and midwifery birth centers (10 NYCRR 12.2, 405.21, 721, 754 and 795) was published in the State Register on May 31, 2023, for a 60-day public comment period ending July 31, 2023. The Department is currently working to assess the comments received.

As part of the Department's Statewide Health Care Facility Transformation III Program (administered through the Office of Primary Care and Health Systems Management), four regional perinatal centers submitted applications for capital funds and one regional perinatal center applied for non-capital operational funds, to establish, enhance, and/or expand perinatal telehealth capacity at the regional perinatal c enter and among their affiliated birthing hospitals. These projects include elements related to providing telehealth services such as direct patient consultation, remote reading of ultrasonography, and remote patient monitoring during the prenatal and postpartum period. Projects are planned in areas where residents are disproportionately affected by chronic comorbidities, reside in rural communities or other medically underserved communities, and/or are majority-minority populations.

To support rural perinatal telehealth capacity, particularly in Upstate New York, the Department invested federal Title V Maternal and Child Health Services Block Grant funds to five regional perinatal centers in 2020-2022. Programs assessed technology and training needs within their obstetrical and pediatric/neonatology units, as well as the needs of their affiliate birthing hospitals, and developed regional action plans to be responsive to local needs. Funds were used primarily to support purchasing and training of telehealth and telemedicine technology, as well as to support clinical telehealth consultations. Due to the COVID-19 pandemic, the unprecedented demands on hospital staff, and unanticipated demand of

telehealth technology, the contracts were extended from a one-year program, to allow for appropriate implementation.

Beginning with the 2023-24 Enacted Budget, and continuing into 2024-25, the State has increased appropriations for the regional perinatal centers. The funding represents a 39% increase from the previous Title V appropriation. Funds are used by regional perinatal centers to support provider education and outreach, neonatal transport coordination, clinical consultation, and quality improvement initiatives with affiliated birthing facilities. Additionally, funds are used to further engage community providers, community-based organizations, and affiliated birthing facilities to collaborate on a variety of locally determined projects aimed at increasing regional capacity to support high-risk obstetrical patients, including those with co-morbidities and those from underserved and minority populations.

Current efforts to strengthen this public health system include increased efforts to address maternal mortality and morbidity, integration of physician- and midwifery-led birth centers into the regional system, and access to ancillary services such as alcohol and substance use services and mental health services, directly and/or through referral, and commensurate with the birthing facility's level of care.

IMPROVE PUBLIC EDUCATION

The Maternal Mortality Review Board suggested consideration of the Centers for Disease Control and Prevention's Hear Her Campaign for possible promotion in this state. In response, the Department implemented two statewide media campaigns, in Fall 2021 and Summer 2022, to build public awareness of the importance of recognizing early urgent maternal warning signs for pregnant and recently pregnant people. The goal of the 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 birthing people to speak up and raise concerns; encourage the birthing person's support systems to engage in important conversations with her; and provide tools for birthing people and providers to better engage in life-saving conversations. The Department utilized social media platforms (Facebook, Instagram, and Snapchat) to convey information on pregnancy-related complications to pregnant people and their partners, friends, and family. The Department employed two palm cards developed by the Centers for Disease Control and Prevention – one for pregnant and recently pregnant people and one for partners, friends, and family. The palm cards contain key information on warning signs and tips for talking about concerns with health care providers. These palm cards were co-branded, printed, and distributed to home visiting agencies in New York State to disseminate to their clients. The palm cards were translated into the ten most common languages spoken in New York State and are housed on the Department website (www.health.ny.gov/hearher) for downloading and printing. The Department is working with the Centers for Disease Control and Prevention on the design of two additional palm cards, specifically for Native American and Alaskan Native people.

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

Funding from the Centers for Disease Control and Prevention allowed the New York State Perinatal Quality Collaborative to expand its efforts related to the COVID-19 pandemic, with an emphasis on improving vaccination rates among populations disproportionately impacted by COVID-19. The goal of this work was to improve outcomes for all pregnant people, people who are planning to become pregnant, and people who are breastfeeding or in the postpartum period. The initiative is focused on improving provider capacity for equitable delivery of COVID-19 vaccinations to pregnant and postpartum people and their families and increasing the number of facilities with protocols to improve COVID-19 vaccination screening and vaccination of pregnant and postpartum people and their families.

Additionally, the Department launched a multimedia, multi-phase campaign to address COVID-19 vaccine hesitancy and promote vaccination among people in the perinatal period. The campaign ran statewide, from January 16 – March 19, 2023, delivering over 87,000,000 total impressions that drove more than 82,000 clicks to the Department's website. Media included testimonials from Dr. Tieg Beazer, DO, MS, an obstetrician from University of Rochester Medical Center, and Dr. Sarah Pachtman, MD, a maternal-fetal medicine specialist at Northwell Health. Dr. Pachtman's testimonial was particularly relevant, as she was pregnant when she received the COVID-19 vaccine.

During reviews, the Board saw an increase in maternal deaths due to substance use disorder. In response to this, the MMRB recommended making naloxone more available to pregnant and recently pregnant women and their families. Brochures were developed, with a focus on people in the perinatal period and their family/friends, to support the implementation of the Board's recommendation by describing naloxone and its use in reversal of overdose, symptoms to watch for, and how to obtain naloxone with no or low copayments through the New York State Naloxone Co-Payment Assistance Program.

The New York State Perinatal Quality Collaborative team worked in collaboration with staff from the AIDS Institute, the New York State Office of Addiction Services and Supports, and patient advocates from the New York State Opioid Use Disorder in Pregnancy and Neonatal Abstinence Syndrome Project. Collaboration among intra and interagency staff and patient advocates was essential in developing the naloxone brochure for patient and families.
The Department has created several consumer materials related to preventing maternal morbidity and mortality. These include a brochure on warning signs of serious events during and after pregnancy, and an updated fact sheet about perinatal mood and anxiety disorder. The Department is currently finalizing design and translation of educational materials on preterm labor and premature birth (English language text available here). Both the pregnancy/postpartum warning signs and preterm labor/premature birth resources, are required to be distributed by clinical providers as they care for pregnant patients, and may be distributed by other stakeholders, such as community-based organizations that provide home visiting services, WIC services, and prenatal education classes.

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

MATERNAL MORTALITY AND MORBIDITY ADVISORY COUNCIL

In 2023, the Maternal Mortality and Morbidity Advisory Council developed 12 recommendations to reduce maternal mortality and morbidity and eliminate racial disparities, which will be published in a separate report. The Maternal Mortality and Morbidity Advisory Council reviewed the Maternal Mortality Review Board's 2018 recommendations and provided additional recommendations of their own. Throughout the process of developing the recommendations, Advisory Council members stressed the importance of addressing the impact of racism and discrimination on maternal health outcomes. Predominately, the Advisory Council stressed the need to center this work on making systemic and/or institution level changes, as they contribute to the inequitable distribution of resources, gaps in services, and continued disparities experienced by many birthing people. Council members indicated that birthing people continue to feel disrespected and/or experience discrimination when accessing care, a barrier which can make obtaining care and/or following provider advice even more challenging. Continuing to proactively address the impact of racism and bias on birth outcomes, as well as focusing on the patient's experience of care, were seen as ongoing needs. Council members suggested that the use of doulas during labor and delivery may improve the experience of care by supporting and empowering birthing people.

Maternal Mortality and Morbidity Advisory Council members stressed the importance of ensuring that providers understand how systems of care and external barriers present challenges to patients' 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. Council members expressed that recommendations focusing primarily on patient education and awareness are not sufficient to address the real barriers pregnant and birthing people face in accessing high quality care. Members suggested instead to focus on practical steps to improve people's ability to access prenatal or postpartum care (e.g., transportation assistance, evening hours, telehealth visits, etc.).

Maternal Mortality and Morbidity Advisory Council 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 quality improvement projects. Council members believe that all health care facilities will benefit from participating in learning collaboratives and quality improvement initiatives, and suggested ways to hold facilities accountable for staff participation. Members suggested the use of "scorecards" to track facility participation in New York State Perinatal Quality Collaborative quality improvement projects, or the use of incentives.

Moving forward, Maternal Mortality and Morbidity Advisory Council members will continue to work in collaboration with the New York State Maternal Mortality Review Board to share their insights on the development of recommendations. The Maternal Mortality and Morbidity Advisory Council is releasing its own report with recommendations.

SECTION 7: OTHER RELATED REPORTS AND WEBSITES

NEW YORK STATE MATERNAL MORTALITY REVIEW REPORT

New York State Report on Pregnancy-Associated Deaths in 2018 - April 2022 (PDF)
New York State Maternal Mortality Review Report, 2014 - August 2020 (PDF)
New York State Maternal Mortality Review Report, 2012-2013 - August 2017 (PDF)
New York State Maternal Mortality Review Report, 2006-2008 - February 2016 (PDF)

MATERNAL MORTALITY REVIEW FACTSHEETS

Snapshots of major findings

Factsheet on New York State Pregnancy-Associated Deaths in 2018

MATERNAL MORTALITY REVIEW BOARD ISSUE BRIEFS

In-depth examinations of key recommendations

Spotlight on Perinatal Mental Health - November 2022 (PDF)
Spotlight on Perinatal Substance Use Disorder - November 2023 (PDF)

MATERNAL MORTALITY AND MORBIDITY ADVISORY COUNCIL REPORT

Maternal Mortality and Morbidity Advisory Council Report, 2023 – March 2024 (PDF)

NEW YORK STATE HEAR HER CAMPAIGN

www.health.ny.gov/HearHer

NEW YORK STATE DEPARTMENT OF HEALTH MATERNAL MORTALITY WEBSITE

https://www.health.ny.gov/community/adults/women/maternal_mortality/

SECTION 8: CONTRIBUTIONS AND ACKNOWLEDGEMENTS

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SECTION 8: CONTRIBUTIONS AND ACKNOWLEDGEMENTS

SUGGESTED CITATION

New York State Maternal Mortality Review Report on Pregnancy-Associated Deaths, 2018-2020. Albany, NY: New York State Department of Health. 2023.

SECTION 9: APPENDIX

APPENDIX A - 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 New York State Vital Records (Vital Records) notifies Maternal Mortality Review Initiative (Initiative) staff that new death record files are available to download from the National Center for Health Statistics, typically at the beginning of each month. The National Center for Health Statistics compiles these files from death certificate information uploaded by Vital Records, to which the National Center for Health Statistics assigns International Classification of Diseases (Revision 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.

Initiative 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 International Classification of Diseases (Revision 10) cause of death codes indicate a pregnancy within one year of death (cause of death 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, 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 Vital Records for further investigation and, if warranted, correction. For example, Vital Records 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 National Center for Health Statistics 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 Maternal Mortality Review database, 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 New York State 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. Initiative 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 MMRIA, a Centers for Disease Control and Prevention -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 B - 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 nine 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 C – New York State Health Service Areas

HSA #	HSA Name	Counties
1	Western New York	Allegany, Cattaraugus, Chautauqua, Erie, Genesee, Niagara, Orleans, Wyoming
2	Finger Lakes	Chemung, Livingston, Monroe, Ontario, Schuyler, Seneca, Steuben, Wayne, Yates
3	Central New York	Cayuga, Cortland, Herkimer, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, St. Lawrence, Tompkins
4	NY-Pennsylvania	Broome, Chenango, Tioga
5	Northeastern New York	Albany, Clinton, Columbia, Delaware, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington
6	Mid-Hudson	Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester
7	New York City	Bronx, Kings, New York, Queens, Richmond
8	Nassau-Suffolk	Nassau, Suffolk

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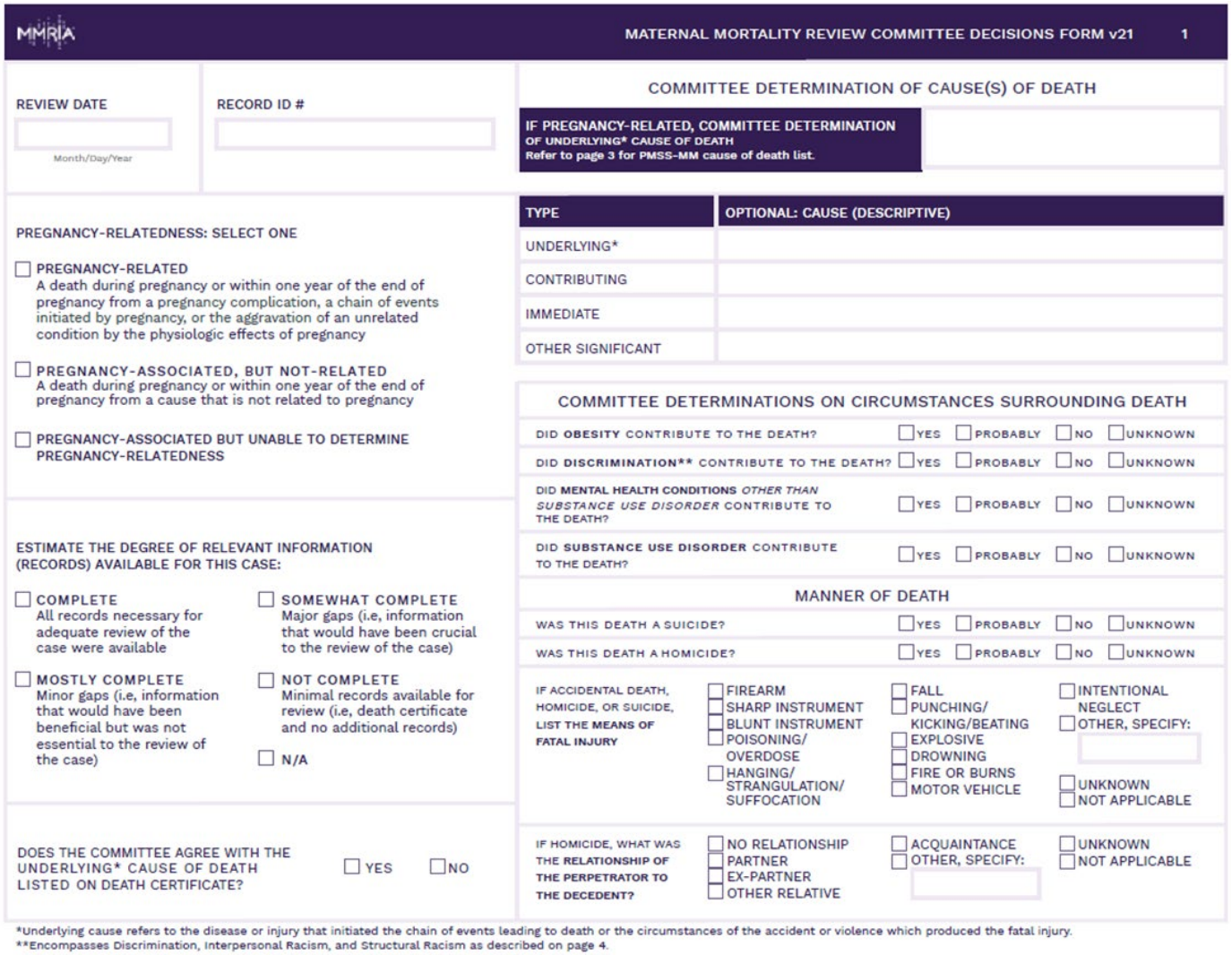
APPENDIX D - MMRIA COMMITTEE DECISIONS FORM



MMRIA — MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v21 1

REVIEW DATE
Month/Day/Year

RECORD ID #

COMMITTEE DETERMINATION OF CAUSE(S) OF DEATH

IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING* CAUSE OF DEATH
Refer to page 3 for PMSS-MM cause of death list.

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

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

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

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

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

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.
**Encompasses Discrimination, Interpersonal Racism, and Structural Racism as described on page 4.

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MMRIA | MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v21 | 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
- Chronic disease
- Clinical skill/ quality of care
- Communication
- Continuity of care/ care coordination
- Cultural/religious
- Delay
- Discrimination
- Environmental
- Equipment/ technology
- Interpersonal racism
- Knowledge
- Law Enforcement
- Legal
- Mental health conditions
- Outreach
- Policies/procedures
- Referral
- Social support/ isolation
- Structural racism
- Substance use disorder - alcohol, illicit/prescription drugs
- Tobacco use
- Trauma
- Unstable housing
- Violence
- Other

DEFINITION OF LEVELS

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

PREVENTION TYPE

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

EXPECTED IMPACT

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

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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.

Hemorrhage (Excludes Aneurysms or CVA)
10.1 - Hemorrhage – Uterine Rupture
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
10.10 - Hemorrhage – Laceration/Intra-Abdominal Bleeding
10.9 - Other Hemorrhage/NOS

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
20.6 - Urinary Tract Infection
20.7 - Influenza
20.8 - COVID-19
20.10 - Pneumonia
20.11 - Other Non-Pelvic Infection (e.g,, TB, Meningitis, HIV)
20.9 - Other Infection/NOS

Embolism - Thrombotic (Non-Cerebral)
30.1 - Embolism – Thrombotic (Non-Cerebral)
30.9 - Other Embolism (Excludes Amniotic Fluid Embolism)/NOS

Amniotic Fluid Embolism
31.1 - Embolism - Amniotic Fluid

Hypertensive Disorders of Pregnancy
40.1 - Preeclampsia
50.1 - Eclampsia
60.1 - Chronic Hypertension with Superimposed Preeclampsia

Anesthesia Complications
70.1 - Anesthesia Complications

Cardiomyopathy
80.1 - Postpartum/Peripartum Cardiomyopathy
80.2 - Hypertrophic Cardiomyopathy
80.9 - Other Cardiomyopathy/NOS

Hematologic
82.1 - Sickle Cell Anemia
82.9 - Other Hematologic Conditions including Thrombophilias/TTP/HUS/NOS

Collagen Vascular/Autoimmune Diseases
83.1 - Systemic Lupus Erythematosus (SLE)
83.9 - Other Collagen Vascular Diseases/NOS

Conditions Unique to Pregnancy
85.1 - Conditions Unique to Pregnancy (e.g, Gestational Diabetes, Hyperemesis, Liver Disease of Pregnancy)

Injury
88.1 - Intentional (Homicide)
88.2 - Unintentional
88.9 - Unknown Intent/NOS

Cancer
89.1 - Gestational Trophoblastic Disease (GTD)
89.3 - Malignant Melanoma
89.9 - Other Malignancy/NOS

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

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

Neurologic/Neurovascular Conditions (Excluding CVA)
92.1 - Epilepsy/Seizure Disorder
92.9 - Other Neurologic Disease/NOS

Renal Disease
93.1 - Chronic Renal Failure/End-Stage Renal Disease (ESRD)
93.9 - Other Renal Disease/NOS

Cerebrovascular Accident not Secondary to Hypertensive Disorders of Pregnancy
95.1 - Cerebrovascular Accident (Hemorrhage/ Thrombosis/Aneurysm/Malformation) not Secondary to Hypertensive Disorders of Pregnancy

Metabolic/Endocrine
96.2 - Diabetes Mellitus
96.9 - Other Metabolic/Endocrine Disorder/NOS

Gastrointestinal Disorders
97.1 - Crohn's Disease/Ulcerative Colitis
97.2 - Liver Disease/Failure/Transplant
97.9 - Other Gastrointestinal Disease/NOS

Mental Health Conditions
100.1 - Depressive Disorder
100.2 - Anxiety Disorder (including Post-Traumatic Stress Disorder)
100.3 - Bipolar Disorder
100.4 - Psychotic Disorder
100.5 - Substance Use Disorder
100.9 - Other Psychiatric Condition/NOS

Unknown COD
999.1 - Unknown COD

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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.

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 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 had a documented diagnosis of a psychiatric disorder. This includes postpartum depression. If a formal diagnosis is not available, refer to your review committee subject matter experts (e.g, psychiatrist, psychologist, licensed counselor) to determine whether the criteria for a diagnosis of substance use disorder or another mental health condition are met based on the available information.

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.

SOCIAL SUPPORT/ISOLATION - LACK OF FAMILY/ FRIEND OR SUPPORT SYSTEM
Social support from family, partner, or friends was lacking, inadequate, and/or dysfunctional.

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).

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).

TRAUMA
The individual experienced trauma: i.e,, loss of child (death or loss of custody), 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; or other physical or emotional abuse other than that related to sexual abuse during childhood.

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.

SECTION 9: APPENDIX

MMRIA MATERNAL MORTALITY REVIEW COMMITTEE DECISIONS FORM v21 5

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

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)