NORTH CAROLINA
2018-2020 Maternal Mortality Review Report

AUGUST 2025

NC DEPARTMENT OF
HEALTH AND
HUMAN SERVICES
Division of Public Health

EXECUTIVE SUMMARY

The North Carolina Maternal Mortality Review Committee (MMRC), established by state law in 2015, examines maternal deaths associated with pregnancy. The 2015 legislation established a nine-member multidisciplinary committee appointed by the Secretary of the NC Department of Health and Human Services (NCDHHS). In 2022, the legislation (G.S 130A-33.60) was updated to allow for an increase in committee members, from nine to 20. This report provides an overview of all maternal deaths in the state with a primary focus on the patterns and trends in pregnancy-associated deaths that occurred from 2018 to 2020 and provides actionable public health and clinical recommendations aimed at the prevention of future maternal deaths. The case identification process is outlined in the Appendix.

Key Findings

- The MMRC reviewed 308 pregnancy-associated deaths from 2018 through 2020. Among these deaths, 127 occurred in 2020; an increase from 98 deaths in 2018 and 83 in 2019.
- 43% (n=133) of the cases were determined to be pregnancy-related.
- Both pregnancy-associated mortality ratios (PAMRs) and pregnancy-related mortality ratios (PRMRs) increased from 2019 to 2020.
- Racial and ethnic differences in pregnancy-related mortality persist. From 2018-2020, the highest PRMRs occurred among Non-Hispanic (NH) Black women with a PRMR of 57.2.
- The majority (87.2%) of pregnancy-related deaths occurring in the 2018-2020 period were preventable, that is 'the committee determined that there was at least some chance of the death being averted by one or more reasonable changes.'
- Among the 133 deaths occurring from 2018-2020 classified as pregnancy-related by the MMRC, mental health conditions were the overall leading cause of death, comprising nearly one-third of all cases (32.3%, n=43).
    - 31 pregnancy-related deaths were attributed to accidental overdoses.
    - Nearly all 31 accidental overdose deaths involved opioids (n=27), and fentanyl was noted among 24 of these cases.
- Thirteen pregnancy-related deaths were homicides:
    - Former or current partners were the perpetrators in all 13 homicide cases.
    - Firearms were noted as the lethal means in 8 of the 13 pregnancy-related homicides.

- Cardiovascular conditions (n=13), thrombotic embolisms (n=11), and infections (n=10) were the 3rd, 4th, 5th leading causes of pregnancy-related deaths during 2018-2020:
  - 2 of the 57 pregnancy-related deaths from 2020 were attributable to COVID-19.
- Discrimination was determined to be a probable contributing factor in 88 pregnancy-related deaths (66.2%) and was the most common contributory factor recorded. Discrimination included other personal characteristics, such as substance use, weight, geography, incarceration history, and other considerations.
- More than 6 out of 10 pregnancy-related deaths demonstrated evidence of social or emotional stress (65.4%), with unemployment, history of substance use, and history of domestic violence being the commonly reported sources of stress.
- Among the 133 pregnancy-related deaths, more than half occurred during pregnancy, delivery, or within 42 days postpartum (n=70; 53%).

BACKGROUND

The current MMRC includes representation from the following perspectives: maternal fetal medicine, general obstetrics and gynecology, certified nurse midwifery, labor and delivery nursing, forensic pathology, substance use, mental health, public health, community advocacy, and community-based doulas.

The MMRC conducts comprehensive reviews of every maternal death of NC residents to determine if the death was pregnancy-related or pregnancy-associated. The Centers for Disease Control and Prevention (CDC) provides definitions and guidelines for classifying deaths occurring during pregnancy, childbirth, and in the postpartum period (up to 365 days from the end of the pregnancy). The MMRC uses these definitions and guidelines to ensure case review processes are standardized and consistent.

DEFINITIONS:

- **Pregnancy-Related:** A death during pregnancy or within one year of the end of the 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 the pregnancy.
- **Pregnancy-Associated, but unable to determine pregnancy relatedness:** The death of a woman while pregnant or within one year of the end of pregnancy, due to a cause that could not be determined to be pregnancy-related or not pregnancy-related.

Case Review Process

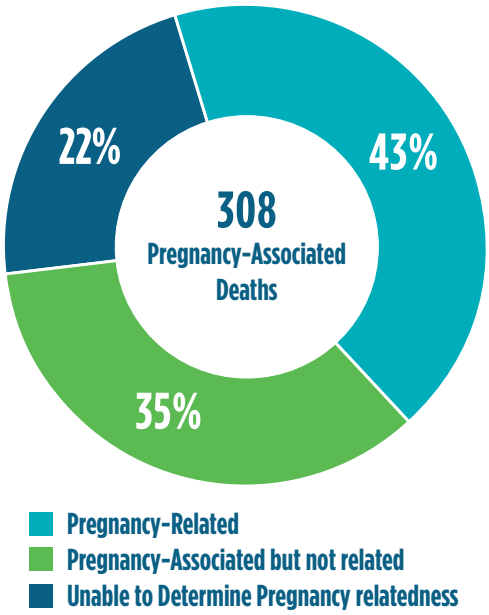
In comparison to the 2014-2016 MMRC report, the 2018-2020 report reflects significantly more pregnancy-related deaths related to mental health conditions and accidents as a result of the Committee's adoption of new guidelines beginning with review of 2018 cases. The MMRC adopted enhanced reviews for suicide and accidental drug overdose deaths based on published reports from other states, such as the Utah Standardized Criteria for Review of Perinatal Suicides and Accidental Drug-Related Deaths. North Carolina's participation in the CDC's Rapid Maternal Overdose Review (RMOR) project also informed the decision to review overdose cases using an enhanced and consistent process for determining pregnancy-relatedness.

OVERVIEW OF 2018-2020 PREGNANCY-RELATED DEATHS

Pregnancy-Related

The MMRC reviewed 308 NC resident deaths occurring from 2018 to 2020 (**Figure 1**). Based on the Committee determination, 133 deaths were classified as pregnancy-related (43%), and 107 deaths were pregnancy-associated but not related (35%). The MMRC was unable to determine pregnancy-relatedness for 68 cases (22%).

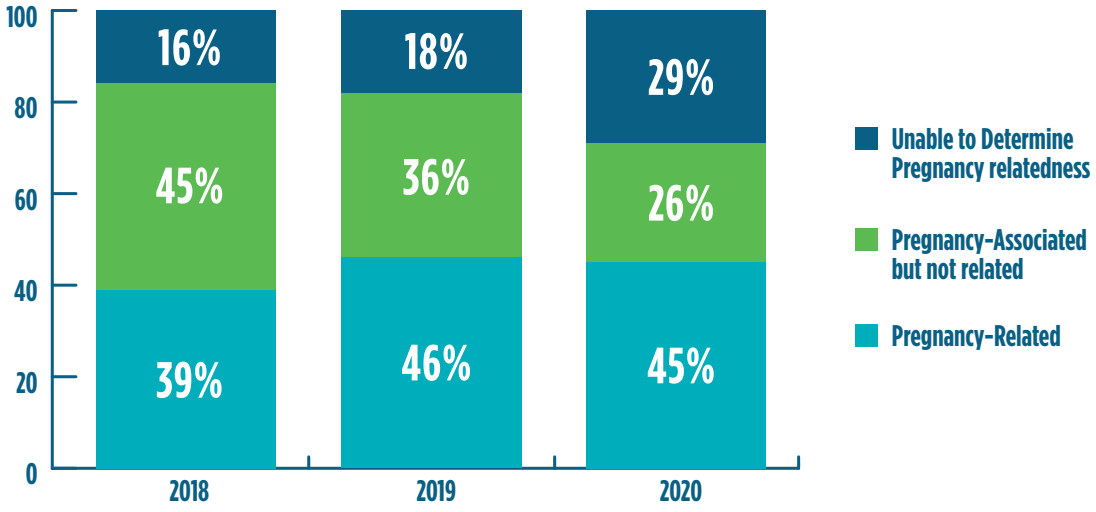
Figure 1. Pregnancy-Associated Death Categories by MMRC Determination, NC Residents 2018-2020



Compared with the MMRC review of 2014-2016 data when 26% of cases were determined to be pregnancy-related and only 4% of cases were classified as undetermined, MMRC case reviews for 2018-2020 deaths represent an increase in both cases determined to be pregnancy-related and in those classified as undetermined. The increase in cases classified as 'unable to determine' pregnancy-relatedness by the MMRC is due to several overlapping factors. The multidisciplinary nature of MMRCs means experts from different fields may interpret the same case differently, and if consensus cannot be reached, the death is classified 'undetermined.' This is more common in complex cases involving suicide, overdose, or chronic conditions, where the influence of pregnancy is not always clear. Social factors like poverty or limited access to care may further complicate assessments. Additionally, while guidance – such as the Utah Criteria for reviewing perinatal suicides and drug-related deaths – improve consistency, it also exposes the limits of current knowledge and data, reinforcing the use of the

'undetermined'; category when clarity is not possible. As presented in **Figure 2**, the proportion of cases that the MMRC classified as pregnancy-related was higher in 2019 (46%) and 2020 (45%), compared with 39% in 2018. In 2020, the MMRC was unable to determine the pregnancy-relatedness for 29% of cases they reviewed, which was higher than in 2018 (16%) and 2019 (18%).

Figure 2. Pregnancy-Related Deaths Categories by MMRC Determination & Year, NC Residents 2018-2020

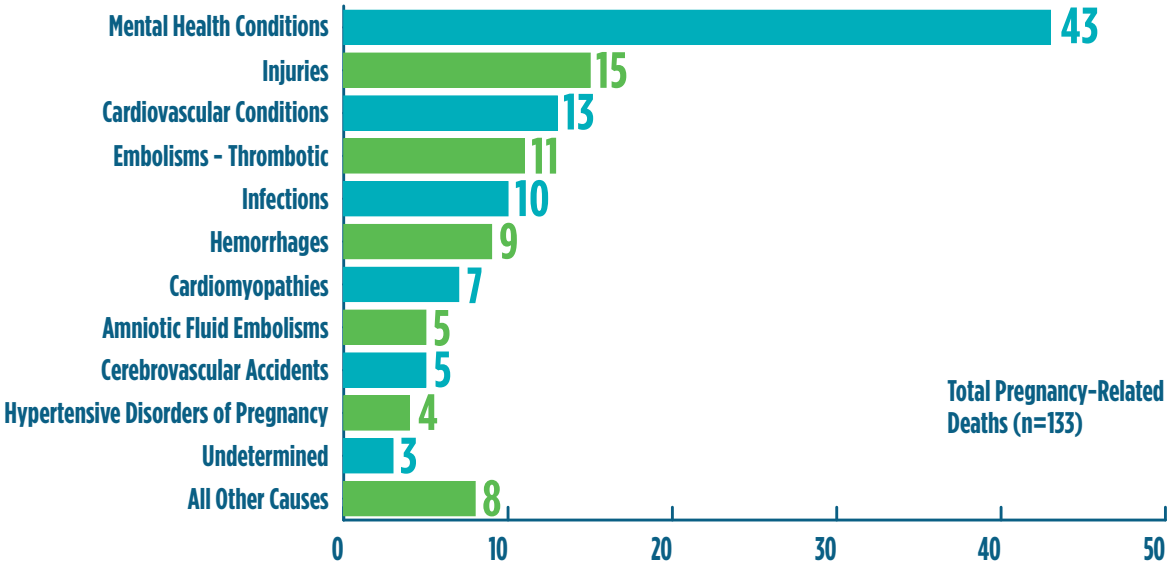


Causes of Pregnancy-Related Deaths

The MMRC classifies pregnancy-related causes of death using a specific set of categories developed by the CDC. The use of a standardized classification protocol facilitates comparable maternal mortality analysis across MMRCs throughout the United States (US). While the MMRC determines pregnancy-relatedness for all cases, the Committee only assigns a cause of death for cases classified as pregnancy-related. Among the 133 deaths from 2018-2020 that were classified as pregnancy-related by the MMRC (**Figure 3**), mental health conditions were the leading cause of death, comprising nearly one-third of all cases (32.3%, n=43). Injuries were the second leading cause of pregnancy-related deaths (11.3%, n=15). Other leading causes, in order of magnitude, include cardiovascular conditions, non-cerebrovascular embolisms, infections, hemorrhages, cardiomyopathies, amniotic fluid embolisms, cerebrovascular accidents,

and hypertensive disorders of pregnancy. Among the infections category, there were 2 pregnancy-related deaths due to COVID-19 in 2020. Eight pregnancy-related deaths are not presented due to small numbers (one death for each cause category). The MMRC was unable to determine a cause of death for three cases.

Figure 3. Leading Causes of Pregnancy-Related Deaths, NC Residents 2018-2020



Overdoses, Suicides, and Homicides

The cause of death classifications on the MMRIA committee decision form (Appendix A) do not include specific categories for accidental poisonings (overdoses) or suicides that would allow the MMRC to specify these as the underlying cause of pregnancy-related deaths. Deaths from overdose and suicide are classified under Mental Health Conditions when the Committee determines pre-existing mental health conditions were the underlying causes of the death. In cases where an overdose was determined to be unrelated to any preexisting mental health condition(s) or a contributing factor in the death, the MMRC may attribute the cause to Unintentional Drug Overdose within the Injury category. In 2017, the CDC added fields to the MMRIA committee decision form for recording whether the Committee concluded that mental health conditions and/or substance use disorder contributed to the death.

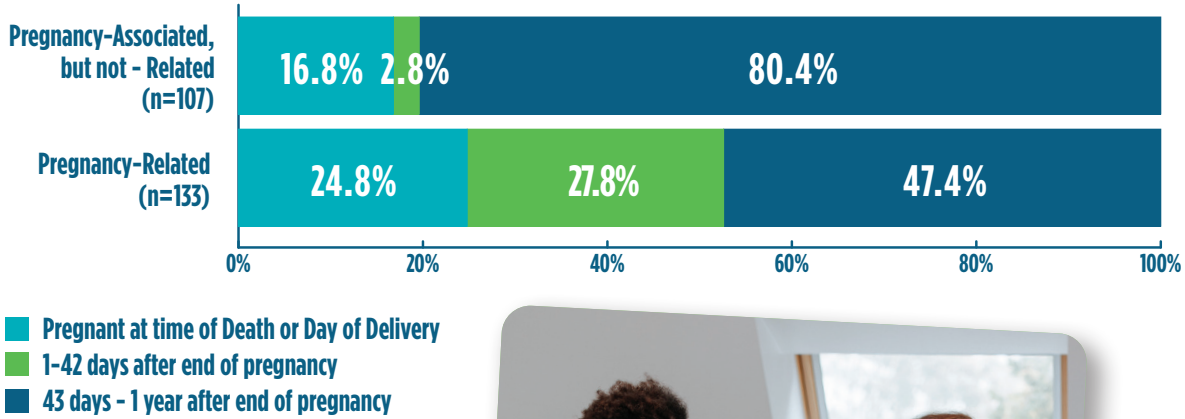
Figure 4. Pregnancy-Related Deaths due to Mental Health Conditions & Injuries (n=58), NC Residents 2018-2020

Figure 4 examines the two leading causes of pregnancy-related deaths from 2018 to 2020 — mental health conditions and injuries — in further detail. Among the 58 pregnancy-related deaths attributed to mental health conditions or injuries, 31 involved accidental drug-overdose (53%). The MMRC determined substance use disorder contributed or probably contributed to the cause of death among all of the accidental overdose cases. Nearly all the accidental overdose deaths involved opioids (27 out of 31 deaths), and fentanyl was noted in 24 of the 31 accidental overdose cases. There were 13 deaths by homicide, 12 suicides, one injury death for which the MMRC was unable to determine intent and one death classified as related to a mental health condition that did not involve an injury. Among the 12 pregnancy-related suicides, five involved hanging/strangulation/suffocation hanging, three involved poisoning/overdose, three involved firearms, and one involved a motor vehicle. Among the suicides, the MMRC concluded that mental health conditions contributed to the death in all 12 cases. Former or current partners were the perpetrators in all 13 homicide cases. Firearms were noted as the lethal means in eight of the 13 pregnancy-related homicides.

Timing of Pregnancy-Related Deaths

Figure 5 presents the temporal proximity of the death to delivery/pregnancy for both pregnancy-related and pregnancy-associated but not related deaths. Pregnancy-related deaths were more likely to occur within a shorter time frame from pregnancy or delivery. During 2018–2020, among the 133 pregnancy-related deaths, more than half occurred during pregnancy, delivery, or within 42 days postpartum (n=70; 53%). In contrast, among deaths classified as pregnancy-associated but not related, only 20% (n=21) transpired during pregnancy, delivery or within 42 days postpartum.

Figure 5. Pregnancy Associated Deaths Reviewed by the Maternal Mortality Review Committee (MMRC) by Determination and Timing of Death, NC Residents 2018-2020



Pregnancy Associated & Pregnancy-Related Mortality Ratios

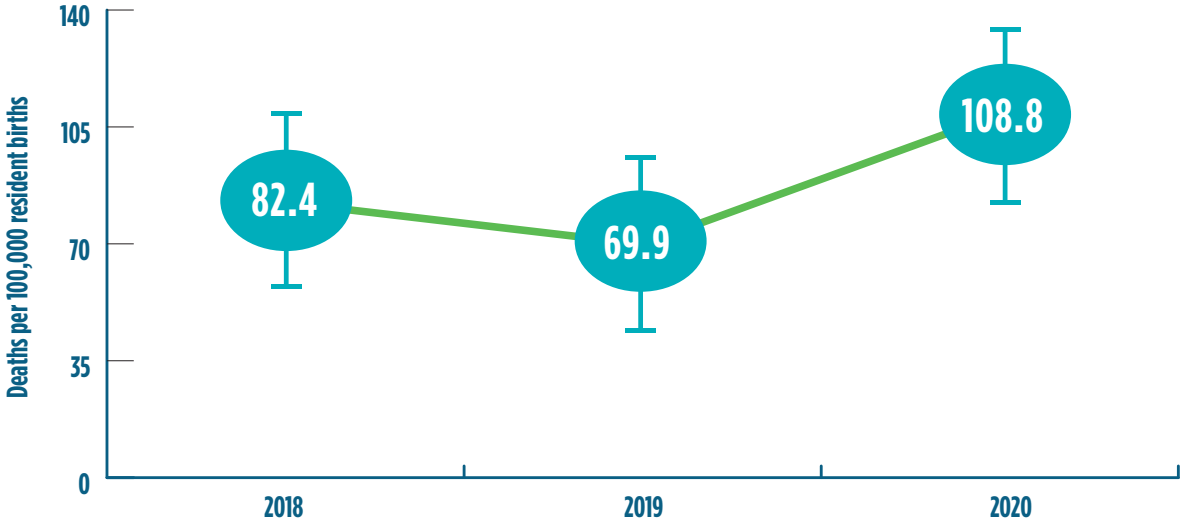
Caution Regarding Interpreting Ratios based on Small Numbers: *Many of the ratios presented in this report are based on a relatively small number of deaths in the numerator. Rates and ratios based on a small number may be unstable which can make interpretation challenging. Readers are urged to pay close attention to the range of the confidence intervals (C.I.) to gauge the degree of instability in the ratios.*

PREGNANCY-ASSOCIATED MORTALITY RATIOS

As noted earlier, the MMRC reviews all pregnancy-associated deaths which include all deaths while pregnant or within one year of the end of pregnancy, regardless of the cause, proximity to pregnancy/delivery, or pregnancy-relatedness. By combining data derived from **2018-2020** MMRC reviews of North Carolina pregnancy-associated deaths, recent trends in pregnancy-associated deaths can be examined. MMRC reviews from earlier years are not included due to methodological changes in the classification of pregnancy-related deaths that occurred prior to 2018 reviews.

During the three-year period 2018 through 2020, an average of 103 pregnancy-associated deaths occurred each year. The pregnancy-associated mortality ratio (PAMR) represents the number of deaths occurring within one year of pregnancy/delivery per 100,000 resident births. As presented in **Figure 6**, in 2018 North Carolina's overall PAMR was 82.4 deaths per 100,000 resident births (C.I. 66.1-98.7). In 2019, the PAMR decreased to 69.9 deaths per 100,000 resident births (C.I. 54.9-84.9). By 2020 the ratio increased to 108.8 (C.I. 89.9-127.7), the highest ratio recorded during the 3-year period.

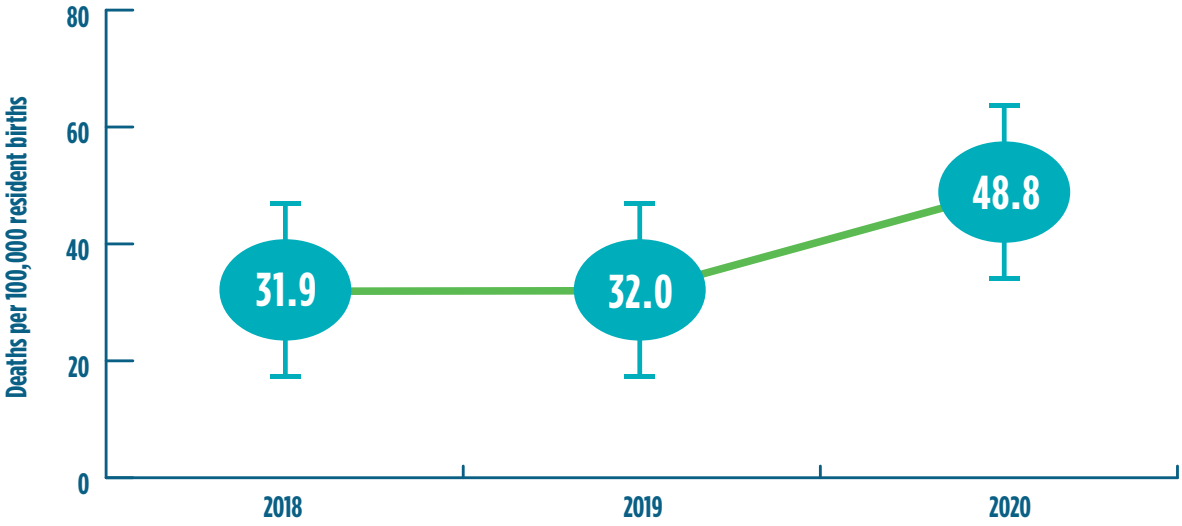
Figure 6. Pregnancy-Associated Mortality Ratios (PAMRS) by Year of Death, NC Residents 2018-2020



PREGNANCY-RELATED MORTALITY RATIOS

The pregnancy-related mortality ratio (PRMR) represents the number of deaths that the MMRC determined to be pregnancy-related per 100,000 resident births. Pregnancy-related deaths represent a subset of all-pregnancy associated deaths, therefore these ratios are smaller than PAMRs. On average, 44 pregnancy-related resident deaths occurred each year from 2018-2020. **Figure 7** presents PRMRs from 2018 through 2020. In 2018, the PRMR was 31.9 (C.I. 21.8-42.1). In 2019, the PRMR remained virtually unchanged at 32.0 (C.I. 21.8-42.2). However, in 2020 the PRMR increased to 48.8 (C.I. 26.2-61.5). As with the 2020 PAMR, the PRMR for 2020 represented the highest ratio recorded during this time period.

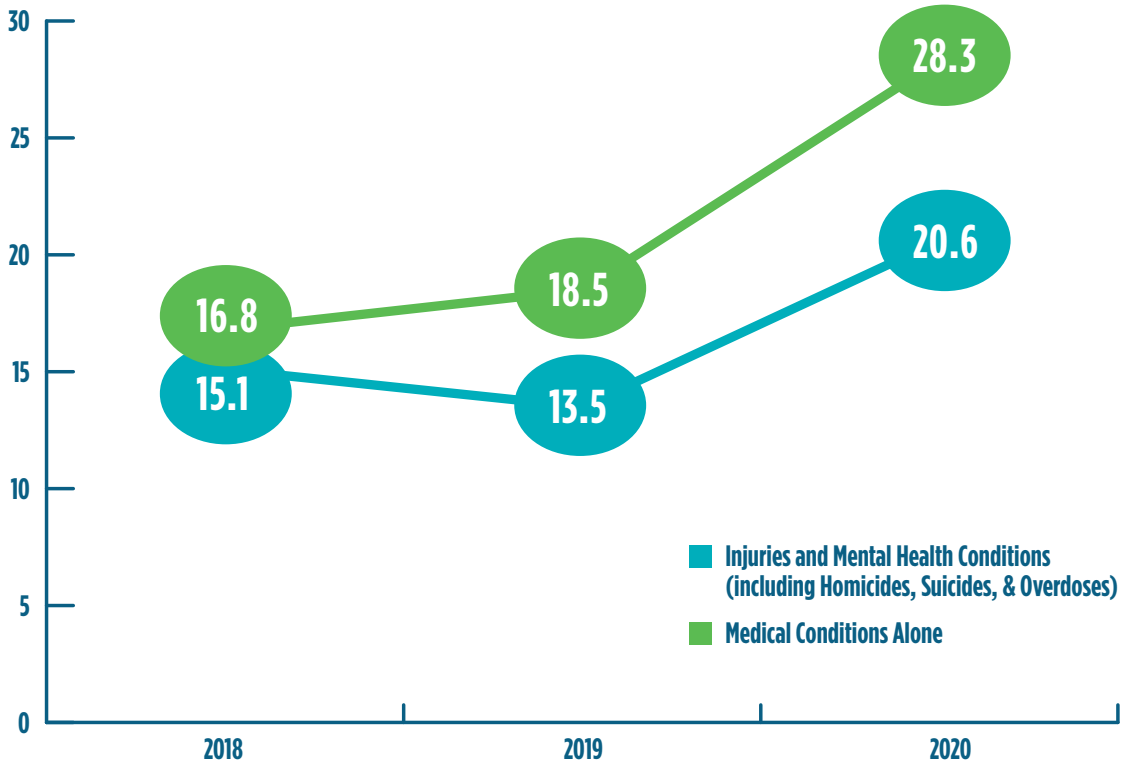
Figure 7. Pregnancy-Related Mortality Ratios (PRMRs) by Year of Death, NC Residents 2018-2020



CAUSES OF DEATH

With most cause of death categories having fewer than 10 pregnancy-related deaths overall during the 2018-2020 period, detailed examination of pregnancy-related mortality ratios for specific causes of death is not feasible. However, examination of PRMRs for injuries and mental health conditions (including homicides, suicides, and accidental overdoses) compared with mortality from medical conditions alone is possible. As shown in **Figure 8**, PRMRs related to medical conditions remained higher than PRMRs for injuries/mental health conditions throughout the three-year period. PRMRs associated with medical conditions increased each year, from 16.8 in 2018 (C.I. 9.4-24.2), to 18.5 in 2019 (C.I. 10.8-26.3), and 28.3 in 2020 (C.I. 18.6-37.9). PRMRs for injuries and mental health conditions decreased slightly from 15.1 in 2018 (C.I. 8.1-22.1) to 13.5 in 2019 (6.9-20.1) but increased to 20.6 in 2020 (C.I. 12.3-28.8).

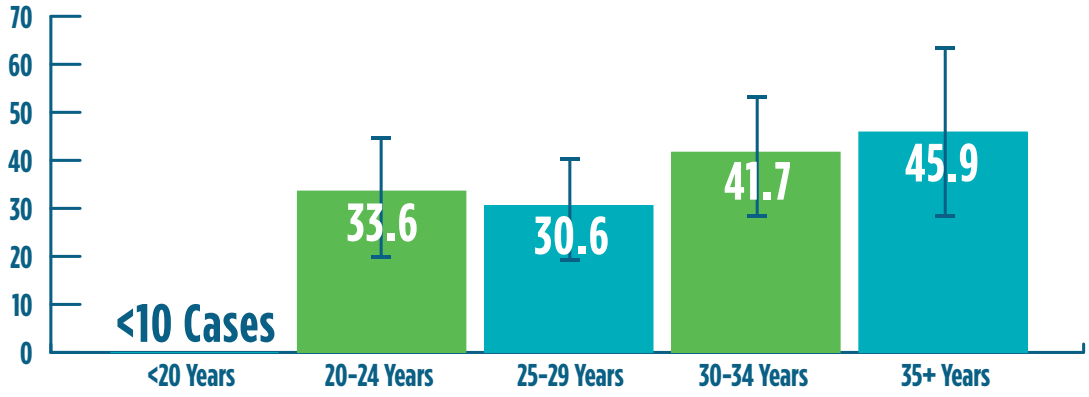
Figure 8. Pregnancy-Related Mortality Ratios (PRMRs) by Cause of Death and Year, NC Residents 2018-2020



MATERNAL AGE

Examining pregnancy-related mortality ratios by maternal age group (**Figure 9**) reveals that PRMRs increase with maternal age. Ratios were highest among women ages 35 and over, with a PRMR of 45.9 (C.I. 28.6-63.3) per 100,000 resident births from 2018-2020. PRMRs were also high among women ages 30 to 34 (41.7; C.I. 29.0-54.5). PRMRs were comparably low among women ages 20 to 24 (33.6; C.I. 20.5-46.8) and ages 25 to 29 (30.6; C.I. 20.0-41.2). There were eight deaths among teenage mothers under age 20 from 2018 to 2020, therefore ratios are not presented for this group due to small numbers.

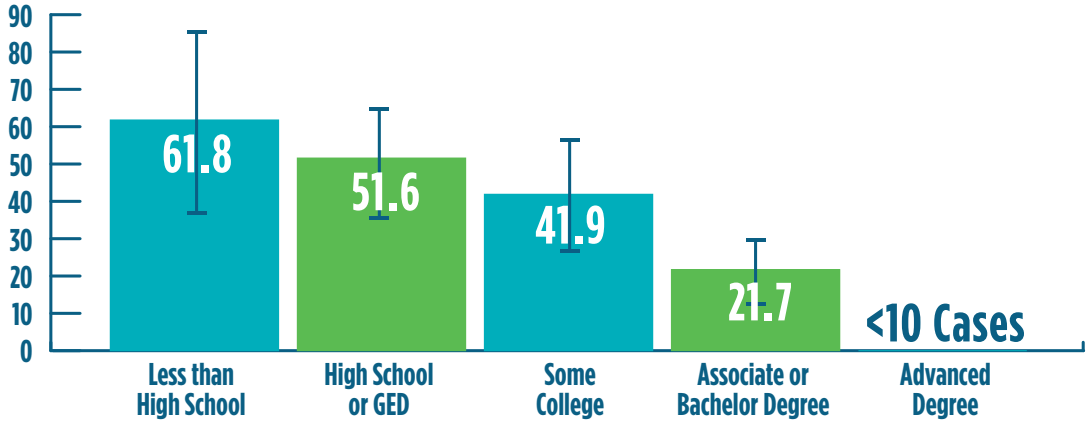
Figure 9. Pregnancy-Related Mortality Ratios (PRMRs) by Age Group, NC Residents 2018-2020



MATERNAL EDUCATION LEVEL

Pregnancy-related mortality is inversely related to maternal education – as maternal education increases, PRMRs decrease. **Figure 10** displays NC pregnancy-related mortality ratios by maternal education level. Among the 133 pregnancy-related deaths identified from 2018-2020, those having a high school education or less experienced the highest pregnancy-related mortality ratio of 61.8 (C.I. 38.9-84.6). In contrast, PRMRs were lowest among those with an Associate or Bachelor degree, with a ratio of 21.7 (C.I. 12.8-30.6).

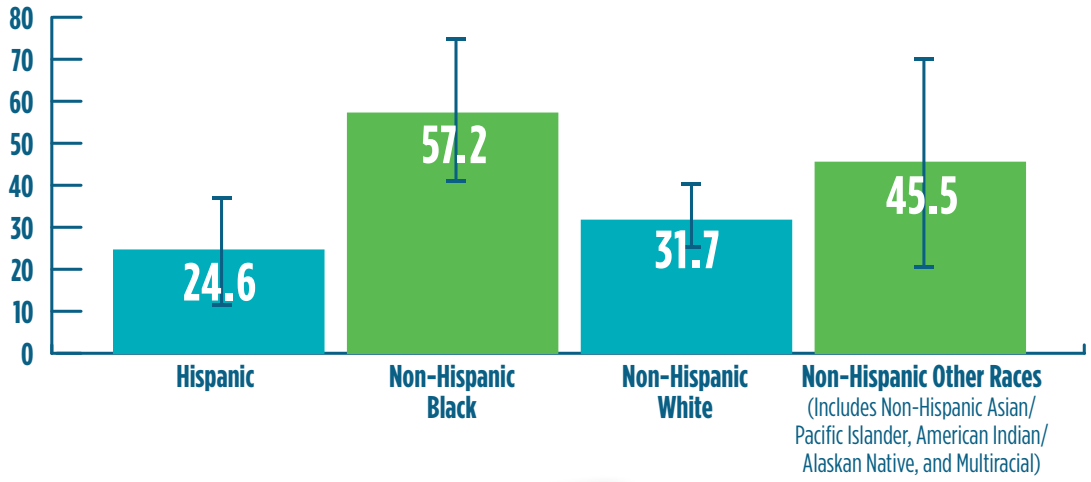
Figure 10. Pregnancy-Related Mortality Ratios (PRMRs) by Education Level, NC Residents 2018-2020



MATERNAL RACE/ETHNICITY

As shown in **Figure 11**, racial and ethnic differences in pregnancy-related mortality persist. From 2018-2020, the highest PRMRs occurred among Non-Hispanic (NH) Black women with a PRMR of 57.2 (C.I. 40.9-73.6). Non-Hispanic women of other races had the second highest PRMR at 45.5, however due to a relatively small number of deaths (n=13), this ratio had a wide confidence interval (C.I. 20.8-70.2). The PRMR for NH White women was 31.7 (C.I. 23.6-39.8). In 2018-2020, Non-Hispanic Black women had PRMRs 1.8 times higher than Non-Hispanic White women. Fewer than 10 pregnancy-related deaths occurred among Non-Hispanic Asian/Pacific Islanders (n=4), American Indians/ Alaskan Natives (n=6), and Multiracial (n=3) women from 2018-2020. As a result, PRMRs are calculated using the aggregate deaths among these groups in the "*Non-Hispanic Other Races*" category. Hispanics had the lowest PRMRs during this period at 24.6 (C.I. 11.7-37.5).

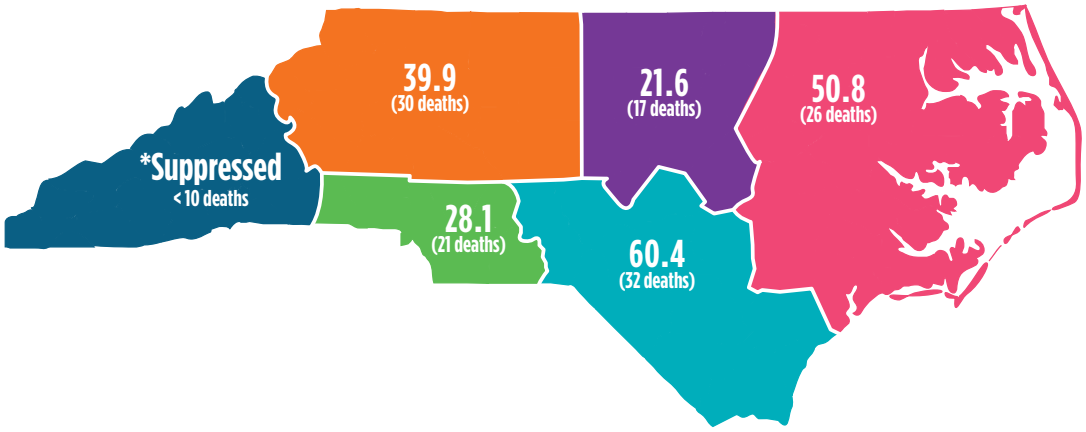
Figure 11. Pregnancy-Related Mortality Ratios (PRMRs) by Race/Ethnicity, NC Residents 2018-2020



REGION

The Division of Public Health's Women, Infant, and Community Wellness Section (WICWS) categorizes North Carolina counties into six Perinatal Care Regions for maternal and infant health surveillance: 1. *Western*, 2. *Northwestern*, 3. *Southwestern*, 4. *Northeastern*, 5. *Southeastern*, and 6. *Eastern*. Examining pregnancy-related mortality ratios by region (**Figure 12**), women living in counties in the Southeastern region had the highest pregnancy-related mortality with a ratio of 60.4 (C.I. 39.5-81.4). Women residing in the Northeastern region of the state had the lowest PRMR at 21.6 (C.I. 11.3-31.9).

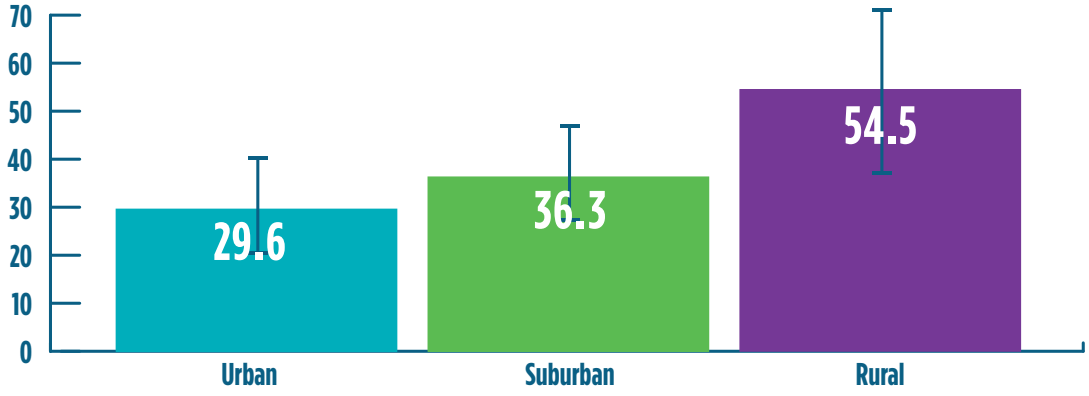
Figure 12. Pregnancy-Related Mortality Ratios (PRMRs) by Perinatal Care Region, NC Residents 2018-2020



URBAN/RURAL RESIDENCE

The National Center for Health Statistics (NCHS) categorizes US counties into six categories that include large central metro, large fringe metro, medium metro, small metro, micropolitan, and noncore. Large central metro and large fringe metro are classified as urban counties. Medium metro and small metro can be classified as suburban and micropolitan and noncore counties are designated as rural. As shown in **Figure 13**, residents of North Carolina's rural counties experienced the highest ratios during 2018-2020 with a PRMR of 54.5 (C.I. 37.4-71.6). Urban counties had the lowest PRMR at 29.6 (C.I. 20.2-39.0). Women living in suburban counties had a similarly lower PRMR at 36.3 (C.I. 26.8-45.8).

Figure 13. Pregnancy-Related Mortality Ratios (PRMRs) by Urban/Rural Status, NC Residents 2018-2020

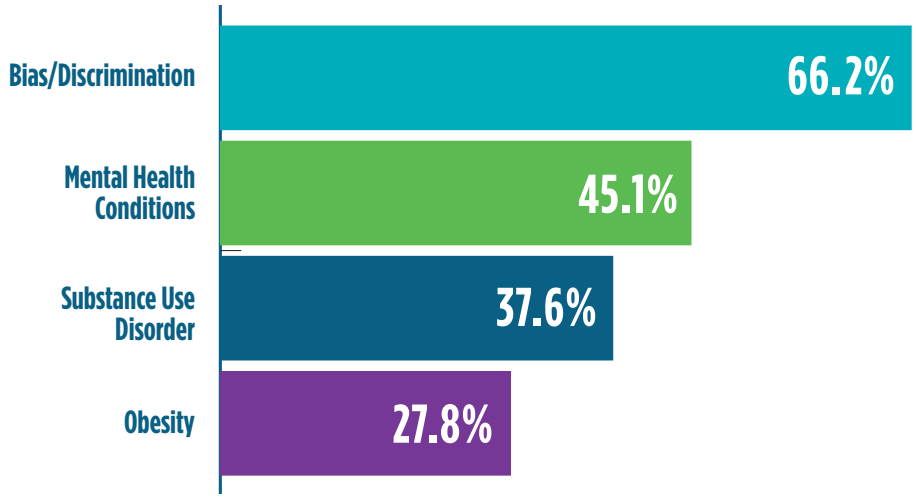


Other Factors Associated with Pregnancy-Related Deaths

CONTRIBUTORY FACTORS

The MMRC documented specific conditions that may have played a contributory role in 2018-2020 pregnancy-related deaths. These conditions include obesity, mental health, substance use disorders, and bias/discrimination. **Figure 14** presents the proportion of pregnancy-related deaths where these factors were documented as contributing or probably contributing.

Figure 14. Percentage of Pregnancy-Related Deaths with Key Contributory Factors Documented by MMRC, NC Residents 2018-2020

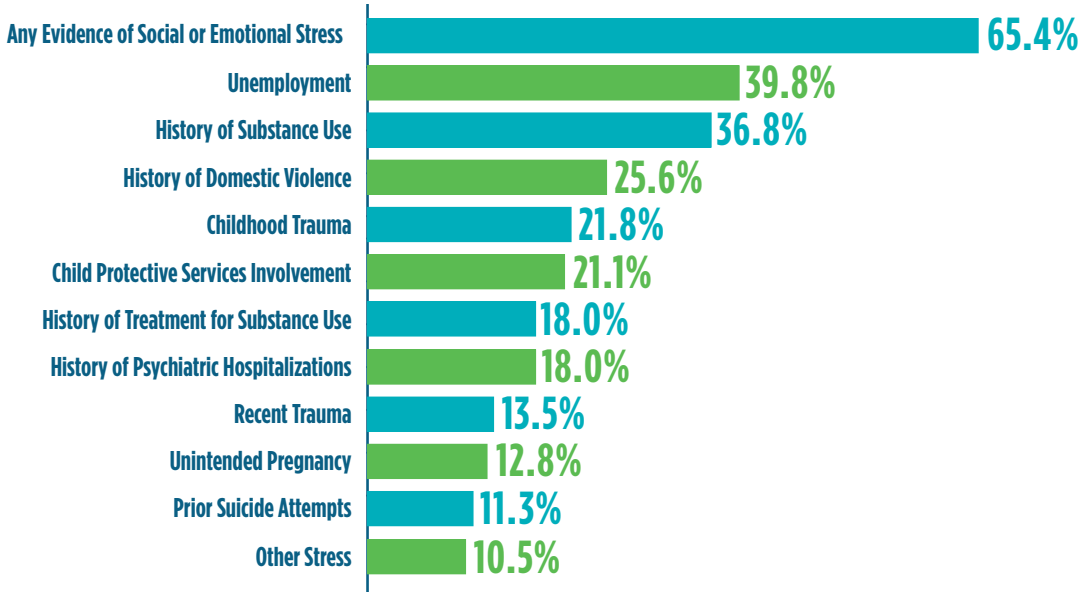


- **Bias/Discrimination*:** Discrimination was determined to be a contributing factor in 88 pregnancy-related deaths (66.2%) and was the most common contributory factor recorded. **It is important to bear in mind that this category is not limited to racial discrimination alone but considered more broadly to include discrimination based on other personal characteristics, such as substance use, weight, geography, incarceration history, and other considerations.**
- **Mental Health Conditions:** Mental health conditions were the second most recorded contributory factor, noted for nearly half of pregnancy-related deaths (45.1%; n=60).
- **Substance Use Disorder:** The MMRC determined that substance use disorder contributed to 50 pregnancy-related deaths (37.6%).
- **Obesity:** A smaller, but still substantial proportion of pregnancy-related deaths recorded that obesity may have been a contributory factor (n=37; 27.8%).

Social and Emotional Stress Documented Through Abstraction

Social and/or emotional stress indicators are documented during abstraction. These stressors, defined in the MMRIA database, include: a history of domestic violence, history of psychiatric hospitalizations, child protective services involvement, history of substance use, unemployment, history of treatment for substance use, unintended pregnancy, recent trauma, history of childhood trauma, prior suicide attempts, or other sources of social/emotional stress. Among pregnancy-related deaths occurring during 2018-2020, 65.4% had some evidence of social or emotional stress at the time of their death (**Figure 15**). Unemployment (39.8%), a history of substance use (36.8%), and a history of domestic violence (25.6%) were the three most common categories of social/emotional stress documented among pregnancy-related deaths during this period.

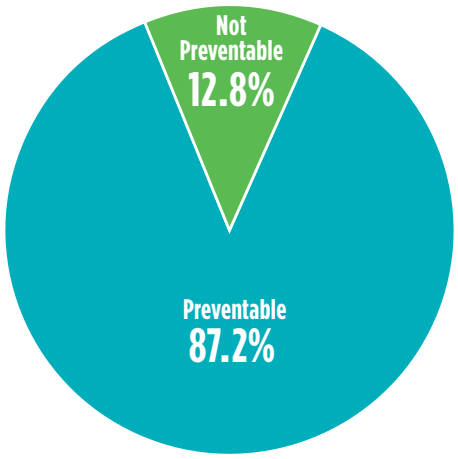
Figure 15. Pregnancy-Related Deaths (n=133) by Evidence of Social or Emotional Stress, NC Residents 2018-2020



Preventability of Pregnancy-Related Deaths

During review, the MMRC also makes determinations regarding whether a death may have been preventable. As shown in **Figure 16** the MMRC determined that the majority (87.2%) of pregnancy-related deaths from 2018-2020 were preventable, that is "the committee 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".

Figure 16. Pregnancy-Related Deaths: Proportion NC MMRC Determined to be Preventable, NC Residents 2018-2020



Among the 116 preventable deaths occurring during 2018-2020, the Committee concluded there was "some chance" to alter the outcome for 52 deaths and a "good chance" to avert the outcome for 57 deaths (**Table 1**). The MMRC was unable to determine whether there was a chance to alter the outcome for seven deaths classified as preventable.

Table 1. Pregnancy-Related Deaths by Preventability, NC Residents 2018-2020

Chance to Alter Outcome	PREVENTABILITY		
	Not Preventable	Preventable	Total
No Chance	17	0	17
Some Chance	0	52	52
Good Chance	0	57	57
Unable to Determine	0	7	7
Total	**17**	**116**	**133**

Source: NCDHHS, Division of Public Health, Title V Office based on Maternal Mortality Review Committee Decisions

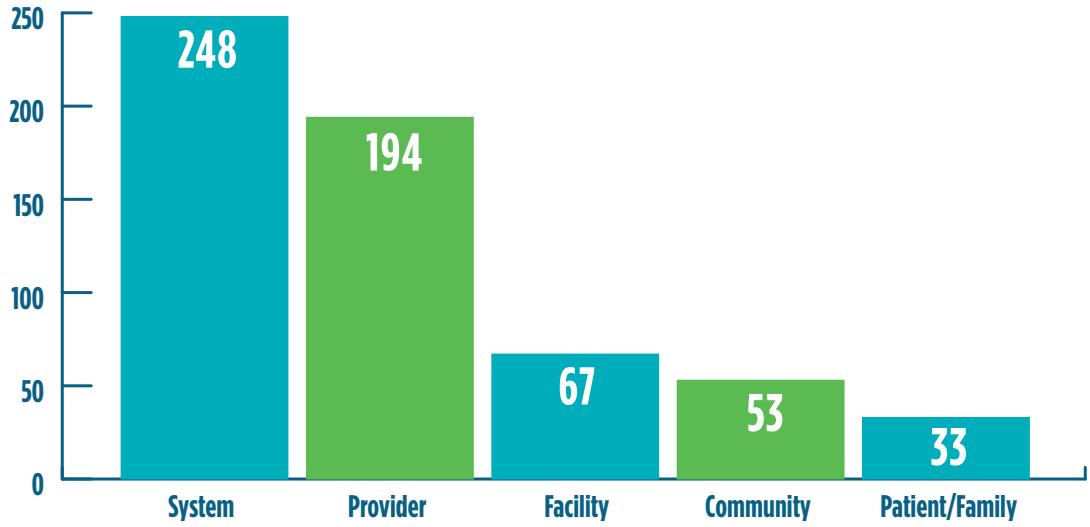
COMMITTEE RECOMMENDATIONS

The MMRC utilizes CDC's MMRIA system's five standardized categories for classifying committee recommendations by contributing factors. These categories are:

- **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.

Among the 116 pregnancy-related deaths that the MMRC determined were preventable, 595 recommendations were developed with an average of five recommendations per case. Recommendations focusing on the system level were the most common (n=248; 42%), followed by approximately one-third (33%) on the provider level. Other recommendations focused on patient/family, facility, and community levels. When the MMRC was first established, due to the nature of the cases reviewed, recommendations were primarily medically focused. In more recent years, the MMRC began making broader, more comprehensive recommendations acknowledging the role of social drivers and non-medical drivers of health and systems that sustain and perpetuate circumstances associated with pregnancy-related deaths. **Figure 17** presents total recommendations made based on standardized categories.

Figure 17. Committee Recommendations by Category, NC Pregnancy-Related Deaths 2018-2020



Using the standardized MMRIA committee determinations form, the MMRC also categorizes its recommendations into contributing factor groupings. These groupings allow for comparisons of the most common types of committee decisions and examination of trends in recommendation categories over time. Overall, there were 595 recommendations made by the MMRC from 2018 through 2020. Nearly one in four (24%) of MMRC recommendations focused on clinical skills and quality of care (n=145). Among the other leading MMRC recommendation categories were Knowledge — Lack of Knowledge Regarding Importance of Event or of Treatment or Follow-up, Lack of Access/Financial Resources, Lack of Continuity of Care, and Lack of Standardized Policies/Procedures.

MMRC RECOMMENDATIONS

The primary goal of the MMRC is to apply the information gathered during maternal death reviews to the development of recommendations and strategies aimed at preventing pregnancy-related deaths in the state. MMRC recommendations are categorized below by perinatal care region and the leading causes of pregnancy-related deaths. In addition, common themes were also derived from the MMRC recommendations from 2018-2020:

- Identification, management, and support of individuals experiencing mental health challenges
- Overdose Prevention and Substance Use Disorders
- Management of Chronic Diseases in Pregnancy
- Management of Obstetric & Postpartum Emergencies
- Access to Care

Note: The CDC's MMRIA system's five standardized categories are abbreviated as follows for each recommendation: S = System; F = Facility, P = Provider, C = Community, Pt/F = Patient/Family

Perinatal Care Region 1: Recommendations by Leading Causes of Death

MENTAL HEALTH CONDITIONS

- Licensing boards should require physicians and advanced practice providers to complete continuing education modules specific to perinatal mental health and substance use disorders to support their understanding of the safety of psychotropic medications during pregnancy. (S)
- Third party payors should reimburse and incentivize for integrated care models, specifically related to behavioral health care, with prenatal and primary care providers. (S)
- NC Medicaid should publish biannual reports available to the public that show areas where behavioral health and substance use treatment providers who accept Medicaid are available and outline what strategies are in place to ensure services are provided, with special consideration given to pregnant and postpartum women. (S)
- The American College of Obstetricians and Gynecologists (ACOG), North Carolina Area Health Education Center (AHEC), and other medical or community-based organizations should offer trainings for provider/clinician to increase the dialogue related to safety of psychotropic medications during pregnancy. (S)
- All health care providers should offer Narcan to patients/family members or community members at every appointment if a patient has a history of overdose or narcotics misuse. Literature regarding Narcan should be made available and/or be visible to patients in exam rooms. (P)

- All prescribers who provide services for pregnant or postpartum people with opioid use disorder must stay up to date with evidence-based practice recommendations which focus on access to medications and appropriate medications during pregnancy and postpartum. (P)
- All health care providers caring for women of reproductive age and during pregnancy should be educated about appropriate risks and benefits of continuing, stopping or changing medications in pregnancy so patients can make informed decisions. (P)
- All health care providers should be educated about the resources available to support their understanding of and communicating the safety of psychotropic medication during pregnancy. (P)
- All health care providers should check the controlled substances database prior to prescribing opioids and facilitate screening for a use disorder when providing care for individuals who are pregnant and up to 12 months postpartum. (P)
- All health care providers should consult with medication consultation lines if information is needed on psychiatric medications that are safe during pregnancy. (P)
- All health care providers should follow evidence-based protocols regarding the treatment of postpartum anxiety. (P)
- All health care providers should give education regarding the benefits/risks around taking psychotropic medications/mood stabilizers during pregnancy period. (P)
- All health care providers should assess for trauma, provide trauma-informed care and refer, if indicated. (P)

CARDIOVASCULAR CONDITIONS

- The NC Healthcare Foundation should create multidisciplinary statewide comprehensive and collaborative cardiac obstetric care initiatives to outline appropriate care for individuals prior to conception, during pregnancy and for at least one year postpartum. (S)
- Payors and government agencies should implement programs that would encourage specialists to work in rural areas continuously. (S)
- Obstetric care providers should ensure appropriate cardiology follow-up for patients with congenital heart disease from pre-conception through at least one year postpartum. (P)

INJURY (HOMICIDES OR SUICIDES)

- Health care facilities should apply national standards for Intimate Partner Violence screening based on guidelines from the ACOG Committee Opinion No 518, which include global screening for all pregnancies. (F)
- The NC General Assembly should allocate funds to make Intimate Partner Violence an ongoing public health priority to provide more messaging and resources in safe, public spaces (including bathrooms). (C)

EMBOLISMS

- Hospital systems should provide ongoing education and counseling for providers about anticoagulation dosing. (S)
- All hospitals should employ the Alliance for Innovation on Maternal Health (AIM) Venous Thromboembolism Bundle. (F)
- All health care providers interpreting classification at the time of ultrasound need to look for the signs of placenta invasion. (P)

Perinatal Care Region 2: Recommendations by Leading Causes of Death

MENTAL HEALTH CONDITIONS

- Third party payors should reimburse and incentivize for integrated care models, specifically related to behavioral health care, with prenatal and primary care providers. (S)
- The American College of Obstetricians and Gynecologists (ACOG), North Carolina Area Health Education Center (AHEC), and other medical or community-based organizations should offer trainings for provider/clinician to increase the dialogue related to the safety of psychotropic medications during pregnancy. (S)
- Health care systems should ensure providers receive training and education in the importance of providing trauma informed care to all. (S)
- Health care systems should ensure that Emergency Department (ED) providers make referrals with an appointment or ED follow-up in 48 hours. (S)
- Health care systems should create an Electronic Health Record dot phrase with Substance Abuse and Mental Health Services Administration (SAMHSA) Treatment Locator and the NC Perinatal Substance Use project for connecting patients to resources. (S)
- NC General Assembly and other funding sources should prioritize human trafficking prevention and support by funding community providers & organizations who are engaged in culturally responsive, trauma-informed care. (S)
- The NCDHHS Division of Public Health should educate and raise awareness of local resources available for maternal mental health among family members, support people, and the community at large. (S)
- All health care facilities should implement a multidisciplinary team who will develop specialized protocols related to surgical pain assessment and treatment for individuals with a known substance use disorder or on methadone treatment. (F)
- All health care providers should ensure that specialty appointments are confirmed when making referrals and should follow up regarding the outcome. (P)
- All health care providers should offer Narcan to patients/family members or community members at every appointment if a patient has a history of overdose or narcotics misuse. Literature regarding Narcan should be made available and/or be visible to patients in exam rooms. (P)

- All prescribers who provide services for pregnant or postpartum people with opioid use disorder must stay up to date with evidence-based practice recommendations which focus on access to medications and appropriate medications during pregnancy and postpartum. (P)
- All health care providers caring for women of reproductive age and during pregnancy should be educated about appropriate risks and benefits of continuing, stopping or changing medications in pregnancy so patients can make informed decisions. (P)
- All health care providers should be educated about the resources available to support their understanding of and communicating the safety of psychotropic medication during pregnancy. (P)
- All obstetric providers should follow American College of Obstetricians and Gynecologist (ACOG) guidelines related to substance use screening with validated screening tools at each trimester and at the postpartum visit, including documenting when administered. (P)
- All health care providers should check the controlled substances database prior to prescribing opioids and facilitate screening for a use disorder when providing care for individuals who are pregnant and up to 12 months postpartum. (P)
- All health care providers should consult with medication consultation lines if information is needed on psychiatric medications that are safe during pregnancy. (P)
- All health care providers should give education regarding the benefits and risks related to taking psychotropic medications and/or mood stabilizers during the pregnancy period. (P)
- Community education programs and media campaigns should be created to educate citizens about mixing substances and the need to call for assistance when there is a suspected overdose. (C)
- The NCDHHS Division of Public Health should create and develop media campaigns to increase awareness of inpatient substance use treatment programs that are available across the state. (C)
- Patients and family members should receive harm reduction education and strategies from providers when engaging in care (Pt/F)

CARDIOVASCULAR CONDITIONS

- The NCDHHS Division of Public Health, in conjunction with communities, should develop educational materials to inform communities about the importance of talking with one another about family medical history. Letting people know “What do I need to tell my family about this?” (S)
- All health care systems should ensure that emergency personnel, including first responders and Emergency Department providers, have ongoing training on guidelines related to the care of pregnant women in cardiac arrest. (S)
- All health care systems should ensure protocols are developed and education provided for performing a resuscitative cesarean surgical delivery after four (4) minutes of resuscitation of a pregnant woman greater than 20 weeks and experiencing cardiac arrest. (P)

- All health care systems should ensure pregnant and recently pregnant women are seen on units with a care team skilled in the care of pregnancy and related disease processes (F)
- Community-based organizations and health care providers should provide education on the importance of sharing personal and family medical history pertaining to the lethality of an inherited disease with pregnant and postpartum women in the community and in their practice. (C)

INJURY (HOMICIDE AND SUICIDE)

- Health systems, including military hospitals, should provide training on how to implement intimate partner violence (IPV) screening in the health care setting, including enforceable protocols and resources for staff and patients. (S)
- All health care providers should screen all pregnant and postpartum women on whether guns are in the house, including safe storage. (S)
- NC legislators should enact legislation that provides adequate funding for mental health treatment regardless of insurance status during pregnancy and for up to 12 months postpartum similar to other states. (S)
- North Carolina should explore alternative options available through community-based organizations for incarcerated women who are pregnant for nonviolent offenses. (S)
- The State of NC should develop and implement a toolkit to standardize clinical skill and quality in carceral settings (jails & prisons), including ongoing orientation, annual reviews and continuing education. (S)
- Health care facilities, including military hospitals, should apply national standards for Intimate Partner Violence (IPV) screening based on guidelines from the ACOG Committee Opinion No 518, which include global screening for all pregnancies. (F)
- Faith leadership, community leadership and IPV advocacy groups should interact to identify and to expand IPV resources within a community (C)
- Payors and policy makers should develop community-based pregnancy care management, like the Care Management for High-Risk Pregnancies model, to be accessible to all pregnant and postpartum women, regardless of insurance status. (C)
- The State of NC should make IPV a public health priority and provide more messaging and resources in safe, public spaces (like bathrooms) for all citizens. (C)
- Social media should link individuals who post about IPV to national IPV hotline resources. (C)

EMBOLISMS

- Health care systems should follow standardized protocols related to Venous Thromboembolism. (S)
- Health care systems should perform autopsy on unexpected deaths of pregnant women or recently pregnant women to determine cause of death with family consent. (S)
- Health care systems with labor and delivery service should run regular code simulations. (F)
- Carceral settings (jails & prisons) should have protocols in place for administering scheduled medications in a timely manner for chronic conditions. (F)

- Emergency Department providers should be educated of the elevated risk of systemic thrombotic events, including unexplained tachycardia as a warning sign. (P)
- All health care providers should order Tissue-type Plasminogen Activator (tPA) immediately upon determining pulmonary embolism as the top diagnosis during cardiac arrest in a pregnant woman. (P)
- Community and advocacy groups should provide education in the community on the risks of pulmonary embolism in pregnancy, including knowing their normal vital signs.

Perinatal Care Region 3: Recommendations by Leading Causes of Death

MENTAL HEALTH CONDITIONS

- NC General Assembly should designate more funding for inpatient beds/programs that focus on services for co-occurring diagnosis. (S)
- NC Medicaid should publish biannual reports available to the public that show areas where behavioral health and substance use treatment providers who accept Medicaid are available and outlines of what strategies are in place to ensure services are provided, with special consideration given to pregnant and postpartum women. (S)
- NC General Assembly should mandate law enforcement agencies share all available records, including police narratives, for maternal death reviews. (S)
- Third party payors should reimburse and incentivize for integrated care models, specifically related to behavioral health care, with prenatal and primary care providers. (S)
- Organizations providing withdrawal management services should offer a full array of available treatment options for women during pregnancy and postpartum. (F)
- Hospital care teams should ensure a warm hand off to behavioral health providers following delivery for patients who have behavioral health or substance use concerns. (F)
- Outpatient obstetric practices should include integrated behavioral health so same day interventions can be provided by a behavioral health clinician throughout the perinatal period. (F)
- All health care providers should attend continuing education on the intersection of pain, substance use, and mental health provided by professional organizations, such as American Society of Addiction Medicine and ACOG. (P)
- All health care providers should be aware of and adhere to ACOG recommendations related to not discontinuing opioid medications in pregnancy. (P)
- All health care providers should recognize that mental health conditions present an increased risk of worsening symptoms, including psychosis in the fourth trimester. (P)
- Obstetric providers and pregnancy care managers should ensure that postpartum follow-up appointments are scheduled for women with a history of substance use disorder. Follow-up for missed appointments should occur within five days of the missed appointment. (P)

- All health care providers should ensure that women with past and recent report history of opioid use disorder, including those on Medication Assisted Treatment, should have access to Naloxone. (P)
- NCDHHS should develop a public health campaign to educate the community about the standing order at pharmacies to distribute Naloxone. (C)

CARDIOVASCULAR CONDITIONS

- All health care providers should follow the Alliance for Innovation on Maternal Health (AIM) severe hypertension in pregnancy bundle for guidelines for treatment of hypertension during pregnancy. (P)

INJURY (HOMICIDES AND SUICIDES)

- The NC General Assembly should allocate funds to make Intimate Partner Violence an ongoing public health priority by providing more messaging and resources in safe, public spaces (including bathrooms). (S)
- The State of NC should implement the National Community Preventive Services Task Force's recommendation to expand access to ignition interlocks for first time to alcohol-impaired driving offenders to reduce alcohol-related crashes. (S)
- Health care facilities should apply national standards for Intimate Partner Violence screening based on guidelines from the ACOG Committee Opinion No 518, which include global screening for all pregnancies. (F)
- Community based organizations and/or coalitions focused on IPV should provide community education on the disparities experienced by communities of color impacted by intimate partner violence. (C)

EMBOLISMS

- Federal officials should ensure the National Institute of Health and other funding agencies invest in understanding the impact of fibroids in pregnancy, particularly in thrombosis and how it contributes to health inequities. (S)
- All health care providers should screen for a family history related to sudden death at initial appointments. (P)
- All health care providers should consider the administration of thrombolytics during a cardiac arrest during pregnancy. (P)
- Patients and community members should be aware of the importance of sharing family history of sudden death to their healthcare provider at new patient visits. (Pt/F)

Perinatal Care Region 4: Recommendations by Leading Causes of Death

MENTAL HEALTH CONDITIONS

- Health care systems should ensure all staff engaged with discharge planning for pregnant & postpartum women should have access to and knowledge of local resources to make referrals. (F)
- Emergency Departments should provide a warm hand-off to a substance use treatment facility with adequate follow-up when a patient presents requesting withdrawal management during pregnancy and/or up to12 months postpartum. (F)
- Obstetric providers should follow up with patients within 1-2 weeks after a perinatal loss is experienced. (P)
- Obstetric providers should make an immediate referral to a pregnancy care manager, if there is a positive history of suicide attempts and/or history of substance use. (P)
- Providers prescribing narcotics should evaluate and make appropriate plans for patients to safely take narcotic medication. (P)
- Communities should have access to perinatal loss support groups. (C)

CARDIOVASCULAR CONDITIONS

- Professional organizations for providers should provide education and training on cardiac disease during pregnancy and the postpartum period. (S)
- Hospital systems should ensure pregnant and postpartum women are seen on units with a care team skilled in the care of pregnancy and related disease processes. (F)
- All health care providers should rule out all potential causes of atypical symptoms when seen in the context of hypertension in pregnancy/postpartum. (P)
- All physicians should receive training to avoid diagnostic tunneling when assuming care for pregnant and postpartum patients, specifically regarding primary causes of maternal death.
- All health care providers should obtain a complete history, including family history when assuming care for a pregnant or postpartum patient. (P)
- All health care providers need to apply the AIM Severe Hypertension in Pregnancy bundle and ACOG guidelines on HELLP (hemolysis, elevated liver enzymes, low platelet count) and Gestational Hypertensive disorders during pregnancy and postpartum. (P)

INJURY (HOMICIDES AND SUICIDES)

- Law enforcement agencies should implement lethality assessments for all assault responses regardless of known history of IPV. (S)
- Law enforcement should provide education about all resources in the community, including a 50B Order of Protection and importance of removing firearms from the possession of the defendant. (S)

- National organizations and advocacy groups should develop a national standard to inform partners and families, who are experiencing intimate partner violence, on strategies to prevent violence during the prenatal and postpartum period. (S)
- NC General Assembly should provide funding for shelter and support services for people experiencing IPV. (S)
- NC General Assembly should support legislation that expands victim advocacy funds and services for IPV survivors, regardless of criminal charges. (S)
- Community and faith leaders, and IPV advocacy groups should interact to identify and respond to IPV within a community, particularly in the prenatal period. (C)
- The NC General Assembly should create legislation to support decreasing access to guns through community buyback programs and other initiatives. (S)
- Obstetric practices should make referrals for all pregnant women, regardless of payor source, to pregnancy care coordination services during the initial obstetric appointment. (F)
- All health care providers should follow ACOG guidelines on assessing for mental health concerns in all pregnant women. (P)
- Providers should educate patients and families regarding the potential lethality of continued access to firearms in the home after a known suicide attempt has occurred. (P)
- All health care providers should follow ACOG and AIM guidelines related to mental health screening in each trimester and during postpartum. (P)
- All health care providers should follow ACOG guidelines to ensure women with a prior history of mental health conditions receive enhanced behavioral health surveillance during pregnancy and up to 12 months postpartum per ACOG criteria. (P)
- NC local health departments and community-based organizations should educate on availability of crisis services, including 988 and the National Maternal Mental Health hotline. (C)
- NC local health departments and community-based organizations should provide education to the community on suicide and risk factors for ongoing suicidal ideation. (C)
- Professional organizations for providers should educate providers on Suicide Risk Equity Screening, which is a public health approach to suicide prevention.
- Payors should reimburse for birth and postpartum doula services to reduce stressors and decrease risk in pregnancy and postpartum periods. (Pt/F)

Perinatal Care Region 5: Recommendations by Leading Causes of Death

MENTAL HEALTH CONDITIONS

- Professional licensing boards for physicians and advanced practice providers should require continuing education specific to perinatal mental health and substance use disorders to support their understanding of the safety of psychotropic medications during pregnancy. (S)

- Medical schools and other health professions training programs for advanced practice providers should require education related to perinatal mental health and substance use disorders to support trainees' understanding of the safety of psychotropic medications during pregnancy. (S)
- Pregnancy care managers or patient navigators should be provided for all pregnant women, particularly those who have history of or active substance use or mental health conditions during pregnancy and up to one year postpartum, regardless of insurance status. (S)
- Federal policy makers should ensure that Tricare expands their network of mental health and substance use providers and allow patients to be reimbursed for out-of-network providers, when an in-network provider is not available. (S)
- NC General Assembly should designate increased funding for inpatient beds/programs that focus on services for co-occurring diagnosis. (S)
- The NCDHHS Division of Social Services should create a statewide, standardized protocol that prioritizes keeping mothers and babies together. (S)
- Obstetric providers should ensure an automatic referral to Social Work is completed for women who report a history of, or current substance use and/or behavioral health concerns during hospital stay. (P)
- All health care providers should use and document the results of the Screening, Brief Intervention, and Referral to Treatment (SBIRT) model that align with ACOG guidelines. (P)
- All health care providers should provide referrals to a behavioral health provider and/or substance use treatment services, if the patient requests an appointment or has a history of behavioral health/substance use concerns. (P)
- Obstetric providers should make an immediate referral to a pregnancy care manager, if there is a positive history of suicide attempts and/or history of substance use. (P)
- The NCDHHS should develop a public health campaign to educate the community about the standing order at pharmacies to distribute Naloxone. (S)
- The NCDHHS Division of Social Services should hire only social workers, with at least a Bachelor of Social Work, as Child Protective Services workers. (S)
- Birth facilities should adopt screening guidelines for neonatal abstinence syndrome entitled Comprehensive Lessening Opioid Use Disorder Impact (CLOUDi) created by the Perinatal Quality Collaborative of North Carolina (PQCNC). (S)
- The NC Justice system should treat substance use disorder as a medical illness and emphasize treatment rather than incarceration for pregnant women. (S)
- Community members should receive education to recognize human trafficking and to utilize resources, such as the National Hotline for Human Trafficking: (888)373-7888. (C)
- County leaders should engage community members to develop specific interventions for opioid settlement funds that address specific needs of pregnant/postpartum women. (C)
- Opioid settlement funds should be directed to support harm reduction efforts, including syringe exchange, Naloxone, Fentanyl and xylazine test strips, safe injection sites and substance use education. (C)

INJURY (HOMICIDE AND SUICIDE)

- Health care systems should require extensive and ongoing training regarding risk factors associated with human trafficking to all staff. (S)
- The NC General Assembly should follow the National Community Preventive Services Task Force recommendation to expand access to ignition interlocks to first time offenders charged with alcohol-impaired driving to reduce alcohol-related crashes. (S)
- The NCDHHS divisions of Health Benefits and Public Health should expand pregnancy care management coverage up to one year postpartum. (S)
- Outpatient obstetric practices should include integrated behavioral health so same day interventions can be provided by a behavioral health clinician throughout the perinatal period. (F)
- All health care providers caring for pregnant or postpartum women should utilize appropriate perinatal mood disorder screening tools, such as the Edinburgh Postnatal Depression Scale (EPDS), Patient Health Questionnaire-9 (PHQ-9), or Generalized Anxiety Disorder-7 (GAD-7). (P)
- Emergency Department providers managing pregnant patients with significant trauma should initiate appropriate mass transfusion protocol without delay. (P)
- Government agencies should ensure that indigenous and tribal representatives are engaged in policy decision-making related to intimate partner violence during pregnancy and the postpartum period. (C)

Perinatal Care Region 6: Recommendations by Leading Causes of Death

MENTAL HEALTH CONDITIONS

- Opioid treatment programs should actively collaborate with obstetric providers to deliver appropriate perinatal care during pregnancy and the postpartum period. (F)
- The NCDHHS Division of Social Services should ensure that child protective service workers and other workers receive trauma and substance use disorder related training. (S)
- Opioid treatment providers should deliver recommended evidence-based care that includes screening, assessment, and treatment of pregnant and postpartum individuals with perinatal substance use disorder during pregnancy and in the postpartum period. (P)
- Health care providers should ensure that women receive referrals to a grief and loss counselor following a pregnancy loss.
- Perinatal providers should use validated screening tools to screen and assess existing and new mental health conditions and provide more timely follow-up visits based on acuity. (P)
- All health care providers should educate patients regarding the benefits and risks associated with taking psychotropic medications and/or mood stabilizers during the pregnancy period. (P)

CARDIOVASCULAR CONDITIONS

- Emergency Departments should develop a system to make prenatal appointments for pregnant patients, regardless of insurance status during an emergency department visit. (S)
- Hospital systems should have a workflow in the Electronic Health Record that incorporates protocols for management of hypertension in all pregnant and postpartum patients. (S)
- Federal law makers should implement a standardized record sharing agreement between states for maternal mortality review purposes. (S)
- The Centers for Disease Control and Prevention and the NCDHHS Division of Public Health should continue the Hear Her campaign to provide ongoing education regarding the importance of listening to pregnant and postpartum women during pregnancy and postpartum. (S)
- Emergency Department and obstetric providers in rural areas should use a cardiac screening tool to identify urgent transfer patients and initiate immediate telehealth consultation, if needed. (F)
- Hospital systems should have a protocol in place to ensure all postpartum patients receive education on the risk factors, signs and symptoms of Pulmonary Embolism. (F)
- Emergency Department providers should consult obstetric providers when pregnant patients are present with severe high blood pressure. (F)
- Cardiologists, who care for complex cardiac diseases within pregnant women, should have a protocol established for immediate referral to an obstetric provider specializing in maternal fetal medicine. (P)
- The NC Healthcare Foundation and NCDHHS Division of Public Health should lead statewide multidisciplinary initiatives focused on comprehensive and collaborative cardiac obstetric care which outlines appropriate care for individuals in the pre-conception period, during intrapartum and at least one year postpartum. (S)
- Obstetric providers should be aware of and implement protocols for early recognition and response to cardiac disease during pregnancy. (P)
- All health care providers should explore barriers or reasons why an individual is not taking their prescribed medication during pregnancy and the postpartum period. (P)
- All health care providers, especially in emergency departments, need to apply the hypertension bundle and ACOG guidelines for recognition of HELLP/hypertensive disorders during pregnancy. (P)

INJURY (HOMICIDES AND SUICIDES)

- Health care systems should create a plan for 24/7 referrals, including a warm hand off, to Intimate Partner Violence (IPV) support services following a positive screening. (S)
- Federal and state lawmakers should provide increased funding/resources to implement ACOG and CDCs policy recommendations on gun violence and safety. (S)
- NC State legislature should expand funding for perinatal behavioral health provider (i.e. psychiatric prescribers, peer support specialists, therapists) workforce to support pregnant women throughout the perinatal period. (S)

- The US Department of Defense should financially support the establishment of an integrated health care model within obstetric offices to support closer follow-up and direct connection with community psychiatric/mental health/ substance use providers. (S)
- Health care systems should require extensive and ongoing training regarding risk factors associated with human trafficking to all staff. (S)
- All health care providers should utilize perinatal psychiatric access lines, if information is needed on psychiatric medications that are safe during pregnancy and postpartum periods. (P)
- Health care facilities should collaborate with the NC Coalition Against Domestic Violence to provide ongoing training for providers and clinical staff related to recognizing the warning signs of IPV, even when screening is incongruent. (F)
- Health care facilities should find ways to create safe spaces for people to answer questions regarding IPV. (F)
- Health care facilities should provide education and resources for IPV, regardless of how screening questions are answered, so that all people have knowledge of resources available, if needed. (F)
- Health care facilities should train all staff in trauma-informed and culturally humble care to improve screening and support for people experiencing traumatic experiences. (F)
- Emergency Department providers should ensure a warm hand-off and follow-up within 48 hours after a referral is made to a perinatal mood disorders specialist. (F)
- Emergency shelters for IPV survivors should create options for sheltering individuals who feel unsafe at home along with their children of all ages, including pets. (C)

EMBOLISM

- Hospital systems should have a protocol in place to ensure all postpartum patients receive education regarding Pulmonary Embolism risk signs and symptoms. (F)
- Health care facilities and/or clinics should provide a postpartum check-in within 2-3 weeks after delivery. The check-in can be held in person or via telehealth (F)
- Health care providers should educate all pregnant individuals about signs and symptoms related to Venous Thromboembolism risk in the postpartum period. (P)
- Obstetric providers should consult with Maternal Fetal Medicine when managing patients with known or newly diagnosed hematologic conditions (P)

APPENDIX

Pregnancy-Associated Death Case Identification

In NC, pregnancy-associated deaths are identified through multiple data sources including Vital Statistics linkages, literal cause(s) of death recorded on death certificates, diagnoses recorded on hospital discharge and emergency department data, and pregnancy checkbox information on the death certificate. Deaths occurring during pregnancy or within one year of the end of the pregnancy MMRC case files. For Vital Records linkages, death certificate data for women ages 10 to 60 are matched with birth and fetal death certificate data using the CDC's "*LinkPlus*" data linkage software. (cite: cdc.gov/national-program-cancer-registries/registry-plus/link-plus.html) Manual review is conducted for all Vital Records linkages to ensure accuracy. Literal causes of death are also queried for key words indicative of pregnancy-related causes, such as *peripartum*, *pregnancy*, *ectopic*, *eclampsia*, and *uterine rupture*. Inpatient hospital discharge and emergency department records are also reviewed to identify pregnancy-related diagnostic codes with a discharge status of deceased. The pregnancy checkbox was added to the North Carolina death certificate beginning with 2014 deaths. Due to known issues with the reliability of information reported in the pregnancy checkbox (cite: https://pubmed.ncbi.nlm.nih.gov/31639369/), maternal deaths identified through the pregnancy checkbox alone are confirmed either through examining the literal cause(s) of death, evaluating confirmatory sources such as inpatient hospital or emergency department records, obituaries, social media, news reports, and/or pregnancy confirmation from the medical certifier listed on the death certificate. Any cases that are unable to be confirmed are flagged for abstractor confirmation using medical records.

To verify the completeness of pregnancy-associated death identification, additional enhanced case ascertainment was conducted for 2018-2020 deaths through collaboration with the North Carolina Violent Death Reporting System (NC-VDRS) and the State Unintentional Drug Overdose Reporting System (SUDORS). The NC-VDRS and SUDORs are injury surveillance systems that capture information from multiple sources, including medical examiner/coroner and toxicology reports. In some instances, information regarding pregnancy status is not available via traditional MMRC case ascertainment is found in these systems. Through linkage with NC-VDRS and SUDORS systems, four additional pregnancy-associated deaths from 2018-2020 were confirmed and underwent committee review.

Case Abstraction

After initial pregnancy-associated mortality deaths are identified and verified, relevant medical, behavioral health, legal and social media information is gathered and complied into a detailed de-identified narrative by the abstraction team, consisting of a Nurse and Licensed Clinical Social Worker, for MMRC review. Abstractors utilize the MMRIA database to store abstraction information. The MMRIA system provides a standardized method for collecting information from the death certificate, birth certificate, fetal death certificate, autopsy report, prenatal care record, behavior health record, emergency department records and others. Social and environmental information is also included.

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