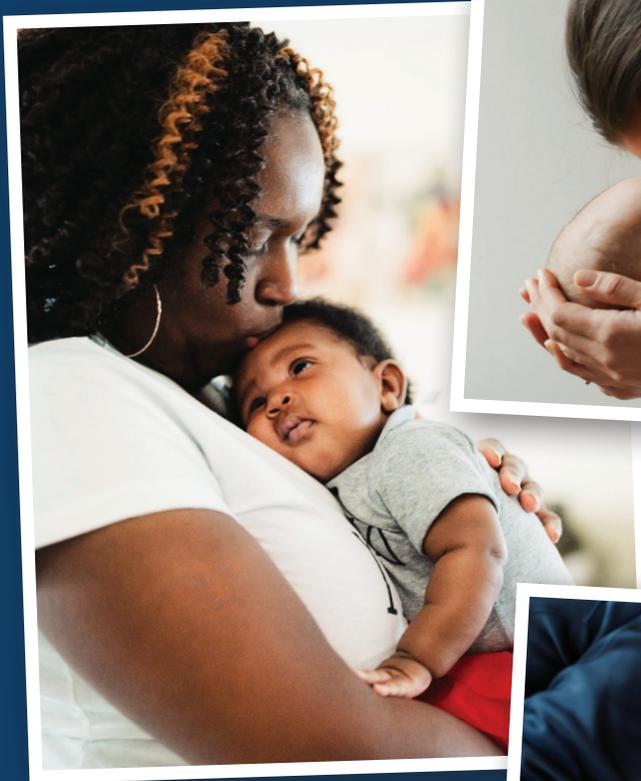


NORTH CAROLINA

# Maternal Mortality Review Report



DECEMBER 2021

# SPECIAL THANKS

A very special thank you goes to Dr. Margaret “Maggie” Harper (Associate Professor Emerita, Wake Forest University School of Medicine) for her tireless and faithful work to ensure that North Carolina maternal deaths were and continue to be reviewed and that the women who lost their lives are not forgotten. North Carolina’s Maternal Mortality Review Committee would not have been established without the diligent and determined efforts of Dr. Harper. She served as the first Chair of the Maternal Mortality Review Committee from 2016-2018. She was also instrumental in training our first nurse abstractor to ensure that cases were properly submitted to the Maternal Mortality Review Committee. Without her time and sacrifice, the review of these cases would not be possible today. **We are pleased to dedicate this inaugural issue to Dr. Margaret “Maggie” Harper.**

## DR. MARGARET A. HARPER



# LETTER FROM CHAIR

North Carolina's maternal mortality review process stands on the shoulders of great leaders in Obstetrics and Gynecology, like Dr. Maggie Harper, and in our greater community. North Carolina led many other states in maternal mortality reviews and in legislative efforts to ensure we had legislation in place to protect and enhance our reviews. We adopt the same approach as the oldest national Maternal Mortality Review Committee (MMRC) in the world, the United Kingdom (UK) Confidential Enquiries in Maternal and Child Health:

*“recognize and respect every maternal death as a young woman who died before her time... a member of a family and of her community... it goes beyond counting numbers to listen and tell the stories of the women who died so as to learn lessons that may save the lives of other mothers and babies... as well as aiming to improve the standard of maternal health.”<sup>1</sup>*

As this report will demonstrate, North Carolina has made advances in reducing maternal mortality for all women. However, the black-white disparity in maternal mortality persists. This disparity is one that we, as a community, must continue to fight to ameliorate. North Carolina continues to actively address these disparities. As a committee, we strive to be inclusive, to approach our work through the lens of health equity, to reduce bias, and most importantly — add to the efforts to make sure no woman dies as a result of pregnancy.

**MARIA SMALL, MD, MPH**

**Associate Professor Obstetrics & Gynecology and Medicine**

# NORTH CAROLINA MMRC REPORT

North Carolina has a longstanding history of reviewing pregnancy-associated deaths that dates back to 1945. In 1988, the Division of Public Health's State Center for Health Statistics introduced an enhanced population-based system for identifying pregnancy-related deaths within the state.<sup>2</sup> Dr. Margaret Harper worked closely with the Division of Public Health to investigate each death by reviewing medical records on behalf of the Division. This effort allowed North Carolina to have a more comprehensive understanding of issues women were facing related to pregnancy. In July 2013, the state was selected to participate in the Association of Maternal & Child Health Programs (AMCHP) *Every Mother Initiative* with five other states.<sup>3</sup> The Merck for Mothers effort provided the state with a \$30,000 award to hold planning meetings and translate our findings into efforts to address pregnancy-associated deaths.

In October 2014, Dr. Harper presented to the NC Child Fatality Task Force on the implications of maternal mortality in our state.<sup>4</sup> She shared the current process for reviewing pregnancy-associated deaths and the challenges it provided. The request was made of the Child Fatality Task Force to support legislation that allowed the development of a Maternal Mortality Review Committee (MMRC). With the Task Force's support, and key leadership from the NC Medical Society and others, North Carolina's MMRC was formalized by the General Assembly effective December 1, 2015.

This legislation established a multidisciplinary committee appointed by the Secretary of the NC Department of Health and Human Services. The MMRC is charged with reviewing pregnancy-associated deaths, making recommendations for prevention, and disseminating findings. The proceedings of the MMRC are protected from discovery and are confidential. The legislation also requires licensed healthcare providers, facilities, and others to share medical records to be utilized as part of the review.

The current MMRC includes representation from Maternal Fetal Medicine, General Obstetrics and Gynecology, Certified Nurse Midwifery, Emergency Medicine, Social Work, Nursing, and the Chief Medical Examiner's Office. Specialty consultants that are brought in to enhance the review process include representatives from: Cardiology, Obstetric Anesthesiology, Substance Use, Psychiatry, Pharmacy, Neurology, Family Medicine, Medicaid, Healthcare Association, Injury Prevention, and groups representing individuals with lived experience.

# North Carolina's Maternal Mortality Review Legislation

§ 130A 33.52. Maternal Mortality Review Committee; membership, compensation.

[www.ncleg.gov/enactedlegislation/statutes/pdf/bysection/chapter\\_130a/gs\\_130a-33.60.pdf](http://www.ncleg.gov/enactedlegislation/statutes/pdf/bysection/chapter_130a/gs_130a-33.60.pdf)

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## Maternal Mortality Case Definitions

North Carolina uses Centers for Disease Control and Prevention (CDC) case definitions for defining and classifying deaths occurring during pregnancy, childbirth, and the postpartum period (up to 365 days from the end of pregnancy).<sup>5</sup>

### PREGNANCY-ASSOCIATED DEATH

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

### PREGNANCY-ASSOCIATED, BUT NOT RELATED DEATH

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

### PREGNANCY-RELATED DEATH

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



# Pregnancy-Associated Death Case Identification

In North Carolina, 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. Only records where death occurred within 365 days of delivery, fetal death, or pregnancy are included in the 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.<sup>6</sup> 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 in calendar 2014. All maternal mortalities 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.

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## Case Abstraction

After initial pregnancy-associated mortality case identification, specialized case abstractors verify pregnancy within a year of death and gather relevant medical and social information necessary for MMRC case reviews. To document and store case abstraction information, abstractors utilize the Maternal Mortality Review Information Application (MMRIA) system, developed by the CDC and the CDC Foundation.<sup>7,8</sup> The MMRIA system provides a standardized method for collecting information from the death certificate, birth certificate, fetal death certificate, autopsy report, prenatal care record, emergency department visit record, hospitalization record, other medical office visits, medical transport, social and environmental profile information, and mental health information. After all available supplementary case material is collected and documented in MMRIA, abstractors summarize the information in a case narrative that provides an overview of the case for the MMRC.

## Committee Review Process

North Carolina's MMRC held its first meeting in 2016 and began reviews of the 2014 pregnancy-associated deaths, focusing exclusively on deaths that were likely to be pregnancy-related. Beginning with 2015 deaths, the MMRC expanded reviews to include all deaths within one year of pregnancy or childbirth, including pregnancy-associated, but not related deaths. The MMRC meets bimonthly to review pregnancy associated deaths. In 2019, the MMRC started meeting in subcommittees prior to the full committee meeting in order to have more time to fully review cases and create a draft recommendation that can be presented to the full committee.

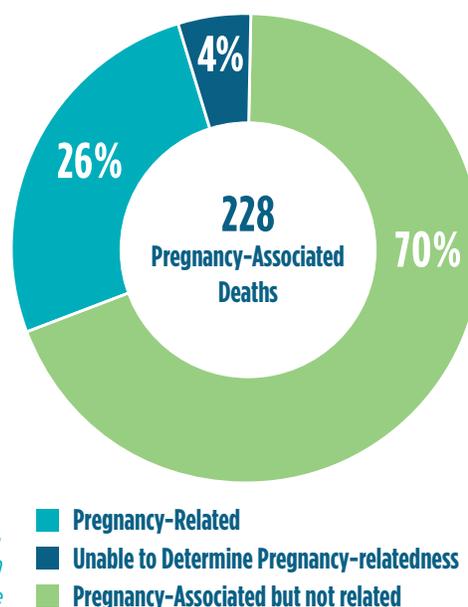
The subcommittees meet quarterly and/or as needed. Each pregnancy-associated death identified is reviewed prior to review by the full MMRC. The subcommittee process provides an opportunity for an in-depth review of all pertinent information related to the woman's history and circumstances of her death. If the subcommittee determines additional information is needed prior to review by the full MMRC, the abstraction team then requests additional records and documents. The MMRC subcommittee makes a preliminary determination of whether a death is pregnancy-related. The full MMRC reviews subcommittee decisions and then makes final determinations regarding the cases.

## Overview of 2014-2016 Pregnancy-Related Deaths

### PREGNANCY-RELATED

The MMRC reviewed a total of 228 deaths occurring from 2014 to 2016 (**Figure 1**). Based on Committee determination, the majority of deaths reviewed during this period were classified as pregnancy-associated, but not related (70%; n=159). The Committee categorized approximately a quarter of the deaths as pregnancy-related (n=60). In 9 cases, the MMRC was unable to make a determination.

Figure 1. Deaths by Pregnancy-Relatedness, NC Residents 2014-16

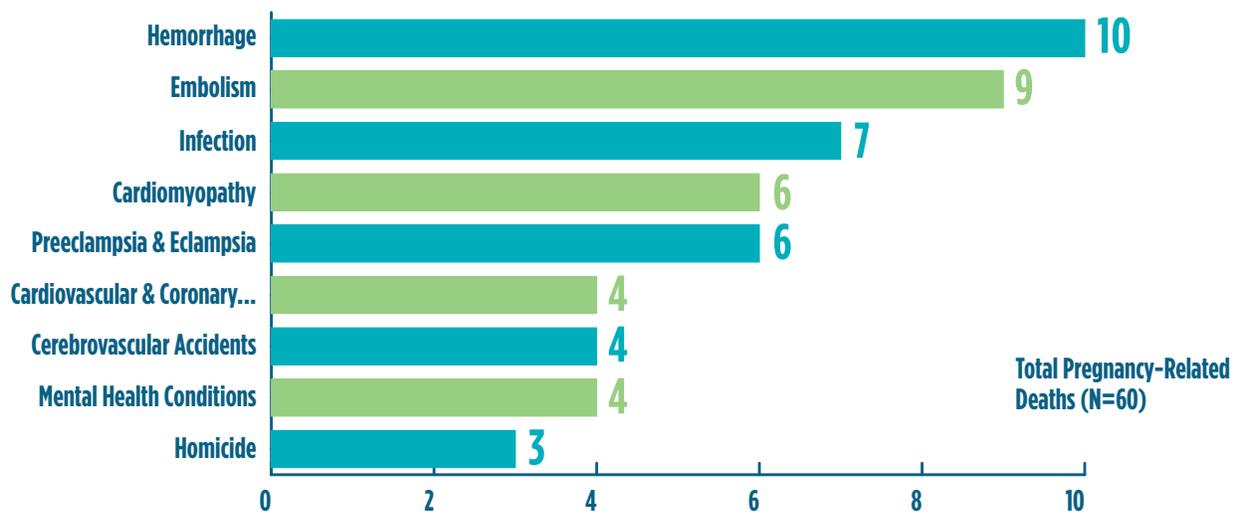


Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee

## CAUSES OF PREGNANCY-RELATED DEATHS

The MMRIA system provides summary cause of death categories for standardized maternal mortality analysis among states. As shown in **Figure 2**, based on North Carolina MMRC case reviews, among the 60 pregnancy-related deaths in 2014-16, hemorrhage accounted for 10 deaths (16.7%), embolism was responsible for 9 deaths (15.0%), and 7 deaths were caused by infections (11.7%). A total of 7 pregnancy-related deaths attributable to specific cause categories cannot be listed here due to small numbers.

Figure 2. Leading Causes of Pregnancy-Related Deaths, NC Residents 2014-16



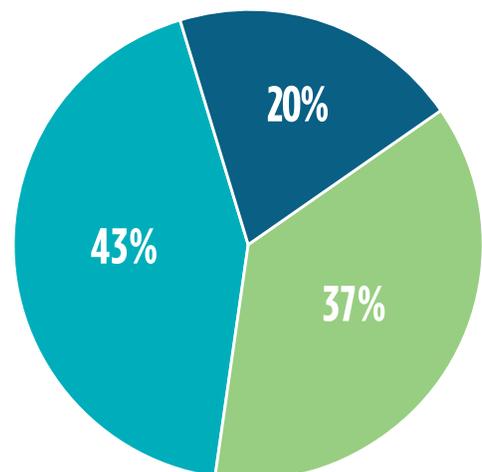
Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee

## TIMING OF PREGNANCY-RELATED DEATHS

**Figure 3** presents the temporal proximity of the death to delivery/pregnancy. From 2014-16, the majority of pregnancy-related deaths occurred during pregnancy or within 42 days of delivery (80%). This contrasts with pregnancy-associated, but not related deaths, where most deaths (74%) occur 42 days or more postpartum.

Source: NCDHHS / Division of Public Health / Women's & Children's Health Section / NC Maternal Mortality Review Committee

Figure 3. Pregnancy-Related Deaths by Timing of Death, NC Residents 2014-16



■ >42 Days Postpartum  
■ Pregnant at Time of Death  
■ 1-42 Days Postpartum

# Demographic Characteristics of Pregnancy-Related Deaths

**AGE GROUP:** Examining pregnancy-related deaths by age group (**Figure 4**), 28% of deaths (n=17) occurred among individuals 30-34 years old and 27% of deaths to individuals 20-24 years old (n=16). The lowest proportion of deaths occurred among individuals in the <20 year age group (8%; n=5).

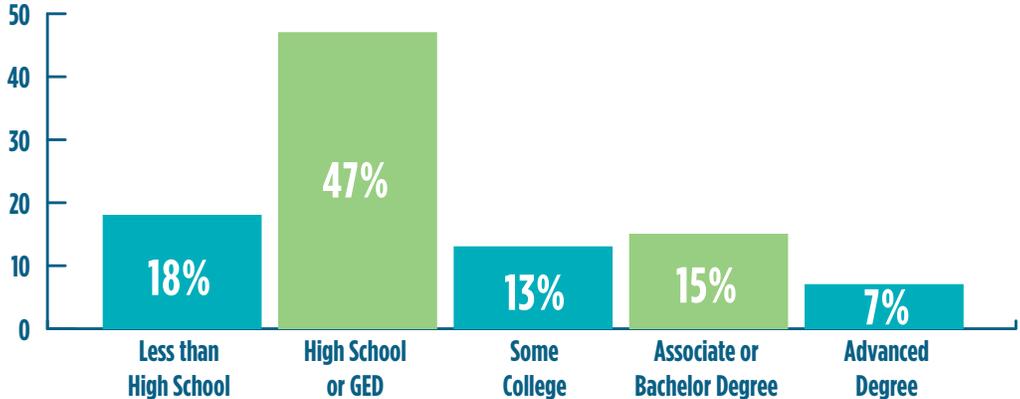
Figure 4. Pregnancy-Related Deaths by Age Group, NC Residents 2014-2016



Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee

**EDUCATION LEVEL:** As presented in **Figure 5**, among the 60 pregnancy-related deaths identified in 2014-2016, over half (65%) occurred to those with a high school education or less. By contrast, just over one in five pregnancy-related deaths (22%) occurred among individuals with Associate, Bachelor or Advanced degrees.

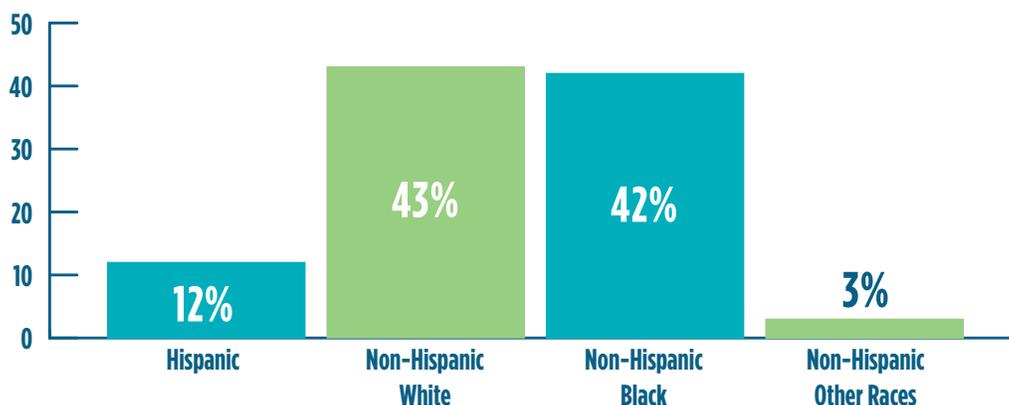
Figure 5. Pregnancy-Related Deaths by Education Level, NC Residents 2014-2016



Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee

**RACE/ETHNICITY:** The small number of pregnancy-related deaths each year prohibit detailed disaggregation by race and ethnicity. However, from 2014-2016, 85% of all pregnancy-related deaths occurred among non-Hispanic white and non-Hispanic Black individuals, as displayed in **Figure 6**. Hispanics accounted for 11.7% of all pregnancy-related deaths during this period (n=7), and non-Hispanics of other races comprised approximately 3% of deaths (n=2). Pregnancy-related mortality ratios among specific racial and ethnic populations will be presented in a separate table later in the report.

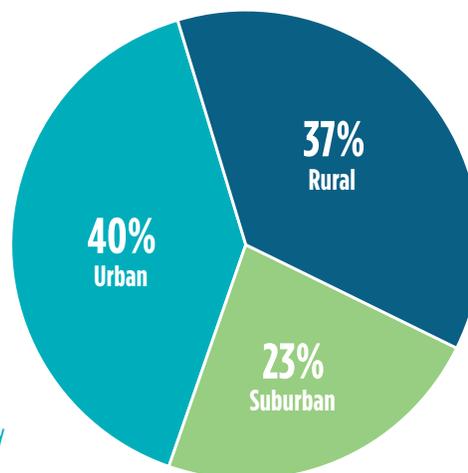
*Figure 6. Pregnancy-Related Deaths by Race/Ethnicity, NC Residents 2014-2016*



*Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee*

**URBAN/RURAL STATUS:** The North Carolina Rural Center classifies NC counties into three categories based on population per square mile: 1) Rural counties: having populations below 250 per square mile; 2) Regional cities or suburban counties: having between 250-750 population per square mile; and 3) Urban counties: having over 750 people per square mile.<sup>9</sup> As presented in **Figure 7**, both rural and urban areas of the state accounted for similar proportions of all pregnancy-related deaths in 2014 to 2016 (37% and 40%, respectively). Regional cities/suburban areas comprised 23% of all deaths.

*Figure 7. Pregnancy-Related Deaths by Urban/Rural Status, NC Residents 2014-2016*



*Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee e*

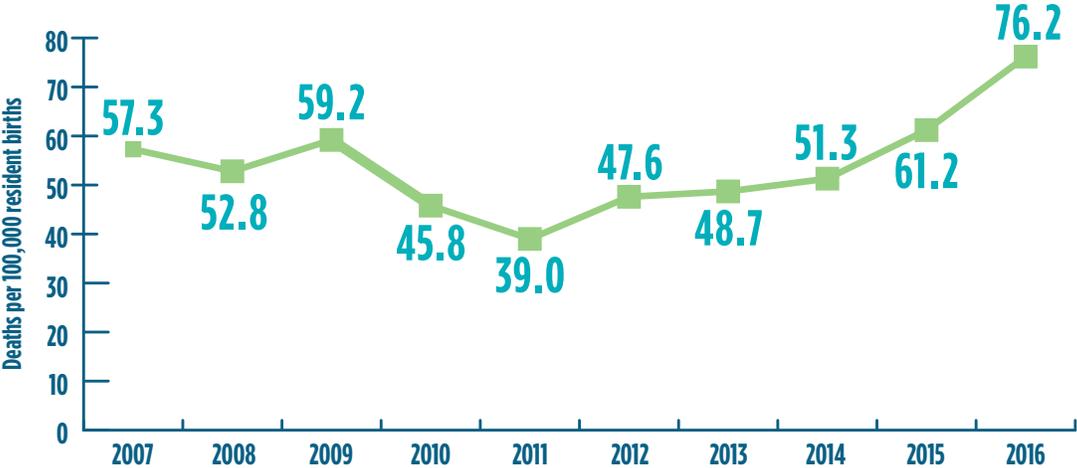


# Trends in Pregnancy-Associated Deaths

Combining data from 2014-2016 maternal mortality reviews generated by the MMRC with data derived from earlier reviews of North Carolina pregnancy-associated deaths, we can examine trends in pregnancy-associated deaths over time.<sup>10</sup> In reviewing trends over time, it is important to bear in mind that a variety of methodological changes occurred in 2014 that may have enhanced death case ascertainment. These changes include the addition of the pregnancy checkbox to the North Carolina death certificate, the addition of identifying information in hospital discharge and emergency department records which better facilitate data linkages, the use of a new standardized tool for collection of maternal death review information (MMRIA), and changes related to the implementation, expansion and team building of the MMRC.

**PREGNANCY-ASSOCIATED MORTALITY RATIOS 2007-2016:** As noted earlier, pregnancy-associated deaths include all deaths while pregnant or within one year of the termination of pregnancy, regardless of the cause or pregnancy-relatedness. Over the last decade, North Carolina’s overall pregnancy-associated mortality ratios have increased 33 percent; from 57.3 deaths per 100,000 resident births in 2007 to a ratio of 76.2 deaths per 100,000 resident births in 2016 (**Figure 8**). The lowest pregnancy-associated mortality ratio occurred in 2011 (39.0) and the highest ratio was in 2016 (76.2).

Figure 8. Overall Pregnancy-Associated Mortality Ratios by Year of Death, NC Residents 2007-2016



Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee

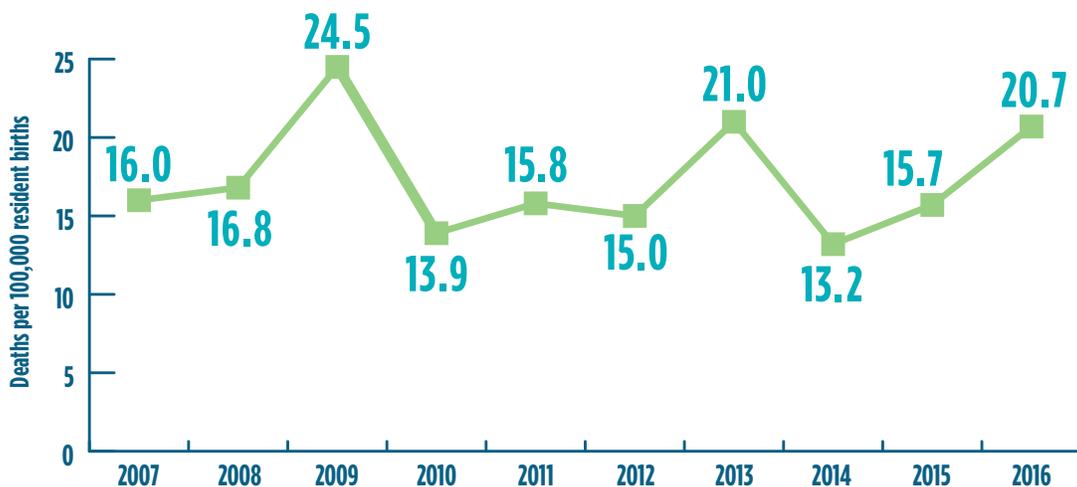


*“Improving maternal health and decreasing maternal mortality with a focus on disparities, supports a critical need for women, children, families, and communities in our state. This report provides us with key recommendations to inform our collective work moving forward.”*

*– Dr. Kelly Kimple, NC Title V Director*

**PREGNANCY-RELATED DEATH RATIOS 2007-2016:** MMRC reviews determine which pregnancy-associated deaths are pregnancy-related. The pregnancy-related death ratio represents the number of pregnancy-related deaths per 100,000 resident births. As shown in **Figure 9**, there is insufficient data to understand whether there are any trends in pregnancy-related death ratios; however, in the three years of deaths reviewed by the MMRC, they have increased; from 13.2 deaths per 100,000 live births in 2014 to a ratio of 20.7 deaths in 2016.

*Figure 9. Pregnancy-Related Mortality Ratios by Year of Death, NC Residents 2007-2016*



*Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee*

**PREGNANCY-RELATED MORTALITY DISPARITIES, 2001-2016:** Given an average of 21 pregnancy-related deaths each year in North Carolina from 2001-2016, we must aggregate several years of data in order to generate reliable pregnancy-related death ratios by race. Using this approach, we can examine four-year aggregate pregnancy-related mortality ratios from 2001-2016 for non-Hispanic White mothers compared with non-Hispanic Black mothers. We also present the disparity ratios between the two groups. Other racial and ethnic groups in North Carolina have aggregate multi-year pregnancy-related death figures that are too small to produce reliable ratios and are not presented in this report.

*Figure 10. Non-Hispanic Black and Non-Hispanic White Pregnancy-Related Mortality Ratios by Year, NC Residents 2001-2016*



*Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee*

As shown in **Figure 10**, non-Hispanic white women experienced significantly lower pregnancy-related mortality ratios than non-Hispanic Black women throughout the time period. Pregnancy-related mortality ratios for non-Hispanic Black women declined 50 percent during this time-period, while disparity ratios decreased by 71 percent. However, the pregnancy-related mortality ratio for non-Hispanic Black mothers continues to be 1.8 times that of non-Hispanic white mothers. It is important to note that some of the reduction in disparity ratios observed during this period is associated with the 73 percent increase in pregnancy-related mortality ratios for non-Hispanic White mothers.

# Preventability of Pregnancy-Related Deaths

Table 1. Pregnancy-Related Deaths by Preventability, NC Residents 2014-16

| Chance to Alter Outcome | Preventability |           |           |
|-------------------------|----------------|-----------|-----------|
|                         | No             | Yes       | Total     |
| No Chance               | 17             | 0         | 17        |
| Some Chance             | 0              | 25        | 25        |
| Good Chance             | 0              | 17        | 17        |
| Unable to Determine     | 1              | 0         | 1         |
| <b>Total</b>            | <b>18</b>      | <b>42</b> | <b>60</b> |

Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee

After a thorough review of deaths from 2014 to 2016, the MMRC determined that more than two-thirds (70%) of North Carolina pregnancy-related deaths 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”.<sup>11</sup> (Table 1). Among the 42 preventable deaths during this time period, the Committee concluded that there was “some chance” to alter the outcome for 25 deaths and a “good chance” to avert the outcome for 17 deaths.

## Rapid Maternal Overdose Review (RMOR)

North Carolina also partnered with the CDC to specifically focus on the review of pregnancy-associated cases related to substance use/drug overdose for 2016 case reviews. Information from this effort will be shared at a later time through a data brief.



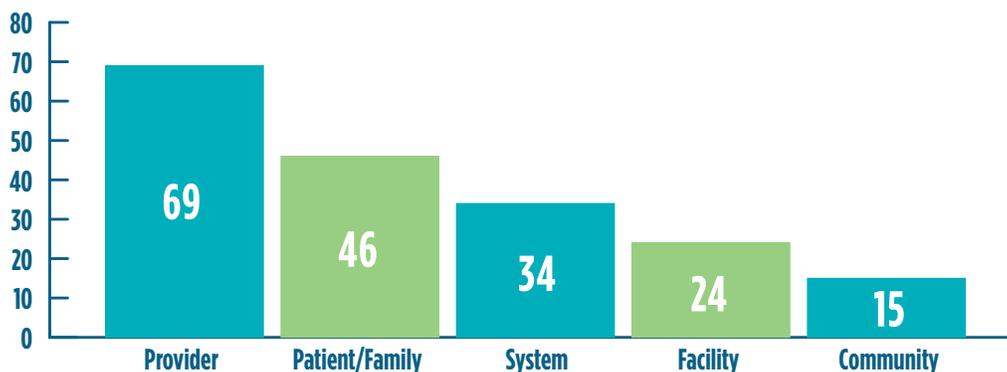
# COMMITTEE RECOMMENDATIONS

The ultimate goal of the North Carolina MMRC is to apply information gathered during pregnancy-related death reviews to devise recommendations and strategies aimed at preventing pregnancy-related deaths in our state. The CDC's MMRIA system assists Maternal Mortality Review Committees by providing five standardized categories for classifying committee recommendations by contributing factors:

- 1) Patient/Family;
- 2) Provider;
- 3) Facility;
- 4) Community; and
- 5) Systems.<sup>11</sup>

Based on reviews of 2014-2016 pregnancy-related deaths, the MMRC identified a total of 188 recommendations. **Figure 11** presents the number of North Carolina MMRC recommendations by contributing factor category.

*Figure 11. Committee Recommendations by Category, NC Pregnancy-Related Deaths 2014-2016*



*Source: NCDHHS / Division of Public Health / Women, Infant and Community Wellness Section / Maternal Health Branch / NC Maternal Mortality Review Committee*



## Provider Recommendations

More than a third (37%) of Committee recommendations were focused on providers, making it the most cited recommendation category. NC MMRC provider recommendations include those that focus on:

- **Adherence with clinical guidelines and protocols** - Examples of these recommendations included using maternity safety bundles, consideration of appropriate levels of maternal care, and adherence to clinical protocols for cardiac care, hypertension, vaccination administration, medical transport, hyperemesis, infection, maternal depression, trauma, pre/post-operative antibiotic prophylaxis, appropriate imaging, and sepsis.
- **Coordination and communication between providers** - In this category, recommendations included facilitation of timely referrals, implementation of virtual/telehealth services, and better communication and coordination between EMS, mental health, prenatal care and hospital providers.
- **Education/Training** - Examples of these recommendations included provider education/training on subjects such as sepsis management, HELLP symptoms, deep vein thrombosis, diagnostic equipment, treatment of chronic pain conditions, discriminatory practices based on weight, early warning signs, post-surgical risks of bariatric surgery, and simulation trainings. Providers were also encouraged to provide education to patients and families on topics such as the fourth trimester, pre/post-operative risk factors and complications, prescription drug compliance, sickle cell disease care, and deep vein thrombosis during the postpartum period.
- **Patient screening and follow-up** - Recommendations included promoting optimal postpartum follow-up after delivery discharge, postpartum depression screening, follow-up after miscarriage.



### *Hear Her Campaign*

<https://newmomhealth.com/hear-her>



## Patient/Family Recommendations

Nearly a quarter (24%) of MMRC recommendations focused on patients and families, centering largely on the need for patient education before, during and after pregnancy. Examples of recommendations included the need for facilities and providers to provide patient and family education regarding the following topics:

- Risks of ectopic pregnancy
- Postpartum cardiomyopathy
- Prenatal and postpartum depression
- Hyperemesis
- Pre/post-operative risk factors
- Prescription medication storage
- Venous thromboembolism (VTE) and pulmonary embolism (PE) prevention
- Postpartum action plan to provide support for mother and infant after discharge from hospital and during postpartum period
- Importance of following up with provider after an emergency room visit

### **Review to Action**

[https://reviewtoaction.org/  
about-us](https://reviewtoaction.org/about-us)





## Systems Recommendations

Recommendations under systems accounted for 18% of 2014-2016 MMRC recommendations. These recommendations included:

- Increase the number of obstetric providers able to prescribe appropriate opioid medication
- Develop consistent guidelines across the state for venous thromboembolism prophylaxis peripartum
- Create electronic medical record flag that indicates patient has prior mental/substance use health records
- Encourage release of mental/substance use health record(s) for optimal comprehensive care
- Healthcare system should adopt patient-centered practices to address end of life and severe co-morbidities during pregnancy; system should focus on improving quality of life versus quantity of life
- Conduct implicit bias training for providers
- Improve utilization of trained interpreters during course of care
- Tobacco use counseling during pregnancy should be routine with appropriate referrals
- Increase access of psychiatric consulting/service within healthcare system
- The hospital system should provide education on early warning signs and integrate early warning tools that create an appropriate rapid response to detect rapid deterioration
- Military health systems should apply standard of care for the 4th trimester, including education to patients and family members regarding postpartum depression
- System should provide reimbursement for inpatient mental health therapy
- Law enforcement should remove firearms from those with depression and high risk for suicide
- Increase mental health support access in the community
- Interpreter services are needed during law enforcement interviews and responses
- Military communities should provide outreach to all pregnant, postpartum and 4th trimester spouses of deployed military members regarding identified support networks and significant others
- Military should provide education regarding resources available to military personnel and their families and refer as appropriate to those services with no penalties



## Facility Recommendations

Facility recommendations, which comprised 13% of all recommendations, primarily focused on the need for policies and protocols. Examples of 2014-2016 MMRC facility recommendations included:

- All maternity healthcare facilities should implement Alliance for Innovation on Maternal Health (AIM) safety bundles
- Emergency departments should involve obstetric providers in a timelier manner when treating pregnant and postpartum individuals
- Establish interim care services for high risk patients with substance use while waiting for placement into inpatient mental health or substance use facilities
- Improve access to sub-specialists
- Provide care coordination in emergency departments for high-risk pregnant cases
- Establish protocols for telemedicine consultation
- Conduct simulation training for emergency department providers/team regarding obstetric care/emergencies



## Community Recommendations

Community recommendations represented 8% of 2014-2016 MMRC recommendations. Recommendations in this category included provision of community education and awareness:

- Communities should develop ways to disseminate information about warning signs of severe maternal morbidity and mortality in early pregnancy
- Provide Cardiopulmonary Resuscitation (CPR) training for family members of patients with diagnoses that put them at risk for sudden cardiac arrest
- Community level organizations/schools/religious leaders should continue to address HIV/AIDS related stigma by providing aggressive community outreach to those who fall through the cracks
- Increase awareness of available healthcare services within the community
- Communities should utilize evidence-based strategies for education regarding firearm safety and suicide

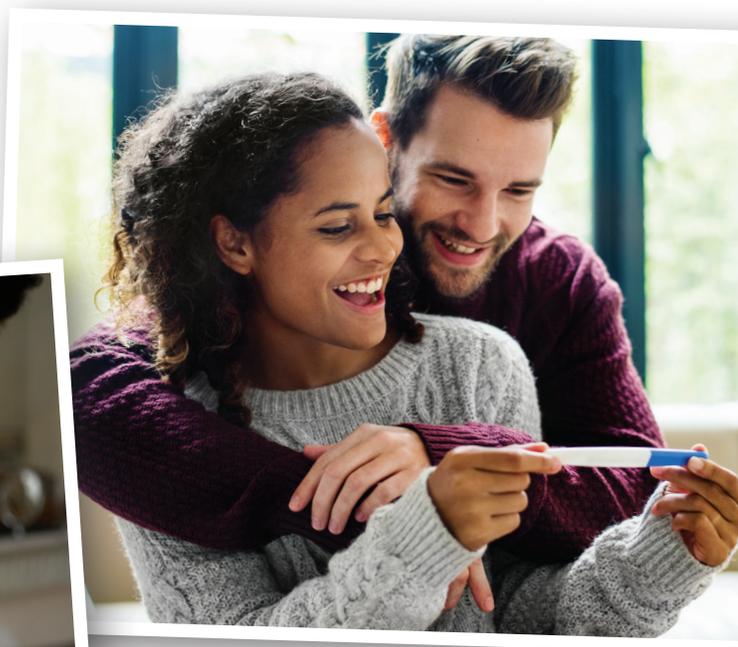


# ACKNOWLEDGMENTS

Special thanks to the dedicated and committed members and specialty consultants of the North Carolina Maternal Mortality Review Committee who volunteer their time to diligently review each case and make recommendations that will lead to the elimination of pregnancy-related deaths and improve the health of women of childbearing age in our state. To the devoted team of staff within the NC Department of Health and Human Services, Division of Public Health (DHHS/DPH) for their meticulous detail in spending hours on each case in abstracting records from hospital, healthcare facilities and other entities, and compiling the data to ensure accuracy and completeness, your work is not unnoticed and greatly appreciated.

DHHS/DPH is extremely grateful to the CDC for supporting this effort in our state. Your leadership, guidance, data management, and resources have allowed us to move this work forward.

DHHS/DPH also acknowledges the NC General Assembly, NC Obstetric and Gynecological Society, NC Trial Lawyers Association, NC Child Fatality Task Force, and numerous others for supporting the establishment of the North Carolina's Maternal Mortality Review Committee through 2015 Legislation.



# REFERENCES

1. Cantwell R et al. Saving Mothers' Lives: Reviewing Maternal Deaths to make Motherhood Safer: 2006–2008. The Eighth Report on Confidential Enquiries into Maternal Deaths in the United Kingdom. *BJOG*. 2011;2011(118):1–203.
2. Buescher PB, Harper M, Meyer RE. Enhanced Surveillance of Maternal Mortality in North Carolina. *North Carolina Medical Journal*, March 2002 63(2): 76-9.
3. Association of Maternal and Child Health Programs (AMCHP). *Every Mother Initiative*. Accessed March 5, 2021: [www.amchp.org/programsandtopics/womens-health/Focus%20Areas/MaternalHealth/Pages/EveryMotherInitiative.aspx](http://www.amchp.org/programsandtopics/womens-health/Focus%20Areas/MaternalHealth/Pages/EveryMotherInitiative.aspx)
4. Harper, Margaret. *Maternal Mortality Review, North Carolina*. 2014 Presentation to the North Carolina Child Fatality Taskforce. Accessed March 5, 2021: [www.ncleg.gov/DocumentSites/Committees/NCCFTF/Presentations/2014-2015/Harper%20Perinatal%20Health%2010\\_20\\_14.pdf](http://www.ncleg.gov/DocumentSites/Committees/NCCFTF/Presentations/2014-2015/Harper%20Perinatal%20Health%2010_20_14.pdf)
5. Review to Action: Working Together to Prevent Maternal Mortality. Accessed March 5, 2021: <https://reviewtoaction.org/learn/definitions>
6. Centers for Disease Control and Prevention, National Program of Cancer Registries (NPCR). *LinkPlus*. Accessed March 5, 2021: [www.cdc.gov/cancer/npcr/tools/registryplus/lp.htm](http://www.cdc.gov/cancer/npcr/tools/registryplus/lp.htm)
7. Review to Action: Working Together to Prevent Maternal Mortality. *Maternal Mortality Review Information Application – MMRIA. What is MMRIA?* Accessed March 5, 2021: <https://reviewtoaction.org/tools/mmria>
8. Centers for Disease Control and Prevention. *Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM)*. Accessed March 5, 2021: [www.cdc.gov/erasemm](http://www.cdc.gov/erasemm)
9. North Carolina Rural Center. *About Us: North Carolina Counties*. Accessed March 5, 2021: [www.ncruralcenter.org/about-us/](http://www.ncruralcenter.org/about-us/)
10. North Carolina Department of Health and Human Services, Division of Public Health, State Center for Health Statistics. *Trends in Maternal Mortality Statistics*. Accessed March 5, 2021: <https://schs.dph.ncdhhs.gov/data/maternal/>
11. Review to Action: Working Together to Prevent Maternal Mortality. *MMRIA Committee Decisions Form*. Accessed March 5, 2021: <https://reviewtoaction.org/node/102>



