2023 New Hampshire Annual Report on Maternal Mortality

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Bureau of Family Health & Nutrition
Division of Public Health Services
Department of Health & Human Services

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Table of Contents:

Executive Summary…………………………………………...………...4

Introduction………………………………………………………...…...5

Overview of 2022 Pregnancy-Associated Deaths in NH.……………...…....6

Overview of 2018-2022 Pregnancy-Related Deaths by
Various MMRC Decisions and Maternal Characteristics…………………...7

2022 NH MMRC Recommendations and Interventions……………………10

Follow-up Actions from Past Recommendations…………….……...……...11

Conclusion…………………..…………………...……………………....12

Appendices:

I. MMRIA Informed Tables and Figures….….……………………….……13

II. Maternal Mortality Review Committee…………….…………….……16

Executive Summary

In 2010, RSA 132:30 and the accompanying rule He-P 3013 established a New Hampshire Maternal Mortality Review Committee (NH MMRC). The function of the NH MMRC is to conduct comprehensive and multidisciplinary reviews of maternal deaths, identify factors associated with these deaths, and make recommendations for future system changes that improve services for perinatal people in New Hampshire. The NH MMRC makes recommendations in hopes that they will lead to proactive implementation of actions that improve outcomes for pregnant and parenting New Hampshire citizens.

According to the Centers for Disease Control and Prevention (CDC), the World Health Organization defines maternal death as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes."[1] The CDC reports that in 2021, 1,205 women died of maternal causes in the United States compared with 861 in 2020 and 754 in 2019. The maternal mortality rate for 2021 was 32.9 deaths per 100,000 live births, compared with a rate of 23.8 in 2020 and 20.1 in 2019."[2]

In New Hampshire, there were eight pregnancy-associated deaths (deaths that occurred while pregnant or up to one year after the end of the pregnancy, regardless of cause) in 2022. The majority (62.5%) of these deaths were caused by substance use overdose, followed by cardiac and coronary conditions. Analysis of aggregated data indicates similar trends in the causes of maternal deaths over the last five years. Most of the deaths occurred among mothers who were between 25 and 34 years old and about half of the decedents had acquired a high school diploma or less. More postpartum deaths occurred among mothers who paid for deliveries using Medicaid. ***Mental health conditions were the leading underlying cause of death. The high prevalence of substance use disorder (SUD) deaths also remains a concern, as seen in previous reports.***

In 2022, the NH MMRC recommendations focus on educating healthcare staff about amniotic fluid embolism and pulmonary embolism, obtaining pediatric health records for case abstraction, collaborating with the New Hampshire Division for Children, Youth and Families, and sharing resources between the Dartmouth Health-Northern New England Perinatal Quality Improvement Network and the New Hampshire Critical Time Intervention centers. Due to the nature of maternal deaths occurring in New Hampshire, this report also discusses the ongoing work built upon previous NH MMRC recommendations to improve the support and care of perinatal people with SUD.

[1] Maternal Mortality Rates in the United States, 2020 (cdc.gov)
[2] Maternal Mortality Rates in the United States, 2021 (cdc.gov)

Introduction

Administered within the NH Department of Health and Human Services (DHHS), Division of Public Health Services (DPHS), Bureau of Family Health and Nutrition, Maternal and Child Health Section (MCH), the oversight and management the NH MMRC is performed by the NH MCH Perinatal Nurse Coordinator/NH MMRC Coordinator and the MCH Epidemiologist. Additional programmatic support is provided by the region's Perinatal Quality Collaborative, known as the Dartmouth Health-Northern New England Perinatal Quality Improvement Network (DH-NNEPQIN). DH-NNEPQIN is legislatively named as the clinical body to work with MCH for the purposes of assisting with the collection, abstraction, and organization of maternal death case reviews. DH-NNEPQIN's Director of Operations serves as the co-abstractor of the case data.

In 2010, RSA 132:30 and the accompanying rule He-P 3013 established a New Hampshire Maternal Mortality Review Committee (NH MMRC). The function of the NH MMRC is to conduct comprehensive and multidisciplinary reviews of maternal deaths, identify factors associated with these deaths, and make recommendations for future system changes that improve services for perinatal people in NH. The NH MMRC makes recommendations in the hopes that they will lead to proactive implementation of actions that improve outcomes for pregnant and parenting New Hampshire citizens.

Program Update

New Hampshire has completed the fourth year of a five-year Centers for Disease Control and Prevention (CDC) "Enhancing Reviews and Surveillance to Eliminate Maternal Mortality" (ERASE MM) grant that was awarded from 2019-2024. This grant has enhanced collaboration between the NH MMRC Coordinator and DH-NNEPQIN for abstraction of New Hampshire maternal death cases and facilitation of the membership and operation of the NH MMRC. De-identified case data entered into the CDC's Maternal Mortality Review Information Application (MMRIA) system is used to keep record of all recommendations made by MMRCs throughout the United States. For NH MMRIA data, please see Appendix I.

The NH MMRC has had continued success in its programmatic functionality. Case abstractors at both MCH and DH-NNEPQIN attend monthly MMRIA office hours, during which there is an opportunity to learn best practices in the use of MMRIA, MMRC data, recommendations, and processes. The office hours also provide opportunities to actively discuss challenges and strategies with colleagues from other states' MMRCs. This improves the nationwide MMRC process and facilitates a network of colleagues for all MMRC case abstractors and epidemiologists.

The MCH Epidemiologist has been working with New Hampshire State Vital Records and the Office of the Medical Examiner (OCME) to confirm "suspected" false positive cases (e.g., advanced maternal age of the decedent) prior to data abstraction, which eliminates unnecessary time spent collecting medical records for cases. She also advocated for data quality in reporting by emphasizing to the OCME the importance of checking the "pregnancy checkbox" on the Death Certificate, thereby reducing the number of "unknowns" and unreported pregnancy-related deaths (mainly those occurring during pregnancy), since they are not captured during birth and death certificate linkages.

The NH MMRC began meeting in person again in the latter part of 2022. It had been meeting virtually due to ongoing concern about COVID-19. Meetings are now in a hybrid format, with

most attendees meeting at a physical location.

The use of virtual accommodations has been beneficial because it has allowed the NH MMRC to consult with subject matter experts. Often, these professionals cannot take hours of time from their schedules to participate in committee meetings in person (when factoring in time spent in transportation to and from the meeting). The virtual option has been successfully utilized as a viable means to provide easy access for expert contributions to meaningful committee dialogue, decisions, and actionable recommendations. The subject matter experts' roles differ from legislated committee members, whose roles are defined within NH RSA 132:30.

The NH MMRC is continuing to add more members with lived experience. The addition of individuals with previous perinatal substance use disorders, perinatal mental health challenges, and other NH MMRC-identified causes of maternal morbidity and mortality enhances other committee members' understanding of these issues. This promotes the creation of practical and actionable recommendations that can have the greatest impact within New Hampshire communities. The list of NH MMRC Committee Members is in Appendix II.

Overview of 2022 Pregnancy-Associated Deaths

Pregnancy-associated death is an "umbrella" term for all deaths during or within one year of pregnancy, regardless of the cause. In 2022, eight pregnancy-associated deaths were recorded in New Hampshire. Half of the deaths occurred during pregnancy while the other half were postpartum. Substance use overdose was the leading cause of death, accounting for five (62.5%) of the eight pregnancy-associated deaths. Two of the deaths in 2022 have yet to be reviewed as abstractors continue to find more information for the NH MMRC.

The following tables break down the 2022 NH Maternal Mortality cases:

Table 1. Pregnancy Status of 2022 Confirmed Cases

Pregnancy Status	Number
Pregnant	4
Postpartum	4

Data Source: Maternal Mortality Review Information Application

Table 2. Timing of death of 2022 Confirmed Cases

Months postpartum	Number
During pregnancy	4
< 3 months	1
3-12 months	3

Data Source: Maternal Mortality Review Information Application

Table 3. Cause and/or Manner of Deaths

Cause	Number
Overdose ***(acute intoxication by fentanyl and or cocaine. etc.)***	**5**
Cardiac	**2**
Medical Causes	**1**

Data Source: Maternal Mortality Review Information Application

Overview of 2018-2022 Pregnancy-Related Deaths

This section includes pregnancy-related maternal deaths reviewed by the NH MMRC over the past five years. A **pregnancy-related death** refers to death while pregnant or up to one year from the end of pregnancy, from any cause related to or aggravated by the pregnancy or its management. These deaths are categorized differently than pregnancy-associated deaths, which refer to all deaths during pregnancy or within 1 year of pregnancy, *regardless of the cause*. The Appendices contain the full dataset on all pregnancy-associated deaths.

The NH MMRC determined that 21 of the pregnancy-associated deaths that occurred between 2018 and 2022 were pregnancy-related, as shown in Table 4 below. The Committee determined that 16 (76.1%) of the pregnancy-related deaths were preventable (Table 5) and a majority (19, 90.5%) of the deaths occurred among Non-Hispanic White individuals. Most of the deaths occurred among women aged 25-34 years old (Figure 1) and about half of the decedents had acquired a high school diploma or less (Table 6). Drug overdose (52.5%) was the leading cause of these deaths (Figure 2), with mental health as the most prevalent underlying contributing factor, as determined from the decedent's medical records and committee deliberations. The Committee determined that mental health conditions were the leading circumstance surrounding death, as shown in Table 7. The top five socio-stressors present in cases of pregnancy-related deaths were history of substance use and treatment, psychiatric hospitalization or treatment, history of childhood trauma, child protective services involvement, and unemployment.

Most overdose deaths occurred postpartum (3 months-1 year). Of the 23 postpartum deaths, 13 (56.5%) had their delivery paid by Medicaid, and seven of the deaths were overdose deaths occurring between 7-9 months postpartum.

Table 4. NH MMRC Decision on Pregnancy-Relatedness, 2018-2022 NH Resident Deaths

Number of deaths by pregnancy-relatedness	Number of deaths	%
Pregnancy-related	21	67.7%
Pregnancy-associated but not -related	7	22.6%
Pregnancy-associated but unable to determine pregnancy-relatedness	3	9.7%
Total	31	100

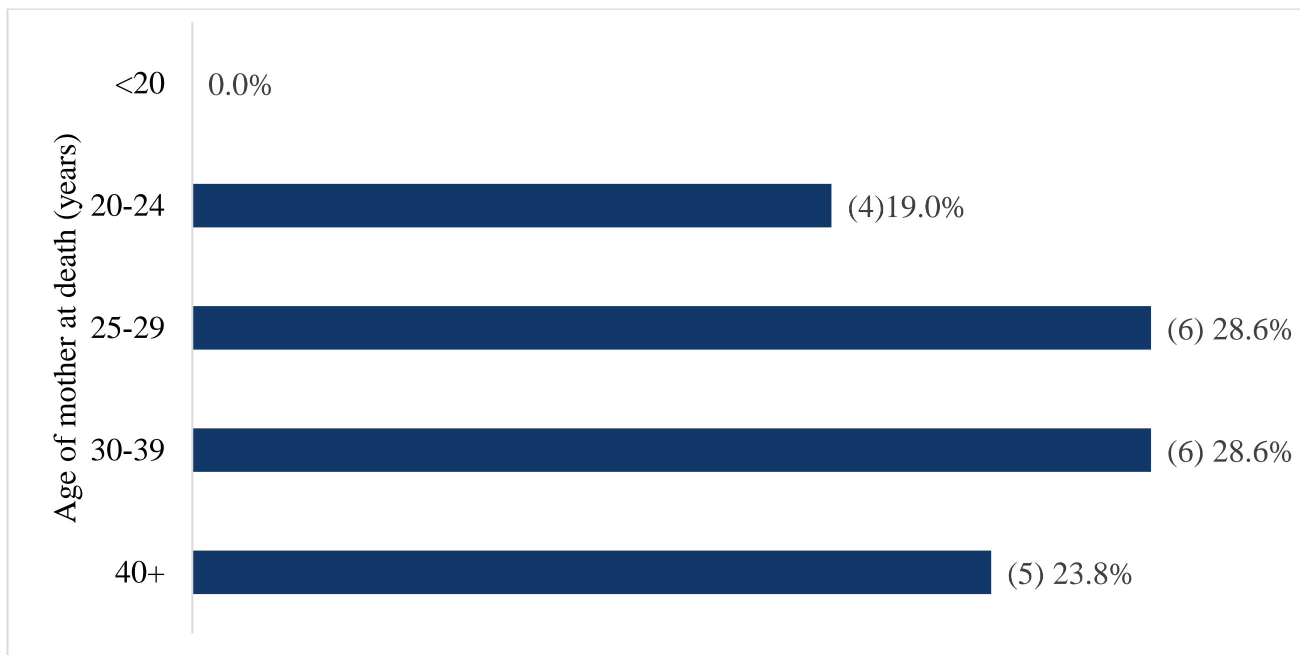
Data Source: Maternal Mortality Review Information Application

Table 5. NH MMRC Decision on Death Preventability of Pregnancy-Related Death, 2018-2022 NH Resident Deaths

MMRC preventability determination	Number of deaths	%
Preventable	16	76.2%
Not Preventable	5	23.8%
Total	21	100%

Data Source: Maternal Mortality Review Information Application

Figure 1. Number of Pregnancy-Related Deaths by Mother's Age, 2018-2022 NH Resident Deaths



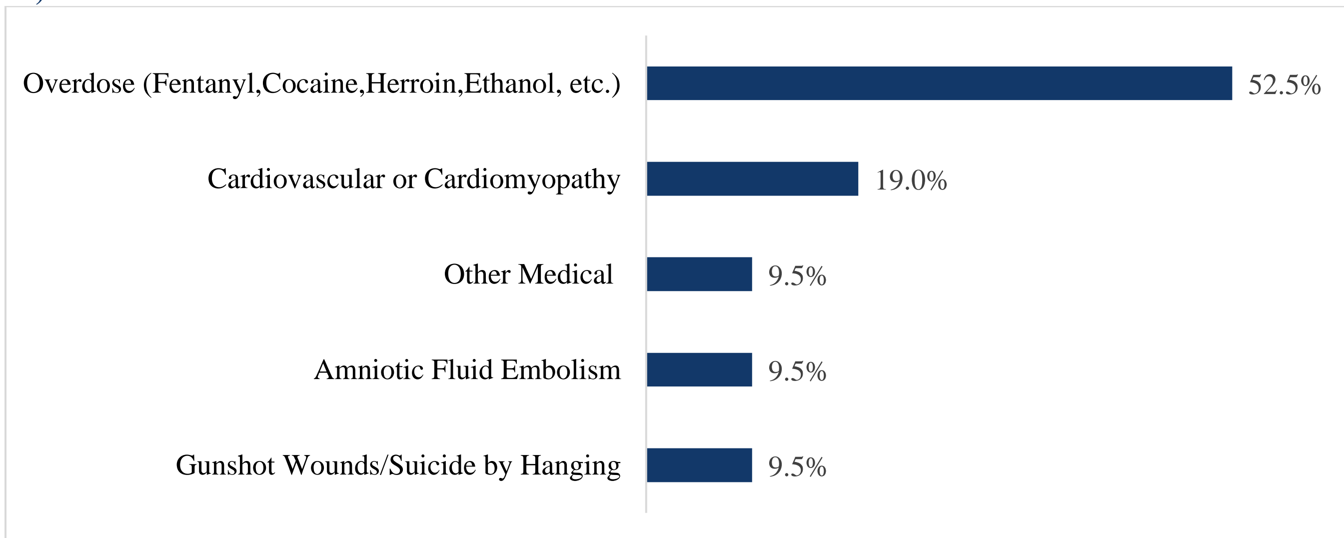
Data Source: Maternal Mortality Review Information Application

Table 6. Pregnancy-Related Deaths by Mother's Education Level 2018-2022 NH Resident Deaths

Education level	Number of Deaths	%
High school diploma equivalent or less	12	57.1%
Completed some college	3	14.3%
Associate, bachelors or advanced degree	6	28.6%
Total	21	100%

Data Source: Maternal Mortality Review Information Application

Figure 2. Causes of Pregnancy-Related Deaths among NH Residents (2018-2022 MMRC Reviewed Cases)



Data source: NH Vital Records Death Certificate Data

Table 7. Frequency of Selected Committee Determinations on Circumstances Surrounding Death among NH Residents, 2018-2022 Pregnancy-Related Deaths

Committee determinations	Yes	No	Probably	Unknown
Did obesity contribute to the death?	3	18	0	0
Did discrimination contribute to the death?	0	13	0	7
Did mental health conditions contribute to the death?	10	7	3	1
Did substance use disorder contribute to the death?	9	9	2	1

Data Source: Maternal Mortality Review Information Application

2022 NH MMRC Recommendations, Interventions, and Current Progress

The following recommendations are the result of the NH MMRC's 2022 comprehensive and multidisciplinary review of pregnancy-associated deaths in New Hampshire. It's the NH MMRC's hope that these recommendations will help improve outcomes for pregnant and parenting New Hampshire citizens.

- DH-NNEPQIN should identify and invite a subject matter expert to present a session on perinatal blood replacement best practices at the February 2023 DH-NNEPQIN meeting.

- DH-NNEPQIN should develop education on cardiovascular collapse related to amniotic fluid embolism and pulmonary embolism and encourage facility perinatal leaders to implement team simulation training (including OB, anesthesia, nursing, and perioperative staff) at the February 2023 DH-NNEPQIN meeting.

The first two NH MMRC recommendations were implemented at the DH-NNEPQIN June 2023 Conference during the session "Profound Cardiac Decompensation During Labor and Delivery."

- The NH MMRC should consult with the New Hampshire Anesthesia Society regarding the management of amniotic fluid embolism and right-sided heart failure.
  - *DH-NNEPQIN consulted the New Hampshire Anesthesia Society in the spring of 2023, prior to the June DH-NNEPQIN Conference.*

- The NH MMRC should always request pediatric health records for case reviews.
  - *The NH MMRC has requested records when the case indicates there was a live birth.*

- NH MMRC should continue pursuing involvement of the Division for Children, Youth, and Families in the NH MMRC to understand more about individual cases.

- The DH-NNEPQIN should share resources with the new state-wide Critical Time Intervention (CTI), which provides support for up to 9 months to those with mental illness, substance use disorder, or recent incarceration.
  - *The NH MMRC is engaging in continued discussion on how to facilitate this recommendation.*

Follow-up Actions from Past NH MMRC Recommendations

The NH Perinatal Substance Exposure Collaborative - Center for Excellence on Addiction

The Collaborative endeavors to identify and support activities that serve the needs of those impacted by perinatal substance exposure in New Hampshire, a mission that aligns with NH MMRC's recommendations. In 2022, NH MMRC presented its recommendations, along with a data presentation from the MCH Epidemiologist, to the Collaborative. The NH MMRC continues to discuss recommendations on perinatal substance use disorder and the development and utilization of the Plan of Safe Care.

SUD Recovery Coaches

The NH MMRC discussed ways to increase access to Substance Use Disorder Recovery Coaches in the state. Fourteen people from across New Hampshire attended a five-day Recovery Coach Academy in May of 2022, where they were trained and certified as coaches. Access to recovery coaches and/or peer support is an evidence-based method to decrease substance use disorder and increase the likelihood of recovery. This promotes a proactive and positive impact on maternal mortality education efforts in New Hampshire.

"Care for Pregnant and Postpartum People with Substance Use Disorder" Patient Safety Bundle

New Hampshire birthing hospitals noted barriers to effective participation in the Patient Safety Bundle, which was previously recommended by the NH MMRC. These barriers included staffing challenges stemming from COVID-19 and the additional time necessary for chart reviews, data entry processes, provider trainings, supportive webinars, and video calls. In recognition that universal best practice improvements take time, representatives of NH birthing hospitals, the DH-NNEPQIN Director of Operations/NH MMRC Co-Abstractor, the DH-NNEPQIN Data Analyst, and the MCH Epidemiologist met biweekly to discuss barriers and progress.

REDCap Tool

In 2022, 10 of the 14 participating New Hampshire birthing hospitals successfully registered to enter de-identified patient-level data in the REDCap tool developed to capture Patient Safety Bundle processes and structural measures. Those that had not yet entered data remained in regular communication. Some of these NH hospitals were tracking patients on paper until they were able to find time to utilize the REDCap tool.

Perinatal Community Advisory Council

A Perinatal Community Advisory Council was formed to aid in reviewing and implementing NH MMRC recommendations. Much of 2021 and early 2022 was spent developing a framework for engaging community advocates who represent birthing families in New Hampshire. With guidance from previous focus groups and a consultant, statewide recruitment took place to identify community representatives who were either currently pregnant or had been pregnant in the past two years.

Two DH-NNEPQIN members were selected as co-facilitators, as both had experience in maternal health and group facilitation. The consultant assisted them with the PCAC onboarding process, guided the group through projects, and focused on skill development. At the 6-month mark, the consultant led an in-person workshop on "Telling My Story," which the newly formed PCAC members found empowering.

Additional Updates

The Alliance for Innovation on Maternal Health (AIM) *"Care for Pregnant and Postpartum People with Substance Use Disorder"* was chosen by the NH MMRC and DH-NNEPQIN as the first bundle implemented in New Hampshire in 2020. This choice was based on data revealing that the greatest percentage of preventable NH maternal deaths was related to Substance Use Disorder. Many of the monthly DH-NNEPQIN webinars in 2022 focused on implementation of this Patient Safety Bundle. All sixteen birthing hospitals in New Hampshire are members of DH-NNEPQIN and participated in the 2022 implementation of the *"Care for Pregnancy and Postpartum People with Substance Use Disorder"* AIM Safety Bundle.

Through the years, the NH MMRC has identified the importance of a well-informed New Hampshire perinatal healthcare workforce. The committee owes much gratitude to DH-NNEPQIN, as they continue to offer relevant and proactive educational offerings to promote understanding of current trends and evidence-based practices that enhance the care of the perinatal population in New Hampshire. It is through this enthusiastic and robust pursuit of quality care that healthcare systems are influenced for the better and proactive changes are implemented.

DH-NNEPQIN webinars and conferences have far-reaching educational value for NH medical professionals and address many areas of perinatal health, morbidity, and mortality. A sizeable number of the monthly DH-NNEPQIN webinars and conference topics directly focused on the implementation of the AIM Patient Safety Bundle involving pregnant and parenting people with substance use disorder.

These monthly webinars were consistently well attended by members of all NH birthing hospitals and numerous NH perinatal care providers. Many of the attendees identified themselves as Registered Nurses. Continuing Educational Units were offered for participation in these educational offerings. Based on attendee feedback, the webinar format was easily accessible and well received, and provided timely information to share with stakeholders and providers.

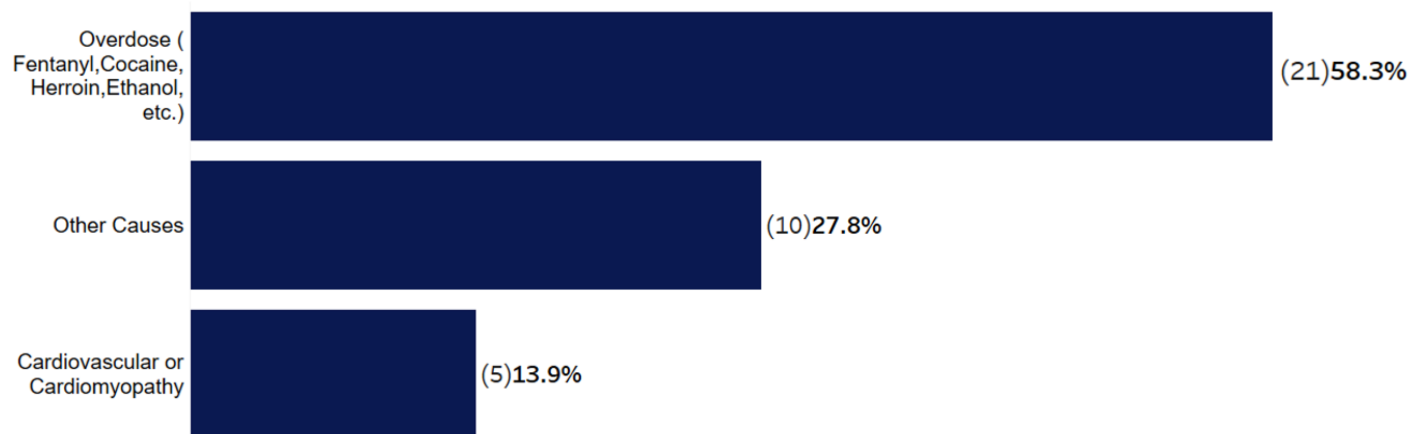
The MCH Epidemiologist disseminated MMRIA data in different formats beyond an annual report, including national presentations, monthly webinars, regional conferences, and published infographics. Presentations include the Region I Federal Office of Women's Health Regional Women's Health Conference in the summer of 2022 and *"Causes of Maternal Mortality in New Hampshire and MMRC Recommendations"* at the Northeast Epidemiology conference in November of 2022.

Conclusion

The NH MMRC is committed to the ongoing identification, abstraction, review, and creation of actionable recommendations for all cases of maternal death in NH. Continued work on the implementation of these recommendations is a high priority. In October of 2023, the NH MMRC newly recommended AIM Safety Bundle, *"Perinatal Mental Health Conditions"* roll-out occurred with introductory AIM webinars, an environmental survey of perinatal mental health screening and future planned provider trainings.

Appendix I – MMRIA Informed Tables and Figures

Figure 1: Causes of Pregnancy-Associated Confirmed Deaths Occurring among NH Residents (2017-2022)



***Other Causes:**Amniotic Fluid Embolism, Suicide by Hanging/Neck Wounds/Gunshot wounds, Hemorrhage, etc. the counts were small hence aggregated

False Positive and out of state residents were excluded

Data Source: NH Vital Records and Maternal Mortality Review Commitee and Vital Records Death Certificate Data

Prepared by MCH Epidemiologist

Table 2. Frequency of Selected Committee Determinations on Circumstances Surrounding Death for Reviewed Cases, 2017-2022

Committee determinations	Yes	No	Probably	Unknown
Did obesity contribute to the death?	3	18	0	0
Did discrimination contribute to the death?	0	13	0	7
Did mental health conditions contribute to the death?	10	7	3	1
Did substance use disorder contribute to the death?	9	9	2	1
Was this death a suicide?	3	21	0	8
Was this death a homicide?	0	30	0	0

Data Source MMRIA aggregates

Table 3. Education Attainment for 2017-2022 Cases

Education attainment of the mother	Number of deaths	Percentage
High school diploma equivalent or less	22	57.9%
Completed some college	4	10.5%
Associate or Bachelor degree	9	23.1%
Unknown/9-12 Grade: No Diploma	3	7.9%
Total	38	100%

Data Source: MMRIA

Table 4. Age Group Category for 2017-2022 Cases

Age group of the mother (years)	Number of deaths	Percentage
<25	6	15.7%
25-29	9	23.7%
30-34	13	34.3%
35-39	4	10.5%
40 and more	6	15.8%
Total	38	100

Data Source: MMRIA

Figure 2: MMRC Determinations on Pregnancy Relatedness and Preventability

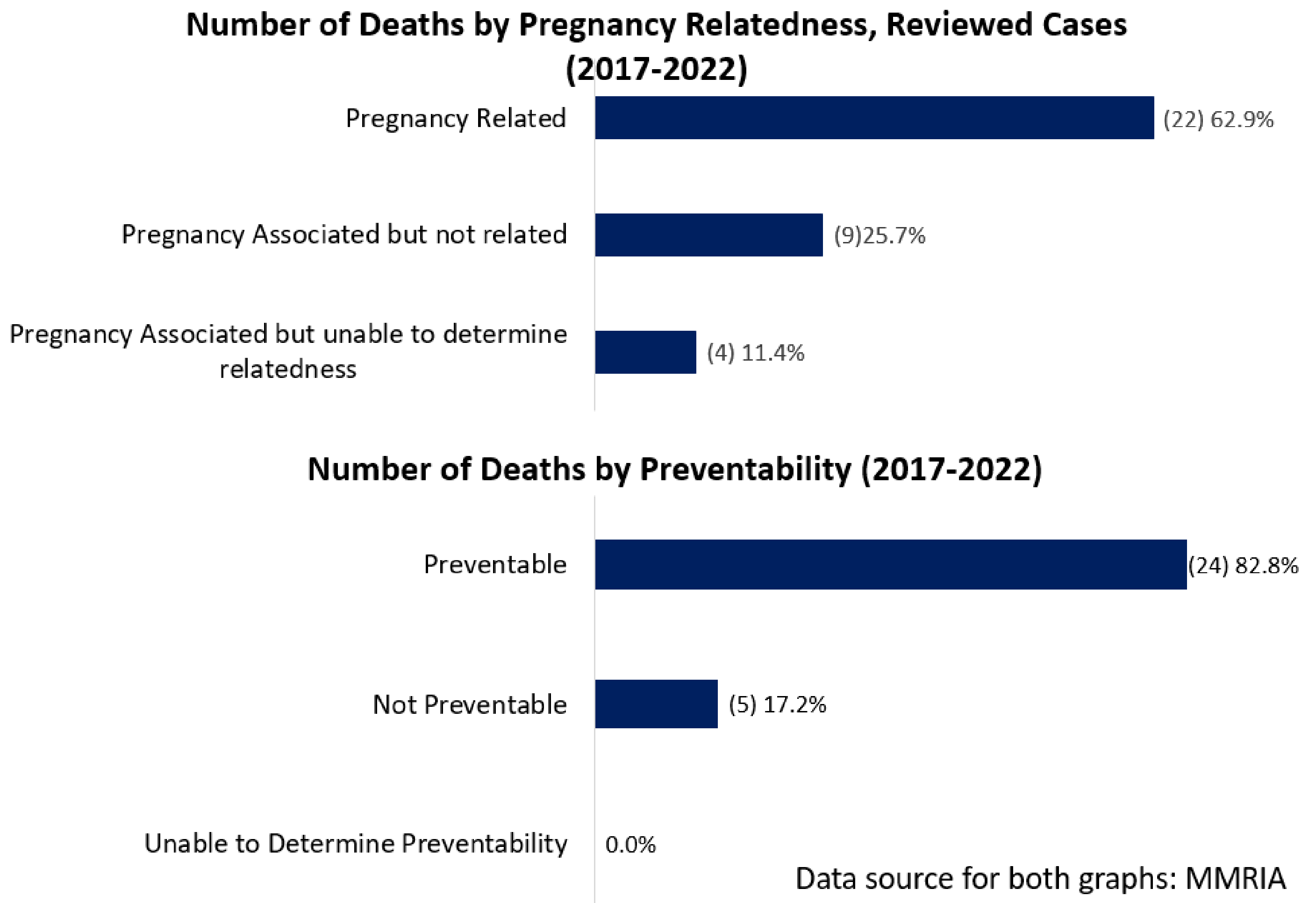


Table 3. Timing of Death in Relation to MMRC for 2017-2022 Cases

Death timing	Number of deaths	Percentage
During pregnancy	15	39.5%
Within 42 days of pregnancy	9	23.7%
Within 43 days to 1 year of pregnancy	14	36.8%
Total	38	100%

Data Source: MMRIA

Table 4. History of social and emotional stress for 2017-2022 reviewed cases

Social or emotional stressor	Number of deaths
Child Protective Services involvement	8
History of childhood trauma	6
History of domestic violence	5
History of psychiatric hospitalizations or treatment	10
History of substance use	20
History of substance use treatment	16
Pregnancy unwanted	2
Prior suicide attempts	7
Recent trauma	2
Unemployment	10
Other	6
Unknown	3
None	3

Data Source: MMRIA aggregates

Table 5. Mother's living arrangement at time of death, 2017-2022

Table 5. Mother's living arrangement at time of death	Number of deaths
Own	2
Rent	4
Public housing	0
Live with relative	8
Homeless	3
Other or unknown	3
Total	20

Number of deaths with missing (blank) values: 17 Data Source: MMRIA aggregates

Appendix II - NH MMRC Membership

Member	Organization
Alison Palmer	Women's Health OBGYN and Psychiatric-Mental Health Nurse Practitioner
Jess Bacon	Chair, NH ACNM & Nursing Practice Specialist Wentworth Douglass Hospital
Emily Baker	Maternal Fetal Medicine, Dartmouth Health
Jessica Bates	NH MCH, DHHS, Administrative Support
DaNae Belt	Nurse Manager, Labor & Delivery Unit, Elliot Hospital
Cheri Breyer	Public Member with Lived Experience & Recovery Coach/CRSW
Johanna Cobb	Medical Director of Obstetric Anesthesia, Dartmouth Health
Melissa Devine	Director, Women’s & Children’s Services, Concord Hospital
Kim Fallon	Chief Forensic Investigator, Office of Chief Medical Examiner
Julia Frew	DH Psychiatrist and Addiction Medicine Physician
Victoria Flanagan	MMRC Case Abstractor & DH NNEPQIN Director of Operations
Daisy Goodman	CNM & Director of the DH Perinatal Addiction Treatment Program
Wanda Joshi	Obstetrical Anesthesiologist, Dartmouth Health
Kris Hering	NH Foundation for Healthy Communities, Vice President of Quality Improvement
Kristen Kraunelis	Mental Health Center of Greater Manchester
Kiera Latham	New England High Intensity Drug Trafficking Area (HIDTA), Overdose Response Strategist
Lauren Lessard	Chair of the NH Chapter of ACOG & Obstetrician/ Gynecologist WDH
Carolyn Nyamasege	MCH Epidemiologist, Division of Public Health, NH DHHS Section
Diane Proulx	Chair, NH AWHONN & Clinical Quality & Safety at Wentworth Douglass Hospital
Nicole Robbins	NH Bureau of Drug and Alcohol Services, NH DHHS
Rhonda Siegel	NH MCH, DHHS Maternal and Child Health Section/Title V Director
Lissa Sirois	NH Bureau of Population Health and Community Services, NH DHHS Bureau Chief, Expert in Nutrition, WIC Program and Breastfeeding
Meagan Smith	NH AWHONN Member at Large & Director of Nursing, Speare Memorial
Jennifer Vallier	Community Health Worker, Elliot Hospital
Mitchell Weinberg	Deputy Chief Medical Examiner, NH OCME
Colleen Whatley	DH Senior Quality and Safety Specialist & MMRC Recommendations Facilitator
Carol Whitman	NH DHHS Perinatal Nurse Coordinator & NH MMRC Coordinator