Maryland Maternal Mortality Review

2024 Annual Report
Health – General Article §13-1212

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Finally, the Program and MMRT wish to acknowledge the people who passed away during or after their pregnancy and who are described in this report. Each death represents a person's life that ended too early, and it is in humble respect for their lives lived and the lives of all birthing people in Maryland that this report is presented.

Summary

Between 2018-2022, Maryland's maternal mortality rate (MMR) was nine percent below the national rate of 23.2 maternal deaths per 100,000 live births. However, both the United States (U.S.) and Maryland have seen increases in their MMR rates, and both rates remain over the Healthy People 2030 goal of 15.7 deaths per 100,000 live births. Additionally, significant racial disparities in maternal deaths remain.

There were 53 pregnancy-associated deaths of Maryland residents in 2022, a 26% increase (11 more deaths) from 2021. Among these deaths, 20 (38%) were determined to be pregnancy-related, and 33 (62%) were determined to be non-pregnancy-related. The leading cause of all pregnancy-associated deaths in 2022 was substance use disorder or unintended overdose (SUD/OD), which continues to be the leading underlying cause of pregnancy-associated deaths for the 10th consecutive year. [1] When pregnancy-associated deaths were determined to be pregnancy-related, the leading causes were non-amniotic fluid embolism and hemorrhage. SUD/OD was the leading cause of pregnancy-associated deaths determined to be non-pregnancy-related.

The pregnancy-associated mortality rate shows considerable variability from 2013 to 2022, with a 50% increase in this period. The 2022 pregnancy-related mortality rate shows an increase of 39% since 2013. The upward trend in the pregnancy-associated mortality rate is mostly driven by the increase in non-pregnancy-related deaths. This is largely due to increasing numbers of deaths due to SUD/OD in the last several years. The majority of 2022 deaths (90% of pregnancy-related deaths and 76% of non-pregnancy-related deaths) were considered preventable if one factor or more could have been changed.

Recommendations from the Maternal Mortality Review Team (MMRT) and the Maternal Mortality Review Stakeholder Group are included as Appendices B-C to this report.[2] The recommendations address key topics that arose during this year's review, including but not limited to ensuring capacity for warm handoffs, engaging with young adults to support health care delivery and promotion, addressing barriers to care, and standardized screening and education for intimate partner violence. The MMRT will continue to disseminate the findings of this review process and promote collaboration among all providers caring for pregnant and postpartum persons to reduce pregnancy-associated deaths in Maryland.

This report is supported by the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health and Human Services (HHS) as part of a financial assistance award totaling $373,413 with 100% funded by CDC/HHS. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement by CDC/HHS or the U.S. government.

Certain data were provided by the Vital Statistics Administration (VSA), Maryland Department of Health, Baltimore, Maryland. VSA disclaims responsibility for any analyses, interpretations or conclusions.

[1] Based on Pregnancy Monitoring Surveillance System (PMSS) codes for substance use disorder (PMSS 100.5) or unintentional injuries (non-homicidal, non-suicidal injury death with means of fatal injury listed as "poisoning/overdose"). In previous reports, these deaths were characterized under "Behavioral Health Conditions".

[2] MMRSG is established in Md. Ann. Code Health – General Art. §13-1208. The statute requires MMRSG to meet at least twice a year to review the findings and recommendations in the annual Maternal Mortality Review Report.

Background

The Maryland Maternal Mortality Review Program (the Program) was enacted in statute in 2000. Md. Ann. Code Health-General Art., §13-1203 - 1207, establishes the Program in the Maryland Department of Health (MDH) and describes its scope. The purpose of the Program is to:

(1) Identify maternal death cases;[3]
(2) Review medical records and other relevant data;
(3) Determine preventability of death;
(4) Develop recommendations for the prevention of maternal deaths; and
(5) Disseminate findings and recommendations to policymakers, physicians and other health care providers, health care facilities, and the general public.

The Program is divided into three pillars (Figure 1): the Review Groups, which conduct reviews of pregnancy-associated deaths and provide recommendations; Epidemiology and Data, which encompasses the Program's analyses comparing other maternal health data and trends; and Dissemination and Action, which supports the translation of Program recommendations into action. In 2021, the Program received funding from the Centers for Disease Control and Prevention (CDC)'s Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) program. This funding supports agencies and organizations to coordinate comprehensive, multidisciplinary maternal mortality reviews. The Program has utilized this funding to strengthen its review processes and support implementation of its recommendations.

Figure 1 – Structure of Maryland's Maternal Mortality Review Program

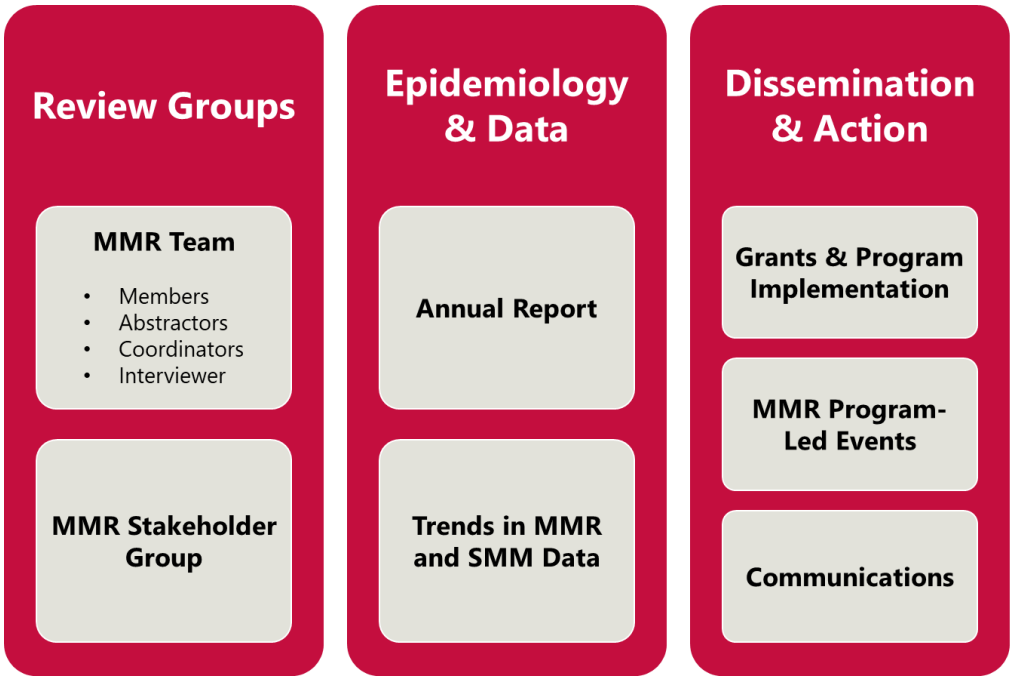


Figure 1 – Structure of Maryland's Maternal Mortality Review Program

[3] Defined as "the death of a woman during pregnancy or within 1 year after the woman ceases to be pregnant", Md. Ann. Code Health-General Art., §13-1201

The Maternal Mortality Review Team (MMRT) is the Program's arm that conducts comprehensive reviews of all pregnancy-associated deaths. The MMRT comprises a diverse, multidisciplinary membership, including health care providers, advanced practice practitioners such as nurse midwives, public health professionals, mental health specialists, community birth workers, individuals with quality improvement expertise, and individuals with lived experience.

MDH contracted with the Maryland Patient Safety Center from July 2022 through June 2024 to provide administrative support to the Program by obtaining medical records, abstracting cases, and hosting meetings for the MMRT. Beginning in December 2024, MDH contracted with The Bizzell Foundation, Inc. to provide administrative support to the Program. The MMRT provides an in-depth review of maternal deaths to determine pregnancy-relatedness and preventability following a standardized question structure developed by the CDC.[4] The MMRT then develops recommendations for the prevention of maternal deaths and disseminates their findings through this report and structured outreach. Additional recommendations are provided by the Maternal Mortality Review Stakeholder Group (MMRSG) (see Appendix B and Appendix C).

According to Health-General Article §13-1212, MDH must annually submit a report by December 1 on the review's findings, the recommendations from the MMRT and MMRSG, and administrative actions executed by the Program to maintain continuous statutory compliance to the Governor and General Assembly.

[4] CDC. Maternal Mortality Review Committee Decisions Form. Maternal Mortality Prevention. https://www.cdc.gov/maternal-mortality/php/mmrc/decisions-form.html

Key Definitions

Figure 2: Key Definitions

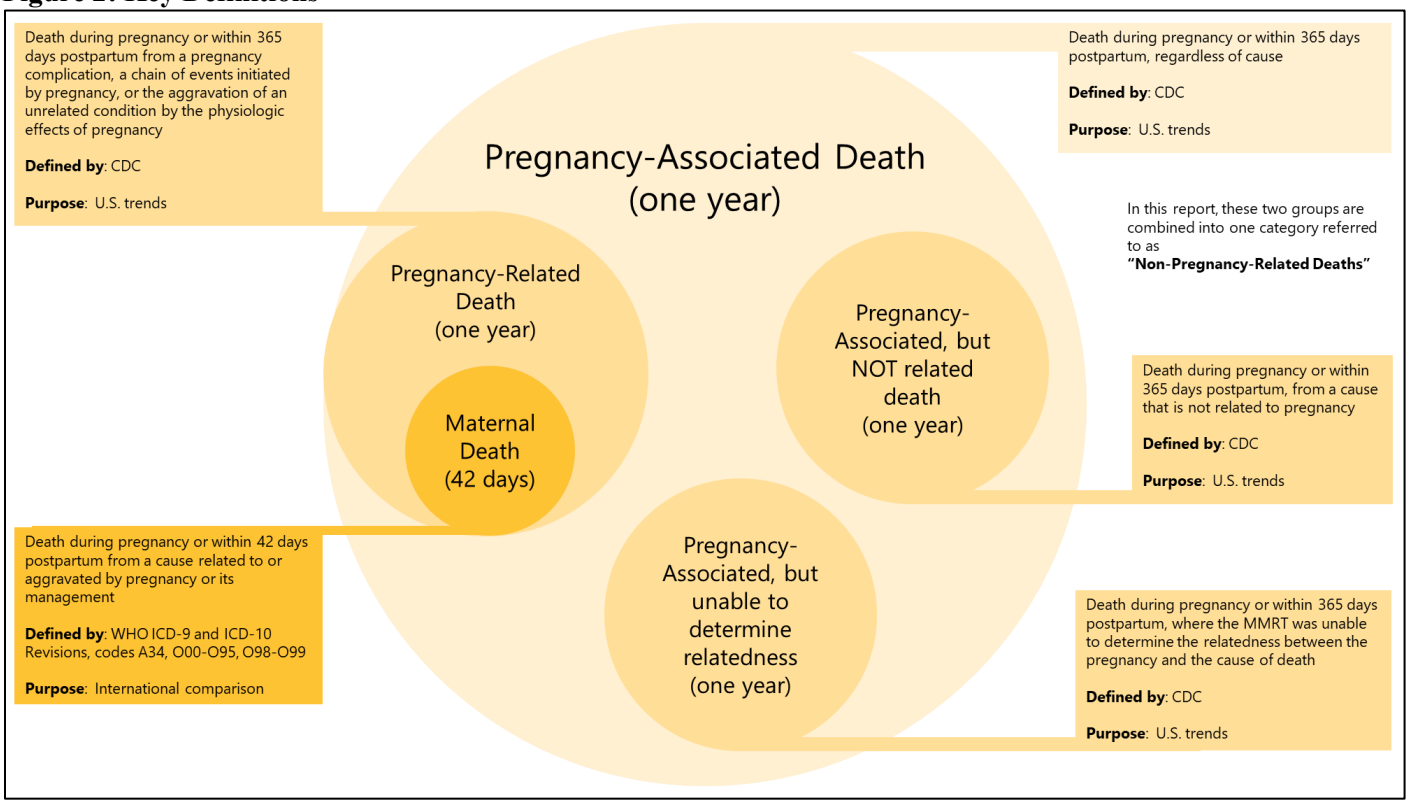


Figure 2 - Key Definitions

Note: Prior to the issuance of the Program's 2020 report, annual reports used different definitions of maternal deaths and MMR, which included all International Classification of Diseases Tenth Revision (ICD-10) codes O00-O99. The Program's annual reports from 2020 onwards have updated the definition to exclude codes O96-O97 to align with the WHO definition.

Globally, a maternal death is defined by the World Health Organization's (WHO's) International Classification of Diseases Ninth and Tenth Revisions (ICD-9 and ICD-10) as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management but not from accidental or incidental causes," and is expressed in the maternal mortality rate (MMR). [5, 6, 7] While this measure is important to establish an international indicator of population health that can be compared across nations, maternal deaths consider a limited period of time and may miss deaths that occur in the later postpartum period. Maternal deaths are identified solely from information on the death certificate or similar registration of the occurrence and cause of death. Maternal deaths are limited in both the time-period and causes considered.

In Maryland, the death certificate was revised in January 2001 to include questions about pregnancy status, pregnancy outcome, and date of delivery for the 12 months preceding death. This pregnancy

[5] Cresswell, J. Maternal Deaths. Indicator Metadata Registry List; World Health Organization. https://www.who.int/data/gho/indicator-metadata-registry/imr-details/4622

[6] The ICD-10 codes used to identify maternal deaths are A34, O00-O95, and O98-O99.

[7] The number of maternal deaths per 100,000 live births in the same time-period.

checkbox has significantly increased identification of maternal deaths beyond those recognized by cause of death alone.[8,]

In higher-income countries with improved medical care, many deaths related to pregnancy occur beyond 42 days after the end of pregnancy. In 1986, the CDC and the American College of Obstetricians and Gynecologists (ACOG) collaborated to recommend the use of expanded definitions to identify deaths more accurately among people where pregnancy was a contributing factor. In addition to the MMR, the CDC and national programs utilize pregnancy-associated deaths, which encompass deaths that occur during pregnancy and up to one year after the end of a pregnancy. These are further subdivided into categories based on the cause of death and the relatedness to pregnancy and its impacts (Figure 2). See Appendix A for a full list of definitions regarding maternal and pregnancy-associated deaths.

Maternal Deaths in Context

Nationally, maternal deaths declined substantially from the 1930s, when the MMR was 670 maternal deaths per 100,000 live births. However, after the late 1980s, the national MMR began to rise again, reaching 22.3 maternal deaths per 100,000 live births in 2022.[9] In order to stabilize rates, the Program presents rolling five-year U.S. and Maryland MMR rates in this report because maternal deaths, specifically in Maryland, are relatively infrequent events that may vary considerably year to year.

The U.S. and Maryland MMR rates for two distinct five-year periods are shown in Figure 3; the earlier period from 2013 to 2017 is compared to the subsequent period from 2018 to 2022. The Maryland MMR was 10% and 9% lower than the national rate in both periods, respectively. Between the two five-year periods, the U.S. MMR increased by seven percent, and the Maryland rate increased by nine percent. Both the U.S. and Maryland rates remain above the Healthy People 2030 Maternal, Infant, and Child Health Objective Four (MICH-04) target of 15.7 maternal deaths per 100,000 live births.[10]

[8] Horon IL. Underreporting of Maternal Deaths on Death Certificates and the Magnitude of the Problem of Maternal Mortality. Am J Public Health. 2005; 95:478-82. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1449205/.
[9] Hoyert, Donna. "Maternal Mortality Rates in the United States, 2022." Centers for Disease Control and Prevention, 02 May 2024, www.cdc.gov/nchs/data/hestat/maternal-mortality/2022/maternal-mortality-rates-2022.htm.
[10] Healthy People 2030. "Reduce Maternal Deaths — MICH-04 - Healthy People 2030 | Health.gov." Healthy People 2030, health.gov/healthypeople/objectives-and-data/browse-objectives/pregnancy-and-childbirth/reduce-maternal-deaths-mich-04.

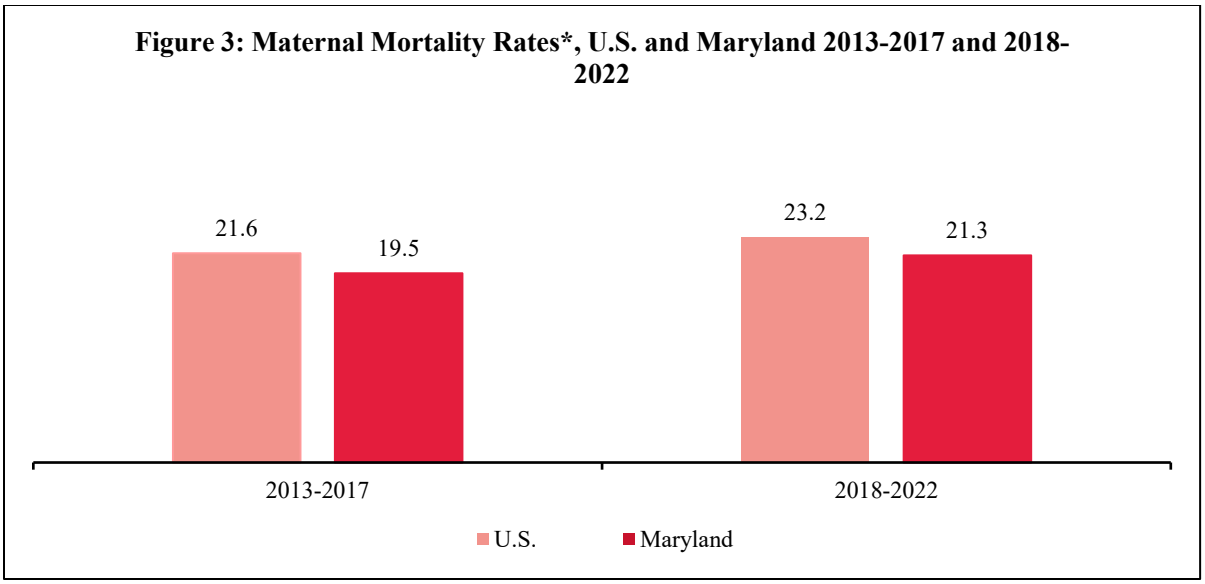


Figure 3
* Rate of maternal deaths per 100,000 live births.
Data Source: CDC WONDER as of 01/31/2026.
Note: The MMR Program shows one significant figure after the decimal when presenting rates. All figures which present percentages/prevalence do not include decimals.

Racial Disparity

In the U.S. between 2018-2022, Black non-Hispanic (NH) individuals had an MMR 2.6 times greater than White NH individuals, a disparity that has persisted since the 1940s. In Maryland, a similar disparity exists between the MMR among Black NH and White NH individuals.[11] Figure 4 shows the MMR by race in Maryland for six overlapping five-year periods dating back to 2013. The 2018-2022 Black NH MMR was 1.7 times higher than the White NH MMR. Appendix D shows the five-year rolling MMR by race in Maryland dating back to the 2003-2007 time-period.

In Maryland, like in many other states across the nation, there are long-standing racial disparities in maternal deaths, with Black NH birthing people and other non-White racial groups disproportionately impacted. These disparities are driven by policies and cultural forces, both explicit and implicit, that are rooted in racism and inequity. One of the goals of this review is to uncover ways in which these factors manifest in the care of birthing people during pregnancy and in the postpartum period, and to determine the facility and systems level changes (see Appendix B and C) that should be made to prevent similar events from happening in the future.

The recent gradual rise in maternal mortality rates and the persistent racial disparities in maternal health reflect the complex factors that continue to make pregnancy and childbirth less safe for Black NH birthing people. The MMRT's recommendations in this report are made with specificity and urgency to ensure that resources and strategies are directed at the most impactful solutions. The MMRT's findings and recommendations rely on thorough and culturally appropriate implementation in all settings that serve Black NH birthing people, recognizing that coordinated, comprehensive approaches are essential to addressing the interconnected inequities that shape maternal health outcomes..

[11] This report utilizes race and ethnicity categories as defined by the Maryland Vital Statistics Administration. See Page xi, https://health.maryland.gov/vsa/Documents/Reports%20and%20Data/Annual%20Reports/REV_2021AnnualReport_FINAL_v1025.pdf

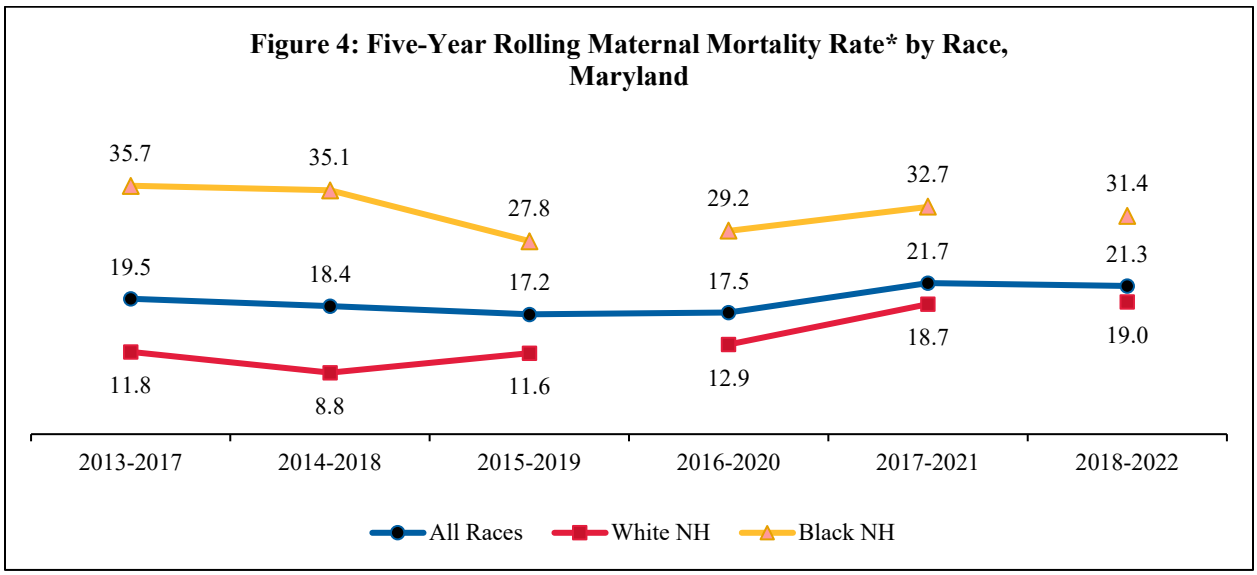


Figure 4
* Rate of maternal deaths per 100,000 live births.
Data Source: CDC WONDER as of 01/31/2026.
Ranges 2013-2017 through 2015-2019: MMR for White NH and Black NH individuals are calculated using bridged race data.
Ranges 2016-2020 through 2017-2021: MMR *estimates* for White NH and Black NH individuals are calculated using single race data where available, and bridged race data where single race data are not available.
Ranges 2018-2022 onwards: MMR for White NH and Black NH individuals are calculated using single race data.
As a result of the rate calculations, the disaggregated rate estimates for White NH and Black NH individuals between the three periods described above are not directly comparable (indicated by breaks in the line graph).

Additional information on the differences between bridged-race and single-race data may be found on the CDC, National Center for Health Statistics (NCHS) website: https://web.archive.org/web/20250131112416/https://www.cdc.gov/nchs/hus/sources-definitions/nhis.htm

Methodology

Case Identification

The Program reviews deaths of individuals who were residents of Maryland at the time of their death, including Maryland residents who died in another state. Residents of other states who died in Maryland are not included in the reviews. Their information is transferred to the respective mortality review committees in those states and is subject to their review. Starting in 2022, every effort is made to obtain medical records and information regarding Maryland residents who die in other states.[12]

Maryland's Vital Statistics Administration (VSA) identifies pregnancy-associated deaths in one of three ways. Individual death certificates are the first method of identifying pregnancy-associated deaths, either using the pregnancy-checkbox field required on the death certificate or because the cause of death listed on the certificate is clearly related to pregnancy (e.g., ruptured ectopic pregnancy, postpartum hemorrhage). The second method of determining pregnancy-associated deaths links death certificates for individuals aged 10-60 years with birth certificates and fetal death certificates from the 365 days

[12] Horon IL, Cheng D. Effectiveness of Pregnancy Check Boxes on Death Certificates in Identifying Pregnancy-Associated Mortality. Pub Health Reports. 2011; 126:195-200. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3056032/.

preceding death to identify additional cases missed in the initial examination of death certificates. The third method is reviewing cases with evidence of pregnancy in deceased individuals that were reported to the Office of the Chief Medical Examiner (OCME).

The MMRT designates and further investigates all deaths occurring during pregnancy or within 365 days of pregnancy conclusion. Therefore, pregnancy-associated deaths include maternal deaths (those occurring during pregnancy up to 42 days after the end of pregnancy) and deaths occurring between 43 to 365 days after the pregnancy ends (see Figure 2).

Using the three methods above, VSA identified 57 possible pregnancy-associated deaths in 2022. Further review identified one false positive case (where the individual was noted as pregnant or recently pregnant by one of the three methods but found upon investigation to not have been pregnant) and three out-of-scope cases (where decedents were residents of other states and whose cases are reviewed by those states). Excluding those cases, the MMRT reviewed 53 deaths (Figure 5).

Figure 5 - Flow Diagram of 2022 Pregnancy-Associated Deaths Evaluated by MMR Program

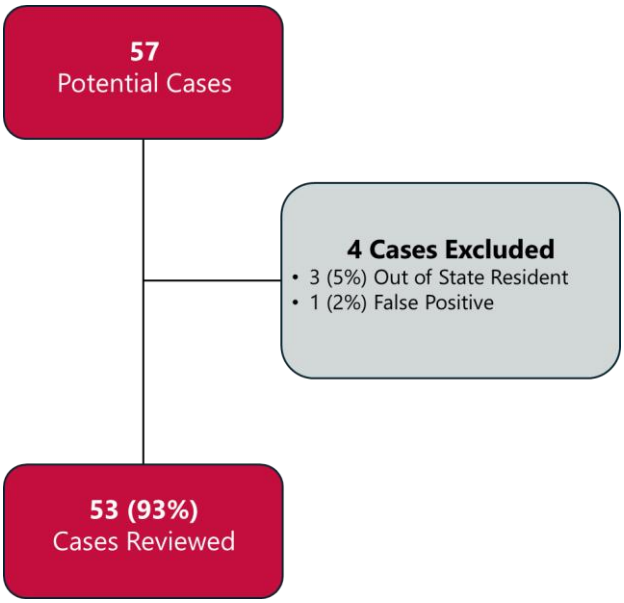


Figure 5 - Flow Diagram of 2022 Pregnancy-Associated Deaths Evaluated by MMR Program
Data Source: Maryland MMR Program and VSA as of 10/16/2025.

Figure 6 shows the annual number of pregnancy-associated deaths in Maryland from 2013-2022. An average of 42 pregnancy-associated deaths occurred per year during this period.

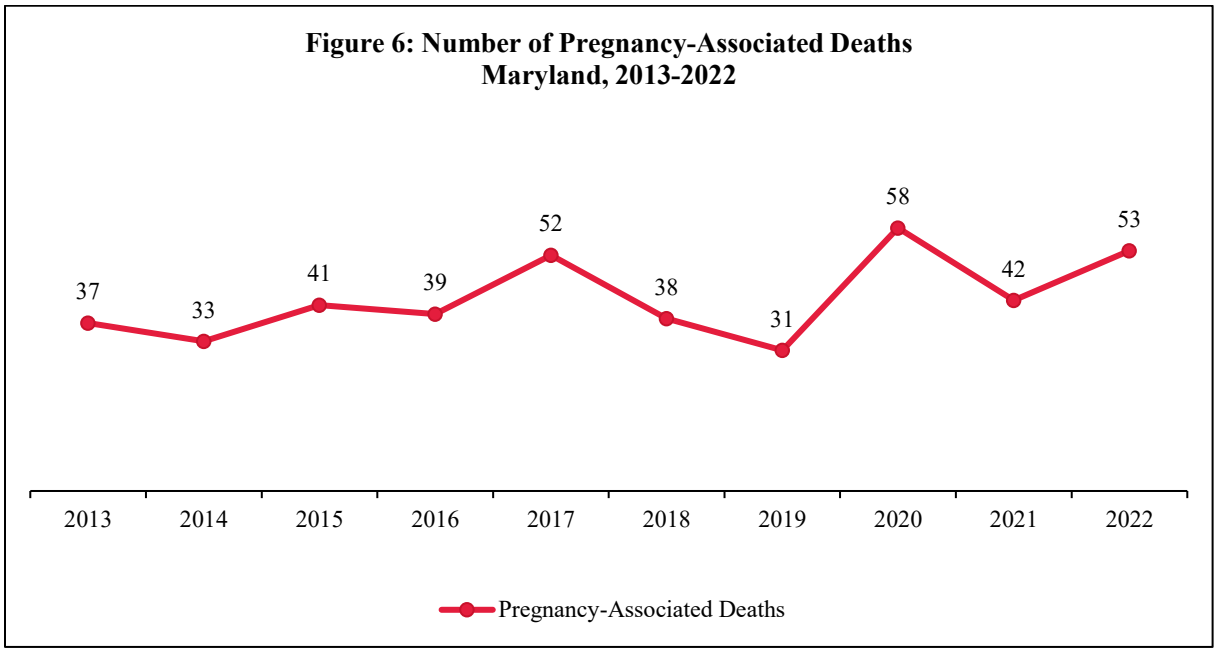


Figure 6
Data Source: Maryland MMR Program as of 10/16/2025.
Note: 2022 was the first year in which deaths among Maryland residents who died out of state were identified, reviewed, and included in the count of pregnancy-associated deaths.

Case Review

The Program conducts several review stages of pregnancy-associated deaths. Once cases are identified and determined to be within scope, medical records related to death and delivery are obtained from hospitals, when applicable. Physician and nurse-midwife abstractors review death certificates, hospital records, OCME records, social media, obituaries or news articles, social records, findings from interviews with close family and friends (if possible), and other available materials to create a cohesive de-identified summary of the events leading up to and context surrounding an individual's death. These case summaries are submitted to the MMRT for review during monthly meetings.[13] The Program uses the Maternal Mortality Review Information Application (MMRIA) system, designed by the CDC, to facilitate Maternal Mortality Review Committee (MMRC) functions "through a common data language."[14]

The MMRT determines pregnancy-relatedness and potential preventability of deaths through discussion. The MMRT includes a wide range of expertise to conduct comprehensive, multidisciplinary reviews.

The review discussions incorporate the CDC framework for case review, which considers medical and non-medical factors contributing to pregnancy-associated deaths and examines quality and content of care.[15] Each case is considered through the lens of five questions:

[13] The Maternal Mortality Review Committee attempts to gather and review comprehensive records for each case. These include but are not limited to: social media records, EMS notes, prescription drug monitoring database information, and police reports. Availability of these records varies by case.
[14] For additional information about MMRIA, see https://www.cdc.gov/maternal-mortality/php/mmrc/guides-tools.html. The Program has established a DUA with the CDC governing the use of data entered into MMRIA.
[15] Berg C, Danel I, Atrash H, Zane S, Bartlett L (Editors). Strategies to Reduce Pregnancy-related Deaths: from Identification and Review to Action. Atlanta: Centers for Disease Control and Prevention; 2001 https://stacks.cdc.gov/view/cdc/6537.

1. Was the death pregnancy-related?
2. What was the underlying cause of death?
3. Was the death preventable?
4. What are the contributing factors to the death?
5. What specific and feasible actions might have changed the person's course and prevented the death?

Cases discussed by the MMRT are de-identified and all members sign confidentiality agreements prior to starting the review. Through these reviews, MMRT members produce recommendations to address factors that contributed to the individual's death. A summary of recommendations based on each year's key themes is presented in Appendix B: Maternal Mortality Review Team.

2022 Case Findings

This section and future sections discuss pregnancy-associated deaths, which include all deaths that occur during pregnancy or up to one year after the end of a pregnancy (see Figure 2). The Program identified a total of 53 pregnancy-associated deaths in 2022, resulting in a pregnancy-associated mortality rate (PAMR) of 77.1 deaths per 100,000 live births. For further analysis, the MMRT divided these deaths into pregnancy-related and non-pregnancy-related deaths, which represent two non-overlapping groups. Of the 53 pregnancy-associated deaths, 20 were determined to be pregnancy-related. The remaining deaths were split into 31, "pregnancy-associated, not related deaths" and two, "pregnancy-associated, unable to determine relatedness deaths." For the remainder of the report, these two groups will be combined into non-pregnancy-related deaths, with a total of 33 deaths. Mortality rates for each group are presented in 1.

Table 1: Mortality rates among 2022 pregnancy-associated deaths, by relatedness category.

Category	Number of Deaths	Single-Year Rate
Pregnancy-associated deaths	53	77.1 deaths per 100,000 live births
Pregnancy-related deaths	*20*	*29.1 deaths per 100,000 live births*
Non-pregnancy-related deaths (incl. pregnancy-associated, not related and pregnancy-associated, unable to determine relatedness)	*33*	*48.0 deaths per 100,000 live births*

Cases by Cause of Death Category

Leading Causes: Pregnancy-Associated, Pregnancy-Related, and Non-Pregnancy-Related Deaths

Figure 7 shows causes of pregnancy-related and non-pregnancy-related deaths by relatedness.[16] The leading cause of all pregnancy-associated deaths (16 out of 53) was substance use disorder or unintended overdose (SUD/OD), the majority of which (94%) were deemed to be non-pregnancy-related.

[16] MMRIA classifies three causes of death: 1) what is listed on the death certificate; 2) the immediate cause of death as determined by the MMRT; and 3) the underlying cause of death as determined by the MMRT, which "refers to the disease or injury that initiated the chain of events leading to death or the circumstances of the accident or violence which produced the fatal injury." Throughout this report, "cause of death" refers to the underlying cause of death.

Causes of Pregnancy-Related Deaths

Among the 20 pregnancy-related deaths in 2022, the leading causes of death were hemorrhage and non-amniotic fluid embolism, which each accounted for three deaths. These were followed by cardiovascular conditions, cerebrovascular accident, homicide, and hypertensive disorders of pregnancy, which each accounted for two deaths. Cancer, cardiomyopathy, infection, metabolic/endocrine, SUD/OD, and suicide each accounted for one pregnancy-related death.

Causes of Non-Pregnancy-Related Deaths

The leading causes of death for non-pregnancy-related deaths was SUD/OD, accounting for 15 of 33 (45%) cases.

Infection Deaths

There were five pregnancy-associated deaths due to infection. One infection death, which was due to sepsis, was related to pregnancy. The remaining four infection deaths were non-pregnancy-related and were due to sepsis, infective endocarditis, human immunodeficiency virus (HIV), and COVID-19.

Accidental Deaths, Homicides, and Suicides

Four pregnancy-associated injury deaths occurred in 2022, all of which were non-pregnancy-related motor vehicle crashes. [17]

Five pregnancy-associated deaths in 2022 were due to homicide, four of which were firearm related. Two homicides were related to pregnancy and three were not related to pregnancy. Eighty percent (80%) of all homicide deaths resulted from intimate partner violence (IPV), meaning the perpetrator was a current or former partner.

Suicide, with underlying mental health conditions, accounted for one pregnancy-related death in 2022. This death was due to intentional overdose.

Substance Use Disorder/Unintended Overdose Deaths (SUD/OD)[18]

In 2022, for the 10th consecutive year, SUD/OD was the leading underlying cause of pregnancy-associated death in Maryland: 16 of the 53 pregnancy-associated deaths (30%) resulted from SUD/OD. Among these, 14 had underlying substance use disorder and two were due to unintended overdose without underlying substance use disorder.

Of the 16 SUD/OD deaths, 12 (75%) involved the potent opioid, fentanyl, or one of its analogs. Xylazine, increasingly found to be involved in opioid-related deaths, especially in Maryland, was found in three of

[17] In this report, "injury" includes only unintentional non-overdose deaths (e.g. motor vehicle collisions). In the Program's prior reports, injury had different definitions.
[18] Based on Pregnancy Monitoring Surveillance System (PMSS) codes for substance use disorder (PMSS 100.5) or unintentional injuries (non-homicidal, non-suicidal injury death – including those with unknown intent - with means of fatal injury listed as "poisoning/overdose"). In previous reports, these deaths were characterized under "Behavioral Health Conditions."

the 12 (25%) fentanyl-related deaths.[19] Cocaine was involved in nine (56%) SUD/OD deaths. Polysubstance use, meaning more than one substance, was found in 81% of SUD/OD deaths. Six individuals (38%) had previously received substance use disorder treatment.

The average age at death was 31 years (range 20-39 years). Ten (10) SUD/OD deaths (63%) were among White NH individuals and six (38%) were among Black NH individuals. Five (31%) of the SUD/OD victims were pregnant at the time of death, one (6%) death occurred within 42 days of the end of the pregnancy, and nine (56%) deaths occurred from 43 to 365 days after the conclusion of pregnancy. The timing of one death was unknown. The average timing of death among all 10 postpartum deaths was 215 days (approximately seven months) postpartum. The MMRT determined that mental health conditions contributed or probably contributed to 13 (81%) of the SUD/OD deaths in 2022.

[19] Kariisa M, O'Donnell J, Kumar S, Mattson CL, Goldberger BA. Illicitly Manufactured Fentanyl–Involved Overdose Deaths with Detected Xylazine — United States, January 2019–June 2022. MMWR Morb Mortal Wkly Rep 2023;72:721–727. DOI: http://dx.doi.org/10.15585/mmwr.mm7226a4.

Figure 7: Number of Pregnancy-Associated Deaths by Relatedness and Cause of Death Category
Maryland, 2022

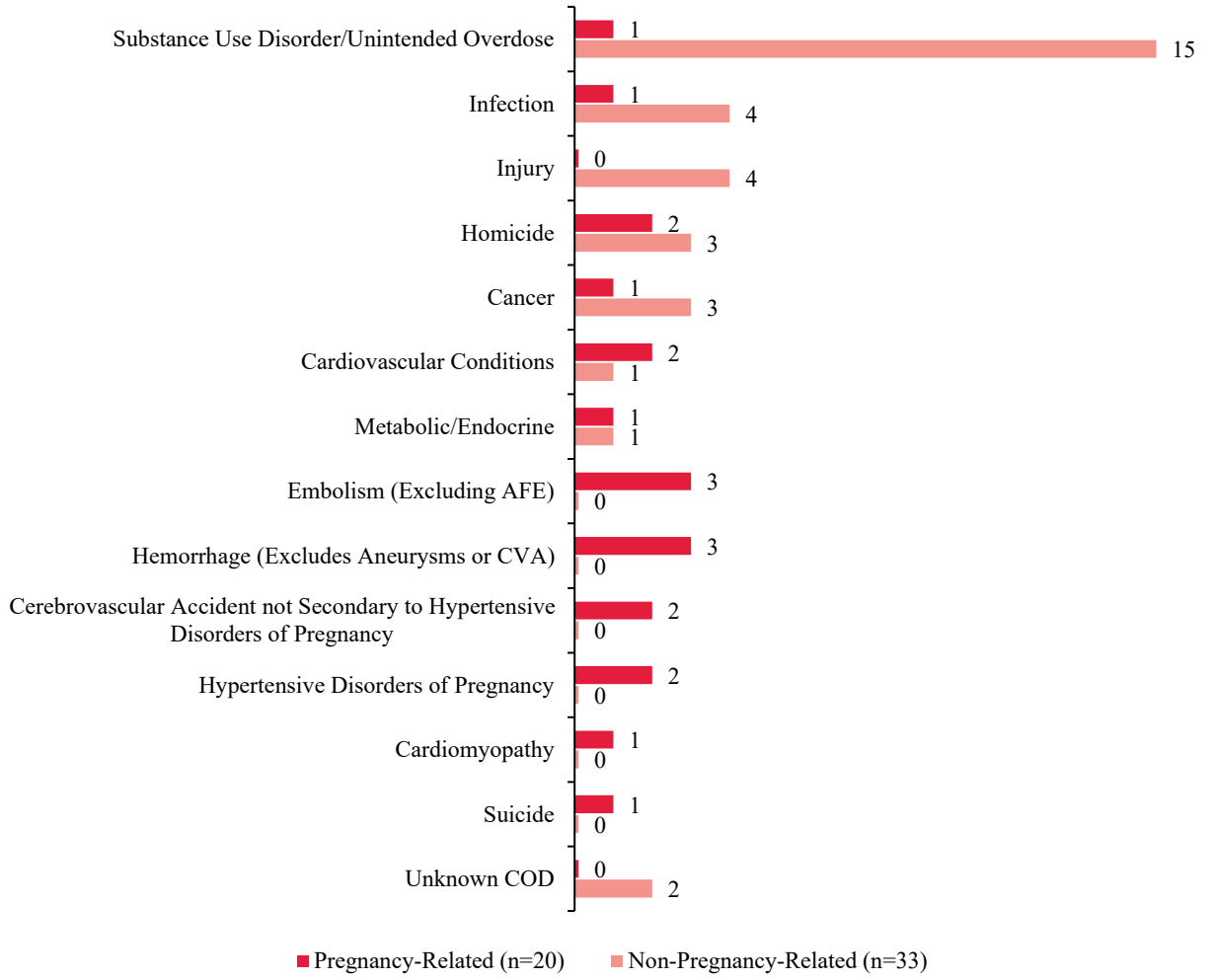


Figure 7
Data Source: Maryland MMR Program as of 10/16/2025.
AFE: Amniotic Fluid Embolism
CVA: Cerebrovascular Accident

Circumstances Surrounding Death

The MMRT determined whether four specific circumstances – obesity, discrimination, mental health conditions other than substance use disorder, and substance use disorder – contributed ("yes" or "probably") to each pregnancy-associated death (see Appendix E for descriptions). Multiple circumstances may contribute to a single death. In 2022, the MMRT determined that obesity contributed to 12 (23%) deaths, discrimination contributed to 10 (19%) deaths, mental health conditions contributed to 19 (36%) deaths, and substance use disorder contributed to 17 (32%) deaths (Figure 8).[20]

[20] According to the CDC's Maternal Mortality Review Committee Decision Form (see Appendix E), discrimination refers to, "Treating someone less or more favorably based on the group, class or category they belong to resulting from biases, prejudices, and stereotyping. It can manifest as differences in care, clinical communication and shared decision-making."

Pre-existing Mental Health Conditions

Among the 19 cases where mental health conditions contributed to death, 16 individuals (84%) had one or more documented pre-existing mental health condition. Either alone or co-occurring with other conditions: nine individuals (47%) had an anxiety disorder, five individuals (26%) had a diagnosis of depression, four individuals (21%) had bipolar disorder, and two (11%) had a psychotic disorder.

Social and Emotional Stressors: Domestic Violence

History of domestic violence was documented among six (11%) of the 53 pregnancy-associated deaths in 2022. While intimate partner violence is perpetrated by former or current romantic partners, domestic violence is perpetrated by any household member, including but not limited to an intimate partner. Examining the history of domestic violence provides context on prior exposure to violence among decedents.

Figure 8: Circumstances Surrounding Pregnancy-Associated Deaths, Maryland, 2022

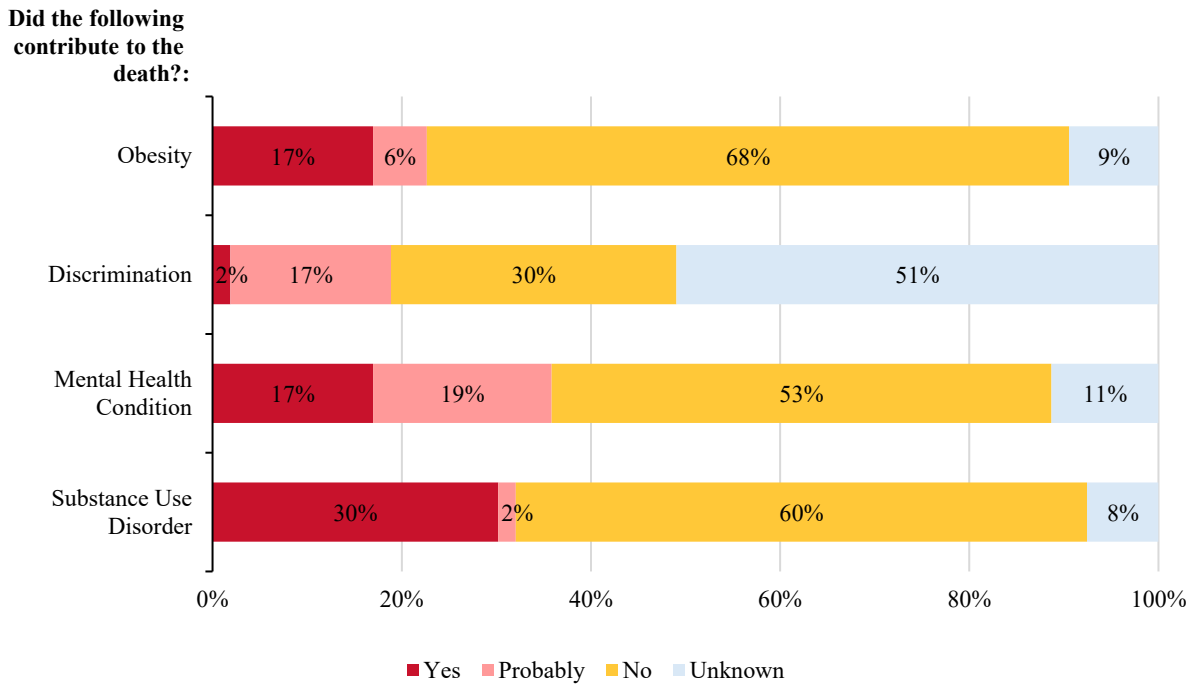


Figure 8
Data Source: Maryland MMR Program as of 10/16/2025.
Note: Multiple circumstances may contribute to a single death.

The causes of and circumstances surrounding 2022 deaths continue to show that substance use disorder, domestic violence, and behavioral health disorders have a significant effect on pregnant persons and their families, and are contributing factors to maternal health, morbidity, and mortality.

Cases by Timing of Death in Relation to Pregnancy

Among the 20 pregnancy-related deaths in 2022, five (25%) occurred during pregnancy, two (10%) on the day of delivery, seven (35%) within 42 days postpartum, and six (30%) between 43 and 365 days postpartum. In contrast, of the 33 non-pregnancy-related deaths, 23 (70%) occurred between 43 to 365 days postpartum, eight (24%) occurred during pregnancy, one (3%) occurred within 42 days postpartum, and the timing of one (3%) was unknown (Figure 9).

Figure 9: Pregnancy-Associated Deaths by Relatedness and Timing of Death Maryland, 2022

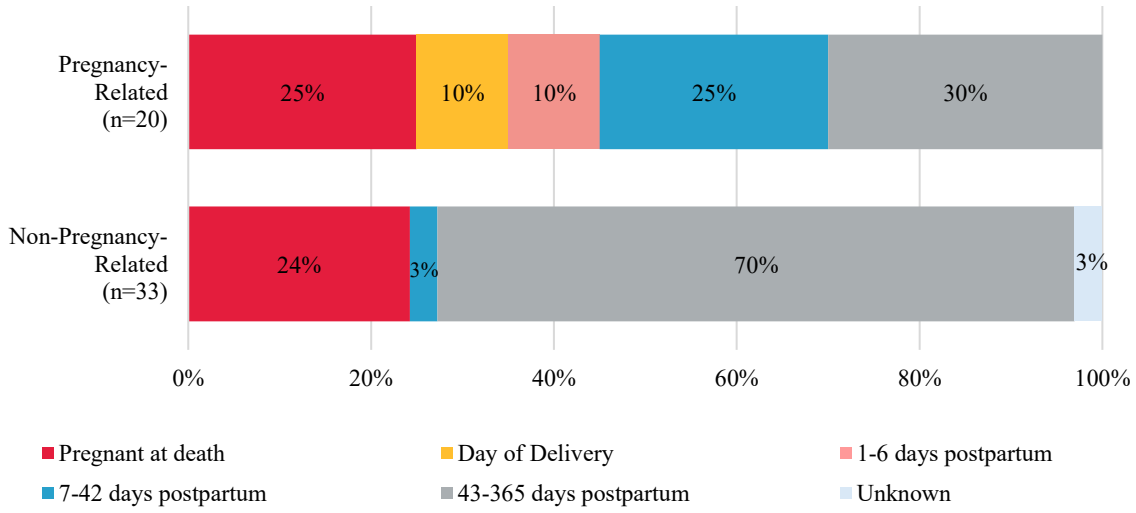


Figure 9
Data Source: Maryland MMR Program as of 10/16/2025.
Note: Percentages may not total 100 due to rounding.

Cases by Outcome of Pregnancy

Among the 20 pregnancy-related deaths, 12 (60%) had a live birth, five (25%) involved a stillbirth or fetal death, two (10%) resulted in a spontaneous abortion, and one (5%) was pregnant at the time of their death, resulting in fetal death. Among the 33 non-pregnancy-related deaths, 23 (70%) had a live birth, five (15%) involved a stillbirth or fetal death, two (6%) involved a spontaneous abortion, two (6%) were pregnant at the time of their death, resulting in fetal death, and one (3%) involved an ectopic pregnancy (Figure 10).

Figure 10: Pregnancy-Associated Deaths by Relatedness and Pregnancy Outcome Maryland, 2022

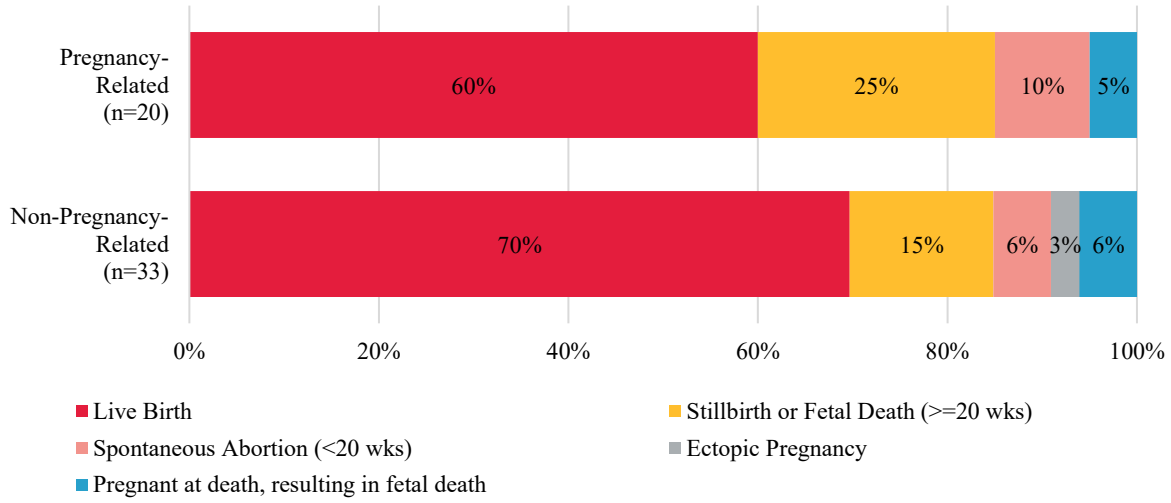


Figure 10
Data Source: Maryland MMR Program as of 10/16/2025.
Note: Percentages may not total 100 due to rounding.

Cases by Maternal Race and Ethnicity

Of the 20 pregnancy-related deaths occurring in 2022, 11 cases (55%) were among Black NH individuals, four cases (20%) were among White NH individuals, four cases (20%) were among Hispanic individuals, and one case (5%) was an Asian NH individual. Of the 33 non-pregnancy-related deaths, 18 cases (55%) were among Black NH individuals, 12 cases (36%) were among White NH individuals, two cases (6%) were among Hispanic individuals, and one case (3%) was an Asian NH individual.

Pregnancy-related and non-pregnancy-related mortality rates among Black NH and White NH individuals in 2022 are shown in Figure 11. The rate of non-pregnancy-related deaths among Black NH individuals was two times higher than that of White NH individuals. In 2022, the rate of pregnancy-related deaths in Black NH individuals was 3.7 times higher than that of White NH individuals, illustrating the persistent racial disparity in these rates in Maryland.

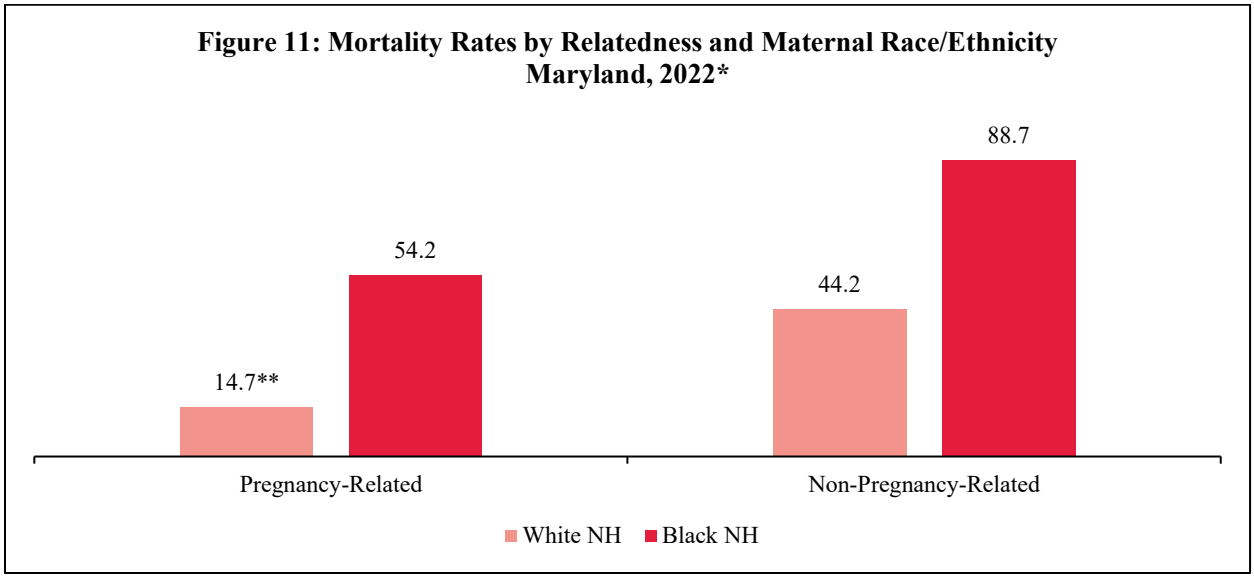


Figure 11
* Rate of pregnancy-related and non-pregnancy-related deaths per 100,000 live births.
** Mortality rates are based on counts <10; rates should be interpreted with caution.
Data Source: Maryland MMR Program and VSA as of 10/16/2025.

Cases by Maternal Age

The distribution of pregnancy-related and non-pregnancy-related deaths by maternal age group is shown in Figure 12. The median age at death among both pregnancy-related deaths and non-pregnancy-related deaths was 33 years. The counts of deaths in most groups are small (< 10); therefore, rates by age group are unstable and are not presented.

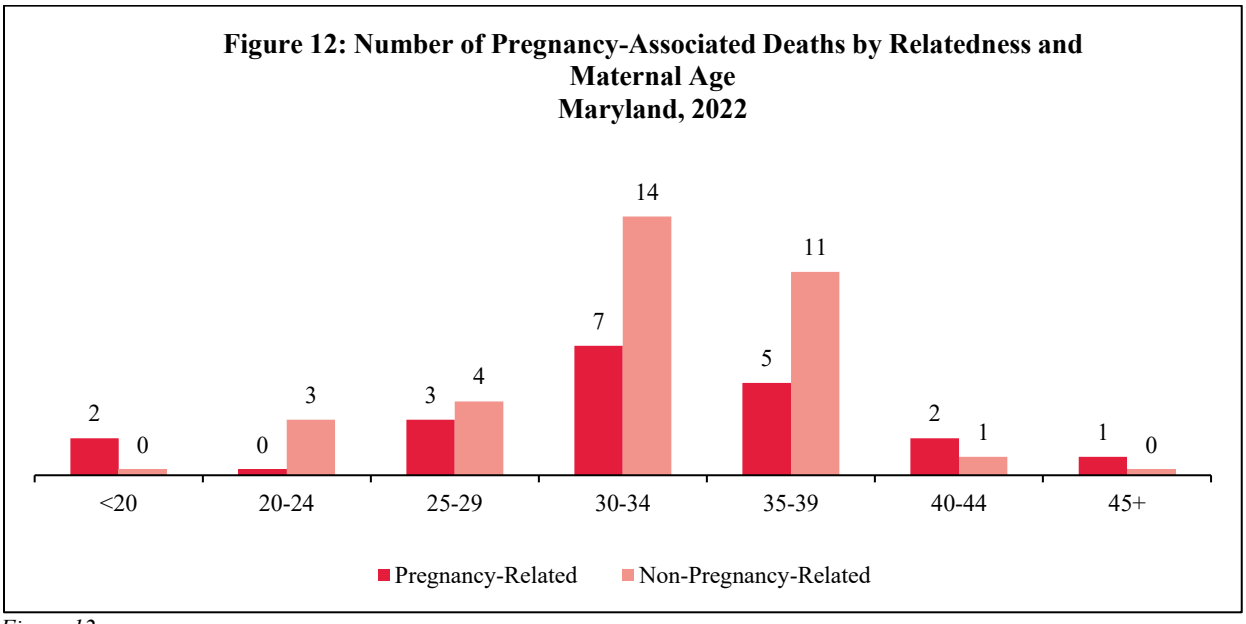


Figure 12
Data Source: Maryland MMR Program as of 10/16/2025.

Cases by Timing of Prenatal Care Initiation

Pregnancy-related and non-pregnancy-related deaths by the trimester when prenatal care was initiated are shown in Figure 13. Of the 20 pregnancy-related deaths, 16 (80%) were among individuals who initiated prenatal care in the first or second trimester of pregnancy. Among the 33 non-pregnancy-related deaths, 20 (61%) were among individuals who began prenatal care in the first or second trimester. The timing of prenatal care initiation was unknown among three pregnancy-related cases and six non-pregnancy-related cases.

Figure 13: Pregnancy-Associated Deaths by Relatedness and Trimester of Prenatal Care Initiation
Maryland, 2022

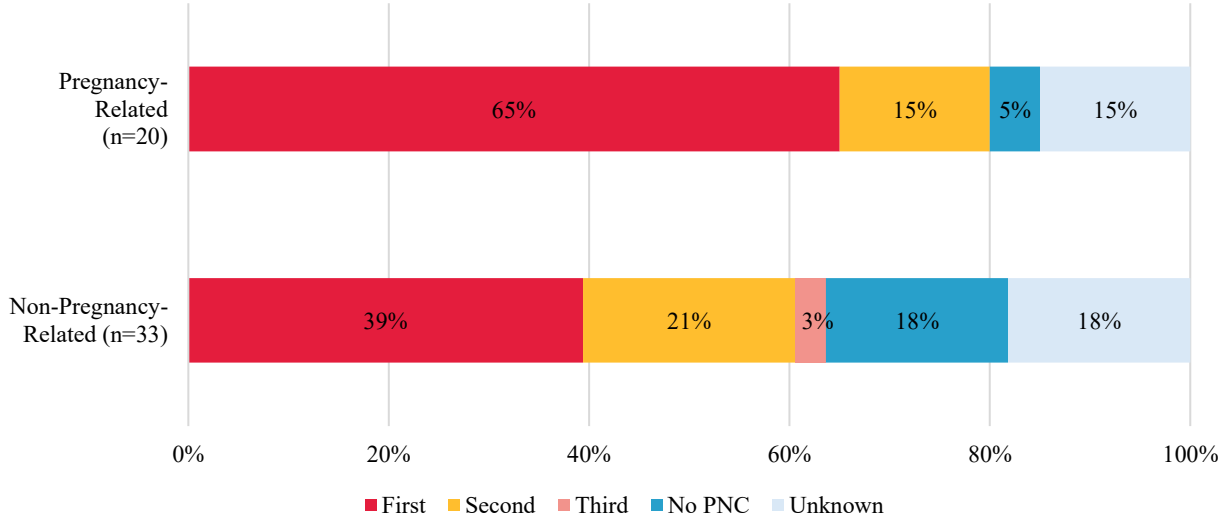


Figure 13
Data Source: Maryland MMR Program as of 10/16/2025.
Note: Percentages may not total 100% due to rounding.

Cases by Residence and Occurrence

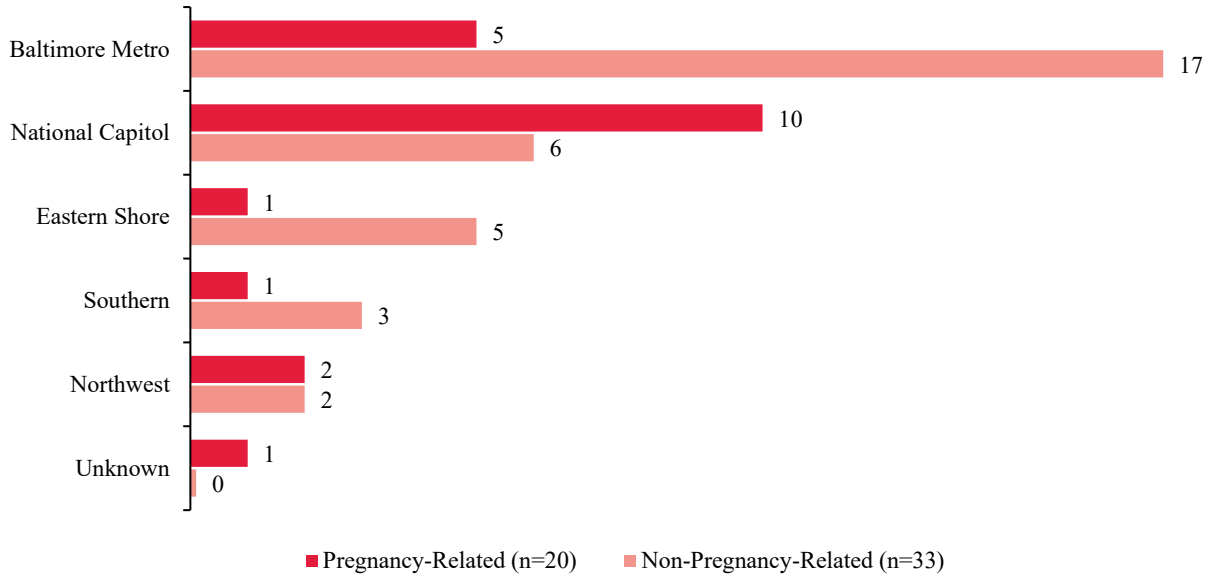
Error! Reference source not found. and Figure 14 show pregnancy-related and non-pregnancy-related deaths by VSA-defined region of residence and by jurisdiction of residence, respectively.[21] Approximately half of pregnancy-related deaths were among residents of the National Capitol region, while just over half of non-pregnancy-related deaths occurred among residents of the Baltimore Metro region.

Among the 20 pregnancy-related deaths, eight were residents of Prince George's County (40%), four were residents of Baltimore City (20%), and two were residents of Montgomery County (10%). There were single (5%) pregnancy-related deaths among residents of Caroline, Charles, Frederick, Howard, and

[21] Maryland has 24 jurisdictions: Twenty-three are counties, and one (Baltimore City) is a municipality. Source: https://msa.maryland.gov/msa/mdmanual/01glance/html/county.html

Washington counties. The jurisdiction of residence was unknown for one pregnancy-related death. Of the 33 non-pregnancy-related deaths, six (18%) were among residents of Baltimore County and five (15%) were among residents Prince George's County. Four individuals were residents of Anne Arundel County (12%), four were residents of Baltimore City (12%), four were residents of Wicomico County (12%), and two (6%) were residents of Charles County. Single non-pregnancy-related deaths (3%) occurred among residents of Allegany, Carroll, Garrett, Harford, Howard, Montgomery, St. Mary's and Somerset counties.

Figure 14: Number of Pregnancy-Associated Deaths by Relatedness and Region of Residence, Maryland, 2022



Data Source: Maryland MMR Program as of 10/16/2025.

Figure 15: Number of Pregnancy-Associated Deaths by Relatedness and Jurisdiction of Residence
Maryland, 2022

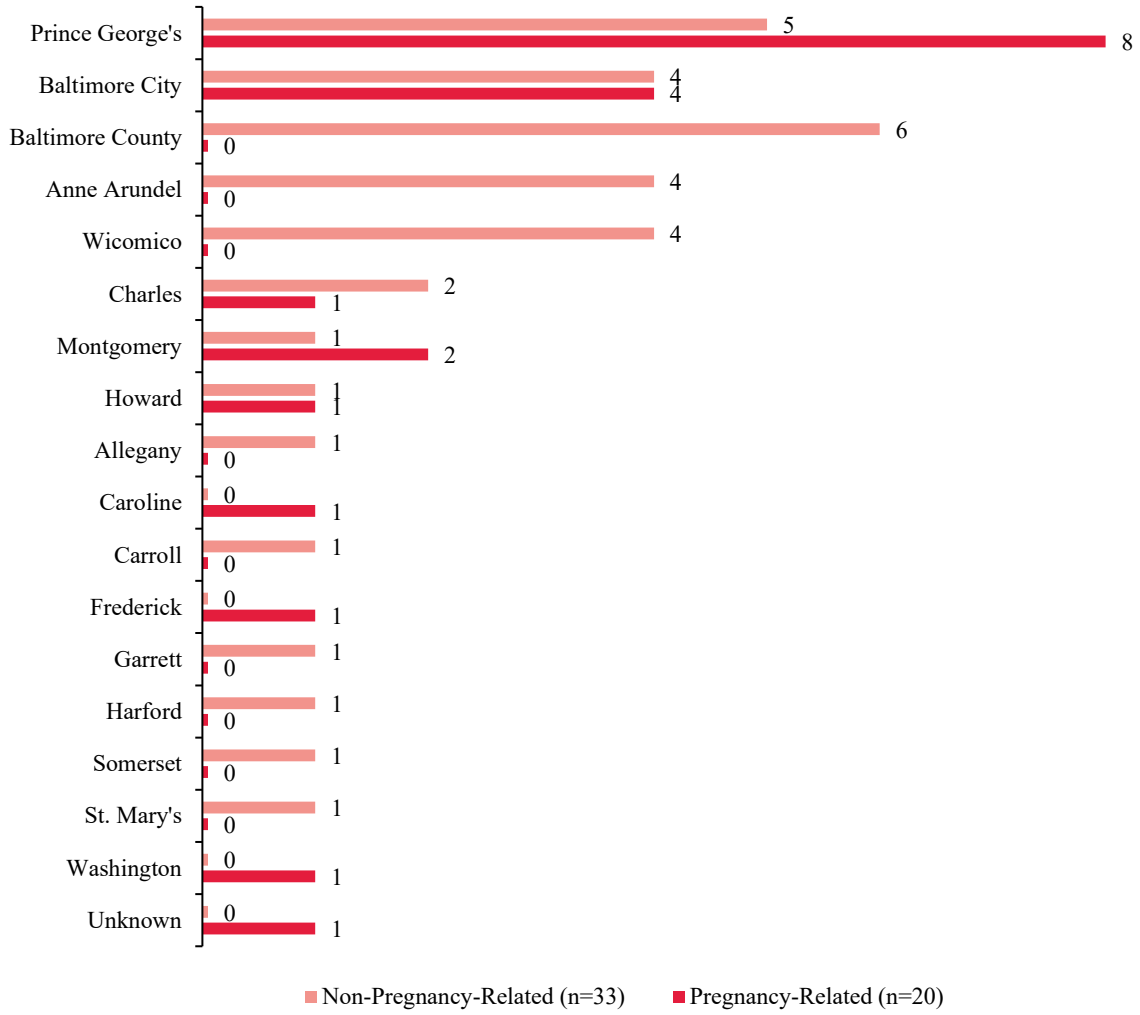


Figure 14
Data Source: Maryland MMR Program as of 10/16/2025.

Figure 15 shows pregnancy-related and non-pregnancy-related deaths by jurisdiction in which the death occurred. Among the 20 pregnancy-related deaths, seven (35%) occurred in Baltimore City, five (25%) occurred in Prince George's County, and three (15%) occurred in Montgomery County. There were single (5%) deaths that occurred in Frederick, Howard, and Washington counties. The jurisdiction of occurrence was unknown for one pregnancy-related death, and one pregnancy-related death occurred out of state.

Among the 33 non-pregnancy-related deaths, seven (21%) occurred in Baltimore City, six (18%) occurred in Baltimore County, four (12%) occurred in Prince George's County and three (9%) occurred in Caroll County. There were two (6%) deaths in Anne Arundel County, two (6%) deaths in Montgomery County, and two (6%) deaths in Wicomico County. There was one (3%) death each in Allegany, Charles, Garrett, St. Mary's, and Somerset counties. Two non-pregnancy-related deaths occurred out of state.

Figure 16: Number of Pregnancy-Associated Deaths by Relatedness and Jurisdiction of Occurrence
Maryland, 2022

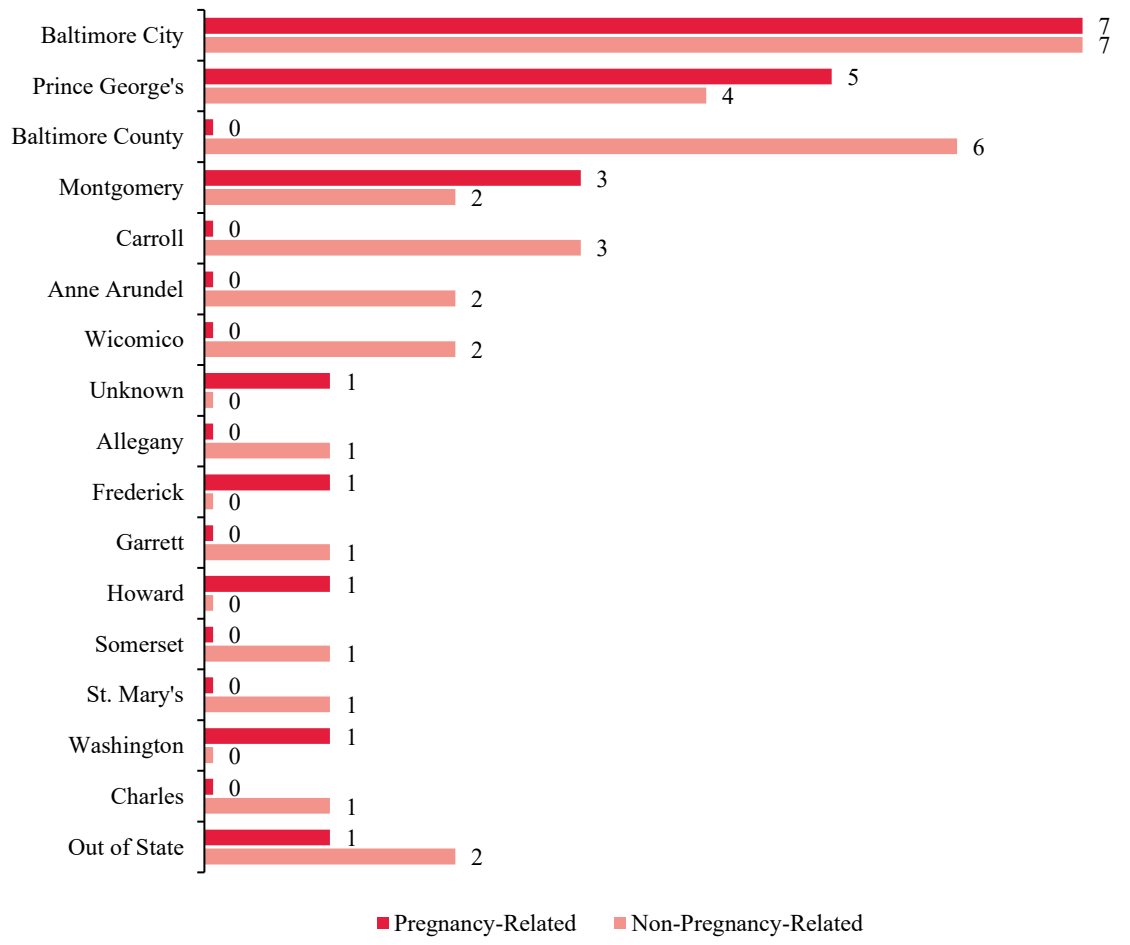


Figure 15
Data Source: Maryland MMR Program as of 10/16/2025.

Cases by Maternal Country of Birth

In 2022, 32% of births in Maryland were among foreign-born mothers. The distribution of country of birth by pregnancy-relatedness among 2022 pregnancy-associated deaths is shown in Figure 16. Foreign-born individuals represented 35% (seven individuals) of pregnancy-related deaths and 27% (nine individuals) of non-pregnancy-related deaths. Countries of birth included nations in the Caribbean, Central Africa, Central America, East Africa, Europe, South Asia, Southeast Asia, and West Africa.

Figure 17: Pregnancy-Associated Deaths by Relatedness and Country of Birth Maryland, 2022

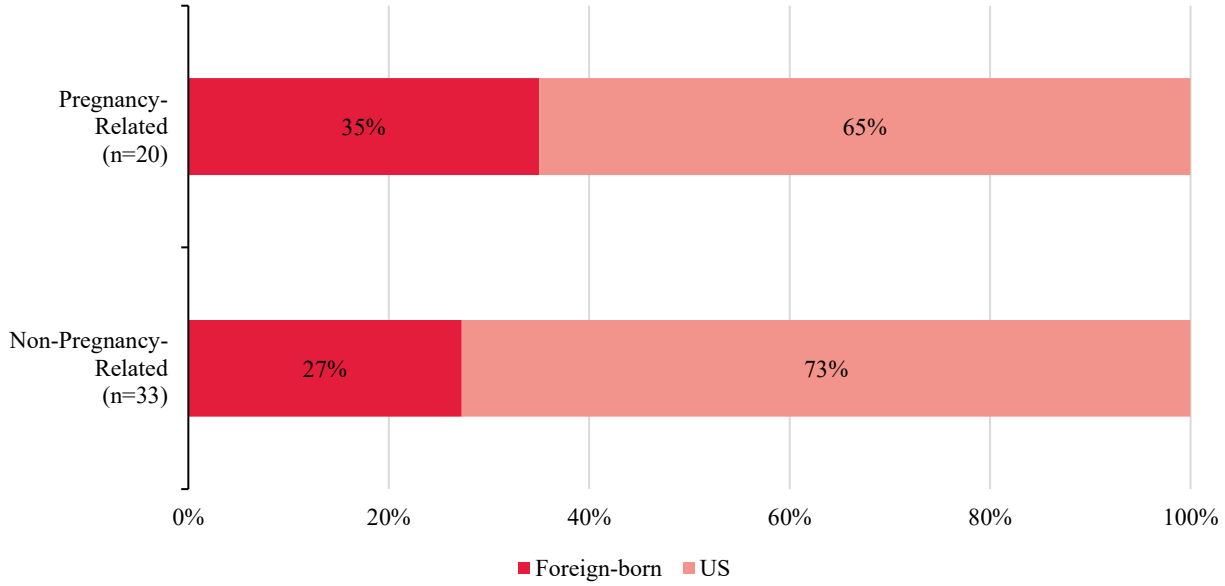


Figure 16
Data Source: Maryland MMR Program as of 10/16/2025.

Preventability of Deaths

A death was considered preventable if there was either a "good chance" or "some chance" of the death "being averted by one or more reasonable changes to patient, family, provider, facility, system, and/or community factors."[22] The MMRT reviews the case and then decides whether the death could have been prevented with some intervention. A determination of preventability does not automatically imply that a clinical error occurred or that the care provided was substandard, but rather highlights opportunities for specific system-level changes that could prevent future similar events. For each preventable death, the MMRT identifies factors that may have contributed to the death and must make a recommendation to address each factor. Multiple factors can exist for a single death.

The MMRT determined that 81% of all pregnancy-associated deaths in 2022 were preventable using the definition above. The 15% non-preventable pregnancy-associated deaths included three cancer deaths, two deaths due to cardiovascular conditions, one death due to cerebrovascular accident, one infectious death, and one injury-related death. The MMRT was unable to determine the preventability of two deaths.

Because differences are observed in causes of death between pregnancy-related and non-pregnancy-related deaths, preventability and common contributing factors are examined separately for each group. The MMRT's recommendations to address preventability and contributing factors are summarized in Appendix B: Maternal Mortality Review Team.

[22] ERASE MM Program (https://www.cdc.gov/maternal-mortality/php/erase-mm/index.html) Maternal Mortality Review Committee Decisions Form v24.3. https://www.cdc.gov/maternal-mortality/media/pdfs/2025/05/mmria-form-v24.3-fillable-508.pdf

Preventability of Pregnancy-Related Deaths

Of the 20 pregnancy-related deaths in 2022, 18 (90%) were determined to be preventable. Commonly cited contributing factors for these 18 preventable pregnancy-related deaths included:

- **Clinical skill/quality of care (39%)**: provider or facility personnel were not appropriately skilled for the situation or did not exercise clinical judgement consistent with standards of care.
- **Knowledge (33%)**: provider's or patient's lack of education, knowledge, or understanding regarding the significance of a health event or the need for treatment/follow-up.
- **Communication (28%):** care was fragmented or uncoordinated among or between healthcare facilities or units.
- **Delay (22%)**: the provider or patient was delayed in referring or accessing care, treatment, or follow-up care/action.

Preventability of Non-Pregnancy-Related Deaths

Among the 33 non-pregnancy-related deaths in 2022, 25 (76%) were determined to be preventable (Figure 17). Commonly cited contributing factors for these 25 preventable non-pregnancy-related deaths included:

- **Substance use disorder (60%)**, meaning recurrent use of alcohol and/or drugs, directly compromised patient's health status and caused health problems or disability.
- **Continuity of care/care coordination (24%)**: lack of continuity between various providers or facilities (e.g. prenatal care, labor and delivery, postpartum care), leading to providers or facilities not having access to a patient's health records or not communicating on a patient's health status.
- **Adherence to medical recommendations (20%)**: the provider or patient did not follow protocol or failed to comply with standard procedures.
- **Mental health conditions (20%)**: the patient had documented diagnosis of a psychiatric disorder or met criteria for a diagnosis of a mental health condition.
- **Unstable housing (16%)**: individual was unhoused, lived in a homeless shelter, or temporarily lived with family or friends.
- **Failure to screen or inadequate assessment of risk (16%):** resulted in the patient not being transferred/transported to a provider who would have been able to give a higher level of care.

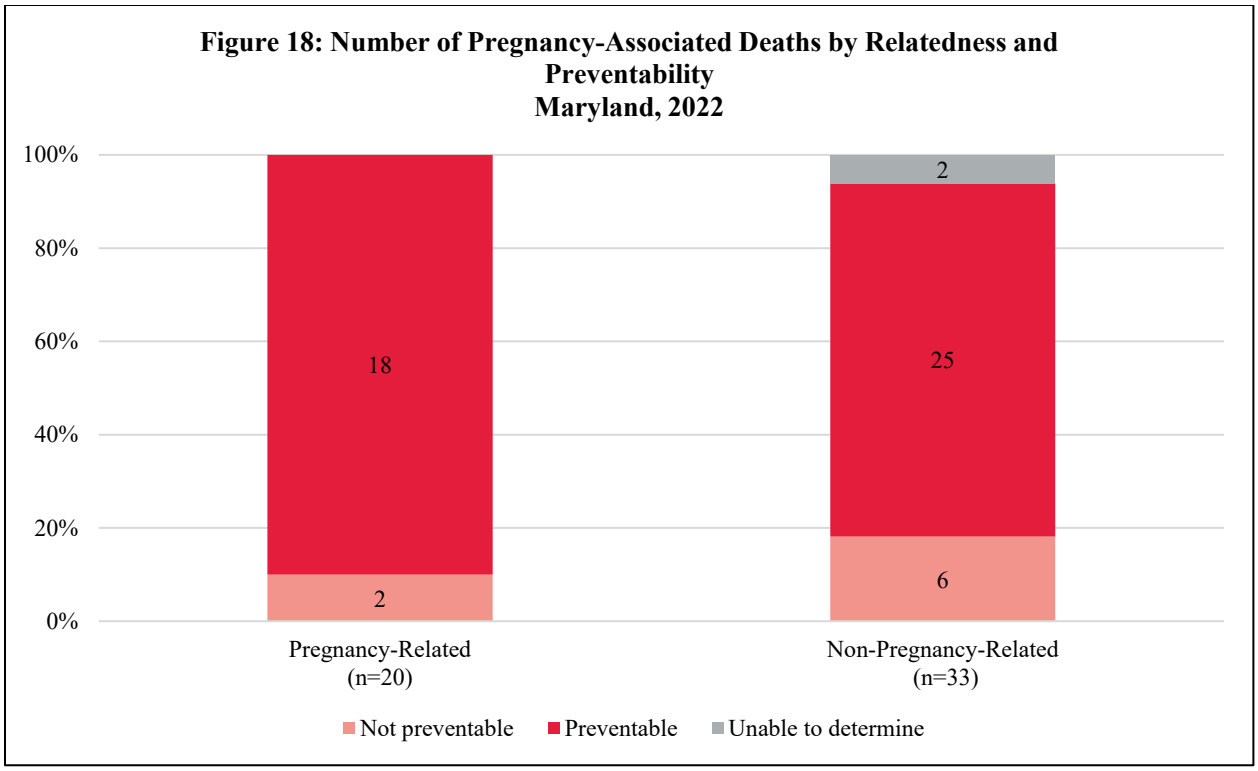


Figure 17
Data Source: Maryland MMR Program as of 10/16/2025.

Trends in Pregnancy-Associated and Pregnancy-Related Deaths

As noted in Figure 3 and 4, the Maryland MMR has increased slightly over the past 10 years but remains below the national average. The MMR, however, is limited in both causes of death considered and the timeframe in relation to pregnancy. The MMR includes only deaths from pregnancy-related causes that can be identified by the death certificate alone, and that occurred during pregnancy or within 42 days of pregnancy conclusion (see Figure 2).

The MMRT reviews all pregnancy-associated deaths, which is a more comprehensive measure that includes deaths from any cause that occur during pregnancy or up to 365 days after the conclusion of pregnancy.

The trends in pregnancy-associated, pregnancy-related, and non-pregnancy-related mortality rates from 2013 to 2022 are shown in Figure 18. The pregnancy-associated mortality rate shows considerable variability over the 10-year period. In 2022, the pregnancy-associated mortality rate was about 1.5 times higher than observed in 2013. The pregnancy-related mortality rate has been less variable over the last five years compared to the non-pregnancy-related mortality rate, which has increased over this period. This is largely due to increasing numbers of overdose deaths in the last several years, the majority of which are categorized as non-pregnancy-related deaths. This is explored further in the "Multiyear Review of Overdose Deaths, 2013" section.

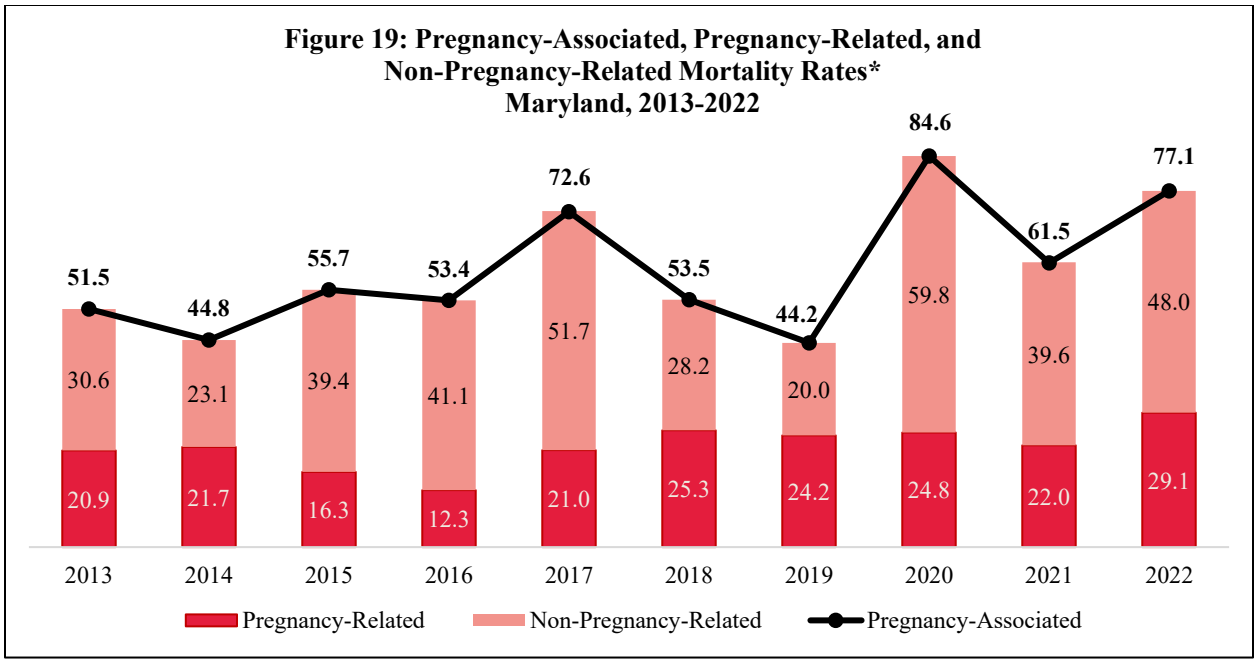


Figure 18

* Rates calculated as number of deaths per 100,000 live births. The sum of the pregnancy-related rate and the non-pregnancy-related rate for a given year may not total the pregnancy-associated rate for that year due to rounding.

Data Source: VSA and Maryland MMR Program as of 10/16/2025.

Note: 2022 was the first year in which deaths among Maryland residents who died out of state were identified, reviewed, and included in the count of pregnancy-associated deaths.

Causes of pregnancy-related deaths are largely medical conditions directly related to pregnancy (such as hemorrhage, embolism, pre-eclampsia), homicide, or medical conditions exacerbated by pregnancy (such as pre-existing cardiovascular disease). Some cases of infection and suicide are also pregnancy-related. The number of cases in Maryland from any individual cause is so small that determining trends for specific causes of pregnancy-related death is not possible.

Approximately one-quarter (26%) of live births in Maryland from 2013 to 2022 were among rural residents (data not shown). Mortality rates by pregnancy-relatedness and rurality of residence are presented in Figure 19. While pregnancy-related mortality rates between rural and non-rural residents were comparable, non-pregnancy-related mortality rates were significantly higher among rural residents. The Program will continue monitoring trends, evaluating distance to care, and exploring additional factors that impact access to care for rural residents.

Figure 20: Non-Pregnancy-Related and Pregnancy-Related Mortality Rates* by Rurality of Residence
Maryland, 2013-2022

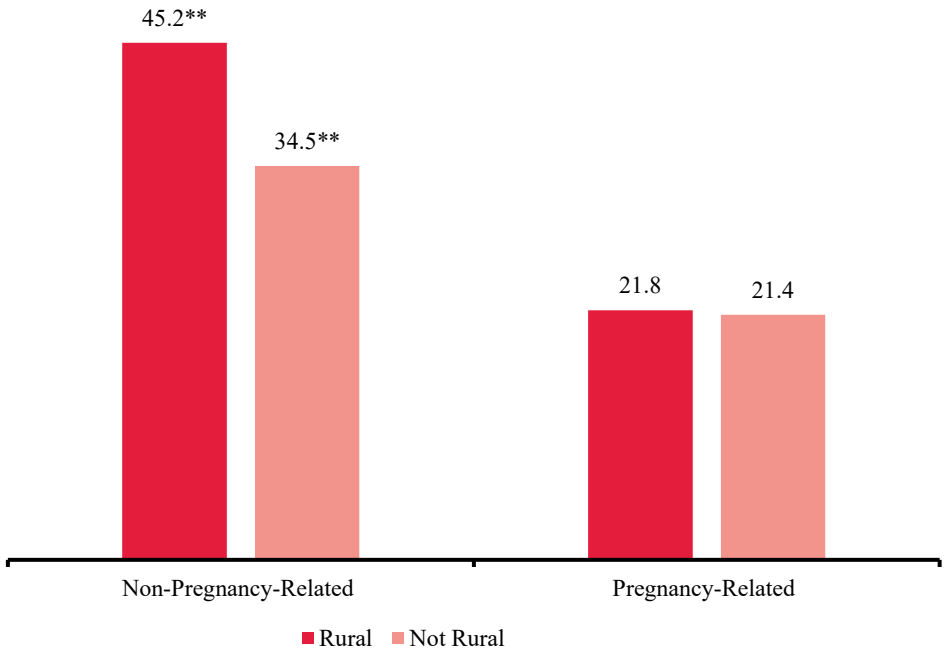


Figure 19
*Rates calculated as number of deaths per 100,000 live births, among cases where residence data was available.
**Denotes statistically significant difference in rates by rurality of residence, $p<0.05$.
Data Source: VSA and Maryland MMR Program as of 10/16/2025.
Note: Rurality was defined using guidance from the Maryland State Office of Rural Health, "The State of Maryland recognizes 18 of its 24 jurisdictions as rural. Maryland's rural counties include: Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne's, Somerset, St. Mary's, Talbot, Washington, Wicomico, and Worcester." https://health.maryland.gov/pophealth/Pages/Rural-health.aspx#:~:text=%E2%80%8BThe%20State%20of,Washington%2C%20Wicomico%2C%20and%20Worcester

Racial Disparities in Pregnancy-Related Mortality

Figure 4 delineates the racial disparities in MMR that have been consistent from 2013 to 2022 in Maryland. Similar trends are observed among pregnancy-related deaths in this period (Figure 20). The pregnancy-related mortality rate was 2.7 times higher among Black NH individuals compared to White NH individuals, a difference which is statistically significant (38.2 vs 14.1). Black NH individuals had a slightly higher rate of non-pregnancy-related mortality than White NH individuals, though this difference was not statistically significant (49.2 vs 45.1).

Figure 21: Non-Pregnancy-Related and Pregnancy-Related Mortality Rates* by Race
Maryland, 2013-2022

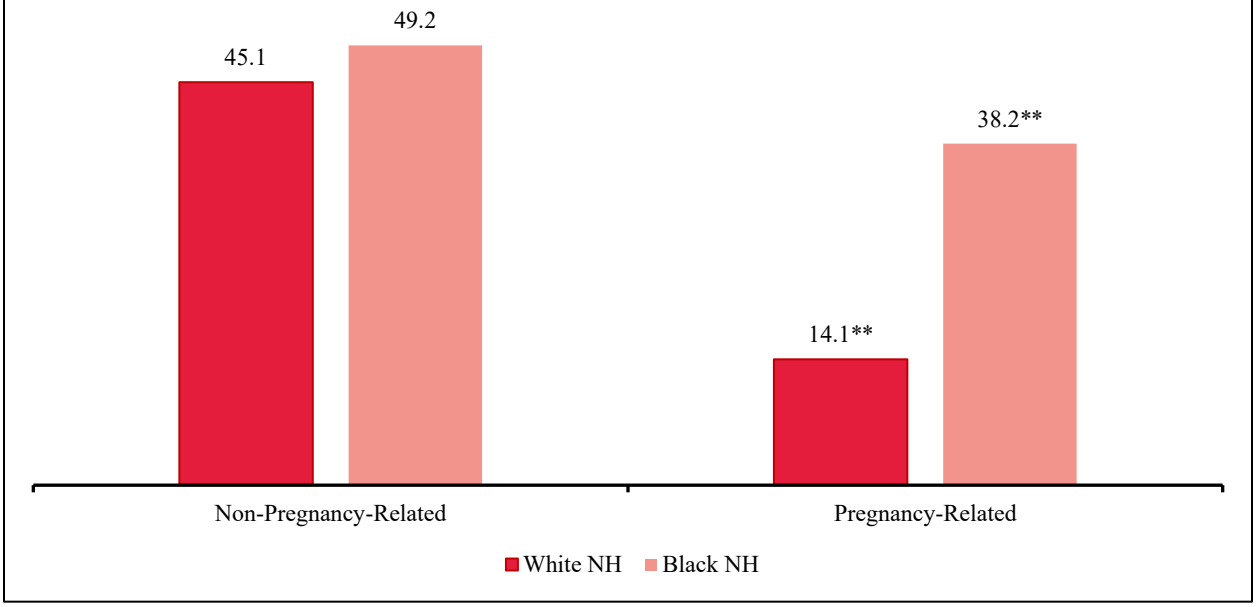


Figure 20
*Rates calculated as number of deaths per 100,000 live births.
**Denotes statistically significant difference in rates by race, p<0.001.
Data Source: VSA and Maryland MMR Program as of 10/16/2025.

Disparities in pregnancy-associated deaths may also be evaluated by comparing the racial and ethnic distribution of births in Maryland from 2013 to 2022 with the distribution of non-pregnancy-related and pregnancy-related deaths (Figure 21). While Black NH individuals made up 31% of live births in this 10-year period, they represent a disproportionate share (54%) of pregnancy-related deaths. In contrast, White NH individuals represented the majority (50%) of non-pregnancy-related deaths.

Figure 22: Live Births, Non-Pregnancy-Related Deaths, and Pregnancy-Related Deaths by Race and Ethnicity Maryland 2013-2022

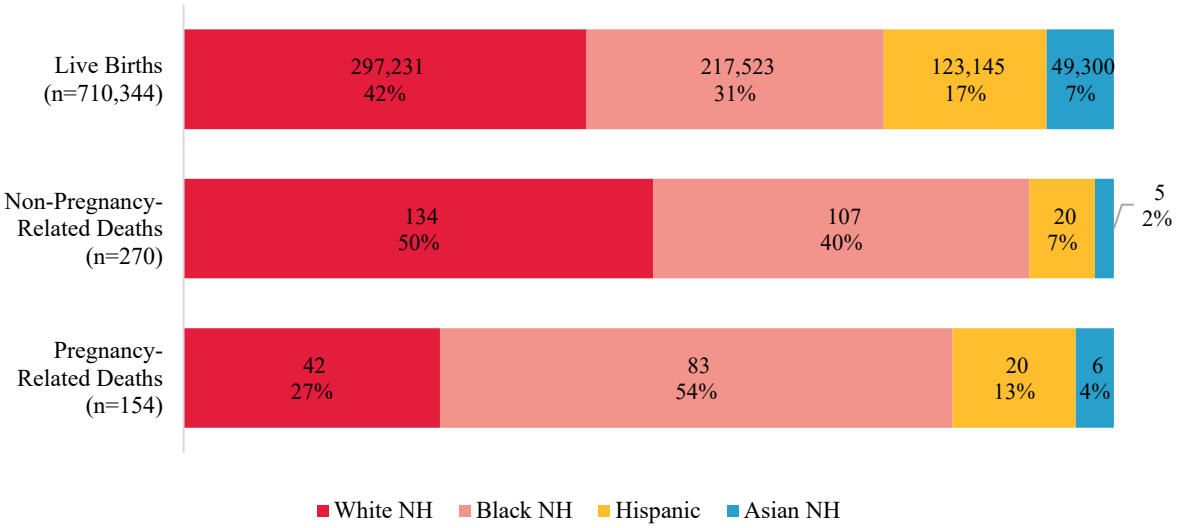
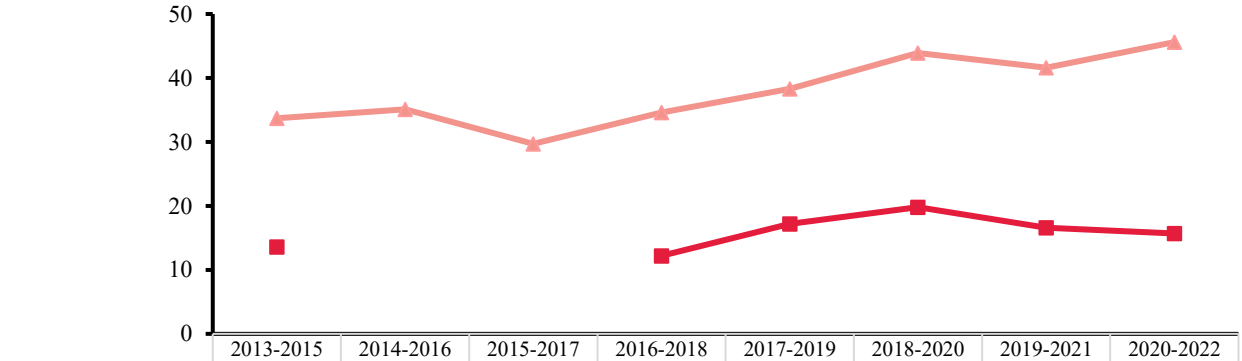


Figure 21
Data Source: VSA and Maryland MMR Program as of 10/16/2025.
Note: The percentages do not total 100% as births and deaths to NH mothers of other races are not included.

Figure 23 shows the trend over time in pregnancy-related mortality rate by race and ethnicity. Rates are shown as rolling three-year averages due to the small number of cases in each category. Even so, there were fewer than 10 deaths among White NH individuals for the time periods 2014-2016 and 2015-2017 and thus, rates are unstable and not presented.

Since 2013, the Black NH pregnancy-related mortality rate has been both consistently higher than the White NH rate and has grown faster than the White NH rate. From the initial 2013-2015 period to the most recent 2020-2022 period, there was a 34% increase in the Black NH rate (33.7 to 45.6) compared to a 15% increase in the White NH rate (13.6 to 15.7). In all periods, the Black NH rate was more than double the White NH rate. Over time, this has represented an excess of more than 20 deaths per 100,000 births among Black NH individuals. Notably, the difference is largest in the most recent three-year period, where the Black NH rate is almost three times higher than the White NH rate (see "Disparity Gap: Rate Ratio"), representing an excess of 30 deaths per 100,000 births among Black NH individuals (see "Disparity Gap: "Rate Difference").

Figure 23: Pregnancy-Related Mortality Rates* by Race/Ethnicity
Maryland, 2013-2022



	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
Black NH	33.7	35.1	29.7	34.6	38.3	43.9	41.6	45.6
White NH	13.6	**	**	12.2	17.2	19.8	16.6	15.7
Disparity Gap: Rate Ratio	2.5	**	**	2.8	2.2	2.2	2.5	2.9
Disparity Gap: Rate Difference	20	**	**	22	21	24	25	30

Black NH White NH

Figure 22
*Rates calculated as number of deaths per 100,000 live births.
** Rates, rate ratios, rate differences not calculated when counts of deaths are <10.
Data Source: VSA and Maryland MMR Program as of 10/16/2025.
Note: Rate differences are rounded to the nearest whole number to represent the excess number of deaths.
Methodology: Pregnancy-related mortality rates stratified by race/ethnicity are calculated using single race methodology. As a result of the updated race/ethnicity categorization methodology, rates presented in this table vary from rates presented in previous annual reports where bridged-race methodology was used to calculate rates. Additional information on the differences between bridged-race and single-race data may be found on the CDC, NCHS website: https://www.cdc.gov/nchs/hus/sources-definitions/race.htm

Leading causes of the 154 pregnancy-related deaths from 2013 to 2022 were hemorrhage (12%), cardiovascular conditions (12%), non-amniotic fluid embolism (10%), and homicide (9%) (Figure 23). Causes of pregnancy-related deaths varied across racial and ethnic groups. Among White NH individuals, SUD/OD, suicide, homicide, non-amniotic fluid embolism, and hemorrhage were the leading causes of death. In contrast, hemorrhage, cardiovascular conditions, homicide, and non-amniotic fluid embolism were the leading causes of death among Black NH individuals. Although total numbers were small, the leading causes among Hispanic individuals were hemorrhage and hypertensive disorders of pregnancy.

Figure 24: Pregnancy-Related Deaths: Underlying Cause of Death and Race/Ethnicity
Maryland, 2013-2022

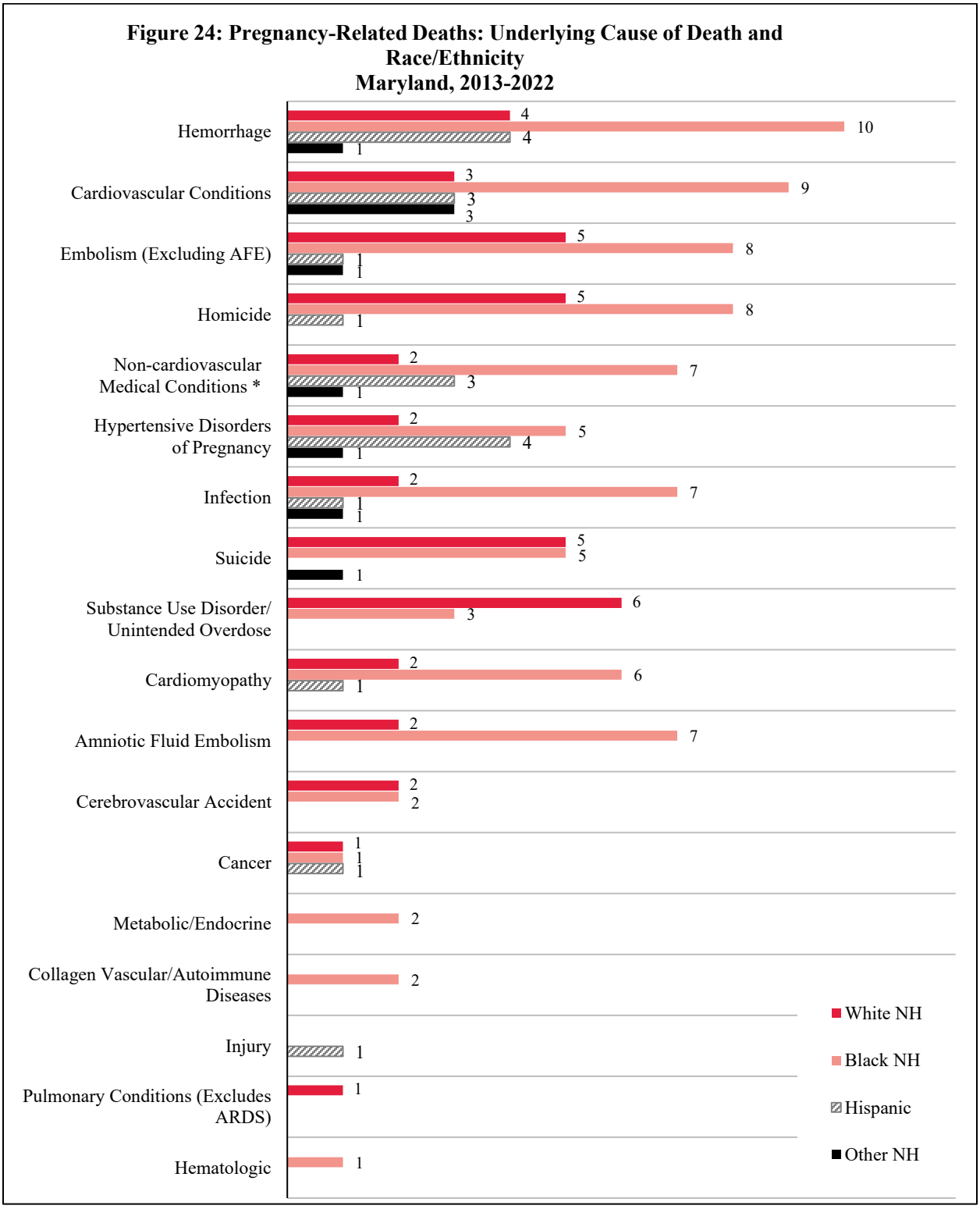


Figure 23
Data Source: Maryland MMR Program as of 10/16/2025.
*Non-cardiovascular medical conditions include conditions such as seizure disorders, asthma, cancer, and collagen vascular diseases such as lupus. Starting with 2020 deaths, the non-cardiovascular medical conditions category is broken out into individual conditions, such as metabolic/endocrine conditions or renal diseases.

For the 270 non-pregnancy-related deaths from 2013 to 2022 (Figure 24), the leading cause of death was SUD/OD (45%). This was also the leading cause among White NH and Black NH individuals, observed three times as frequently among White NH individuals. The second leading cause of non-pregnancy-related death was injury, followed by non-cardiovascular medical conditions and homicide. Homicides were observed most frequently among Black NH individuals.

Figure 25: Non-Pregnancy-Related Deaths: Underlying Cause of Death & Race/Ethnicity
Maryland, 2013-2022

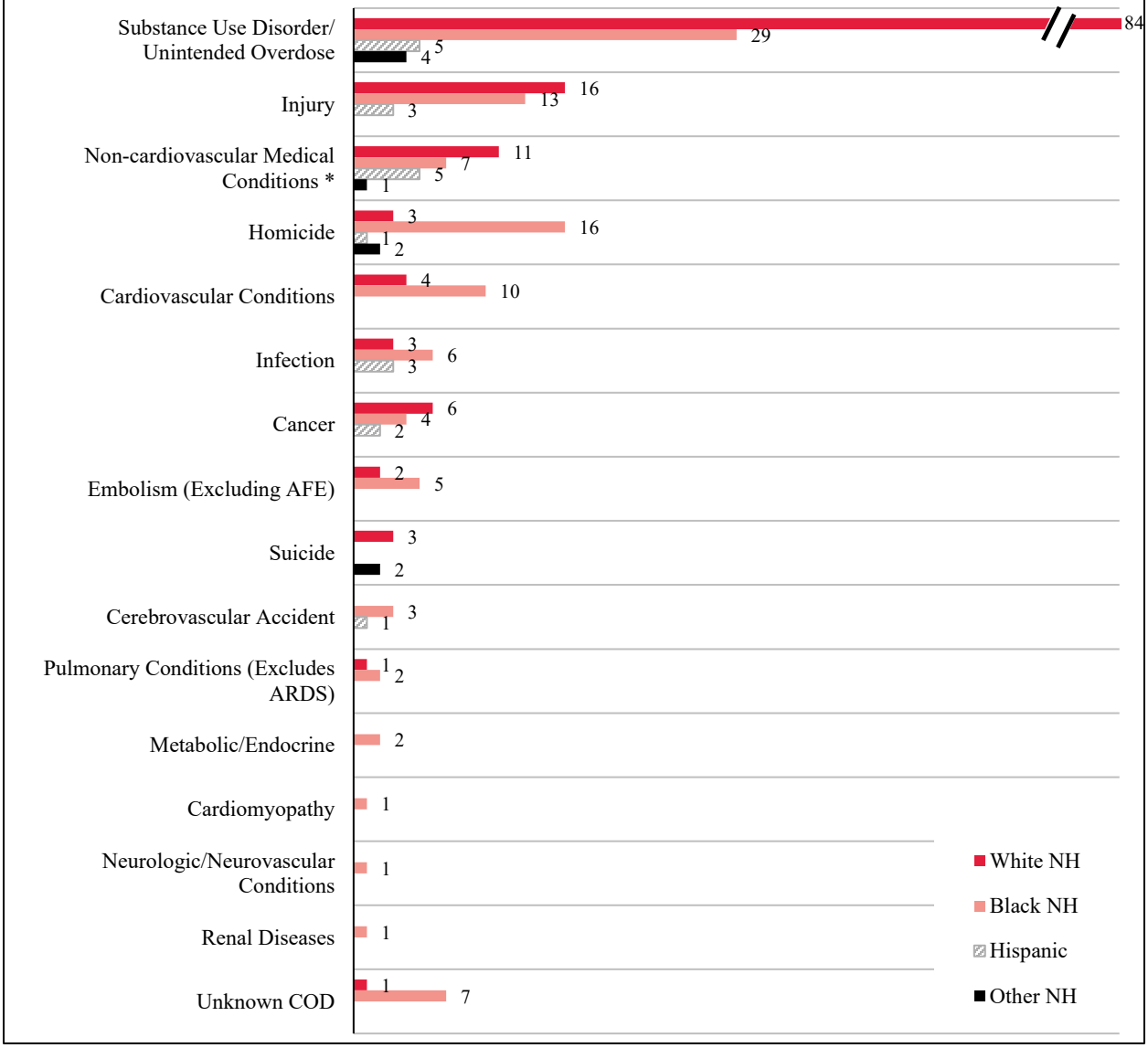


Figure 24
Data Source: Maryland MMR Program as of 10/16/2025.
Note: For visual clarity, a break is included in the bar representing deaths due to behavioral health conditions among White NH individuals.
Note: Due to updated data and analysis methodology, this figure is not directly comparable to those in previous reports.
*Non-cardiovascular medical conditions include conditions such as seizure disorders, asthma, cancer, and collagen vascular diseases such as lupus. Starting with 2020 deaths, the non-cardiovascular medical conditions category is broken out into individual conditions, such as metabolic/endocrine conditions or renal diseases.

Mortality rates as they relate to the timing of death and pregnancy-relatedness are shown in Figure 25 for White NH and Black NH individuals. Among pregnancy-related deaths, higher mortality rates were observed among Black NH individuals during pregnancy, in the early postpartum (0 to 42 days) period, and in the late postpartum (42 to 365 days) period compared to White NH individuals. Among non-pregnancy-related deaths, slightly higher mortality rates were observed in the late postpartum period (43 to 365 days postpartum) among White NH individuals.

Figure 26: Pregnancy-Related and Non-Pregnancy-Related Mortality Rates*, by Timing of Death and Race/Ethnicity, Maryland, 2013-2022

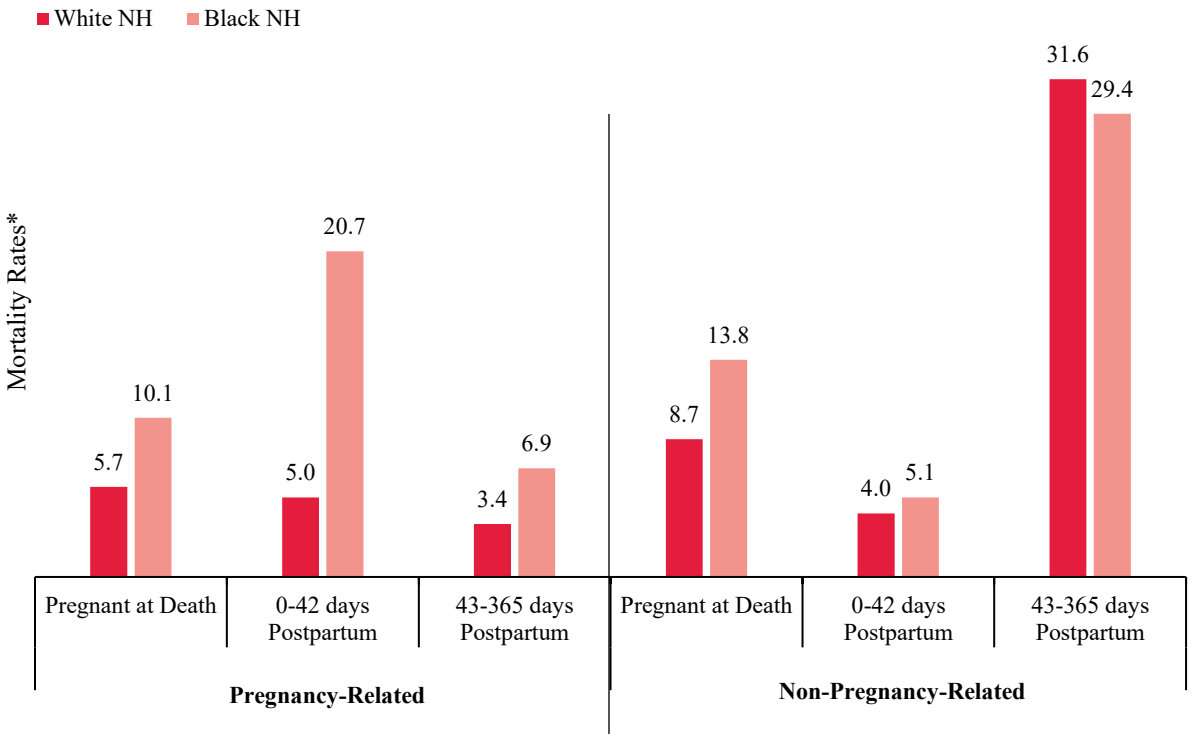


Figure 25
*Rates calculated as number of deaths per 100,000 live births.
Data Source: VSA and Maryland MMR Program as of 10/16/2025.
Note: Additional race/ethnicity categories are not presented due to low counts of deaths (<10) and thus unreliable rates.

Calculation of the pregnancy-related mortality rates by race and selected maternal characteristics revealed notable differences. Figure 26 shows pregnancy-related mortality rates among White NH and Black NH individuals by timing of prenatal care initiation. Among pregnant persons initiating prenatal care during the first trimester, the pregnancy-related mortality rate was three times higher in Black NH individuals compared to White NH individuals between 2013 and 2022, a difference which was statistically significant. Early initiation of prenatal care did not eliminate the racial disparity in pregnancy-related deaths.

The pregnancy-related mortality rate was 5.6 times higher among White NH individuals and 1.3 times higher among Black NH individuals who received late or no prenatal care compared to those who received early prenatal care.

Figure 27: Pregnancy-Related Mortality Rates* by Prenatal Care Initiation and Race/Ethnicity Maryland, 2013-2022

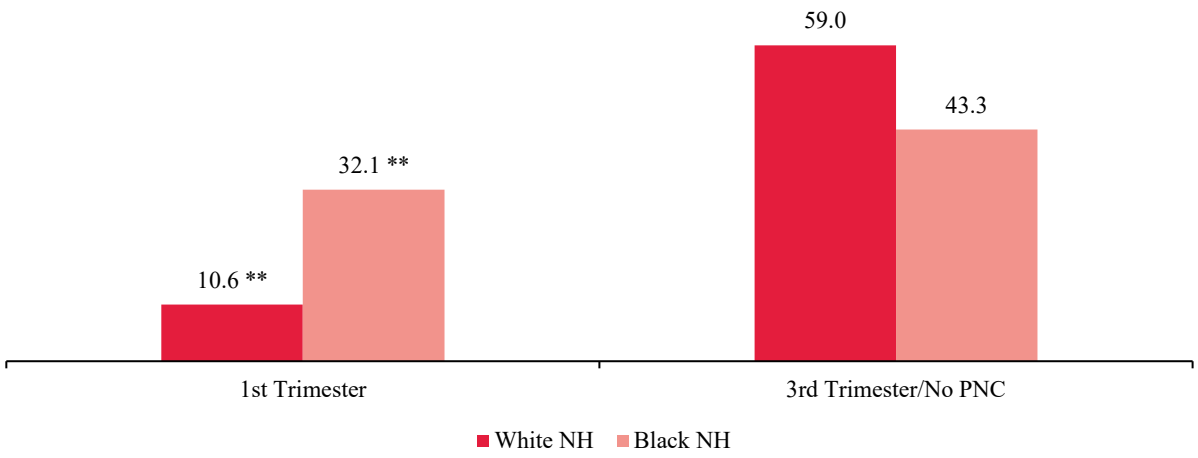


Figure 26
* Number of pregnancy-related deaths per 100,000 live births.
** Denotes statistically significant difference between Black NH and White NH, p<0.001.
Data Source: VSA and Maryland MMR Program as of 10/16/2025.
Note: Additional race/ethnicity categories are not presented due to low counts of deaths (<10) and thus unreliable rates.

As shown in Figure 27, racial differences also appeared when examining pregnancy-related mortality rates by maternal age from 2013 to 2022. During this period the Black NH mortality rate was higher than that of White NH individuals at all ages, with significantly higher rates in the 25-29 year, 30–34 year, and 35-39 year age groups. The Black NH pregnancy-related mortality rate was 2.1 times higher in the 25-29 year age group, 4.7 times higher in the 30-34 year age group, and 3.2 times higher in the 35-39 year age group.

Figure 28: Pregnancy-Related Mortality Rates* by Age Group and Race/Ethnicity
Maryland, 2013-2022

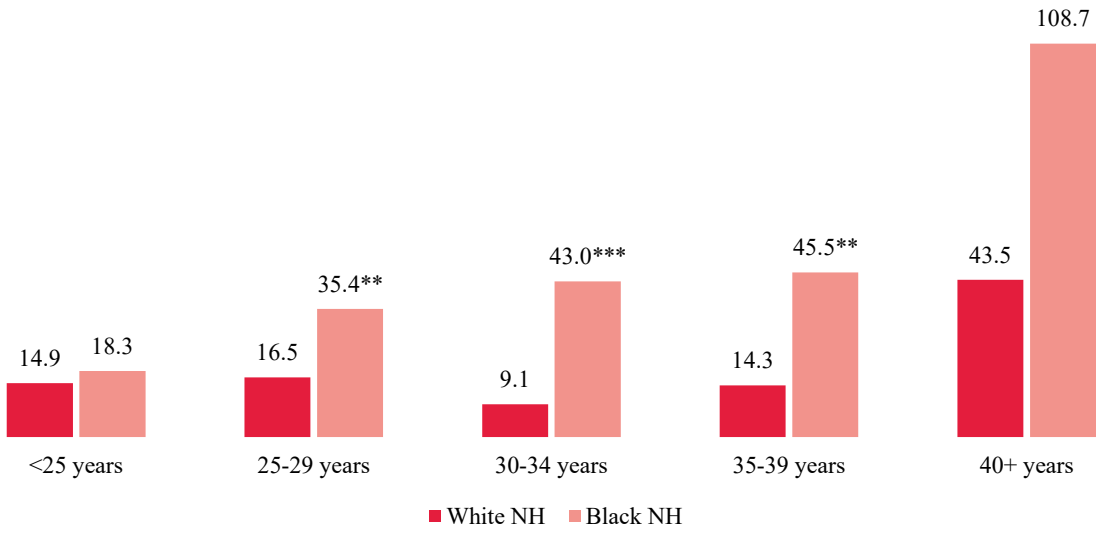


Figure 27
* Number of pregnancy-related deaths per 100,000 live births.
** Denotes statistically significant difference between Black NH and White NH, $p<0.05$.
*** Denotes statistically significant difference between Black NH and White NH, $p<0.001$.
Data Source: Maryland MMR Program as of 10/16/2025.
Note: Additional race/ethnicity categories are not presented due to low counts of deaths (<10) and thus unreliable rates.

The prevalence of pre-existing medical conditions was also determined by race among pregnancy-related death cases from 2013 to 2022 (Figure 28). Diabetes and hypertension were more frequently observed as pre-existing conditions among Black NH individuals compared to White NH individuals, with the difference in pre-existing hypertension proving to be statistically significant. Other psychiatric conditions (e.g. anxiety, bipolar disorder) were more frequently observed as a pre-existing condition in White NH individuals compared to Black NH individuals, a difference which is statistically significant. Pre-existing depression was documented in 31% of pregnancy-related deaths among White NH individuals, and 22% of pregnancy-related deaths among Black NH individuals. While data for Hispanic individuals are presented, results must be interpreted with caution due to the low overall count of pregnancy-related deaths in this population.

Figure 29: Prevalence of Pre-existing Medical Conditions among Pregnancy-Related Deaths, by Race/Ethnicity, Maryland, 2013-2022

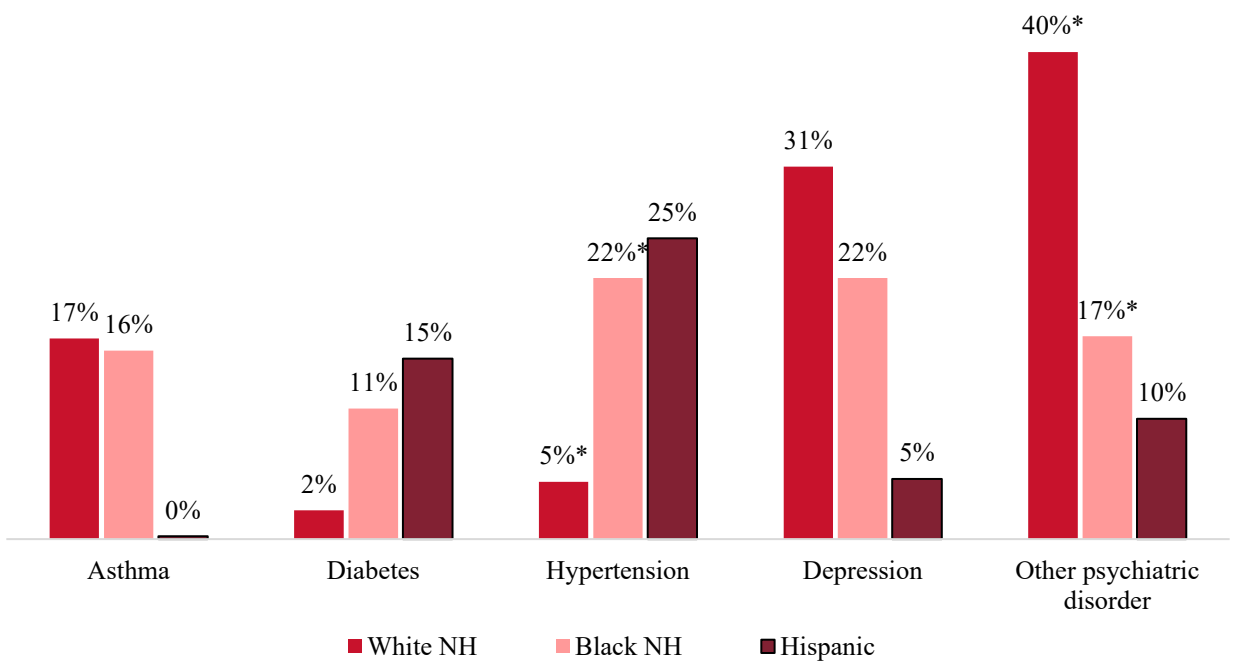


Figure 28
* Denotes statistically significant difference between Black NH and White NH, p<0.05.
Data Source: Maryland MMR Program as of 10/16/2025.
Note: "Other psychiatric disorder" includes anxiety, bipolar disorder, psychotic disorder, and other unspecified psychiatric disorders. Individuals may have more than one pre-existing condition.
Note: Counts for pregnancy-related deaths among Hispanic individuals are relatively low, and results must be interpreted with caution.

Multiyear Review of SUD/OD Deaths, 2013-2022

To better understand factors involved in SUD/OD deaths, a review of pregnancy-associated deaths in Maryland from 2013 to 2022 was undertaken. Over this 10-year period, SUD/OD was the underlying cause of death in 131 (31%) of 424 pregnancy-associated deaths where a cause of death was determined. **Error! Reference source not found.** shows the number of pregnancy-associated overdose deaths by year, with the highest number of cases occurring in 2020.

Figure 30: Pregnancy-Associated Deaths From Substance Use Disorder or Unintended Overdose, Maryland, 2013-2022 (N=131)

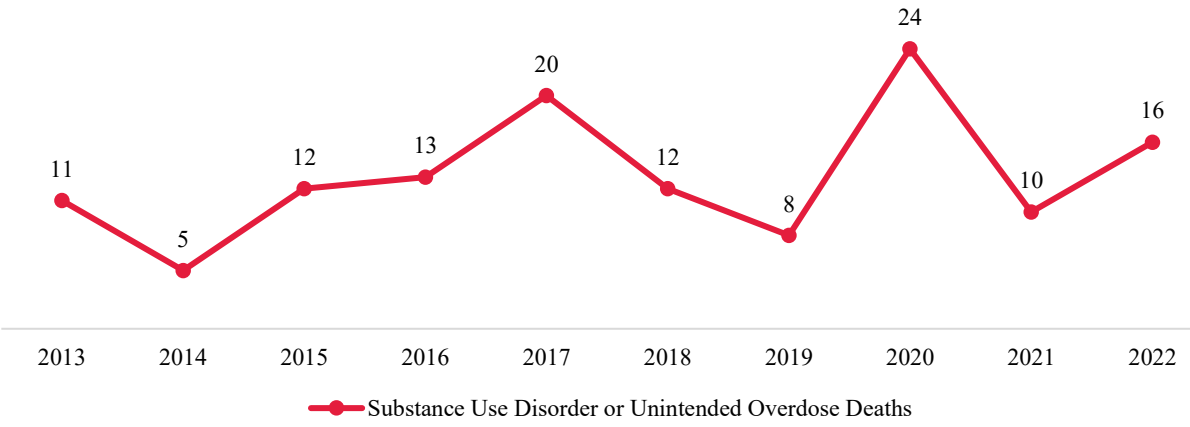


Figure 29
Data Source: VSA and Maryland MMR Program as of 10/16/2025.
Note: The number of overdose deaths from 2020 varies from the Program's 2022 Annual Report and 2023 Annual Report due to updated data and analysis methodology. The analysis for this current report evaluates underlying cause of death.

In Table 2, the 131 deaths due to substance use disorder or unintended overdose are compared with the 293 non-overdose deaths that occurred between 2013 and 2022. Most notably, the racial distribution is strikingly different, with approximately two in three SUD/OD deaths (69%) occurring among White NH persons and over half (54%) of non-overdose deaths occurring among Black NH persons. The average age at death was comparable among both groups (30 years in overdose cases and 31 years in non-overdose cases).

A similar percentage of individuals were pregnant at the time of death in both the overdose (27%) and non-overdose (25%) groups, but more than half (62%) of deaths in the overdose group occurred in the late postpartum period. Deaths following the conclusion of pregnancy occurred, on average, two months later among the overdose group (182 days vs 121 days).

Strikingly, 100% of the overdose deaths from 2013 to 2022 were considered preventable or potentially preventable, compared with 69% of the non-overdose deaths.

Table 2: Incident Characteristics of Pregnancy-Associated Deaths, Maryland, 2013-2022 Data presented as mean ± standard deviation, or number (%)		
Characteristic	**Substance Use Disorder or Unintentional Overdose Deaths (n=131)**	**Non-overdose Deaths (n=293)**
Demographics		
Average age at death (years)	30 ± 5	31 ± 7
White NH	90 (69)	86 (29)
Black NH	32 (24)	158 (54)
Non-Hispanic Other	4 (3)	14 (5)
Hispanic	5 (4)	35 (12)
Timing of death		
Pregnant at death	35 (27)	73 (25)
0-42 days postpartum	13 (10)	86 (29)
43-365 days postpartum	81 (62)	130 (44)
Unknown	2 (2)	4 (1)
Average days postpartum*	182 ± 101	121 ±114
Preventability		
Death preventable or potentially preventable	131 (100)	203 (69)

Table 2: Incident Characteristics of Pregnancy-Associated Deaths, Maryland, 2013-2022

* Among individuals whose death occurred in the postpartum period and exact timing of death in relation to the end of pregnancy was known.

Note: Percentages may not total 100% due to rounding.

Note: Due to updated data and analysis methodology, this table is not directly comparable to those in previous reports.

Data Source: Maryland MMR Program as of 10/16/2025.

Conclusion

Preventable maternal mortality continues to exist in Maryland with persistent disparities in pregnancy-related mortality between Black NH birthing people and their White NH counterparts. This report describes pregnancy-associated deaths from across the state with specific recommendations in the appendices from the MMRT and MMRSG to prevent future deaths that are based on a careful review of each death by a multidisciplinary team.

The Program is actively working to increase its dissemination of information to key partners, including community organizations and birthing people, and reinforce its support for community organizations and partners working to address drivers of pregnancy-associated deaths. In 2025, MDH's Maternal and Child Health Bureau released two new tools to enhance understanding of women's and maternal health: the Maryland Women's Health Dashboard and the Maternal Health Hospital Report Card. [23,24] Further, the Program continues to work closely with the Maternal Health Innovation Program and the Maryland Perinatal Neonatal Quality Collaborative to understand the drivers of severe maternal morbidity and their connections to maternal mortality. Taken together, these efforts continue our collective work to ensure the safety, security, and wellbeing of every birthing Marylander.

[23] https://health.maryland.gov/dataoffice/mdh-dashboards/Pages/WomensHealth.aspx

[24] https://health.maryland.gov/dataoffice/mdh-dashboards/Pages/MHHReportCard.aspx

Appendix A: Definitions

- A pregnancy-associated death is defined by the CDC as, "A death during or within one year 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." [25]
- The pregnancy-associated mortality rate is the number of pregnancy-associated deaths per 100,000 live births in the same time-period.
- A pregnancy-related death is defined by the CDC as, "A death during or within one year 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."[26]
- The pregnancy-related mortality rate is the number of pregnancy-related deaths per 100,000 live births in the same time-period.
- A pregnancy-associated but not related death is defined by the CDC as, "A death during or within one year of pregnancy, from a cause that is not related to pregnancy." [21]
- A pregnancy-associated but unable to determine pregnancy-relatedness death is defined as a death during or within one year of pregnancy, where the MMRT was unable to determine the relatedness between the pregnancy and the cause of death.

[25] CDC. "About Maternal Mortality Review Committees." Maternal Mortality Prevention, 20 May 2024, http://www.cdc.gov/maternal-mortality/php/mmrc/index.html.
[26] Maternal Mortality Review Terminology. (2025). YouTube; CDC Foundation. https://youtu.be/8zdotEjKks4

Appendix B: Maternal Mortality Review Team

MATERNAL MORTALITY REVIEW COMMITTEE

June 23, 2026

The Honorable Wes Moore
Governor
State of Maryland
Annapolis, MD 21401-1991

The Honorable Bill Ferguson
President of the Senate
Maryland General Assembly
H-107 State House
Annapolis, MD 21401-1991

The Honorable Joseline Peña-Melnyk
Speaker of the House
Maryland General Assembly
H-101 State House
Annapolis, MD 21401-1991

RE: Health-General Article §13-1212, Annotated Code of Maryland - 2024 Annual Report – Maryland Maternal Mortality Review (MSAR #12020)

Dear Governor Moore, President Ferguson, and Speaker Peña-Melnyk:

Pursuant to Health-General Article, §13-1212; Senate Bill 459, Chapter 74 of the Acts of 2000; and House Bill 1518, Chapter 308 of the Acts of 2018, and based on the report of the Maternal Mortality Review Program, the Maternal Mortality Review Team submits these recommendations related to maternal mortality in Maryland. The Maternal Mortality Review Team thanks the Governor and the Maryland General Assembly for their leadership and interest in maternal mortality in Maryland and looks forward to working with you for continued improved outcomes in this important public health issue.

If you have questions concerning this report, please contact Meghan Lynch, Director, Office of Governmental Affairs at meghan.lynch@maryland.gov.

Sincerely,

Jaimi S. Hall

Jaimi Hall, MSN, RNC-OB, C-EFM
Maternal Mortality Review Team Chair

Enclosure
Cc:
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Meg Sullivan, MD, MPH, Deputy Secretary, Public Health Services
Peter DeMartino, PhD, Director, Prevention and Health Promotion Administration
Iliana Siarmalis, MPH, MCHES, CPH, Acting Director, Maternal and Child Health Bureau
Sarah Albert, Department of Legislative Services (5 copies)

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Maternal Mortality Review Team (MMRT) Recommendations, 2022 Case Review

In 2022, for the 10th consecutive year, substance use disorder or unintentional drug overdose (SUD/OD) was the leading cause of pregnancy-associated death in Maryland. Sixteen (16) of the 53 pregnancy-associated deaths (30%) resulted from SUD/OD, 75% of which involved the potent opioid fentanyl or one of its analogs. The MMRT makes the following recommendations based on the findings in this report.

Substance Use Disorder

Inadequate pain management and missed opportunities for care connections among pregnant and postpartum individuals with histories of substance use was also a theme in several deaths.

<u>During Labor and Delivery</u>

1. At admission for delivery in patients with a history of opioid use disorder (OUD), providers should consider referral to pain management teams trained in the care of birthing persons with substance use disorder (SUD).
2. Not all facilities may have direct or convenient access to pain management specialists. The MMRT encourages the use of technology-based solutions (i.e. telemedicine consultation with specialists or utilization of the MACS for MOMS provider warmline) to support appropriate clinical guidance and practice. These connections could be made to a range of health care professionals (potentially including, but not limited to: pharmacists, anesthesiologists, behavioral health practitioners, pain specialists, and obstetricians) who are qualified to provide consultation on pain management strategies.
    a. Hospital systems may consider models that support higher acuity facilities in providing specialist access to lower acuity facilities, such as models used for maternal fetal medicine consultations.

<u>During the postpartum period</u>

3. Health care teams (potentially including clinicians, payors, state and local health departments, and community birth workers) should optimize improved postpartum pain management for patients with a history of OUD that may include the use of holistic pain management strategies and comfort techniques.
4. Providers should ensure use of shared decision making with individuals who have a history of SUD, especially when narcotics use might be indicated (i.e. planned C-section).
5. The MMRT also observed several deaths where individuals experienced an overdose when they went back to a previously used and tolerated dosage. There is an opportunity for improved education and integration of harm reduction strategies.
    a. Providers should counsel all patients with a history of substance use disorder on their continued risk of relapse, especially the increased risk of relapse in the first year postpartum.

This year's review again saw multiple birthing people who were offered substance use treatment resources but chose not to engage with care at that time.

6. For individuals not yet ready to access treatment services, easily accessible safe use sites should be established, in accordance with the growing evidence base demonstrating their positive impacts. Safe use sites should be staffed by trained personnel who are equipped to provide education, referrals to substance use disorder treatment, and other resources to people who use drugs.

Care Connections

As in past years, there continue to be opportunities to strengthen care coordination and movement of patients between various health and social systems during pregnancy and as they transition into the postpartum period. Absence of case management and referral services were noted as contributing to several deaths. The MMRT has also made several recommendations specific to the value of these services for pregnant and postpartum individuals with SUD.

1. Hospitals should offer case management to all pregnant and postpartum patients with complex, somatic, behavioral, and/or social diagnoses, unless they have documented that another professional healthcare entity is providing case management. These services could be provided by dedicated social workers or case managers embedded in birthing facilities.
2. Insurers should be required to offer case management services for individuals with multiple co-occurring chronic conditions to publicize and promote these services. Services provided should be ongoing beyond the postpartum period and into the inter-conception period.
3. The State, health systems, and other entities supporting care coordination should promote peer navigators in emergency departments to link patients with substance use disorder to care.
4. The Maryland Department of Health (MDH) should evaluate the capacity of local county/communities to provide resources to birthing/postpartum persons with substance use disorders, including full behavioral health care, and ensure sufficient state resources are available to meet the need of that jurisdiction or region.
5. Behavioral health providers and obstetric providers should actively coordinate care throughout the pregnancy and postpartum periods for patients with substance use disorders and/or significant mental health conditions.
    a. When behavioral health providers become aware that a patient is pregnant, they should make a reasonable effort to obtain consent for bidirectional release of medical records so care can be coordinated.
    b. Likewise, if obstetric providers are aware that a patient is obtaining mental health and/or substance use care, they should make a reasonable effort to obtain consent for bidirectional release of medical records.
    c. The State can also support information sharing by circulating the standard consent form for substance use records release to obstetric providers.

Supporting Patient Access to Care

<u>Transportation</u>

1. Hospitals, offices, and healthcare systems should consider the impact lack of transportation has on birthing people's ability to access care and ensure that birthing people are assessed for barriers

to transportation and provided with transportation vouchers. This includes any barriers specific to attending prenatal, postpartum, and behavioral health visits.

Telehealth

1. Providers and health systems should expand the use of telemedicine to address barriers such as transportation, particularly for high-risk patients. When a telemedicine visit notes a potential issue, the provider must attempt to remove barriers preventing an in-person visit and have the patient present in person.

Patient-driven monitoring

1. Remote blood pressure monitoring devices should be issued as a standard practice for all pregnant patients in Maryland.

Childcare

The MMRT recognizes that some pregnant patients lack safe childcare and this presents a barrier to receiving both routine prenatal/postpartum care and more urgent pregnancy-related services. These patients are disproportionately lower-income and at higher risk of serious complications because of lack of childcare.

1. Health care systems, community-based organizations, professional associations such as the Maryland Chapter of the American College of Obstetricians and Gynecologists (ACOG), and other providers should engage in conversations to identify how pregnant and postpartum patients can be supported in bringing children to outpatient visits, and identifying emergency care options if they need hospital-based services.
    a. Possible solutions could include investments and coordination of services, such as postpartum sibling doulas or emergency in-hospital childcare.

Facilitating Postpartum Visit Attendance

ACOG recommends that all recently pregnant individuals attend a postpartum visit ideally within the first three weeks and no later than 12 weeks after the end of pregnancy.[*] In Maryland, approximately 10% of new parents report not attending these visits within the recommended timeframe.[†] The MMRT reviewed several instances where lack of attendance at a postpartum visit contributed to deaths. To support postpartum visit attendance, the MMRT recommends:

1. Obstetricians, women's health providers, and MDH should provide education on the importance and utility of prenatal and postpartum care, particularly regarding interconnections with other health conditions. This education can be provided through provider visits and via public health campaigns.

[*] ACOG Committee Opinion No. 736: Optimizing Postpartum Care. Obstetrics & Gynecology 131(5):p e140-e150, May 2018. | DOI: 10.1097/AOG.0000000000002633. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2018/05/optimizing-postpartum-care
[†] Maryland PRAMS 2023

2. Maryland law requires that all birthing hospitals contact postpartum individuals within 24-48 hours after discharge. Staff who make these calls could utilize these connection points to encourage individuals to return for their postpartum visit.
3. Providers can also consider adjusting the timing of the postpartum visit, in consultation with the patient, to a shorter and/or more feasible time interval.
    a. This is especially critical for patients with certain conditions (for example, hypertensive disorders of pregnancy or underlying depression and anxiety disorders) who should be scheduled and encouraged to come in sooner.
4. Providers can also explore alternative models (such as dyad care visits) of postpartum and pediatric care to support postpartum visit attendance and opportunities to address concerns.
5. Health systems and providers should utilize all possible appointment joining options (in-person vs. telehealth) and consider patient concerns and acuity.

Violence

Four of 53 deaths (8%) reviewed in 2022 were due to gun violence.

1. Policymakers should develop ways of restricting gun access and improving safety measures, such as passing legislation, to limit the public health impact of gun violence. These include, but are not limited to, increased gun safety and safe storage education and access to gun locks, universal screening for the presence of guns in the home, and implementation of red flag laws.
2. Healthcare providers should provide universal education on intimate partner violence to all patients especially in pregnancy and postpartum. These materials should ideally be provided at multiple points, including as part of discharge materials. Education systems should include content on healthy relationships starting in middle school.

Appendix C: Maternal Mortality Review Stakeholder Group

Maternal Mortality Review Stakeholder Group (MMRSG) Background

House Bill 1518, enacted during the 2018 legislative session of the Maryland General Assembly, established a Maternal Mortality Review Stakeholder Group (MMRSG) in Md. Ann. Code Health – General Art. §13-1208. The statute requires MMRSG to meet at least twice a year to review the findings and recommendations in the annual Maternal Mortality Review Report. This group includes representatives of the Maryland Office of Minority Health and Health Disparities, the Maryland Patient Safety Center, the Baltimore Healthy Start Program, women's health advocacy organizations, community organizations engaged in maternal health and family support issues, family members that have experienced a maternal death, local health department staff, and health care providers that provide maternal health services (a full membership listing is included in this Appendix).

MMRSG is charged with reviewing and adding to the recommendations of the Maternal Mortality Review Report, examining issues resulting in disparities in maternal deaths, and identifying new recommendations with a focus on initiatives to address disparities in maternal deaths. Recommendations from MMRSG follow those put forward by the Maternal Mortality Review Team (MMRT).

Maternal Mortality Review Stakeholder Group Membership

Melissa Aftoora, Queen Anne's County Health Department
Asjouré Brown, House of Ruth Maryland
Jennifer Corder, MD, Maryland Association of County Health Officers
Pastor Meldon Dickens, Community Representative
Kathryn Fiddler, DNP, Maryland Commission for Women
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Rosemarie DiMauro Satyshur, PhD, RN, Family Representative, University of Maryland School of Nursing
Ben Wormser, MD, MPH, Maryland Department of Health
Diane Young, DrPH, MS, RN, Prince George's County Health Department

Maternal Mortality Review Stakeholder Group Recommendations, 2022 Case Review

Substance Use Disorder

The MMRSG expanded on the MMRT's recommendation to establish accessible safe use sites, noting that individuals must often seek these services beyond their local area.

- When considering interventions to address substance use in pregnancy and postpartum, programs should also take into account logistics, including addressing barriers to care access like transportation.

Violence Prevention and Maternal Mortality

The MMRSG discussed recommendations made by the MMRT concerning homicides where intimate partner violence (IPV) was a contributor, emphasizing that education on healthy relationships can also be expanded to occur in settings beyond clinical care.

- The MMRSG recommended that facilities should deliver standardized screening and education for IPV to ensure all patients are receiving the same assessment and information. Groups that interact with pregnant and postpartum individuals should also provide education on the increased risk of IPV during pregnancy and in the postpartum period.

Care Coordination

The report noted continuity of care and referrals as factors contributing to pregnancy-associated deaths in 2022. The MMRSG discussed that gaps in care can occur when individuals seek care across healthcare settings or across the state.

- The MMRSG recommended ensuring capacity for warm handoffs, particularly for patients that may be seeking or receiving care across jurisdictions. Hospitals, perinatal care facilities, local health departments, and community organizations need resources to ensure staff and training to respond to referrals.

Life Course

Promoting health and wellness during adolescence can lay the foundation for healthier pregnancies later in life. The MMRSG discussed establishing early support for preventive care, chronic disease management, and healthy behaviors to improve long-term maternal outcomes.

- School health programs, school-based health centers, federally qualified health centers, local health departments and other groups that engage with teens and young adults should be leveraged to support health care delivery and promotion. These efforts should focus on health across the life course, including chronic disease prevention and management.

Telemedicine

The MMRSG discussed opportunities to improve engagement and to reduce transportation-related and childcare-related barriers in accessing care.

- Providers should fully utilize telemedicine and other remote monitoring options, including virtual doula support and community health worker (CHW) support, to support healthy pregnancies and postpartum periods.
- CHWs could be particularly important to support postpartum follow up after discharge as required under the Maternal Health Act of 2024, including providing education on maternal warning signs.

Comprehensive Reproductive Care

- The State should invest in efforts to prevent unintended pregnancy and comprehensive reproductive care that includes engagement of all individuals, including male partners.

Appendix D: Five-Year Rolling Maternal Mortality Rates by Race and Ethnicity, Maryland and United States, 2003-2022

Appendix D shows the five-year rolling MMR by race and ethnicity in Maryland from 2003 to 2022.

Table D1: Five-Year Rolling Maternal Mortality Rate* by Race/Ethnicity, Maryland and United States, 2003-2022

	Maryland			United States		
Year	**All Races**	**White NH**	**Black NH**	**All Races**	**White NH**	**Black NH**
2003-2007	21.6	13.3	41.1	13.3	9.8	33.9
2004-2008	21.2	13.0	38.1	13.9	10.5	34.6
2005-2009	21.9	14.5	38.6	14.6	11.4	35.5
2006-2010	24.1	17.6	40.2	15.0	11.7	35.1
2007-2011	25.7	20.9	37.5	16.1	13.3	36.7
2008-2012	25.5	20.6	39.8	17.6	14.5	40.4
2009-2013	24.5	20.4	39.8	18.9	16.0	43.5
2010-2014	25.7	18.7	45.2	19.9	17.0	45.2
2011-2015	23.5	17.6	40.5	20.7	18.1	47.2
2012-2016	19.7	12.3	38.0	21.2	18.6	48.3
2013-2017	19.5	11.8	35.7	21.6	19.1	48.2
2014-2018	18.4	8.8	35.1	20.7	18.2	45.4
2015-2019	17.2	11.6	27.8	20.4	17.9	44.1
2016-2020	17.5	12.9	29.2	20.9	18.2	47.0
2017-2021	21.7	18.7	32.7	23.1	19.5	50.6
2018-2022	21.3	19.0	31.4	23.2	19.5	51.0

*Rate of maternal deaths per 100,000 live births. Source: CDC WONDER as of 01/31/2026.
Ranges 2003-2007 through 2015-2019: MMR for White NH and Black NH individuals are calculated using bridged race data.
Ranges 2016-2020 through 2017-2021: MMR *estimates* for White NH and Black NH individuals are calculated using single race data where available, and bridged race data where single race data are not available.
Ranges 2018-2022 onwards: MMR for White NH and Black NH individuals are calculated using single race data.
As a result of the rate calculations, the disaggregated rate estimates for White NH and Black NH individuals between the three periods described above are not directly comparable (indicated by breaks in the line graph).

Additional information on the differences between bridged-race and single-race data may be found on the CDC, National Center for Health Statistics (NCHS) website: https://web.archive.org/web/20250131112416/https://www.cdc.gov/nchs/hus/sources-definitions/nhis.htm

Appendix E: Centers for Disease Control and Prevention's Maternal Mortality Review Committee Decisions Form

REVIEW DATE

Month/Day/Year

RECORD ID #

PREGNANCY-RELATEDNESS: SELECT ONE

☐ PREGNANCY-RELATED
A death during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy

☐ PREGNANCY-ASSOCIATED, BUT NOT-RELATED
A death during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy

☐ PREGNANCY-ASSOCIATED BUT UNABLE TO DETERMINE PREGNANCY-RELATEDNESS

ESTIMATE THE DEGREE OF RELEVANT INFORMATION (RECORDS) AVAILABLE FOR THIS CASE:
These fields are for internal jurisdiction use in order to evaluate opportunities to gain better access to information for reviews.

☐ COMPLETE
All records necessary for adequate review of the case were available

☐ SOMEWHAT COMPLETE
Major gaps (i.e., information that would have been crucial to the review of the case)

☐ MOSTLY COMPLETE
Minor gaps (i.e., information that would have been beneficial but was not essential to the review of the case)

☐ NOT COMPLETE
Minimal records available for review (i.e., death certificate and no additional records)

DOES THE COMMITTEE AGREE WITH THE UNDERLYING[1] CAUSE OF DEATH LISTED ON DEATH CERTIFICATE?
The underlying cause of death determination as documented by a multidisciplinary MMRC may be different from the underlying cause of death used by pathologists in the course of death certification documented in the Vital Statistics system.

☐ YES ☐ NO

COMMITTEE DETERMINATION OF CAUSE(S) OF DEATH

IF PREGNANCY-RELATED, COMMITTEE DETERMINATION OF UNDERLYING[1] CAUSE OF DEATH
Refer to Appendix A for PMSS-MM cause of death list.

If a death is pregnancy-associated, not related then an underlying cause of death entry is not necessary. Use optional box below.

TYPE	OPTIONAL: CAUSE (DESCRIPTIVE)
UNDERLYING[1,2]	
CONTRIBUTING[2,3]	
IMMEDIATE[2]	
OTHER SIGNIFICANT[2]	

COMMITTEE DETERMINATIONS ON CIRCUMSTANCES SURROUNDING DEATH[4]

DID **OBESITY** CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN
DID **DISCRIMINATION**[5] CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN
DID **MENTAL HEALTH CONDITIONS** OTHER THAN SUBSTANCE USE DISORDER CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN
DID **SUBSTANCE USE DISORDER** CONTRIBUTE TO THE DEATH?	☐ YES	☐ PROBABLY	☐ NO	☐ UNKNOWN

MANNER OF DEATH

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

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

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

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

- ☐ NO RELATIONSHIP
- ☐ PARTNER
- ☐ EX-PARTNER
- ☐ OTHER RELATIVE
- ☐ OTHER
- ☐ ACQUAINTANCE
- ☐ OTHER, SPECIFY:
- ☐ UNKNOWN
- ☐ NOT APPLICABLE

[1] Underlying cause refers to the disease or injury that initiated the chain of events leading to death or the circumstances of the accident or violence which produced the fatal injury.
[2] OPTIONAL field, CDC does not use this data.
[3] Add descriptions of contributors in the pathway between the immediate and underlying cause of death, as provided by the committee. Note that this is different from the contributing factors worksheet on page 2.
[4] If "Yes" or "Probably" is selected for preventable deaths, then an aligned contributing factor class and description would be expected in the grid on page 2.
[5] Encompasses Discrimination, Interpersonal Racism, and Structural Racism as described in Appendix B.

COMMITTEE DETERMINATION OF PREVENTABILITY

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

WAS THIS DEATH PREVENTABLE? ☐ YES ☐ NO

CHANCE TO ALTER OUTCOME[6] ☐ GOOD CHANCE ☐ SOME CHANCE ☐ NO CHANCE ☐ UNABLE TO DETERMINE

CONTRIBUTING FACTORS AND RECOMMENDATIONS FOR ACTION (Entries may continue to grid on page 3)

CONTRIBUTING FACTORS WORKSHEET

What were the factors that contributed to this death? Multiple contributing factors may be present at each level: Choose one contributing factor per row until all contributing factors have been identified and described.

RECOMMENDATIONS OF THE COMMITTEE

If there was at least some chance that the death could have been averted, what were the specific and feasible actions that, if implemented or altered, might have changed the course of events? Develop one recommendation per row until all contributing factors have been addressed.

DESCRIPTION OF ISSUE (enter a description for EACH contributing factor listed)	**CONTRIBUTING FACTOR** (enter one per row; repeat as needed if a contributor has more than one recommendation)	**LEVEL**	**COMMITTEE RECOMMENDATION** [Who?] should [do what?] [when?] Map recommendations to contributing factors; repeat as needed if a recommendation has more than one contributor.	**LEVEL**	**PREVENTION TYPE** (choose below)	**EXPECTED IMPACT** (choose below)

CONTRIBUTING FACTOR KEY (DESCRIPTIONS IN APPENDIX B)

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

DEFINITION OF LEVELS

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

PREVENTION TYPE

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

EXPECTED IMPACT

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

[6] If “Good Chance” or “Some Chance” are selected, then CDC considers this is a “Yes” in their analytic use of the preventability determination.

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

CONTRIBUTING FACTORS WORKSHEET

What were the factors that contributed to this death? Multiple contributing factors may be present at each level: Choose one contributing factor per row until all contributing factors have been identified and described.

RECOMMENDATIONS OF THE COMMITTEE

If there was at least some chance that the death could have been averted, what were the specific and feasible actions that, if implemented or altered, might have changed the course of events? Develop one recommendation per row until all contributing factors have been addressed.

DESCRIPTION OF ISSUE (enter a description for EACH contributing factor listed)	**CONTRIBUTING FACTOR** (enter one per row; repeat as needed if a contributor has more than one recommendation)	**LEVEL**	**COMMITTEE RECOMMENDATIONS** [Who?] should [do what?] [when?] Map recommendations to contributing factors; repeat as needed if a recommendation has more than one contributor.	**LEVEL**	**PREVENTION TYPE** (choose below)	**EXPECTED IMPACT** (choose below)

CONTRIBUTING FACTORS AND RECOMMENDATIONS FOR ACTION (Continued from page 3)

CONTRIBUTING FACTORS WORKSHEET

What were the factors that contributed to this death? Multiple contributing factors may be present at each level: Choose one contributing factor per row until all contributing factors have been identified and described.

RECOMMENDATIONS OF THE COMMITTEE

If there was at least some chance that the death could have been averted, what were the specific and feasible actions that, if implemented or altered, might have changed the course of events? Develop one recommendation per row until all contributing factors have been addressed.

DESCRIPTION OF ISSUE (enter a description for EACH contributing factor listed)	**CONTRIBUTING FACTOR** (enter one per row; repeat as needed if a contributor has more than one recommendation)	**LEVEL**	**COMMITTEE RECOMMENDATIONS** [Who?] should [do what?] [when?] Map recommendations to contributing factors; repeat as needed if a recommendation has more than one contributor.	**LEVEL**	**PREVENTION TYPE** (choose below)	**EXPECTED IMPACT** (choose below)

APPENDIX A. PMSS-MM CODES: IF PREGNANCY-RELATED,[7] COMMITTEE DETERMINATION OF UNDERLYING[1] CAUSE OF DEATH

Hemorrhage (Excludes Aneurysms or CVA)
10.1 - Hemorrhage – Uterine Rupture
10.2 - Placental Abruption
10.3 - Placenta Previa
10.4 - Ruptured Ectopic Pregnancy
10.5 - Hemorrhage – Uterine Atony/Postpartum Hemorrhage
10.6 - Placenta Accreta/Increta/Percreta
10.7 - Hemorrhage due to Retained Placenta
10.10 - Hemorrhage – Laceration/Intra-Abdominal Bleeding
10.9 - Other Hemorrhage/NOS

Infection
20.1 - Postpartum Genital Tract (e.g., of the Uterus/ Pelvis/Perineum/Necrotizing Fasciitis)
20.2 - Sepsis/Septic Shock
20.4 - Chorioamnionitis/Antepartum Infection
20.6 - Urinary Tract Infection
20.7 - Influenza
20.8 - COVID-19
20.10 - Pneumonia
20.11 - Other Non-Pelvic Infection (e.g., TB, Meningitis, HIV)
20.9 - Other Infection/NOS

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

Amniotic Fluid Embolism
31.1 - Amniotic Fluid Embolism

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

Anesthesia Complications
70.1 - Anesthesia Complications

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

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

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

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

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

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

Cardiovascular Conditions (excluding cardiomyopathy, HDP, and CVA)
90.1 - Coronary Artery Disease/Myocardial Infarction (MI)/Atherosclerotic Cardiovascular Disease
90.2 - Pulmonary Hypertension
90.3 - Valvular Heart Disease Congenital and Acquired
90.4 - Vascular Aneurysm/Dissection (Non-Cerebral)
90.5 - Hypertensive Cardiovascular Disease
90.6 - Marfan Syndrome
90.7 - Conduction Defects/Arrhythmias
90.8 - Vascular Malformations Outside Head and Coronary Arteries
90.9 - Other Cardiovascular Disease, including CHF, Cardiomegaly, Cardiac Hypertrophy, Cardiac Fibrosis, Non-Acute Myocarditis/NOS

Pulmonary Conditions (Excludes ARDS-Adult Respiratory Distress Syndrome)
91.1 - Chronic Lung Disease
91.2 - Cystic Fibrosis
91.3 - Asthma
91.9 - Other Pulmonary Disease/NOS

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

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

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

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

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

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

Unknown COD
999.1 - Unknown COD

[1] Underlying cause refers to the disease or injury that initiated the chain of events leading to death or the circumstances of the accident or violence which produced the fatal injury.
[7] Pregnancy-related death: death during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

APPENDIX B. CONTRIBUTING FACTOR DESCRIPTIONS

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

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

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

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

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

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

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

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

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

DISCRIMINATION
Treating someone less or more favorably based on the group, class or category they belong to resulting from biases, prejudices, and stereotyping. It can manifest as differences in care, clinical communication and shared decision-making. (Hardeman, 2022)[8]

ENVIRONMENTAL FACTORS
Factors related to weather or social environment.

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

INTERPERSONAL RACISM
Discriminatory interactions between individuals based on differential assumptions about the abilities, motives, and intentions of others and resulting in differential actions toward others based on their race. It can be conscious as well as unconscious, and it includes acts of commission and acts of omission. It manifests as lack of respect, suspicion, devaluation, scapegoating, and dehumanization. (Hardeman, 2022)[8]

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

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

LEGAL
Legal considerations that impacted outcome.

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

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

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

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

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

STRUCTURAL RACISM
The systems of power based on historical injustices and contemporary social factors that systematically disadvantage people of color and advantage white people through inequities in housing, education, employment, earnings, benefits, credit, media, health care, criminal justice, etc. (Hardeman, 2022)[8]

SUBSTANCE USE DISORDER – ALCOHOL, ILLICIT/ PRESCRIPTION DRUGS
Substance use disorder is characterized by recurrent use of alcohol and/or drugs causing clinically and functionally significant impairment, such as health problems or disability. The committee may determine that substance use disorder contributed to the death when the disorder directly compromised their health status (e.g., acute methamphetamine intoxication exacerbated pregnancy- induced hypertension, or they were more vulnerable to infections or medical conditions).

TOBACCO USE
The patient's use of tobacco directly compromised the patient's health status (e.g., long-term smoking led to underlying chronic lung disease).

TRAUMA
The individual experienced trauma: i.e., loss of child (death or loss of custody), rape, molestation, or one or more of the following: sexual exploitation during childhood plus persuasion, inducement, or coercion of a child to engage in sexually explicit conduct; or other physical or emotional abuse other than that related to sexual abuse during childhood.

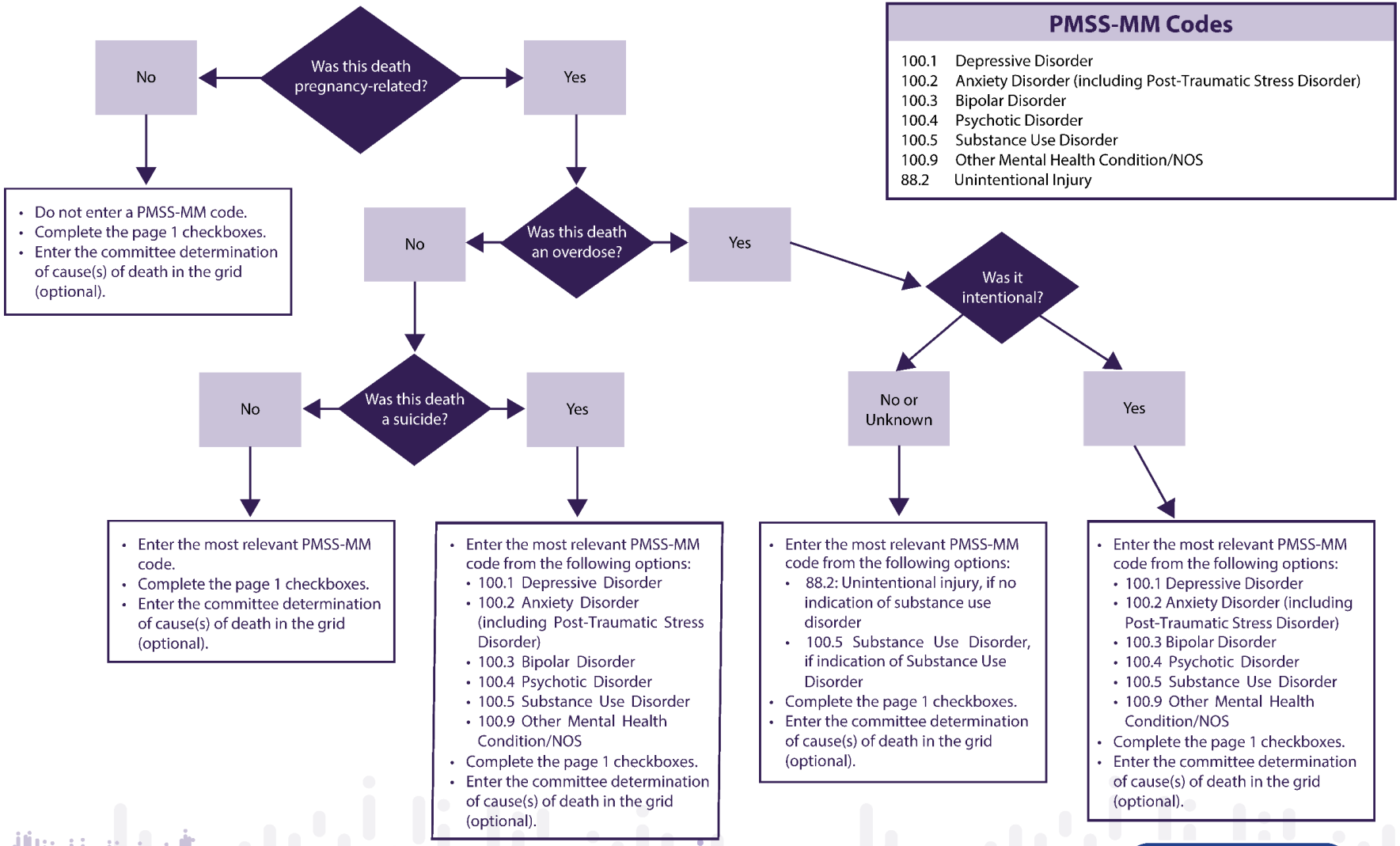
UNSTABLE HOUSING
Individual lived "on the street," in a homeless shelter, or in transitional or temporary circumstances with family or friends.

VIOLENCE AND INTIMATE PARTNER VIOLENCE (IPV)
Physical or emotional abuse perpetrated by current or former intimate partner, family member, friend, acquaintance, or stranger.

OTHER
Contributing factor not otherwise mentioned. Please provide description.

[8] Hardeman RR, et al. *Developing Tools to Report Racism in Maternal Health for the CDC Maternal Mortality Review Information Application (MMRIA): Findings from the MMRIA Racism & Discrimination Working Group*. Matern Child Health J. 2022.

APPENDIX C. CODING UNDERLYING CAUSE OF DEATH FOR SUICIDES AND OVERDOSES



PMSS-MM Codes

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

APPENDIX D. FAQ: COMMITTEE DETERMINATIONS ON CIRCUMSTANCES SURROUNDING DEATH

These frequently asked questions refer to the following checkboxes on the committee decisions form:

Did obesity contribute to the death?
Did discrimination[9] contribute to the death?
Did mental health conditions other than substance use disorder contribute to the death?
Did substance use disorder[10] contribute to the death?
Was this death a suicide?
Was this death a homicide?
If accidental death, homicide, or suicide, list the means of fatal injury.
If homicide, what was the relationship of the perpetrator to the decedent?

1. **Should the checkboxes be completed for all pregnancy-associated deaths or just those determined to be pregnancy-related?**

   The checkboxes should be completed for all deaths reviewed by your committee, regardless of relatedness. If your committee does not review a pregnant or postpartum person's death because it is considered out of your scope, there is no need to complete the checkboxes.

2. **Should the checkboxes be completed in reference to the pregnant or postpartum person, or the broader context surrounding the death?**

   The checkboxes refer to the decedent's own experience. For example, if a pregnant or postpartum person had a substance use disorder which contributed to the death, the checkbox should be marked 'yes'. In contrast, if the death was a homicide where the perpetrator had a substance use disorder that contributed to causing a death, and the victim did not have a substance use disorder, or the victim had a substance use disorder that did not contribute to the death, the checkbox should be marked 'no'.

3. **Does discrimination encompass racism and other forms of bias?**

   Yes, and more specificity may be added using the contributing factors worksheet on page 2 of the committee decisions form. Interpersonal racism or structural racism may also be documented there.

4. **If substance use was involved in the death, should we choose 'yes' for the substance use disorder checkbox?**

   This checkbox refers to 'substance use disorder', not just substance use. The committee should only choose 'yes' or 'probably' if there is indication of a substance use disorder diagnosis or an expert on the committee (e.g., psychiatrist, psychologist, licensed counselor) who feels that the criteria for a diagnosis of substance use disorder are met based on the available information. Additionally, the checkbox should only be marked 'yes' if the committee decides that the substance use disorder was a contributing factor in the death. If the pregnant or postpartum person had a substance use disorder but this did not contribute to the death, the checkbox should be marked 'no'.

   If the committee determines the death was an intentional or accidental overdose, this should be recorded as poisoning/overdose under means of fatal injury.

5. **For the substance use disorder and mental health conditions checkboxes, is a formal diagnosis required?**

   A diagnosis should ideally be indicated in the pregnant or postpartum person's medical records. However, this may underestimate the number of pregnant or postpartum people with substance use disorder or mental health conditions if persons are unable to access care or treatment. Refer to your review committee subject matter experts (e.g. psychiatrist, psychologist, licensed counselor) to determine whether the criteria for a diagnosis of substance use disorder or another mental health condition are met based on the available information.

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[9] Defined as treating someone less or more favorably based on the group, class or category they belong to resulting from biases, prejudices, and stereotyping [including racism]. It can manifest as differences in care, clinical communication and shared decision-making. (Hardeman RR, et al. *Developing Tools to Report Racism in Maternal Health for the CDC Maternal Mortality Review Information Application (MMRIA): Findings from the MMRIA Racism & Discrimination Working Group*. Matern Child Health J. 2022.)

[10] Characterized by recurrent use of alcohol and/or drugs causing clinically and functionally significant impairment, such as health problems or disability. The committee may determine that substance use disorder contributed to the death when the disorder directly compromised a pregnant or postpartum person's health status (e.g., acute methamphetamine intoxication exacerbated pregnancy-induced hypertension, or the pregnant or postpartum person was more vulnerable to infections or medical conditions).

6. **If substance use disorder contributed to the death, but another mental health condition did not, should we also choose 'yes' for the mental health conditions checkbox?**

   No, substance use disorder should be captured separately from other mental health conditions.

7. **Does substance use disorder include tobacco use?**

   No, substance use disorder as defined here does not include tobacco use. You would NOT mark the substance use disorder checkbox as 'yes' or 'probably' based solely on tobacco use. If the committee determines that tobacco use was a contributor to the death, ensure that Tobacco Use is noted in the contributing factor worksheet with an actionable recommendation that addresses it.

8. **When do we need to choose a means of fatal injury on the committee decisions form?**

   If the committee determines that a death was an accidental death, homicide, or suicide, they should also determine the means of fatal injury to be recorded on the committee decisions form. Unintentional and intentional overdoses should be recorded as poisoning/overdose.

9. **If the committee selects 'yes' or 'probably' for any of the checkboxes (obesity, discrimination, mental health conditions, and/or substance use disorder), should they always document the corresponding contributing factor class and an actionable recommendation?**

   Typically, we expect the circumstances surrounding a death to align with a specified contributing factor class and recommendation. However, recommendations are focused on actions that would have prevented the death. If your committee determines that a circumstance such as obesity contributed to a death that is not preventable, they do not need to document a contributing factor class and recommendation.

10. **When do we need to choose a relationship of the perpetrator to the decedent?**

    If the committee determines that a death was a homicide, they should also record the relationship of the perpetrator to the decedent on the committee decisions forms. The means of fatal injury checkbox should also be filled out for all homicides.

11. **If certain deaths are not reviewed by our committee (for example, suicides and homicides), should we still complete the checkboxes?**

    No, these checkboxes are intended to capture the committee decisions. If a death is not reviewed by the committee, the Circumstances Surrounding Death checkboxes should not be completed.

12. **What if our determination for manner of death does not match the manner indicated on the death record?**

    The checkboxes are intended to capture the decisions of the review committee, and it is expected that sometimes these decisions may differ from the death record. For example, an overdose may have an unknown manner of death on the death certificate, but relevant subject matter experts (e.g. medical examiner), could review additional information and determine that the overdose was intentional. The committee would then check 'yes' for the suicide checkbox. There is also a place on the committee decisions form for indicating whether the committee agrees with the cause of death listed on the death certificate.

13. **Are there opportunities for quality improvement with the checkbox data?**

    Yes, there are lots of opportunities using checkbox data. For example, all unintentional overdoses and overdoses of unknown intent with indication of substance use disorder should have an underlying cause of death PMSS-MM code of 100.5 (Substance Use Disorder) or 100.9 (Other Mental Health Conditions/NOS). If the substance use disorder checkbox is marked 'yes', but the PMSS-MM code is 88.2 (Unintentional Injury), there may be discrepancies in how the MMRC is selecting PMSS-MM codes.

    Another opportunity for quality improvement is to compare the obesity checkbox with the decedent's actual BMI calculated using the height and weight provided in the records. Are there instances where your committee is selecting 'yes' when the BMI suggests the person was at a healthy weight? Of note—this checkbox is intended to capture whether obesity contributed to the death, not whether the pregnant or postpartum person was obese / obesity was present.

APPENDIX E. CONSENSUS PREGNANCY-RELATED CRITERIA FOR SUICIDE AND UNINTENTIONAL OVERDOSES[11, 12]

Present Y/N	Consensus pregnancy-related criteria for suicide and unintentional overdoses	Examples
	Pregnancy Complication	
	Increased pain directly attributable to pregnancy or postpartum events leading to self-harm or drug use that are implicated in suicide or unintentional drug-related death. *[consensus during pregnancy]*	Back pain, pelvic pain, kidney stones, cesarean incision, or perineal tear pain
	Traumatic event in pregnancy or postpartum (diagnosis of fetal anomaly, stillbirth, preterm delivery, neonatal or infant death, traumatic delivery experience, removal of children from custody) with a temporal relationship between the event leading to self-harm or increased drug use and subsequent death. *[consensus in all time periods]*	Stillbirth, preterm delivery, diagnosis of fetal anomaly, traumatic delivery experience, relationship destabilization due to pregnancy, removal of child(ren) from custody
	Pregnancy-related complication likely exacerbated by drug use leading to subsequent death. *[consensus in pregnancy – only time period considered]*	Placental abruption or preeclampsia in setting of drug use
	Chain of Events Initiated by Pregnancy	
	Cessation or attempted taper of medications for pregnancy-related concerns (neonatal/fetal exposure risk, fear of child protective service involvement) leading to maternal destabilization or drug use and subsequent death. Neonatal or fetal risk - *[consensus in all time periods]*. Child Protective Service involvement - *[consensus during pregnancy]*	Substance use pharmacotherapy (methadone or buprenorphine), psychiatric medications, pain medications
	Inability to access inpatient or outpatient addiction or mental health treatment due to pregnancy. *[consensus during and within 6 months of pregnancy]*	Health care professionals uncomfortable with treating pregnant women, facilities not available that accept pregnant women
	Perinatal psychiatric conditions resulting in maternal destabilization or drug use and subsequent death. *[consensus during and within 6 months of pregnancy]*	Depression diagnosed in pregnancy or postpartum resulting in suicide
	Recovery/stabilization of substance use disorder achieved during pregnancy or postpartum with clear statement in records that pregnancy was motivating factor with subsequent relapse and subsequent death. *[no consensus at any time period]*	Relapse leading to overdose due to decreased tolerance or polysubstance use
	Aggravation of Underlying Condition by Pregnancy	
	Worsening of underlying depression, anxiety or other psychiatric condition in pregnancy or postpartum period with documentation that mental illness led to drug use or self-harm and subsequent death. *[consensus during and within 6 months of pregnancy]*	Pre-existing depression exacerbated in the postpartum period leading to suicide
	Exacerbation, under-treatment or delayed treatment of pre-existing condition in pregnancy or postpartum leading to use of prescribed or illicit drugs resulting in death, or suicide. *[consensus during and within 6 months of pregnancy]*	Undertreatment of chronic pain leading to misuse of medications or use of illicit drugs, resulting in death
	Medical conditions secondary to drug use in setting of pregnancy or postpartum that may be attributable to pregnancy-related physiology and increased risk of complications leading to death. *[no consensus at any time period]*	Stroke or cardiovascular arrest due to stimulant use

[11] Smid MC et al, 2023. *Consensus pregnancy-related criteria for suicide and unintentional overdoses using a Delphi process.* Arch Womens Ment Health.

[12] The italicized text in brackets specify where the Delphi exercise with representatives from 48 MMRCs and eight experts in maternal mortality, substance use disorder, and maternal mental health reached consensus on the criterion. Lack of Delphi consensus as shown in brackets should not override committee consensus on a specific case. If "Yes" is chosen by the committee for at least one of the boxes under any of the three categories then that would constitute a pregnancy-related death.