Maternal Deaths in Michigan, 2015-2019 Data Update

Michigan Maternal Mortality Surveillance (MMMS) Program

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Key Findings

- A total of **443** maternal deaths were reported in Michigan during 2015-2019, of which **30** deaths were verified as not being pregnant.
- During 2015-2019, **77** deaths were identified as pregnancy-related. The most common causes of pregnancy-related death were hypertensive disorders of pregnancy, hemorrhage and infection/ sepsis.
- During 2015-2019, **309** deaths were identified as pregnancy-associated, not related. The most common cause of pregnancy-associated, not related death were accidental poisoning/drug overdose and medical causes not directly related to or aggravated by the pregnancy.
- During 2015-2019, **27** deaths had pregnancy-relatedness that was unable to be determined. The most common causes of unable-to-determine deaths were medical and substance use disorder.
- Disparities exist by race, age, and education level for both pregnancy-related and pregnancy- associated, not related deaths.
- Among the reviewed pregnancy-related deaths, **63.6** percent were determined to be preventable; among the reviewed pregnancy-associated, not related deaths, **68.0** percent were deemed to be preventable.

Data Notes

All maternal deaths, defined as those that occur during pregnancy or within one year of pregnancy, are reviewed by the Michigan Maternal Mortality Review Committee (MMRC). In 2020, the Michigan MMRC restructured from two distinct injury and medical committees to one multidisciplinary team. The restructured MMRC takes a holistic view of the upstream factors that affect maternal deaths. As a result of the restructure and the subjective nature of case review, there was an increase in determinations of pregnancy-related and preventable maternal deaths that can be seen starting with the 2019 data included within this report.

This report includes data from all deaths reviewed by the MMRC, including nine deaths that occurred in Michigan to out-of-state residents, apart from Figure 2 which is restricted to Michigan residents only.

Maternal race is classified through a two-step process. The first step classifies maternal deaths with American Indian/Alaska Native indicated within any race fields as American Indian/Alaska Native. The remainder of the maternal deaths are classified based on bridged race. This is a new methodology for reporting maternal deaths that differs from previous reports that classified based on bridged race only.

Maternal death categories:

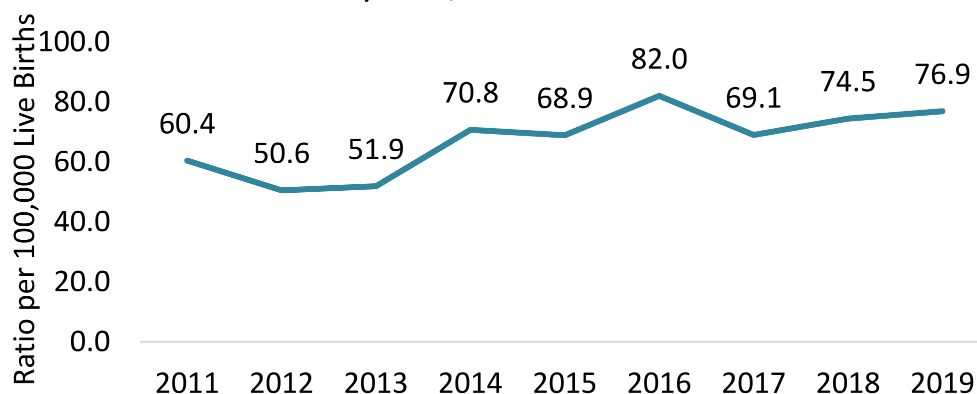
Pregnancy-associated mortality includes all maternal deaths that occur during pregnancy, at delivery or within one year of pregnancy and includes:

- **Pregnancy-associated, not related** mortality – deaths unrelated to the pregnancy
- **Pregnancy-related** mortality – deaths related to or aggravated by the pregnancy
- **Unable-to-determine** mortality – includes deaths in which pregnancy-relatedness is unable to be determined after MMRC review.

Pregnancy-Associated Mortality

Pregnancy-associated mortality is the death of a person while pregnant or within one year of the end of a pregnancy. This includes pregnancy-related, pregnancy-associated, not related and deaths where pregnancy-relatedness was unable to be determined.

Figure 1. Pregnancy-Associated Maternal Mortality by Year, 2011-2019

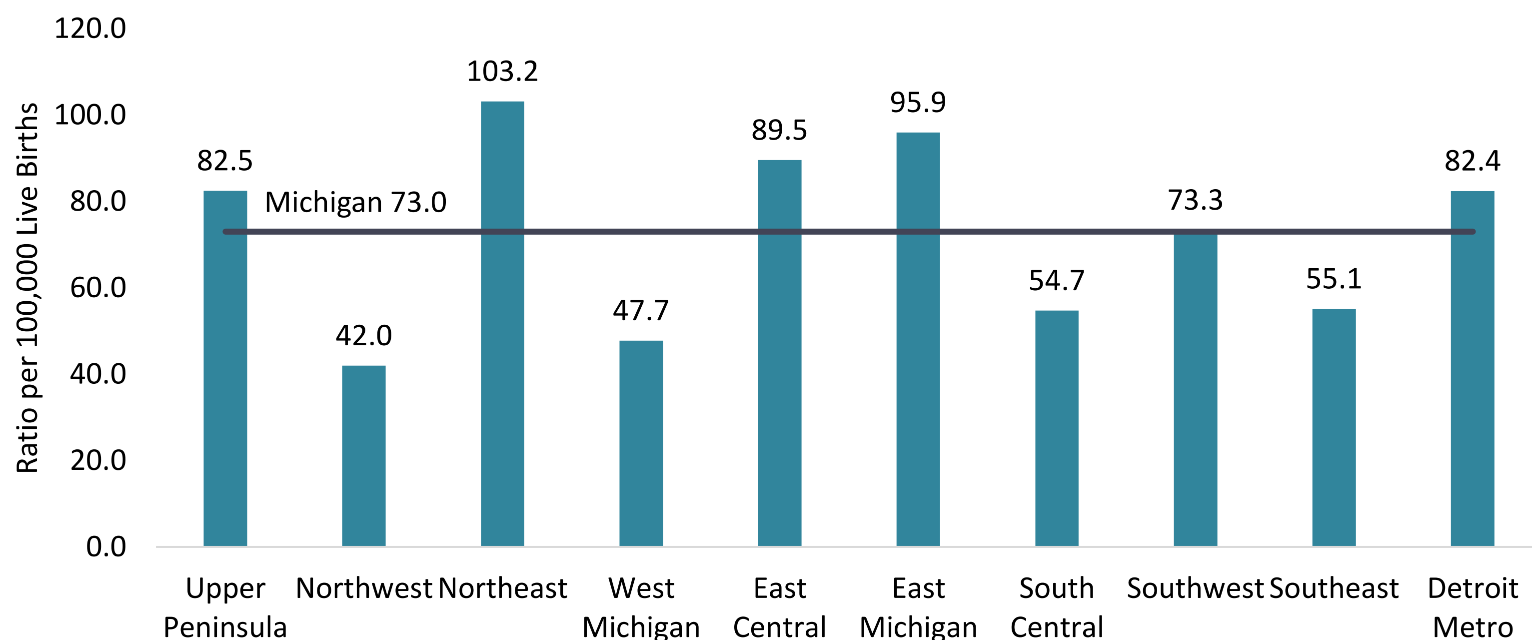


- Between 2011 and 2019, there were 679 cases of pregnancy-associated maternal mortality.
- The resulting pregnancy-associated mortality ratio was 67.2 per 100,000 live births.
- The overall trend between 2011 and 2019 was increasing with fluctuations between years.

Prosperity Region

Between 2015 and 2019, the pregnancy-associated maternal mortality ratio for Michigan residents was 73.0 per 100,000 live births. The Upper Peninsula, Northeast, East Central, East Michigan and Detroit Metro prosperity regions experienced higher pregnancy-associated maternal mortality compared to Michigan overall.

Figure 2. Pregnancy-Associated Maternal Mortality by Prosperity Region, Michigan Residents, 2015-2019



Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2011-2019; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2011-2019

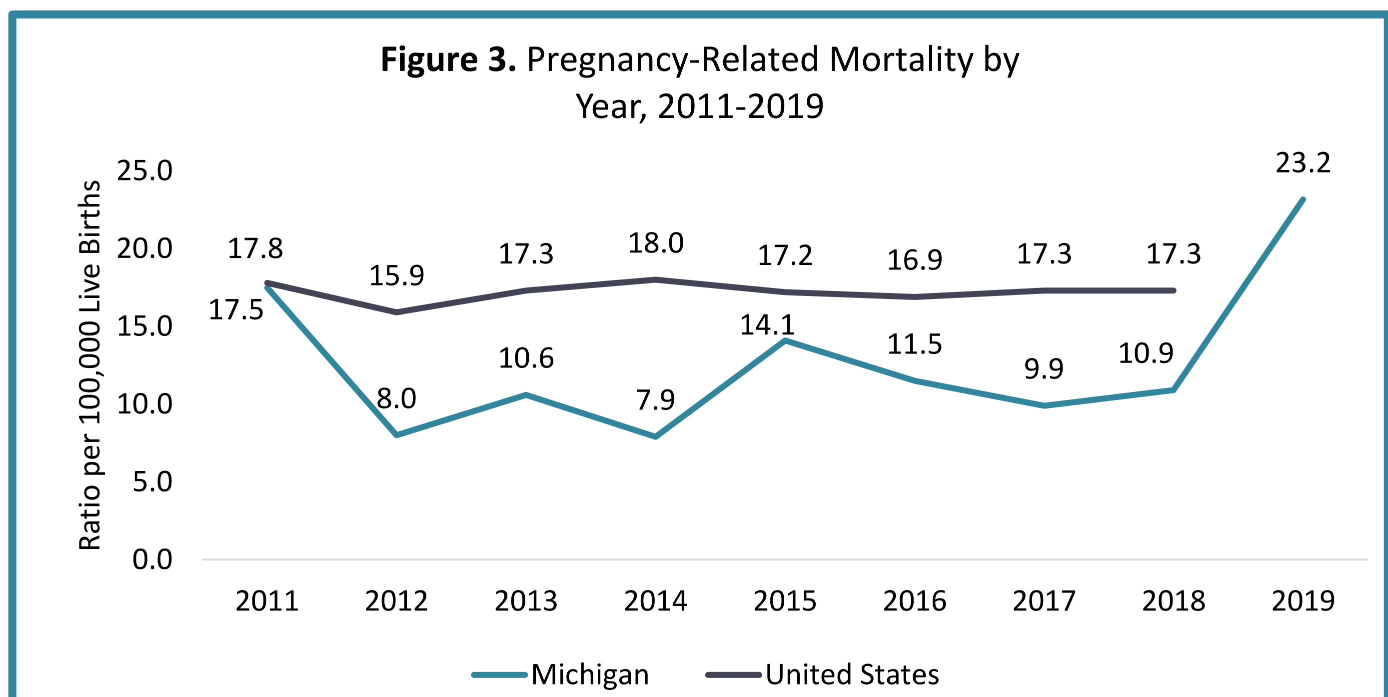
Pregnancy-Related Mortality

Pregnancy-related mortality is the death of a person while pregnant or within one year of the end of a pregnancy from any cause **related to or aggravated by** the pregnancy or its management. This does not include accidental or incidental causes.

- From 2011-2019, **127** women died of pregnancy-related causes in Michigan, which is a ratio of **12.6** deaths per 100,000 live births.

- After experiencing a drop in 2012, the pregnancy-related maternal mortality ratio in Michigan experienced an overall increasing trend with fluctuations between years. Due to the relatively small numbers of cases in Michigan, a small change in deaths can lead to large changes in the mortality ratio.

- In 2019, the pregnancy-related maternal mortality ratio increased **2.1** times as compared to the previous year. This is largely due to a change in MMRC structure and the subjective nature of case review (see page 2).



Michigan and the United States

- In 2011, Michigan experienced a similar maternal mortality ratio as compared to the United States. Between 2012 and 2018, the pregnancy-related maternal mortality ratio in Michigan was consistently lower compared to the United States (Figure 3). United States data for 2019 was not available at the time of this report.

- It is important to note Michigan's pregnancy-related mortality ratios are based on a combination of vital records and MMRC determination. The national pregnancy-related mortality analyses do not include committee review.

Date Sources: Centers for Disease Control and Prevention, Pregnancy Mortality Surveillance System, 2011-2018; Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2011-2019; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2011-2019

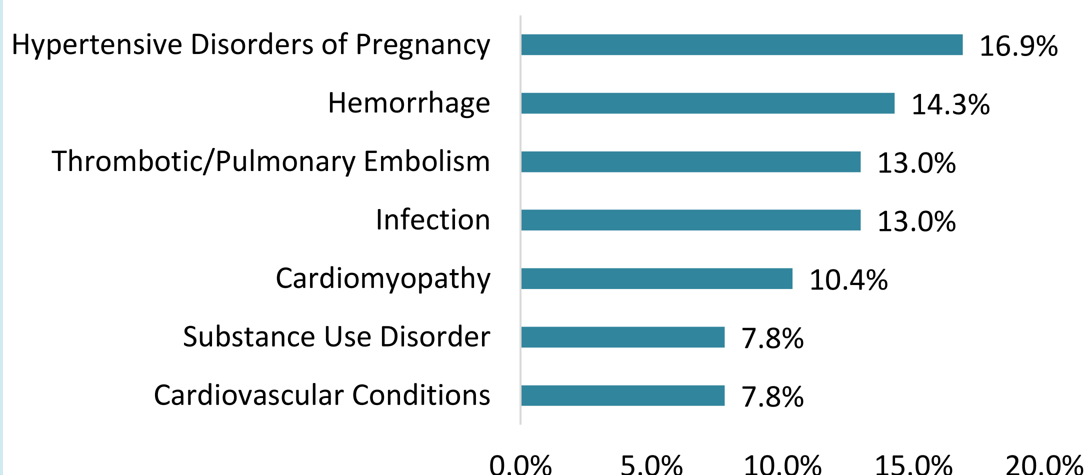
Pregnancy-Related Mortality

Causes of Pregnancy-Related Deaths

Underlying cause of maternal death is used to classify pregnancy-related maternal mortality groupings. Underlying cause is the disease or injury that initiated the chain of events leading to the death. Percentages in figure 4 reflect percentage of pregnancy-related cases with primary or secondary underlying cause of death within the cause of death category.

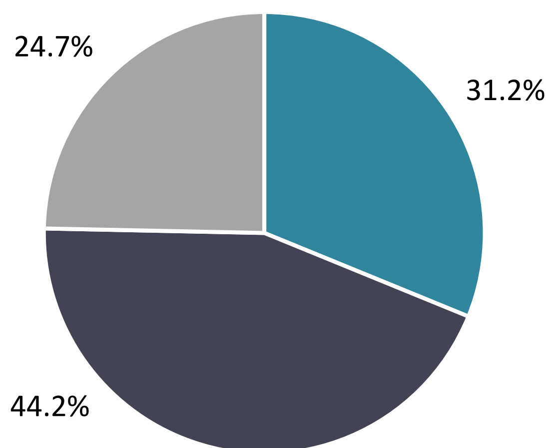
- Between 2015 and 2019, there were 77 pregnancy-related maternal deaths in Michigan. This is a ratio of 13.8 pregnancy-related deaths per 100,000 live births.
- Hypertensive disorders of pregnancy, followed by hemorrhage, thrombotic/ pulmonary embolism and infection/sepsis were the leading underlying causes of pregnancy-related maternal mortality between 2015 and 2019.

Figure 4. Leading Causes of Pregnancy-Related Maternal Mortality, 2015-2019



Pregnancy Period

Figure 5. Pregnancy-Related Maternal Mortality by Pregnancy Period, 2015-2019



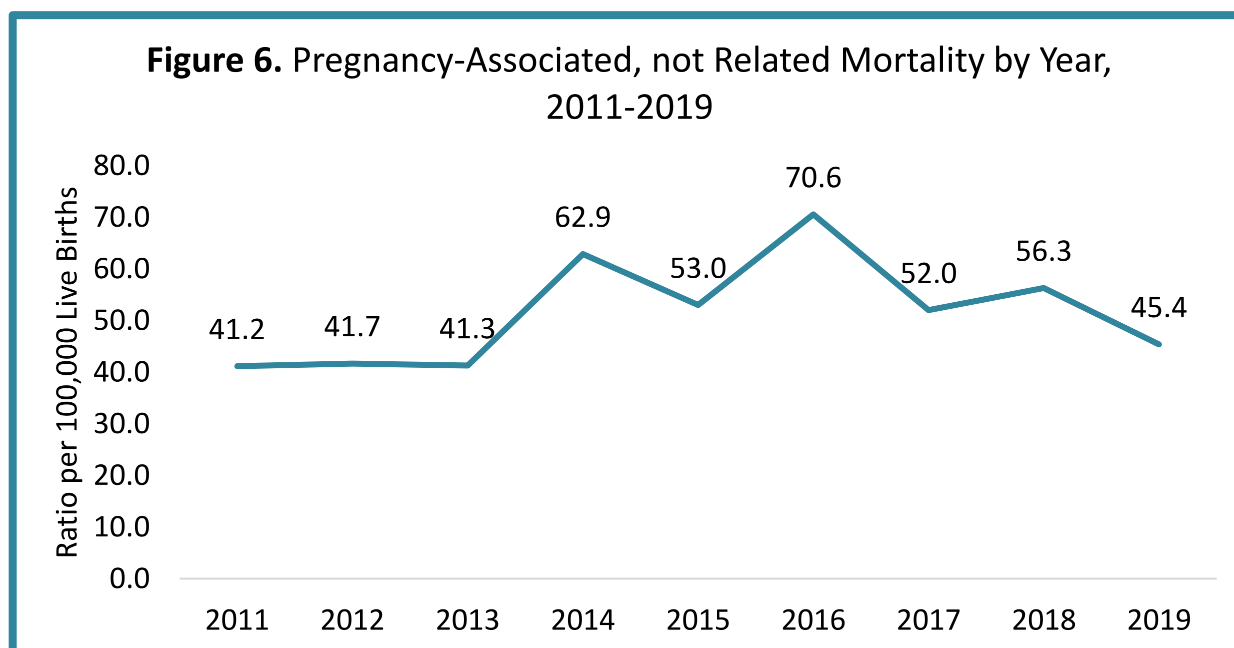
- Pregnancy-related mortality can occur any time during the pregnancy or the one-year period following the pregnancy.
- Between 2015 and 2019, most pregnancy-related maternal deaths occurred 1-42 days postpartum (44.2%) or during the antepartum or intrapartum pregnancy interval (31.2%).
- Antepartum refers to deaths that occur before childbirth and intrapartum refers to deaths that occur during labor or delivery.

Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2015-2019; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files and Live Birth Files, 2015-2019

Pregnancy-Associated, not Related Mortality

Pregnancy-associated, not related mortality is the death of a person while pregnant or within one year of the end of a pregnancy due to a cause **unrelated to** pregnancy.

- From 2011-2019, **521** women died of pregnancy-associated, not related causes in Michigan, which is a ratio of **51.5** deaths per 100,000 live births.
- Between 2011 and 2013, the pregnancy-associated, not related maternal mortality ratio remained stable (approximately 41 maternal deaths per 100,000 live births). Over the next six years, the pregnancy-associated, not related maternal mortality ratio fluctuated, with an overall increasing trend.
- The increase in pregnancy-associated, not related maternal mortality seen in 2014 onwards is mostly due to an increase in substance use disorder and medical causes of death.
- The decrease seen in 2019 is primarily due to a change in MMRC structure that resulted in an increased number of maternal deaths being classified as pregnancy-related or unable to determine pregnancy-relatedness (see page 2).



- National data not available for comparison for pregnancy-associated, not related maternal deaths.

Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2011-2019; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2011-2019

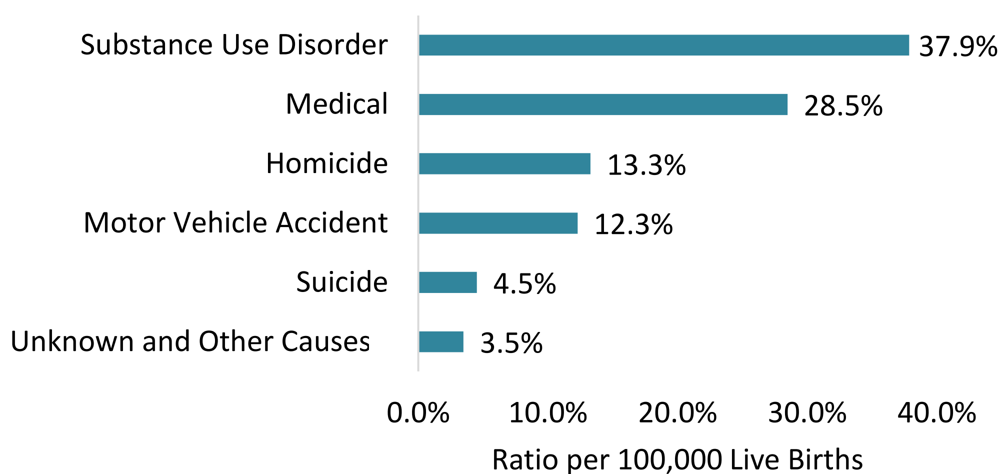
Pregnancy-Associated, not Related Mortality

Causes of Pregnancy-Associated, not Related Deaths

Underlying cause of maternal death is used to classify pregnancy-associated, not related maternal mortality groupings. Underlying cause is the disease or injury that initiated the chain of events leading to the death.

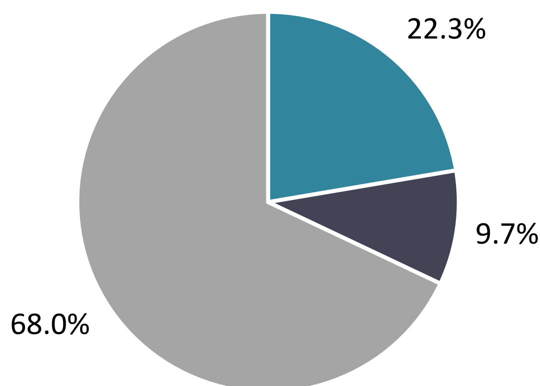
- Between 2015 and 2019, there were 309 pregnancy-associated, not related maternal deaths in Michigan. This is a ratio of 55.6 pregnancy-associated, not related deaths per 100,000 live births.
- Substance use disorder and medical conditions unrelated to or aggravated by the pregnancy were the leading causes of pregnancy-associated, not related medical deaths.

Figure 7. Leading Causes of Pregnancy-Associated, not Related Maternal Mortality, 2015-2019



Pregnancy Period

Figure 8. Pregnancy-Associated, not Related Maternal Mortality by Pregnancy Period, 2015-2019



- Pregnancy-associated, not related mortality can occur any time during the pregnancy or the one-year period following the pregnancy.
- Between 2015 and 2019, most pregnancy-associated, not related maternal deaths occurred 43 days or more postpartum (68.0%), followed by antepartum or intrapartum (22.3%).

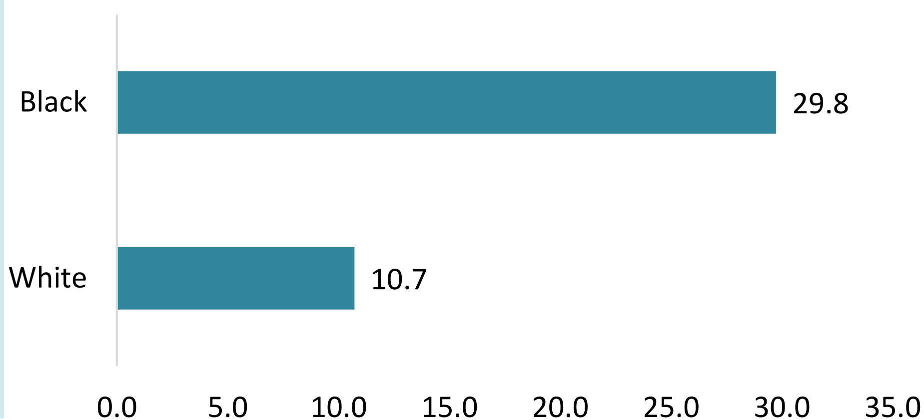
Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2015-2019; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files and Live Birth Files, 2015-2019

Disparities

Pregnancy-Related Mortality

- Nationwide, Black women die from pregnancy-related causes at a much higher ratio compared to white women.
- From 2015-2019, black women were **2.8** times more likely to die from pregnancy-related causes in Michigan (29.8 and 10.7 per 100,000 live births, respectively) (Figure 9).
- Races other than white and Black suppressed due to sample size less than six.

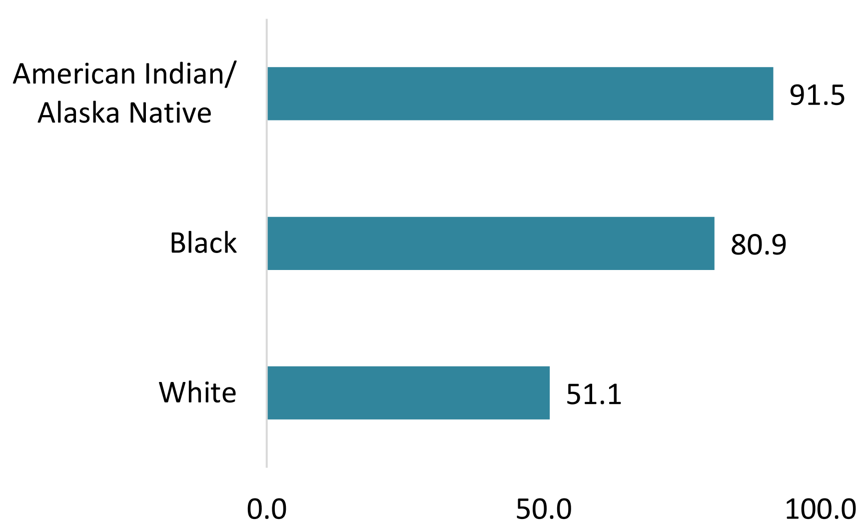
Figure 9. Pregnancy-Related Mortality by Race, 2015-2019



Pregnancy-Associated, Not Related Mortality

- Disparities exist among pregnancy-associated, not related deaths in Michigan.
- From 2015-2019, American Indian/Alaska Native women were **1.8** times as likely to die from pregnancy-associated, not related causes compared to white women in Michigan (91.5 and 51.1 per 100,000 live births, respectively) (Figure 10).
- From 2015-2019, Black women were **1.6** times as likely to die from pregnancy-associated, not related causes compared to white women (80.9 and 51.1 per 100,000 live births, respectively) (Figure 10).

Figure 10. Pregnancy-Associated, not Related Mortality by Race, 2015-2019



Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2015-2019; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2015-2019

Preventability

The MMRC considers whether an intervention at the provider, patient, facility, system, community, or policy domain could have potentially averted the death. A death is considered **preventable** if the committee determines there was at least some chance of the death being averted by one or more reasonable changes in any domain at any level. Preventability is unknown if there is insufficient information available to determine if a death was preventable.

Figure 11. Preventability for Pregnancy-Related Deaths, 2015-2019

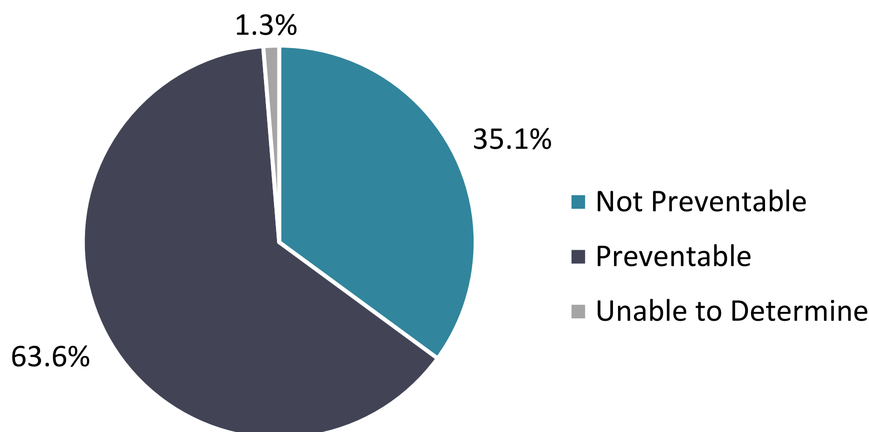
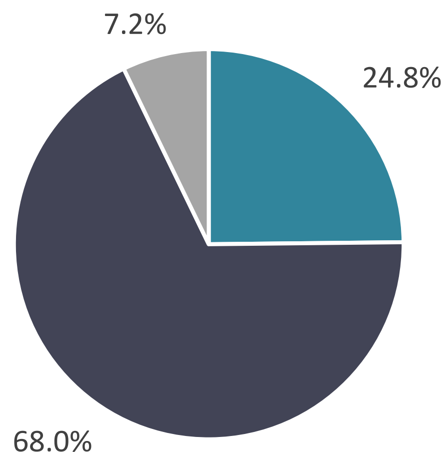


Figure 12. Preventability for Pregnancy-Associated, Not Related Deaths, 2015-2019[a]



- Most pregnancy-related deaths were determined to be preventable (63.6 percent)
- Most pregnancy-associated, not related deaths were determined to be preventable (68.0 percent).

[a] Not all pregnancy-associated, not related maternal deaths are reviewed for preventability, typically due to expedited nature of the case. Between 2015 and 2019, 153 pregnancy-associated, not related cases were reviewed for preventability (Figure 12).
Date Source: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2015-2019

Recommendation Process

The MMMS program is a state-level structured process by which a multidisciplinary committee reviews cases of maternal death that occur during pregnancy, at delivery or within one year of the end of pregnancy. The purpose of the review is to identify medical systems and patient issues that can be addressed to better understand the underlying factors associated with each death and develop recommendations aimed at improving health outcomes for pregnant and parenting women at the community, provider, facility and system levels. The MMRCs generated 57 recommendations through their review of maternal deaths in Michigan and a full list can be found on our website at Michigan.gov/MMMS. Determinations are guided by the U.S. Center for Disease Control and Prevention, Maternal Mortality Review Information Application's (MMRIA) Committee Decisions Form.

Priority Recommendations

The following table displays the MMMS priority recommendations (abbreviated) which meet the following criteria:

- Highest prioritization score
- Primary and/or secondary prevention
- Large and medium impact level
- Recommendations that have been made for more than one case

To view the full list of recommendations, visit Michigan.gov/MMMS.

MMMS/MMRC Priority Recommendations
Support f**ull implementation** of the MI-AIM safety bundles: **Obstetric Hemorrhage, Sepsis in Obstetrical Care** and **Severe Hypertension in Pregnancy** while working to adopt and implement the Safety Bundles: 1. Care for Pregnant and Postpartum People with Substance Use Disorder (Formerly, Obstetric Care for Women with Opioid Use Disorder (+AIM)) 2. Safe Reduction of Primary Cesarean Birth (+AIM/OBI) 3. Mental Health: Depression and Anxiety (+AIM) 4. Maternal Venous Thromboembolism (+AIM) 5. Improving Health Care Response to Cardiovascular Disease in Pregnancy and Postpartum (CMQCC)
Partner with Family Planning and Chronic Disease to provide **contraceptive counseling** and **reproductive life planning** education to providers working with individuals of reproductive age.
Offer women **wrap-around services** to help align systems of care and transform every interaction into a potential opportunity for change.
Increase access to **home visiting/family support services** for all pregnant and postpartum women in Michigan.
Require **social work consults** for all pregnant or postpartum patients with Substance Use Disorder, intimate partner violence (IPV), past trauma and/or mental health disorders including referrals to appropriate follow-up care and support such as to a maternal infant health program (MIHP).
Implement a comprehensive **state-wide education initiative** to address pregnancy and its intersection with mental health, sexual abuse, IPV, trauma, substance use, and chronic health conditions as well as its increased occurrence in populations of women who are most **vulnerable and marginalized**.
Encourage providers and hospital discharge planners to **use doulas, community health workers, family support professionals** and **home visiting programs** to **improve access to care and provide peer support** to pregnant and parenting women.
Work with CPS to create systematic change around policies regarding follow up, prevention services for high-risk women, and care coordination.
Increase awareness and visibility of behavioral health options, including MC3 Perinatal, to prenatal care providers, birthing hospitals, and emergency.
Preconception care interventions to prevent and treat chronic disease and awareness of reproductive health are crucial elements which should be targeted before pregnancy for ensuring improved pregnancy, neonatal and child health outcomes.

Focus on Health Equity

In December 2019, the MMRCs convened a Health Equity Work Group Meeting to review MMRC recommendations, specifically related to racial disparities, and examine opportunities for integrating a health equity framework into our maternal mortality reviews. MMRC members (Injury and Medical) generated the following recommendations:

MMRC Health Equity Work Group Recommendations (abbreviated)
The MMRCs will continue to integrate a **health equity framework** to address **systemic inequities** and the **social determinants of health** that result in disparate outcomes for all Michigan mothers.
MMRCs, in conjunction with MDHHS, will increase access to education for providers and systems on **delivering culturally competent care and reducing stigma, bias and barriers when implementing services** and recommend that all providers are exposed to **implicit bias training** that leads to use of best practices for dignity and respectful care.
The MMMS program will continue to seek out and/or expand access to internal and external data sources so MMRCs can better understand the **modifiable social and environmental determinants of health and health inequities**.
The MMMS program will make an annual health equity and **implicit bias training** mandatory for all (MMRC) members.
MDHHS will provide practical tools at the community level to **reduce health inequities**.
The MMRCs will evaluate all maternal death cases to determine if **social, economic, environmental and/or structural disparities** affected health outcomes.

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MDHHS-Pub-1487 (12-22)