Maternal Deaths in Michigan, 2013-2017 Data Update

Michigan Maternal Mortality Surveillance (MMMS) Program

For more information about the MMMS Program, please contact Melissa Limon-Flegler, Program Coordinator, at limonfleglerm1@michigan.gov or Heidi Neumayer, Program Epidemiologist, at neumayerh@michigan.gov.

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Further information and data related to the MMMS Program can be found at www.michigan.gov/mmms.

Key Findings

- 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).
- Deaths are categorized as either **pregnancy-related** (pages 2-3) or **pregnancy-associated, not related** (page 4).
- A total of **436 maternal deaths** were reported in Michigan during 2013-2017, of which **48 deaths** were verified as not being pregnant.
    - During 2013-2017, **61 deaths** were identified as pregnancy-related.
    - The most common causes of pregnancy-related death were infection/sepsis, hemorrhage, and thrombotic pulmonary/other embolism.
    - During 2013-2017, **316 deaths** were identified as pregnancy-associated, not related.
    - The most common cause of pregnancy-associated, not related death were medical causes not directly related to the pregnancy and accidental poisoning/drug overdose.
    - Pregnancy-relatedness was unable to be determined for an additional 11 deaths.
    - Disparities exist by race, age, and education level for both pregnancy-related and pregnancy associated, not related deaths.
    - Among the reviewed pregnancy-related deaths, 54.1 percent were determined to be preventable; among the reviewed pregnancy-associated, not related injury cases, 52.6 percent were deemed to be preventable.

Pregnancy-Related Mortality

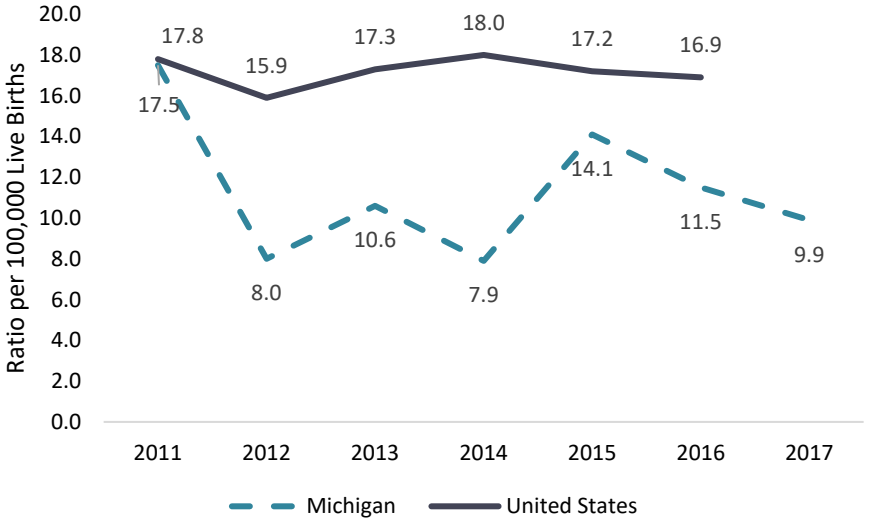
Pregnancy-related mortality is the death of a woman while pregnant or within one year of the end of a pregnancy from any cause **related to or aggravated by** the pregnancy or its management. This does not include accidental or incidental causes.

From 2011-2017, 90 women died of pregnancy-related causes in Michigan, which is a ratio of 11.3 deaths per 100,000 live births.

Michigan experienced consistently lower ratios of pregnancy-related maternal mortality as compared to the United States, apart from 2011 when the ratios were comparable (Figure 1). Between 2011 and 2016[a] the national pregnancy-related mortality ratio remained relatively stable, while Michigan experienced between year fluctuations with an overall decrease between 2011 and 2017. Due to the relatively small numbers of cases in Michigan, a small change in deaths can lead to large changes in the mortality ratio.

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.

Figure 1. Pregnancy-Related Mortality in MI, 2011-2017



Date Sources: Centers for Disease Control and Prevention, Pregnancy Mortality Surveillance System, 2011-2016[a]; Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2011-2017; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2011-2017

[a]2017 national data not yet available for comparison at time of report.

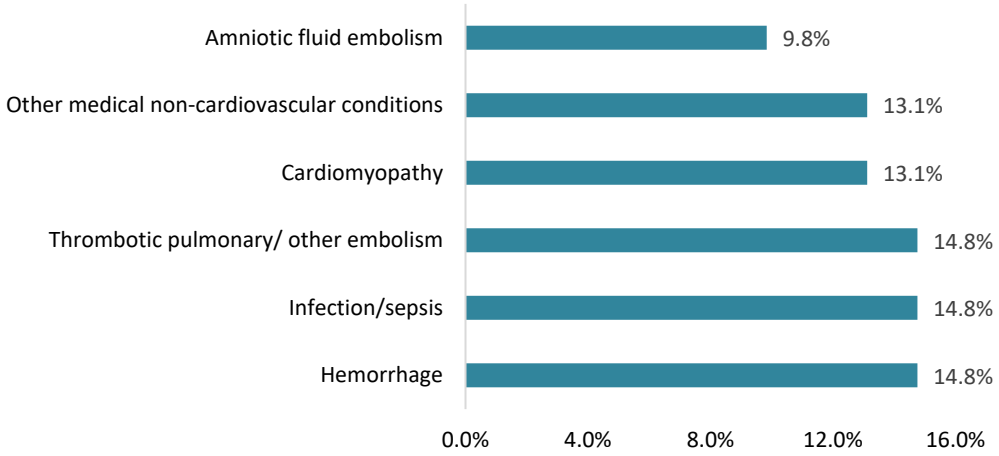
All data in this report except trend data (Figure 1 and Figure 4) reflect 2013-2017 aggregated.

Pregnancy-Related Mortality

Causes of Pregnancy-Related Deaths

The most common causes of pregnancy-related deaths in Michigan are infection/sepsis, hemorrhage, and thrombotic pulmonary/other embolism (14.8%) (Figure 2). Less common but significant causes of death include cardiomyopathy, other medical non-cardiovascular conditions (including mental health conditions and chronic diseases such as cancer, epilepsy, and asthma), amniotic fluid embolism, hypertensive disorders of pregnancy, cerebrovascular conditions and cardiovascular conditions.

Figure 2. Causes of Pregnancy-Related Deaths in Michigan, 2013-2017

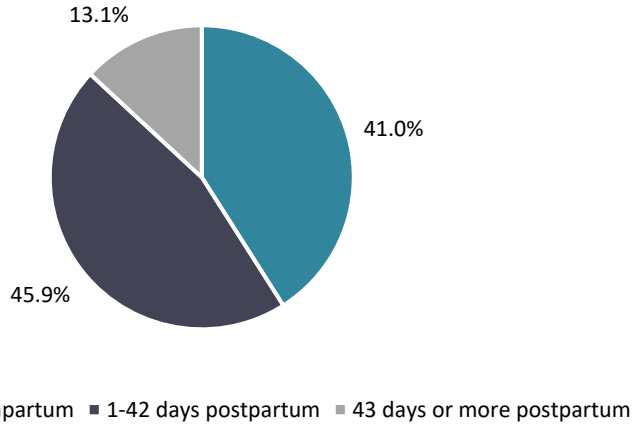


Note: Hypertensive disorders of pregnancy, cerebrovascular conditions, cardiovascular conditions and unknown pregnancy-related categories were suppressed due to <6 cases.

Pregnancy Period

Pregnancy-related mortality can occur any time during the pregnancy or the one-year period following the pregnancy. Between 2013 and 2017, most pregnancy-related maternal deaths occurred 1-42 days postpartum (45.9%) or during the antepartum or intrapartum pregnancy interval (41.0%). Antepartum refers to deaths that occur before childbirth and intrapartum refers to deaths that occur during labor or delivery.

Figure 3. Pregnancy-Related Maternal Mortality by Pregnancy Period, 2013-2017



Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2013-2017; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files and Live Birth Files, 2013-2017

Pregnancy-Associated, Not Related Mortality

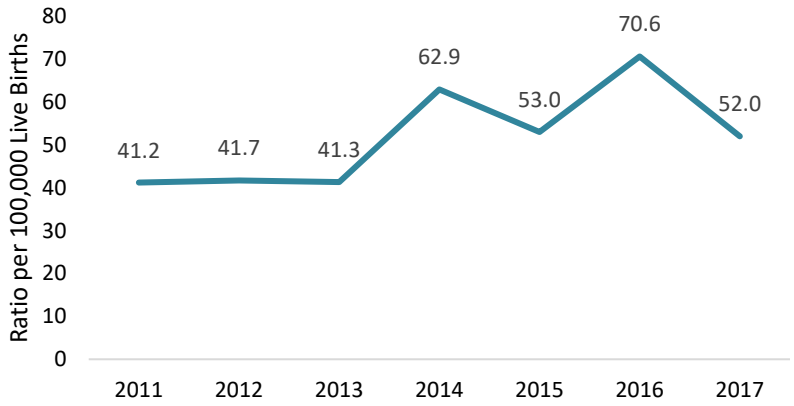
Pregnancy-associated, not related mortality is the death of a woman while pregnant or within one year of the end of a pregnancy due to a cause **unrelated to** pregnancy.

From 2011-2017, 410 women in Michigan died from pregnancy-associated, not related causes for a ratio of 51.7 per 100,000 live births. This includes both accidental and medical causes of death which were determined to be unrelated to pregnancy.

The pregnancy-associated maternal mortality ratio remained stable between 2011 and 2013 (approximately 41 pregnancy associated maternal deaths per 100,000 live births). The pregnancy-associated maternal mortality ratio fluctuated between years from 2014 to 2017 with a low of 52.0 per 100,000 live births (2017) to a high of 70.6 per 100,000 live births (2016).

The increase in the pregnancy-associated maternal mortality ratio after 2013 is driven by pregnancy-associated medical cases as well as substance use disorder deaths.

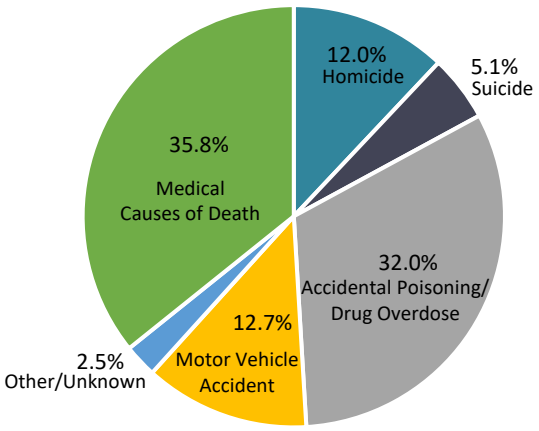
Figure 4. Pregnancy-Associated, Not Related Mortality in MI, 2011-2017



Causes of Pregnancy-Associated, Not Related Deaths

The most common causes of pregnancy-associated, not related death are medical causes that are not directly related to the pregnancy (35.8%), followed by substance use deaths (32.0%)(Figure 5). Other common causes of death include motor vehicle accidents (12.7%), homicide (12.0%), and suicide (5.1%). Other accidental deaths and unknown causes of death make up the remaining pregnancy-associated, not related deaths.

Figure 5. Causes of Pregnancy-Associated, Not Related Deaths in Michigan 2013-2017

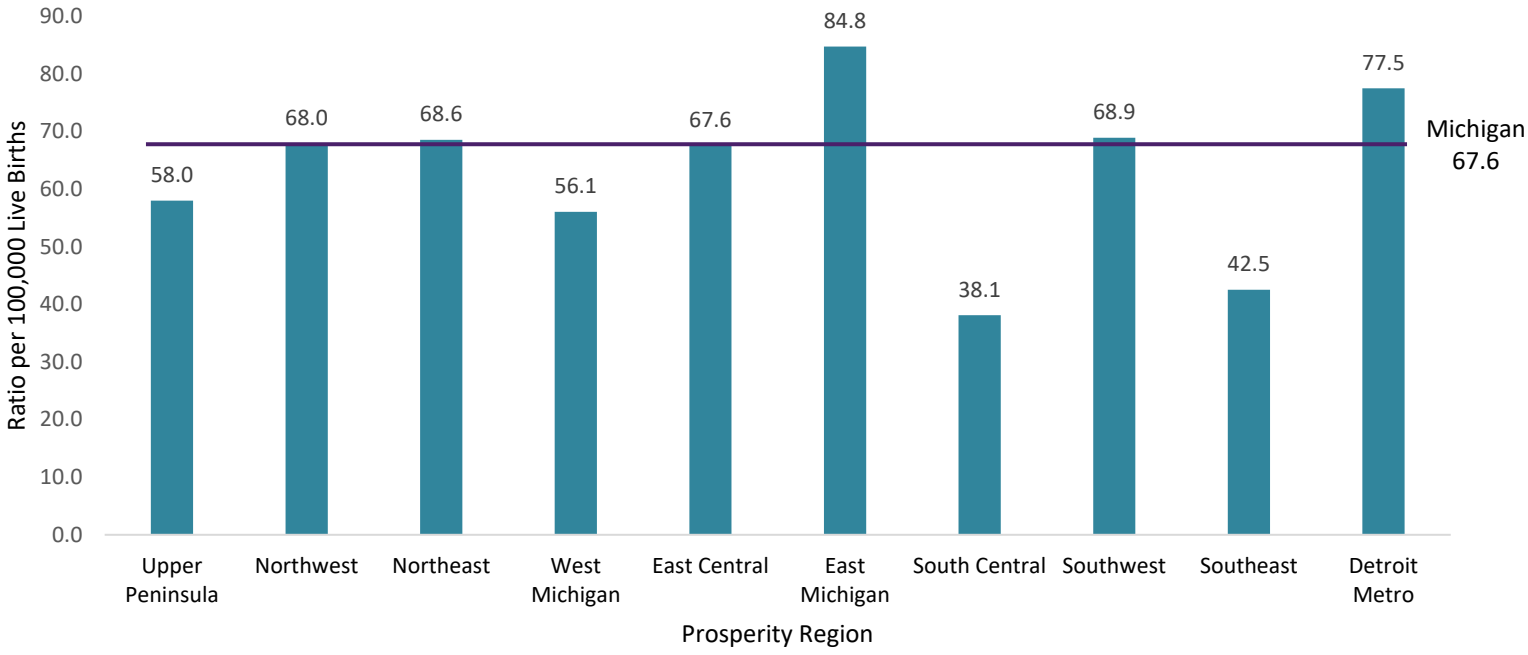


Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2013-2017; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2013-2017

Pregnancy-Associated (Total) Mortality

Pregnancy-associated (total) mortality is the death of a woman 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 6. Pregnancy Associated Maternal Mortality Ratio by Prosperity Region, 2013-2017



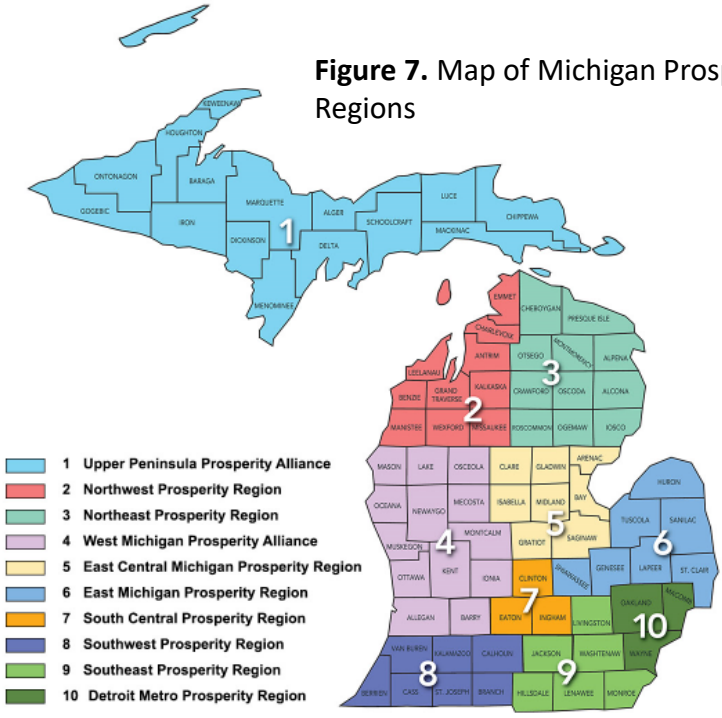
Prosperity Region

Between 2013 and 2017, Prosperity Regions 6 and 10 experienced higher pregnancy-associated maternal mortality ratios when compared to Michigan as a whole.

Prosperity Regions 2, 3, 5, and 8 experienced similar pregnancy-associated mortality ratios when compared to Michigan overall.

Prosperity Regions 1, 4, 7 and 9 experienced lower pregnancy-associated mortality ratios when compared to Michigan overall.

Figure 7. Map of Michigan Prosperity Regions



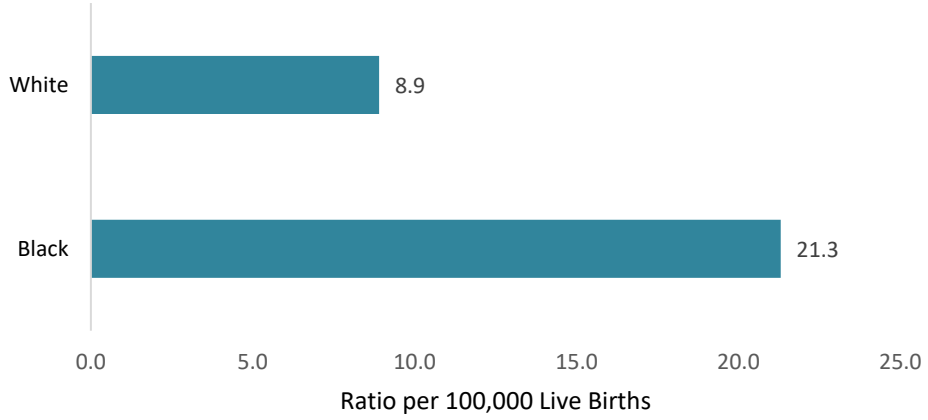
Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2013-2017; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2013-2017

Disparities

Pregnancy-Related Mortality

Nationwide, black women die from pregnancy-related causes at a much higher ratio compared to white women. From 2013-2017, black women were **2.4 times** more likely to die from pregnancy-related causes in Michigan (21.3 and 8.9 per 100,000 live births, respectively) (Figure 8). However, this is an improvement from 2007-2010, when black women died from pregnancy complications five times more often than white women. This may be due to a larger decrease in the *average* number of pregnancy-related deaths in black women compared to white women.

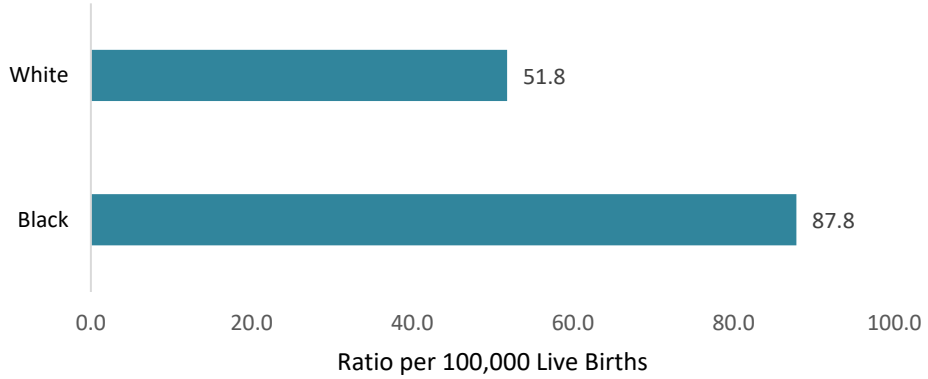
Figure 8. Pregnancy-Related Mortality Ratio (per 100,000 live births) by Maternal Race, Michigan, 2013-2017



Pregnancy-Associated, Not Related Mortality

Disparities also exist among pregnancy-associated, not related deaths in Michigan. From 2013-2017, black women were **1.7 times** as likely to die from pregnancy-associated, not related causes compared to white women in Michigan (87.8 and 51.8 per 100,000 live births, respectively) (Figure 9).

Figure 9. Pregnancy-Associated, Not Related Mortality Ratio (per 100,000 live births) by Maternal Race, Michigan, 2013-2017



Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2013-2017; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2013-2017

Preventability

The MMRCs consider 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 10. Preventability for Pregnancy-Related Deaths, MI 2013-2017

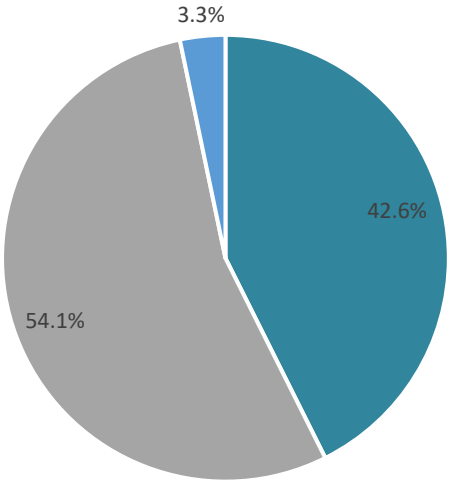
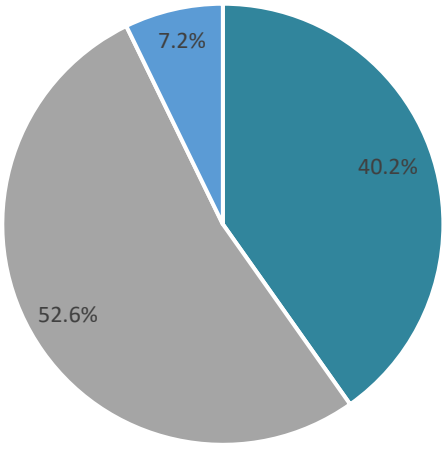


Figure 11. Preventability for Pregnancy-Associated, Not Related Deaths, MI 2013-2017[a]



[a] Not all pregnancy-associated, not related maternal deaths are reviewed for preventability, typically due to expedited nature of the case. Between 2013 and 2017, 194 pregnancy-associated, not related cases were reviewed for preventability (Figure 11).

Date Source: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2013-2017

Recommendation Process

The MMMS program is a state-level structured process by which two multidisciplinary committees (Injury and Medical) review 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 www.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 table below displays the MMMS priority recommendations (abbreviated). The recommendations highlighted in the table were made by both the MMRC Injury and Medical Committees. To view the full list of recommendations, visit www.Michigan.gov/MMMS.

<table>
<tr><th>Top MMRC Injury Committee Recommendations</th><th>Top MMRC Medical Committee Recommendations</th></tr>
<tr><td colspan="2">The committee and MI-AIM staff will work toward full implementation of the AIM safety bundles: Obstetric Hemorrhage and Severe Hypertension in Pregnancy while working to adopt & implement the Safety Bundles:
1. Obstetric Care for Women with Opioid Use Disorder (+AIM)
2. Safe Reduction of Primary Cesarean Birth (+AIM)
3. Mental Health: Depression and Anxiety (+AIM)
4. Maternal Venous Thromboembolism (+AIM)
5. Sepsis bundle (CMQCC)
6. Improving Health Care Response to Cardiovascular Disease in Pregnancy and Postpartum (CMQCC)</td></tr>
<tr><td colspan="2">Partner with MDHHS Family Planning Program and other related entities to promote increased contraceptive access, and create and implement an education campaign focused on contraceptive access, including LARC</td></tr>
<tr><td colspan="2">Provide universal home visiting services for all pregnant and postpartum women in Michigan.</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="2">Create and implement a toolkit to promote appropriate evaluation and care for all women presenting to the emergency department and other medical facilities with severe pain or other possible pregnancy associated health complication.</td></tr>
<tr><td colspan="2">Women need wrap-around services to help align systems of care and transform every interaction into an opportunity for change.</td></tr>
<tr><td colspan="2">Continue to expand and implement telemedicine interventions to ensure timely access.</td></tr>
<tr><td>Implement substance use screening (including alcohol and tobacco) at first prenatal visit, throughout pregnancy and postpartum visits.
○ Providers need education on the next step for positive drug screens and guidance on early detection/intervention of substance use disorders.
○ When talking to patients about their substance use, providers should use an empathetic and objective approach. (Impact Level: Giant)</td><td>Internally align MDHHS to increase capacity on programs providing education to pregnant women and the providers of pregnant women.</td></tr>
<tr><td>Enact improved polices regarding; the completion of depression screening once a trimester and at postpartum visits and early follow up and referral for women who screen positive.</td><td>Partner with Family Planning and Chronic Disease to provide contraceptive counseling and reproductive life planning education to providers working with high-risk women.</td></tr>
<tr><td>Facilitate a partnership between MI AIM and other medical organizations to increase access to provider education (on topics such as how to provide care coordination, what resources exist, etc.)</td><td>Conduct promotional campaign regarding the Mandatory Reporting Laws in Michigan in an effort to capture all maternal deaths that occur in Michigan.</td></tr>
<tr><td>Promote the National Domestic Violence Hotline to increase awareness of services and programs in Michigan.</td><td>Ensure that patients with disabilities receive coordination of and equal access to quality health care information and services.</td></tr>
<tr><td>Promote the National Suicide Prevention Lifeline and support expanding the capacity of the program in Michigan</td><td>Partner with Michigan Midwives and the American College of Nurse Midwives, to enhance education and coordination with midwives.</td></tr>
</table>

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 & 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.