



Maternal Deaths in Michigan, 2012-2016 Data Update

Michigan Maternal Mortality Surveillance Program

For more information about the Michigan Maternal Mortality Surveillance Program, please contact:

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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 Committee.
- Deaths are categorized as either **pregnancy-related** (Pages 2-3) or **pregnancy-associated, not related** (Pages 4-5).
- A total of **423 deaths** were reported in Michigan during 2012-2016, of which **55 deaths** were verified as not being pregnant and the pregnancy-relatedness was unable to be determined for an additional **4 deaths**.
 - During 2012-2016, **59 deaths** were identified as pregnancy-related.
 - The most common causes of pregnancy-related death were **cardiomyopathy, infection/sepsis, and hemorrhage**.
 - During 2012-2016, **305 deaths** were identified as pregnancy-associated, not related.
 - The most common cause of pregnancy-associated, not related death was **accidental drug overdose**.
 - Disparities exist by race, age, and education level for both pregnancy-related and pregnancy associated, not related deaths.
 - Among the reviewed pregnancy-related deaths, 52.5 percent were determined to be preventable; among the reviewed pregnancy-associated, not related injury cases, 44.1 percent were deemed to be preventable.

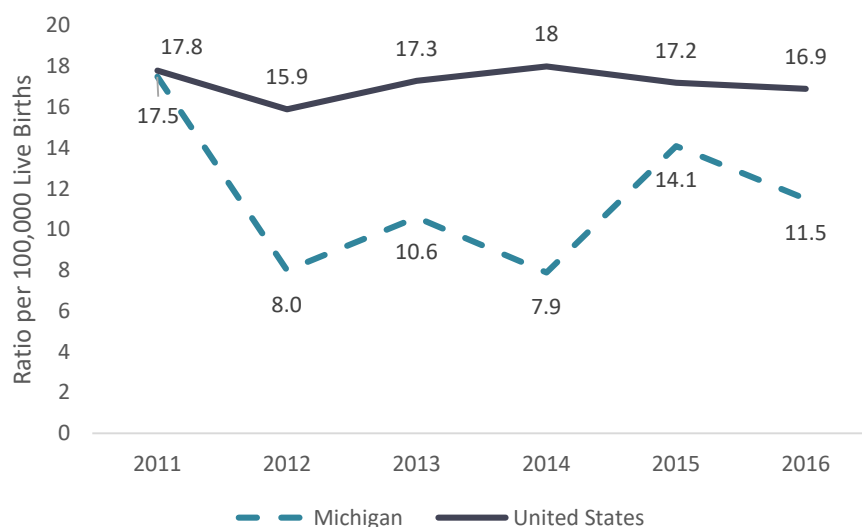
Pregnancy-Related Mortality

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 2011-2016, 79 women died of pregnancy-related causes in Michigan, which is a ratio of 11.6 deaths per 100,000 live births. Because of the relatively small numbers of cases, a small change in deaths can lead to large changes in the mortality ratio.

In 2011, the national pregnancy-related mortality ratio was comparable to Michigan's ratio (17.8 and 17.5 per 100,000, respectively) (Figure 1). Pregnancy-related mortality in the United States remained stable in subsequent years, while Michigan experienced a decreasing trend with minor fluctuations between years. It is important to note, Michigan pregnancy-related mortality ratios are based on a combination of ICD-10 codes and maternal mortality committee review. The national pregnancy-related maternal mortality ratios are based solely on ICD-10 codes.

Figure 1. Pregnancy-Related Mortality in MI, 2011-2016



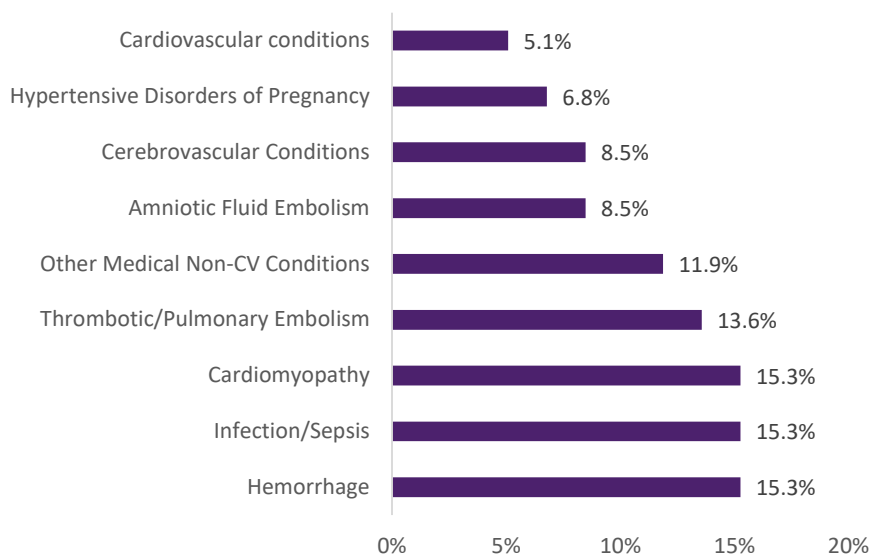
Date Sources: Centers for Disease Control and Prevention, Pregnancy Mortality Surveillance System, 2012-2016; Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2012-2016

Pregnancy-Related Mortality

Causes of Pregnancy-Related Deaths

The most common causes of pregnancy-related deaths in Michigan are cardiomyopathy, infection/sepsis, and hemorrhage (15.3%) (Figure 2). Less common but significant causes of death include thrombotic events such as pulmonary embolism, other medical conditions, amniotic fluid embolism, cerebrovascular conditions, hypertensive disorders of pregnancy, and cardiovascular conditions.

Figure 2. Causes of Pregnancy-Related Deaths in Michigan, 2012-2016

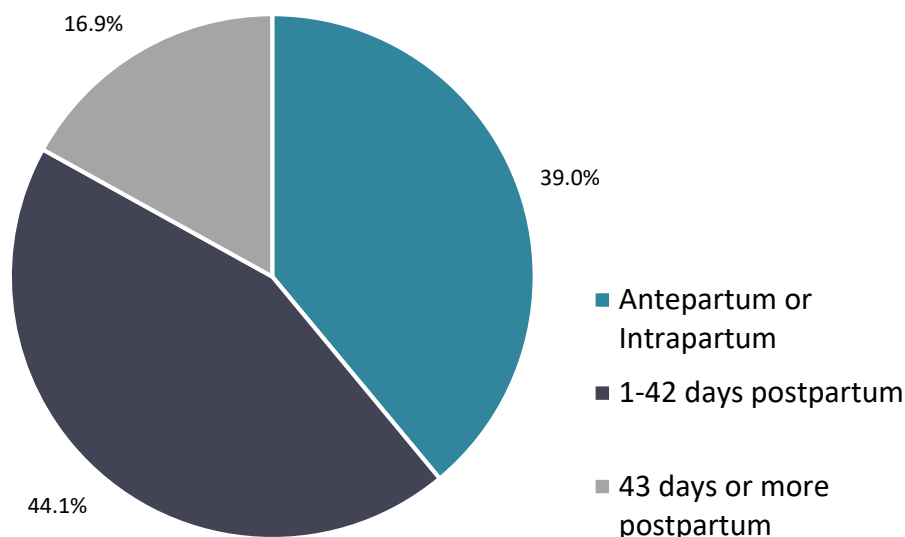


Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2012-2016

Pregnancy Period

Pregnancy-related mortality can occur any time during the pregnancy or the one-year period following the pregnancy. Most deaths occur during the antepartum (during pregnancy) or intrapartum (during delivery) periods (39.0%) or the first six weeks postpartum (44.1%) (Figure 3).

Figure 3. Pregnancy-Related Maternal Mortality by Pregnancy Period, 2012-2016



Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files and Live Birth Files, 2012-2016

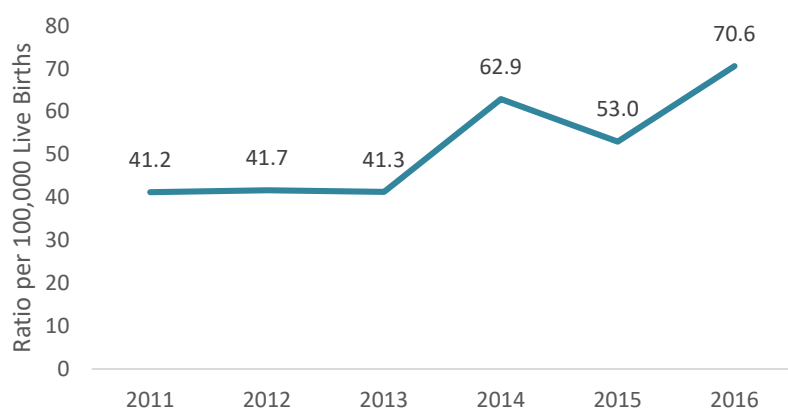
Pregnancy-Associated, Not Related Mortality

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 2011-2016, 352 women in Michigan died from pregnancy-associated, not related causes for a ratio of 51.6 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 rose from 41.3 to 62.9 per 100,000 live births between 2013 and 2014 (Figure 4). The ratio decreased from 2014 to 2015, while remaining above the 2011 through 2013 ratios. In 2016, the ratio increased to 70.6 per 100,000 live births.

Figure 4. Pregnancy-Associated, Not Related Mortality in MI, 2011-2016



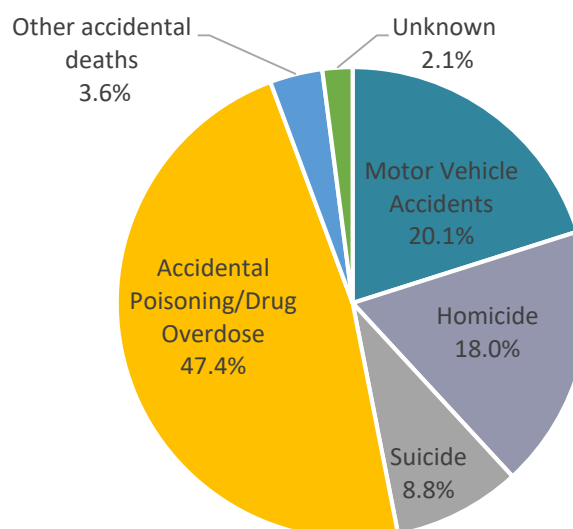
Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2012-2016

There is no clear explanation for the large increase in pregnancy-associated, not related deaths between 2013 and 2014, but we suspect it was due to an increase in deaths due to cardiovascular conditions, as well as other medical conditions such as cancer, asthma, epilepsy, and other chronic diseases. The increase in deaths from 2015 to 2016 can likely be attributed to an increase in the number of substance use deaths.

Causes of Pregnancy-Associated, Not Related Injury Deaths

The most common cause of pregnancy-associated, not related injury death is accidental poisoning/drug overdose (47.4%) (Figure 5). Other common causes of death include motor vehicle accidents (20.1%), homicide (18.0%), and suicide (8.8%). Other accidental deaths (3.6%) include deaths such as electrocution, hypothermia, fire, drowning, and other accidental deaths.

Figure 5. Causes of Pregnancy-Associated Injury Deaths in Michigan, 2012-2016



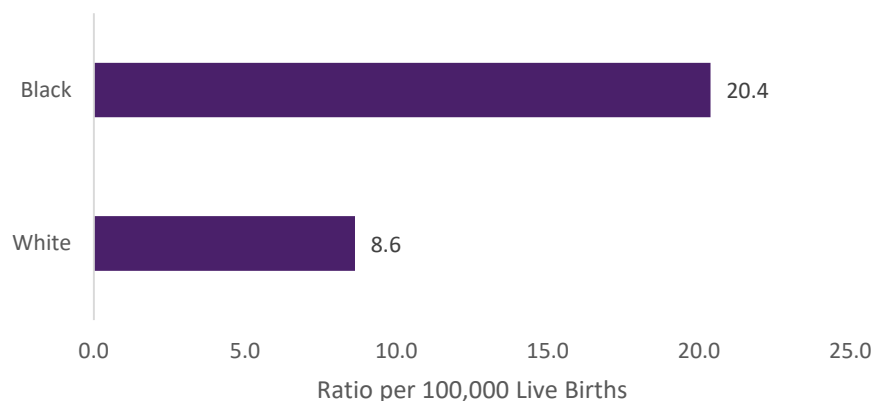
Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2012-2016

Disparities

Pregnancy-Related Mortality

Nationwide, black women die from pregnancy-related causes at a much higher ratio compared to white women. From 2012-2016, black women were **2.4 times** more likely to die from pregnancy-related causes in Michigan (20.4 and 8.6 per 100,000 live births, respectively) (Figure 6). 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 6. Pregnancy-Related Mortality Ratio (per 100,000 live births) by Maternal Race, Michigan, 2012-2016

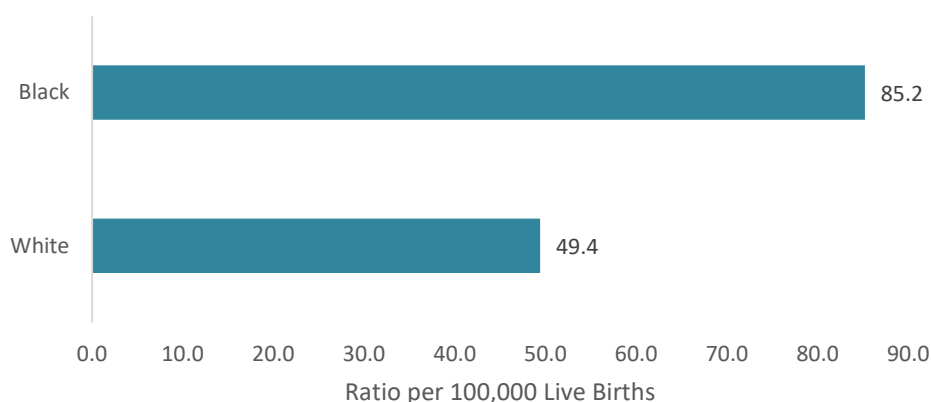


Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2012-2016

Pregnancy-Associated Mortality

Disparities also exist among pregnancy-associated, not related deaths in Michigan. From 2012-2016, black women were **1.7 times** as likely to die from pregnancy-associated, not related causes compared to white women in Michigan (85.2 and 49.4 per 100,000 live births, respectively) (Figure 7).

Figure 7. Pregnancy-Associated, Not Related Mortality Ratio (per 100,000 live births) by Maternal Race, Michigan, 2012-2016



Date Sources: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016; Michigan Department of Health and Human Services, Division for Vital Records and Health Statistics, Resident Death Files, 2012-2016

Preventability

The committees 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 8. Preventability for Pregnancy-Related Deaths, MI 2012-2016

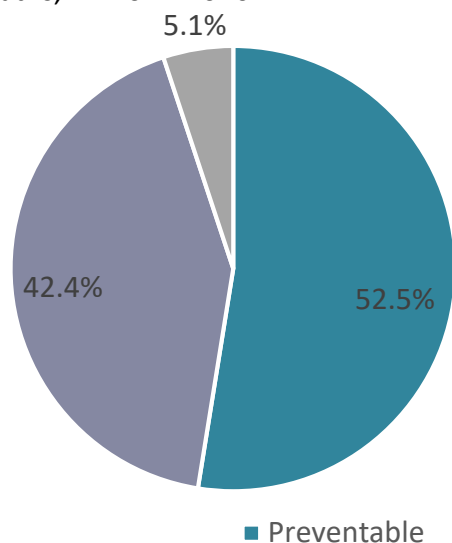
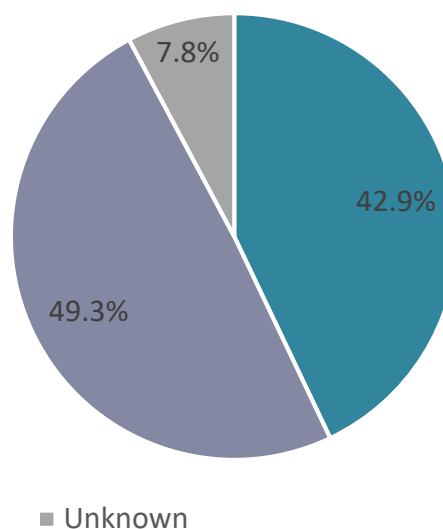


Figure 9. Preventability for Pregnancy-Associated, Not Related Deaths, MI 2012-2016



Date Source: Michigan Department of Health and Human Services, Michigan Maternal Mortality Surveillance Program, 2012-2016

Priority Recommendations

The committees recommend:

- Working toward full implementation of the Alliance for Innovation on Maternal Health (AIM) safety bundles: Hemorrhage, Hypertension, Maternal Venous Thromboembolism, Mental Health: Depression and Anxiety, Safe Reduction of Primary Cesarean Birth, Sepsis, and Obstetric Care for Women with Opioid Use Disorder.
- Internally align MDHHS to increase capacity of programs providing education to pregnant women and the providers of pregnant women.
- Partner with Family Planning to create and implement education campaigns focused on Long-Acting Reversible Contraceptive (LARC) and promoting increased LARC access.
- Provide universal home visiting services for all pregnant and postpartum women.
- Implement substance use screening (including alcohol and tobacco) at first prenatal visit, throughout pregnancy, and at postpartum visits.
- Enact improved policies regarding depression screening once per trimester and at postpartum visits, with early follow up and referral for women who screen positive.
- Implement a comprehensive state-wide education initiative to address pregnancy and its intersection with mental health and substance use.
- 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.
- 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.