

MARYLAND DEPARTMENT OF HEALTH AND MENTAL HYGIENE  
PREVENTION AND HEALTH PROMOTION ADMINISTRATION

**MARYLAND MATERNAL  
MORTALITY REVIEW  
2015 ANNUAL REPORT**

**Health – General Article § 13-1207**

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## BACKGROUND

Health-General Article §13-1203-1207, Annotated Code of Maryland establishes a Maternal Mortality Review Program (MMR Program) in Maryland. The MMR Program: (1) identifies maternal death cases; (2) reviews medical records and other relevant data; (3) determines preventability of death; (4) develops recommendations for the prevention of maternal deaths; and (5) disseminates findings and recommendations to policymakers, health care providers, health care facilities, and the general public.

The Maryland Department of Health and Mental Hygiene (Department) conducts maternal mortality reviews in consultation with MedChi, the Maryland State Medical Society. The Department provides funding to MedChi to assist in the maternal mortality review process. MedChi's Maternal and Child Health Subcommittee assists in obtaining medical records, abstracting cases, and convening a committee of clinical experts from across the State, the Maternal Mortality Review Committee (MMR Committee), to provide an in-depth review of maternal deaths to determine pregnancy-relatedness and preventability. The MMR Committee then develops recommendations for the prevention of maternal deaths, and disseminates their findings and recommendations to policy makers, health care providers, health care facilities, and the general public.

### *Key Definitions*

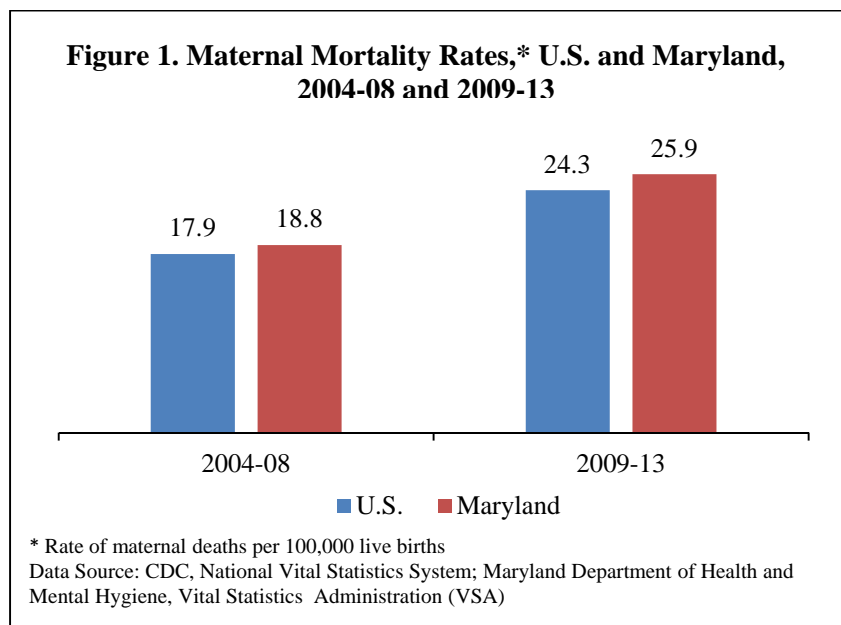
- A **maternal death** is defined by the World Health Organization's (WHO) International Classification of Diseases Ninth and Tenth Revisions (ICD-9 and ICD-10) as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management but not from accidental or incidental causes."
- The **maternal mortality ratio or rate (MMR)** is the number of maternal deaths per 100,000 live births in the same time period.
- A **pregnancy-associated death** is defined by the Centers for Disease Control and Prevention (CDC) as "the death of a woman while pregnant or within one year or 365 days of pregnancy conclusion, irrespective of the duration and site of the pregnancy, regardless of the cause of death."
- The **pregnancy-associated mortality rate** is the number of pregnancy-associated deaths per 100,000 live births.
- A **pregnancy-related death** is defined by the CDC as "the death of a woman while pregnant or within one year of conclusion of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by her pregnancy or its management, but not from accidental or incidental causes."
- The **pregnancy-related mortality rate** is the number of pregnancy-related deaths per 100,000 live births.

The three terms, "maternal death," "pregnancy-associated death," and "pregnancy-related death", create a challenge when comparing data from different sources and reports for different jurisdictional entities. The WHO monitors maternal deaths worldwide as a key indicator of population health, and of social and economic development. 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 more developed 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 more accurately identify deaths among women in which pregnancy was a contributing factor. This collaboration led to the definitions for pregnancy-associated and pregnancy-related deaths. Enhanced surveillance methods are necessary to determine pregnancy-associated and pregnancy-related deaths and will be discussed below.

### ***Rising Rates of Maternal Mortality***

Nationally, maternal mortality has declined dramatically since the 1930s when the MMR was 670 maternal deaths per 100,000 live births. The United States (U.S.) MMR was at its lowest level in 1987 at 6.6 maternal deaths per 100,000 live births. However, the MMR has risen since that time, and was 28.9 maternal deaths per 100,000 live births in 2013, the latest year for which national data are available. To compare Maryland's MMR with the national rate, a five-year average is used. This stabilizes the Maryland rate because maternal deaths are relatively infrequent events that may vary considerably year to year, particularly in a small state like Maryland. For the periods from 2004-2008 and 2009-2013, the Maryland MMR has remained slightly higher than the national rate (see Figure 1). Both are above the Healthy People 2020 MMR target of 11.4 maternal deaths per 100,000 live births (MICH-5). Between the two 5-year periods shown, the U.S. MMR increased by 36 percent and the Maryland rate increased by 38 percent.



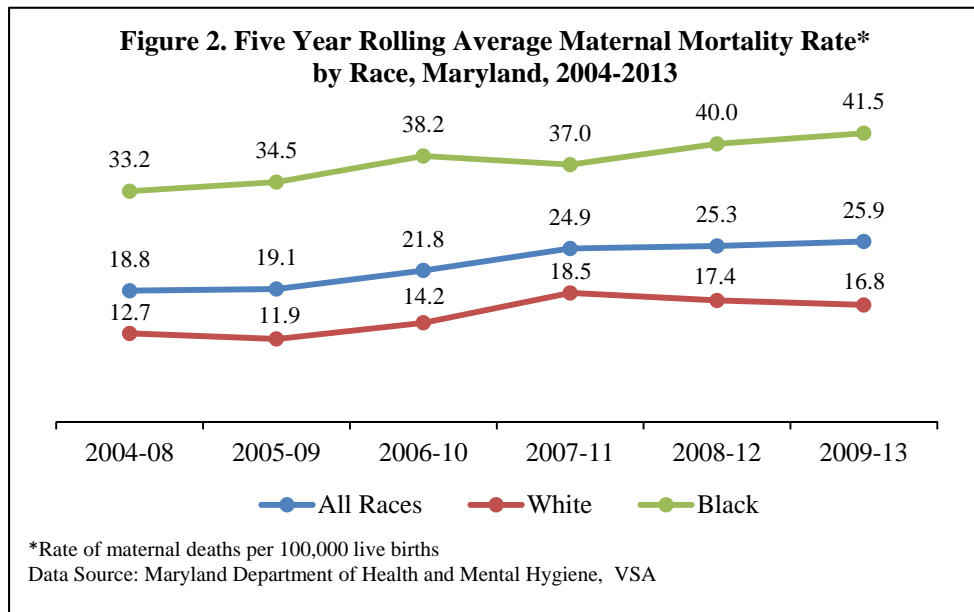
While Maryland's high MMR is concerning, it is also a reflection of the State's intense efforts to more accurately identify maternal deaths since the mid-1990s. To facilitate identification of maternal deaths, the Maryland death certificate was revised in January 2001 to include questions about pregnancy within the year prior to death. This enhanced surveillance resulted in more than double the number of maternal deaths identified in Maryland compared with data from the 1980s and early 1990s. While the number of maternal deaths identified has doubled, it is unclear

whether the actual risk of a woman dying during pregnancy or within 42 days after has increased or not. Many studies have shown an increase in chronic health conditions among pregnant women in the U.S., including hypertension, diabetes, and heart disease.<sup>1,2,3</sup> These conditions may put pregnant women at higher risk of adverse outcomes.

### ***Racial Disparity***

In the U.S., Black women have a MMR more than two and a half times greater than that for White women, a disparity that has persisted since the 1940s. In Maryland, there is a similarly large disparity between the rates among Black and White women.

Figure 2 shows the MMR by race in Maryland for six overlapping 5-year periods over the past decade. Compared to 2004-2008, the 2009-2013 White MMR in Maryland increased 32 percent and the Black MMR increased 25 percent. The 2009-2013 Black MMR is two and a half times the White MMR.



## **METHODOLOGY**

### ***Case Identification***

Cases for review are limited to women who were residents of Maryland at the time of their death. Maryland residents who died in other states are counted in the official Vital Statistics Administration (VSA) reports, but they are not included in the case reviews because of the

<sup>1</sup> Elena Kuklina et al., “Hypertensive disorders and severe obstetric morbidity in the United States: 1998–2006,” *Obstetrics & Gynecology*, 113 (2009): 1299-1306.

<sup>2</sup> Sandra S. Albrecht, et al., “Diabetes trends among delivery hospitalizations in the United States, 1994–2004,” *Diabetes Care*, 33 (2010): 768-773 <<http://care.diabetesjournals.org/content/33/4/768.full.pdf+html>>.

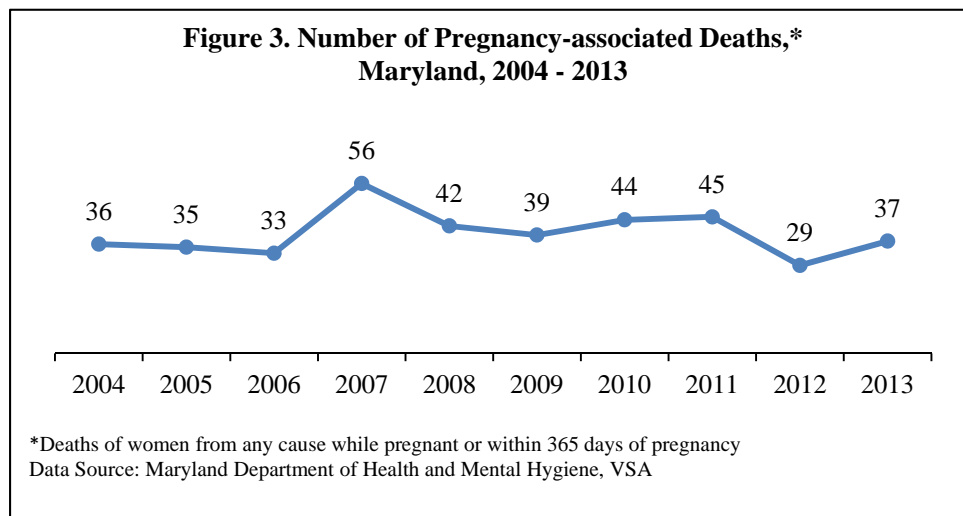
<sup>3</sup> Elena Kuklina et al., “Chronic heart disease and severe obstetric morbidity among hospitalizations for pregnancy in the USA: 1995–2006,” *BJOG: An International Journal of Obstetrics and Gynaecology*, 118 (2011): 345-352.

difficulty in obtaining records across states. These out-of-state deaths account for a maximum of two to four cases per year, or approximately five to ten percent of total pregnancy-associated deaths.

Maternal deaths are determined by information on the death certificates alone. The Maryland 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. Maryland is one of 42 states plus the District of Columbia that now include questions specifically designed to improve identification of maternal deaths on the death certificate. The pregnancy checkbox has significantly increased identification of maternal deaths beyond those recognized by cause of death alone. Only 62 percent of Maryland maternal deaths in the years 1993-2000 were identified by cause of death information alone.<sup>4</sup> With the addition of the pregnancy checkbox, 98 percent of maternal deaths are now identified.<sup>5</sup>

Pregnancy-associated deaths are identified in one of three ways in Maryland. Individual death certificates are the first method of identifying pregnancy-associated deaths through the use of checkbox questions on the death certificate, or because the cause of death is clearly related to pregnancy (e.g. ruptured ectopic pregnancy). The second method of determining pregnancy-associated deaths comes from linking death certificates for women aged 10-50 years with birth certificates and fetal death certificates to identify additional cases that were not found through examination of death certificates alone. Thirdly, cases reported to the Office of the Chief Medical Examiner (OCME) are subject to a manual review process to identify evidence of pregnancy in deceased women.

All deaths occurring during pregnancy or within 365 days of pregnancy conclusion are designated as pregnancy-associated and investigated further. Using these three methods, 37 pregnancy-associated deaths were identified in 2013. These cases are reviewed in detail in this report. Figure 3 shows the number of pregnancy-associated deaths in Maryland from 2004-2013. An average of 40 pregnancy-associated deaths occurred per year during this period.



<sup>4</sup> Isabelle L. Horon, "Underreporting of maternal deaths on death certificates and the magnitude of the problem of maternal mortality," *American Journal of Public Health*, 95 (2005): 478-82.

<sup>5</sup> Isabelle L. Horon, Diana Cheng, "Effectiveness of pregnancy check boxes on death certificates in identifying pregnancy-associated mortality," *Public Health Reports*, 126 (2011): 195-200.



## ***Case Review***

Pregnancy-associated deaths undergo several stages of review. Once cases are identified, medical records are obtained from the hospitals of death and delivery, when applicable. Physician and nurse-midwife consultants review death certificates, hospital records, and OCME records for all cases and prepare case summaries that will go to the MMR Committee workgroups for review of pregnancy-relatedness. All 2013 cases involving death from medical causes, injury, substance use, homicide, or suicide were reviewed for pregnancy-relatedness.

Pregnancy-relatedness and potential preventability of death are determined through workgroup discussion. The MMR Committee workgroups include obstetric, maternal fetal medicine, nurse-midwifery, nursing and social work specialties, as well as, representatives from the Department's Maternal and Child Health Bureau, VSA, and the OCME. Representatives from all delivery hospitals in Maryland are encouraged to participate. The workgroup discussions incorporate the CDC framework for case review outlined in "Strategies to Reduce Pregnancy-Related Deaths: From Identification and Review to Action."<sup>6</sup> This approach takes into account medical and non-medical factors contributing to maternal death, and examines quality and content of medical care (see Appendix A: Maryland Maternal Mortality Review Case Discussion Guide). Cases discussed by the MMR Committee workgroups are de-identified and members sign confidentiality agreements. The full MMR Committee meets to review issues identified through case reviews and to develop recommendations.

## **CASE FINDINGS**

A total of 37 pregnancy-associated deaths were identified in 2013 for a pregnancy-associated mortality rate of 51.5 deaths per 100,000 live births. Of the 37 deaths, 15 were determined to be pregnancy-related, while the remaining 22 were either determined not to be related to pregnancy or the relatedness to pregnancy could not be determined. The resulting pregnancy-related mortality rate was 20.9 deaths per 100,000 live births.

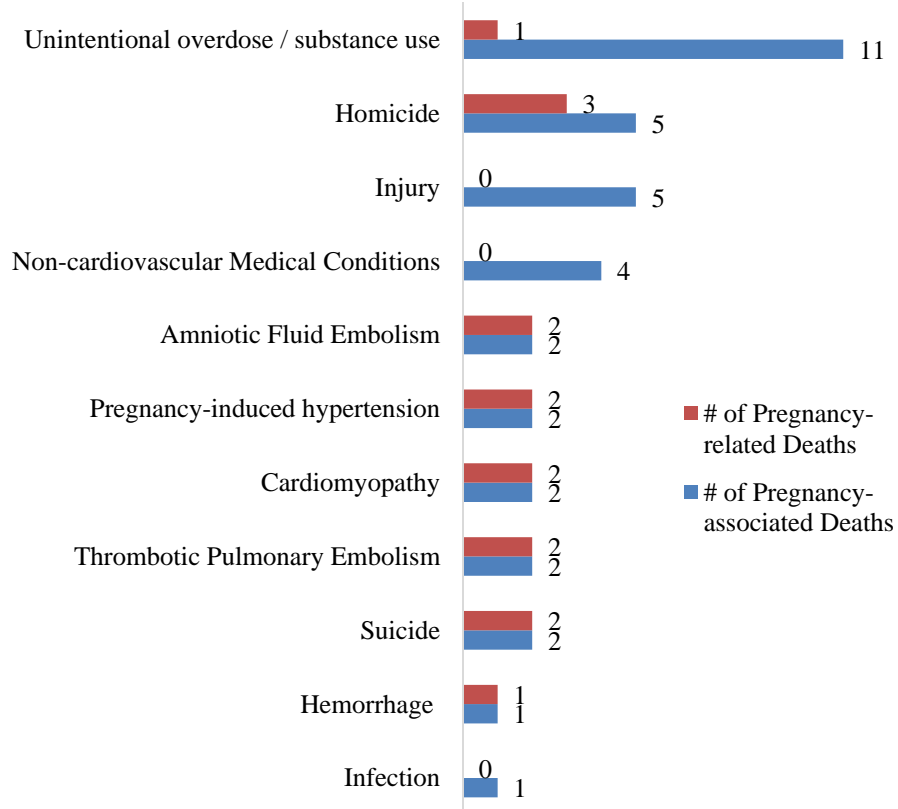
### ***Cases by Cause of Death Category***

Figure 4 shows the categories of cause of death for pregnancy-associated and pregnancy-related deaths. The leading cause of pregnancy-associated deaths in 2013 was substance use with unintentional overdose, accounting for 30 percent of these deaths. Homicide and injury each accounted for 14 percent of pregnancy-associated deaths; an additional five percent were due to suicide. The remaining 37 percent of pregnancy-associated deaths were due to natural (medical) causes.

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<sup>6</sup> Hani K. Atrash et al., "Strategies to Reduce Pregnancy-Related Deaths: From Identification and Review to Action," Centers for Disease Control and Prevention <[http://www.cdc.gov/reproductivehealth/ProductsPubs/PDFs/Strategies\\_taged.pdf](http://www.cdc.gov/reproductivehealth/ProductsPubs/PDFs/Strategies_taged.pdf)>.

**Figure 4. Number of Pregnancy-associated\* and Pregnancy-related\*\* Deaths by Category of Cause of Death,\*\*\* Maryland, 2013**



\* Number of deaths of women from any cause while pregnant or within 365 days of pregnancy  
 \*\* Number of deaths of women while pregnant or within 365 days of pregnancy from any cause related to or aggravated by pregnancy  
 \*\*\*Category as determined by Maternal Mortality Review Committee  
 Data Source: Maryland Department of Health and Mental Hygiene, VSA

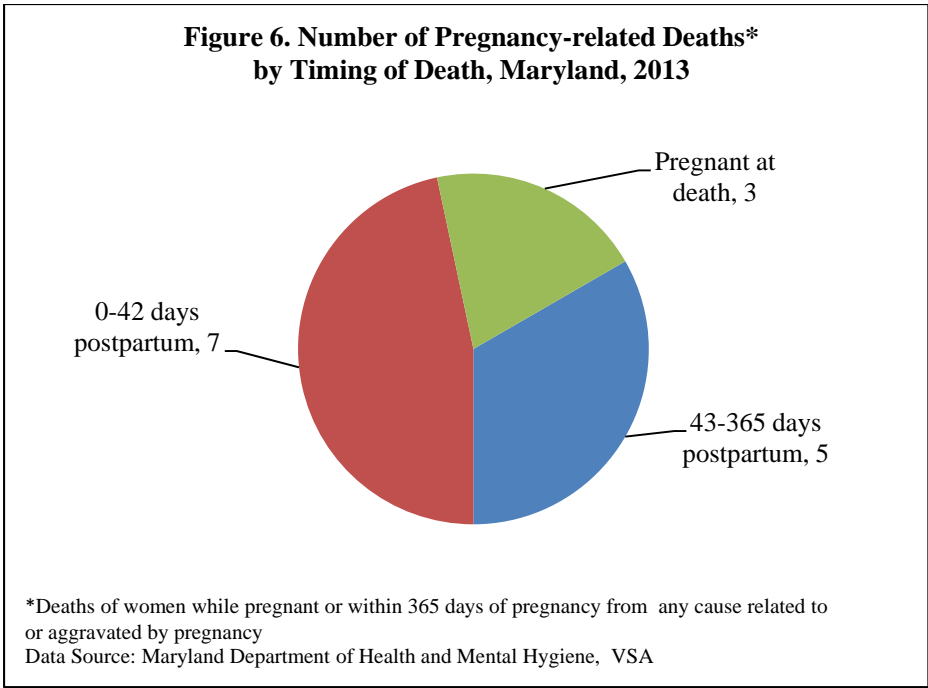
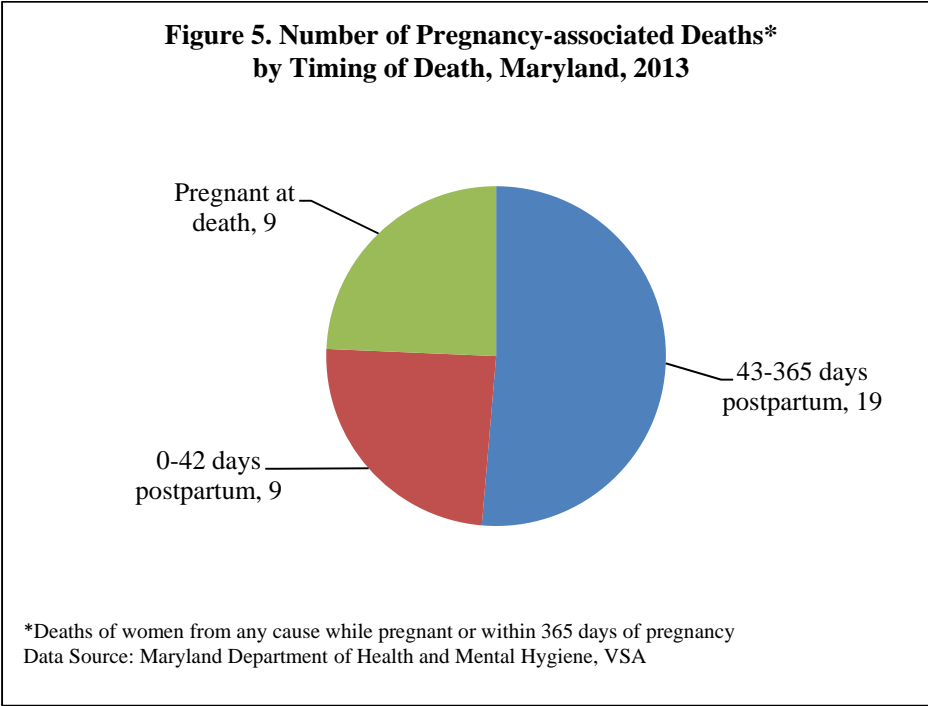
The number of pregnancy-associated deaths involving substance use and unintentional overdose increased dramatically in 2013. Only four such deaths were reported to the MMR Committee in 2012. VSA reported 14 pregnancy-associated unintentional overdose deaths in 2013 based on death certificate information.<sup>7</sup> After review of medical records, however, no evidence of pregnancy in the year preceding death could be proven in one case. Therefore, this case was not included by the MMR Committee workgroup. For two other cases in which substance use was present, the MMR Committee concluded after detailed review that one death was the result of cardiomyopathy and the other was a suicide by intentional drug overdose. Therefore, only 11 pregnancy-associated deaths involving unintentional overdose are indicated in Figure 4. This still represents almost a three-fold increase over the number of such deaths in the previous year.

Among the 15 pregnancy-related deaths in 2013, three deaths (20 percent) were the result of homicide. Two suicides and one unintentional overdose death were also among the pregnancy-related deaths. The remaining 60 percent of pregnancy-related deaths resulted from natural causes.

<sup>7</sup> “Increase in Overdose Deaths Among Pregnant Women and New Mothers,” October 2014, Department of Health and Mental Hygiene <[http://dhhm.maryland.gov/data/Documents/PA%20death%20brief\\_final.pdf](http://dhhm.maryland.gov/data/Documents/PA%20death%20brief_final.pdf)>.

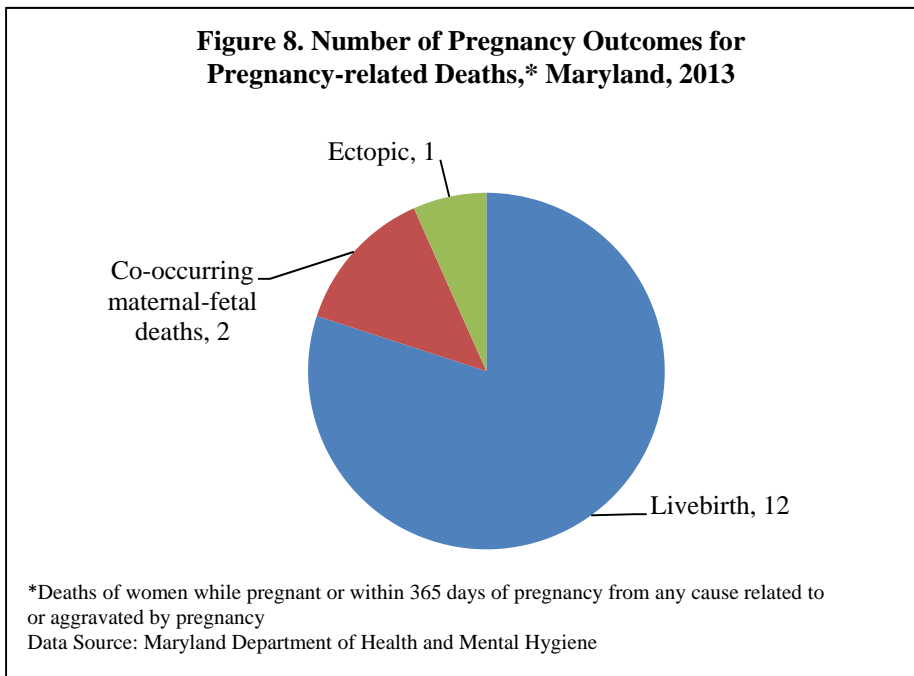
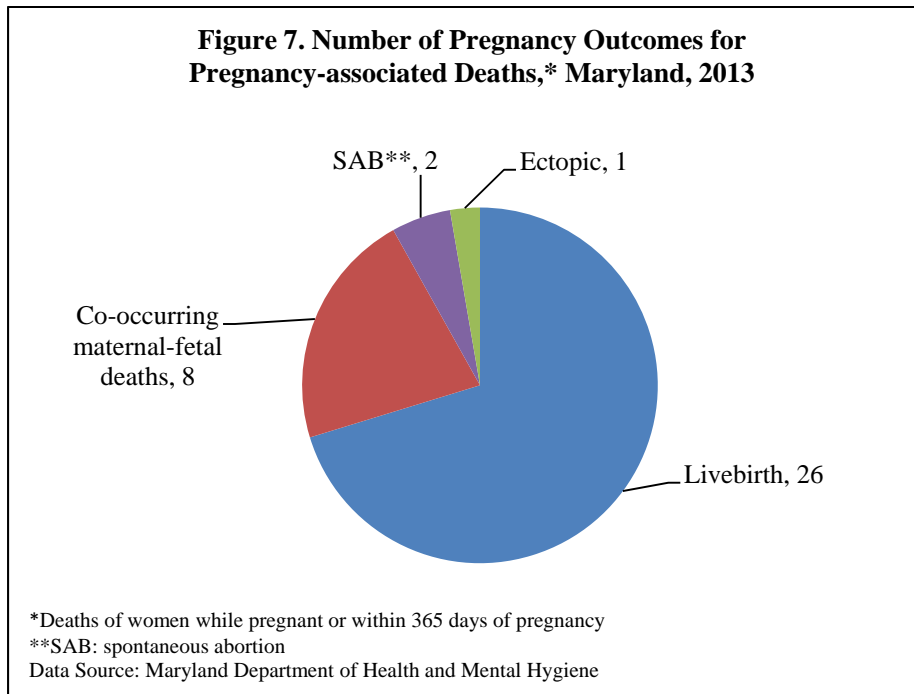
**Cases by Timing of Death in Relation to Pregnancy**

Of the pregnancy-associated deaths in 2013, 24 percent occurred during pregnancy, 24 percent within 42 days postpartum, and 51 percent between 43-365 days postpartum (see Figure 5). Among pregnancy-related deaths, 20 percent occurred during pregnancy, 47 percent within 42 days postpartum, and 33 percent between 43-365 days postpartum (see Figure 6).



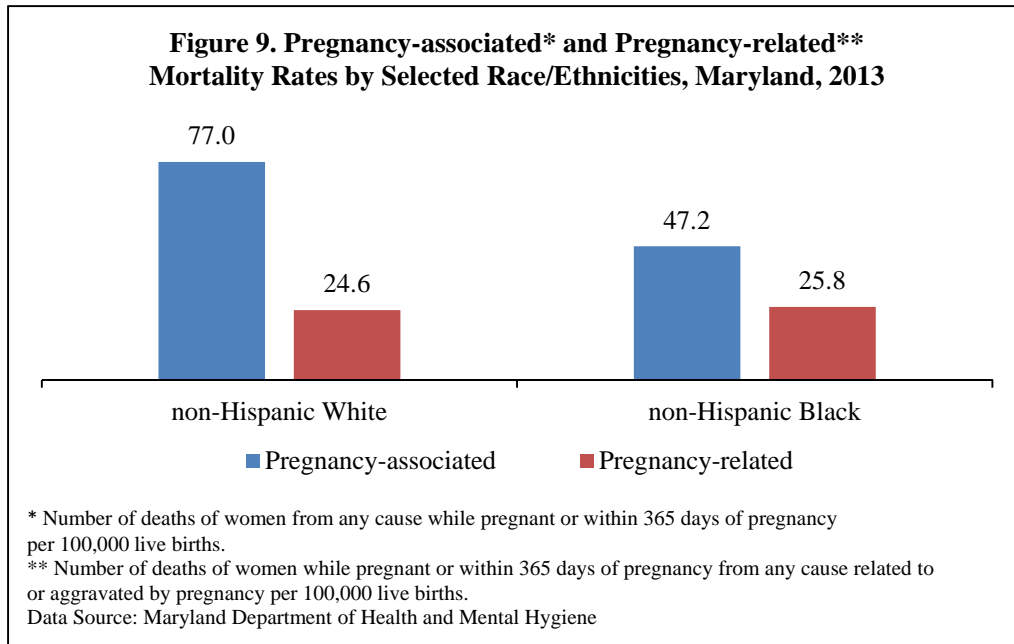
### Cases by Outcome of Pregnancy

Among 2013 pregnancy-associated deaths, 70 percent of cases had a live birth, 22 percent had co-occurring maternal and fetal deaths, five percent (two cases) had a spontaneous abortion, and one case involved an ectopic pregnancy (see Figure 7). Among pregnancy-related deaths, 80 percent of cases had a live birth, 13 percent had co-occurring maternal and fetal deaths, and one case involved an ectopic pregnancy (see Figure 8).



### *Cases by Maternal Race and Ethnicity*

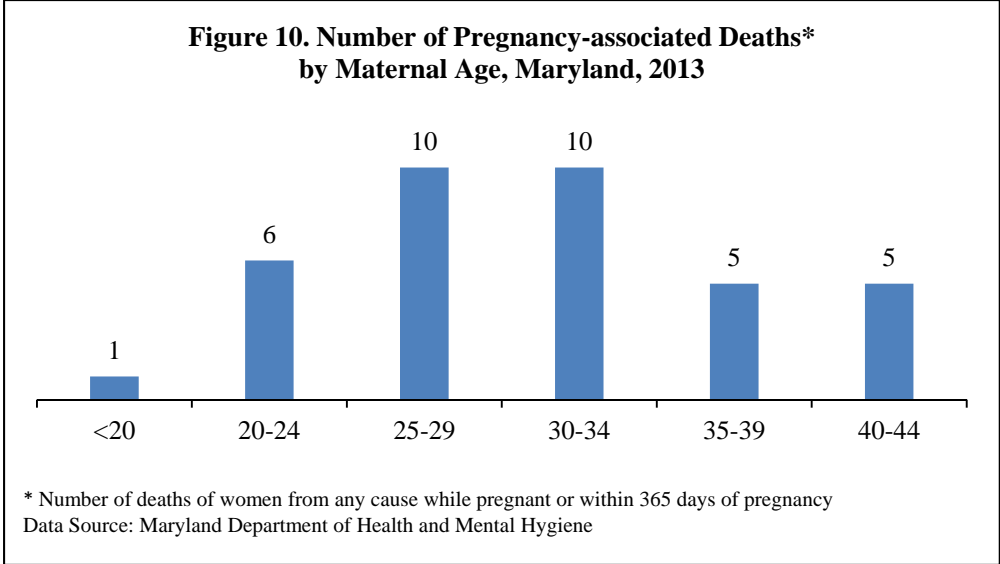
Of the 2013 pregnancy-associated deaths, 25 (68 percent) occurred among non-Hispanic White women, 11 (30 percent) among non-Hispanic Black women, and one in an Asian woman. Eight (53 percent) of pregnancy-related deaths were among non-Hispanic White women, six (40 percent) among non-Hispanic Black women, and one in an Asian woman. Pregnancy-associated and pregnancy-related mortality rates by race in 2013 are shown in Figure 9. Rates for racial or ethnic groups with fewer than five deaths are not displayed.



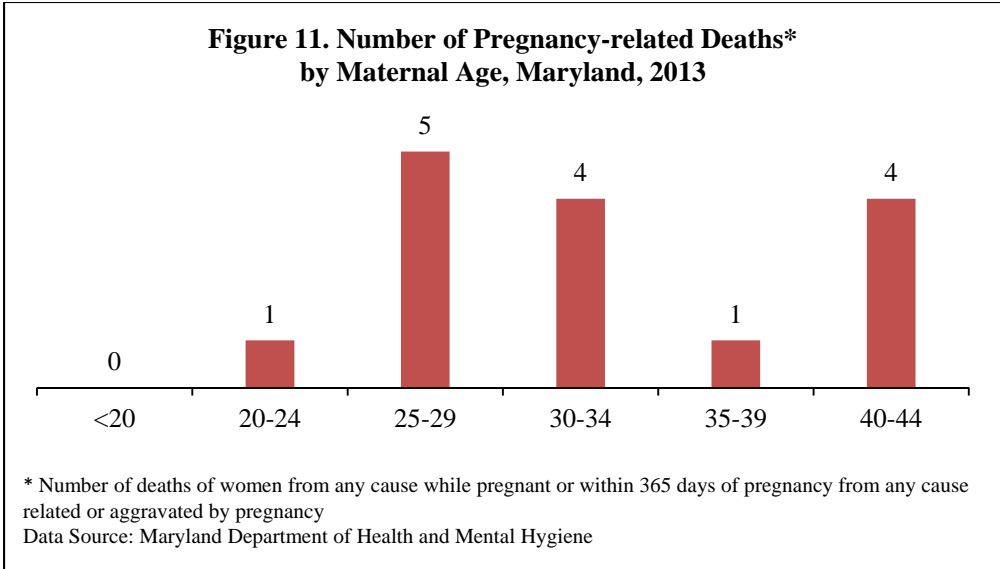
Among 2013 deaths, the pregnancy-associated mortality rate for non-Hispanic White women was 1.6 times higher than the rate for non-Hispanic Black women. This is in contrast to previous years. Among deaths occurring in 2010 to 2012, the non-Hispanic Black pregnancy-associated mortality rate was 1.3-1.5 times higher than the non-Hispanic White rate. This reversal in relative rates between the two racial groups is due primarily to the high number of substance use-related unintentional overdose deaths in 2013. Ten of the 11 overdose deaths occurred among non-Hispanic White women.

### *Cases by Maternal Age*

The distribution of pregnancy-associated deaths by maternal age group is shown in Figure 10. The pregnancy-associated mortality rate was very similar for women ages 20-24, 25-29, 30-34 and 35-39 years, at 45.6 to 50.0 deaths per 100,000 live births in each age group. The mortality rate rose sharply for women ages 40-44 years at 193.3 deaths per 100,000 live births. The rate for women under age 20 is not reported due to small numbers of deaths leading to unstable rates.



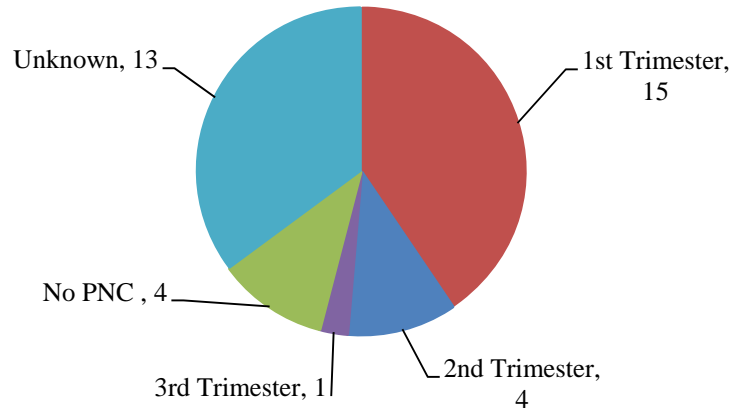
The distribution of pregnancy-related deaths by maternal age group is shown in Figure 11. The pregnancy-related death rate among women ages 25-29 years was 25.0 deaths per 100,000 live births. Rates for age groups with fewer than five deaths are not reported.



***Cases by Timing of Prenatal Care Initiation***

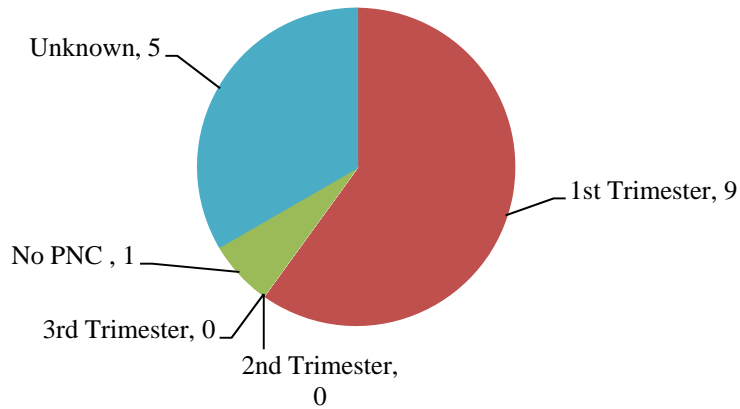
The distributions of pregnancy-associated and pregnancy-related deaths by the trimester when women initiated prenatal care are shown in Figures 12 and 13, respectively. Forty-one percent of pregnancy-associated deaths were among women who initiated care in the first trimester of pregnancy. Sixty percent of the pregnancy-related deaths were among women who received first trimester prenatal care.

**Figure 12. Number of Pregnancy-associated Deaths\* by Timing of Prenatal Care (PNC) Initiation, Maryland, 2013**



\*Deaths of women while pregnant or within 365 days of pregnancy  
Data Source: Maryland Department of Health and Mental Hygiene

**Figure 13. Number of Pregnancy-related Deaths\* by Timing of Prenatal Care (PNC) Initiation, Maryland, 2013**

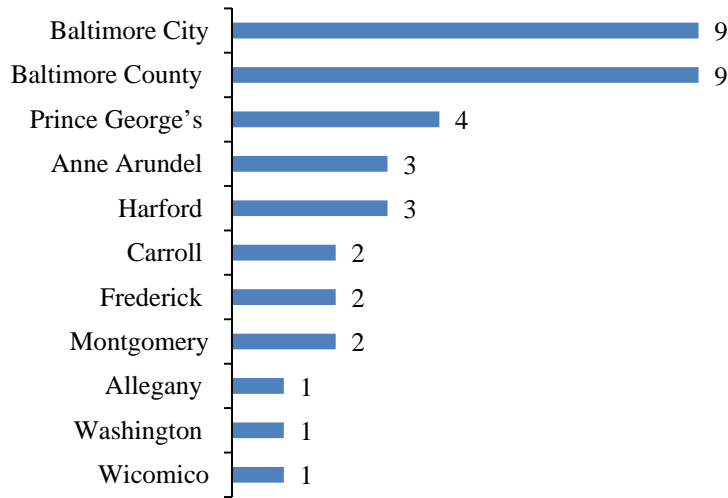


\*Deaths of women while pregnant or within 365 days of pregnancy from any cause related to or aggravated by pregnancy  
Data Source: Maryland Department of Health and Mental Hygiene

***Cases by Jurisdiction of Residence and Occurrence***

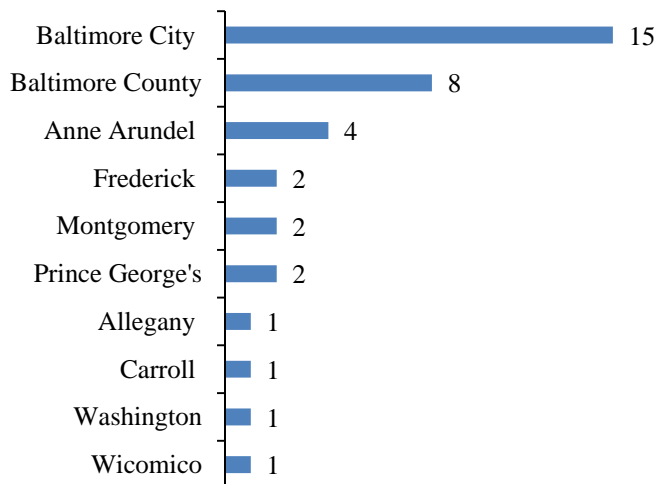
Forty-eight percent of the 2013 pregnancy-associated deaths were among residents of Baltimore City and Baltimore County, 24 percent in each jurisdiction (see Figure 14). Forty-one percent of the pregnancy-associated deaths occurred in Baltimore City and 22 percent in Baltimore County (see Figure 15).

**Figure 14. Number of Pregnancy-associated Deaths\* by Jurisdiction of Residence, Maryland, 2013**



\*Deaths of women from any cause while pregnant or within 365 days of pregnancy  
Data Source: Maryland Department of Health and Mental Hygiene

**Figure 15. Number of Pregnancy-associated Deaths\* by Jurisdiction of Occurrence, Maryland, 2013**

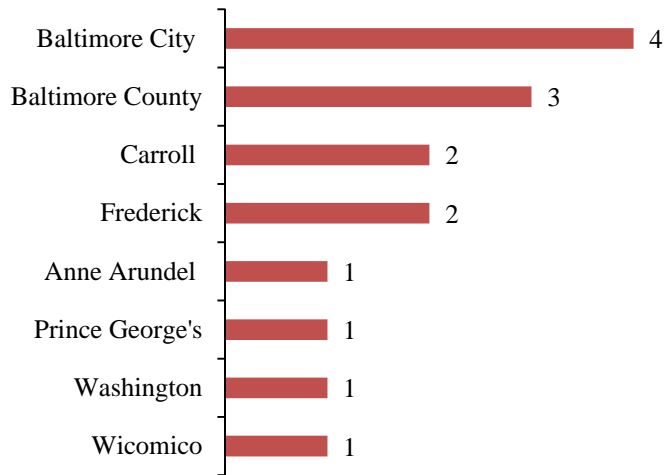


\*Deaths of women from any cause while pregnant or within 365 days of pregnancy  
Data Source: Maryland Department of Health and Mental Hygiene

In 2013, 27 percent of pregnancy-related deaths were among residents of Baltimore City, 20 percent among residents of Baltimore County, and 13 percent each among residents of Carroll and Frederick Counties (see Figure 16). Forty-seven percent of the pregnancy-related deaths occurred in Baltimore City and 13 percent each in Baltimore and Frederick Counties (see Figure 17).

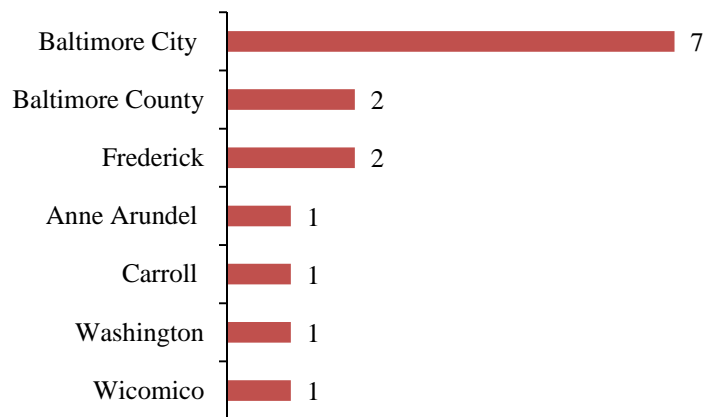


**Figure 16. Number of Pregnancy-related Deaths\* by Jurisdiction of Residence, Maryland, 2013**



\*Deaths of women from any cause while pregnant or within 365 days of pregnancy from any cause related to or aggravated by pregnancy  
 Data Source: Maryland Department of Health and Mental Hygiene

**Figure 17. Number of Pregnancy-related Deaths\* by Jurisdiction of Occurrence, Maryland, 2013**



\*Deaths of women from any cause while pregnant or within 365 days of pregnancy from any cause related to or aggravated by pregnancy  
 Data Source: Maryland Department of Health and Mental Hygiene

***Preventability of Deaths***

After reviewing all available information pertaining to a case, the MMR Committee comes to a consensus opinion that the death was preventable, potentially preventable, unpreventable, or preventability could not be determined. Of the 37 pregnancy-associated deaths, 27 (73 percent) were judged to be preventable or potentially preventable. In two cases, preventability could not

be determined, and eight cases were considered unpreventable deaths. Among the 15 pregnancy-related deaths, 11 (73percent) were determined to be preventable or potentially preventable. The remaining four cases were considered unpreventable deaths.

All 11 of the unintentional overdose deaths were considered potentially preventable, as were four of five homicide deaths and both suicide deaths. Three of five injury deaths were also felt to be potentially preventable. The eight deaths considered unpreventable involved medical causes of death except one motor vehicle accident. Medical causes of unpreventable death included amniotic fluid embolus, cancer, cardiomyopathy, and preeclampsia.

## **FOCUS ON BEHAVIORAL HEALTH CONDITIONS**

Among the 37 pregnancy-associated deaths occurring in 2013, 18 cases (49 percent) were due to behavioral health conditions, including:

- 11 cases (30 percent) involving substance use and unintentional overdose
  - All 11 deaths were considered potentially preventable.
  - One of 11 cases was related to pregnancy.
  - Ten of 11 cases involved opioid overdose.
  - Seven of 11 cases had documented comorbidities of mental health conditions or intimate partner violence.
- Five cases (14 percent) resulting from homicide
  - Four cases were potentially preventable, while in one case preventability could not be determined.
  - Three cases were related to pregnancy, in one case relatedness to pregnancy could not be determined, and one case was not pregnancy related.
  - In the four potentially preventable cases, there was a history of intimate partner violence, and the perpetrator was a current or former intimate partner of the victim. In two cases, neighbors reported hearing escalating arguments; in the other two cases, protective orders had been filed.
- Two cases (5 percent) involving suicide
  - Both cases were potentially preventable.
  - Both cases were related to pregnancy and associated with perinatal depression.
  - Both women received some psychiatric care and were on medication, but care and medication use may have been sporadic and inconsistent.
  - Each had a comorbidity of substance use or intimate partner violence.

Several key findings were apparent as a result of these cases reviews:

Reproductive histories of women who died of behavioral health conditions frequently documented unintended pregnancies, short inter-pregnancy intervals, numerous past pregnancies, pregnancy losses, and terminations.

Twelve (67 percent) of the 18 deaths due to behavioral health conditions occurred postpartum. All of these postpartum deaths occurred after the traditional 6-week postpartum obstetric visit,

leaving a potential gap in access to health care and case management for these women beyond the usual period of perinatal care. In contrast, of the 14 deaths due to medical causes, 64 percent occurred before six weeks postpartum.

Appropriate interventions were not clearly offered to women who were in need of behavioral health services. Documented referrals for substance use, mental health, or intimate partner violence services were lacking. There was little or no documentation of any behavioral health issues in the prenatal, delivery, or postpartum records. This could be due to the lack of awareness by providers of the existence of the behavioral health problem or lack of knowledge of appropriate interventions and community resources.

Records of substance use, mental health, or intimate partner violence interventions were lacking. Communication, if any, with behavioral health providers was not documented in the medical records.

The homicide victims, their friends and families were not aware of the severity and potential lethality of the intimate partner violence. Domestic violence programs were not used by the victims in any of the deaths due to intimate partner violence.

Naloxone may have prevented many of the deaths due to opioid overdose.

## **RECOMMENDATIONS RELATED TO BEHAVIORAL HEALTH CONDITIONS**

A single cause of death was assigned to each case, however, comorbidities of substance use, intimate partner violence and depressive disorders were common in the majority of cases and contributed to the immediate cause of death. Seventeen (94 percent) of the 18 behavioral health-related deaths were considered potentially preventable. In one case preventability could not be determined, but none of the cases was considered unpreventable. In contrast, of the 14 deaths due to medical causes, seven cases (50 percent) were determined to be unpreventable. Due to the high frequency and potential preventability of unintentional overdose, homicide, and suicide deaths, the MMR Committee decided to focus its recommendations on behavioral health conditions. With the goal of preventing future deaths, the MMR Committee puts forth the recommendations outlined in Table 1 related to behavioral health conditions.

**Table 1. 2015 Recommendations and Action Items Related to Behavioral Health Conditions**

<b>Cause of Death</b>	<b>Recommendations</b>	<b>Action Items</b>
<p>Unintentional Overdose</p> <p>Homicide</p> <p>Suicide</p>	<ul style="list-style-type: none"> <li>• Promote universal screening at least once during pregnancy, at delivery, and postpartum for substance use, mental health, and intimate partner violence conditions.</li> <li>• Document screening tools used, referrals given, and treatment plans in perinatal records.</li> <li>• Reduce unintended pregnancy and encourage reproductive life planning.</li> <li>• Improve communication and collaboration between providers of prenatal care and other providers (mental health, substance use, domestic violence, primary care, oral health, etc.).</li> <li>• Promote interdisciplinary case management among substance use, mental health, and intimate partner violence programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Create and disseminate a resource list of valid screening tools for substance use, mental health, and intimate partner violence.</li> <li>• Create and disseminate a resource list of referral service options by Maryland jurisdiction.</li> <li>• Strive for a single point of contact for behavioral health services to facilitate providers’ accessing referral sources.</li> <li>• Promote integration of reproductive life planning and preconception counseling into health care visits by all disciplines.</li> <li>• Encourage use of Long Acting Reversible Contraception (LARC) for women who indicate they do not desire to become pregnant.</li> <li>• Promote the importance of establishing linkages and relationships to ongoing care during the perinatal and postpartum period.</li> <li>• Facilitate obtaining medical records from behavioral health service providers so that the obstetric chart has comprehensive information of the patient’s behavioral health care..</li> <li>• Establish a liaison between MMR Program and state behavioral health task forces on Heroin/Opioids, Maternal Perinatal Mental Health, and intimate partner violence.</li> </ul>
<p>Unintentional Overdose</p>	<ul style="list-style-type: none"> <li>• Improve safe opioid prescribing practices.</li> <li>• Encourage Prescription Drug Monitoring Program (PDMP) utilization by providers.</li> <li>• Encourage naloxone co-prescribing and 3<sup>rd</sup> party prescribing.</li> <li>• Inform substance use treatment providers about perinatal health.</li> </ul>	<ul style="list-style-type: none"> <li>• Raise provider awareness about substance use during pregnancy and promote current resources and trainings.</li> <li>• Educate providers on the use and importance of the PDMP.</li> <li>• Train providers, patients, and families on naloxone use and response to opioid overdose.</li> <li>• Develop consultation resource about perinatal and reproductive health issues for substance use treatment providers.</li> </ul>
<p>Homicide</p>	<ul style="list-style-type: none"> <li>• Increase awareness of the potential severity of intimate partner violence and its impact on health among providers and women.</li> <li>• Increase awareness of services offered at local domestic violence programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage obstetric provider outreach to local domestic violence programs to facilitate referrals for appropriate services.</li> <li>• Encourage use of relationship safety cards so that women can determine whether their relationship is a healthy one.</li> </ul>
<p>Suicide</p>	<ul style="list-style-type: none"> <li>• Inform providers of risks and benefits of antidepressant use during pregnancy, as well as, risks of untreated depression.</li> <li>• Increase professional resources for women who need consultation about perinatal mental health disorders.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide information to mental health providers about medication safety and best treatment choices for reproductive-age women considering pregnancy.</li> <li>• Create resource list by Maryland jurisdiction of mental health providers, hotlines, helplines, and support groups that counsel and treat women about perinatal mental health disorders.</li> <li>• Develop consultation resources about mental health management during pregnancy for prenatal care and mental health providers.</li> </ul>

## **UPDATE ON ACTIVITIES RELATED TO PREECLAMPSIA DEATHS**

A subgroup of the MMR Committee, led by Drs. Meredith Birsner, Robert Atlas, and Clark Johnson, developed two educational tools emphasizing the most recent ACOG statements on management of hypertensive disorders of pregnancy, including preeclampsia. The first was an alert bulletin with diagnostic and treatment recommendations, and the second was a more detailed Power Point presentation which covered the full range of issues related to hypertensive disorders of pregnancy. The bulletin was intended for distribution to providers of perinatal care, and the Power Point presentation for continuing education use by obstetric programs in the State. Both were distributed electronically to the chiefs of obstetrics at all Maryland delivery hospitals. An electronic survey to assess the utilization of the two educational tools is planned for later this year.

## **UPDATE ON ACTIVITIES RELATED TO CARDIOMYOPATHY DEATHS**

A review by the MMR Committee of cardiomyopathy deaths over the last five years revealed that many of these deaths occur long after the conclusion of pregnancy. Sixty-seven percent occurred beyond the usual 6-week period of perinatal care. A letter to members of the Maryland chapter of the American College of Cardiology is being drafted, calling attention to these findings and urging continued vigilance for the possible late development of cardiomyopathy complications in postpartum women.

## **UPDATE ON THE MARYLAND MATERNAL MORTALITY REVIEW PROCESS**

The current outline for case summary abstraction was developed more than five years ago from sample forms in use by other state maternal mortality review programs as well as resource information from the CDC. It is generic in structure and thus does not always capture diagnosis-specific data elements. Individual members of the MMR Committee are developing supplemental data forms for each of the CDC diagnostic categories. Attention is being given to identifying specific diagnostic and treatment elements which reflect evidence-based or best practice interventions. It is hoped that such expanded data collection will enhance both workgroup deliberations and quality improvement recommendations.

## **SUMMARY**

Maryland continues to have a slightly higher maternal mortality rate than the U.S. average, and substantially higher than the Healthy People 2020 goal of 11.4 deaths per 100,000 live births. This in part reflects efforts in the State to accurately identify maternal deaths. Enhanced surveillance methods include questions on the death certificate about pregnancy within the year prior to death, linkage of women's death certificates with birth and fetal death certificates from the previous year, review of medical examiner records, and detailed case review by the MMR Committee.

Thirty-seven pregnancy-associated deaths were identified in 2013. Fifteen (41 percent) of these cases were determined to be pregnancy-related, with the cause of death related to or aggravated

by the pregnancy or its management. Of the 37 pregnancy-associated deaths, 18 (49 percent) were due to behavioral health conditions, including substance use, intimate partner violence, and mental health disorders. Ninety-four percent of the behavioral health-related deaths were considered potentially preventable.

Because of the high frequency and potential preventability of these deaths, the MMR Committee focused its recommendations in this report on behavioral health conditions. The MMR Committee will continue to broaden its dissemination of findings and recommendations, and to promote communication and collaboration among all providers caring for pregnant and postpartum women in an effort to reduce pregnancy-associated deaths in Maryland.

## Appendix A

### Maryland Maternal Mortality Review Case Discussion Guide

Date: \_\_\_\_\_ Case # \_\_\_\_\_

Purpose: To review pregnancy-associated deaths in order to classify cases, identify trends in mortality, and develop recommendations for systems change.

Case Definition: Death of a woman while pregnant or within 365 days of pregnancy conclusion

#### 1. Medical Care and Non-medical Causes Underlying the Death

##### Quality/content of medical care

- Preventive services
- Community and patient education
- Nutrition, substance use, and social services
- Preconception services
- Prenatal care
- Labor and delivery services
- Postpartum care and follow-up
- Management & treatment
- Diagnostic procedures
- Medical interventions
- Patient education and follow-up

##### Non-medical (social) causes underlying the death

- Intendedness of pregnancy
- Woman's and her family's knowledge about pregnancy & its possible complications
- Timeliness on the part of the woman in recognizing a problem & taking action
- Accessibility/acceptability of healthcare (cultural/experience/financial/geographic/transportation/logistic)
- Cultural competence and communication skills of health care providers
- Woman's adherence or non-adherence to medical advice and health interventions

#### 2. Issues specific to this case

Individual Behavior: \_\_\_\_\_

\_\_\_\_\_

Provider Practice: \_\_\_\_\_

\_\_\_\_\_

Institutional/ Systems Issues: \_\_\_\_\_

\_\_\_\_\_

Additional issues: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Sources of Information: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Information Missing: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1. Type of Case:

Pregnancy-related (causes related to or aggravated by pregnancy or its management)

Not Pregnancy-related (cause unrelated to pregnancy)

Undetermined

Due to: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. This case was:

Preventable ( individual  provider  institutional/systems issues)

Potentially Preventable ( individual  provider  institutional/systems issues)

Undetermined

Not Preventable

3. Resources or services needed but  not used or  not available:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Recommendation(s) to address issues in this case:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_