



# THE SURGEON GENERAL'S CALL TO ACTION

TO IMPROVE MATERNAL HEALTH



U.S. Department of Health & Human Services

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## **FOREWORD FROM THE SECRETARY, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**

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The United States has one of the most technologically advanced healthcare systems in the world, yet we have a maternal mortality rate that is higher than comparable countries. Racial and ethnic, geographic, and age disparities are especially concerning: Pregnancy-related mortality for Black and American Indian and Alaska Native women is two to three times higher than for white, Hispanic, and Asian/Pacific Islander women.<sup>a</sup> The share of rural counties with hospital obstetric services decreased significantly in the past decade, and women over 35 years are one and a half times more likely to experience complications during pregnancy.

The disparities go well beyond tragic, unnecessary deaths. Each year, thousands of women experience severe maternal morbidity—unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to their health. These health outcomes create lasting burdens that make it more challenging for mothers to live healthy, flourishing lives. Such disparities and outcomes are unacceptable.

The Trump Administration, including through leadership by the Surgeon General, has made it a priority to tackle health issues that disproportionately impact Americans of color—such as kidney care, HIV/AIDS, hypertension, and sickle cell disease—and we must do the same for maternal health. We are committed to reducing disparities and improving outcomes for our nation’s mothers, and we can accomplish even more if Congress acts on the maternal health proposals contained in President Trump’s Fiscal Year 2021 Budget.

We have an opportunity for action. Research indicates that as much as two-thirds of pregnancy-related deaths are preventable. Key factors that may contribute to high maternal mortality and morbidity include variation in clinical practice patterns, access to care, and data limitations that inhibit surveillance and research.

Implementing evidence-based measures to reduce maternal mortality has been shown to cut mortality by as much as half.<sup>b</sup> The Department of Health and Human Services is releasing an Action Plan that lays out a path forward to deliver such results.

But we cannot accomplish our goals from Washington. Every American has an important role. This Surgeon General’s Call to Action outlines the critical roles that each of us can play to reduce the unacceptably high rates of maternal mortality and morbidity in the United States. Success will require the coordinated efforts of states, healthcare professionals, health care and birthing facilities, women and families, payors, employers, innovators, and researchers, working in collaboration with federal partners.

Calls to Action by the United States Surgeon General are a rare step, reserved for the most serious public health crises facing all Americans. Maternal morbidity and mortality is a crisis, and has been for far too long.

Taking action together, we can help all women set a course for health before, during, and after pregnancy, ensuring healthy futures for both our mothers and children.

***Alex M. Azar II***  
***Secretary of Health and Human Services***

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a CDC Morbidity and Mortality Weekly Report. Racial/Ethnic Disparities in Pregnancy-Related Deaths — United States, 2007–2016, <https://www.cdc.gov/mmwr/volumes/68/wr/pdfs/mm6835a3-H.pdf>.

b Main, E. K., Markow, C., & Gould, J. (2018). Addressing maternal mortality and morbidity in California through public-private partnerships. *Health Affairs*, 37(9), 1484-1493.

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## **FOREWORD FROM THE SURGEON GENERAL, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**

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As a husband, father, son, and the Nation's Doctor, I am deeply committed to improving the health and well-being of America's mothers and mothers-to-be. The death of a woman from pregnancy-related causes is one of the greatest tragedies that can befall a family and a community. Sadly, this catastrophe happens about 700 times each year in the U.S. -- far more frequently than in countries of similar population size and income. Severe complications of pregnancy number in the tens of thousands, and pregnancy-related events can put women at increased risk of certain medical conditions for the rest of their lives.

Further, we cannot truly address maternal health-- especially maternal morbidity and mortality-- without acknowledging the disparate outcomes many women of color face. For example, black and American Indian/ Alaska Native women die from pregnancy-related causes at two to three times that of their white, Asian Pacific Islander, and Hispanic counterparts.

These outcomes are not just unacceptable. They are largely avoidable. In fact, the Centers for Disease Control and Prevention (CDC) estimates that two out of three pregnancy-related deaths are considered preventable. Simply put, we can – and must – do more for our moms.

Looking around the country, we have seen that adoption of best practices in the home, community, clinic, and hospital, leads to better outcomes for women and babies. I am issuing this Call to Action to equip each of you with specific actions that will help ensure every woman is provided the best chance to see her child take their first steps, graduate from high school, and even have a baby of their own.

It is also an inescapable fact that this Surgeon General's Call to Action will be released during unprecedented times. The novel coronavirus and the disease it causes (COVID-19) have changed all of our lives and touched every household in America. It has brought to light many of the factors, such as housing, transportation, and workplace policies, that make some Americans more vulnerable to health threats. COVID-19 has also shed light on how many Americans, including women of reproductive age, have hypertension, diabetes, unhealthy body weight, and other chronic conditions. We have discovered that such health burdens not only increase risks during pregnancy, but may also increase susceptibility to and severity of COVID-19. That's why it is more pressing than ever that we address these determinants of health—both societal and medical—as they impact the lives and livelihoods of women, and in turn, our nation's future.

The health of our nation depends on the health of our mothers. That is why I applaud the fact that both the Department of Health and Human Services Action Plan to Improve Maternal Health in America and this Call to Action have adopted a life-course approach, promoting and building health across the age spectrum through individual, community, and healthcare actions. By investing early and over time in all three levels of action, we can become a nation of healthy mothers—and over the long term, a healthier nation.

I ask that you join me in this mission. Read this document. Share it with your friends and colleagues. Then take the actions that are a good fit for you and your organization or community. Every single one of us has a unique role to play. By working together we can support moms, save lives, and set the foundation for a healthier nation.

***Jerome M. Adams, MD, MPH***  
***Vice Admiral, U.S. Public Health Service***  
***Surgeon General***  
***U.S. Department of Health and Human Services***

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# INTRODUCTION: CALLING FOR NATIONAL ACTION TO IMPROVE MATERNAL HEALTH

Optimizing maternal health is an important public health goal for the United States and is crucial to the well-being of future generations.<sup>1,2</sup> The urgency of this goal is even more apparent during challenging times, such as the current pandemic which has highlighted striking health disparities in our nation. Maternal health is the health of women during pregnancy, childbirth, and the postpartum period. However, efforts to improve maternal health must extend beyond this time period and begin with promoting mental and physical health in young girls and adolescents, and continue throughout the reproductive years.<sup>3</sup> This life-course approach to improving maternal health is highlighted in this *Call to Action*. This approach is also used in *Healthy Women, Healthy Pregnancies, Healthy Futures: The U.S. Department of Health and Human Services' (HHS) Action Plan to Improve Maternal Health in America*. While the *HHS Action Plan* summarizes the Department's work to ensure the U.S. is one of the safest countries in the world to give birth, achieving this vision for all women, regardless of race, ethnicity, social and economic status, will require involvement from both public and private sectors. This *Call to Action* is intended to engage and equip individuals, organizations, and communities with actions to improve women's health prior to, during, and following pregnancy.<sup>c,d</sup>

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c Although this *Call to Action* offers a brief description of selected factors that contribute to maternal health, factors are wide-ranging and multifaceted and a comprehensive description is outside the scope of this document.

d This *Call to Action* reflects the current state of evidence and recommendations to improve maternal health. Conclusions from some studies may not be generalizable to all women. This evidence base is still evolving and more studies are needed to assess factors that impact maternal health outcomes.



# THE CURRENT STATE: MATERNAL MORTALITY AND MORBIDITY IN THE UNITED STATES

# MATERNAL MORTALITY

Despite having one of the most technologically advanced health care systems in the world, the U.S. continues to have unacceptably high rates of maternal mortality.<sup>4</sup> In 2018, for every 100,000 live births, approximately 17 women died while pregnant or within 42 days of the end of pregnancy from causes related to pregnancy or delivery.<sup>5</sup>

In the United States, maternal mortality is measured in multiple ways by different data collection systems (Appendix A). While “maternal deaths”<sup>6</sup> refer to deaths occurring during pregnancy or within 42 days of the end of pregnancy, the term “pregnancy-related death”<sup>7</sup> includes deaths occurring during pregnancy and up to one year after pregnancy. Between 2011 and 2015, 31.3% of pregnancy-related deaths occurred during pregnancy, 16.9% on the day of delivery, 18.6% on days 1-6 postpartum, 21.4% 7-42 days postpartum, and 11.7% 43-365 days postpartum (Figure 1).<sup>8,9</sup> Overall, approximately two out of three pregnancy-related deaths are considered preventable.<sup>10</sup>

From 2011 to 2015, the most common causes of pregnancy-related deaths in the U.S. were cardiovascular conditions, accounting for more than 1 in 3 pregnancy-related deaths.<sup>8</sup>

## MATERNAL DEATHS:

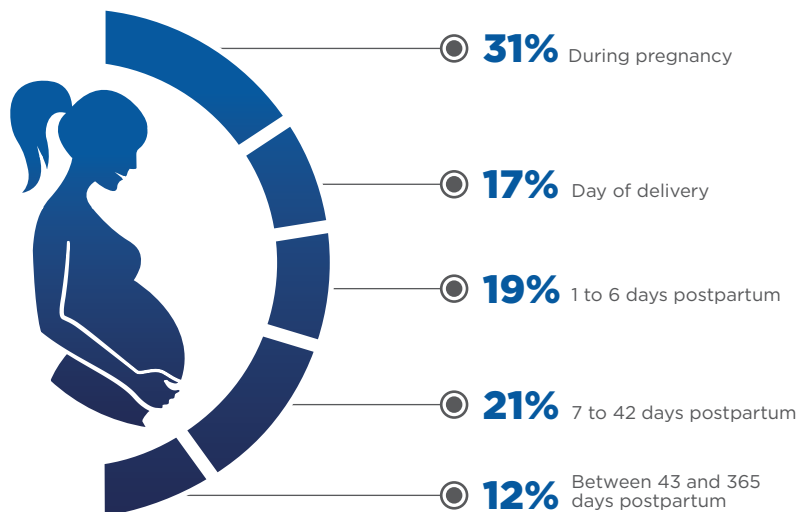
*Deaths of women while pregnant or within 42 days of the end of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. Late maternal deaths (occurring between 43 days and 1 year of death) are not included as part of the WHO definition of maternal mortality*

## PREGNANCY-RELATED DEATHS:

*Deaths that occur while pregnant or within one year of the end of pregnancy from a cause related to pregnancy or its management, but not from accidental or incidental causes*

**FIGURE 1**

Pregnancy-related deaths by time of death relative to the end of pregnancy – Pregnancy Mortality Surveillance System, U.S., 2011-2015





Causes of pregnancy-related death vary depending on when the death occurs. In 2011-2015, the most common causes of death on the day of delivery were hemorrhage (excessive bleeding) and amniotic fluid embolism (when amniotic fluid enters a mother’s bloodstream) (Figure 2).<sup>8</sup> Hemorrhage, hypertensive disorders of pregnancy (gestational hypertension, preeclampsia, eclampsia/seizures), and infection were leading causes of death during the first 6 days after delivery. During pregnancy, leading causes included “other non-cardiovascular medical conditions” (e.g., blood disorders, immune disorders, kidney disease), “other cardiovascular conditions”, (e.g., congenital heart disease, ischemic heart disease), and infection. Causes of death between 7 to 42 days after delivery included infection, cardiovascular conditions, and cerebrovascular accidents (stroke). From 43 days through the end of the first year after delivery, cardiomyopathy (weakness of the heart muscle) was the leading cause of pregnancy-related death.

Over the past two decades, the contribution of hemorrhage, hypertensive disorders of pregnancy, and anesthesia complications to pregnancy-related deaths have declined, while the contribution of cardiovascular conditions has increased.<sup>8,11,12</sup>

## CARDIOVASCULAR CONDITIONS:

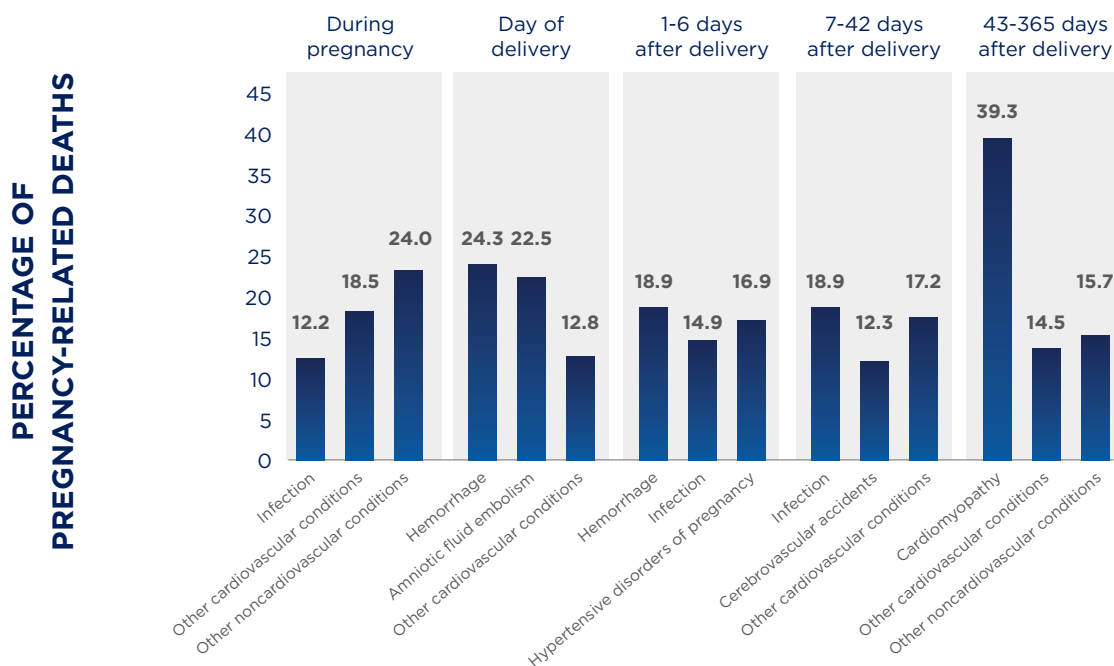
*Cardiomyopathy*

*Cerebrovascular accidents*

*Other cardiovascular conditions (congenital heart disease, ischemic heart disease, heart valve disease, hypertensive heart disease, and congestive heart failure)*

**FIGURE 2**

Pregnancy-related deaths by cause of death and time of death relative to the end of pregnancy – Pregnancy Mortality Surveillance System, U.S., 2011-2015



Data Source: Vital Signs: Pregnancy-Related Deaths, United States, 2011-2015, and Strategies for Prevention, 13 States, 2013-2017. <https://www.cdc.gov/mmwr/volumes/68/wr/mm6818e1.htm>

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## SEVERE MATERNAL MORBIDITY

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Thousands of women experience unintended outcomes of labor and delivery that result in significant short- or long-term consequences to their health.<sup>13</sup> These complications are referred to as severe maternal morbidity (SMM) and include eclampsia, sepsis, or hysterectomy, to name a few.<sup>14</sup> Blood transfusions (procedure in which a patient is given donated blood) are significant events and can be an indicator of SMM, although they may not always reflect SMM in the absence of other indicators.<sup>15,16</sup> As a result of this and changes in data reporting,<sup>e</sup> recent SMM estimates and those provided in this *Call to Action* do not include those who only received blood transfusions.

In 2017, there were over 25,000 hospital deliveries with an SMM (not including those who only received a blood transfusion),<sup>f</sup> and the five most common complications were disseminated intravascular coagulation (clotting and bleeding disorder), hysterectomy (surgical removal of the uterus), acute kidney failure, sepsis (severe infection), and adult respiratory distress syndrome. When those with blood transfusions alone are included, the number of hospital deliveries with an SMM more than doubles.<sup>9</sup>

### SEVERE MATERNAL MORBIDITY:

*Unintended outcomes of labor and delivery that result in significant short-term or long-term consequences to a woman's health*

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e Administrative hospital discharge data with International Classification of Diseases (ICD) diagnosis and procedure codes are used to identify hospital deliveries with SMM. In October 2015, there was a transition from the 9th to 10th revision of the ICD coding system with a substantial increase in coding specificity for blood transfusions. Analyses are underway to better understand the impact of this coding change on blood transfusions, but preliminary data indicate significant decreases in reporting.

f The SMM estimate is based on the Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia (from all states except Alabama, Idaho, and New Hampshire), 2017 pooled estimates with ICD-10-CM/PCS coding. [www.hcup-us.ahrq.gov/sidoverview.jsp](http://www.hcup-us.ahrq.gov/sidoverview.jsp). HCUP SID Partners: <https://www.hcup-us.ahrq.gov/partners.jsp?SID>

g The SMM estimate is based on the Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia (from all states except Alabama, Idaho, and New Hampshire), 2017 pooled estimates with ICD-10-CM/PCS coding. [www.hcup-us.ahrq.gov/sidoverview.jsp](http://www.hcup-us.ahrq.gov/sidoverview.jsp). HCUP SID Partners: <https://www.hcup-us.ahrq.gov/partners.jsp?SID>

## DIFFERENCES IN MATERNAL MORTALITY AND MORBIDITY AND CONTRIBUTING FACTORS

There are significant differences in the rates of pregnancy-related mortality and SMM in the U.S., including by race and ethnicity, education, geography, and age. Understanding and addressing the factors that contribute to these differences can improve maternal health across the U.S.

### SOCIODEMOGRAPHIC AND GEOGRAPHIC DIFFERENCES

#### RACE AND ETHNICITY

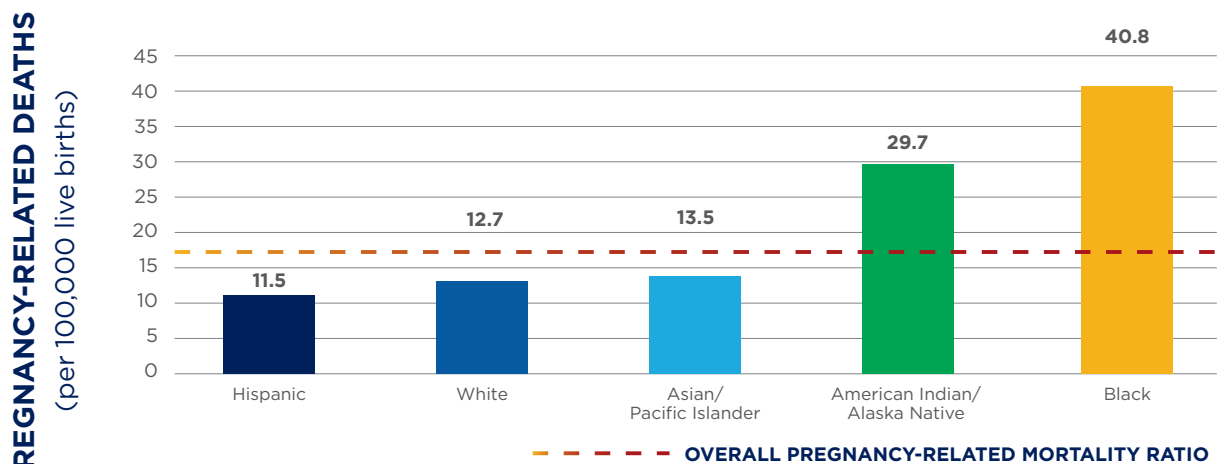
Maternal health disparities exist and are especially marked for some racial and ethnic minority women. In particular, non-Hispanic black and American Indian/Alaska Native (AI/AN) women have higher rates of pregnancy-related mortality and severe maternal morbidity than women of other racial and ethnic groups (Figures 3 and 4).

#### PREGNANCY-RELATED MORTALITY RATIO:

*Pregnancy-related deaths per 100,000 live births*

**FIGURE 3**

Pregnancy-related mortality ratios by race and ethnicity – Pregnancy Mortality Surveillance System, U.S., 2007-2016

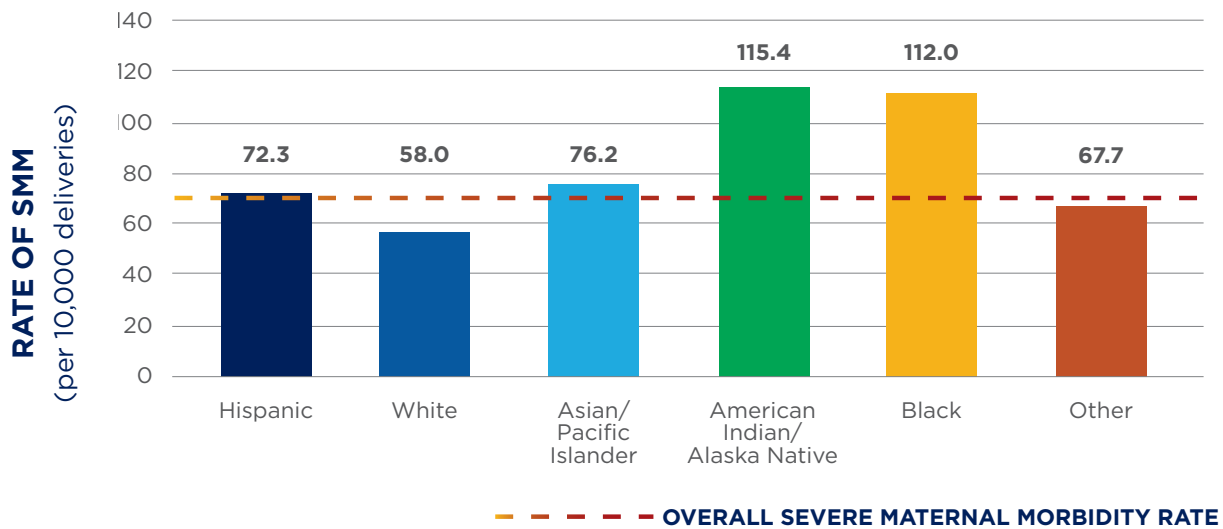


Source: Racial/Ethnic Disparities in Pregnancy-Related Deaths - United States, 2007-2016. <https://www.cdc.gov/mmwr/volumes/68/wr/mm6835a3.htm>

SMM also varies among different racial and ethnic groups. In 2017, the rates of SMM among hospital deliveries for non-hispanic black and AI/AN women were more than 1.5 times as high as those for white, Hispanic, Asian/Pacific Islander and women of other races and ethnicities (Figure 4).

**FIGURE 4**

Severe Maternal Morbidity (SMM) Rate by Race/Ethnicity, 2017



Data Note: Blood transfusions are excluded as an SMM indicator using ICD-10-CM/PCS in 2017. The Healthcare Cost and Utilization Project (HCUP) does not receive data from Indian Health Service (IHS) hospitals or tribally-operated facilities. Although over 75 percent of AI/AN deliveries occur outside of these facilities,<sup>h17,18</sup> Indian health facilities may refer more complex deliveries to other hospitals that would be included in HCUP. There is state variation in the reporting of race and ethnicity information on inpatient records reported to HCUP, with two states not reporting race and ethnicity information in 2017. Additionally, HCUP data may undercount or misclassify AI/AN women due to missing race and ethnicity data. The 2016 AI/AN SMM rate was 81.5 SMM per 10,000 deliveries, which is approximately 30 percent lower than the 2017 SMM estimate. Hence, readers should use caution when interpreting the SMM rate for AI/AN hospital deliveries, as it may not be representative of the SMM rate for all AI/AN hospital deliveries.

Source: Estimates provided by the Agency for Healthcare Research and Quality based on analysis of the Healthcare Cost and Utilization Project, State Inpatient Databases, 41 States and the District of Columbia, 2017 (from all states with reliable race reporting data in 2017 except Minnesota, Montana, North Dakota, Nebraska, Utah, and West Virginia). [www.hcup-us.ahrq.gov/sidoverview.jsp](http://www.hcup-us.ahrq.gov/sidoverview.jsp)

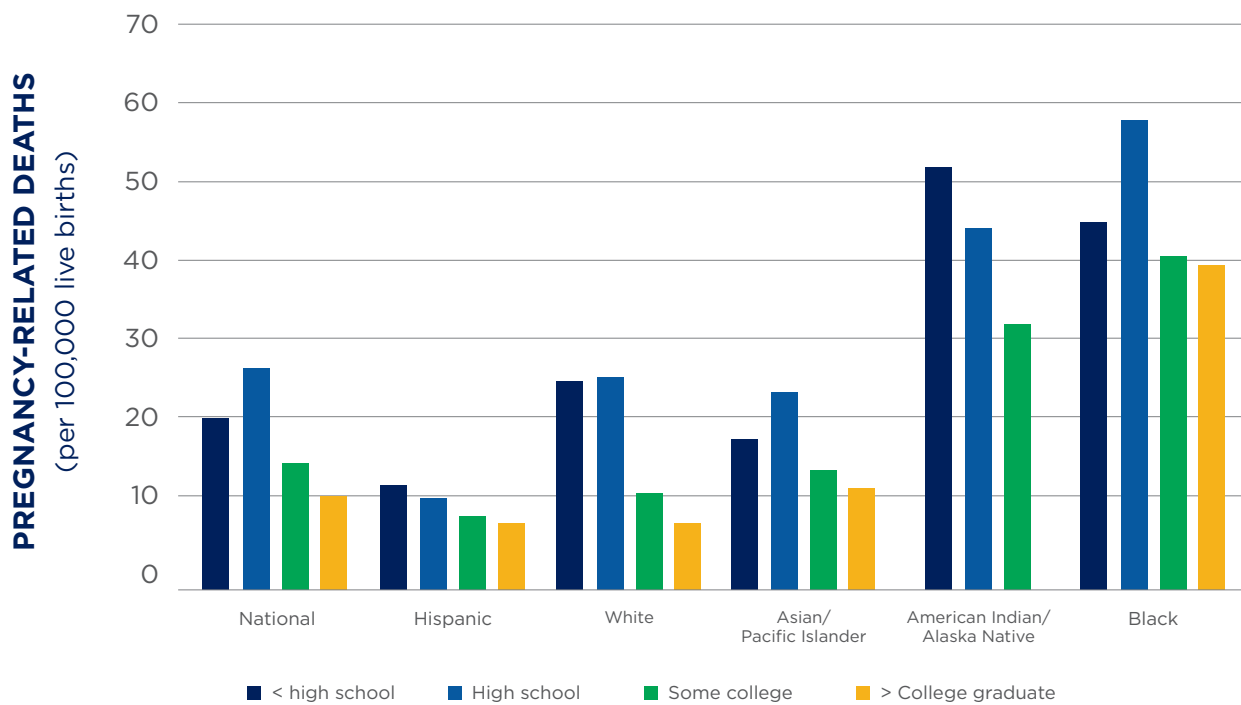
<sup>h</sup> Data from IHS and National Vital Statistics System in 2018 indicate there were 5,040 births in Tribal Facilities and 2,296 births in Federal IHS facilities, out of 29,092 births in the U.S. among AI/AN women.

## EDUCATION

Women with at least some college education have lower pregnancy-related mortality ratios than those with a high school education or less (Figure 5). Black and AI/AN women have the highest pregnancy-related mortality ratios regardless of education level.

**FIGURE 5**

Pregnancy-related mortality ratios by race, ethnicity and education, Pregnancy Mortality Surveillance System, U.S., 2007-2016



Note: The sample size of AI/AN women with a college degree or higher is insufficient to generate a reliable estimate of the pregnancy-related mortality ratio for this population.

Source: Racial/Ethnic Disparities in Pregnancy-Related Deaths - United States, 2007-2016. <https://www.cdc.gov/mmwr/volumes/68/wr/mm6835a3.htm>

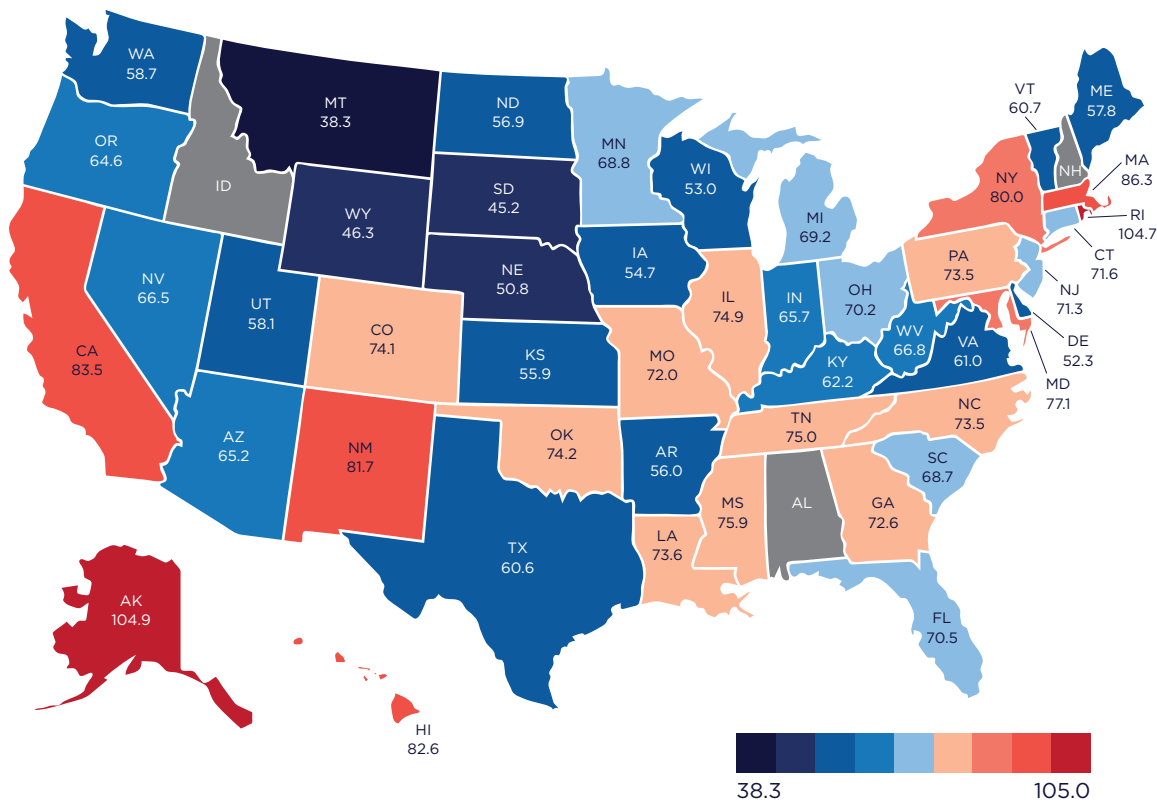
## GEOGRAPHY

Maternal health outcomes have also been shown to vary by geographic location. During the period from 2007 to 2016, the pregnancy-related mortality ratio in the state with the highest ratio was 3.8 times that of the state with the lowest ratio.<sup>19</sup> When states are grouped into high, medium, and low pregnancy-related mortality ratio categories, differences in pregnancy-related mortality by race and ethnicity persist. Black and AI/AN women have pregnancy-related mortality ratios approximately 2-3 times that of white women regardless of whether the group of states is in the high, medium or low category.<sup>20</sup>

Some states report higher rates of SMM (not including those who only received a blood transfusion) than others (Figure 6).<sup>i</sup>

**FIGURE 6**

Rate of SMM (per 10,000 delivery hospitalizations) by State, 2017



Note: States colored gray indicate that HCUP data were not available in 2017. Estimates do not include blood transfusions as an SMM indicator using ICD-10-CM/PCS in 2017.

Source: Estimates provided by the Agency for Healthcare Research and Quality based on analysis of the Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia (from all states except Alabama, Idaho, and New Hampshire), 2017. [www.hcup-us.ahrq.gov/sidoverview.jsp](http://www.hcup-us.ahrq.gov/sidoverview.jsp). HCUP SID Partners: <https://www.hcup-us.ahrq.gov/partners.jsp?SID>

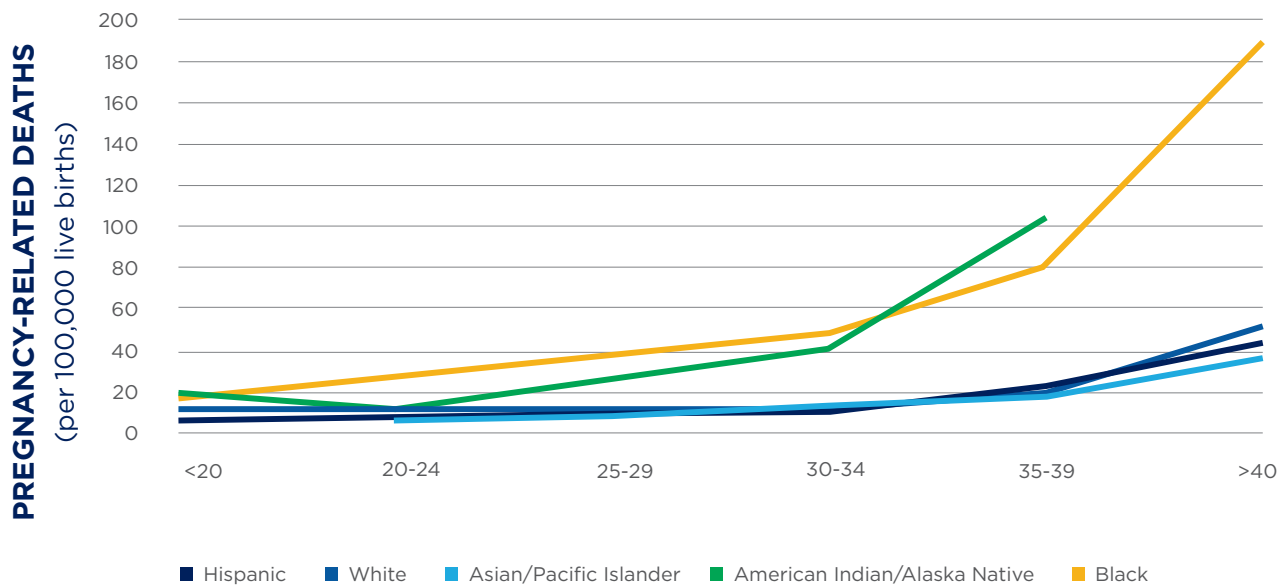
<sup>i</sup> The SMM estimates are based on the Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia (from all states except Alabama, Idaho, and New Hampshire), 2017 pooled estimates with ICD-10-CM/PCS coding. [www.hcup-us.ahrq.gov/sidoverview.jsp](http://www.hcup-us.ahrq.gov/sidoverview.jsp). HCUP SID Partners: <https://www.hcup-us.ahrq.gov/partners.jsp?SID>

## MATERNAL AGE

Pregnancy-related deaths vary by maternal age, with the highest pregnancy-related mortality ratios reported for women aged 35 years and older.<sup>20</sup> There are also racial and ethnic disparities in pregnancy-related deaths that increase by age. These are especially marked for black and AI/AN women (Figure 7).

**FIGURE 7**

Pregnancy-related mortality ratios by race, ethnicity and age, Pregnancy Mortality Surveillance System, U.S., 2007-2016



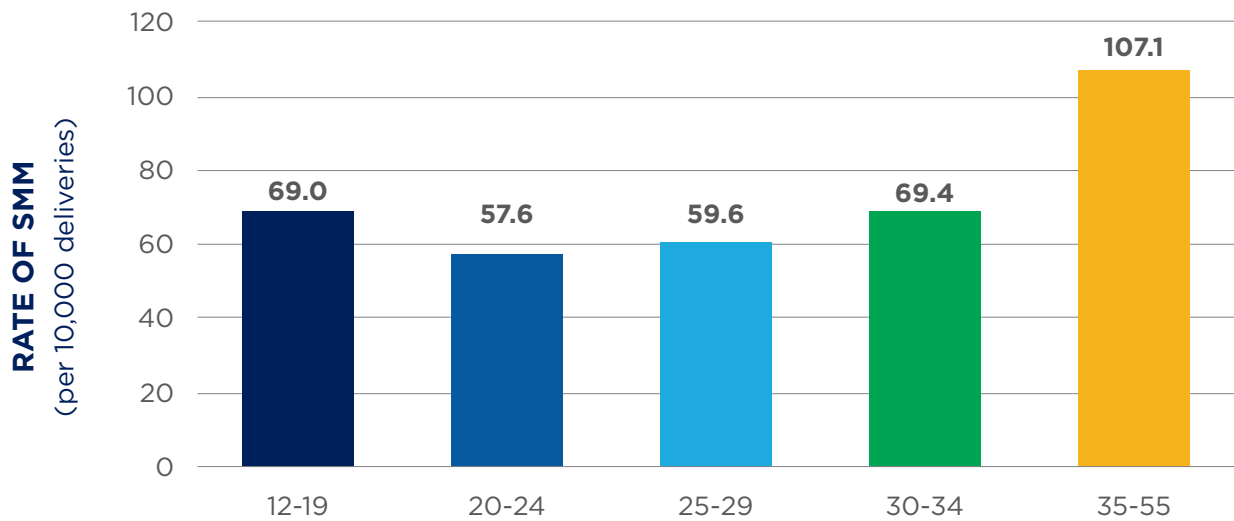
Note: Pregnancy-related mortality ratios were not reported for AI/AN women ages  $\geq 40$  because there were fewer than 10 deaths among women in this category and thus the estimates may be unreliable.

Source: Racial/Ethnic Disparities in Pregnancy-Related Deaths - U.S., 2007-2016: <https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm>

SMM rates also vary by age. Women age 35 years and older also have a substantially higher rate of SMM than women in other groups at approximately 107 events per 10,000 delivery hospitalizations as compared to rates of approximately 60-70 events per 10,000 delivery hospitalizations in younger age groups (Figure 8).

**FIGURE 8**

Severe maternal morbidity (SMM) rate by age, 2017



Source: Estimates provided by the Agency for Healthcare Research and Quality based on analysis of the Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases (SID), 47 States and the District of Columbia (from all states except Alabama, Idaho, and New Hampshire), 2017. [www.hcup-us.ahrq.gov/sidoverview.jsp](http://www.hcup-us.ahrq.gov/sidoverview.jsp). HCUP SID Partners: <https://www.hcup-us.ahrq.gov/partners.jsp?SID>



## CONTRIBUTING FACTORS

Thirteen Maternal Mortality Review Committees (MMRCs) identified several factors that may contribute to pregnancy-related deaths, including those at the patient or family (e.g., lack of knowledge of warning signs), community (e.g., unstable housing), provider (e.g., lack of continuity of care), health facility (e.g., limited experience with obstetric emergencies), and system levels (e.g., lack of guiding policies, procedures, or standards).<sup>8</sup>

Similar factors may also contribute to maternal health disparities. One U.S. study found that site of care is a contributing factor to maternal health disparities such that hospitals with a higher proportion of deliveries to black women had higher rates of SMM for both black and white women than those with lower proportions of deliveries to black women, even after adjustment for selected patient and hospital characteristics.<sup>21</sup>

Conditions in which people are born, live, work and age, such as access to healthy food options, safe public spaces, and educational and employment opportunities, can also influence health.<sup>22</sup> One conceptual model highlights these social determinants of health and suggests that patient factors, community or neighborhood factors, health care provider factors, and system factors also have a role in health outcomes.<sup>23</sup> Further research is needed to determine how such factors influence maternal health outcomes and which ones have the most impact.



## RISKS TO MATERNAL HEALTH

Many health conditions that are present prior to pregnancy may worsen or cause complications during pregnancy. These conditions can potentially lead to death or other adverse outcomes for the mother and/or baby. High blood pressure (hypertension), diabetes, unhealthy weight, and infectious diseases, warrant special attention in the context of pregnancy. Other important risk factors, such as substance use and substance use disorders, mental health conditions, and intimate partner violence (IPV) can also contribute to adverse outcomes.

Some groups of women are more likely to have these conditions than others. For example, Native Hawaiian or Pacific Islander, AI/AN, and black women have higher rates of pre-pregnancy overweight and obesity than non-Hispanic white women.<sup>17</sup> Compared to white women, AI/AN women are more than twice as likely to have a diagnosis of diabetes prior to pregnancy.<sup>17</sup> Black women ages 20-44 years have a prevalence of hypertension more than twice that of other racial and ethnic groups.<sup>24</sup> White women have the highest rates of prescription opioid overdoses as compared to other ethnic groups.<sup>25</sup>

Reproductive-aged women with disabilities (such as difficulty with vision, hearing, mobility, cognition, self-care, or independent living) are more likely to have risks to healthy pregnancies compared to women without disabilities, including high blood pressure, cardiovascular conditions, diabetes, weight concerns, and mental health concerns, and are also at higher risk for poor birth outcomes.<sup>26,27,28</sup>

## HIGH BLOOD PRESSURE (HYPERTENSION)

In 2017-2018, approximately 13 percent of women aged 18-39 years had chronic hypertension.<sup>29</sup> Chronic hypertension has increased among pregnant women over time, largely due to increasing rates of obesity and increased maternal age.<sup>30</sup> Women with hypertension are at higher risk for pregnancy complications such as superimposed preeclampsia, placental abruption (premature separation of the placenta from the uterus associated with abnormal bleeding), kidney failure, and cesarean delivery.<sup>31</sup> Complications for the infant can also occur, including premature birth and fetal growth restriction.<sup>31</sup> National guidelines now recommend that individuals self-monitor their blood pressure outside the clinical setting and work closely with their healthcare teams and others to achieve optimal control of their hypertension.<sup>32</sup>

Gestational hypertension (high blood pressure that first occurs after 20 weeks of pregnancy) and preeclampsia are hypertensive disorders that occur specifically during pregnancy.<sup>33</sup> Women with these conditions are at higher risk of future cardiovascular disease.<sup>34,35,36,37,38</sup>

### **PREECLAMPSIA:**

*A condition marked by high blood pressure during pregnancy and potential of damage to other organs, such as the kidneys (e.g., protein in the urine), liver, and brain*

## DIABETES

Diabetes is a disease that occurs when blood glucose, also called blood sugar, is too high. In 2011-2016, approximately 3 percent of women aged 20-44 years were diagnosed with diabetes and for more than half of these women their diabetes was not under control.<sup>24</sup> Over time, diabetes can lead to serious problems, such as heart disease and stroke, as well as damage to the eyes, kidneys, and nerves.<sup>39</sup>

Women with diabetes prior to pregnancy are at higher risk for pregnancy complications, such as pre-eclampsia, cesarean section, miscarriage or stillbirth, preterm birth, birth defects, and macrosomia (larger than average infant).<sup>40</sup>

Gestational diabetes is a type of diabetes that occurs during pregnancy. In 2018, approximately 7 percent of women who gave birth in the U.S. had gestational diabetes.<sup>17</sup> Women with gestational diabetes are also at increased risk of complications during pregnancy and delivery, including preeclampsia, cesarean section, fetal macrosomia, shoulder dystocia (baby's shoulders become stuck in maternal pelvis during delivery), and prematurity.<sup>41</sup>

Approximately half of women who have gestational diabetes will develop type 2 diabetes later in life.<sup>41</sup> Infants born to women with gestational diabetes are at higher risk of developing overweight and obesity in childhood.<sup>42</sup> Children who are overweight or obese are more likely to be overweight in adulthood.<sup>43</sup>

### GESTATIONAL DIABETES:

*A type of diabetes that is first seen in a pregnant woman who did not have diabetes before she was pregnant*

## UNHEALTHY WEIGHT

Body mass index (BMI) is a screening tool that is used to define weight categories and is based on a person's height and weight. Weight categories include: underweight (<18.5 kg/m<sup>2</sup>), normal weight (18.5-24.9 kg/m<sup>2</sup>), overweight (25- 29.9 kg/m<sup>2</sup>) and obese (≥30 kg/m<sup>2</sup>).<sup>44</sup>

The U.S. is currently experiencing a decades-long obesity epidemic. Obesity is associated with many diseases and other health conditions, such as heart disease, type 2 diabetes, high blood pressure, stroke, sleep apnea, and mental illness.<sup>45</sup> Over the past two decades, the prevalence of obesity has increased in the U.S., especially for adolescent girls and women.<sup>46</sup> In 2015-2016, the prevalence of obesity was 20.9 percent among adolescent girls aged 12-19 years, 36.5 percent among women aged 20-39 years, and 44.7 percent among those aged 40-59 years.<sup>47</sup>

There has also been an increase in the proportion of women who enter pregnancy either overweight or obese.<sup>48</sup> From 2011 to 2015, there was an 8 percent increase in the prevalence of pre-pregnancy obesity.<sup>48</sup> Obesity can increase the risk of pregnancy-related conditions, including gestational diabetes<sup>49</sup> and preeclampsia.<sup>50</sup> Pregnant women with obesity are also at increased risk of cesarean delivery<sup>51</sup> and adverse infant outcomes, including preterm birth, stillbirth, macrosomia, and birth defects.<sup>52</sup>

The amount of weight gained during pregnancy is important for the health and well-being of women and their infants. Recommendations for healthy weight gain during pregnancy are based on pre-pregnancy BMI and vary from 11 to 40 pounds (for singleton pregnancies) to 25-62 pounds (for twin pregnancies).<sup>53,54,55</sup>

## **INFECTIOUS DISEASES**

Infectious diseases can complicate pregnancies and place a woman and her infant at risk for adverse events.<sup>56</sup> These can include viral infections (e.g., influenza, viral hepatitis, rubella, human immunodeficiency virus or HIV) as well as bacterial infections (e.g., tuberculosis, listeriosis, urinary tract infections, gonorrhea, syphilis, chlamydia and other sexually transmitted infections). Prenatal care includes screening and/or testing for many infectious diseases. Routine immunizations<sup>57</sup> are important for protecting against infectious diseases.

COVID-19 is an emerging viral disease that has impacted millions of individuals across the world. Recent evidence suggests that among reproductive-aged women (aged 15-44 years) with COVID-19, pregnant women are more likely to be hospitalized, admitted into an intensive care unit, and to receive mechanical ventilation as compared to non-pregnant women.<sup>58</sup> Information is still emerging about the impact of COVID-19 on maternal and infant health outcomes.

## **SUBSTANCE USE AND SUBSTANCE USE DISORDERS**

In the 2018 National Survey on Drug Use and Health, approximately 12 percent of pregnant women reported using tobacco products in the previous month.<sup>59</sup> During the same time period, nearly 10 percent of pregnant women reported using alcohol and approximately 5 percent reported drug use (marijuana, opioids, cocaine, and others) in the past month.<sup>59</sup> These substances can harm a mother and her infant. Complications during pregnancy, which vary by substance used, may include ectopic (outside the uterus) pregnancy, miscarriage, or stillbirth; other complications that may affect the baby include Sudden Infant Death Syndrome (SIDS), fetal alcohol spectrum disorders, neonatal abstinence syndrome (group of symptoms affecting babies exposed to drugs, commonly opioids while in the uterus), birth defects, premature birth, or low birth weight.<sup>60,61,62</sup>

Substance use disorders occur when the repeated use of alcohol and/or drugs causes significant impairment, including health problems, disability, and failure to meet major responsibilities at work, school, or home.<sup>63</sup> Substance use disorders are often underdiagnosed among women, occur regardless of sociodemographic characteristics, and result in high costs for individuals, families, and society.<sup>64</sup> During 1999-2014, national rates of opioid use disorder at delivery more than quadrupled, increasing from 1.5 to 6.5 per 1,000 delivery hospitalizations.<sup>65</sup>

Substance use disorders can be identified and effectively treated prior to a woman becoming pregnant as well as during pregnancy.<sup>64</sup> Non-medication treatments, such as cognitive behavioral therapy and motivational enhancement therapy as well as contingency management, which provides rewards or incentives for treatment participation, are commonly used in the treatment of substance use disorders.<sup>66</sup> For some substance use disorders, such as opioid use disorder,<sup>67</sup> medications are the primary treatment.

## **MENTAL HEALTH**

Each year more than 20 percent of U.S. women experience a mental, behavioral, or emotional disorder, such as depression or anxiety.<sup>68</sup> Mental health conditions are also common complications during pregnancy<sup>69</sup> and in the postpartum period<sup>70</sup> and may contribute to poor maternal outcomes. Data from 14 state MMRCs between 2008 and 2017 showed that almost 10 percent of pregnancy-related deaths were due (in whole or in part) to mental health conditions.<sup>10</sup> These conditions serve as underlying factors in injury or death due to overdose or suicide. Mental health conditions in the postpartum period, such as postpartum depression, are associated with poorer maternal and infant bonding, decreased breastfeeding initiation, and delayed infant development.<sup>71</sup>

## **INTIMATE PARTNER VIOLENCE**

More than one in three U.S. women report having experienced IPV during their lifetime.<sup>72</sup> This includes physical violence, sexual violence, stalking, and psychological aggression by a current or former intimate partner.<sup>73</sup> IPV often begins or escalates during the pregnancy and postpartum periods, making women and their infants especially vulnerable during this time.<sup>74,75</sup> IPV is also associated with an increased risk of adverse maternal and neonatal outcomes, including homicide, suicide, depression, low birth weight, and preterm birth.<sup>76,77</sup> In some U.S. states, homicide during pregnancy and the postpartum period surpasses any single obstetric or other cause of death for this population.<sup>74,78</sup>



# STRATEGIES AND ACTIONS: IMPROVING MATERNAL HEALTH AND REDUCING MATERNAL MORTALITY AND MORBIDITY

Given the importance of maternal health for our families, communities, and nation, addressing the unacceptable rates of maternal mortality and severe maternal morbidity calls for a comprehensive approach that addresses health from well before to well after pregnancy. A singular focus on the perinatal period would ignore upstream health factors associated with chronic conditions as well as other environmental and social factors that contribute to poor outcomes.<sup>3</sup> HHS has laid the framework by providing recommendations for preventive services that promote optimal women's health.<sup>79,80,81</sup> The strategies and actions in this document are based on these recommendations as well as consensus statements and recommendations from other organizations. The following sections outline specific actions for addressing the conditions and risk factors outlined above as well as other factors that may impact maternal health. The opportunity for action exists across the spectrum of women and families; states, tribes, and local communities; healthcare professionals; healthcare systems, hospitals and birthing facilities; payors; employers; innovators, and researchers. Individuals, organizations and communities should select and implement actions as applicable to their needs. Regardless of organization or group, everyone can help to improve maternal health in the U.S.

## EVERYONE CAN:

- Recognize the need to address mental and physical health across the life course—starting with young girls and adolescents and extending through childbearing age.<sup>3</sup>
- Support healthy behaviors that improve women's health, such as breastfeeding,<sup>82</sup> smoking cessation,<sup>83</sup> and physical activity.<sup>84</sup>
- Recognize and address factors that are associated with overall health and well-being, including those related to social determinants of health.<sup>22</sup>
- Understand that maternal health disparities exist in the U.S., including geographic, racial and ethnic disparities (Figures 3-7), and work to address them.
- Acknowledge that maternal age and chronic conditions, such as hypertension, obesity, and diabetes are risk factors for poor maternal health outcomes (See prior sections "Differences in Maternal Mortality and Morbidity" and "Risks to Maternal Health").
- Learn about early 'warning signs' of potential health issues (such as fever, frequent or severe headaches, or severe stomach pain, to name a few<sup>85</sup>) that can occur at any time during pregnancy or in the year after delivery.
- Work collaboratively to recognize the unique needs of women with disabilities and include this population of women in existing efforts to reduce maternal health disparities.<sup>26,27,28</sup>



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## WOMEN AND FAMILIES

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Women can play a critical role in promoting, achieving, and maintaining their health and well-being, often with the support of fathers, partners, and other family members. Preventive health and wellness visits can provide women with screenings, risk factor assessment, support for family planning, immunizations, counseling, and education to promote optimal health.<sup>79</sup> Women can engage in healthy practices, monitor their overall health, and address conditions they may have such as hypertension, diabetes and obesity. Many resources in the form of books, mobile applications, social media, and guides provide information about what to expect before, during and after pregnancy as well as information on important health behaviors, preventive care, medications, and potential risks.

Prenatal appointments provide the opportunity for healthcare professionals to monitor pregnancy, perform prenatal screening tests,<sup>85</sup> discuss questions and concerns that women may have, including plans for delivery and infant feeding, and provide recommendations to promote a healthy pregnancy.<sup>86</sup> A statewide study of all live births in Pennsylvania and Washington showed that starting prenatal appointments in the second trimester instead of the first, or attending fewer prenatal appointments, was associated with a higher risk of unhealthy behaviors and adverse outcomes, including low gestational weight gain, prenatal smoking, and pregnancy complications.<sup>87</sup> Data also show disparities in initiating and/or receiving prenatal care, with non-Hispanic white (82.5 percent) and Asian women (81.8 percent) more likely to receive prenatal care in the first trimester than all other racial and ethnic groups, including Hispanic (72.7 percent), non-Hispanic black (67.1 percent), AI/AN (62.6 percent), and Native Hawaiian or Pacific Islander women (51.0 percent).<sup>17</sup>

Women should also be supported after delivery to reduce the risk of adverse maternal and infant outcomes. For example, breastfeeding has demonstrated benefits for infants and can also be beneficial to mothers, including decreased bleeding after delivery and reduced risks of hypertension, type 2 diabetes, breast and ovarian cancer.<sup>88</sup> Black mothers are less likely to initiate breastfeeding than white or Hispanic mothers (74.0 percent versus 86.6 percent and 82.9 percent, respectively).<sup>89</sup> These data suggest opportunities for understanding and addressing these disparities.

### WOMEN AND FAMILIES CAN:

#### FOCUS ON IMPROVING OVERALL HEALTH.<sup>90</sup>

Try to engage in healthy behaviors and practices by participating in regular physical activity,<sup>84</sup> eating healthy,<sup>91</sup> getting adequate sleep,<sup>92,93</sup> and getting ongoing preventive care that includes immunizations<sup>57</sup> and dental care.<sup>94</sup> Recognize that oral health is part of overall health and that pregnant mothers may be prone to gingivitis and cavities.<sup>95</sup> Abstain from tobacco<sup>96</sup> and other potentially harmful substances, including marijuana,<sup>97</sup> prior to and during pregnancy. As there is no amount of alcohol known to be safe during pregnancy or while trying to become pregnant, women should consider stopping all alcohol use when planning to become pregnant.<sup>98</sup> Follow medical advice for chronic health conditions such as diabetes and hypertension, learn family medical history, and adopt or maintain healthy lifestyles. Women who are planning or may become pregnant should

take a daily folic acid supplement.<sup>99</sup> For women who are entering pregnancy at a later age or with chronic diseases or disorders, learn how to minimize associated risks through ongoing preventive and appropriate prenatal care.

### **PROMOTE POSITIVE INVOLVEMENT OF MEN AS FATHERS/PARTNERS DURING PREGNANCY, CHILDBIRTH, AND AFTER DELIVERY.**

Promote men's positive involvement as partners and fathers.<sup>100</sup> Include men in decision-making to support the woman's health, to the extent that it promotes and facilitates women's choices and their autonomy in decision-making.<sup>101</sup>

### **ATTEND HEALTH CARE APPOINTMENTS.<sup>79</sup>**

Women should attend primary care, prenatal, postpartum, and any recommended specialty care visits and provide health information, including pregnancy history and complications, to their health care providers during all medical care visits, even in the years following delivery.<sup>101,102</sup> Know health numbers, such as blood pressure and body weight, and record them at each visit. If recommended, continue to monitor and record blood pressure in-between visits.<sup>103</sup> Those with diabetes should check and record your blood sugar regularly.<sup>104</sup>

### **COMMUNICATE WITH HEALTHCARE PROFESSIONALS.**

Ask questions and talk to healthcare professionals about health concerns, including any symptoms you experience, past health problems, or concerns about potentially sensitive issues, such as IPV and substance use.<sup>105</sup> Be persistent or seek second opinions if a healthcare professional is not taking concerns seriously (See the Joint Commission "Speak Up" guide for ways patients can become active in their care<sup>106</sup>).

### **LEARN HOW TO IDENTIFY PHYSICAL AND MENTAL WARNING SIGNS DURING AND AFTER PREGNANCY.**

Utilize resources that provide information about the changes that occur with a healthy pregnancy and how to recognize the warning signs<sup>85</sup> for complications that may need prompt medical attention. The CDC's Hear Her campaign seeks to raise awareness of warning signs, empower women to speak up and raise concerns, and encourage their support systems and providers to engage with them in life-saving conversations.<sup>107</sup> Learn to recognize the symptoms of postpartum depression such as feelings of sadness, anxiety, or despair, especially those that interfere with daily activities, and seek support.<sup>108</sup>

### **ENGAGE IN HEALTHY BEHAVIORS IN THE POSTPARTUM PERIOD.**

If electing to breastfeed, seek support as needed. Resources include healthcare providers, lactation consultants, lactation counselors, peer counselors, and others. Attend postpartum visits as they are the best way to assess physical, social, and psychological well-being and identify any new or unaddressed health issues that could affect future health.<sup>109</sup> Continue engaging in healthy behaviors after pregnancy, such as managing chronic disease and living a healthy lifestyle.

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## STATES, TRIBES AND LOCAL COMMUNITIES

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States, tribes, and local communities can create environments that are supportive of women’s health and tailored to local needs and challenges. They can create the infrastructure needed to engage in healthier lifestyles and to ensure access to high quality medical care.

Healthy People provides national goals to guide health promotion and disease prevention efforts in the U.S. and highlights the importance of creating social and physical environments that promote good health for all.<sup>22</sup> Often referred to as social determinants of health, the conditions into which people are born, live, work, play, worship, and age can strongly influence their overall health.<sup>22</sup> Examples of social determinants include access to educational opportunities, availability of resources to meet daily needs (e.g., healthy food options), public safety and exposure to crime.<sup>22</sup> Examples of physical determinants include natural and built environments (e.g., green space, sidewalks, bike lanes), and housing and community design, and exposure to physical hazards.<sup>22</sup> Case studies have demonstrated that health outcomes can be improved where there is a concerted and coordinated effort involving both healthcare systems and communities where their patients live.<sup>110,111,112</sup>

Perinatal regionalization or risk-appropriate care<sup>113</sup> is a promising approach for improving maternal safety as it has been shown to be an effective strategy for improving neonatal outcomes,<sup>114</sup> though more research is needed to assess its impact on maternal health outcomes. States can explore this approach as well as other strategies to increase access to quality care, such as the adoption of telemedicine, and the review of the scope of practice laws (what health care professionals are authorized to do), licensure and recruitment policies. Perinatal Quality Collaboratives (PQCs) are state or multi-state networks of multidisciplinary teams that work to improve maternal and infant outcomes by advancing evidence-informed clinical practice through quality improvement initiatives.<sup>115</sup>

States, tribes and local health agencies play a role in providing essential services to protect the health and promote the well-being of their communities through education, prevention, and treatment. They provide support for community-driven initiatives and evidence-based practices that address topics such as emerging infections (e.g., COVID-19), sexually transmitted infections, and immunizations. The role of public health is changing due to increased demands from chronic disease, new economic forces, and changing policy environment.<sup>116</sup> The National Consortium for Public Health Workforce released a *Call to Action* addressing the need for strategic skills in the public health workforce to enable collaboration across sectors to address the social and economic factors that drive health.<sup>117</sup>

Surveillance data can help to monitor trends and focus efforts to reduce maternal morbidity and mortality. States, tribes, and communities have the opportunity to assess maternal deaths, injuries and illnesses and identify strategies for preventing these adverse outcomes. The Centers for Disease

### MMRCs:

*Multidisciplinary committees that perform comprehensive reviews of deaths among women during and within a year of the end of pregnancy*

Control and Prevention (CDC) supports states in establishing MMRCs to perform comprehensive reviews of deaths among women during pregnancy or within a year after birth, obtain better data on the circumstances and root causes surrounding each death, and develop recommendations for the prevention of these deaths.<sup>117</sup> However, MMRC reviews can lag by several years, and some states have not yet created MMRCs. Ensuring that MMRCs collect uniform data, such as through the Maternal Mortality Review Information Application (MMRIA),<sup>118</sup> will provide comprehensive national data on maternal mortality and result in more timely and detailed reporting to inform prevention efforts.

Representative population-based data on pregnancy and disability are lacking.<sup>118</sup> State health departments, researchers, and other stakeholders can work together to address gaps in surveillance and identify best practices for reducing health disparities, including among pregnant women with disabilities.

## STATES, TRIBES, AND LOCAL COMMUNITIES CAN:

### **CREATE SOCIAL AND PHYSICAL ENVIRONMENTS THAT PROMOTE GOOD HEALTH.<sup>22</sup>**

Improve factors that are associated with health and wellness, including safe communities, clean water and air, stable housing, access to affordable healthy food, public transportation, parks and sidewalks, and other social determinants of health. Support prevention of domestic violence and abuse. Consider addressing areas recognized as “food deserts” (areas with little access to affordable, nutritious food) or “food swamps” (areas with an abundance of fast food and junk food outlets). Encourage healthy eating initiatives tailored to the community such as community gardens, farmer’s markets, school programs, businesses’ support of healthy foods, as well as participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) for eligible women.

### **PROVIDE BREASTFEEDING SUPPORT AT THE INDIVIDUAL AND COMMUNITY LEVELS.**

Establish policies to support women’s abilities to breastfeed, to reach their breastfeeding goals once they return to their communities and worksites, and thus achieve full health benefits of breastfeeding for their babies and themselves.<sup>119,120</sup>

### **STRENGTHEN PERINATAL REGIONALIZATION AND QUALITY IMPROVEMENT INITIATIVES.**

Consider adopting a classification system for maternal care that ensures women and infants receive risk-appropriate care in every region utilizing national-level resources, such as the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) joint consensus document on levels of maternal care,<sup>121</sup> and other state-level guidelines. Develop coordinated regional systems for risk-appropriate care that address maternal health needs.

### **PROMOTE COMMUNITY-DRIVEN INITIATIVES<sup>101</sup> AND WORKFORCE DEVELOPMENT.**

Pursue promising community-driven initiatives, such as the Health Resources and Services Administration’s (HRSA) Maternal and Child Health Bureau’s Healthy Start program<sup>122</sup> and the Best

Babies Zone Initiative,<sup>123</sup> funded by the W.K. Kellogg Foundation, that aim to reduce disparities in short-term (e.g., access to maternal healthcare), medium-term (e.g., breastfeeding and postpartum visits), and/or long-term outcomes (e.g., premature births and low birth weight infants). Develop or recruit a workforce that supports the maternal health needs of the community. Incentivize healthcare professionals with obstetric training to serve in rural, remote or underserved areas.<sup>124</sup>

### **ENSURE A BROAD SET OF OPTIONS FOR WOMEN TO ACCESS QUALITY CARE.**

Examine scope of practice and telehealth laws to maximize women's access to a variety of healthcare professionals,<sup>125</sup> especially in rural regions and underserved areas,<sup>125</sup> while ensuring procedures are in place to address obstetric emergencies. Engage and collaborate with federal and tribal health systems within states to avoid duplication of services and support access to a full range of care. Support partnerships between academic medical centers and rural hospitals for staff education and training and improved coordination and continuity of care. Support state and regional PQCs in their efforts to improve the quality of care and outcomes for mothers and infants.

### **SUPPORT EVIDENCE-BASED PROGRAMS TO ADDRESS HEALTH RISKS BEFORE, DURING AND AFTER PREGNANCY.**

Provide funding for local implementation of evidence-based programs, such as home-visiting, substance use disorder treatment, tobacco cessation, mental health services and other programs as recommended by the Community Preventive Services Task Force.<sup>126</sup> Support local efforts to prevent family violence and provide support for women experiencing IPV. Educate the public about risk factors for high-risk pregnancies, pregnancy-related warning signs, risk-reducing behaviors, and the importance of prenatal and postpartum care.

### **IMPROVE THE QUALITY AND AVAILABILITY OF DATA ON MATERNAL MORBIDITY AND MORTALITY.**

Address challenges with vital statistics and data reporting,<sup>127,128</sup> such as racial misclassification,<sup>129</sup> and misclassification and documentation of the causes of death, and improve the accuracy of maternal mortality and morbidity reporting for national comparison and analysis. Enhance data and monitoring of racial and ethnic disparities. Expand and strengthen MMRCs to review and assess all pregnancy-associated deaths (the death of a woman while pregnant or within one year of the termination of pregnancy, regardless of the cause)<sup>130</sup> and identify opportunities for prevention.

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## HEALTHCARE PROFESSIONALS

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While states, tribes, and local communities help to ensure infrastructure and programmatic support for maternal health, individual healthcare professionals provide education, support, and care for women before, during, and after pregnancy.

The full range of healthcare professionals and teams should understand factors that contribute to women's overall health and work to identify and mitigate potential pregnancy risks. Every medical appointment or interaction with health care professionals is an opportunity to ensure that standards of care and the full needs of women are being met. Given the vast diversity in geography, economy, and racial and ethnic make-up of communities across the U.S., healthcare professionals can ensure that the care they provide is scientifically-sound and culturally appropriate to the individual and their respective community.<sup>101</sup>

Fragmented care across healthcare settings may inhibit providers from having a full understanding of a patient's medical condition(s) and risks.<sup>131,132</sup> Many opportunities exist across providers to improve communication, including through care coordination, adoption of mobile applications, and enhanced interoperability of electronic health records (EHRs). Even healthcare professionals who do not normally care for pregnant women play a role in reducing maternal morbidity and mortality. Engaging and coordinating care among a diverse set of healthcare professionals, such as primary care providers, emergency department providers, dentists, cardiologists, endocrinologists, psychologists, and social workers, can be challenging, but strengthens the ability to identify, address, and prevent harm.

Various professional associations play a key role in developing standards of care to provide guidance on screenings, preventive care, prenatal and postpartum care, and management of obstetric emergencies. Associations are valuable resources for developing evidence-based guidelines on areas important to maternal health.

### HEALTHCARE PROFESSIONALS CAN:

#### **ENSURE QUALITY PREVENTIVE HEALTHCARE FOR ALL WOMEN, CHILDREN, AND FAMILIES.**

Increase knowledge, awareness, and utilization of clinical practice tools such as those associated with recommendations from the USPSTF;<sup>133</sup> the Women's Preventive Services Guidelines;<sup>79</sup> Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents;<sup>134</sup> and the CDC. Use preventive health care and wellness visits to conduct screenings, assess risk factors, provide support for family planning, offer immunizations, and provide education and counseling to promote optimal health. Include such topics as folic acid supplementation for all women who are planning or capable of pregnancy,<sup>100</sup> breastfeeding, nutrition, physical activity, sleep, oral health, substance use, and injury and violence prevention.<sup>91</sup>

### **ADDRESS DISPARITIES SUCH AS RACIAL, SOCIOECONOMIC, GEOGRAPHIC, AND AGE, AND PROVIDE CULTURALLY APPROPRIATE CARE<sup>110</sup> IN CLINICAL PRACTICES**

Increase self and situational awareness of and attention to disparities. Participate in research to determine if provider training may improve patient-provider interactions. Learn how to identify and work to address inequities within health systems, processes, and clinical practices using standardized protocols. Provide culturally and linguistically appropriate services that respect and respond to individual needs and preferences.<sup>135</sup>

### **HELP PATIENTS TO MANAGE CHRONIC CONDITIONS.**

Reduce the burden of chronic conditions, such as hypertension, diabetes, and obesity, as well as mental health and substance use disorders (See prior section “Risks to Maternal Health”) on women’s health across the lifespan by helping them to manage these conditions. For example, refer women at risk to diabetes educators, nutritionists, and mental health professionals. Conduct cardiovascular risk evaluation, to include history of hypertensive disorders of pregnancy and gestational diabetes,<sup>136</sup> and provide risk reduction strategies for women of childbearing age before, during, and after pregnancy.

### **COMMUNICATE WITH WOMEN AND THEIR FAMILIES ABOUT PREGNANCY.**

Listen to women and their family members’ concerns before, during, and after delivery. Engage the family in creating a supportive environment. Discuss and make available options for traditional practices that may vary by culture and personal preferences. Educate about warning signs<sup>85</sup> during pregnancy and the postpartum period.<sup>137</sup> Use culturally acceptable and easily understandable methods of communication.<sup>138</sup> Link women with a substance use disorder to family-centered treatment approaches.<sup>139</sup>

### **FACILITATE TIMELY RECOGNITION AND INTERVENTION OF EARLY WARNING SIGNS DURING AND UP TO ONE YEAR AFTER PREGNANCY.**

Track patient vital signs (e.g., blood pressure) across healthcare visits, including prenatal, initial hospital admission, and postpartum visits. Learn to recognize and react to signs and symptoms associated with hemorrhage, pre-eclampsia, hypertension, cardiomyopathy, infection, embolism, substance use, and mental health issues. Use screenings and tools to identify warning signs early so women can receive timely treatment. Coordinate care across obstetrician-gynecologists and primary care providers and consult with specialists, as needed.

### **IMPROVE HEALTHCARE SERVICES DURING THE POSTPARTUM PERIOD AND BEYOND.**

Communicate the importance of postpartum visits, including the ACOG recommendation for an initial assessment within the first 3 weeks postpartum followed by ongoing care as needed and a comprehensive visit within 12 weeks after delivery.<sup>110</sup> Non-obstetric providers can have an important

role to play. For example, pediatricians could screen for maternal mental health during well-baby visits utilizing validated tools, such as the Edinburgh Postnatal Depression scale.<sup>140</sup> Other non-obstetric providers should ask about prior pregnancies when taking medical history and be aware of pregnancy-related morbidities that can occur up to one year post-delivery and those that raise life-time risks, such as gestational diabetes,<sup>141</sup> gestational hypertension, and preeclampsia,<sup>34,35,36,37</sup> and follow recommended guidelines.<sup>102,103</sup>

### **PARTICIPATE IN QUALITY IMPROVEMENT AND SAFETY INITIATIVES TO IMPROVE CARE.**

Engage with state and/or national quality collaboratives and patient safety initiatives to improve maternal health. (See section “Health Systems, Hospitals, and Birthing Facilities”). Consider using resources, such as the Agency for Healthcare Research and Quality’s Toolkit for Improving Perinatal Safety<sup>142</sup> which includes patient safety bundles, TeamSTEPPS® (team strategies and techniques to enhance performance and patient safety<sup>143</sup>) and simulation training.

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## **HEALTH SYSTEMS, HOSPITALS, AND BIRTHING FACILITIES**

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Health systems provide comprehensive care for the full range of women’s health before, during, and after pregnancy. Within these systems, hospitals provide the vast majority of delivery services. In 2018, approximately 98 percent of all live births occurred in hospital settings.<sup>17</sup> Over the past two decades, many rural counties have lost their hospital-based obstetric services.<sup>144</sup> In these areas, women are more likely to have out-of-hospital births and to deliver in hospitals without obstetric units, as compared to those living in rural counties that maintained hospital-based obstetric services.<sup>145</sup> Additionally, in rural or underserved areas, access to maternal care in the prenatal and postpartum period may be limited.<sup>125</sup>

Hospitals and health systems can address this through strategies such as telemedicine and linking facilities that do not offer planned childbirth services with those that do, and facilitating prompt consultation and safe transportation to the appropriate level of maternal care. The designation of levels of care, as outlined in the ACOG/SMFM Levels of Maternal Care, helps to ensure that women receive care at facilities that are best equipped to address their needs.<sup>122</sup> The CDC developed the Levels of Care Assessment Tool (LOCATe) to assist states and other jurisdictions in assessing and monitoring levels of care.<sup>146</sup>

Quality improvement strategies, such as participation in PQCs<sup>116</sup> and implementation of maternal “safety bundles,” may help hospitals and health systems to reduce maternal morbidity and mortality.<sup>147</sup> A safety bundle is a set of practices and policies designed to identify appropriate and timely actions the health care staff can take in response to maternal complications. The Alliance for



Innovation on Maternal Health (AIM) is a maternal safety and quality improvement initiative that addresses preventable causes of maternal morbidity and mortality through the implementation of bundles to identify and swiftly respond to common pregnancy-related complications.<sup>148</sup> The President's FY 2021 Budget proposes \$15 million to expand the AIM Program. Adoption of safety bundles by hospitals requires leadership and clinical team commitment, as well as training and implementation support.

Offering diverse provider types for maternal care, such as family physicians, midwives and support personnel (e.g., doulas) in hospitals and other healthcare settings may support women's preferences. Midwifery care is provided in hospital settings, birth centers, and home settings, and can be a valuable part of women's health care.<sup>148</sup>

Medical history associated with pregnancy and delivery does not always travel with women in their future medical records or across different types of providers. Addressing this is key to ensuring coordinated care across providers within and between health systems.

## HEALTH SYSTEMS, HOSPITALS AND BIRTHING FACILITIES CAN:

### **ENSURE AVAILABILITY OF RISK-APPROPRIATE CARE ACROSS THE HEALTHCARE SYSTEM.**

Ensure staff, equipment, and services are available to address the health needs of women with both low- and high-risk pregnancies. Implement guidelines for levels of maternal care at all birthing hospitals and facilities and work with states to adopt standardized criteria and uniform definitions for levels of maternal care (See prior section, "States, Tribes and Local Communities").

### **IMPROVE ACCESS TO CARE AND COMMUNICATION WITH PATIENTS.**

Adopt methods for improving access to care and communication, especially in rural or underserved areas or when conditions limit face-to-face interactions, while ensuring patient safety and quality of care. These methods can include telehealth and remote monitoring, among others. Work with health insurers to address gaps in access to medical facilities, equipment, information, and transportation for women with disabilities.<sup>149</sup>

### **IMPROVE THE QUALITY AND SAFETY OF PERINATAL CARE.**

Provide evidence-based clinical practice, including utilization of standardized protocols related to pregnancy, delivery, and the postpartum period. Consider other resources, such as the Agency for Healthcare Research and Quality's Toolkit for Improving Perinatal Safety.<sup>143</sup> Participate in state, or regional PQCs to implement quality improvement efforts and monitor progress with standardized data. Consider routine surveillance and monitoring of "near misses" and other SMM events.

### **PROVIDE COMPREHENSIVE DISCHARGE INSTRUCTIONS.**

Ensure discharge processes include education for women and families about warning signs (e.g., Association of Women's Health, Obstetrics and Neonatal Nurses' Save Your Life discharge instructions<sup>150</sup>), and the importance of postpartum visits.<sup>110</sup>

### **TRAIN HEALTHCARE PROFESSIONALS IN NON-OBSTETRIC SETTINGS ABOUT OBSTETRIC EMERGENCIES.**

Standardize protocols and training to respond to obstetric emergencies in the emergency department<sup>8</sup> and other non-obstetric settings, to include transportation to the most appropriate facility for care. Train non-obstetric clinicians to consider and seek recent pregnancy history when assessing patients.<sup>8</sup>

### **ENCOURAGE OBSTETRIC CARE-TRAINED PROVIDERS TO SERVE IN RURAL, REMOTE AND UNDERSERVED AREAS.<sup>125</sup>**

Support additional training in obstetric care in residencies for family physicians, especially those who will practice in rural, remote or underserved areas.

### **OFFER A VARIETY OF HEALTHCARE PROVIDER AND SUPPORT OPTIONS TO FIT MATERNAL PREFERENCES AND NEEDS.**

Leverage and incorporate midwives into hospital obstetric care and other community programs.<sup>126</sup> Support maternal-infant home visiting and away-from-home programs/pre-maternal homes (where pregnant women from remote areas can stay before the birth of their child<sup>101</sup>) to support care.

### **ADDRESS DISPARITIES AND PROVIDE CULTURALLY APPROPRIATE CARE IN HEALTHCARE SETTINGS.**

Provide education and training on disabilities. Identify and work to address inequities within health systems, processes, and clinical practices. Ensure the availability of culturally and linguistically appropriate services that respect and respond to individual needs and preferences.<sup>136</sup>

### **SUPPORT BREASTFEEDING PRACTICES.**

Implement hospital or birthing center initiatives, such as the Baby Friendly Hospital Initiative, to help women successfully initiate and continue breastfeeding their infants.<sup>151</sup> Ensure access to lactation support providers for breastfeeding women.

### **COORDINATE WITH COMMUNITY RESOURCES.**

Consider coordination with resources, such as group prenatal programs,<sup>152</sup> WIC,<sup>153</sup> home visiting programs,<sup>154</sup> and others that address social determinants of health. Consider alternative approaches to expanding access and education, to include use of community health workers.<sup>155</sup>

### **ENHANCE COMMUNICATION WITHIN AND ACROSS HEALTHCARE SETTINGS.**

Adopt methods to ensure the seamless transition of information between providers along the care continuum, including strengthening communication and care coordination among obstetrician-gynecologists and other health care professionals.

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## PAYORS

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Health insurance coverage is a key determinant of health care access and utilization.<sup>156</sup> Payors – including private health insurers, state-based Medicaid and the Children’s Health Insurance Program (CHIP) -- can play a key role in addressing maternal health by helping to ensure affordability of and access to high quality preconception, prenatal, delivery, and postpartum care.<sup>157,158</sup>

Reimbursement for, and access to, comprehensive care, such as preventive services recommended by the USPSTF (A or B rating),<sup>134</sup> Women’s Preventive Services Initiative,<sup>79</sup> and Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents,<sup>135</sup> can ensure women and children receive recommended services. These services may include preventive screening (e.g., blood pressure, weight status, diabetes, infectious diseases, sexually transmitted infections, cancer) and vaccinations, breastfeeding support, mental health support, substance use screening and treatment, and screening for intimate partner and family violence.

Ensuring a wide range of healthcare professionals are included in a health plan’s network may broaden women’s access to comprehensive services that address the full spectrum of care. Coverage of programs, such as those that fund transportation to appointments, or technology, such as applications that facilitate chronic condition management and timely and convenient communication, can reduce barriers to care.

Overall, while there are many strategies that payors can consider for helping to improve maternal health, including those outlined below, more research is needed to assess the impact of these actions on maternal health outcomes.

### PAYORS CAN:

#### **PROMOTE ACCESS AND PAYMENT FOR WOMEN’S HEALTH SERVICES ACROSS THE LIFESPAN.**

Develop services and networks to provide care before, during, and after pregnancy, including pre-pregnancy counseling. Reimburse time spent with healthcare professionals to discuss healthy lifestyles, family planning, optimal management of chronic conditions (e.g., diabetes, hypertension, obesity), substance use disorders, and mental health conditions. Reduce cost barriers and ensure payment options are understood by women and their families.

#### **ALIGN FINANCIAL INCENTIVES WITH THE FULL RANGE OF PERINATAL CARE.**

Provide financial reimbursement and quality incentives related to improving maternal care for women of all races and ethnicities and implementing standards of care. Implement value-based payment incentives for innovative ways of delivering high quality care. Support efforts to reduce barriers that patients may face when accessing healthcare, such as transportation, language needs, or geographic

isolation. Promote telehealth, as appropriate, for women in underserved, rural or remote areas or under conditions that limit face-to-face interaction and support remote monitoring of highly prevalent and harmful conditions like hypertension and diabetes.

### **ENSURE A WIDE RANGE OF HEALTHCARE PROFESSIONALS ARE INCLUDED IN A HEALTH PLAN'S NETWORK.**

Also, consider coverage for supportive services, such as doulas, lactation support, and home visiting programs.

### **MONITOR POPULATION-LEVEL TRENDS AND IDENTIFY OPPORTUNITIES FOR IMPROVEMENT.**

Utilize data to inform strategies for improving maternal health and support provider participation in quality improvement efforts in states and local communities, such as PQCs. Track trends in quality of care and health care utilization and develop approaches that may reduce identified disparities.

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## **EMPLOYERS**

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Employers play a key role in establishing norms and expectations around the support of working mothers, including paid family leave and workplace policies.

The postpartum period is a crucial time for women to recover from birth, bond with their new infant(s), and firmly establish breastfeeding practices. Lawmakers have been working to prioritize parental leave for the American people. In 1993, the Family and Medical Leave Act (FMLA)<sup>159</sup> was signed into law to provide certain employees up to 12 weeks of unpaid leave, including after the birth or adoption of a child.<sup>160</sup> FMLA applies to public agencies (local, state, or federal government agencies), public and private elementary and secondary schools, and private-sector employers with 50 or more employees.<sup>161</sup> FMLA covers more than half of the workforce, however, some eligible women may be unable to take this unpaid leave for financial reasons.<sup>161</sup>

In December 2019, Congress passed and the President signed into law a major improvement in the compensation and benefits package for the government's 2.1 million Federal civilian employees as part of the National Defense Authorization Act (NDAA).<sup>162</sup> The Act provides Federal civilian employees with up to 12 weeks of paid parental leave to care for a new child, whether through birth, adoption, or foster care, beginning in October 2020.

In addition to parental leave, other federal worker protection laws have been enacted, such as the Fair Labor Standards Act (FLSA), which ensures that American workers receive a minimum wage.<sup>163</sup> In 2010, the FLSA was amended to require employers to provide reasonable break time and a space for an employee to express breast milk for her nursing child for one year after the child's birth.<sup>164</sup>

Employers have an opportunity to play a key role in supporting women during their pregnancies and in the postpartum period. Due to the recognized health and economic benefits, ACOG endorses paid parental leave, including full benefits and 100% of pay for at least six weeks after delivery.<sup>165</sup> In addition to paid leave<sup>166</sup> in the postpartum period, other family-friendly benefits such as flexible work schedules, preventive medical care, and childcare for sick children may improve recruitment of potential employees and greater retention of current employees.

Employers who offer health insurance are in a position to advocate for comprehensive care coverage to support maternal health. Effective workplace programs and policies can also reduce health risks and improve the quality of life for workers, including women and their families.<sup>167</sup>

Overall, there are many strategies that employers can consider that may help to improve maternal health, including those outlined below, however, more research is needed to assess the impact of these actions on maternal health outcomes.

## EMPLOYERS CAN:

### **ADOPT AND SUPPORT FAMILY-FRIENDLY POLICIES.**

Consider paid family leave<sup>168</sup> and other family-friendly policies, such as flexible work schedules and on-site or easy-to-access high quality childcare. These policies may also help with recruitment and retention of valuable employees.<sup>167</sup>

### **SUPPORT BREASTFEEDING.**

Provide lactation spaces for breastfeeding mothers, including for those who do not qualify under the FLSA.<sup>166</sup> Consider going beyond what is required in the FLSA<sup>164</sup> (e.g., break time, private rooms) by providing hospitable and welcoming environments, including access to refrigerators, comfortable chairs, sinks and microwaves, for applicable employees.

### **ENSURE ROBUST MATERNAL CARE THROUGH EMPLOYER-SPONSORED COVERAGE.**

Negotiate with health insurers on behalf of employees for comprehensive care, including expanding options for receiving care (e.g., telehealth), reducing out-of-pocket costs, and implementing innovative approaches to monitor and manage risk factors (See prior section, “Payors”).

### **DEVELOP A WORKPLACE HEALTH PROGRAM.**

Develop or adopt workplace programs and policies that promote healthy behaviors, such as ready access to local fitness facilities, healthy vending or cafeteria options, tobacco-free environments and work settings free of environmental threats. Provide worksite blood pressure screening, health education, and lifestyle counseling to help employees control their blood pressure.<sup>169</sup>

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## INNOVATORS

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Innovative approaches across the health care arena can improve maternal health outcomes through policies, technology, systems, products, services, delivery methods, and models of care.

For example, while diabetes educators and nutritionists may already be included in some models of obstetric care, the inclusion of hypertension educators may be an innovative approach to further enhance comprehensive care in the obstetric setting. Technological innovation, such as mobile or computer-based applications, may help to monitor and/or manage women's health during and beyond pregnancy. This could include mobile applications or monitoring systems that can help to manage conditions, such as diabetes or hypertension. For example, HRSA's Remote Pregnancy Monitoring Challenge supports innovative-technology-based solutions to help providers remotely monitor the health of pregnant women while empowering these women to monitor their own health and healthcare.<sup>170</sup>

Improvements and innovations in EHR technology offer an opportunity for improving maternal health. Interoperability between systems can allow providers to have a more complete view of a woman's health by incorporating information from various clinical settings and systems. However, the demands of the current EHR systems may take time away from direct patient-provider communication. EHR systems should be improved to ensure they are provider-friendly and valuable to health care professionals. They should also incorporate improvements such as recommended care guidelines and clinical decision support tools, and facilitate linkage of maternal health records with infant health records.

Finally, innovation in delivery methods can address access issues for women who have barriers to care, such as those living in rural or underserved areas, or with limited transportation, or when conditions limit face-to-face interactions. Telehealth innovators can help states and providers identify opportunities for connecting women with a broad range of services to meet their needs. This could include providing remote access to obstetricians, maternal-fetal medicine and other specialists.

Listed below are some topic areas for innovators to consider that may improve maternal health. Innovations should be evaluated to assess their impact on maternal health outcomes.

### INNOVATORS CAN:

#### **IMPROVE COMMUNICATION BETWEEN PROVIDERS AND WOMEN.**

Decrease burden of EHRs on providers to allow more time for communication with patients. Develop mobile applications to facilitate communications during and after pregnancy so that women can conveniently raise issues or concerns to providers and providers can remotely monitor key vital signs. Such applications can focus on various aspects of prenatal and postpartum care and can involve a team of healthcare professionals. Consider developing applications tailored to a variety of cultures, health literacy levels, and racial and ethnic populations and incorporating human-centered design in the development of these applications.

### **PROMOTE COORDINATION OF CARE ACROSS HEALTHCARE PROFESSIONALS.**

Help to address a fragmented system by facilitating communication across different providers using innovative approaches.

### **DEVELOP AND/OR PARTICIPATE IN NEW MODELS OF MATERNAL CARE:**

Consider models of care that address maternal health risk factors, such as hypertension, diabetes, unhealthy weight, substance use disorders, mental health conditions, and IPV, to name a few. For example, the Center for Medicare and Medicaid Innovation's Maternal Opioid Misuse (MOM) Model supports the coordination of care and integration of critical health services for pregnant and postpartum Medicaid beneficiaries with opioid use disorder. This, and other innovative payment and delivery models have the potential to improve quality of care for mothers and infants.<sup>171</sup>

### **EXPAND DELIVERY METHODS FOR ACCESSING SPECIALTY CARE.**

For example, telehealth companies can better meet maternal health needs by designing technology that connects women to needed specialty care providers (e.g., obstetricians, maternal-fetal medicine specialists, cardiologists, endocrinologists, pulmonologists, nephrologists, nutritionists, and mental health professionals) and services.

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## **RESEARCHERS**

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A critical component of developing solutions and monitoring their impact is the ability to glean information from reliable and comprehensive data; however, there are substantial data limitations and gaps in existing research on maternal health. Further, clinical studies often exclude pregnant women due to an increased risk or concern for adverse outcomes in this population, particularly in research for therapeutic products. Researchers have opportunities to advance this area by adding to the field of evidence on clinical outcomes and by improving the quality of data that are available for analysis.

In clinical arenas, more outcomes-based research would be valuable for understanding the interaction of comorbidities during and after pregnancy and the effectiveness of selected interventions on improving maternal health. More research is needed on disease processes and clinical interventions, protective factors, demographic risk factors, racial disparities, and health system factors.<sup>172</sup>

Research is also needed to fill clinical gaps in knowledge related to the defining and treating medical conditions that are known risk factors for maternal mortality, including preeclampsia, cardiovascular disease, peripartum cardiomyopathy, and hemorrhage.<sup>173,174,175</sup> Research on screening algorithms, risk assessments, and diagnosis involving biomarkers could help to improve timeliness of the identification of women with these conditions and their referral to treatment.<sup>175,176</sup> The National Institutes of Health (NIH) supports research addressing many aspects of maternal health.

Evidence has been provided throughout this document for many strategies and actions, however, more research is needed for others, particularly those in the “Payors” and “Employers” section. Researchers should consider examining those areas, as well as those listed below.

## RESEARCHERS CAN:

### **IDENTIFY BIOLOGICAL, ENVIRONMENTAL, AND SOCIAL FACTORS THAT AFFECT MATERNAL HEALTH.**

Consider analyzing data from NIH’s PregSource®, a crowdsourcing research project designed to improve the understanding of pregnancy by gathering information directly from pregnant women via confidential online questionnaires.<sup>177</sup> The Pregnancy Risk Assessment and Monitoring System (PRAMS)<sup>178</sup> and the National Health and Nutrition Examination Survey (NHANES)<sup>179</sup> are examples of publicly available data sources that can be used for analysis. The Transformed Medicaid Statistical Information System (T-MSIS) also has data and research-ready files specific to Medicaid and CHIP information.<sup>180</sup>

### **ADVANCE A RESEARCH AGENDA, SUCH AS DISCUSSED IN THE HHS ACTION PLAN<sup>181</sup>, TO IDENTIFY EFFECTIVE, EVIDENCE-BASED CLINICAL BEST PRACTICES AND HEALTHCARE SYSTEM FACTORS, INCLUDING RESEARCH ON REDUCING DISPARITIES.**

Conduct research to identify, develop, and rigorously test clinical interventions to address risk factors; identify healthcare factors (e.g., quality of care); and provide insights into healthcare delivery approaches (e.g., care coordination, innovative models of care) for improving access to high-quality maternal health care. Support research to understand, prevent, and reduce adverse maternal health outcomes among racial and ethnic minority women, those who are socioeconomically disadvantaged, and those in rural, remote and/or underserved areas. This should include exploring the potential effects of inequities within health systems, processes, and clinical practices on maternal health outcomes.

### **EXPAND RESEARCH TO DEVELOP SUFFICIENT EVIDENCE ON MEDICATIONS AND TREATMENT.**

Adopt recommendations made by the HHS Task Force on Research Specific to Pregnant Women and Lactating Women (PRGLAC),<sup>182</sup> to increase research for therapeutic products already in use by pregnant or lactating women and for existing therapeutic products not currently licensed for use during pregnancy, but with potential benefit for pregnant women and their infants, and to increase discovery and development of new therapeutic products for these populations.

### **ENHANCE MATERNAL HEALTH SURVEILLANCE BY IMPROVING THE ACCURACY, QUALITY, CONSISTENCY, SPECIFICITY, TRANSPARENCY, TIMELINESS, AND STANDARDIZATION OF EPIDEMIOLOGICAL DATA ON MATERNAL HEALTH.**

Improve data quality and timeliness; enhance data and monitoring of racial, ethnic and geographic disparities, and disparities among women with disabilities; and assess strategies to leverage and harmonize national data systems for monitoring maternal health.





## CONCLUSION AND LONG-TERM VISION

The health and well-being of our nation's women and their families is paramount to the overall health of the U.S. population and future generations. When considering strategies and actions to improve maternal health, it is important to address health across the life course -- starting with young girls and adolescents and extending through childbearing age and beyond, while engaging a variety of stakeholders, including women and families, states, tribes, and local communities, healthcare professionals, health systems, hospitals, and birthing facilities, payors, employers, innovators, and researchers. Everyone can contribute by creating environments that support the health and well-being of women, promoting healthy pregnancies, preventing the development of risk factors in the first place, and ensuring access to high-quality healthcare before, during, and after pregnancy.

The conditions in which women are born, grow, live, work, and age greatly influence their health status, health risks, and outcomes. These social determinants also contribute to racial and ethnic disparities in maternal health outcomes that are persistent and are critical to address if we are to make progress on improving maternal health and reducing maternal mortality and morbidity in the United States. Everyone can work together to better understand these disparities and to identify and implement prevention strategies to achieve health equity.

As the strategies and actions in this *Call to Action* make clear, each of us has a critical role to play in improving maternal health and reversing the unacceptable rates of maternal mortality and severe maternal morbidity in the United States. This will provide the best opportunity for all women to have a safe passage through pregnancy and set a sustained course for their health and the health of future generations.



## GLOSSARY OF TERMS

**MATERNAL DEATH:** 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 the pregnancy or its management but not from accidental or incidental causes.<sup>6</sup>

**PERINATAL:** The period from 22 completed weeks of gestation through seven days after birth.<sup>183</sup>

**PERINATAL QUALITY COLLABORATIVE (PQC):** state or multi-state networks working to improve maternal and infant health by advancing evidence-informed clinical practices and processes using quality improvement principles.

**POSTPARTUM:** The period immediately after the birth of a child and up to 12 months after delivery.<sup>110</sup>

**PRECONCEPTION HEALTH:** The health of a woman before becoming pregnant.<sup>184</sup>

**PREGNANCY-ASSOCIATED DEATH:** The death of a woman while pregnant or within one year of termination of pregnancy, regardless of cause.<sup>131</sup>

**PREGNANCY-RELATED DEATH:** The death of a woman while pregnant or within 1 year of the end of a pregnancy –regardless of the outcome, duration or site of the pregnancy—from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.<sup>7</sup>

**PRENATAL PERIOD:** The period from conception to birth.

**REPRODUCTIVE PERIOD:** The period from first menarche to last menstruation when a woman can become pregnant and give birth.

**RISK-APPROPRIATE CARE:** A strategy developed to improve health outcomes for pregnant women and infants that ensures those at high risk of complications receive care at a birth facility that is best prepared to meet their health needs.<sup>185</sup>

**SEVERE MATERNAL MORBIDITY:** Unintended outcomes of the process of labor and delivery that result in significant short-term or long-term consequences to a woman's health.<sup>13</sup>

**SOCIAL DETERMINANTS OF HEALTH:** Conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.<sup>22</sup>

**UNDERSERVED AREAS:** Medically underserved areas and Health Professional Shortage Areas exist in all states in urban and rural areas, and identify geographic areas and populations with a lack of, and barriers to, access to health professionals and medical care services.<sup>186</sup>



## ABBREVIATIONS

- ABBREVIATIONS -

**ACOG:** American College of Obstetricians and Gynecologists  
**AHRQ:** Agency for Healthcare Research and Quality  
**AIM:** Alliance for Innovation on Maternal Health  
**AI/AN:** American Indian/Alaska Native  
**BMI:** Body mass index  
**CDC:** Centers for Disease Control and Prevention  
**CHIP:** Children’s Health Insurance Program  
**CMS:** Centers for Medicare & Medicaid Services  
**EHR:** Electronic Health Record  
**FDA:** Food and Drug Administration  
**FLSA:** Fair Labor Standards Act  
**FMLA:** Family and Medical Leave Act  
**HCUP:** Healthcare Cost and Utilization Project  
**HHS:** U.S. Department of Health and Human Services  
**HRSA:** Health Resources and Services Administration  
**IHS:** Indian Health Service  
**IPV:** Intimate Partner Violence  
**LOCATE:** Levels of Care Assessment Tool (CDC)  
**MCHB:** Maternal and Child Health Bureau  
**MMRC:** Maternal Mortality Review Committee  
**MMRIA:** Maternal Mortality Review Information Application  
**NDAA:** National Defense Authorization Act  
**NHANES:** National Health and Nutrition Examination Survey  
**NIH:** National Institutes of Health  
**OASH:** Office of the Assistant Secretary for Health  
**OECD:** Organisation for Economic Co-operation and Development  
**OWH:** Office on Women’s Health  
**PQC:** Perinatal Quality Collaborative  
**PRAMS:** Pregnancy Risk Assessment Monitoring System  
**SMFM:** Society for Maternal-Fetal Medicine  
**SMM:** Severe maternal morbidity  
**T-MSIS:** Transformed Medicaid Statistical Information System  
**USPSTF:** U.S. Preventive Services Task Force  
**WHO:** World Health Organization  
**WIC:** Special Supplemental Nutrition Program for Women, Infants, and Children



## APPENDICES

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## **APPENDIX A:**

# **MEASURING MATERNAL DEATHS AND PREGNANCY-RELATED DEATHS**

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### **NATIONAL VITAL STATISTICS SYSTEM**

The Centers for Disease Control and Prevention's (CDC's) National Vital Statistics System (NVSS) measures maternal deaths using the WHO definition for maternal mortality.<sup>5</sup> NVSS reports the maternal mortality rate (MMR) as the number of maternal deaths per 100,000 live births. This measure of maternal mortality is used to compare the U.S. to other countries that use the same measure.

### **PREGNANCY MORTALITY SURVEILLANCE SYSTEM**

A related but different measure is the pregnancy-related mortality ratio (PRMR), reported by the CDC Pregnancy Mortality Surveillance System (PMSS) as the number of pregnancy-related deaths per 100,000 live births. This measure includes all deaths that occur within one year of pregnancy from a cause related to the pregnancy or its management. The PMSS and NVSS measures also differ in other ways, including how the data are collected and how the cause of death is determined to be related to pregnancy or not.

The PMSS provides greater detail on the causes and circumstances surrounding a pregnancy-related death than what is found using vital records alone. PMSS receives death certificates linked with live birth or fetal death certificates, and additional data when available (e.g., autopsy reports, hospital discharge records, and media reports). All of the information obtained is summarized, and medically trained epidemiologists determine the cause and time of death related to the pregnancy. This allows for a thorough exploration and description of the causes and timing of death, which is critical for tailoring programs and interventions to reduce pregnancy-related deaths.

### **MATERNAL MORTALITY REVIEW COMMITTEES**

Beginning in the 1930s, maternal mortality review committees (MMRCs) were formed to examine pregnancy-related deaths for insights to help prevent future events.<sup>187</sup> Today, MMRCs represent a critical tool in helping understand the factors driving maternal mortality and what we can do to prevent future deaths. The President's 2021 Budget invests \$24 million in the CDC to expand MMRCs to all 50 states to ensure every pregnancy-related death is examined. As limitations with death certificate data alone have been identified, and concerns about maternal mortality increased, there has been an increased emphasis on the importance of multi-disciplinary MMRCs to look at data sources beyond vital records, including medical records, social service records, autopsy reports, and other clinical and nonclinical data sources. They may also conduct interviews to develop a comprehensive understanding of the events surrounding the death.



These detailed reviews of deaths establish temporal and causal relationships to pregnancy. Committees evaluate contributing factors, assess preventability (whether there was at least some chance of averting the death by one or more reasonable changes to patient, family, healthcare provider, facility, systems, or community factors), and make recommendations for preventive action.<sup>188</sup> These insights can inform quality improvement efforts throughout pregnancy and the year after delivery.

The Maternal Mortality Review Information Application (MMRIA) is a data system developed by the CDC as a key tool for MMRCs. MMRIA supports essential MMRC functions such as data abstraction, case narrative development, documentation of committee decisions, and analysis. This data system supports MMRCs in producing relevant and comparable data to inform policy, process, clinical care, and public health. MMRIA also supports efforts to aggregate MMRC findings across states to enable multi-state reporting.<sup>189</sup>

### SYSTEMS OF MATERNAL MORTALITY SURVEILLANCE IN THE UNITED STATES

Data Source	National Vital Statistics System	Pregnancy Mortality Surveillance System	Maternal Mortality Review Committees
Source of Classification	International Classification of Diseases (ICD), 10th Revision codes	Medical epidemiologists, utilizing Pregnancy Mortality Surveillance System codes	Multi-disciplinary committees
Strengths	<p>Strongest source of historical data, dating back to 1900</p> <p>Reliable basis for international comparison</p> <p>Relies on readily available data from death certificates</p>	<p>Clinically relevant national measure of burden of maternal deaths</p> <p>30-year history</p>	<p>Allows for the most accurate identification and comprehensive review of deaths</p> <p>Allows specific recommendations for development of local, state, and national prevention strategies that are informed by local context of deaths</p>
Challenges	<p>Constrained by the limited codes in the ICD</p> <p>Does not capture sufficient detail to inform prevention strategies</p> <p>Changes in ICD coding may affect comparisons over time</p>	<p>Limited to information primarily derived from death and birth certificates</p> <p>Does not capture detailed information on contributors to deaths</p>	<p>Resource-intensive</p> <p>Reliant on data from multiple sources, including medical records, social records, autopsy reports, and informant interviews</p> <p>Requires review by multiple stakeholders</p> <p>Currently, MMRCs do not exist in each state, inhibiting use of this data for national surveillance</p>

Table adapted from: St. Pierre A, Zaharatos J, Goodman D, Callaghan WM. Challenges and opportunities in identifying, reviewing, and preventing maternal deaths. *Obstet Gynecol*, 2018 Jan; 131(1): 138-142.

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## **APPENDIX B:**

### **GOVERNMENT PROGRAMS AND RESOURCES**

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#### **ADMINISTRATION FOR COMMUNITY LIVING (ACL)**

- Center for Human Dignity and Health Access for Individuals with Disabilities: <https://acl.gov/grants/human-dignity-and-civilrights-people-disabilities>
- ACL Fact Sheet: Accessible Medical Diagnostic Equipment: <https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/MDE%20Fact%20Sheet%20Final.docx>
- ACL NIDILRR-funded National Research Center for Parents with Disabilities, Parents Empowering Parents and investigators: <https://heller.brandeis.edu/parentswith-Disabilities>
- Parenting with a Disability - The Looking Glass: <https://lookingglass.org/nationalservices/national-center>
- Association of Maternal and Child Health Programs Toolbox on Women’s Health and Disability: <http://www.amchp.org/programsandtopics/womens-health/Focus%20Areas/WomensHealthDisability/Pages/default.aspx>
- National Council on Disability “Rocking the Cradle: Ensuring the Rights of Parents with Disabilities”: <https://www.ncd.gov/publications/2012/Sep272012>

#### **AGENCY FOR HEALTHCARE RESEARCH AND QUALITY (AHRQ)**

- Evidence-based Practice Center (EPC) Program: <https://www.ahrq.gov/research/findings/evidence-based-reports/index.html>
- The Healthcare Cost and Utilization Project (HCUP): <https://www.hcup-us.ahrq.gov/>
- The National Healthcare Quality and Disparities Report: <https://nhqrnet.ahrq.gov/inhqrdr/> or <https://www.ahrq.gov/research/findings/nhqrdr/index.html>
- Safety Program for Perinatal Care (SPPC) toolkit: <https://www.ahrq.gov/hai/tools/perinatal-care/index.html>

## CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS)

- Rural Maternal Health: <https://www.cms.gov/About-CMS/Agency-Information/OMH/equity-initiatives/rural-health/rural-maternal-health>
- Strong Start for Mothers and Newborns Initiative: <https://innovation.cms.gov/innovation-models/strong-start>
- Maternal Opioid Misuse (MOM) Model: <https://innovation.cms.gov/initiatives/maternal-opioid-misuse-model/>
- Integrated Care for Kids (InCK) Model: <https://innovation.cms.gov/innovation-models/integrated-care-for-kids-model>
- Maternal & Infant Health Initiative: <https://www.medicaid.gov/medicaid/quality-of-care/improvement-initiatives/maternal-and-infant-health/index.html>
- Medicaid Adult and Child Core Measure Sets:  
  
Adult Core Set : <https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2020-adult-core-set.pdf>  
  
Child Core Measure Set: <https://www.medicaid.gov/medicaid/quality-of-care/performance-measurement/adult-and-child-health-care-quality-measures/childrens-health-care-quality-measures/index.html>  
  
Maternity Core Set: <https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2020-maternity-core-set.pdf>
- Medicaid and CHIP Scorecard: <https://www.medicaid.gov/state-overviews/scorecard/index.html>
- Medicaid Maternal Depression Screening: <https://www.medicaid.gov/sites/default/files/Federal-Policy-Guidance/Downloads/cib051116.pdf>

## CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

- Hear Her Campaign: <https://www.cdc.gov/hearher/index.html>
- Pregnancy-related Mortality Surveillance System: <https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm>
- National Center for Health Statistics Maternal Mortality Data and Resources: <https://www.cdc.gov/nchs/maternal-mortality/index.htm>
- Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM): <https://www.cdc.gov/erase-mm>

- Perinatal Quality Collaboratives: <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pgc.htm>
- CDC Levels of Care Assessment Tool (CDC LOCATe): <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/cdc-locate/index.html>
- Million Hearts: <https://millionhearts.hhs.gov/index.html>
- Addressing Opioid Use Disorder to Improve Maternal and Infant Health: <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/substance-abuse/opioid-use-disorder-pregnancy/addressing-opioid-use-maternal-infant-htm>
- Depression Among Women: <https://www.cdc.gov/reproductivehealth/depression/index.htm>
- US Medical Eligibility Criteria (US MEC) for Contraceptive Use, 2016: <https://www.cdc.gov/reproductivehealth/contraception/mmwr/mec/summary.html>
- US Selected Practice Recommendations (US SPR) for Contraceptive Use, 2016: <https://www.cdc.gov/reproductivehealth/contraception/mmwr/spr/summary.html>
- *Treating for Two: Medicine and Pregnancy*: <https://www.cdc.gov/pregnancy/meds/treatingfortwo/index.html>
- <https://www.cdc.gov/hiv/group/gender/pregnantwomen/opt-out.html>
- Sexually Transmitted Diseases Treatment Guidelines, 2015
- 2018 Sexually Transmitted Disease Surveillance Report

## HEALTH RESOURCES AND SERVICES ADMINISTRATION (HRSA)

- Remote Pregnancy Monitoring Challenge: <https://mchbgrandchallenges.hrsa.gov/challenges/remote-pregnancy-monitoring>
- Alliance for Innovation on Maternal Health (AIM): <https://safehealthcareforeverywoman.org>
- Infant Mortality Collaborative Improvement and Innovation Network (CoIIN): <https://mchb.hrsa.gov/maternal-child-health-initiatives/collaborative-improvement-innovation-networks-coiins>
- Preconception Collaborative Improvement and Innovation Network: <https://beforeandbeyond.org/pchimcoiin/>
- Screening and Treatment for Maternal Depression and Related Behavioral Disorders: <https://mchb.hrsa.gov/maternal-child-health-initiatives/mental-behavioral-health/mdrbd>
- Women's Preventive Services Guidelines: <https://www.womenspreventivehealth.org/wellwomanchart/>

- Healthy Start Initiative: Eliminating Disparities in Perinatal Health: <https://mchb.hrsa.gov/maternal-child-health-initiatives/healthy-start>
- The Maternal, Infant, and Early Childhood Home Visiting Program: <https://mchb.hrsa.gov/home-visiting>
- Rural Maternity and Obstetrics Managements (RMOMS) Program: <https://www.hrsa.gov/grants/find-funding/hrsa-19-094>  
<https://www.hhs.gov/about/news/2019/09/10/hhs-awards-9-million-new-models-obstetrics-care-rural-communities.html>
- Supporting Maternal Health Innovation Programs – the Maternal Health Learning and Innovation Center: <https://impact.fpg.unc.edu/what-we-do/maternal-health-learning-and-innovation-center>
- State Maternal Health Innovation Programs: <https://mchb.hrsa.gov/maternal-child-health-initiatives/fy20-state-maternal-health-innovation-awards>
- Maternal and Child Health Research Networks: <https://mchb.hrsa.gov/research/projects-networks.asp>

## INDIAN HEALTH SERVICE (IHS)

- Breastfeeding Toolkit (referenced on Health Education Resources page): <https://www.ihs.gov/healthed/resources/breastfeedingtoolkit/>
- Tobacco Use/Statistics among Pregnant Women: <https://www.ihs.gov/hpdp/tobaccoprevention/>
- Healthy Weight Model/Across the Lifespan: <https://www.ihs.gov/healthyweight/hwmodel/>
- Healthy Weight for Life/Actions for Providers (discusses pre-conception/prenatal care, breastfeeding/infant feeding education and support): <https://www.ihs.gov/healthyweight/providers/>
- Baby Friendly Hospital Initiative/Promoting Breastfeeding: <http://www.ihs.gov/babyfriendly/>
- Hepatitis C and Pregnancy: <https://www.ihs.gov/dccs/hcv/>
- HIV: Clinical Information Guidelines (links to pediatric HIV infection/perinatal guidelines): <https://www.ihs.gov/hivaids/clinicalinfo/guidelines/>
- HIV Testing/IHS Guidelines/resources to CDC recommendation for breastfeeding: <https://www.ihs.gov/hivaids/clinicalinfo/hivtesting/>  
<https://www.ihs.gov/hivaids/treatment/>

- Opioid Use/Substance Abuse/Maternal Health/Child Health:  
<https://www.ihs.gov/opioids/maternalchild/>  
<https://www.ihs.gov/opioids/childhealth/>  
<https://www.ihs.gov/asap/providers/maternaladdiction/> (linked on MCH page)
- Women’s Health – Maternal and Child Health page linking MCH topics: <https://www.ihs.gov/womenshealth/maternalchildhealth/>
- Diabetes Standards of Care & Clinical Practices: Preconception, Pregnancy, Postpartum:  
<https://www.ihs.gov/diabetes/clinician-resources/soc/preconception-pregnancy-postpartum-diabetes1/>

## **NATIONAL INSTITUTES OF HEALTH (NIH)**

- PregSource®: <https://pregsource.nih.gov/>
- HHS Task Force on Research Specific to Pregnant Women and Lactating Women (PRGLAC):  
<https://www.nichd.nih.gov/about/advisory/PRGLAC>
- The National Cancer Institute’s Smokefree Women website (free information and tools to help women quit smoking): <https://women.smokefree.gov/>

## **OFFICE OF THE ASSISTANT SECRETARY FOR HEALTH (OASH)**

- Office of Infectious Disease and HIV/AIDS Policy  
Healthmap Vaccine Finder: <https://vaccinefinder.org>
- Office of Population Affairs: [www.hhs.gov/opa/reproductive-health/index.html](http://www.hhs.gov/opa/reproductive-health/index.html)
- Office on Women’s Health  
Pregnancy: <https://www.womenshealth.gov/pregnancy>  
Breastfeeding: <https://www.womenshealth.gov/breastfeeding>  
Mental health: <https://www.womenshealth.gov/patient-materials/health-topic/mental-health>

## **OFFICE OF MINORITY HEALTH (OMH)**

National Standards for Culturally and Linguistically Appropriate Services: <https://thinkculturalhealth.hhs.gov/clas>

## SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION (SAMHSA)

- Marijuana Use and Pregnancy: <https://attcnetwork.org/centers/network-coordinating-office/product/marijuana-use-and-pregnancy>
- The Stigma is Real: Pregnant and Parenting Women with Substance Use Disorders: <https://attcnetwork.org/centers/mountain-plains-attc/product/stigma-real-pregnant-and-parenting-women-substance-use>
- Healing Two Generations: Care for Pregnant/Parenting Women with OUD/SUD (Webinar): <https://attcnetwork.org/centers/northwest-attc/product/healing-two-generations-care-pregnantparenting-women-oudsud-webinar>
- Healthy Pregnancy Healthy Baby Fact Sheet: <https://store.samhsa.gov/product/Healthy-Pregnancy-Healthy-Baby-Fact-Sheets/SMA18-5071>
- Opioid Use Disorder and Pregnancy: <https://store.samhsa.gov/product/Opioid-Use-Disorder-and-Pregnancy/SMA18-5071FS1>
- Treating Babies Who Were Exposed to Opioids Before Birth: <https://store.samhsa.gov/product/Treating-Babies-Who-Were-Exposed-to-Opioids-Before-Birth/SMA18-5071FS3>
- Good Care for You and Your Baby While Receiving Opioid Use Disorder Treatment: <https://store.samhsa.gov/product/Good-Care-for-You-and-Your-Baby-While-Receiving-Opioid-Use-Disorder-Treatment/SMA18-5071FS4>
- Clinical Guidance for Treating Pregnant and Parenting Women With Opioid Use Disorder and Their Infants: <https://store.samhsa.gov/product/Clinical-Guidance-for-Treating-Pregnant-and-Parenting-Women-With-Opioid-Use-Disorder-and-Their-Infants/SMA18-5054>
- A Collaborative Approach to the Treatment of Pregnant Women with Opioid Use Disorders <https://store.samhsa.gov/product/A-Collaborative-Approach-to-the-Treatment-of-Pregnant-Women-with-Opioid-Use-Disorders/SMA16-4978>

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## **APPENDIX C: ACKNOWLEDGMENTS**

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