



United States Government Accountability Office  
Congressional Requesters

March 2020

# MATERNAL MORTALITY

## Trends in Pregnancy- Related Deaths and Federal Efforts to Reduce Them

Accessible Version

# GAO Highlights

Highlights of [GAO-20-248](#), a report to congressional requesters

View [GAO-20-248](#). For more information, contact Mary Denigan-Macauley at (202) 512-7114 or [deniganmacauleym@gao.gov](mailto:deniganmacauleym@gao.gov).

## Why GAO Did This Study

Every year in the United States, hundreds of women die of complications related to pregnancy and childbirth. According to CDC data, racial/ethnic disparities exist with regard to these deaths. For example, non-Hispanic black women were more than three times as likely to die as non-Hispanic white women, and non-Hispanic American Indian/Alaska Native women were more than two times as likely to die as non-Hispanic white women.

GAO was asked to review issues related to maternal mortality in the United States. In this report, GAO describes, among other things, (1) trends in pregnancy-related deaths in the United States, including trends in causes and timing of these deaths, and (2) HHS funding efforts focused on reducing pregnancy-related deaths.

GAO reviewed documentation about HHS's surveillance efforts related to pregnancy-related deaths; and analyzed CDC data on leading causes of pregnancy-related deaths from 2007 through 2016 (the most recent 10-year period available at the time of GAO's review). GAO also reviewed documentation and interviewed HHS and state public health officials in five selected states about HHS's funding efforts aimed at reducing pregnancy-related deaths, including select efforts used in these states. GAO selected these states primarily based on their geographic diversity and their implementation of select efforts to address maternal mortality.

GAO provided a draft of this report to HHS. HHS provided technical comments, which GAO incorporated as appropriate.

March 2020

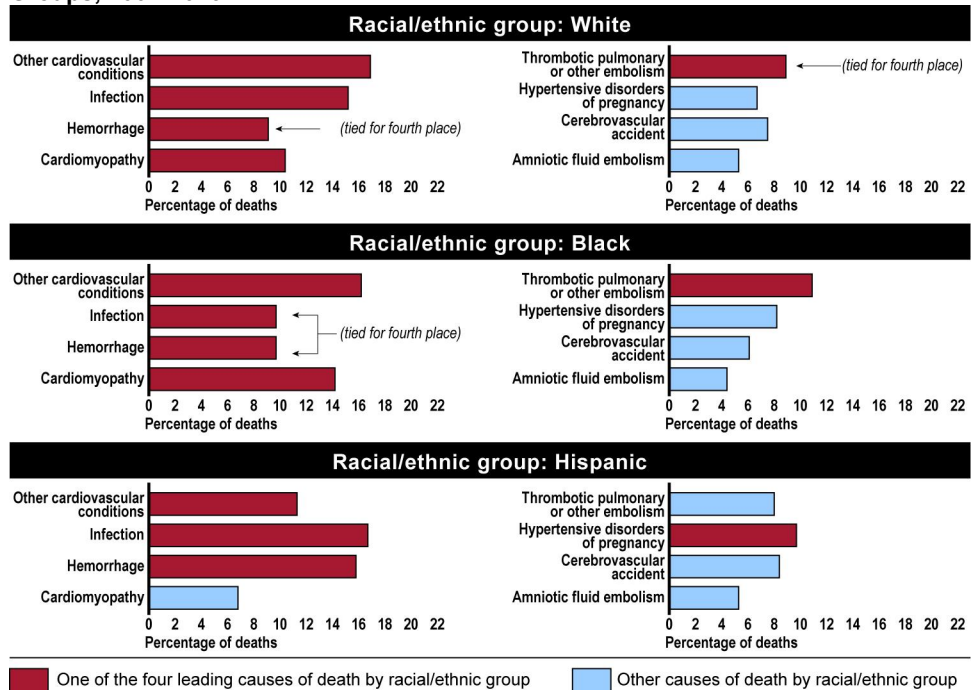
# MATERNAL MORTALITY

## Trends in Pregnancy-Related Deaths and Federal Efforts to Reduce Them

### What GAO Found

GAO's analysis of the Centers for Disease Control and Prevention's (CDC) Pregnancy Mortality Surveillance System data shows that from 2007 through 2016, over 6,700 women died of causes related to or aggravated by their pregnancy—either while pregnant or within 1 year of the end of pregnancy. While CDC data show an overall increase in the pregnancy-related mortality ratio in the United States during this time frame, the annual ratio fluctuated. Cardiovascular conditions, infection, and hemorrhage were the leading causes of pregnancy-related deaths, and comprised about 50 percent of all pregnancy-related deaths from 2007 through 2016. In addition, CDC data show that the leading causes of pregnancy-related deaths differed by racial ethnic groups. (See figures.)

**Figure: Leading Causes of Pregnancy-Related Deaths by Select Racial/Ethnic Groups, 2007-2016**



Source: GAO analysis of Centers for Disease Control and Prevention Pregnancy Mortality Surveillance System data. | GAO-20-248

**Data table for Figure: Leading Causes of Pregnancy-Related Deaths by Select Racial/Ethnic Groups, 2007-2016**

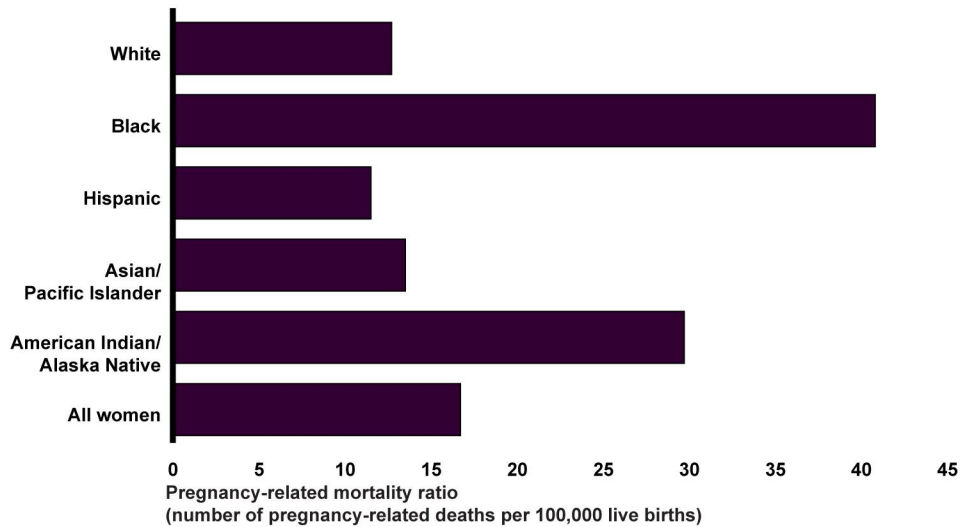
Racial/ethnic group <sup>a</sup> (Total number of deaths <sup>b</sup> )	Other cardiovascular conditions	Infections	Hemorrhage	Cardiomyopathy	Thrombotic pulmonary or other embolism	Hypertensive disorders of pregnancy	Cerebrovascular accident	Amniotic fluid embolism
White (2,756)	16.9	15.2	9.1	10.4	8.9	6.7	7.5	5.3
Black (2,432)	16.2	9.7	9.7	14.2	10.9	8.2	6.1	4.4
American Indian/Alaska Native (117)	11.1	8.5	19.7	14.5	7.7	12.8	5.1	2.6
Asian/Pacific Islander (339)	11.2	15	19.5	6.2	3.2	6.2	10.9	15
Hispanic (1,096)	11.3	16.7	15.8	6.8	8	9.7	8.4	5.3

Notes: "Other cardiovascular conditions" includes conditions not reported separately as cardiomyopathy—when the normal muscle in the heart thicken, stiffen, thin out, or fill with substances the body produces that do not belong in the muscle, or cerebrovascular accidents—known as stroke.

Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

White and black women were non-Hispanic. Hispanic women might be of any race.

**Figure: Pregnancy-Related Deaths per 100,000 Live Births by Racial/Ethnic Group, 2007-2016**



Source: Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report, September 2019. | GAO-20-248

**Data Table for Figure: Pregnancy-Related Deaths per 100,000 Live Births by Racial/Ethnic Group, 2007-2016**

	Ratio
White	12.7
Black	40.8
Hispanic	11.5
Asian/Pacific Islander	13.5
American Indian/Alaska Native	29.7
All women	16.7

Notes: White, black, American Indian/Alaska Native and Asian/Pacific Islander women were non-Hispanic. Hispanic women might be of any race.

The Department of Health and Human Services has 13 ongoing efforts aimed at reducing pregnancy-related deaths. The following are key examples of these:

- **Supporting Maternal Mortality Review Committees Cooperative Agreements.** According to CDC officials, in September 2019, CDC awarded 5-year cooperative agreements to 24 recipients covering 25 states with amounts ranging from \$150,000 to over \$550,000 in the first year, totaling about \$8.4 million. Under these agreements, CDC is providing funding to state agencies and organizations that coordinate and manage Maternal Mortality Review Committees. The committees are responsible for comprehensively reviewing deaths to identify prevention opportunities.
- **Maternal and Child Health (MCH) Services Block Grant Program.** The Health Resources and Services Administration provides funding through this program to 59 states and jurisdictions to improve maternal and child health. In fiscal year 2017, total expenditures for services for pregnant women from all sources—federal funds, as well as state, local, program income, and other funds—was about \$300 million. According to agency officials, many recipients reported using their block grant funding to help support or complement other federal initiatives, such as their review committee, quality collaborative, and use of maternal safety bundles.

According to officials GAO interviewed in five selected states, they use these efforts and others collectively to address pregnancy-related deaths. For example, according to officials in one state, they implemented an obstetric hemorrhage maternal safety bundle in 2018 based on the state's Maternal Mortality Review Committee finding that hemorrhage was a leading cause of pregnancy-related deaths in the state. According to officials, the state's Maternal Mortality Review Committee was funded primarily through the MCH Services Block Grant.

All five states also mentioned beginning or continuing to address racial/ethnic or other health disparities with block grant funding, through their Maternal Mortality Review Committees, or other efforts. For example, officials in one state said they use block grant funding to support their Black Infant Health Program, which helps address maternal morbidity and mortality of black mothers in the late maternal period. Additionally, two of the HHS funding efforts awarded in fiscal year 2019 have outcomes related to decreasing racial and ethnic disparities in maternal mortality: the Alliance for Innovation on Maternal Health Community Care Initiative and the State Maternal Health Innovation Program.

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### **Abbreviations**

AIM	Alliance for Innovation on Maternal Health
CDC	Centers for Disease Control and Prevention
HHS	Department of Health and Human Services
HRSA	Health Resources and Services Administration
MCH	Maternal and Child Health
MMRC	Maternal Mortality Review Committees
MMRIA	Maternal Mortality Review Information Application
NIH	National Institutes of Health
NVSS	National Vital Statistics System
PMSS	Pregnancy Mortality Surveillance System
PQC	Perinatal Quality Collaborative

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March 12, 2020

Congressional Requesters

Every year in the United States, approximately 700 women die of complications related to pregnancy and childbirth, while thousands of others experience life-threatening complications.<sup>1</sup> In 2014, for example, more than 50,000 women experienced a life-threatening pregnancy complication, such as heart failure or cardiac arrest during surgery or a procedure. While the maternal mortality ratio decreased globally by about 3 percent from 2000 through 2015, the ratio in the United States has increased by about 3 percent for this time period.<sup>2</sup>

Within the Department of Health and Human Services (HHS), the Centers for Disease Control and Prevention (CDC) is the federal agency responsible for surveillance—the continuous, systematic collection and analysis of health-related data—of all deaths in the United States, including pregnancy related-deaths. CDC data show that racial/ethnic and age disparities exist in the rates of pregnancy-related deaths.<sup>3</sup> For example, from 2007 through 2016, non-Hispanic black women were more than three times as likely to die than non-Hispanic white women, while non-Hispanic American Indian/Alaska Native women were more than two times as likely to die than non-Hispanic white women. (See fig. 1.)

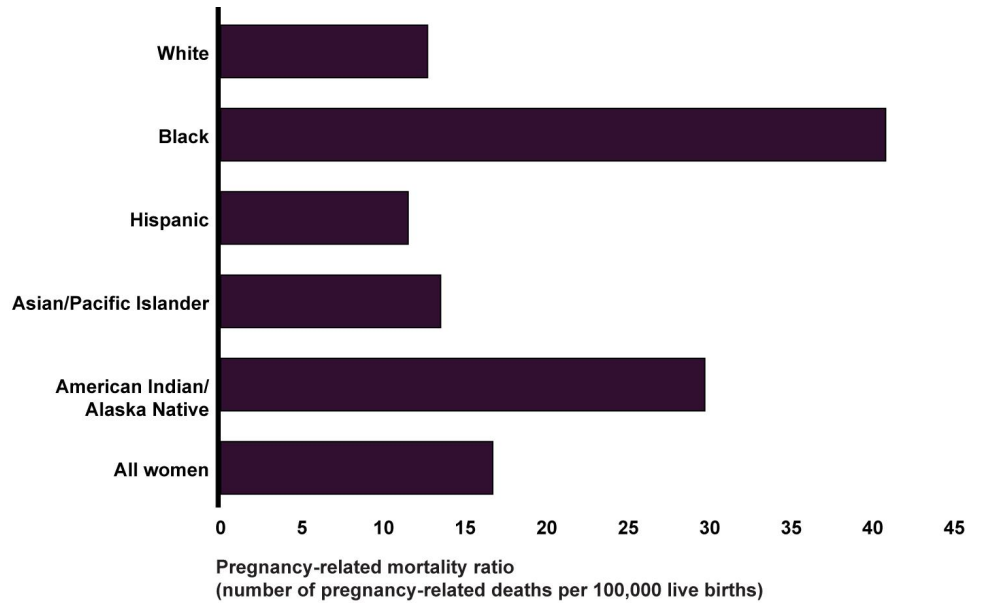
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<sup>1</sup>M. C. Lu, “Reducing Maternal Mortality in the United States.” *JAMA*. vol. 320, no. 20 (2018), 1237-1238.

<sup>2</sup>For purposes of this report, we use the term “maternal mortality” broadly to mean the death of a woman during pregnancy, at delivery, or soon thereafter. The maternal mortality ratio is the number of maternal deaths—those occurring during pregnancy or within 42 days of pregnancy—per 100,000 live births, as defined by the World Health Organization. “Global, regional, and national levels of maternal mortality, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015.” *Lancet*, vol. 388 (2016) 1775-1812.

<sup>3</sup>A pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

**Figure 1: Pregnancy-Related Deaths per 100,000 Live Births by Racial/Ethnic Group, 2007-2016**



Source: Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report, September 2019. | GAO-20-248

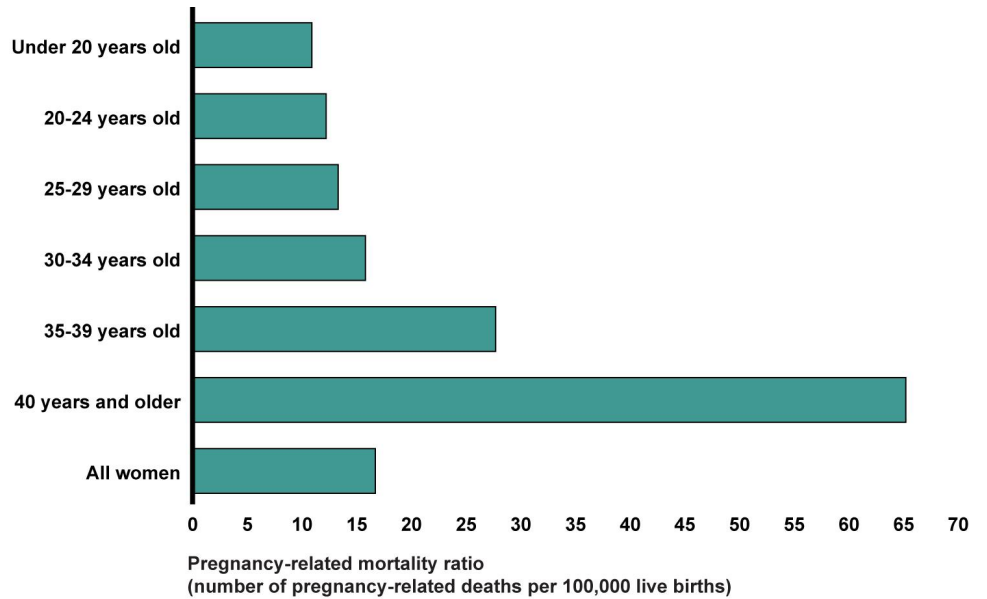
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	Ratio
<b>White</b>	12.7
<b>Black</b>	40.8
<b>Hispanic</b>	11.5
<b>Asian/Pacific Islander</b>	13.5
<b>American Indian/Alaska Native</b>	29.7
<b>All women</b>	16.7

Note: White, black, American Indian/Alaska Native and Asian/Pacific Islander women were non-Hispanic. Hispanic women might be of any race.

Similarly, rates of pregnancy-related deaths for women 35 years old and older are higher than the rates for women under 35 years old. (See fig. 2).

**Figure 2: Pregnancy-Related Deaths per 100,000 Live Births by Age Group, 2007-2016**



Source: Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report, September 2019. | GAO-20-248

**Data table for Figure 2: Pregnancy-Related Deaths per 100,000 Live Births by Age Group, 2007-2016**

	Ratio
Under 20 years old	10.9
20-24 years old	12.2
25-29 years old	13.3
30-34 years old	15.8
35-39 years old	27.7
40 years and older	65.2
All women	16.7

According to a Health Resources and Services Administration (HRSA) report, access to consistent, high quality, and reliable data that identify both the characteristics of women who die due to pregnancy complications and the specific circumstances that lead to these deaths is essential to inform critical action steps and for developing prevention

strategies.<sup>4</sup> Such data can inform, for example, state and local efforts funded by HHS to reduce these deaths.

You asked us to review issues related to maternal mortality in the United States. This report describes

1. HHS's surveillance efforts related to maternal mortality;
2. trends in pregnancy-related deaths in the United States, including trends in the causes and timing of these deaths; and
3. HHS funding efforts focused on reducing pregnancy-related deaths.

To describe HHS surveillance efforts, conducted by CDC, related to maternal mortality in the United States, we reviewed agency documentation, such as reports on maternal mortality. We identified three such efforts—the National Vital Statistics System (NVSS), the Pregnancy Mortality Surveillance System (PMSS) and the Maternal Mortality Review Information Application (MMRIA). We also interviewed CDC and selected state officials (see state selection criteria below).

To describe the trends in pregnancy-related deaths in the United States, we analyzed PMSS data, including any age or racial/ethnic differences, for these deaths from 2007 through 2016—the most recent 10-year period available at the time of our review. We also analyzed PMSS data on the timing of pregnancy-related deaths in the United States—whether the death occurred during pregnancy or within 1 year of the end of the pregnancy—for the period of 2011 through 2016. According to agency officials, data on this variable were not collected by CDC until 2011. We assessed the reliability of the PMSS data by (1) comparing PMSS data provided to GAO with published reports, (2) reviewing existing documentation on the data and the data collection processes that produced them, and (3) interviewing agency officials knowledgeable about the data. We determined that the PMSS data were sufficiently reliable for our purposes.

To describe HHS funding efforts focused on reducing pregnancy-related deaths, we reviewed agency documentation, such as agency notices of funding opportunities and award announcements, and interviewed

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<sup>4</sup>Department of Health and Human Services, Health Resource and Services Administration, *HRSA Maternal Mortality Summit: Promising Global Practices to Improve Maternal Health Outcomes Technical Report* (February 15, 2019). HRSA is the primary federal agency within HHS for improving health care to people who are geographically isolated, economically or medically vulnerable.

officials at CDC, the Centers for Medicare & Medicaid Services, HRSA, the Indian Health Service, the National Institutes of Health (NIH), and the Substance Abuse and Mental Health Services Administration about their efforts to reduce maternal mortality. HHS officials identified these agencies as having efforts that may focus on reducing maternal mortality. For our review, we identified ongoing funding efforts with a stated outcome, goal or focus on reducing pregnancy-related deaths.

In addition, we interviewed state public health and vital records officials from five selected states—California, Georgia, Illinois, Maryland, and Texas—about their efforts to reduce maternal mortality. We selected these states because of their geographic diversity and because these states have

- a Maternal Mortality Review Committee (MMRC), which are multidisciplinary committees whose goals are to systematically and comprehensively review clinical and non-clinical information about pregnancy-related deaths to develop recommended strategies for preventing future deaths.
- a Perinatal Quality Collaborative (PQC), a network of multidisciplinary teams that work to improve measurable outcomes for maternal and infant health, and disseminate best practices.
- at least one of the maternal safety bundles implemented—sets of evidence-based practices that when implemented collectively and reliably in the delivery setting may improve patient outcomes and reduce maternal mortality and severe maternal morbidity—that were developed as part of the HRSA-supported Alliance on Innovation in Maternal Health (AIM) initiative.<sup>5</sup>

We conducted this performance audit from October 2018 through March 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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<sup>5</sup>Severe maternal morbidity includes unexpected outcomes of labor and delivery that result in significant short or long-term consequences to a woman's health.

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## Background

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### Death Registration Process

In the United States, deaths from all causes are recorded and tracked through a multi-step registration process, which may vary by state, according to CDC officials. According to CDC officials, when an individual dies, a death certificate is filed with the state. Funeral directors are responsible for providing demographic information about the deceased individual, while physicians, coroners, and medical examiners are responsible for providing information on cause of death. The local registrar of vital statistics is responsible for verifying the information, and then transferring copies of the death certificate to the city or county health department in some jurisdictions, and to the state registrar. The state vital registration office is responsible for verifying the information, maintaining official copies, and creating an electronic record. According to CDC officials we interviewed, state vital records offices submit their death certificate information to CDC electronically.

In 2003, CDC revised the standard death certificate to include a checkbox to indicate whether a woman was pregnant at the time of her death or up to 1 year after delivery or end of pregnancy. (See fig. 3)

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**Figure 3: Pregnancy Checkbox in U.S. Death Certificate**

**36. IF FEMALE:**

- Not pregnant within past year
- Pregnant at time of death
- Not pregnant, but pregnant within 42 days of death
- Not pregnant, but pregnant 43 days to 1 year before death
- Unknown if pregnant within the past year

Source: United States Standard Death Certificate (2003 revision). | GAO-20-248

The checkbox is part of the medical portion of the death certificate that is completed by a physician, coroner, or medical examiner. According to CDC officials, there has been staggered adoption of the revised death

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certificate by states, and not every state death certificate included the pregnancy checkbox until 2019.

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## CDC Has Two National Surveillance Systems Related to Maternal Mortality and Has Created a Resource to Facilitate State Efforts

CDC collects maternal mortality data using two national surveillance systems, NVSS and PMSS. In addition, CDC has developed a data application that state or local MMRCs can use to centrally collect information abstracted from various sources about each death.

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### NVSS

Federal law directs CDC's National Center for Health Statistics to collect statistics on maternal mortality.<sup>6</sup> According to CDC officials, the National Center for Health Statistics receives copies of electronic records for deaths from all states and jurisdictions, such as the District of Columbia. It uses this death certificate information to assign ICD-10 codes based on the cause of death.<sup>7</sup> According to CDC officials, the National Center for Health Statistics uses these coded records to compile national vital statistics files in NVSS, which is the source of official statistics on

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<sup>6</sup>See 42 U.S.C. § 242k(b)(1)(A).

<sup>7</sup>According to CDC officials, staff review and assign an ICD-10 code manually to these deaths because they are rare in contrast to most other deaths, which are coded using an automated algorithm. Starting in 1999, CDC began coding causes of death using the 10th edition of the International Classification of Diseases (ICD-10). ICD-10 includes a specific category (O codes) for pregnancy, childbirth, or puerperium-related causes of deaths. The puerperium period typically refers to the time after pregnancy when a woman's reproductive organs return to a non-pregnancy state. According to CDC officials, for a death to be assigned an O code, the death certificate must have indicated that the woman died during pregnancy, within 42 days of pregnancy, between 43 days to 1 year after pregnancy or included a cause of death that indicates one of these conditions. Within the O code category, there are codes for specific categories of causes of death, such as a code for postpartum hemorrhage.

mortality in the United States, including maternal deaths.<sup>8</sup> NVSS data are used to identify national trends and make international comparisons.

CDC published national maternal mortality rates for deaths that occurred in 2007 based on data collected in NVSS in its report on all deaths in the United States.<sup>9</sup> CDC also made these data publicly available in microdata files that can be downloaded through website applications and, according to officials, in response to specific requests when additional details, such as geography, are sought.<sup>10</sup> However due to staggered implementation of the 2003 revised death certificate by the states and reliability concerns about the use of the pregnancy checkbox, CDC officials said that as of September 2019, they have not published NVSS statistics on maternal mortality in the agency's annual mortality reports since the report on deaths that occurred in 2007. For example, as specified in the technical notes of a June 2019 CDC report on national vital statistics for deaths in 2017, CDC noted evidence of an increase in false reporting of maternal deaths as a result of incorrect completion of the pregnancy checkbox on death certificates. According to CDC officials, the individual who completed the pregnancy checkbox may have incorrectly noted that a woman was pregnant or had been pregnant within 1 year of her death, and as a result, the death would have been recorded as a maternal death or late maternal death. However, prior to the addition of the pregnancy checkbox, there was a general concern that the United States was not

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<sup>8</sup>NVSS uses the term "maternal death," as defined by the World Health Organization, to mean the death of a woman while pregnant or within 42 days 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. The term does not include "late maternal death," which occurs more than 42 days but less than 1 year after pregnancy.

<sup>9</sup>The maternal mortality rate is the number of maternal deaths—deaths during pregnancy or within 42 days of pregnancy—per 100,000 live births, as defined by with the World Health Organization definition.

<sup>10</sup>Through CDC's website, the public can access vital records data, including data on maternal mortality, using an application called CDC WONDER. According to CDC officials, through HHS's Office of Women's Health's website, the public can access vital records data, including data on maternal mortality, using an application called the Health Information Gateway.



identifying all of the maternal deaths and thus did not have a full picture of maternal mortality.<sup>11</sup>

According to CDC officials, the agency has recently taken steps to improve NVSS data on maternal mortality. For example, in 2018, CDC developed training for individuals who complete the cause of death portion of a death certificate, and in 2019 was developing guidance on completing the pregnancy checkbox. The agency also participated in a quality assurance pilot from January 2016 through March 2017 with four states, Georgia, Louisiana, Michigan, and Ohio, to test processes that may improve state-level data on maternal mortality. The results of the pilot were made available in articles in 2019, and CDC officials said the agency is currently disseminating the findings from the pilot to other states.<sup>12</sup> According to agency officials, one of the findings from the pilot was that a greater proportion of deaths where the pregnancy checkbox on the death certificate was marked incorrectly were for women aged 45 and older. As a result, CDC officials said they plan to use additional criteria when classifying deaths for these women. Specifically, they will only code the death as a maternal death or late maternal death if the cause of death is explicitly reported on the death certificate as due to pregnancy or an obstetric cause.

CDC officials stated that the changes they made improved the accuracy of data on maternal mortality, and they will implement the new reporting criteria for 2018 data.<sup>13</sup> On January 30, 2020, CDC published maternal

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<sup>11</sup>For example, CDC officials noted some death certificates contain only general cause of death descriptions and do not contain enough information to determine whether the death was related to the woman's pregnancy.

<sup>12</sup>A.E.C. Daymude, A. Catalano, D. Goodman. "Checking the pregnancy checkbox: Evaluation of a four-state quality assurance pilot." *Birth*. (2019) 1-8 and Catalano, A., N.L. Davis, E.E. Petersen, et al. *Pregnant? Validity of the Pregnancy Checkbox on Death Certificates in Four States, and Characteristics Associated with Pregnancy Checkbox Errors*. (forthcoming).

<sup>13</sup>In addition, CDC officials said the agency plans to release additional data files using the new reporting criteria for years 2015 through 2018 and provide those files in response to individual data requests for these years.

mortality statistics in a National Vital Statistics Report.<sup>14</sup> For data on maternal mortality accessible through CDC's website, CDC officials said they will direct users of these data to its limitations that are noted in the annual report. Officials said they will also publish guidance on the limitations of the maternal mortality statistics, and they will continue to monitor the accuracy of the data. Taking these steps to improve the NVSS data on maternal mortality and noting their limitations should help provide federal, state, and local organizations with accurate data. For example, CDC notes on its CDC WONDER website that state, local, and county health departments rely on this source of publicly accessible data to review their community's population health trends, evaluate their program's performance for planning purposes, and compare their community with other locations.<sup>15</sup>

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## PMSS

In 1986, CDC initiated a second national surveillance system for maternal mortality, PMSS. Unlike NVSS, PMSS is exclusively focused on pregnancy-related deaths. According to CDC, the system was developed because more clinical classification of the causes of these deaths was needed in order to fill data gaps and help clinicians and public health professionals to better understand circumstances surrounding pregnancy-related deaths, including the causes and appropriate actions to prevent them. This collection effort included expanding the scope of deaths under surveillance to those up to 1 year after the end of pregnancy, which is beyond the international standard of up to 42 days after the end of a pregnancy.

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<sup>14</sup>Department of Health and Human Services, Centers for Disease Control and Prevention, *Maternal Mortality in the United States: Changes in Coding, Publication, and Data Release, 2018*, National Vital Statistics Reports vol. 69, no. 2 (Maryland: January 2020). CDC also published two related publications in January 2020. HHS, CDC, *Evaluation of the Pregnancy Status Checkbox on the Identification of Maternal Deaths*, National Vital Statistics Reports vol. 69, no. 1 (Maryland: January 2020) and HHS, CDC, *The Impact of the Pregnancy Checkbox and Misclassification on Maternal Mortality Trends in the United States, 1999-2017*, Vital and Health Statistics series 3, no. 44 (January 2020).

<sup>15</sup>Information on maternal mortality is available on CDC's Wide-ranging ONline Data for Epidemiologic Research (CDC WONDER), which is a public resource—an application that makes many health-related data sets available to CDC staff, public health departments, researchers, and others. [HTTPS://WONDER.CDC.GOV/WONDER/HELP/ABOUT-CDC-WONDER-508.PDF](https://wonder.cdc.gov/wonder/help/about-cdc-wonder-508.pdf). Accessed on November 20, 2019.

To collect the additional data, CDC officials annually send requests to vital records offices for all 50 states and other applicable jurisdictions to provide the following: death certificates, linked live birth or fetal death certificates, and any other supporting information for 1) deaths with an ICD-10 Chapter O code for the previous year, and 2) all deaths from any cause (including injury or trauma) among women who were pregnant or were within 1 year of pregnancy as identified by matching the death certificate to a birth or fetal death certificate or by a pregnancy checkbox on the death certificate. According to CDC officials and related literature, linking information on death certificates to information on infant birth or fetal death certificates can help confirm that the pregnancy checkbox on the death certificate was completed accurately. In addition to confirming validity of a pregnancy-related death as indicated by the checkbox, linking information on death certificates to infant birth or fetal death certificates can identify pregnancy-related deaths where the checkbox did not indicate a pregnancy but should have (false negatives). CDC officials said that PMSS data are considered the most reliable source of national data on pregnancy-related deaths because (1) PMSS links death certificates with birth or fetal death certificates and additional information when available (e.g., hospital records), and (2) these files are reviewed by medically trained epidemiologists to determine if the cause and time of death are related to the pregnancy.

CDC publishes national data from PMSS on the leading causes of pregnancy-related deaths and pregnancy-related mortality ratios using this system. However, the data are not published annually—such as is generally the case with NVSS data on deaths—and only national level data are made publicly available from PMSS in annual updates on the website and periodically in reports.<sup>16</sup> According to agency officials, states and jurisdictions voluntarily provide the records in response to CDC's request that specifies that PMSS analyses will only be published at the national and regional level, and those records are subject to confidentiality protections.<sup>17</sup> Additionally, according to CDC officials, because of the time involved in collecting documentation from states, the most recent data available from PMSS as of September 2019 were for deaths in 2016.

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<sup>16</sup>As noted earlier, CDC resumed publication of NVSS data on maternal mortality in January 2020.

<sup>17</sup>See 42 U.S.C. § 242m(d).

To improve the timeliness of PMSS data, CDC is taking steps to gain access directly to the records that states have been submitting to the agency. Specifically, CDC entered into a contract, effective August 2019, for a pilot project with the National Association for Public Health Statistics and Information Systems to become an approved user of the State and Territorial Exchange of Vital Events system.<sup>18</sup> According to the National Association for Public Health Statistics and Information Systems, this vital events system provides timely access to state vital records, including records on deaths, to federal and state data partners for use in authorized public health and administrative programs, like those at CDC. According to the contract, over the next 5 years, select CDC staff will receive training on the use of the system and will coordinate phased access to state and jurisdiction vital records.<sup>19</sup> At the conclusion of the contract, authorized CDC staff are expected to have access to electronic vital records data from up to 51 states and jurisdictions. CDC officials said this should allow them to link birth and death certificate information and no longer rely on states and jurisdictions to conduct vital records linkages for PMSS.<sup>20</sup> According to CDC officials, being able to access the vital events system will allow them to confirm and report pregnancy-related deaths with improved timeliness.

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## MMRIA

In 2017, CDC released MMRIA, in which MMRCs— multidisciplinary committees at the state and other jurisdictional level that review pregnancy-related deaths—can collect and review data from various sources (e.g., medical records, social service records, autopsy reports, and vital records) to determine preventability, and identify factors that contributed to these deaths as well as prevention strategies to address

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<sup>18</sup>The National Association for Public Health Statistics and Information Systems is an organization representing 57 state and other jurisdiction vital records offices that developed and operates the vital events system, a private electronic portal through which vital records information is shared among data partners, on behalf of state vital records offices.

<sup>19</sup>According to CDC, National Association for Public Health Statistics and Information Systems activities will occur as funding allows.

<sup>20</sup>Before this agreement, CDC's Division of Reproductive Health requested that states link the certificates and then submit the linked documents to CDC. According to CDC officials, some jurisdictions are timelier in providing information than others.

these factors.<sup>21</sup> As of June 2019, CDC officials said that 25 states and one other jurisdiction were using this system.

While MMRCs provide the information collected in MMRIA, federally published reports only include aggregate information from select states collected through the application. For example, in May 2019, CDC published a study using information from 13 states.<sup>22</sup> In the study, state MMRCs identified an average of three to four contributing factors per pregnancy-related death based on information collected through MMRIA, such as:

- community factors (e.g., unstable housing and limited access to transportation);
- health facility factors (e.g., limited experience with obstetric emergencies and lack of appropriate personnel or services);
- patient factors (e.g., lack of knowledge of warning signs and nonadherence to medical regimens);
- provider factors (e.g., missed or delayed diagnosis); and
- system-level factors (e.g., inadequate access to care and poor case coordination).

Similar to PMSS data, the most current aggregated data that CDC publishes from the MMRIA can be for deaths that occurred 2 or more years prior to the date of the report. As noted in the May 2019 article, the most recent information from states contributing to the article varied with some state data on these deaths being as recent as 2017 while the most recent data from other states was from 2014. According to CDC officials, in August 2019, CDC awarded 24 cooperative agreements covering 25 states, and under these agreements, the committees will use the system to record review results within 2 years of a death.

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## Data Show an Overall Increase in the Pregnancy-Related Mortality Ratio, with

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<sup>21</sup>The Maternal Mortality Review Data System was the precursor to MMRIA. Published reports on the results of MMRC reviews have included data from both systems.

<sup>22</sup>E.E. Petersen, N.L. Davis, D. Goodman, et al. "Vital Signs: Pregnancy-Related Deaths, United States, 2011–2015, and Strategies for Prevention, 13 States, 2013–2017." *Morbidity and Mortality Weekly Report (MMWR)*, vol.68, no 18 (2019) 423–429.

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## Specific Causes Varying by Race/Ethnicity, Age, and Other Factors

Our analysis of CDC's PMSS data shows that from 2007 through 2016, over 6,700 women died of causes related to or aggravated by their pregnancy—either while pregnant or within 1 year of the end of pregnancy.<sup>23</sup> Our analysis also shows that while there was an overall increase in the pregnancy-related mortality ratio during this time frame, the annual mortality ratio in the United States fluctuated.<sup>24</sup> As previously noted, CDC data also show that racial and age disparities exist in the rates of pregnancy-related deaths. For example, from 2007 through 2016, non-Hispanic black women were more than three times as likely to die than non-Hispanic white women, while non-Hispanic American Indian/Alaska Native women were more than two times as likely to die than non-Hispanic white women. Similarly, rates of pregnancy-related deaths for women 35 years old and older are higher than the rates for women under 30 years old. During this time period, the specific causes of death varied by race/ethnicity and age. Further, CDC data show that most of the deaths occurred within 42 days of delivery or the end of pregnancy.

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## Cardiovascular Conditions, Infection, and Hemorrhage Were the Leading Causes of Pregnancy-Related Deaths, though Causes Differed Among Racial/Ethnic and Age Groups

CDC's PMSS data show that among all pregnancy-related deaths, the cause of death varied. In general, what CDC classifies as "other cardiovascular conditions" was the most common cause of pregnancy-related deaths, followed by infection, hemorrhage, and cardiomyopathy.<sup>25</sup> (See fig. 4.) These four leading causes comprised about 50 percent of all

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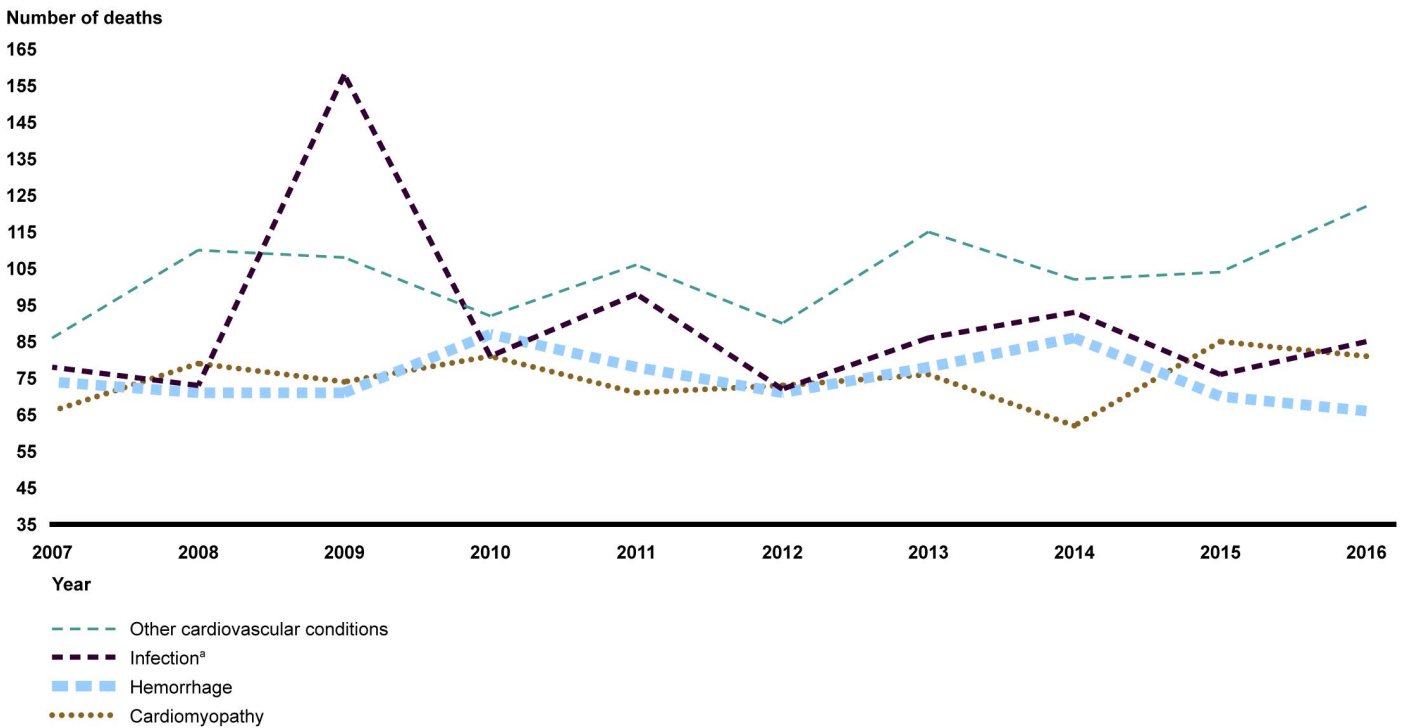
<sup>23</sup>We based this information on PMSS data, which we found to be sufficiently reliable for reporting pregnancy-related death information at the national level.

<sup>24</sup>The pregnancy-related mortality ratio is the number of pregnancy-related deaths per 100,000 live births.

<sup>25</sup>"Other cardiovascular conditions" includes conditions that are not reported separately as cardiomyopathy—when the normal muscle in the heart thicken, stiffen, thin out, or fill with substances the body produces that do not belong in the heart muscle, or cerebrovascular accidents—also known as stroke. PMSS categorizes causes of pregnancy-related deaths into 11 categories. See Appendix I for more information about these categories.

pregnancy-related deaths from 2007 through 2016. See appendix I for more information on leading causes of pregnancy-related deaths.

**Figure 4: Leading Causes of Pregnancy-Related Deaths, 2007-2016**



Source: GAO analysis of Centers for Disease Control and Prevention Pregnancy Mortality Surveillance System data. | GAO-20-248

**Data Table for Figure 4: Leading Causes of Pregnancy-Related Deaths, 2007-2016**

Year	Other cardiovascular conditions	Infections <sup>a</sup>	Hemorrhage	Cardiomyopathy
2007	86	78	74	66
2008	110	73	71	79
2009	108	158	71	74
2010	92	81	87	81
2011	106	98	78	71
2012	90	72	71	73
2013	115	86	78	76
2014	102	93	86	62
2015	104	76	70	85
2016	122	85	66	81

Notes: “Other cardiovascular conditions” includes conditions that are not reported separately as cardiomyopathy—when the normal muscle in the heart thicken, stiffen, thin out, or fill with substances

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the body produces that do not belong in the heart muscle, or cerebrovascular accidents—also known as stroke.

In multiple CDC publications of Pregnancy Mortality Surveillance System data, “other non-cardiovascular medical conditions” is a leading cause of pregnancy-related deaths. GAO did not include this category in the figure because the category is composed of more than 10 diverse conditions, including cancer, autoimmune disease, and gastrointestinal disorders, among others, that each represent less than 3 percent of all pregnancy-related deaths for the 10-year time frame. See appendix I for more information on this category.

Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

<sup>a</sup>According to CDC officials, there was a spike in pregnancy-related deaths due to infection in 2009 due to the H1N1 influenza epidemic.

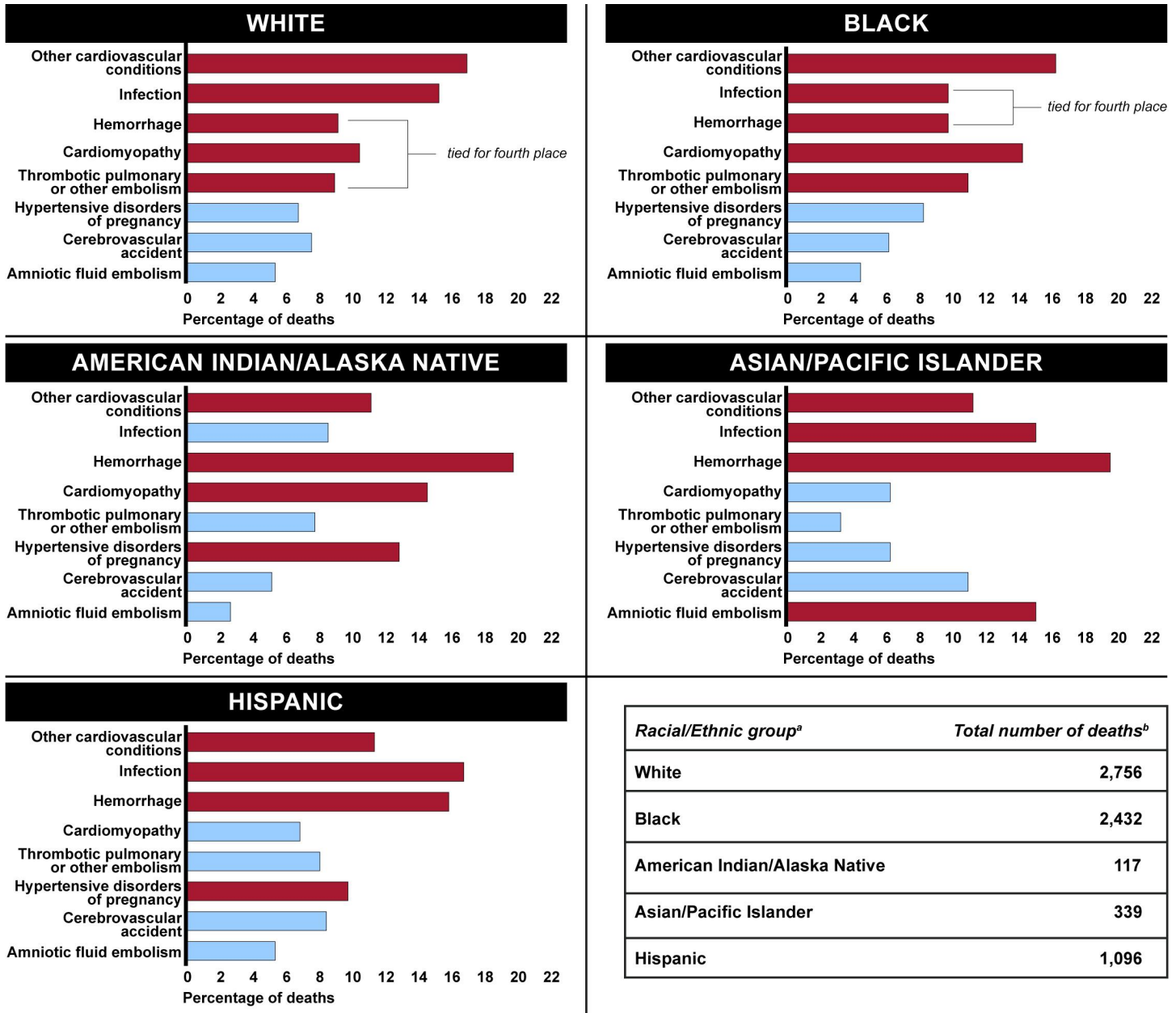
CDC data shows that the leading causes of pregnancy-related deaths differed by racial/ethnic groups. Specifically, for non-Hispanic white and black women, the leading cause was other cardiovascular conditions from 2007 through 2016; for non-Hispanic American Indian/Alaska Native and Asian/Pacific Islander women, it was hemorrhage; for Hispanic women, it was infection, as indicated by figure 5. CDC has reported that multiple factors contribute to pregnancy-related mortality and to racial/ethnic disparities, including community, health facility, patient/family, provider, and system factors.<sup>26</sup>

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<sup>26</sup>E. E. Petersen, N. L. Davis, D. Goodman, et al. “Racial/Ethnic Disparities in Pregnancy-Related Deaths—United States, 2007–2016.” *Morbidity and Mortality Weekly Report*, vol. 68, no. 35 (2019).



**Figure 5: Leading Causes of Pregnancy-Related Deaths by Racial/Ethnic Group, 2007-2016**



■ One of the four leading causes of death by racial/ethnic group    
 ■ Other causes of death by racial/ethnic group

Source: GAO analysis of Centers for Disease Control and Prevention Pregnancy Mortality Surveillance System data. | GAO-20-248

**Data Table for Figure 5: Leading Causes of Pregnancy-Related Deaths by Racial/Ethnic Group, 2007-2016**

Racial/ethnic group <sup>a</sup> (Total number of deaths <sup>b</sup> )	Other cardiovascular conditions	Infections	Hemorrhage	Cardiomyopathy	Thrombotic pulmonary or other embolism	Hypertensive disorders of pregnancy	Cerebrovascular accident	Amniotic fluid embolism
White (2,756)	16.9	15.2	9.1	10.4	8.9	6.7	7.5	5.3
Black (2,432)	16.2	9.7	9.7	14.2	10.9	8.2	6.1	4.4
American Indian/Alaska Native (117)	11.1	8.5	19.7	14.5	7.7	12.8	5.1	2.6
Asian/Pacific Islander (339)	11.2	15	19.5	6.2	3.2	6.2	10.9	15
Hispanic (1,096)	11.3	16.7	15.8	6.8	8	9.7	8.4	5.3

Notes: “Other cardiovascular conditions” includes conditions that are not reported separately as cardiomyopathy—when the normal muscle in the heart thicken, stiffen, thin out, or fill with substances the body produces that do not belong in the heart muscle, or cerebrovascular accidents—also known as stroke.

In multiple CDC publications of Pregnancy Mortality Surveillance System data, “other non-cardiovascular medical conditions” is a leading cause of pregnancy-related deaths. GAO did not include this category in the figure because the category is composed of more than 10 diverse conditions, including cancer, autoimmune disease, and gastrointestinal disorders, among others, that each represent less than 3 percent of all pregnancy-related deaths for the 10-year time frame. See appendix I for more information on this category.

Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

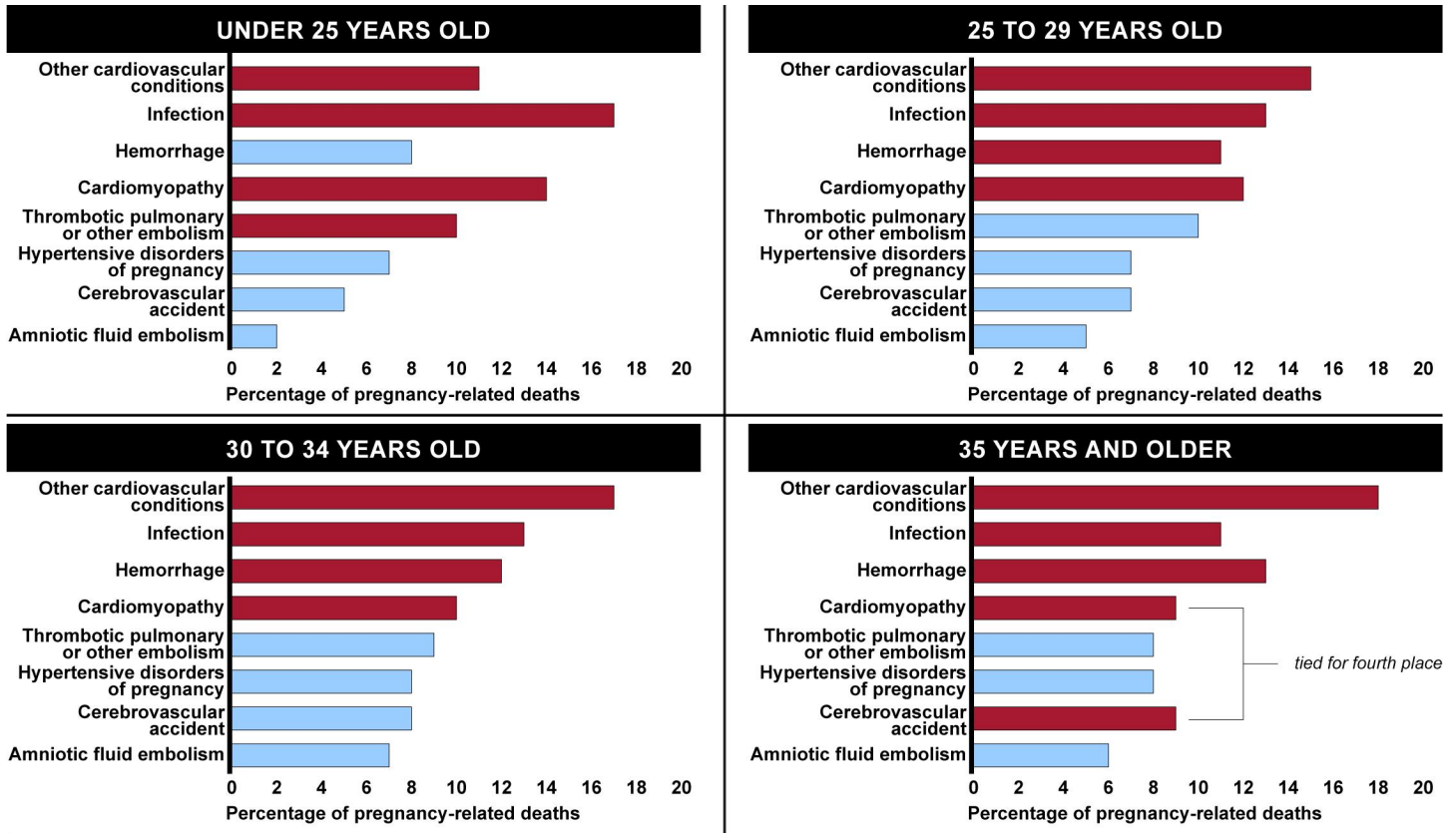
<sup>a</sup>White, black, American Indian/Alaska Native and Asian/Pacific Islander women were non-Hispanic. Hispanic women might be of any race.

<sup>b</sup>From 2007 through 2016, there were 25 pregnancy-related deaths where race/ethnicity was unknown that were not included in our analyses.

Leading causes of pregnancy-related deaths also differed by the age of the woman, as indicated by figure 6. Specifically, the leading cause for women under 25 was infection, while for all other women the leading cause was other cardiovascular conditions. In a 2017 article, the authors noted that maternal morbidity and mortality rates increase with advanced maternal age, due in part to increased prevalence of chronic conditions (e.g., hypertension, diabetes, and chronic heart disease.).<sup>27</sup> This may help explain the variation in the rate of pregnancy-related deaths among women of different ages.

<sup>27</sup>N. L. Davis, D. L. Hoyert, D. A. Goodman, et al. “Contribution of maternal age and pregnancy checkbox on maternal mortality ratios in the United States, 1978-2012”, *American Journal of Obstetrics & Gynecology*, (2017) 352.e1-7

**Figure 6: Leading Causes of Pregnancy-Related Deaths by Age Group, 2007-2016**



Age group	Total number of deaths <sup>a</sup>
Under 25 years old	1,501
25-29 years old	1,531
30-34 years old	1,602
35 years and older	2,129

■ One of the four leading causes of death by age group    
 ■ Other causes of death by age group

Source: GAO analysis of Centers for Disease Control and Prevention Pregnancy Mortality Surveillance System data. | GAO-20-248

**Data Table for Figure 6: Leading Causes of Pregnancy-Related Deaths by Age Group, 2007-2016**

Age Group (total deaths)	Other cardiovascular conditions	Infections	Hemorrhage	Cardiomyopathy	Thrombotic pulmonary or other embolism	Hypertensive disorders of pregnancy	Cerebrovascular accident	Amniotic fluid embolism
Under 25 years old (1,501)	11	17	8	14	10	7	5	2
25 to 29 years old (1,531)	15	13	11	12	10	7	7	5
30 to 34 years old (1,602)	17	13	12	10	9	8	8	7
35 years and older (2,129)	18	11	13	9	8	8	9	6

Notes: “Other cardiovascular conditions” includes conditions that are not reported separately as cardiomyopathy—when the normal muscle in the heart thicken, stiffen, thin out, or fill with substances the body produces that do not belong in the heart muscle, or cerebrovascular accidents—also known as stroke..

In multiple CDC publications of Pregnancy Mortality Surveillance System data, “other non-cardiovascular medical conditions” is a leading cause of pregnancy-related deaths. GAO did not include this category in the figure because the category is composed of more than 10 diverse conditions, including cancer, autoimmune disease, and gastrointestinal disorders, among others, that each represent less than 3 percent of all pregnancy-related deaths for the 10-year time frame. See appendix I for more information on this category.

Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

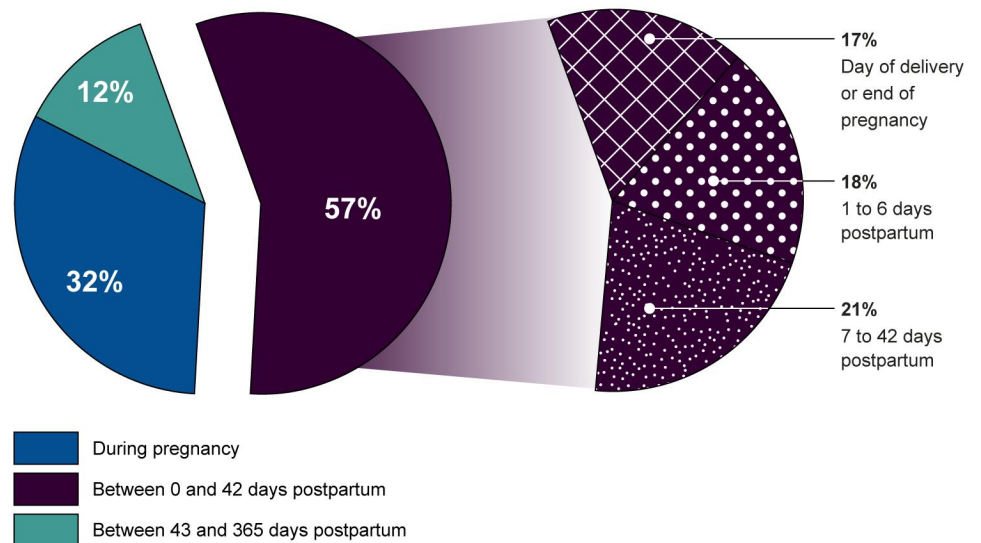
\*From 2007 through 2016, there were two pregnancy-related deaths where age was unknown that were not included in our analyses.

### Most Pregnancy-Related Deaths Occurred within 42 Days of the End of Pregnancy, while Specific Causes of Death Varied Depending on When the Death Occurred

Our analysis of CDC’s PMSS data shows that from 2011 through 2016, most pregnancy-related deaths occurred between 0 and 42 days postpartum—meaning that they occurred either on the day of delivery or end of pregnancy up to 42 days after pregnancy. (See fig. 7.) According

to CDC officials, understanding the timing of pregnancy-related deaths is important for prioritizing intervention strategies. The officials noted that deaths resulting from cardiomyopathy can occur months after pregnancy but can also be prevented with appropriate interventions. In particular, the American College of Obstetricians and Gynecologists published guidance for managing pregnancy and heart disease that noted that complications are frequently encountered in the days, weeks, and months after delivery in women with known cardiovascular disease and in those with latent cardiovascular disease. Women with multiple risk factors for cardiovascular disease may be particularly at risk of manifesting symptoms for the first time during their postpartum course.<sup>28</sup>

**Figure 7: Pregnancy-Related Deaths by Timing of Death Relative to Pregnancy, 2011-2016**



Source: GAO analysis of Centers for Disease Control and Prevention Pregnancy Mortality Surveillance System data. | GAO-20-248

<sup>28</sup>American College of Obstetricians and Gynecologists. "ACOG Practice Bulletin No. 212: Pregnancy and Heart Disease." *Obstetrics & Gynecology*, vol. 133, no. 5 (2019), e320-356.

**Data Table for Figure 7: Pregnancy-Related Deaths by Timing of Death Relative to Pregnancy, 2011-2016**

	Percentage
During pregnancy	32
Between 0 and 42 days postpartum	57
Between 43 and 365 days postpartum	12

**Percentage breakdown of 57**

	Percentage
Day of delivery or end of pregnancy	17
1 to 6 days postpartum	18
7 to 42 days postpartum	21

Notes: Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

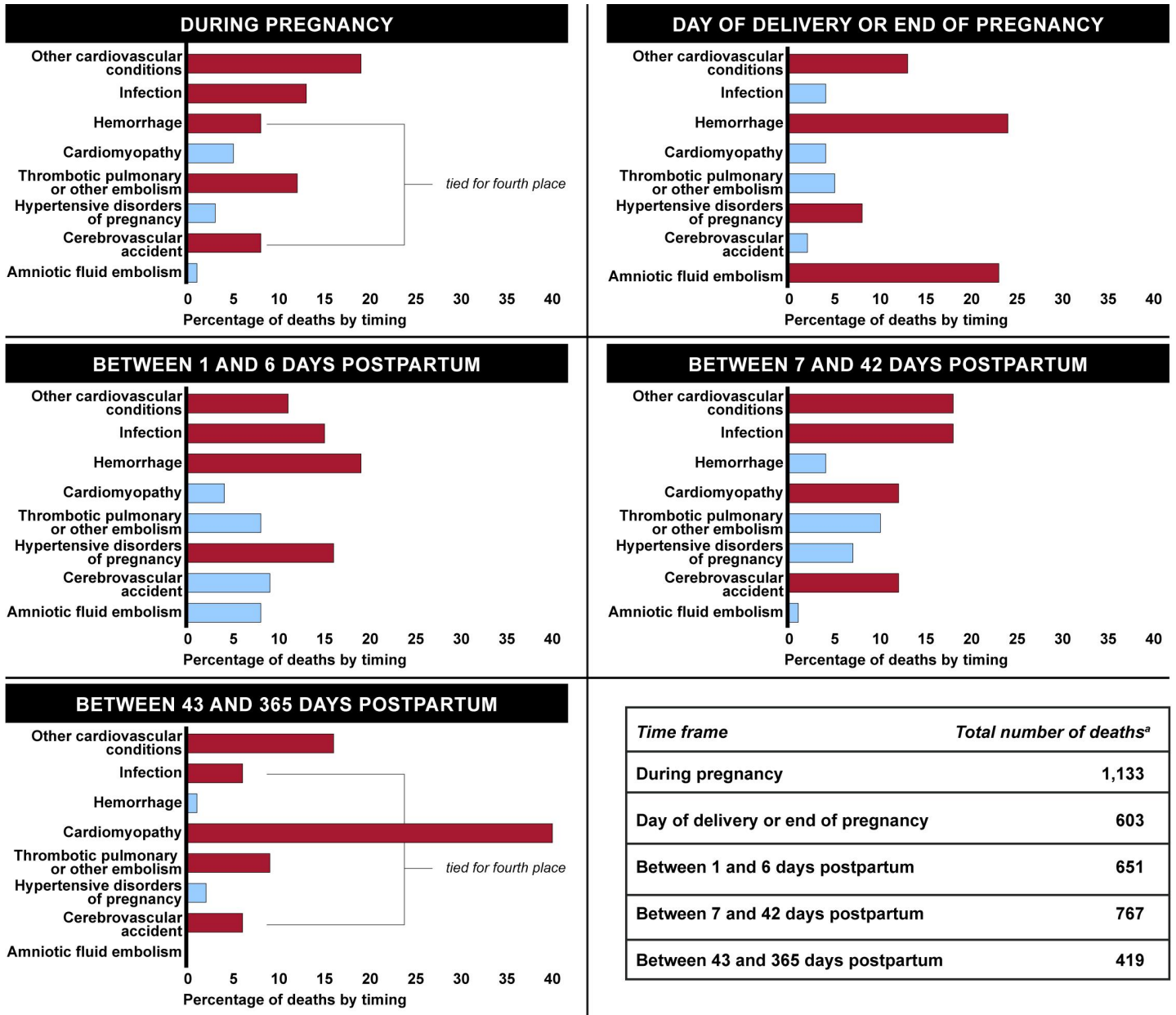
Percentages in this graphic do not total 100 due to rounding.

According to CDC officials, data on the timing of death relative to pregnancy are only available for 2011-2016, and the specific timing of death is known for almost 88 percent (or 3,573) of the pregnancy-related deaths from this time.

CDC’s data show that the leading causes of pregnancy-related death varied depending on when the death occurred. For example, over the period 2011-2016, hemorrhage and amniotic fluid embolism were leading causes of pregnancy-related deaths on the day of delivery or the end of pregnancy, while cardiomyopathy was the leading cause of pregnancy-related deaths between 43 and 365 days postpartum. (See fig. 8.) A recent article on pregnancy-related deaths stated that multiple factors contribute to pregnancy-related deaths during pregnancy, labor and delivery, and the postpartum period. Further, the article notes that no single intervention strategy is sufficient, and reducing these deaths requires reviewing and learning from each death, improving women’s health, and reducing social inequities across the life span, as well as ensuring quality care for pregnant and postpartum women, according to the article.<sup>29</sup> See appendix II for supplemental data on pregnancy-related deaths.

<sup>29</sup>E. E. Petersen, N. L. Davis, D. Goodman, et al. “Vital Signs: Pregnancy-Related Deaths, United States, 2011–2015, and Strategies for Prevention, 13 States, 2013–2017.” *Morbidity and Mortality Weekly Report (MMWR)*, vol. 68, no. 18 (2019):423–429.

**Figure 8: Leading Causes of Pregnancy-Related Deaths by Timing of Death Relative to Pregnancy, 2011-2016**



Source: GAO analysis of Centers for Disease Control and Prevention Pregnancy Mortality Surveillance System data. | GAO-20-248

**Data Table for Figure 8: Leading Causes of Pregnancy-Related Deaths by Timing of Death Relative to Pregnancy, 2011-2016**

Time frame (Total number of deaths <sup>a</sup> )	Other cardiovascular conditions	Infections	Hemorrhage	Cardiomyopathy	Thrombotic pulmonary or other embolism	Hypertensive disorders of pregnancy	Cerebrovascular accident	Amniotic fluid embolism
During pregnancy (1,133)	19	13	8	5	12	3	8	1
Day of delivery or end of pregnancy (603)	13	4	24	4	5	8	2	23
Between 1 and 6 days postpartum (651)	11	15	19	4	8	16	9	8
Between 7 and 42 days postpartum (767)	18	18	4	12	10	7	12	1
Between 43 and 365 days postpartum (419)	16	6	1	40	9	2	6	0

Notes: “Other cardiovascular conditions” includes conditions that are not reported separately as cardiomyopathy—when the normal muscles in the heart thicken, stiffen, thin out, or fill with substances the body produces that do not belong in the heart muscle, or cerebrovascular accidents—also known as stroke.

In multiple CDC publications of Pregnancy Mortality Surveillance System data, “other non-cardiovascular medical conditions” is a leading cause of pregnancy-related deaths. GAO did not include this category in the figure because the category is composed of more than 10 diverse conditions, including cancer, autoimmune disease, and gastrointestinal disorders, among others, that each represent less than 3 percent of all pregnancy-related deaths for the 10-year time frame. See appendix I for more information on this category.

Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

<sup>a</sup>According to CDC officials, data on the timing of death relative to pregnancy are only available for 2011-2016, and the specific timing of death is known for almost 88 percent (or 3,573) of the pregnancy-related deaths from this time.



## HHS Funds Multiple Ongoing Efforts Focused on Reducing Pregnancy-Related Deaths

### State Participation in the Alliance for Innovation on Maternal Health (AIM) Initiative

According to the American College of Obstetrics and Gynecology, as of June 2019, 26 states were enrolled in the AIM initiative. The AIM initiative, funded by the Health Resources and Services Administration, engages provider organizations, state-based public health systems, consumer groups and others in a national partnership to assist state-based teams in implementing evidence-based maternal safety bundles.

Ten of the 26 states joined in the last year and are beginning to implement maternal safety bundles and collect data. Five of these bundles are being implemented by one or more states. Bundle topics: Maternal Venous Thromboembolism, Postpartum Care Basics for Maternal Safety: From Birth to Comprehensive Postpartum Visit, Obstetric Care for Women with Opioid Use Disorder, Obstetric Hemorrhage, Reduction of Peripartum Racial/Ethnic Disparities, Safe Reduction of Primary Cesarean Birth, Severe Hypertension in Pregnancy, and Postpartum Care Basics for Maternal Safety: Transition from Maternity to Well Woman Care.

Source: American College of Obstetricians and Gynecologists. | GAO-20-248

HHS has 13 ongoing funding efforts aimed at reducing pregnancy-related deaths, one of which is exclusively focused on reducing pregnancy-related deaths, while the others have additional focus areas, such as improving infant health.<sup>30</sup> (See appendix III for details on each of the 13 efforts and appendix IV for additional details on HRSA- and NIH-funded research.) Below are summaries of two of the key funding efforts, one of which is exclusively focused on reducing maternal mortality and the other involves annual awards to 59 states and jurisdictions:

- Preventing Maternal Deaths: Supporting Maternal Mortality Review Committees Cooperative Agreements.** Under these cooperative agreements, CDC is providing funding to state agencies and organizations that coordinate and manage MMRCs.<sup>31</sup> As previously mentioned, MMRCs systematically and comprehensively review pregnancy-related deaths in order to identify prevention opportunities.<sup>32</sup> Funding recipients will identify and review deaths within 1 year of death and enter clinical and non-clinical data and committee decisions in MMRIA—a standardized data system managed by CDC—within 2 years of death. As part of the agreement, recipients—in coordination with CDC—analyze data and share findings with stakeholders, such as clinicians, to inform policy and prevention strategies to reduce pregnancy-related deaths, such as screening procedures. According to CDC officials, in August 2019, CDC awarded these 5-year cooperative agreements to 24 recipients

<sup>30</sup>Two of these efforts are not discrete funding opportunities, but rather a variety of research funding opportunities offered by HRSA and NIH.

<sup>31</sup>Previously, in December 2015, CDC, the CDC Foundation, and the Association of Maternal and Child Health Programs partnered to launch the Building U.S. Capacity to Review and Prevent Maternal Deaths initiative to address barriers that MMRCs face in achieving full functionality and sustainability. Merck, on behalf of its Merck for Mothers Program, funded the initiative through an agreement with CDC Foundation. In FY 2019, Congress provided CDC funding for CDC's work with MMRCs.

<sup>32</sup>MMRCs are multidisciplinary committees at the state and jurisdiction-level, including doctors, nurses, social workers, researchers, and others, that systematically and comprehensively review clinical and non-clinical information about pregnancy-related deaths to develop recommended strategies for preventing future deaths.

covering 25 states.<sup>33</sup> Recipients received different amounts ranging from \$150,000 to over \$550,000 in the first year to support their MMRC. CDC anticipates awarding a similar level of funding for the 5-year period of performance.

- **Maternal and Child Health (MCH) Services Block Grant Program.** HRSA provides funding through this program to 59 states and jurisdictions to improve maternal and child health.<sup>34</sup> According to agency officials, many recipients reported using their MCH Services Block Grant funding to help support or complement other federal initiatives, such as an MMRC, a Perinatal Quality Collaborative (PQC), and Alliance for Innovation on Maternal Health (AIM) maternal safety bundles.<sup>35</sup> For example, according to HRSA officials, in fiscal year 2018, 38 recipients self-reported that the block grant partially or fully funded their MMRCs, and additional states and jurisdictions reported using block grant support for planning activities to begin development of their MMRC. Further, states and jurisdictions cited PQCs, networks of multidisciplinary teams that work to improve measurable outcomes for maternal and infant health, in their block grant narrative.<sup>36</sup> Additionally, implementation of a HRSA-supported AIM maternal safety bundle, sets of actionable, evidence-based practices for improving maternal outcomes was cited.<sup>37</sup> (Appendix III includes more information on funding for PQCs and AIM maternal safety bundles.) Our review of HRSA documentation shows that in

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<sup>33</sup>According to CDC, the recipients include Alaska, Arizona, California, Colorado, Connecticut, Delaware, Illinois, Indiana, Kansas, Louisiana, Mississippi, Missouri, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Utah, Washington, and Wisconsin. Additionally, Utah's award includes a subcontract to support review of deaths in Wyoming.

<sup>34</sup>HRSA, an agency within HHS, is the primary agency for improving health care for those who are geographically isolated, and/or economically or medically vulnerable, such as pregnant women and mothers.

<sup>35</sup>CDC also provides funds for MMRCs and PQCs through cooperative agreements, and HRSA also provides funds for AIM maternal safety bundles through cooperative agreements.

<sup>36</sup>State PQCs are networks of multidisciplinary teams that work to improve measurable outcomes for maternal and infant health by advancing evidence-informed clinical practices using quality improvement principles. PQCs work with clinical teams, experts, and stakeholders, including patients and families, to disseminate best practices and optimize resources to improve perinatal care and outcomes.

<sup>37</sup>AIM maternal safety bundles are sets of evidence-based practices that when implemented collectively and reliably in the delivery setting may improve patient outcomes and may reduce maternal mortality and severe maternal morbidity.

fiscal year 2017, total federal expenditures for the block grant program were about \$540 million for women and children covered by the program, and expenditures for services for pregnant women from all sources—federal funds, as well as state, local, program income, and other funds—was about \$300 million.<sup>38</sup>

**Indian Health Service (IHS) Implementation of Alliance for Innovation on Maternal Health (AIM) Maternal Safety Bundles**

In 2017, IHS's leadership released a request that IHS federal hospitals that provide inpatient obstetric care implement at least one maternal safety bundle—sets of evidence-based practices that when implemented collectively and reliably in the delivery setting may improve patient outcomes and reduce maternal mortality and severe maternal morbidity. According to IHS, since 2014, IHS has had phased implementation of the bundles in federal hospitals that provide inpatient obstetric care.

Officials said that for many facilities, Obstetric Hemorrhage was the first bundle implemented. Others have also been implemented, such as the Severe Hypertension in Pregnancy bundle, and the Obstetric Care for Women with Opioid Use Disorder bundle.

Source: Indian Health Service. | GAO-20-248

According to officials we interviewed in five selected states, they use these two efforts—MMRC findings and MCH block grant funding—and other efforts collectively to address pregnancy-related deaths. For example, according to Georgia officials, Georgia's PQC received funding from CDC and implemented the AIM obstetric hemorrhage maternal safety bundle in 2018 based on the state's MMRC finding that hemorrhage was a leading cause of pregnancy-related deaths in Georgia. According to officials, Georgia's MMRC was funded primarily through the MCH Services Block Grant. Similarly, according to Maryland officials, Maryland's PQC oversees implementation of the state's AIM initiative. Officials we interviewed from three of the five selected states said that the AIM initiative had an immediate or the largest effect on addressing maternal mortality in their state. Officials from the other two states said they could not identify which efforts had the largest or most immediate effect on addressing maternal mortality. Officials from one state noted the importance of their collaborative approach and the other noted that there is no one contributing factor for maternal mortality. See appendix V for more information about how the selected states we interviewed are using these funding efforts.

All five states also mentioned beginning or continuing to address racial/ethnic or other health disparities with block grant funding, through their MMRCs, or other efforts. For example, officials in one state said they use block grant funding to support its Black Infant Health Program, which helps address maternal morbidity and mortality of black mothers in the late maternal period. Additionally, two of the HHS funding efforts awarded in fiscal year 2019 have outcomes related to decreasing racial and ethnic disparities in maternal mortality: the Alliance for Innovation on Maternal

<sup>38</sup>These block grants may be used by states "to provide and to assure mothers and children (in particular those with low income or with limited availability of health services) access to quality maternal and child health services," among other things. 42 U.S.C. §701(a)(1)(A). States determine the actual services provided under the block grant. For example, a state may provide medical services in sectors where public and private health insurers offer limited coverage options, such as coverage for dental and durable medical equipment (e.g., wheelchairs and oxygen equipment).

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Health Community Care Initiative and the State Maternal Health Innovation Program.

In addition to those efforts that are exclusive to maternal mortality or have a focus on maternal mortality, HHS agencies have other funding efforts that may reduce maternal mortality by improving maternal health. For example, agency officials also identified the following:

- HRSA's Maternal, Infant, and Early Childhood Home Visiting Program supports voluntary, evidence-based home visiting services for at-risk pregnant women and parents with children up to kindergarten entry. Our review of agency documentation shows that in fiscal year 2019, HRSA awarded about \$351 million in funding to 56 states, territories, and nonprofit organizations to support communities in providing voluntary evidence-based home visiting services through the Maternal, Infant, and Early Childhood Home Visiting Program.
- The Substance Abuse and Mental Health Services Administration, which is responsible for leading public health efforts to advance the behavioral health of the nation and reducing the impact of substance abuse and mental illness on America's communities. The agency funds two programs that provide grants to public and private nonprofit entities and state substance abuse agencies for substance use disorder treatment and recovery services for pregnant and postpartum women. Our review of agency documentation and interviews with agency officials shows that from fiscal year 2017 through 2019, the Substance Abuse and Mental Health Services Administration awarded 41 Services Grant Program for Residential Treatment for Pregnant and Postpartum Women and six State Pilot Grant Program for Treatment for Pregnant and Postpartum Women grants.
- The Centers for Medicare & Medicaid Services, which administers the Medicare and Medicaid programs, developed the Maternal Opioid Misuse Model. Through this model, state Medicaid agencies will coordinate with care-delivery partners to test whether payments for evidence-based, coordinated care delivery improve outcomes and reduce costs for pregnant and postpartum Medicaid beneficiaries with opioid use disorder and their infants. According to agency officials, funding for cooperative agreements with 10 state Medicaid agencies began in January 2020.

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## Agency Comments

We provided a draft of this report to HHS. HHS provided technical comments, which we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the Secretary of HHS, and appropriate congressional committees. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have questions about this report, please contact me at (202) 512-7114 or [deniganmacauleym@gao.gov](mailto:deniganmacauleym@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VI.



Mary Denigan-Macauley  
Director, Health Care

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List of Requesters

The Honorable Patty Murray  
Ranking Member  
Committee on Health, Education, Labor, and Pensions  
United States Senate

The Honorable Tammy Baldwin  
United States Senate

The Honorable Cory A. Booker  
United States Senate

The Honorable Benjamin L. Cardin  
United States Senate

The Honorable Thomas R. Carper  
United States Senate

The Honorable Richard J. Durbin  
United States Senate

The Honorable Kirsten Gillibrand  
United States Senate

The Honorable Kamala D. Harris  
United States Senate

The Honorable Debbie Stabenow  
United States Senate

The Honorable Elizabeth Warren  
United States Senate

The Honorable Ron Wyden  
United States Senate

# Appendix I: Pregnancy Mortality Surveillance System Cause of Death Categories

In 1986, the Centers for Disease Control and Prevention (CDC) initiated national surveillance of pregnancy-related deaths in the Pregnancy Mortality Surveillance System (PMSS) because more clinical information was needed to fill data gaps about causes of these deaths. A pregnancy-related death, as defined in statute, is 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>1</sup>

As of September 2019, CDC used 11 categories when coding the cause of death for pregnancy-related deaths in PMSS, and 2016 data were the most recent data available. From 2007 through 2016, there were 6,765 pregnancy-related deaths, according to PMSS data. See table below for information on the 11 cause of pregnancy-related death categories, including PMSS data on leading causes, most common time frame, and most common age group affected.

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<sup>1</sup>42 U.S.C. § 247b-12(e)(3).

**Appendix I: Pregnancy Mortality Surveillance  
System Cause of Death Categories**

**Table 1: Cause of Pregnancy-Related Deaths Category Information and Related Statistics, 2007 through 2016**

<b>Cause of Death</b>	<b>Breakdown</b>	<b>Information</b>
Other cardiovascular conditions (accounts for about 15 percent of deaths)	Examples of associated conditions:	Other cardiovascular conditions include coronary artery disease (plaque buildup in the walls of the arteries that supply blood to the heart and other parts of the body), pulmonary hypertension (high blood pressure in the blood vessels that carry blood to the lungs), and valvular heart disease (damage to or a defect in one of the four heart valves), among others
	Leading cause of death for:	Non-Hispanic black women (about 16 percent of deaths for this racial group) and non-Hispanic white women (about 17 percent of deaths for this racial group)
	Most common time frame: <sup>a</sup>	During pregnancy (about 38 percent of these deaths from other cardiovascular conditions)
	Most common age group affected:	Women 35 years and older (about 37 percent of deaths from other cardiovascular conditions)
Infection (accounts for about 13 percent of deaths)	Examples of associated conditions:	Infection includes conditions, such as sepsis (when the body has an extreme response to an infection that can rapidly lead to tissue damage, organ failure, and death), urinary tract infections (an infection in any part of your urinary system—kidneys, ureters, bladder and urethra), and others, such as influenza.
	Leading cause of death for:	Hispanic women (about 17 percent of deaths for this racial group)
	Most common time frame: <sup>a</sup>	During pregnancy (about 33 percent of deaths from infection) or between 7 and 42 days postpartum (about 33 percent of deaths from infection)
	Most common age group affected:	Women under 25 years old (about 29 percent of deaths from infection)
Cardiomyopathy (accounts for about 11 percent of deaths)	Examples of associated conditions:	Cardiomyopathy occurs when the normal muscle in the heart thicken, stiffen, thin out, or fill with substances the body produces that do not belong in the heart muscle.
	Leading cause of death for:	No racial/ethnic groups
	Most common time frame: <sup>a</sup>	Between 43 and 365 days postpartum (about 45 percent of deaths from cardiomyopathy)
	Most common age group affected:	Women under 25 years old (about 29 percent of deaths from cardiomyopathy)
Hemorrhage (accounts for about 11 percent of deaths)	Examples of associated conditions:	Hemorrhage includes placental abruption (when the placenta partially or completely separates from the inner wall of the uterus before delivery), ruptured ectopic pregnancy (when a fertilized egg implants outside of the uterus, such as in a fallopian tube, and ruptures as it grows), and hemorrhage due to retained placenta (generally when the placenta is not expelled within 30 minutes of delivery of the infant).
	Leading cause of death for:	Non-Hispanic American Indian/Alaska Native women (about 20 percent of deaths for this racial group) and non-Hispanic Asian/Pacific Islander women (about 20 percent of deaths for this racial group)
	Most common time frame: <sup>a</sup>	Day of delivery or the end of pregnancy (about 38 percent of deaths from hemorrhage)
	Most common age group affected:	Women 35 years and older (about 36 percent of deaths from hemorrhage)



**Appendix I: Pregnancy Mortality Surveillance  
System Cause of Death Categories**

<b>Cause of Death</b>	<b>Breakdown</b>	<b>Information</b>
Thrombotic pulmonary or other embolism (accounts for about 9 percent of deaths)	Examples of associated conditions:	Thrombotic, pulmonary, or other embolisms include deep vein thrombosis (when a blood clot forms in a deep vein, usually in the lower leg, thigh, or pelvis), and pulmonary embolism (when a clot breaks loose and travels through the bloodstream to the lungs).
	Leading cause of death for:	No racial/ethnic groups
	Most common time frame: <sup>a</sup>	During pregnancy (about 40 percent of deaths from a thrombotic embolism)
	Most common age group affected:	Women 35 years and older (about 28 percent of deaths from a thrombotic embolism)
Hypertensive disorders of pregnancy (accounts for about 8 percent of deaths)	Examples of associated conditions:	Hypertensive disorders of pregnancy include conditions, such as preeclampsia (high blood pressure during pregnancy or postpartum and other organ damage (e.g., liver or kidney damage) and eclampsia (the new onset of seizures or coma in a pregnant woman with preeclampsia).
	Leading cause of death for:	No racial/ethnic groups
	Most common time frame: <sup>a</sup>	Between 1 and 6 days postpartum (about 42 percent of deaths from hypertensive disorders of pregnancy)
	Most common age group affected:	Women 35 years and older (about 33 percent of deaths from hypertensive disorders of pregnancy)
Cerebrovascular accidents (accounts about 7 percent of deaths)	Examples of associated conditions:	Cerebrovascular accidents, also known as stroke, include ischemic stroke when an artery that supplies blood to the brain is blocked and part of the brain goes without blood for too long or hemorrhagic stroke when an artery in the brain leaks blood or ruptures. An aneurysm is an example of condition that can cause a hemorrhagic stroke.
	Leading cause of death for:	No racial/ethnic groups
	Most common time frame: <sup>a</sup>	Between 7 and 42 days postpartum (about 33 percent of deaths from cerebrovascular accidents)
	Most common age group affected:	Women 35 and older (about 37 percent of deaths from cerebrovascular accidents)
Unknown (accounts for about 6 percent of deaths)	Examples of associated conditions:	Officials told us that unknown includes deaths where pregnancy complications, obstetric complications, among others were listed as the cause of death on the death certificate.
	Leading cause of death for:	No racial/ethnic groups
	Most common time frame: <sup>a</sup>	During pregnancy (about 41 percent of deaths from an unknown cause)
	Most common age group affected:	Women 35 and older (about 34 percent of deaths from an unknown cause)
Amniotic fluid embolism (accounts for about 5 percent of deaths)	Examples of associated conditions:	Amniotic fluid embolism occurs when amniotic fluid enters into the maternal circulation.
	Leading cause of death for:	No racial/ethnic groups
	Most common time frame: <sup>a</sup>	Day of delivery or end of pregnancy (about 64 percent of deaths from an amniotic fluid embolism)
	Most common age group affected:	Women 35 and older (about 38 percent of deaths from an amniotic fluid embolism)
Anesthesia-complications (accounts less	Examples of associated conditions:	Anesthesia complications include aspiration pneumonia due to anesthesia, which involves when there is swelling or an infection of the lungs or large airways.
	Leading cause of death for:	No racial/ethnic groups

**Appendix I: Pregnancy Mortality Surveillance  
System Cause of Death Categories**

<b>Cause of Death</b>	<b>Breakdown</b>	<b>Information</b>
than 1 percent of deaths)	Most common time frame: <sup>a</sup>	Day of delivery or end of pregnancy (about 33 percent of deaths from anesthesia complications) and between 1 and 6 days postpartum (about 33 percent of deaths from anesthesia complications)
	Most common age group affected:	Women 30 to 34 years old (about 33 percent of deaths from anesthesia complications)
Other non-cardiovascular medical conditions (accounts for about 13 percent of deaths)	Examples of associated conditions:	Other non-cardiovascular medical conditions includes a range of conditions, such as:
		Hematologic, such as sickle cell disease, a group of inherited red blood cell disorders.
		Collagen vascular/autoimmune diseases, such as systemic lupus erythematosus—the most common type of lupus—in which the immune system attacks its own tissues, causing widespread inflammation and tissue damage in the affected organs, such as lungs, kidneys, and blood vessels.
		Immune deficiency problems, such as human immunodeficiency virus infection, which interferes with your body’s ability to fight the organisms that cause disease and over time can weaken the immune system and result in acquired immunodeficiency syndrome.
		Cancer, such as gestational trophoblastic disease, which is a group of rare tumors that involve abnormal growth of cells inside a woman’s uterus.
		Pulmonary conditions, such as cystic fibrosis, which is an inherited disease characterized by the buildup of thick, sticky mucus that can damage many of the body’s organs and commonly includes progressive damage to the respiratory system and chronic digestive system problems.
		Neurologic conditions, such as epilepsy/seizure disorder, which is a brain disorder that causes repeated seizures and can cause brief changes in how a person behaves, thinks, or feels.
Leading cause of death for:	Most common time frame: <sup>a</sup>	Renal disease, such as chronic kidney failure, which is the gradual loss of kidney function and when it reaches an advanced stage, dangerous levels of fluid, electrolytes and wastes can build up in your body.
		Endocrine/metabolic, such as obesity, which is a complex disease involving an excessive amount of body fat and increases your risk of other diseases and health problems, such as heart disease, diabetes, high blood pressure and certain cancers.
		Gastrointestinal disorders, such as Crohn’s disease, which is an inflammatory bowel disease that can be painful and debilitating, and sometimes may lead to life-threatening complications.
Most common age group affected:		No racial/ethnic group
		During pregnancy (about 53 percent of deaths from other non-cardiovascular medical conditions)
		Women under 25 years old (about 30 percent of deaths from other non-cardiovascular medical conditions)

Source: GAO analysis of Pregnancy Mortality Surveillance System data, Department of Health and Human Services documents and officials, and other documents. | GAO-20-248

<sup>a</sup>According to CDC officials, data on the timing of death relative to pregnancy are only available from 2011 through 2016, and the specific timing of death is known for almost 88 percent (or 3,573) of the pregnancy-related deaths from this time.

# Appendix II: Supplemental Data on Pregnancy-Related Deaths

The following tables include supplemental data on pregnancy-related deaths by racial/ethnic and age groups.

**Table 2: Percentage of Pregnancy-Related Deaths by Racial/Ethnic Group for Each Age Range, 2007-2016**

Racial/Ethnic group <sup>a</sup>	Percentage of women under 25 years old	Percentage of women 25-29 years old	Percentage of women 30-34 years old	Percentage of women 35 years and older
White women (n=2,756)	21	22	25	33
Black women (n=2,431)	26	24	22	29
American Indian/Alaska Native women (n=117)	22	23	23	32
Asian/Pacific Islander, women (n=339)	7	19	34	40
Hispanic women (n=1,096)	23	23	23	31
<b>All women (n=6,739)<sup>b</sup></b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>31</b>

Source: GAO analysis of Pregnancy Mortality Surveillance System data. | GAO-20-248

Note: Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

Percentages do not always add to 100 due to rounding.

<sup>a</sup>White, black, American Indian/Alaska Native and Asian/Pacific Islander women were non-Hispanic. Hispanic women might be of any race.

<sup>b</sup>From 2007 through 2016, there were 26 pregnancy-related deaths where race/ethnicity or age was unknown that were not included in our analyses.

**Appendix II: Supplemental Data on Pregnancy-Related Deaths**

**Table 3: Percentage of Pregnancy-Related Deaths by Racial/Ethnic Group for Each Time Frame Relative to Pregnancy, 2011-2016**

Racial/Ethnic group <sup>a</sup>	During pregnancy	Between 0 and 42 days postpartum			Between 43 and 365 days postpartum
		Day of delivery or the end of pregnancy	Between 1 and 6 days postpartum	Between 7 and 42 days postpartum	
White women (n=1,493)	34	16	18	21	11
Black women (n=1,278)	33	15	15	23	14
American Indian/ Alaska Native women (n=56)	30	14	23	16	16
Asian/Pacific Islander women (n=203)	16	33	28	14	9
Hispanic women (n=536)	26	18	23	23	10
<b>All women (n=3,566)<sup>b</sup></b>	<b>32</b>	<b>17</b>	<b>18</b>	<b>21</b>	<b>12</b>

Source: GAO analysis of Pregnancy Mortality Surveillance System data | GAO-20-248

Note: Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

Percentages do not always add to 100 due to rounding.

<sup>a</sup>White, black, American Indian/Alaska Native and Asian/Pacific Islander women were non-Hispanic. Hispanic women might be of any race.

<sup>b</sup>According to CDC officials, data on the timing of death relative to pregnancy are only available for 2011-2016, and the specific timing of death is known for almost 88 percent (or 3,573) of the pregnancy-related deaths from this time. Of the deaths with available timing information, there were seven pregnancy-related deaths where the race/ethnicity was unknown that were not included in this analysis.

**Appendix II: Supplemental Data on Pregnancy-Related Deaths**

**Table 4: Percentage of Pregnancy-Related Deaths by Age Group for Each Time Frame Relative to Pregnancy, 2011-2016**

Age group	During pregnancy	Between 0 and 42 days postpartum			Between 43 and 365 days postpartum
		Day of delivery or the end of pregnancy	Between 1 and 6 days postpartum	Between 7 and 42 days postpartum	
Women under 25 years old (n=743)	32	14	15	22	16
Women 25-29 years old (n=808)	29	16	18	25	12
Women 30-34 years old (n=855)	27	20	21	22	10
Women 35 years and older (n=1,167)	36	17	18	19	10
<b>All women (n=3,573)<sup>a</sup></b>	<b>32</b>	<b>17</b>	<b>18</b>	<b>21</b>	<b>12</b>

Source: GAO analysis of Pregnancy Mortality Surveillance System data. | GAO-20-248

Note: Pregnancy-related death, as defined in statute, is 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. 42 U.S.C. § 247b-12(e)(3).

Percentages do not always add to 100 due to rounding.

<sup>a</sup>According to CDC officials, data on the timing of death relative to pregnancy are only available for 2011-2016, and the specific timing of death is known for almost 88 percent (or 3,573) of the pregnancy-related deaths from this time.

# Appendix III: Ongoing Department of Health and Human Services Funding Efforts to Reduce Pregnancy-Related Deaths

As of September 2019, the Department of Health and Human Services was providing funding for 13 efforts with a stated outcome, goal, or focus on reducing pregnancy-related deaths. One of these—Supporting Maternal Mortality Review Committees—is funded by CDC and has an exclusive focus on reducing deaths of the women during pregnancy or up to 1 year of pregnancy, while the other 12 have additional focus areas, such as improving infant health. Two of these efforts are not discrete funding opportunities, but rather a variety of research funding opportunities offered by the Health Resources and Services Administration and the National Institutes of Health. Table 5 lists the 13 efforts, their current awards, funding, purpose, and examples of goals or research.

**Table 5: Ongoing Department of Health and Human Services (HHS) Funding Efforts with a Focus on Pregnancy-Related Deaths**

	Ongoing HHS Funding Opportunities	Description
<b>Centers for Disease Control and Prevention (CDC)</b>	Preventing Maternal Deaths: Supporting Maternal Mortality Review Committees (MMRC)	<p><b>Funding details:</b> In 2019, CDC awarded 24 5-year cooperative agreements; recipients received between \$150,000 and over \$550,000 in funding each year for a total funding amount of about \$8.4 million across all awardees for fiscal year 2019.</p> <p><b>Purpose:</b> Supports MMRC’s ability to collect the most detailed, complete data on causes and circumstances surrounding pregnancy-related deaths to develop recommendations for prevention. This multidisciplinary approach encourages collaboration with clinical and non-clinical partnerships to improve quality of care and address social determinants of health to reduce health inequities.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) Short-term outcome: timely, accurate, and standardized information available about deaths to women during pregnancy and the year after the end of pregnancy, including opportunities for prevention, within funded jurisdictions and across funded jurisdictions; and 2) long-term outcome: reduction in maternal complications of pregnancy.</p>

**Appendix III: Ongoing Department of Health  
and Human Services Funding Efforts to  
Reduce Pregnancy-Related Deaths**

<b>Ongoing HHS Funding Opportunities</b>	<b>Description</b>
State-based Perinatal Quality Collaboratives (PQC) Cooperative Agreements	<p><b>Funding details:</b> In 2017, CDC awarded 13 5-year cooperative agreements to states with up to \$200,000 in annual funding for a total funding amount of about \$2.6 million per year across all awardees. These states included New York – which had received funding in both in the 2011 and 2014 award cycles – New Jersey, Delaware, Florida, Georgia, Illinois, Louisiana, Massachusetts, Minnesota, Mississippi, Oregon, and Wisconsin. Previous award cycles in 2011 and 2014 provided funding to three and six states, respectively.</p> <p><b>Purpose:</b> Supports states’ ability to enhance the capacity of PQC—networks of multidisciplinary teams that work to improve measurable outcomes for maternal and infant health—in early stages of development by conducting quality improvement projects. These projects include reduction of maternal morbidity and mortality and reduction of medically unnecessary cesarean deliveries.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) Short-term outcome: increased participation of hospitals throughout the state in the PQC; 2) intermediate outcome: service delivery improvements made statewide; and 3) long-term outcome: improvements in perinatal measures.</p>
National Network of Perinatal Quality Collaboratives Cooperative Agreement	<p><b>Funding details:</b> In 2017, CDC awarded a 5-year cooperative agreement to the National Institute for Children’s Health Quality with about \$228,000 in annual funding.</p> <p><b>Purpose:</b> Supports PQCs nationwide (funded and unfunded) to improve care and programming related to maternal and infant health broadly including through promoting collaborative learning, through providing technical assistance in the use of rapid response data and quality improvement support, and through providing resources to states.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) Short-term outcome: improved communication among PQCs across the country; 2) intermediate outcome: development and sustainment of more fully functioning PQCs across the country; and 3) long-term outcome: improvements in perinatal measures.</p>
Stop the Clot, Spread the Word®	<p><b>Funding details:</b> In 2015, CDC awarded the National Blood Clot Alliance a cooperative agreement with about \$365,045 in annual funding for 5 years for a total award amount of about \$1.8 million. According to CDC, approximately \$365,045 of the total amount awarded was applied to the campaign that specifically focuses on pregnancy and blood clots.</p> <p><b>Purpose:</b> Supports national digital campaigns that provide information on the risk factors, signs, and symptoms of venous thromboembolism or blood clots, including one that focuses on pulmonary embolism or blood clots in the lungs—one of the most common causes of pregnancy-related deaths in the United States.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) Increased knowledge and awareness of the signs, symptoms, and best treatments for venous thromboembolism by consumers and healthcare providers; and 2) increased adherence to venous thromboembolism treatment.</p>

**Appendix III: Ongoing Department of Health  
and Human Services Funding Efforts to  
Reduce Pregnancy-Related Deaths**

	<b>Ongoing HHS Funding Opportunities</b>	<b>Description</b>
<b>Health Resources and Services Administration (HRSA)</b>	Maternal and Child Health (MCH) Services Block Grants	<p><b>Funding details:</b> In fiscal year 2017, HRSA awarded block grants to 59 states and jurisdictions which had over \$6 billion in expenditures of federal, state, local, and other funds for maternal and child health, with approximately \$300 million of which were for services for pregnant women.</p> <p><b>Purpose:</b> States use this funding to, among other things, support promotion of health and wellbeing before, during, and after pregnancy. Commonly cited activities supported or complemented by the block grants include other federal initiatives such as MMRCs, PQCs, and implementation of Alliance for Innovation on Maternal Health (AIM) maternal safety bundles. There are three levels of service in block grant programs that include direct services, enabling service, and public health services and systems.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) National Outcome Measures which are longer-term measures, include Early Prenatal Care, Severe Maternal Morbidity, and Maternal Mortality, and 2) National Performance Measures, short term indicators that influence national outcome measures, related to women/maternal health include well-woman visits, low-risk cesarean deliveries, preventive dental visits during pregnancy, and smoking during pregnancy. Based on their identified priorities, each state or jurisdiction has to select at least one of these four national performance measures.</p>
	Alliance for Innovation on Maternal Health (AIM) Cooperative Agreement	<p><b>Funding details:</b> In fiscal year 2018, HRSA awarded a 5-year cooperative agreement to the American College of Obstetricians and Gynecologists with \$2 million in annual funding. According to the American College of Obstetricians and Gynecologists, the approved budget in the cooperative agreement provides states enrolling in AIM the opportunity to receive \$26,000 in the state's initial year of membership. After the first year, states may receive up to \$16,000 additional funding to further support implementation if necessary. Otherwise, AIM states receive \$9,000 to support travel and bundle implementation support sessions.</p> <p><b>Purpose:</b> Supports efforts to reduce maternal deaths and severe maternal morbidity by engaging provider organizations, state-based public health systems, consumer groups and other stakeholders in a national partnership to develop and implement evidence-based maternal safety bundles.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) Facilitate widespread implementation of the current maternal safety bundles and/or resources; and 2) develop new maternal safety bundles and/or resources that address new topics in the quality and safety of maternity care practices.</p>
	Alliance for Innovation on Maternal Health (AIM) Community Care Initiative	<p><b>Funding details:</b> In fiscal year 2019, HRSA awarded a 5-year cooperative agreement to the National Healthy Start Association, Inc. with about \$1.83 million in annual funding.</p> <p><b>Purpose:</b> Supports the development and implementation of non-hospital focused maternal safety bundles within community-based organizations and outpatient clinical settings and builds upon the foundational work of the Alliance for Innovation on Maternal Health by addressing preventable maternal mortality and severe maternal morbidity among pregnant and postpartum women outside of hospital and birthing facility settings.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) Number of new non-hospital focused maternal safety bundles developed; 2) number of process and outcome data measures created for new and existing non-hospital focused maternal safety bundles; and 3) number of maternal safety bundles fully integrated with contents of the peripartum racial/ethnic disparity bundle.</p>



**Appendix III: Ongoing Department of Health  
and Human Services Funding Efforts to  
Reduce Pregnancy-Related Deaths**

<b>Ongoing HHS Funding Opportunities</b>	<b>Description</b>
Healthy Start Initiative supplemental funding	<p><b>Funding details:</b> In 2019, HRSA awarded about \$12 million in supplemental funding (about \$140,000 per year) to 85 award recipients in addition to base funding that these recipients received for the primary purpose of the Healthy Start Program.<sup>b</sup></p> <p><b>Purpose:</b> Provides support for recipients to hire clinical providers to provide direct access to well-woman care as well as maternity care aimed at reducing adverse pregnancy outcomes among high-risk and underserved women. These clinical providers will also support health educators by conducting training on the identification of maternal early warning signs in order to prevent obstetric emergencies often related to maternal mortality and severe maternal morbidity.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) The percent of programs promoting and/or facilitating timely prenatal care; 2) the percent of programs promoting and/or facilitating timely postpartum care; and 3) the percent of programs promoting and/or facilitating well-woman visits/preventive health care.</p>
Rural Maternity and Obstetrics Management Strategies Program	<p><b>Funding details:</b> In 2019, HRSA awarded 3 4-year cooperative agreements to Bexar County Hospital District in San Antonio, Texas, Saint Francis Medical Center in Cape Girardeau, Missouri, and Taos Health Systems, Inc. in Taos, New Mexico with up to \$600,000 in funding the first year for a total funding amount of about \$1.8 million across all awardees. Future funding amounts are contingent upon availability.</p> <p><b>Purpose:</b> Supports efforts to improve access to and continuity of maternal and obstetrics care in rural communities.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) A safe delivery environment with the support and access to specialty care for perinatal women and infants in rural communities; 2) models of maternal and obstetrics care reinforced and sustained by a payment/reimbursement structure; and 3) improved clinical outcomes for maternal and neonatal health spanning the preconception, pregnancy, labor, and delivery, and postpartum periods.</p>
State Maternal Health Innovation Program	<p><b>Funding details:</b> In fiscal year 2019, HRSA awarded 9 5-year cooperative agreements to Arizona, Iowa, Illinois, Maryland, Montana, North Carolina, New Jersey, Ohio and Oklahoma with up to about \$2 million in annual funding for a total funding amount of about \$18.7 million across all awardees.</p> <p><b>Purpose:</b> Strengthens partnerships and collaboration by establishing a state-focused Maternal Health Task Force, improving state-level data surveillance on maternal mortality and severe maternal morbidity, and promoting and executing innovation in maternal health service delivery.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) Increases within the state for the percentage of women covered by health insurance and the percentage of women who receive an annual well-woman visit; and 2) decreases within the state for the rate of pregnancy-related deaths and the racial, ethnic, and/or geographic disparities in pregnancy-related mortality rates.</p>

**Appendix III: Ongoing Department of Health and Human Services Funding Efforts to Reduce Pregnancy-Related Deaths**

<b>Ongoing HHS Funding Opportunities</b>	<b>Description</b>
Supporting Maternal Health Innovation Program	<p><b>Funding details:</b> In fiscal year 2019, HRSA awarded a 5-year cooperative agreement to the University of North Carolina – at Chapel Hill with \$2,600,000.</p> <p><b>Purpose:</b> Supports HRSA award recipients who focus on improving maternal health, states, and key stakeholders in their efforts to reduce and prevent maternal mortality and severe maternal morbidity by 1) providing capacity-building assistance to award recipients of the State Maternal Health Innovation Program and the Rural Maternity and Obstetrics Management Strategies Program to implement innovative and evidence-informed strategies, and 2) Establishing a resource center to provide national guidance in improving maternal health.</p> <p><b>Examples of goals:</b><sup>a</sup> 1) 75 percent of HRSA award recipients who focus on improving maternal health and who receive support and/or technical assistance to reduce maternal mortality and severe maternal morbidity will report they are better able to implement innovative and evidence-informed strategies to reduce and prevent maternal mortality and severe maternal morbidity; and 2) increase the dissemination of national resources to support the adoption of the AIM and AIM – Community Care Initiative safety bundles as well as other innovative, evidence-informed strategies to serve communities experiencing disparities that contribute to maternal mortality and severe maternal morbidity.</p>
Supported research	<p><b>Funding details:</b> HRSA supports research, including by funding it through various grants and cooperative agreements.</p> <p><b>Purpose:</b> The Maternal and Child Health Bureau supports the Maternal and Child Health Extramural Research Program which provides leadership and funding for field-based, applied and translational research to advance the field of maternal and child health, improve the health and well-being of women, children, and families, and address the needs of economically or medically vulnerable maternal and child health populations. Within the Maternal and Child Health Bureau, the Pregnancy-Related Care Research Network assesses the clinical care patterns and educational needs of health care providers in order to support efforts to improve health care for mothers and their children, as well as for pregnant and post-partum women.</p> <p><b>Examples of research:</b> Ensuring Access to High-Quality Maternity Care in Rural America, Factors Associated with High-Risk Rural Women Giving Birth in Non-NICU Hospital Settings, and Identifying Maternal Deaths in Texas Using an Enhanced Method. (See appendix IV for additional information about supported research.)</p>
<b>National Institutes of Health (NIH)</b>	<p>Supported research</p> <p><b>Funding details:</b> NIH supports research, including by funding it through various grants, contracts, and other funding mechanisms.</p> <p><b>Purpose:</b> NIH funds maternal health research through a number of its institutes and centers, such as the <i>Eunice Kennedy Shriver</i> National Institute of Child Health and Human Development; the National Heart, Lung, and Blood Institute, and the Office of Research on Women’s Health. For example, NIH officials noted that the <i>Eunice Kennedy Shriver</i> National Institute of Child Health and Human Development supports essential research designed to overcome many of the complex challenges that women encounter in trying to achieve and maintain healthy pregnancies, and to prevent maternal mortality and severe maternal morbidity.</p> <p><b>Examples of research:</b> Blood Pressure Trajectory and Category and Risk of Hypertensive Disorders of Pregnancy in Nulliparous Women, Recent Increases in the U.S. Maternal Mortality Rate: Disentangling Trends from Measurement Issues, Making Vital Statistics Count: Preventing U.S. Maternal Deaths Requires Better Data. (See appendix IV for additional information about supported research.)</p>

Source: GAO analysis of HHS documents and interviews with HHS officials. | GAO-20-248

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**Appendix III: Ongoing Department of Health  
and Human Services Funding Efforts to  
Reduce Pregnancy-Related Deaths**

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Notes: In general, federal agencies use grants and cooperative agreements to transfer a thing of value to the recipient entity to carry out a public purpose as authorized by federal law. Cooperative agreements are used when substantial involvement by the federal agency is expected in carrying out the activity, and grants are used when substantial involvement by the federal agency is not expected. In general, federal agencies use contracts as legal instruments for the acquisition of property or services for the direct benefit or use of the federal government. See 31 U.S.C. §§ 6303-6305.

<sup>a</sup>Goals include outcomes, objectives, or performance measures for each funding arrangement.

<sup>b</sup>The Healthy Start Initiative base funding is not included because HRSA officials said the primary focus is infant mortality.

# Appendix IV: Health Resources and Services Administration and National Institutes of Health Research

Health Resources and Services Administration (HRSA) and National Institutes of Health (NIH) officials noted research the agencies support, including funding related to maternal health that also includes projects specific to maternal mortality or that can affect maternal mortality.

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## HRSA

The Maternal and Child Health Bureau supports field-based, applied and translational research through an extramural research program that provides leadership and funding that support innovative research to inform practitioners, the scientific community, and the public. According to HRSA officials, this research program helps to advance the field of maternal and child health; improve the health and well-being of women, children, and families; and address the needs of economically or medically vulnerable maternal and child health populations.

According to HRSA officials, in fiscal year 2018, HRSA awarded a total of about \$1.2 million in funding for six research projects related to maternal illness. The following HRSA website includes an option for searching for funded projects using key terms, <https://mchb.hrsa.gov/research/>.

The following are examples of publications based on research funded by HRSA:

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## Surveillance of Maternal Mortality

- Baeva, S., D.L. Saxton, K. Ruggiero, et al. "Identifying Maternal Deaths in Texas Using an Enhanced Method, 2012", *Obstetrics & Gynecology*, vol. 131, no. 5 (2018): 762-769.

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## Maternal Health

- Casey, M.M., P. Hung, C. Henning-Smith, et al. "Rural Implications of Expanded Birth Volume Threshold for Reporting Perinatal Care Measures." *Joint Commission Journal on Quality and Patient Safety*, vol. 42, no. 4 (2016): 179-187.
- Hung, P., K.B. Kozhimannil, M.M. Casey, et al. "Why Are Obstetric Units in Rural Hospitals Closing Their Doors?" *Health Services Research*, vol. 51, no. 4 (2016): 1546-1560.
- Kozhimannil, K.B., C. Henning-Smith, P. Hung, et al. "Ensuring Access to High-Quality Maternity Care in Rural America." *Women's Health Issues*, vol. 26, no. 3 (2016): 247-250.
- Kozhimannil, K.B., P. Hung, M.M. Casey, et al. "Factors Associated with High-Risk Rural Women Giving Birth in Non-NICU Hospital Settings." *Journal of Perinatology*, vol. 36, no. 7 (2016): 510-515.
- Kozhimannil, K.B., M.M. Casey, P. Hung, et al. "Location of Childbirth for Rural Women: Implications for Maternal Levels of Care." *American Journal of Obstetrics and Gynecology*, vol. 214, no. 5 (2016): 661e1-10.
- Kozhimannil, K.B., C. Henning-Smith, and P. Hung. "The Practice of Midwifery in Rural US Hospitals." *Journal of Midwifery & Women's Health*, vol. 61, no. 4 (2016): 411-418.
- Kozhimannil, K.B., P. Hung, M.M. Casey, et al. "Relationship between Hospital Policies for Labor Induction and Cesarean Delivery and Perinatal Care Quality among Rural U.S. Hospitals." *Journal of Health Care for the Poor and Underserved*, vol. 27, no. 4 (2016): 128-143.
- Weigel, P.A., F. Ullrich, D.M. Shane, et al. "Variation in Primary Care Service Patterns by Rural-Urban Location." *Journal of Rural Health*, vol. 32, no. 2 (2016): 196-203.

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## NIH

NIH support research, including funding maternal health research through a number of its institutes and centers, such as the Eunice Kennedy Shriver National Institute of Child Health and Human Development; the National Heart, Lung, and Blood Institute; the National Institute of Alcohol Abuse and Alcoholism; the National Institute of Diabetes and Digestive and Kidney Diseases; the National Institute of Mental Health; the National Institute of Nursing Research, and the Office of Research on Women's

Health. For example, NIH officials noted that The *Eunice Kennedy Shriver* National Institute of Child Health and Human Development supports essential research designed to overcome many of the complex challenges that women encounter in trying to achieve and maintain healthy pregnancies, and to prevent maternal mortality and severe maternal morbidity.

In fiscal year 2018, NIH funded 661 projects totaling almost \$303 million that included a focus on maternal health. The following NIH website includes a link to funded research for fiscal years 2015 through 2018 and estimates for fiscal year 2019 and 2020 by category, including maternal health, [https://report.nih.gov/categorical\\_spending.aspx](https://report.nih.gov/categorical_spending.aspx).

The following are examples of publications based on research funded by NIH:

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### Surveillance of Maternal Mortality

- MacDorman, M.F., E. Declercq, and M.E. Thoma. "Making Vital Statistics Count: Preventing U.S. Maternal Deaths Requires Better Data." *Obstetrics & Gynecology*, vol. 131, no. 5 (2018): 759-761.
- MacDorman, M.F., E. Declercq, H. Cabral, et al. "Recent Increases in the U.S. Maternal Mortality Rate: Disentangling Trends from Measurement Issues." *Obstetrics & Gynecology*, vol. 128, no. 3 (2016): 447-455.
- Thoma, M.E., D.A. De Silva, and M.F. MacDorman. "Examining Interpregnancy Intervals and Maternal and Perinatal Health Outcomes Using U.S. Vital Records: Important Considerations for Analysis and Interpretation." *Paediatric and Perinatal Epidemiology*, vol. 33, no. 1 (2019): O60-O72.

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### Maternal Health

- Brogly, S.B., K.E. Saia, M.M. Werler, et al. "Prenatal Treatment and Outcomes of Women with Opioid Use Disorder." *Obstetrics & Gynecology*, vol. 132, no. 4 (2018): 916-922.
- Dimidjian, S., S.H. Goodman, J.N. Felder, et al. "Staying Well During Pregnancy and the Postpartum: A Pilot Randomized Trial of Mindfulness-based Cognitive Therapy for the Prevention of Depressive Relapse/Recurrence." *Journal of Consulting and Clinical Psychology*, vol. 84, no. 2 (2016): 134-145.

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**Appendix IV: Health Resources and Services  
Administration and National Institutes of  
Health Research**

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- Hauspurg, A., S. Parry, B.M. Mercer, et al. "Blood Pressure Trajectory and Category and Risk of Hypertensive Disorders of Pregnancy in Nulliparous Women." *American Journal of Obstetrics and Gynecology*, vol. 221, no. 3 (2019): 277.e1-277.e8.
- Liu, T., M. Zhang, E. Guallar, et al. "Trace Minerals, Heavy Metals, and Preeclampsia: Findings from the Boston Birth Cohort." *Journal of the American Heart Association*, vol. 8, no. 16 (2019): e012346.
- Miller, E.C., M. Gallo, E.R. Kulick, et al. "Infections and Risk of Peripartum Stroke during Delivery Admissions." *Stroke*, vol. 49, no. 5 (2018): 1129-1134.
- Sheen, J.J., J. D. Wright, D. Goffman, et al. "Maternal Age and Risk for Adverse Outcomes." *American Journal of Obstetrics and Gynecology*, vol. 219, no. 4 (2018): 390.e1-390.e15.

# Appendix V: Maternal Mortality Efforts in Selected States

To describe how selected states use Department of Health and Human Services (HHS) funds to implement select efforts to reduce maternal mortality, we interviewed officials from five states—California, Georgia, Illinois, Maryland, and Texas—selected because of their geographic diversity and because these state have the following efforts shown in Table 6. Officials from three of the five states we interviewed said that the Alliance for Innovation on Maternal Health (AIM) Initiative had an immediate or the largest effect on addressing maternal mortality in their state. Officials from the other two states said they could not identify which efforts had the largest or most immediate effect on addressing maternal mortality. Officials from one state noted the importance of a collaborative approach and the other noted that there is no one contributing factor for maternal mortality. Some of the HHS-funded efforts previously described in appendix III had not been awarded at the time of our interviews, such as the State Maternal Health Innovation Program cooperative agreements. See table 6 below for information about these states' efforts.



**Appendix V: Maternal Mortality Efforts in Selected States**

**Table 6: Selected State Efforts to Reduce Maternal Mortality**

California	Efforts
Maternal and Child Health (MCH) Services Block Grant	<ul style="list-style-type: none"> <li>• <b>Recipient:</b> The California Department of Public Health, Maternal, Child and Adolescent Health Division is the recipient of the MCH Services Block Grant.</li> <li>• <b>Federal and overall expenditures:</b> California’s fiscal year 2017 MCH Services Block Grant expenditures totaled over \$3.8 billion, almost \$42 million of which were federal expenditures. Over \$37 million of the total spending was for pregnant women.<sup>a</sup></li> <li>• <b>Women and maternal health priorities:</b> The 2017 priority need for women and maternal health was to improve access and utilization to comprehensive, quality health services for women.</li> <li>• <b>National Performance Measure and National Outcome Measure:</b> With regard to women and maternal health, California tracks progress against the following National Performance Measure—percent of women ages 18-44 with a preventive visit in the past year, which is related to the maternal mortality National Outcome Measure—maternal mortality rate per 100,000 live births.</li> <li>• <b>Other points of interest:</b> MCH Services Block Grant funds support the Black Infant Health Program, which officials said helps address maternal morbidity and mortality of black mothers in the late maternal period.</li> </ul>
Maternal Mortality Review Committee (MMRC)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> California’s Pregnancy Associated Mortality Review was established in 2006 after a concerning increase in maternal mortality.</li> <li>• <b>Latest report:</b> According to officials, their latest MMRC report, as of September 2019, that covers pregnancy-related deaths from obstetric and other medical causes was published in 2018 for deaths that occurred from 2002 through 2007. In 2019, the MMRC published a special report that covers pregnancy-associated suicides that occurred from 2002 through 2012.</li> <li>• <b>Federal funding:</b> (1) Officials said California uses the MCH Services Block Grant to fund staff time and resources for the MMRC. (2) According to Centers for Disease Control and Prevention (CDC) officials, in 2019, California was awarded a cooperative agreement with CDC.<sup>b</sup></li> <li>• <b>Use of MMRIA:</b> As of May 2019, officials said the MMRC was not submitting the results of their reviews to CDC using Maternal Mortality Review Information Application (MMRIA)—an electronic application for collecting and sharing MMRC results. The MMRC will be expected to use MMRIA in accordance with the 2019 cooperative agreement with CDC that requires recipients to share this information within 2 years of a death.</li> <li>• <b>Other points of interest:</b> According to officials, California recently implemented a rapid case review model, where committee members discuss cases through electronic communication. In this model, committee members only identify the cause of death and relationship to pregnancy. Quality improvement opportunities and preventability are not assessed in the rapid case review model. Officials said this will improve the timeliness and accuracy of their data on maternal deaths up to 1 year after the end of pregnancy.</li> </ul>

**Appendix V: Maternal Mortality Efforts in Selected States**

California	Efforts
Perinatal Quality Collaborative (PQC) and Alliance for Innovation on Maternal Health (AIM)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> California’s Maternal Quality Care Collaborative was established in 2006 and uses research, quality improvement toolkits, state-wide outreach collaboratives and a Maternal Data Center to improve health outcomes for mothers and infants.</li> <li>• <b>Federal funding:</b> According to CDC officials, California’s collaborative received funding through cooperative agreements awarded by CDC in 2011 and 2014.</li> <li>• <b>AIM bundle implementation:</b> According to officials, California’s Maternal Quality Care Collaborative works closely with AIM in the development of the maternal safety bundles and then develops toolkits that provide evidence-based guidance for implementing best practices to improve clinical care in obstetrics.</li> <li>• <b>Use of data center:</b> According to officials, California’s collaborative used its 2011 PQC grant funding from CDC to develop the California Maternal Data Center. They also said that the Maternal Data Center allows hospitals to view their quality of care in real time and compare themselves to similar hospitals. Birth outcome measures tracked in the data center are broken out by racial group so California can work to address the disparities in birth outcomes.</li> <li>• <b>Other points of interest:</b> California officials cited continued concern about racial disparities in maternal mortality in their states. As such, officials stated the collaborative is developing a Birth Equity Collaborative to improve birth care, experiences and outcomes for, by and with Black mothers and birthing people in California.</li> </ul>
Georgia	Efforts
Maternal and Child Health (MCH) Services Block Grant	<ul style="list-style-type: none"> <li>• <b>Recipient:</b> The Georgia Department of Public Health is the recipient of the MCH Services Block Grant.</li> <li>• <b>Federal and overall expenditures:</b> Georgia’s fiscal year 2017 MCH Services Block grant expenditures totaled about \$283 million, almost \$17 million of which were federal expenditures. Over \$23 million of total spending was for pregnant women.<sup>a</sup></li> <li>• <b>Women and maternal health priorities:</b> The 2017 priority need for women and maternal health was to prevent maternal mortality.</li> <li>• <b>National Performance Measure and National Outcome Measure:</b> With regard to women and maternal health, Georgia tracks progress against the following National Performance Measure—percent of women, ages 18 through 44, with a preventive medical visit in the past year, which is related to the maternal mortality National Outcome Measure—maternal mortality rate per 100,000 live births.</li> <li>• <b>Other points of interest:</b> Officials said they have ideas for future project using their MCH Services Block Grant funds that include grants to community partners working to address specific causes of maternal mortality.</li> </ul>
Maternal Mortality Review Committee (MMRC)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> According to officials, Georgia’s MMRC was re-established in 2013 after a period of inactivity, when physicians and state officials became aware of an increase in maternal deaths.</li> <li>• <b>Latest report:</b> According to officials, their latest MMRC report, as of September 2019, was issued in 2019 and covers deaths that occurred in 2014 as well as aggregate data for 2012-2014.</li> <li>• <b>Federal funding:</b> Officials said the MCH Services Block Grant is the primary source of funding for the MMRC.</li> <li>• <b>Use of MMRIA:</b> According to officials, Georgia began submitting case abstraction and MMRC case review findings into MMRIA in April 2017. The MMRC has shared results of their reviews for inclusion in two multi-state publications issued in 2018 and 2019.</li> <li>• <b>Other points of interest:</b> Officials said the Department of Public Health leads the Georgia PQC that serves as the action arm of the MMRC. The Georgia PQC utilizes findings and recommendations from the MMRC to implement maternal quality improvement initiatives.</li> </ul>

**Appendix V: Maternal Mortality Efforts in Selected States**

<b>Georgia</b>	<b>Efforts</b>
Perinatal Quality Collaborative (PQC) and Alliance for Innovation on Maternal Health (AIM)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> Georgia’s PQC was established in 2012 to identify and implement quality improvement strategies to improve maternal and neonatal care and outcomes.</li> <li>• <b>Federal funding:</b> (1) According to CDC officials, in 2017, Georgia’s PQC was awarded a 3-year cooperative agreement with CDC. (2) According to state officials, the PQC will be eligible to receive \$9,000 annually from AIM to support implementation of AIM maternal safety bundles.</li> <li>• <b>AIM bundle implementation:</b> In 2018, Georgia’s PQC implemented the Obstetric Hemorrhage AIM bundle based on the MMRC’s finding that hemorrhage was a leading cause of death in Georgia. Forty-four of the state’s hospitals were implementing this bundle as of March 2019.</li> <li>• <b>Use of a data center:</b> According to officials, Georgia’s Department of Public Health submits structure and process measure data to the AIM Data Center for each participating hospital. DPH utilizes hospital discharge data to monitor the impact of quality improvement initiatives on maternal outcomes.</li> <li>• <b>Other points of interest:</b> Officials said the PQC has a Health Equities Subcommittee that is exploring opportunities to address racial/ethnic disparities in maternal and neonatal health in the state.</li> </ul>
<b>Illinois</b>	<b>Efforts</b>
Maternal and Child Health (MCH) Services Block Grant	<ul style="list-style-type: none"> <li>• <b>Recipient:</b> The Illinois Department of Public Health is the recipient of the MCH Services Block Grant.</li> <li>• <b>Federal and overall expenditures:</b> Illinois’s fiscal year 2017 MCH Services Block Grant expenditures totaled over \$52 million, almost \$21 million of which were federal expenditures. Almost \$12 million of the total spending was for pregnant women.<sup>a</sup></li> <li>• <b>Women and maternal health priorities:</b> The 2017 priority need for women and maternal health was to assure accessibility, availability and quality of preventive and primary care for all women, particularly for women of reproductive age.</li> <li>• <b>National Performance Measure and National Outcome Measure:</b> With regard to women and maternal health, Illinois tracks progress against the following National Performance Measure—percent of women, ages 18 through 44, with preventive medical visit in the past year, which is related to the maternal mortality National Outcome Measure—maternal mortality rate per 100,000 live births.</li> <li>• <b>Other points of interest:</b> Officials said they are planning to address disparities through a multiyear approach that includes identifying barriers to care for minority and at risk populations and eventually using MCH Services Block grant funds to support community organizations to overcome these barriers.</li> </ul>
Maternal Mortality Review Committee (MMRC)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> Illinois’ MMRC was established in 2000.</li> <li>• <b>Latest report:</b> According to officials, the latest MMRC report, as of September 2019, was published in 2018 and covers deaths that occurred in 2015.</li> <li>• <b>Federal funding:</b> (1) Officials said the MCH Services Block Grant funds the MMRC. (2) According to CDC officials, in 2019, Illinois was awarded a cooperative agreement with CDC.<sup>b</sup></li> <li>• <b>Use of MMRIA:</b> Officials said the MMRC began submitting the results of their reviews to CDC’s MMRIA in March 2019, after working with CDC on implementation. The MMRC will be expected to continue using MMRIA in accordance with the 2019 cooperative agreement with CDC that requires recipients to share this information within 2 years of a death.</li> <li>• <b>Other points of interest:</b> Illinois has two MMRCs. The second MMRC, established in 2015, is focused on violent deaths—homicide, suicide, and drug overdose.</li> </ul>

**Appendix V: Maternal Mortality Efforts in Selected States**

Illinois	Efforts
Perinatal Quality Collaborative (PQC) and Alliance for Innovation on Maternal Health (AIM)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> Illinois’s PQC was established in 2012 to use data-driven, evidence-based practices and improves perinatal quality resulting in improved birth outcomes, improved health for women and infants, and decreased costs in Illinois.</li> <li>• <b>Federal funding:</b> According to CDC officials, in 2014 and 2017, Illinois’s PQC was awarded a 3-year cooperative agreement from CDC.</li> <li>• <b>AIM bundle implementation:</b> According to officials, in 2016 Illinois’s PQC began implementing the Severe Hypertension in Pregnancy AIM maternal safety bundle. Additionally, in 2018 the PQC implemented the Obstetric Care for Women with Opioid Use Disorder AIM bundle. As of May 2019, 119 hospitals were participating in at least one PQC initiative.</li> <li>• <b>Use of a data center:</b> According to officials, Illinois’s PQC used early funding from the Children’s Health Insurance Program Reauthorization Act of 2009 to develop a rapid-response data system and CDC funding supports the data system ongoing development. The hospitals use Illinois’s PQC data system and not the AIM data system to implement quality improvement initiatives, and Illinois’s PQC submits de-identified data to AIM.</li> <li>• <b>Other points of interest:</b> Officials said they are working to develop a birth equity initiative to address racial disparities in the state to launch in 2021.</li> </ul>
Maryland	Efforts
Maternal and Child Health (MCH) Services Block Grant	<ul style="list-style-type: none"> <li>• <b>Recipient:</b> The Maryland Department of Health is the recipient of the MCH Services Block Grant.</li> <li>• <b>Federal and overall expenditures:</b> Maryland’s fiscal year 2017 MCH Services Block Grant expenditures totaled about \$20 million, almost \$12 million of which were federal expenditures. Over \$2 million of the total spending was for pregnant women.<sup>a</sup></li> <li>• <b>Women and maternal health priorities:</b> The 2017 priority needs for women and maternal health were to optimize the health and well-being of girls and women across the life span using preventive strategies and to reduce substance use/abuse across the life span for MCH populations including use of tobacco products, alcohol, prescription drugs and opioids.</li> <li>• <b>National Performance Measure and National Outcome Measure:</b> With regard to women and maternal health, Maryland tracks progress against the following National Performance Measure—percent of cesarean deliveries among low-risk first births and percent of women who smoke during pregnancy, which are related to the maternal mortality National Outcome Measure—maternal mortality rate per 100,000 live births.</li> <li>• <b>Other points of interest:</b> Officials said they used the MCH Services Block Grant to establish an effort called Babies Born Healthy Program—originally designed to address infant mortality—which has been expanded to provide care coordination to mothers from three months to 1 year post pregnancy as a way to address the disparities in the state’s maternal mortality.</li> </ul>
Maternal Mortality Review Committee (MMRC)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> Maryland’s Maternal Mortality Review Program, which includes an MMRC, was established by in 2000.</li> <li>• <b>Latest report:</b> According to officials, the latest MMRC report, as of September 2019, was published in 2018 and covers deaths that occurred in 2016. The MMRC has published annual reports since 2002.</li> <li>• <b>Federal funding:</b> According to officials, Maryland uses the MCH Services Block Grant to fund a contract with the state’s medical society to prepare cases for the MMRC to review.</li> <li>• <b>Use of MMRIA:</b> As of June 2019, officials said the MMRC was not submitting the results of its review to CDC using MMRIA, but plan to begin using MMRIA in 2020 for their review of deaths that occurred in 2018.</li> <li>• <b>Other points of interest:</b> Officials said that the Maryland state legislature established a stakeholder group—advocacy and community group representatives—to and community group representatives—to help facilitate looking at the MMRC’s findings through a lens of disparity.</li> </ul>

**Appendix V: Maternal Mortality Efforts in Selected States**

Maryland	Efforts
<p>Perinatal Quality Collaborative (PQC) and Alliance for Innovation on Maternal Health (AIM)</p>	<ul style="list-style-type: none"> <li>• <b>Date established:</b> The Maryland Patient Safety Center started Maryland’s PQC in 2007 to improve maternal and infant health and to reduce severe maternal and infant morbidity and mortality through education, collaboration and implementation of evidence-based interventions.</li> <li>• <b>Federal funding:</b> According to officials, the PQC receives a small funding award of \$9,000 annually through AIM to support implementation of AIM maternal safety bundles.</li> <li>• <b>AIM bundle implementation:</b> Officials said Maryland’s PQC implemented the Safe Reduction of Primary Cesarean Section Birth AIM bundle, which ended in 2018. The PQC continues to monitor the hospitals’ sustainability of the bundle. In 2019, the PQC implemented the Obstetric Care for Women with Opioid Use Disorder AIM bundle.</li> <li>• <b>Use of data center:</b> Officials said they use an automated process for inputting data into the AIM Data Center.</li> <li>• <b>Other points of interest:</b> According to officials, the PQC is considering programming to address racial disparities in maternal mortality, including the possible addition of unconscious bias courses to its patient safety education programs.</li> </ul>
Texas	Efforts
<p>Maternal and Child Health (MCH) Services Block Grant</p>	<ul style="list-style-type: none"> <li>• <b>Recipient:</b> The Texas Department of State Health Services is the recipient of the MCH Services Block Grant.</li> <li>• <b>Federal and overall expenditures:</b> Texas’s fiscal year 2017 MCH Services Block Grant expenditures totaled over \$72 million, almost \$34 million of which were federal expenditures. Almost \$11 million of the total spending was for pregnant women.<sup>a</sup></li> <li>• <b>Women and maternal health priorities:</b> The 2017 priority need for women and maternal health was to ensure use of culturally and linguistically appropriate Maternal and Child Health education and outreach efforts.</li> <li>• <b>National Performance Measure (NPM) and National Outcome Measure (NOM):</b> With regard to women and maternal health, Texas tracks progress against the following National Performance Measure—percent of women who smoke during pregnancy, which is related to the maternal mortality National Outcome Measure—maternal mortality rate per 100,000 live births.</li> <li>• <b>Other points of interest:</b> Officials said their MCH Services Block Grant funds programs that address health disparities, including the Texas Healthy Mothers and Babies Coalition that provides funding for staff to specific community groups working to remove barriers to care for people in their community.</li> </ul>
<p>Maternal Mortality Review Committee (MMRC)</p>	<ul style="list-style-type: none"> <li>• <b>Date established:</b> Texas’s Maternal Mortality and Morbidity Task Force was established in 2013. The name was changed to the Texas Maternal Mortality and Morbidity Review Committee.</li> <li>• <b>Latest report:</b> According to officials, the MMRC’s latest report, as of September 2019, was published in 2018 and covers deaths that occurred in 2012. Officials noted the report also included analyses of 2012 through 2015 data and a summary of a Department of State Health Services study published 2018, which used an enhanced method to calculate a more accurate maternal mortality rate for Texas in 2012.</li> <li>• <b>Federal funding:</b> (1) According to officials their MMRC has been exclusively funded by the MCH Services Block Grant. (2) According to CDC officials, in 2019, Texas was awarded a cooperative agreement with CDC.<sup>b</sup></li> <li>• <b>Use of MMRIA:</b> As of May 2019, officials said the MMRC was not submitting the results of their review to CDC using MMRIA, but officials said they were working with CDC to address challenges to its implementation. The MMRC will be expected to use MMRIA in accordance with the 2019 cooperative agreement with CDC that requires recipients to share this information within 2 years of a death.</li> <li>• <b>Other points of interest:</b> Officials said Texas’s committee meetings are public and media, legislators, and others have participated.</li> </ul>

**Appendix V: Maternal Mortality Efforts in Selected States**

Texas	Efforts
Perinatal Quality Collaborative (PQC) and Alliance for Innovation on Maternal Health (AIM)	<ul style="list-style-type: none"> <li>• <b>Date established:</b> Texas’s Collaborative for Healthy Mothers and Babies began operating in 2013 to advance health care quality and patient safety for all Texas mothers and babies. According to officials, in 2017, Texas also established TexasAIM in collaboration with the hospital association to guide the implementation of maternal safety bundles.</li> <li>• <b>Federal funding:</b> Officials said the MCH Services Block Grant provides funding for Texas’s Collaborative for Healthy Mothers and Babies and funding for TexasAIM’s implementation of AIM maternal safety bundles.</li> <li>• <b>AIM bundle implementation:</b> According to officials, TexasAIM began implementing the Obstetric Hemorrhage AIM bundle in 2018. In 2021, they will implement the Obstetric Care for Women with Opioid Use Disorder AIM bundle.</li> <li>• <b>Use of data center:</b> Officials said that Texas Department of State Health Services staff submit outcome measures and hospital staff submit quarterly structure and process measures into the AIM Data Center.</li> <li>• <b>Other points of interest:</b> According to officials, Texas’s Collaborative for Healthy Mothers and Babies used AIM’s information on Maternal Early Warning Signs, which provides the steps necessary to identify risk early.</li> </ul>

Source: GAO analysis of Department of Health and Human Services (HHS) and state documents and interviews with HHS and state officials. | GAO-20-248

Note: unless otherwise specified, the use of officials refers to state officials.

<sup>a</sup>Data for FY 2017 expenditures were the latest available as of October 2019.

<sup>b</sup>In 2019, CDC awarded 5-year Supporting Maternal Mortality Review Committee cooperative agreements. These agreements support a MMRC’s ability to collect the most detailed, complete data on causes and circumstances surrounding pregnancy-related deaths to develop recommendations for prevention. This multidisciplinary approach encourages collaboration with clinical and non-clinical partnerships to improve quality of care and address social determinants of health to reduce health inequities.

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# Appendix VI: GAO Contact and Staff Acknowledgments

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