Pregnancy-Related Deaths: Data from Maternal Mortality Review Committees in 36 US States, 2017-2019

Advisory Committee on Infant and Maternal Mortality (ACIMM)

March 20, 2023
Disclosure

• I have no potential conflicts of interest to disclose

• The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention (CDC)
ERASE MM Initiative and national reporting

- CDC analyses and reports focus on pregnancy-related deaths
  - The death occurs during pregnancy or within 1 year of the end of pregnancy and is from any cause related to or aggravated by the pregnancy
  - This is a population with unique causes of death and for which opportunities for prevention exist within the sphere of maternal health focused programs, policy, and systems

- Pregnancy-associated but not related deaths
  - Those deaths occurring during pregnancy or within 1 year of the end of pregnancy, which are not from a cause related to or aggravated by the pregnancy are classified as pregnancy-associated, but not related.
  - Tell us that an individual died during or within a year of pregnancy, but the death was not causally related to the pregnancy
  - While these deaths mirror causes of death individuals of reproductive age, they represent a biased subset
MMRCs in 36 states contributed data on 1,018 pregnancy-related deaths among their residents.
Distribution of pregnancy-related deaths by race-ethnicity, 2017-2019

Percent of Pregnancy-Related Deaths

- Non-Hispanic Native Hawaiian and Other Pacific Islander
- Non-Hispanic American Indian or Alaska Native
- Non-Hispanic other/multiple races
- Non-Hispanic Asian
- Hispanic
- Non-Hispanic Black
- Non-Hispanic White

Age was missing for 5 (0.5%) pregnancy-related deaths; ages ranged from 16 to 49 years.
Distribution of pregnancy-related deaths by age, 2017-2019

Age was missing for 5 (0.5%) pregnancy-related deaths; ages ranged from 16 to 49 years
Distribution of pregnancy-related deaths by education

- Advanced degree
- Associate or bachelor’s degree
- Some college credit, but no degree
- High school graduate or GED completed
- 12th grade or less; no diploma

Education was missing for 30 (2.9%) pregnancy-related deaths
Timing of pregnancy-related deaths

- 22% While pregnant
- 13% Day of delivery
- 12% 1-6 days after end of pregnancy
- 23% 7-42 days after end of pregnancy
- 30% 43 days to 1 year after end of pregnancy

Timing was missing (n=2) or unknown (n=14) for 16 (1.6%) pregnancy-related deaths
Underlying cause of pregnancy-related death

- MMRC identified*
- Disease or injury that initiated the chain of events leading to death
- Uses coding that includes 69 specific causes of pregnancy-related death

* Determined by the MMRC, after review of information across all sources, independent of the underlying cause of death or manner of death that is documented on the death certificate. The ways MMRCs capture underlying cause of death codes, manner of death, and circumstances surrounding a death are available at: https://reviewtoaction.org/sites/default/files/2022-12/mmria-form-v22-fillable_Dec11.pdf

<table>
<thead>
<tr>
<th>Underlying Cause of Death</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hematologic</td>
<td>821 - Sickle Cell Anemia, 82.9 - Other Hematologic Conditions including Thrombophilia/TPP/HUS/NOS</td>
</tr>
<tr>
<td>Collagen Vascular/Autoimmune Diseases</td>
<td>831 - Systemic Lupus Erythematosus (SLE), 63.9 - Other Collagen Vascular Diseases/NOS</td>
</tr>
<tr>
<td>Conditions Unique to Pregnancy</td>
<td>851 - Conditions Unique to Pregnancy (e.g., Gestational Diabetes, Hypertension, Liver Disease of Pregnancy)</td>
</tr>
<tr>
<td>Injury</td>
<td>881 - Intentional (Homicide), 88.2 - Unintentional</td>
</tr>
<tr>
<td>Cancer</td>
<td>691 - Gestational Trophoblastic Disease (GTD), 89.3 - Malignant Malignoma, 89.9 - Other Malignancies/NOS</td>
</tr>
<tr>
<td>Cardiovascular Conditions (excluding cardiomyopathy, HDP, and CVA)</td>
<td>501 - Coronary Artery Disease/Myocardial Infarction, 502 - Pulmonary Hypertension</td>
</tr>
<tr>
<td>Hypertensive Disorders of Pregnancy (HDP)</td>
<td>401 - Preeclampsia, 402 - Eclampsia</td>
</tr>
<tr>
<td>Anemia Complications</td>
<td>701 - Anesthesia Complications</td>
</tr>
<tr>
<td>Anemia</td>
<td>801 - Postpartum Preeclampsia, 802 - Hypertrophic Preeclampsia, 809 - Other Cardiomyopathy/NOS</td>
</tr>
<tr>
<td>Neurologic/Neurovascular Conditions (Excluding CVA)</td>
<td>921 - Epilepsy/Seizure Disorder, 92.9 - Other Neurologic Diseases/NOS</td>
</tr>
<tr>
<td>Renal Disease</td>
<td>931 - Chronic Renal Failure/End-Stage Renal Disease (ESRD), 93.9 - Other Renal Disease/NOS</td>
</tr>
<tr>
<td>Cerebrovascular Accident (CVA) not Secondary to HDP</td>
<td>551 - Cerebrovascular Accident (Hemorrhage/Thrombosis/Aneurysm/Malformation) not Secondary to Hypertensive Disorders of Pregnancy</td>
</tr>
<tr>
<td>Metabolic/Endocrine</td>
<td>96.2 - Diabetes Mellitus, 96.9 - Other Metabolic/Endocrine Disorders/NOS</td>
</tr>
<tr>
<td>Gastrointestinal Disorders</td>
<td>973 - Crohn's Disease/Ulcerative Colitis, 97.2 - Liver Disease/Failure/Transplant</td>
</tr>
<tr>
<td>Mental Health Conditions</td>
<td>100.3 - Depressive Disorder, 100.4 - Psychotic Disorder</td>
</tr>
<tr>
<td>Unknown</td>
<td>99.1 - Unknown COD</td>
</tr>
</tbody>
</table>

- Determined by the MMRC, after review of information across all sources, independent of the underlying cause of death or manner of death that is documented on the death certificate. The ways MMRCs capture underlying cause of death codes, manner of death, and circumstances surrounding a death are available at: https://reviewtoaction.org/sites/default/files/2022-12/mmria-form-v22-fillable_Dec11.pdf
**Most frequent underlying causes of pregnancy-related deaths***

1. Mental Health Conditions include deaths to suicide, unintentional or unknown intent overdose/poisoning related to substance use disorder, and other deaths determined by the MMRC to be related to a mental health condition, including substance use disorder.

2. Excludes aneurysms or cerebrovascular accident (CVA).

3. Cardiac and coronary conditions include deaths to coronary artery disease, pulmonary hypertension, acquired and congenital valvular heart disease, vascular aneurysm, hypertensive cardiovascular disease, Marfan Syndrome, conduction defects, vascular malformations, and other cardiovascular disease; and excludes cardiomyopathy and hypertensive disorders of pregnancy.

4. Injury includes intentional injury (homicide), unintentional injury, including overdose/poisoning deaths not related to substance use disorder, and injury of unknown intent or not otherwise specified.

---

*Only 10 most frequent underlying causes of death are shown; underlying cause of death was missing (n=10) or unknown (n=21) for 31 (3.0%) pregnancy-related deaths.*
Most frequent underlying causes of pregnancy-related deaths among non-Hispanic Black persons*

1 Cardiac and coronary conditions include deaths to coronary artery disease, pulmonary hypertension, acquired and congenital valvular heart disease, vascular aneurysm, hypertensive cardiovascular disease, Marfan Syndrome, conduction defects, vascular malformations, and other cardiovascular disease; and excludes cardiomyopathy and hypertensive disorders of pregnancy.

2 Excludes aneurysms or cerebrovascular accident (CVA)

3 Mental health conditions include deaths to suicide, unintentional or unknown intent overdose/poisoning related to substance use disorder, and other deaths determined by the MMRC to be related to a mental health condition, including substance use disorder.

4 Injury includes intentional injury (homicide), unintentional injury, including overdose/poisoning deaths not related to substance use disorder, and injury of unknown intent or not otherwise specified.

*Only 10 most frequent underlying causes of death are shown; underlying cause of death was missing (n=6) or unknown (n=7) for 13 (4.1%) pregnancy-related deaths
Most frequent underlying causes of pregnancy-related deaths among Hispanic persons*

1 Mental health conditions include deaths to suicide, unintentional or unknown intent overdose/poisoning related to substance use disorder, and other deaths determined by the MMRC to be related to a mental health condition, including substance use disorder

2 Excludes aneurysms or cerebrovascular accident (CVA)

3 Cardiac and coronary conditions include deaths to coronary artery disease, pulmonary hypertension, acquired and congenital valvular heart disease, vascular aneurysm, hypertensive cardiovascular disease, Marfan Syndrome, conduction defects, vascular malformations, and other cardiovascular disease; and excludes cardiomyopathy and hypertensive disorders of pregnancy.

4 Injury includes intentional injury (homicide), unintentional injury, including overdose/poisoning deaths not related to substance use disorder, and injury of unknown intent or not otherwise specified.

*Only 10 most frequent underlying causes of death are shown. More than 10 are shown because the frequency was the same for the 10th cause for 2 causes; underlying cause of death was unknown for 3 (2.1%) pregnancy-related deaths.
Most frequent underlying causes of pregnancy-related deaths among non-Hispanic Asian persons*

1. **Hemorrhage**
2. **Amniotic Fluid Embolism**
3. **Cardiac and Coronary Conditions**
   - Includes deaths to coronary artery disease, pulmonary hypertension, acquired and congenital valvular heart disease, vascular aneurysm, hypertensive cardiovascular disease, Marfan Syndrome, conduction defects, vascular malformations, and other cardiovascular disease; and excludes cardiomyopathy and hypertensive disorders of pregnancy.
4. **Mental Health Conditions**
5. **Injury**
6. **Cancer**
7. **Embolism-Thrombotic**
8. **Cardiomyopathy**
9. **Hypertensive Disorders of Pregnancy**

---

1. Excludes aneurysms or cerebrovascular accident (CVA).
2. Injury includes intentional injury (homicide), unintentional injury, including overdose/poisoning deaths not related to substance use disorder, and injury of unknown intent or not otherwise specified.
3. Mental health conditions include deaths to suicide, unintentional or unknown intent overdose/poisoning related to substance use disorder, and other deaths determined by the MMRC to be related to a mental health condition, including substance use disorder.

*Underlying cause was unknown for 2 (5.9%) pregnancy-related deaths.
Most frequent underlying causes of pregnancy-related deaths among non-Hispanic White persons*

1 Mental health conditions include deaths to suicide, unintentional or unknown intent overdose/poisoning related to substance use disorder, and other deaths determined by the MMRC to be related to a mental health condition, including substance use disorder
2 Excludes aneurysms or CVA
3 Cardiac and coronary conditions include deaths to coronary artery disease, pulmonary hypertension, acquired and congenital valvular heart disease, vascular aneurysm, hypertensive cardiovascular disease, Marfan Syndrome, conduction defects, vascular malformations, and other cardiovascular disease; and excludes cardiomyopathy and hypertensive disorders of pregnancy.
4 Injury includes intentional injury (homicide), unintentional injury, including overdose/poisoning deaths not related to substance use disorder, and injury of unknown intent or not otherwise specified.

*Only 10 most frequent underlying causes of death are shown; underlying cause of death was missing (n=4) or unknown (n=6) for 10 (2.1%) pregnancy-related deaths.
84% of pregnancy-related deaths with an MMRC preventability determination were determined to be preventable.

A preventability determination was missing (n=4) or unable to determine (n=18) for 22 (2.2%) pregnancy-related deaths.
Pregnancy-Related Deaths Among American Indian or Alaska Native Persons: Data from Maternal Mortality Review Committees in 36 U.S. States, 2017–2019
Summary of an alternative approach to classifying pregnancy-related deaths among American Indian or Alaska Native persons

- 9* pregnancy-related deaths classified as non-Hispanic single race AIAN
- + 1 with notation of Other Race and "Native American" specified in the text field
- + 5 included with notation of Hispanic ethnicity (n=4) or missing ethnicity (n=1)
- + 2 included with notation of more than one race

17 pregnancy-related deaths categorized as AIAN

* Consistent with previously described methods
**Underlying causes of pregnancy-related deaths among American Indian or Alaska Native persons (N=16*)**

1 Mental health conditions include deaths to suicide, unintentional or unknown intent overdose/poisoning related to substance use disorder, and other deaths determined by the MMRC to be related to a mental health condition, including substance use disorder

2 Excludes aneurysms or cerebrovascular accident (CVA)

3 Cardiac and coronary conditions include deaths to coronary artery disease, pulmonary hypertension, acquired and congenital valvular heart disease, vascular aneurysm, hypertensive cardiovascular disease, Marfan Syndrome, conduction defects, vascular malformations, and other cardiovascular disease; and excludes cardiomyopathy and hypertensive disorders of pregnancy.

4 Injury includes intentional injury (homicide), unintentional injury, including overdose/poisoning deaths not related to substance use disorder, and injury of unknown intent or not otherwise specified.

*Underlying cause was unknown for 1 (5.9%) pregnancy-related death*
93% of AIAN pregnancy-related deaths with a MMRC preventability determination were determined to be preventable.

A preventability determination was missing (n=1) or unable to determine (n=1) for 2 (12%) pregnancy-related deaths.
Summary of Key Findings

• Pregnancy-related deaths occurred during pregnancy, delivery, and up to a year after the end of pregnancy
• The leading cause of pregnancy-related death varied by race and ethnicity
• Over 80% of pregnancy-related deaths were determined to be preventable
• Methodological decisions about racial classification can impact the size and characteristics of the population used in an analysis
THANK YOU!
For more information, contact CDC
1-800-CDC-INFO (232-4636)

For more information, contact: 
ERASEMM@cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the 
official position of the Centers for Disease Control and Prevention.