MAY 28, 2024

Pregnancy-Related Deaths: Data From Maternal Mortality Review Committees in 38 U.S. States, 2020

KEY POINTS

- Pregnancy-related deaths occurred during pregnancy, delivery, and up to 1 year postpartum.
- The leading cause of pregnancy-related death varied by race and ethnicity.
- Over 80% of pregnancy-related deaths were determined to be preventable.

Introduction

Maternal mortality review committees (MMRCs) are multidisciplinary groups/teams that convene at the state or local level to comprehensively review deaths during or within 1 year of the end of pregnancy (pregnancy-associated deaths). MMRCs have access to clinical and nonclinical information, such as vital records, medical records, and social service records, to:

- More fully understand the circumstances surrounding each death.
- Determine whether the death was pregnancy-related.
- Develop recommendations for action to prevent similar deaths.

Data on 525 pregnancy-related deaths among residents of 38 states during 2020 were shared with the Centers for Disease Control and Prevention (CDC) through the Maternal Mortality Review Information Application (MMRIA). For more information on interpretation and the data please see the Data sources and methods section.

The data

Table 1. Characteristics of Pregnancy-Related Deaths, Data From Maternal Mortality Review Committees in 38 U.S. States, 2020[a,b]

	Number of pregnancy-related deaths (N = 525)	%
Race and ethnicity		
Hispanic	101	19.5
Non-Hispanic American Indian or Alaska Native	7	1.4
Non-Hispanic Asian	15	2.9
Non-Hispanic Black	157	30.3
Non-Hispanic Native Hawaiian or other Pacific Islander	2	0.4
Non-Hispanic White	221	42.6
Non-Hispanic other/multiple races	16	3.1
Age at death (years)		
15–19	15	2.9
20–24	69	13.2

	Number of pregnancy-related deaths (N = 525)	%
25–29	150	28.7
30–34	142	27.2
35–39	109	20.8
40–44	36	6.9
≥45	2	0.4
Education		
12th grade or less; no diploma	89	17.2
High school graduate or GED completed	212	40.9
Some college credit, but no degree	107	20.7
Associate or bachelor's degree	85	16.4
Advanced degree	25	4.8

[a] Race or ethnicity was missing for 6 (1.1%) pregnancy-related deaths; age was missing for 2 (0.4%) pregnancy-related deaths; education was missing for 7 (1.3%) pregnancy-related deaths. Deaths with missing values were not included in percent calculations.

[b] Percentages might not sum to 100 because of rounding.

Table 2. Urbanicity[a] of Place of Last Residence, Data From Maternal Mortality Review Committees in 38 U.S. States, 2020[b]

	Number of pregnancy-related deaths	%
Urban	401	82.5
Rural	85	17.5

[a] Urban classification includes metropolitan division (≥2,500,000) and metropolitan (≥50,000–2,499,999). Rural classification includes micropolitan (10,000–49,999) and rural (<10,000) as captured in MMRIA.

[b] Among pregnancy-related deaths, 7.4% lacked geographic information based on county of last residence (n = 39). Deaths with missing values were not included in percent calculations.

Table 3. Distribution of Pregnancy-Related Deaths by Timing of Death in Relation to Pregnancy, Data From Maternal Mortality Review Committees in 38 U.S. States, 2020[a]

	Number of pregnancy-related deaths	%
During pregnancy	135	25.7
Day of delivery	58	11.1
1–6 days postpartum	85	16.2
7–42 days postpartum	106	20.2
43–365 days postpartum	141	26.9

[a] Percentages might not sum to 100 because of rounding.

Spotlight

Among pregnancy-related deaths in 2020, **47% occurred 7–365 days postpartum.**

Among the 525 pregnancy-related deaths, an underlying cause of death was identified for 511 deaths. In 2020, the six most frequent underlying causes of pregnancy-related death—mental health conditions, cardiovascular conditions, infection, hemorrhage, embolism, hypertensive disorders of pregnancy—accounted for over 82% of pregnancy-related deaths (Table 4). Infection was the most frequent underlying cause of pregnancy-related deaths among Hispanic women; amniotic fluid embolism was the most frequent underlying cause of pregnancy-related deaths among non-Hispanic Asian women; cardiovascular conditions were the most frequent underlying cause of pregnancy-related deaths among non-Hispanic Black women; and mental health conditions were the most frequent underlying cause of pregnancy-related deaths among non-Hispanic White women. Frequency of underlying causes of pregnancy-related death among non-Hispanic American Indian or Alaska Native (AI/AN), and non-Hispanic Native Hawaiian or other Pacific Islander (NHOPI) women, are included in Table 4 but were not ranked due to the small number of deaths.

Table 4. Underlying Causes of Pregnancy-Related Deaths[a], Overall and by Race-Ethnicity[b], Data From Maternal Mortality Review Committees in 38 U.S. States, 2020[c]

Condition	Total		Hispanic		*Non-Hispanic*									
					AI/AN		Asian		Black		NHOPI		White	
	Number of pregnancy-related deaths	%	Number of pregnancy-related deaths	%	Number of pregnancy-related deaths	%	Number of pregnancy-related deaths	%	Number of pregnancy-related deaths	%	Number of pregnancy-related deaths	%	Number of pregnancy-related deaths	%
Mental health conditions[d]	115	22.5	16	15.8	2	-	1	7.7	13	8.6	0	-	79	36.4
Cardiovascular conditions	85	16.6	12	11.9	2	-	1	7.7	35	23	0	-	33	15.2
Cardiomyopathy	*35*	*6.8*	*5*	*5*	*2*	-	*1*	*7.7*	*12*	*7.9*	*0*	-	*14*	*6.5*
Other cardiovascular conditions[e]	*50*	*9.8*	*7*	*6.9*	*0*	-	*0*	*0.0*	*23*	*15.1*	*0*	-	*19*	*8.8*
Infection	84	16.4	32	31.7	2	-	1	7.7	29	19.1	1	-	16	7.4
COVID-19	*54*	*10.6*	*29*	*28.7*	*2*	-	*0*	*0*	*17*	*11.2*	*1*	-	*4*	*1.8*
Hemorrhage	57	11.2	14	13.9	0	-	1	7.7	11	7.2	0	-	29	13.4
Embolism	44	8.6	5	5	0	-	2	15.4	21	13.8	0	-	14	6.5
Hypertensive disorders of pregnancy	36	7.1	7	6.9	0	-	1	7.7	11	7.2	0	-	13	6
Amniotic fluid embolism	19	3.7	4	4	0	-	3	23.1	2	1.3	0	-	9	4.2
Injury	11	2.2	1	1	0	-	0	0	5	3.3	0	-	5	2.3
Cerebrovascular accident	10	2	2	2	0	-	0	0.0	3	2	0	-	5	2.3
Collagen vascular/autoimmune diseases	9	1.8	3	3	0	-	1	7.7	2	1.3	1	-	2	0.9
Metabolic/endocrine	9	1.8	0	0	0	-	0	0.0	7	4.6	0	-	2	0.9
Pulmonary conditions	7	1.4	2	2	0	-	0	0.0	3	2	0	-	2	0.9
Cancer	5	1	1	1	0	-	0	0.0	3	2	0	-	1	0.5
Conditions unique to pregnancy	4	0.8	0	0	0	-	0	0.0	1	0.7	0	-	3	1.4
Hematologic	4	0.8	1	1	0	-	1	7.7	1	0.7	0	-	1	0.5
Neurologic/neurovascular conditions	4	0.8	0	0	0	-	1	7.7	1	0.7	0	-	1	0.5
Anesthesia complications	3	0.6	0	0	0	-	0	0.0	2	1.3	0	-	1	0.5
Gastrointestinal disorders	3	0.6	1	1	0	-	0	0.0	2	1.3	0	-	0	0
Renal diseases	2	0.4	0	0	0	-	0	0.0	0	0	0	-	1	0.5

[a] Specific cause of death was missing (n = 3) or listed as "Unknown" (n = 11) for a total of 14 (2.7%) pregnancy-related deaths. Deaths with missing values were not included in percent calculations. Percentages are not presented when the denominator is <10.

[b] Race or ethnicity was missing for 6 (1.1%) pregnancy-related deaths. Deaths among women classified as non-Hispanic other/multiple races, or missing race or ethnicity, are included in the total number of deaths.

[c] Percentages might not sum to 100 because of rounding.

[d] Mental health conditions include deaths of suicide, 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.

[e] Other cardiovascular conditions include deaths of 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.

For the details of each cause of death category, please see the Committee Decisions Form PDF.

Spotlight

Among pregnancy-related deaths with information on underlying cause of death, **leading underlying cause of death varied by race and ethnicity.**

For each death, MMRCs determine whether the death was a suicide and whether the death was a homicide. Among the 525 pregnancy-related deaths, a "suicide manner of death" determination was available for 501 deaths and a "homicide manner of death" determination was available for 518 deaths. Deaths without a determination include those where the MMRC selected "unknown" because of insufficient information or nonagreement among committee members.

Table 5. Among Pregnancy-Related Deaths, MMRC-Determined Manner of Death, Data From Maternal Mortality Review Committees in 38 U.S. States, 2020[a,b]

	Suicide		Homicide	
	Number of pregnancy-related deaths	%	Number of pregnancy-related deaths	%
No	456	91	508	98.1
Yes	37	7.4	9	1.7
Probably	8	1.6	1	0.2

[a] A suicide manner of death determination was missing (n = 1) or listed as "unknown" (n = 23) for a total of 24 (4.6%) pregnancy-related deaths. A homicide manner of death determination was missing (n = 3) or listed as "unknown" (n = 4) for a total of 7 (1.3%) of pregnancy-related deaths. Deaths with missing values were not included in percent calculations.

[b] Percentages might not sum to 100 because of rounding.

Spotlight

Among pregnancy-related deaths with information on manner of death in 2020, MMRCs determined **7% to be a suicide, and 2% to be a homicide.**

Among the 525 pregnancy-related deaths, a preventability determination was made for 515 deaths. Among these, 430 (84%) were determined to be preventable (Table 6).

Table 6. Percentage of Pregnancy-Related Deaths Determined by MMRCs To Be Preventable, Data From Maternal Mortality Review Committees in 38 U.S. States, 2020[a]

	Number of pregnancy-related deaths	%
Preventable	430	83.5
Not preventable	85	16.5

[a] A preventability determination was missing (n = 1) or unable to be determined (n = 9) for a total of 10 (1.9%) pregnancy-related deaths. Deaths with missing values were not included in percent calculations.

Spotlight

Among pregnancy-related deaths in 2020, MMRCs determined **84% to be preventable.**

Data sources and methods

EXPAND ALL +

Considerations for interpretation +

- CDC reports from different years of analysis based on data from MMRCs should not be directly compared.
- These data describe the distribution of characteristics among pregnancy-related deaths, but do not describe the estimated risk or disproportionate burden of pregnancy-related deaths by characteristics.
- Beginning in 2020, a new category for grouping Cardiovascular conditions was introduced. This Cardiovascular condition category includes deaths with underlying causes of cardiomyopathy and other cardiovascular conditions. Other cardiovascular conditions were referred to as cardiac and coronary condition in previous reports.
- Beginning in 2020, COVID-19 could be documented by MMRCs as an underlying cause of death and is included in the infection category.

Data were shared for aggregate analysis by jurisdictional MMRCs through MMRIA. MMRIA supports standardized record abstraction, case summary development, documentation of committee decisions, and analysis. Data analyzed included information on pregnancy-related deaths that occurred in 2020 among residents of these 38 states: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Tennessee, Utah, Washington, Wisconsin, and Wyoming.

In some states, only a partial year of data was shared. Some states group review of deaths by cause of death and may have reviewed only some causes before sharing data with CDC. Sensitivity analysis did not indicate any major differences in underlying causes of death when data for those states were excluded.

We used race and ethnicity data from the birth or fetal death records, when available, and from death records when a birth record or fetal death record was unavailable. Race and Hispanic origin are reported separately on the birth, fetal, and death records; more than one race

can be selected. All deaths with a notation of Hispanic origin are classified as Hispanic. For deaths with missing notation of Hispanic origin, race and ethnicity of the decedent was classified as missing. For deaths with a notation of non-Hispanic origin but a notation of race was missing, the race or ethnicity of the decedent was classified as missing. For non-Hispanic women, race was classified as: non-Hispanic single-race White, non-Hispanic single-race Black, non-Hispanic single-race AI/AN, non-Hispanic single-race Asian, non-Hispanic single-race NHOPI. For brevity, text and tables omit the term "single-race." Text from the "Other" race field was not recoded. When "Other "race or more than one race were noted, race was classified as "non-Hispanic other/multiple races."

Age at death was based on information from the death record. We used education level from the birth or fetal death record, when available, and from death records when a birth or fetal death record was unavailable. Geographic classifications are those produced by Texas A&M Geoservices.

Timing of death in relation to pregnancy was assigned using the number of days between the date of death and the end of pregnancy as documented by the MMRC abstractor. MMRIA instructs MMRC abstractors to enter "0" number of days if the death occurred on the day of delivery. Deaths classified as occurring on the "Day of delivery" occurred within 24 hours of the end of pregnancy. If the abstractor-assigned number of days was missing, deaths that the MMRC abstractor classified as "Pregnant at the time of death" were classified as "During pregnancy." If an abstractor-assigned timing of death was missing, timing of death was calculated using the number of days between the date of death on the death record and the date of birth or fetal death on the linked birth or fetal death record by CDC. If timing of death was still missing, deaths with the standard pregnancy checkbox on the death certificate marked as "Pregnant at the time of death" were classified as "During pregnancy." We completed a manual review of narratives in MMRIA for 10% of the deaths in each time period to confirm the classification of timing of death. No discrepancies were noted except for deaths that occurred on the day of delivery. Based on this finding, we completed a manual review of narratives for all deaths that occurred on the day of delivery and recoded inaccurate timing of deaths. The timing of death documented in the narrative was used to classify timing of deaths when deaths were missing a timing classification based on the number of days, abstractor-assigned category, and pregnancy checkbox.

Pregnancy-related deaths determined by the MMRCs to be suicides were assigned an underlying cause of death of mental health conditions during analysis, if not already assigned this cause of death by an MMRC. Deaths where the MMRCs determined the means of fatal injury to be "overdose/poisoning," and where the MMRCs determined that substance use disorder contributed to the death, were assigned an underlying cause of death of mental health conditions during analysis, if not already assigned this cause of death by an MMRC.

Definitions

Pregnancy-related: A death during pregnancy or within 1 year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy. In addition to having a temporal relationship to pregnancy, these deaths are causally related to pregnancy or its management.

Preventability: A death is considered preventable if the committee determines that there was at least some chance of the death being averted by one or more reasonable changes to patient, community, provider, facility, and/or systems factors. MMRIA allows MMRCs to document preventability decisions in two ways: (1) determining preventability as a "yes" or "no", and/or (2) determining the chance to alter the outcome by using a scale that indicates "no chance", "some chance", or "good chance." Any death with a "yes" response or a response that there was "some chance" or a "good chance" to alter the outcome was considered "preventable." Deaths with a "no" response or "no chance" were considered "not preventable."

Acknowledgements

Maternal Mortality Review Committee data included in this report were provided by the Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, New York City, Ohio, Oklahoma, Oregon, Pennsylvania, Philadelphia, Rhode Island, Tennessee, Utah, Washington, Wisconsin, and Wyoming Departments of Health or agencies responsible for maternal mortality review. Any published findings and conclusions are those of the authors and do not necessarily represent the official position of these Departments of Health or agencies responsible for maternal mortality review. This project was supported in part by an appointment to the Research Participation Program at the Centers for Disease Control and Prevention administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and the Centers for Disease Control and Prevention.

SOURCES

CONTENT SOURCE:
National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP); Division of Reproductive Health