

# 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

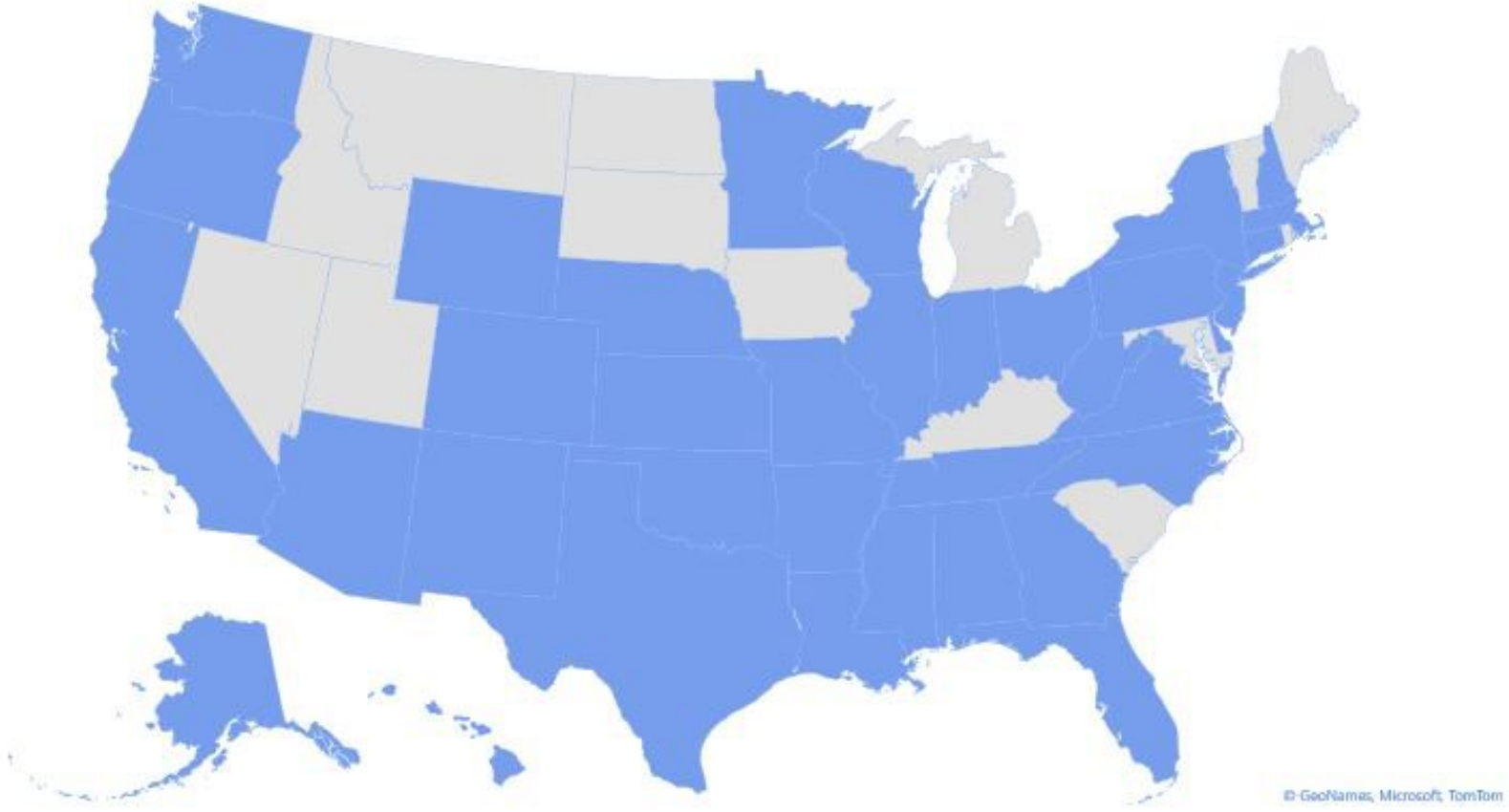
- I have no potential conflicts of interest to disclose
- The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention (CDC)

# ERASE MM Initiative and national reporting

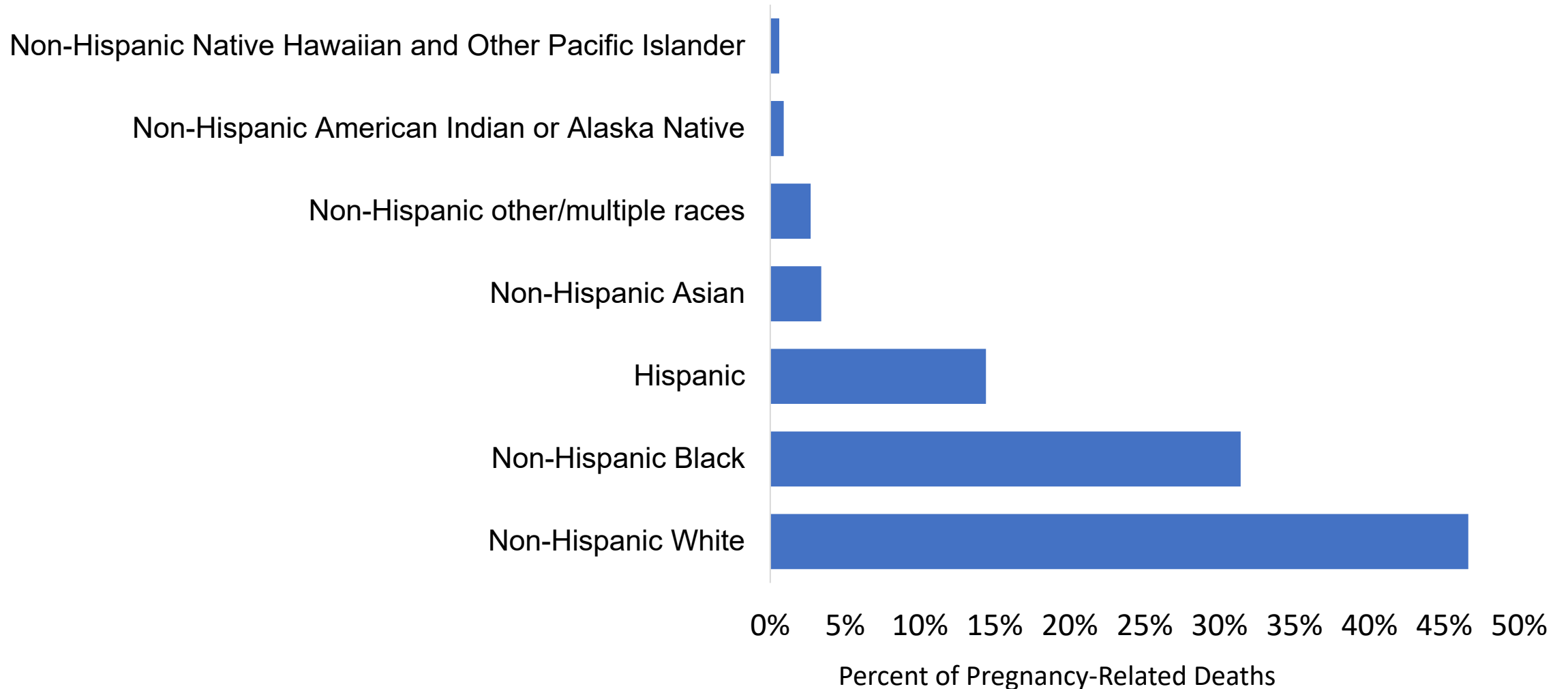
- CDC analyses and reports focus on *pregnancy-related deaths*
  - The death occurs during pregnancy or within 1 year of the end of pregnancy and is from any cause related to or aggravated by the pregnancy
  - This is a population with unique causes of death and for which opportunities for prevention 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

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

# MMRCs in 36 states contributed data on 1,018 pregnancy-related deaths among their residents

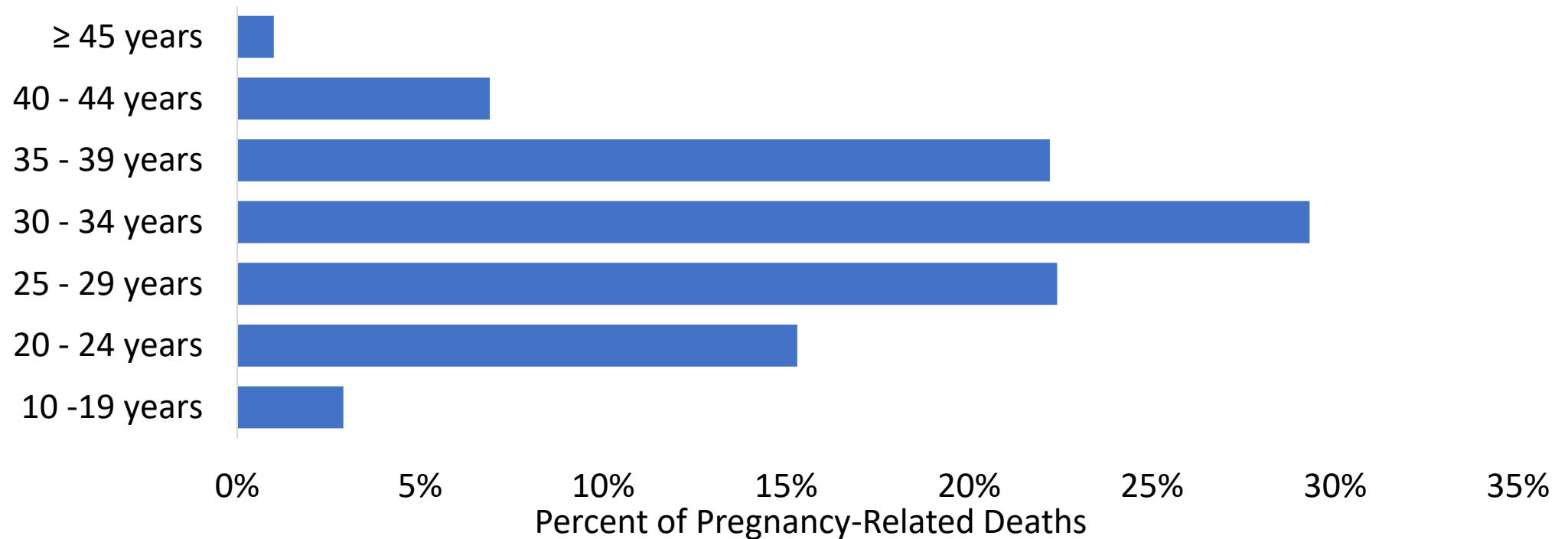


# Distribution of pregnancy-related deaths by race-ethnicity, 2017-2019



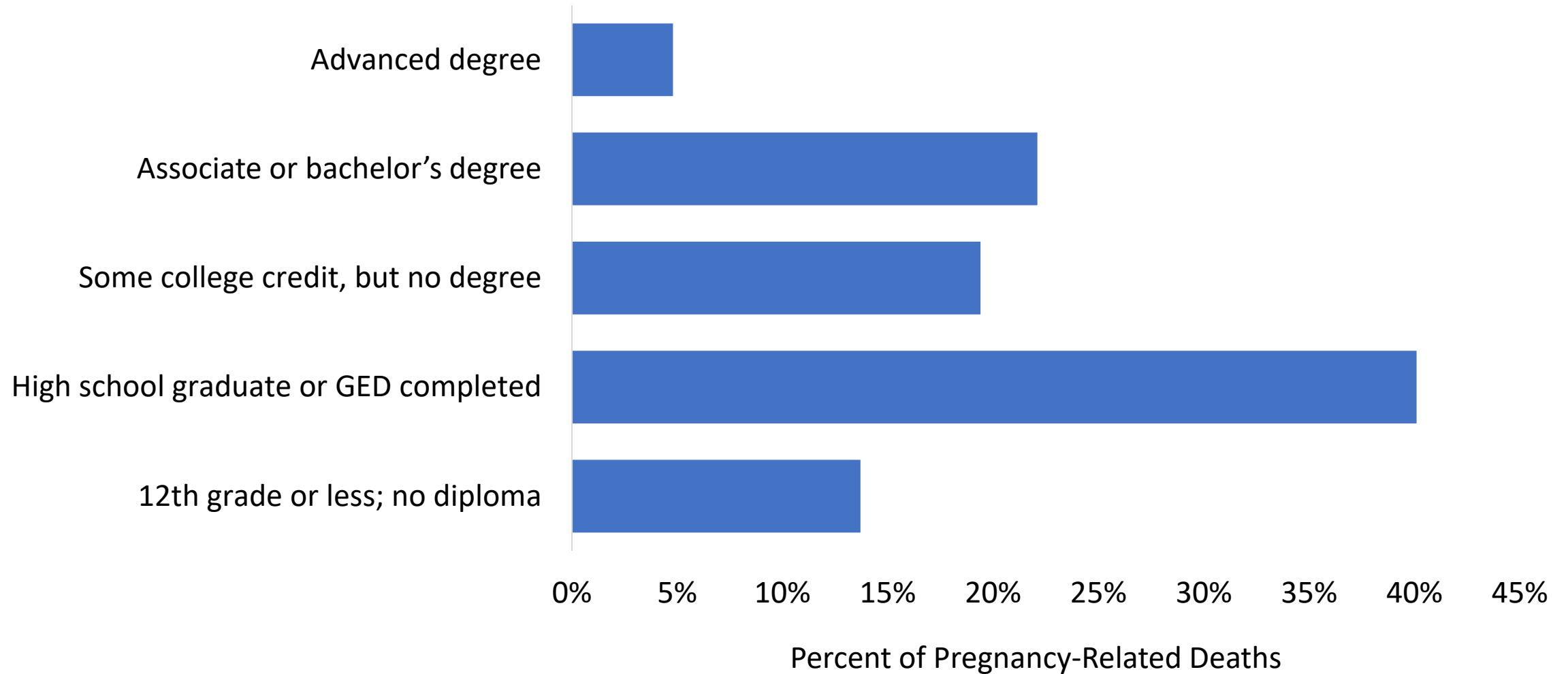
Age was missing for 5 (0.5%) pregnancy-related deaths; ages ranged from 16 to 49 years

# 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

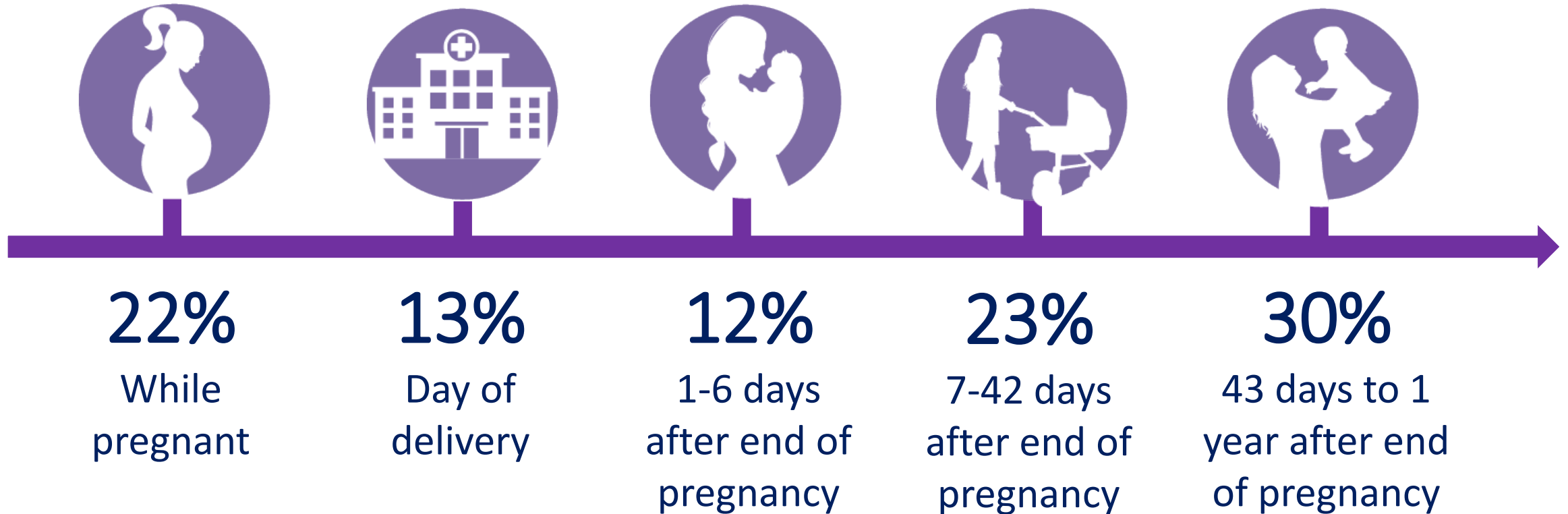
# Distribution of pregnancy-related deaths by education



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



# Timing of pregnancy-related deaths



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](https://reviewtoaction.org/sites/default/files/2022-12/mmria-form-v22-fillable_Dec11.pdf)

## Hemorrhage (Excludes Aneurysms or CVA)

- 10.1 - Hemorrhage – Uterine Rupture
- 10.2 - Placental Abruptio
- 10.3 - Placenta Previa
- 10.4 - Ruptured Ectopic Pregnancy
- 10.5 - Hemorrhage – Uterine Atony/Postpartum Hemorrhage
- 10.6 - Placenta Accreta/Increta/Percreta
- 10.7 - Hemorrhage due to Retained Placenta
- 10.10 - Hemorrhage – Laceration/Intra-Abdominal Bleeding
- 10.9 - Other Hemorrhage/NOS

## Infection

- 20.1 - Postpartum Genital Tract (e.g., of the Uterus/ Pelvis/Perineum/Necrotizing Fasciitis)
- 20.2 - Sepsis/Septic Shock
- 20.4 - Chorioamnionitis/Antepartum Infection
- 20.6 - Urinary Tract Infection
- 20.7 - Influenza
- 20.8 - COVID-19
- 20.10 - Pneumonia
- 20.11 - Other Non-Pelvic Infection (e.g., TB, Meningitis, HIV)
- 20.9 - Other Infection/NOS

## Embolism - Thrombotic (Non-Cerebral)

- 30.1 - Embolism – Thrombotic (Non-Cerebral)
- 30.9 - Other Embolism (Excludes Amniotic Fluid Embolism)/NOS

## Amniotic Fluid Embolism

- 31.1 - Embolism - Amniotic Fluid

## Hypertensive Disorders of Pregnancy (HDP)

- 40.1 - Preeclampsia
- 50.1 - Eclampsia
- 60.1 - Chronic Hypertension with Superimposed Preeclampsia

## Anesthesia Complications

- 70.1 - Anesthesia Complications

## Cardiomyopathy

- 80.1 - Postpartum/Peripartum Cardiomyopathy
- 80.2 - Hypertrophic Cardiomyopathy
- 80.9 - Other Cardiomyopathy/NOS

## Hematologic

- 82.1 - Sickle Cell Anemia
- 82.9 - Other Hematologic Conditions including Thrombophilias/TTP/HUS/NOS

## Collagen Vascular/Autoimmune Diseases

- 83.1 - Systemic Lupus Erythematosus (SLE)
- 83.9 - Other Collagen Vascular Diseases/NOS

## Conditions Unique to Pregnancy

- 85.1 - Conditions Unique to Pregnancy (e.g., Gestational Diabetes, Hyperemesis, Liver Disease of Pregnancy)

## Injury

- 88.1 - Intentional (Homicide)
- 88.2 - Unintentional
- 88.9 - Unknown Intent/NOS

## Cancer

- 89.1 - Gestational Trophoblastic Disease (GTD)
- 89.3 - Malignant Melanoma
- 89.9 - Other Malignancies/NOS

## Cardiovascular Conditions (excluding cardiomyopathy, HDP, and CVA)

- 90.1 - Coronary Artery Disease/Myocardial Infarction (MI)/Atherosclerotic Cardiovascular Disease
- 90.2 - Pulmonary Hypertension
- 90.3 - Valvular Heart Disease Congenital and Acquired
- 90.4 - Vascular Aneurysm/Dissection (Non-Cerebral)
- 90.5 - Hypertensive Cardiovascular Disease
- 90.6 - Marfan Syndrome
- 90.7 - Conduction Defects/Arrhythmias
- 90.8 - Vascular Malformations Outside Head and Coronary Arteries
- 90.9 - Other Cardiovascular Disease, including CHF, Cardiomegaly, Cardiac Hypertrophy, Cardiac Fibrosis, Non-Acute Myocarditis/NOS

## Pulmonary Conditions (Excludes ARDS-Adult Respiratory Distress Syndrome)

- 91.1 - Chronic Lung Disease
- 91.2 - Cystic Fibrosis
- 91.3 - Asthma
- 91.9 - Other Pulmonary Disease/NOS

## Neurologic/Neurovascular Conditions (Excluding CVA)

- 92.1 - Epilepsy/Seizure Disorder
- 92.9 - Other Neurologic Diseases/NOS

## Renal Disease

- 93.1 - Chronic Renal Failure/End-Stage Renal Disease (ESRD)
- 93.9 - Other Renal Disease/NOS

## Cerebrovascular Accident (CVA) not Secondary to HDP

- 95.1 - Cerebrovascular Accident (Hemorrhage/Thrombosis/Aneurysm/Malformation) not Secondary to Hypertensive Disorders of Pregnancy

## Metabolic/Endocrine

- 96.2 - Diabetes Mellitus
- 96.9 - Other Metabolic/Endocrine Disorders/NOS

## Gastrointestinal Disorders

- 97.1 - Crohn's Disease/Ulcerative Colitis
- 97.2 - Liver Disease/Failure/Transplant
- 97.9 - Other Gastrointestinal Diseases/NOS

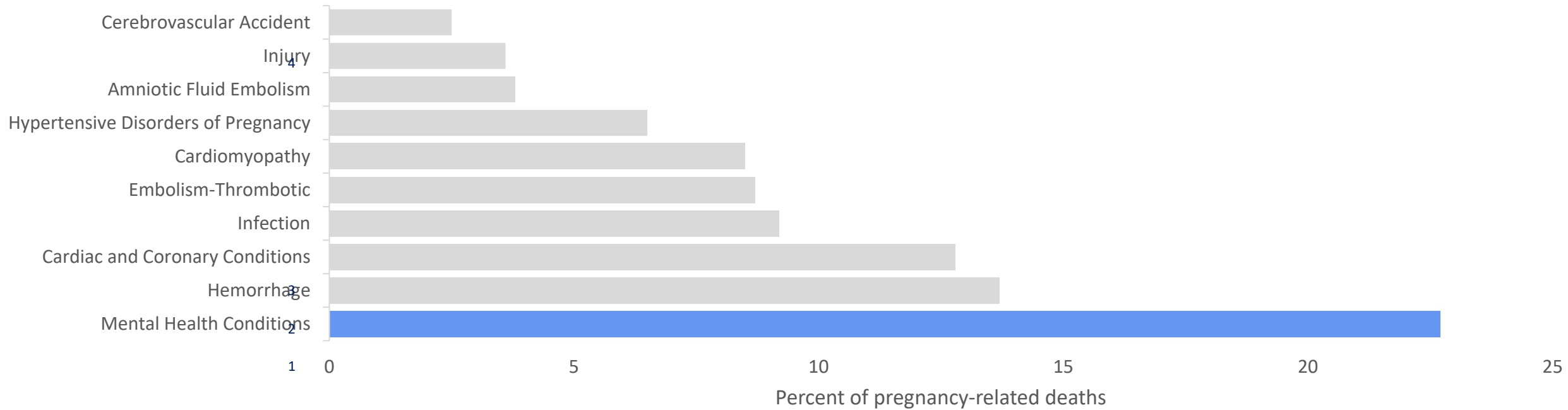
## Mental Health Conditions

- 100.1 - Depressive Disorder
- 100.2 - Anxiety Disorder (including Post-Traumatic Stress Disorder)
- 100.3 - Bipolar Disorder
- 100.4 - Psychotic Disorder
- 100.5 - Substance Use Disorder
- 100.9 - Other Psychiatric Conditions/NOS

## Unknown COD

- 999.1 - Unknown COD

# Most frequent underlying causes of pregnancy-related deaths\*



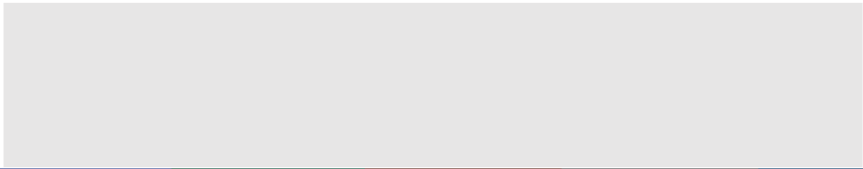
<sup>1</sup> Mental health conditions include deaths to suicide, unintentional or unknown intent overdose/poisoning related to substance use disorder, and other deaths determined by the MMRC to be related to a mental health condition, including substance use disorder

<sup>2</sup> Excludes aneurysms or cerebrovascular accident (CVA)

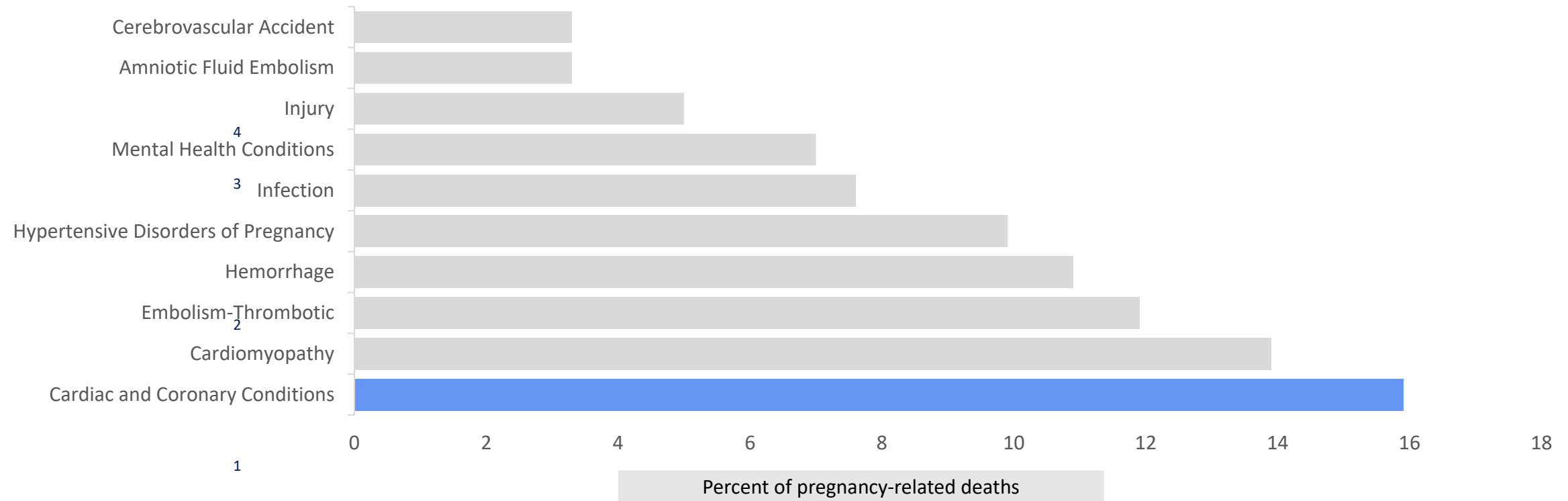
<sup>3</sup> Cardiac and coronary conditions include deaths to coronary artery disease, pulmonary hypertension, acquired and congenital valvular heart disease, vascular aneurysm, hypertensive cardiovascular disease, Marfan Syndrome, conduction defects, vascular malformations, and other cardiovascular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

<sup>4</sup> 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\*



<sup>1</sup> 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.

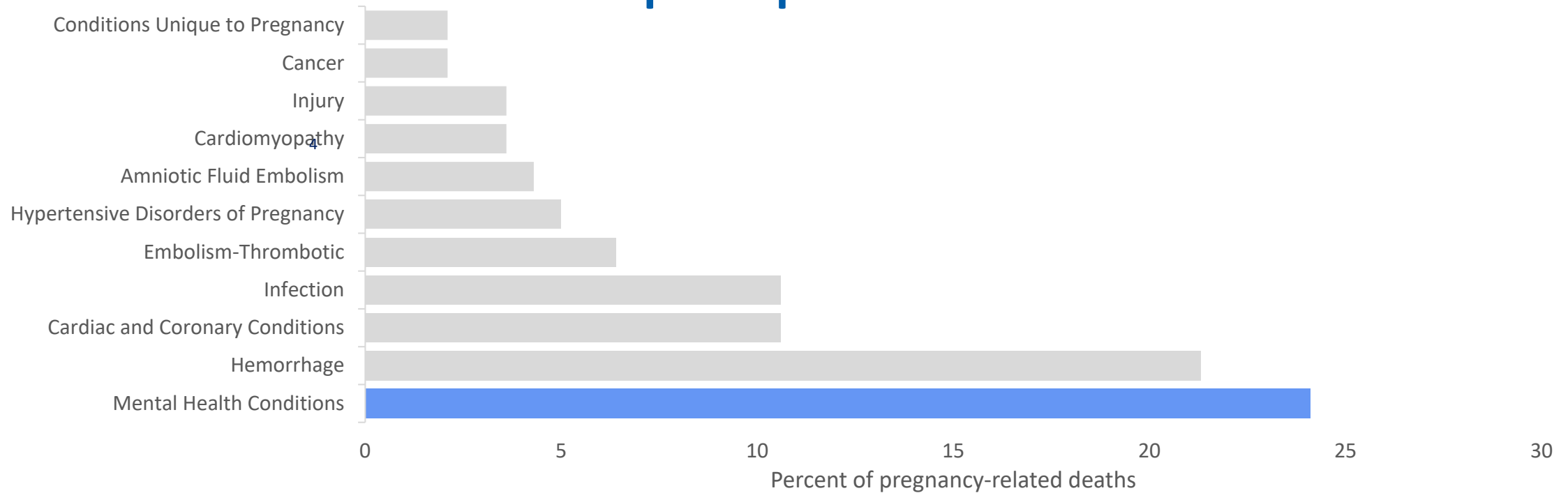
<sup>2</sup> Excludes aneurysms or cerebrovascular accident (CVA)

<sup>3</sup> 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

<sup>4</sup> 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\*



<sup>1</sup> 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

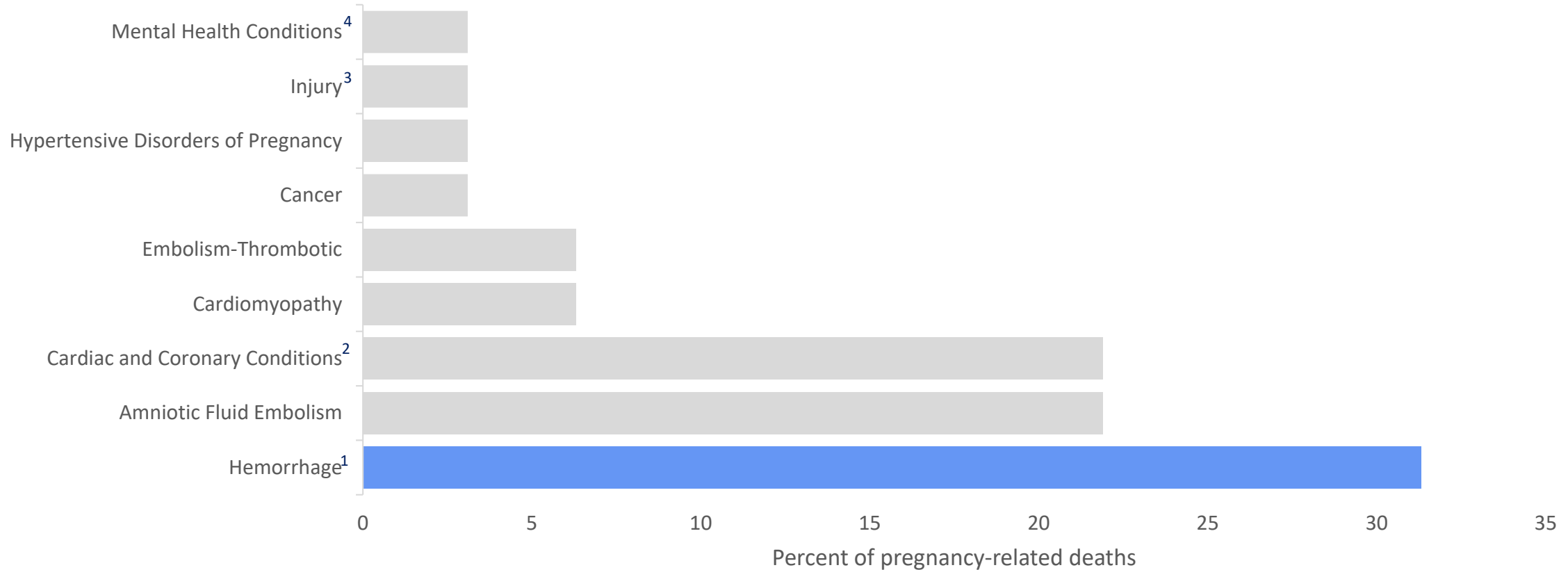
<sup>2</sup> Excludes aneurysms or cerebrovascular accident (CVA)

<sup>3</sup> 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.

<sup>4</sup> 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 10<sup>th</sup> 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\*



<sup>1</sup>Excludes aneurysms or cerebrovascular accident (CVA)

<sup>2</sup>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.

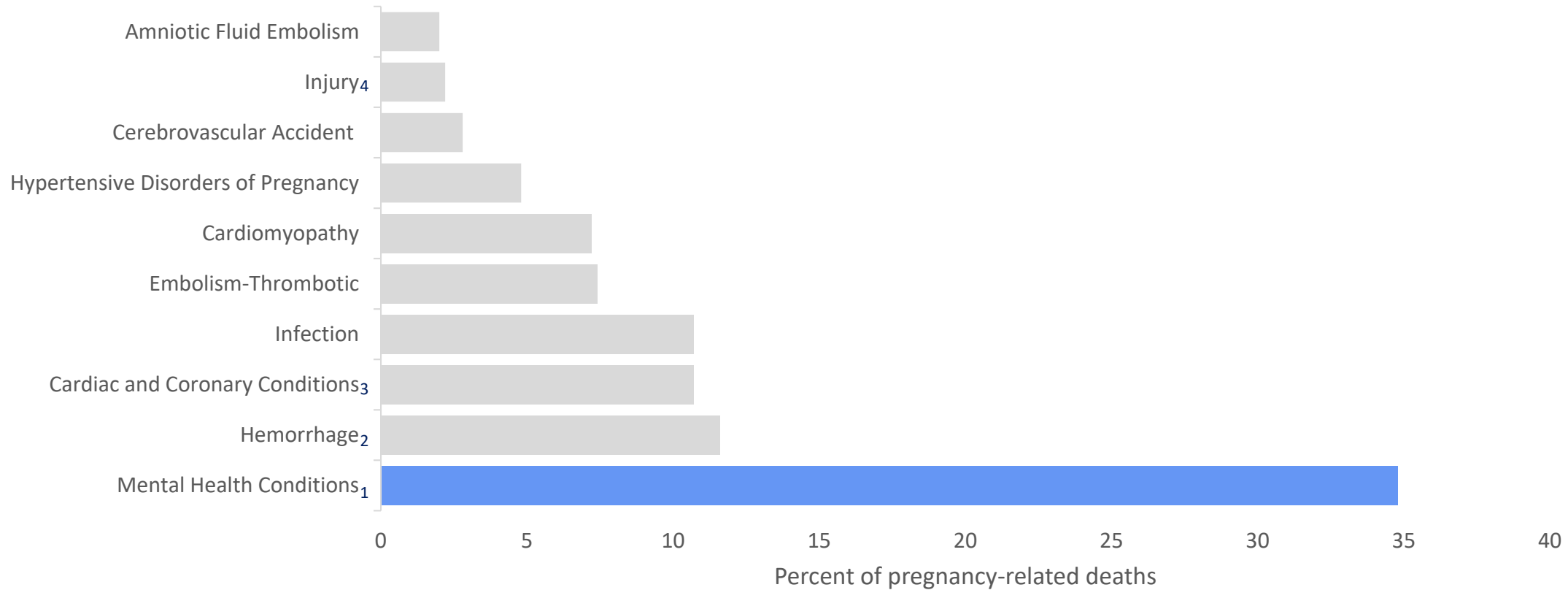
<sup>3</sup>Injury includes intentional injury (homicide), unintentional injury, including overdose/poisoning deaths not related to substance use disorder, and injury of unknown intent or not otherwise specified.

<sup>4</sup>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\*



<sup>1</sup> 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

<sup>2</sup> Excludes aneurysms or CVA

<sup>3</sup> 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.

<sup>4</sup> 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.

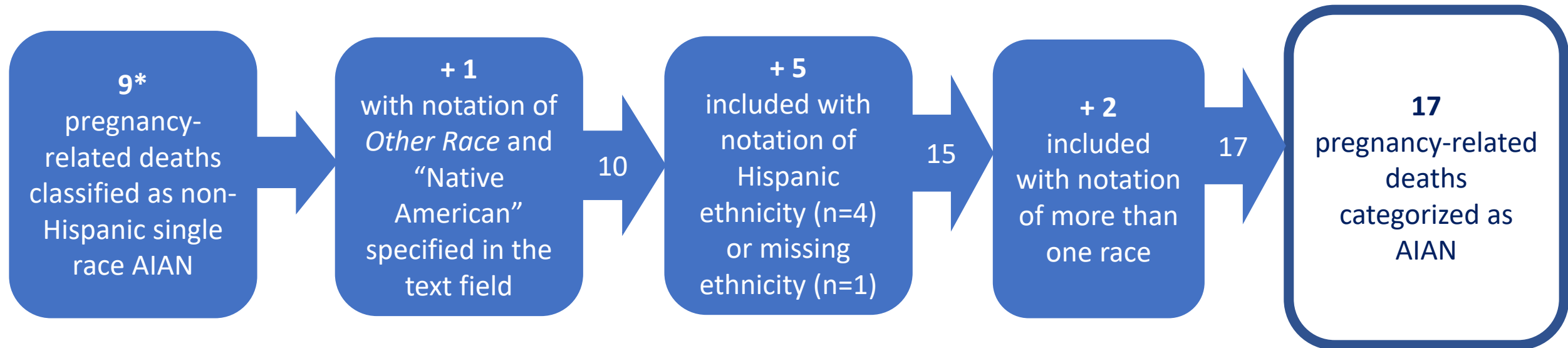
**84%** of pregnancy-related deaths with an MMRC preventability determination were determined to be **preventable**

A preventability determination was missing (n=4) or unable to determine (n=18) for 22 (2.2%) pregnancy-related deaths.



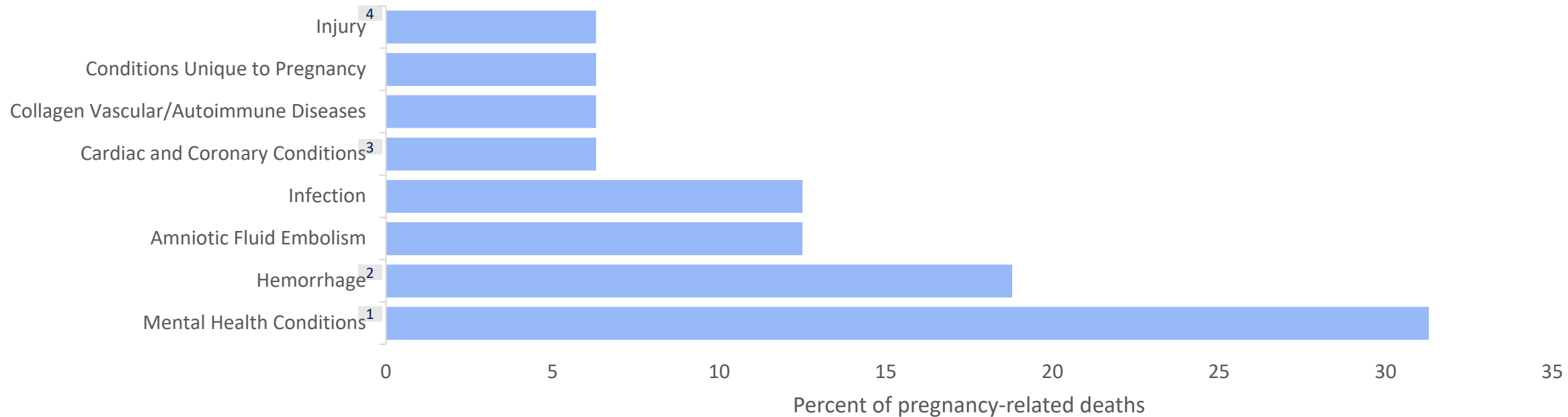
**Pregnancy-Related Deaths Among American  
Indian or Alaska Native Persons: Data from  
Maternal Mortality Review Committees in 36  
U.S. States, 2017–2019**

# Summary of an alternative approach to classifying pregnancy-related deaths among American Indian or Alaska Native persons



\* Consistent with previously described methods

# Underlying causes of pregnancy-related deaths among American Indian or Alaska Native persons (N=16\*)



<sup>1</sup> 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

<sup>2</sup> Excludes aneurysms or cerebrovascular accident (CVA)

<sup>3</sup> 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.

<sup>4</sup> 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:  
[ERASEMM@cdc.gov](mailto:ERASEMM@cdc.gov)



For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.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.

