# Update on Maternal Mortality

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# Objectives

1. Discuss epidemiology and trends in maternal mortality in the United States
2. Describe causes of mortality and risk factors

# Today's Talk

The Problem

- Definitions/Data: Maternal mortality in the United States

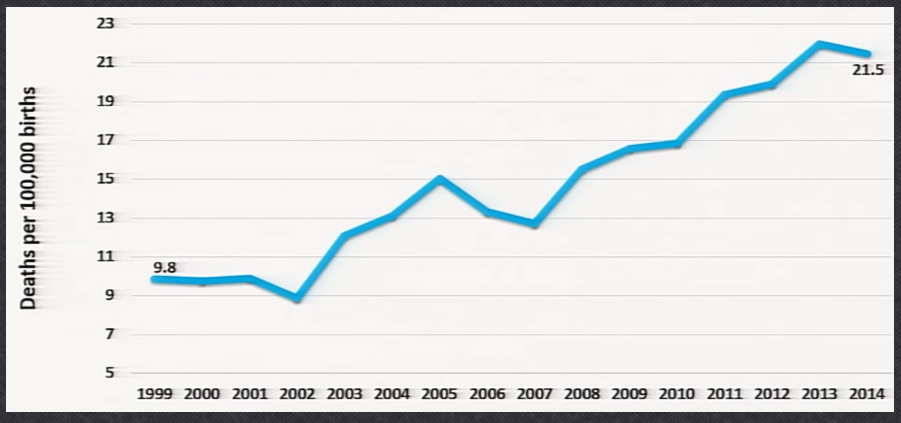
Maternal Mortality Review Committees (MMRCs)

- Goals, function, process
- Example: Cardiomyopathy

Data to Action

- State Initiatives: Past/Planned
- National Agenda

# Maternal Mortality Rate, United States 1999-2014




cdc.gov/nchs/nvss/deaths.htm

**700**

About 700 women die from pregnancy-related complications each year in the US.

**3 in 5**

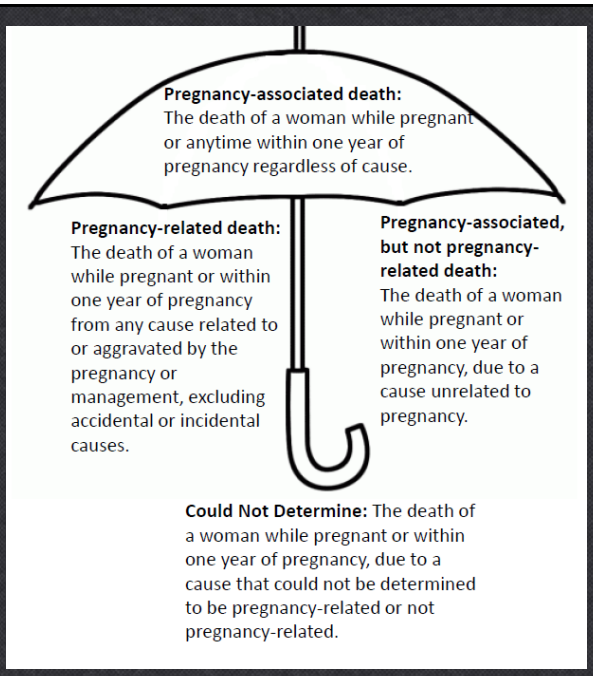
About 3 in 5 pregnancy-related deaths could be prevented.

**1 in 3**

About 1 in 3 pregnancy-related deaths occur 1 week to 1 year after delivery.

## DATA & DEFINITIONS

## DEFINITIONS

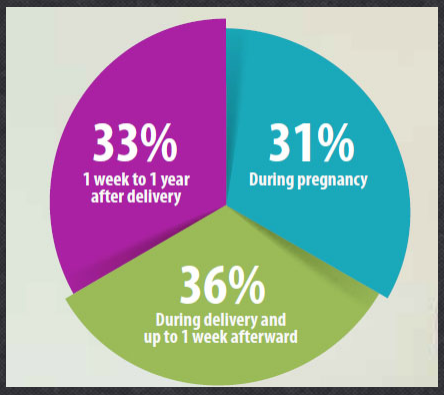



Centers for Disease Control and Prevention
The American College of Obstetricians and Gynecologists, 1986

## Leading Causes of Death

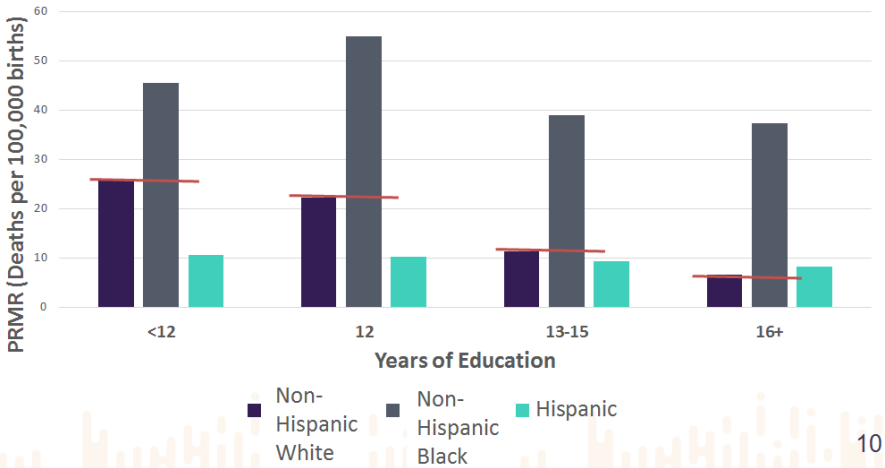
- Heart disease and stroke cause most deaths overall.
- Obstetric emergencies, like hemorrhage and amniotic fluid embolism, cause most deaths at delivery.
- In the week after delivery, hemorrhage, hypertension and infection are most common.
- Cardiomyopathy causes most deaths 1 week to 1 year after delivery.

# Timing of Maternal Deaths




Source: CDC Vital Signs—May, 2019

## Pregnancy-Related Mortality Ratio, 2011-2013
### by Race-Ethnicity and Education

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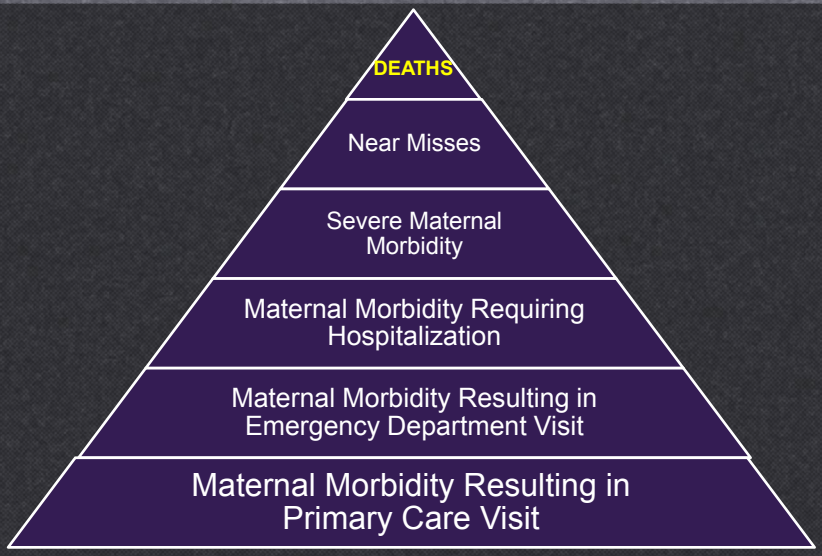
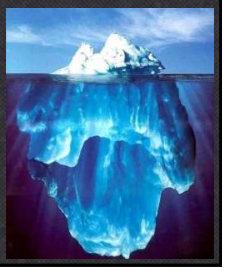
# Maternal mortality is the tip of the iceberg . . . . . .




## Severe Maternal Morbidity Among Delivery and Postpartum Hospitalizations in the United States

*William M. Callaghan, MD, MPH, Andreea A. Creanga, MD, PhD, and Elena V. Kuklina, MD, PhD*

- **Nationwide Inpatient Sample database**
- **Aim to capture indicators of organ system failure (25)**
- **Use mortality hospitalizations to identify morbidity not previously considered**
- **Length of stay >90$^{th}$ percentile for diagnosis-identified cases by mode of delivery**
  - **>2 days vaginal**
  - **>3 days repeat cesarean**
  - **>4 days primary cesarean**
- **Include postpartum admissions**



Callaghan et al. Obstet Gynecol 2012;120:1029-36

# Vital Statistics: The Basis for Identification

- Based on death certificates sent from the states
- Coded by ICD-10 coding rules
- Cause of death ("O" codes)
- Not all maternal deaths have a clinically meaningful code
- Checkbox indicating recent or current pregnancy status
  - Checkbox introduced in 2003; adopted in Ohio in 2007
- Linkage analysis
  - Death certificates linked to birth/fetal death certificates

# Sources of Data

| | CDC – National Center for Health Statistics (NCHS) | CDC – Pregnancy Mortality Surveillance System (PMSS) | Maternal Mortality Review Committees |
|---|---|---|---|
| Data Source | Death certificates | Death certificates linked to fetal death and birth certificates | Death certificates linked to fetal death and birth certificates, **medical records, social service records, autopsy, informant interviews…** |
| Time Frame | During pregnancy – 42 days | During pregnancy – 365 days | During pregnancy – 365 days |
| Source of Classification | ICD-10 codes | Medical epidemiologists (PMSS-MM) | **Multidisciplinary committees** (PMSS-MM) |
| Terms | Maternal death | Pregnancy associated, (Associated and) Pregnancy related, (Associated but) Not pregnancy related | Pregnancy associated, (Associated and) Pregnancy related, (Associated but) Not pregnancy related |
| Measure | Maternal Mortality Rate - # of Maternal Deaths per 100,000 live births | Pregnancy Related Mortality Ratio - # of Pregnancy Related Deaths per 100,000 live births | Pregnancy Related Mortality Ratio - # of Pregnancy Related Deaths per 100,000 live births |
| Purpose | Show national trends and provide a basis for international comparison | Analyze clinical factors associated with deaths, publish information that may lead to prevention strategies | **Understand medical and non-medical contributors to deaths, prioritize interventions that effectively reduce maternal deaths** |

Nicely reviewed in:
- Callaghan, William M. 2012. Overview of maternal mortality in the United States. Seminars in perinatology. 36; 1: 2-6.
- Berg C, et al. (Editors). Strategies to reduce pregnancy-related deaths: from identification and review to action. Atlanta: Centers for Disease Control and Prevention; 2001

# MMR DEFINITION

**A Maternal Mortality Review (MMR)…**

***…has 3 components that the surveillance data systems (NCHS and PMSS) don't have:***

1. **Robust DATA system dedicated to maternal mortality with multi-level data from multiple sources including non-traditional sources**
2. **A multidisciplinary committee of EXPERTS to review each case, define its preventability, and formulate prevention measures (Focus on prevention)**
3. **PH STAFF (usually a state department of public health team) to gather and manage the data, establish and guide the committee, communicate with stakeholders, and conduct and disseminate research and surveillance. (AKA, put it all together)**

**Source: CDC, 2019**

# The Review Process

## Maternal Mortality Review IS NOT…

- A mechanism for assigning blame or responsibility for any death
- A research study
- Peer review
- An institutional review
- A substitute for existing mortality and morbidity inquiries

Source: Berg, C., Danel, I., Atrash H., Zane, S. Bartlett, L. (Eds.). Strategies to reduce pregnancy-related deaths: From identification and review to action. Atlanta: Centers for Disease Control and Prevention; 2001

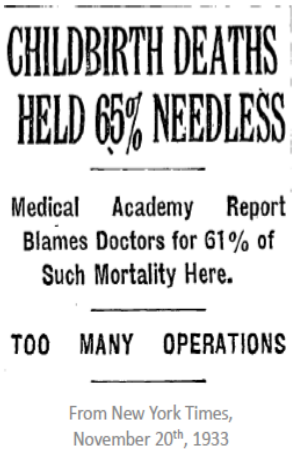
## History of Maternal Death Reviews

**1930**

- New York Academy of Medicine
- Philadelphia County Medical Society

**1968**: 44 states + Washington, DC

**2012**: ~ 18 states + Philadelphia



CHILDBIRTH DEATHS HELD 65% NEEDLESS

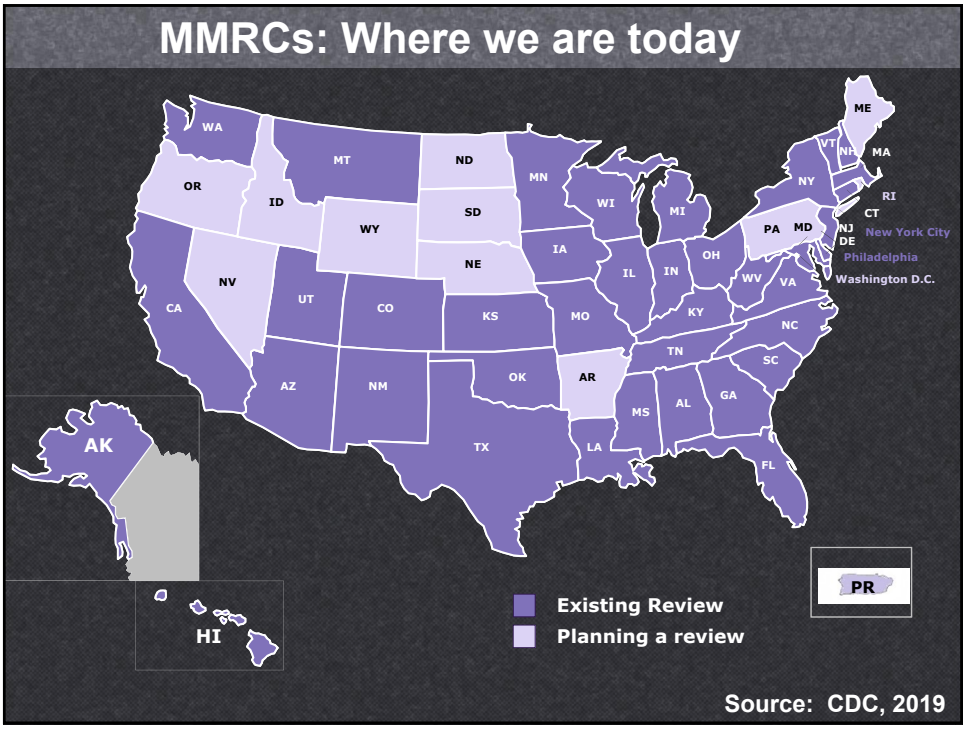
Medical Academy Report Blames Doctors for 61% of Such Mortality Here.

TOO MANY OPERATIONS

From New York Times, November 20th, 1933

**2018: 33 states and 3 cities**

## MMRCs: Where we are today




Source: CDC, 2019

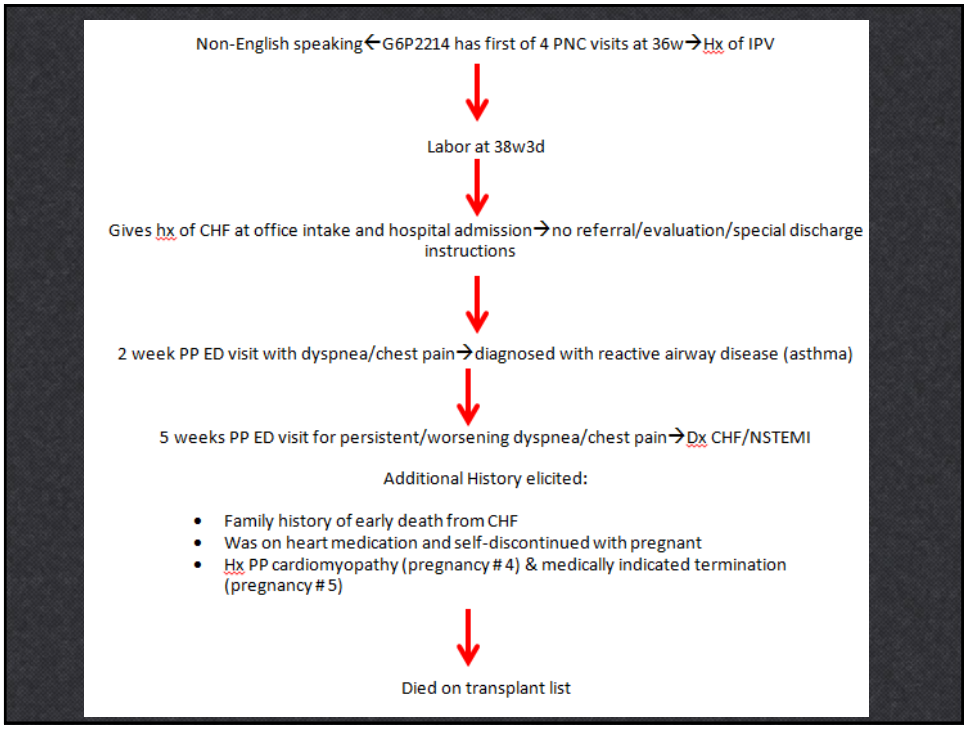
## The Process of Review

- Authorities and Protections
- Have the right people at the table
  - Ob/gyn, MFM, midwifery
  - Anesthesia
  - Forensic pathology
  - State and local health departments
  - Legal system and risk management
  - CFR, hospital administration, social work
- Identify cases
- Obtain pertinent records
- Prepare case summaries (de-identified)

## CASE REVIEW PROCESS: 6 Key Questions

- Identify cause(s) of death and contributing factors
- Determine relationship to pregnancy
- Focus on case issues with opportunity for improvement: could the outcome be altered? Was it preventable?
- Identify contributing factors
- Make recommendations and action steps: Consider not the individual case but systems improvements
- What is the level of impact from these actions?

## The Case




## 1. Was the Death Pregnancy-Related?

- **Definition: Death of a woman while pregnant or within one year of termination of pregnancy, regardless of duration and site of pregnancy, from any cause related to or aggravated by her pregnancy or its management**
- **Alternative Question: Would she have died if she hadn't been or recently been pregnant?**

## 2. What was the Cause of Death?

- Death certificates
  - Immediate
  - Underlying
  - Contributing
- Recommended
  - Underlying cause as categorized by the CDC-PMSS codes
    - Clinically meaningful
    - Consistent with most other MMRCs

## 3. Was the Death Preventable?

- Definition: A death is considered preventable if the committee determines the there was at least some chance of the death being averted by one or more reasonable changes to contributing factors
- Range of interpretations
  - What does reasonable mean? Feasible?
- Alternatively ask: Was there an Opportunity to Alter the Outcome?

# 3. Was the Death Preventable?

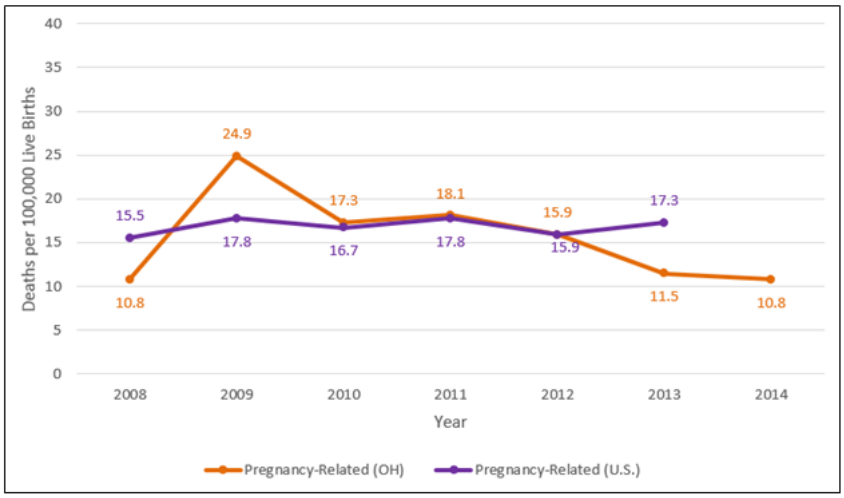
- **WHO:** Who could have prevented the occurrence?
  - Consider the level of contact with outside agency (example: health care or law enforcement)
    - Is it a one time contact or an on-going relationship?
- **WHAT:** Is there a program or an intervention that we can implement that would affect the chain of events that lead to this death?
  - How clear is the connection is between the inciting/contributing factor and the cause of death? Is it direct causation or an observed association?
- **WHEN:** Timeline of events
  - How far downstream is the consequence? How far upstream is the causation
  - When is the proposed intervention point?
    - Preventable during pregnancy
    - Preventable during 1-2 years before pregnancy (ie mental health, addiction, diabetes treatment, management of comorbidities)
    - Preventable over a decade or a lifetime (ie prevention of ACES, PTSD, addiction, obesity, and such)

# CONTRIBUTING FACTORS→ACTIONABLE RECOMMENDATIONS

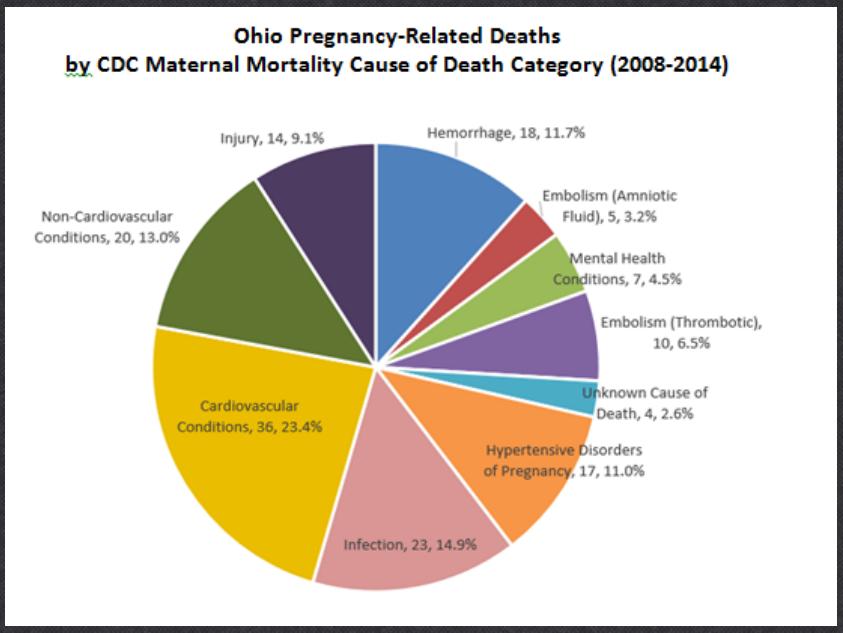
| CONTRIBUTING FACTOR LEVEL | CONTRIBUTING FACTOR (SEE BELOW) AND DESCRIPTION OF ISSUE | [Who?] should [do what?] [when?] RECOMMENDATIONS OF THE COMMITTEE |
|---|---|---|
| PATIENT/FAMILY | History of intimate partner violence (IPV) | Obstetric provider should screen for depression, IPV, housing stability and nutritional needs and provide referrals to supportive community resources |
| PROVIDER | Quality of care - Failure to perform risk assessment for cardiac hx and IPV; delayed diagnosis of cardio-myopathy/CHF; bias "pt compliance" | Obstetric providers should refer patients w/a reported cardiac condition or significant family history to cardiologist during PNC and postpartum |
| | | Obstetric providers are req'd to do anti-bias training |
| FACILITY | Policies/procedures - interpretive services | Facilities should implement and adhere to utilization of official translation services |
| SYSTEM | Unstable housing - transient housing | State office of community health should implement system-wide policy that prioritizes housing for pregnant women |
| | Access/financial - Late entry prenatal care | State should expand Medicaid coverage to women of reproductive age |
| COMMUNITY | Social support/isolation - Single mother / Marital Separation | Community and faith-based leaders should expand resources/capacity for IPV victims during pregnancy and postpartum |

# Data to action

**Ohio and U.S. Pregnancy-Related Mortality Ratios (2008-2014)**



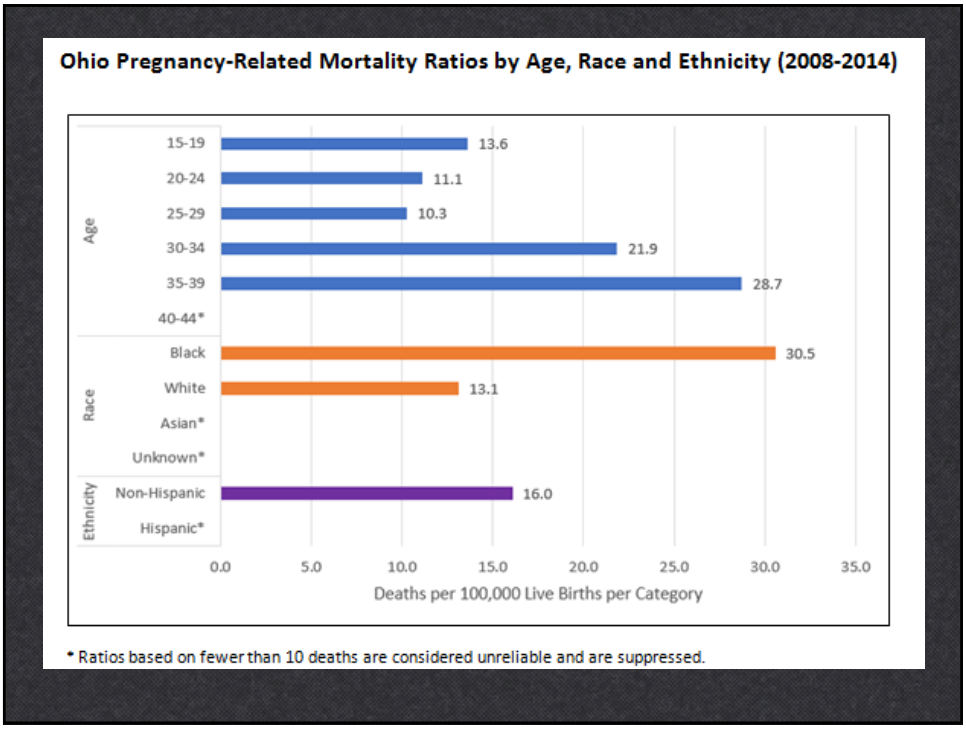

**Ohio Data Sources:** Ohio Department of Health Pregnancy-Associated Mortality Review and Bureau of Vital Statistics.
**U.S. Data Source:** Centers for Disease Control and Prevention Pregnancy Mortality Surveillance Sys5tem.
**Note:** 2014 U.S. pregnancy-related mortality ratio data are not yet available.




# Ohio: Maternal Deaths of Cardiac Origin

| CDC Maternal Mortality COD Codes, Cardiomyopathy | # |
|---|---|
| 80.1 Post-partum/peripartum cardiomyopathy | 12 |
| 80.9 Other cardiomyopathy/NOS | 6 |
| **Total** | **18** |

| CDC Maternal Mortality COD Codes, Cardiovascular Conditions | # |
|---|---|
| 90.1 Coronary artery disease/myocardial infarction (MI)/atherosclerotic cardiovascular disease | 9 |
| 90.2 Pulmonary hypertension | 3 |
| 90.4 Vascular aneurysm/dissection | 8 |
| 90.5 Hypertensive cardiovascular disease | 6 |
| 90.7 Conduction defects/arrhythmias | 8 |
| 90.9 Other cardiovascular disease/NOS | 5 |
| **Total** | **39** |




# ACTIONS TO IMPROVE DATE & REDUCE MATERNAL DEATHS

- Beta tested MMRDS (MMRIA precursor)
- Quality Improvement—Vital Statistics
  - Compared COD listed on DC to COD determined by PAMR, 2008-2011 cases to ascertain false positives
  - Participated in CDC checkbox pilot project
- Simulation Training for Obstetric Emergencies
  - Onsite trainings at 5 sites: 2014 (3), 2017 (2)
  - Train the Trainer sessions (4) for OB nurse educators: 2015 (2), 2017 (2)
  - Advanced Train the Trainer sessions: 2017 (2)
  - Patient Safety Webinar Series (2017)
- Participating in the AIM Opioid Use Disorder in Pregnant Women Collaborative

# At the Federal Level

**Preventing Maternal Deaths Act (HR 1318/S1112): Signed into law by President Trump**

- Help or assist states create/expand MMRCs
- Require DHHS to research ways to reduce disparities in maternal health outcomes

**CDC Partnership**

- MMRIA: A Common Language



# FUTURE DIRECTIONS

- Multi-year Ohio-specific report to be released
- Engage broad group of stakeholders
  - Comprehensive report
  - Facilitated town hall meeting
- Improve response to obstetric emergencies
  - Needs assessment survey
  - HTN in Pregnancy Pilot
  - Consider becoming an AIM state
- Build capacity at local level to prevent mortality and morbidity
- Improve quality and consistency of inter-conception care
- Build capacity for medical sub-specialists, including MFM, to provide services to HR women: telehealth

# IF YOU ARE:

**Health Care Providers**

- Help patients manage chronic conditions.
- Communicate with patients about warning signs.
- Use tools to flag warning signs early so women can receive timely treatment.

**Hospital Systems**

- Standardize coordination of care and response to emergencies.
- Improve delivery of quality prenatal and postpartum care.
- Train non-obstetric providers to consider recent pregnancy history.

# IF YOU ARE:

**States or Communities**

- Assess and coordinate delivery hospitals for risk-appropriate care.
- Support review of the causes behind every maternal death.

**Women and their Families**

- Know and communicate about symptoms of complications.
- Note pregnancy history any time medical care is received in the year after delivery.