# Exploring the Challenges of Maternal Mortality

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# Disclosures

- No disclosures

# Objectives

- List areas of health disparities that have been identified regarding maternal mortality.
- Be familiar with programs that have successfully reduced maternal mortality
- Describe areas for improvement in our practice of medicine to further reduce maternal mortality

# Definitions

- ***Maternal mortality*** = "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes"
- ***Maternal Mortality Ratio*** = maternal deaths per 100,000 live births
- ***Pregnancy-associated death:*** Death while pregnant or within one year of the end of the pregnancy, irrespective of cause
- ***Pregnancy-related death:*** Death during pregnancy or within one 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. Used in the U.S. only, this CDC measure is typically reported as a ratio per 100,000 births.

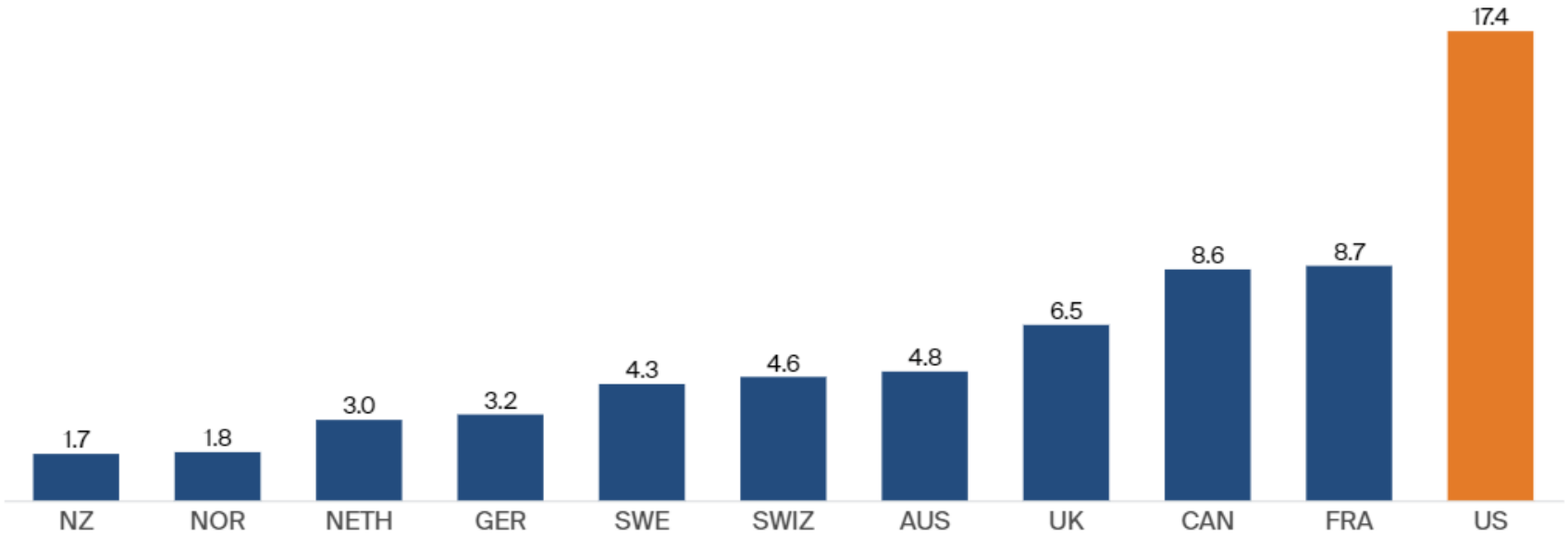
# Where does the US stand on Maternal Mortality on the world stage?

- The MMR in low income countries in 2017 was 462 per 100 000 live births versus 11 per 100 000 live births in high income countries according to WHO. Maternal mortality (who.int)
- US data show the maternal mortality rate for 2020 was 23.8 deaths per 100,000 live births compared with a rate of 20.1 in 2019. Maternal Mortality Rates in the United States, 2020 (cdc.gov)
- Countries with the best MMR include Italy, Poland and Norway with an MMR of 2.0 in 2017. Maternal mortality ratio (per 100 000 live births) (SDG 3.1.1) (who.int)
- Maternal mortality ratio (per 100 000 live births) (who.int)

Exhibit 1

# Maternal Mortality Ratios in Selected Countries, 2018 or Latest Year

*Deaths per 100,000 live births*




Download data

Notes: The maternal mortality ratio is defined by the World Health Organization as the death of a woman while pregnant or within 42 days of termination 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.

Data: OECD Health Data 2020, showing data for 2018 except 2017 for Switzerland and the UK; 2016 for New Zealand; 2012 for France.

Source: Roosa Tikkanen et al., *Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries* (Commonwealth Fund, Nov. 2020). https://doi.org/10.26099/411v-9255

Maternal Mortality Maternity Care US Compared 10 Other Countries | Commonwealth Fund

# Trends

- Between 2000 and 2017, the maternal mortality ratio dropped by about 38% worldwide.
- 94% of all maternal deaths occur in low and lower middle-income countries, many of which are preventable with skilled care.
- While most developing countries are seeing a decrease in maternal mortality, the US is seeing a rise.

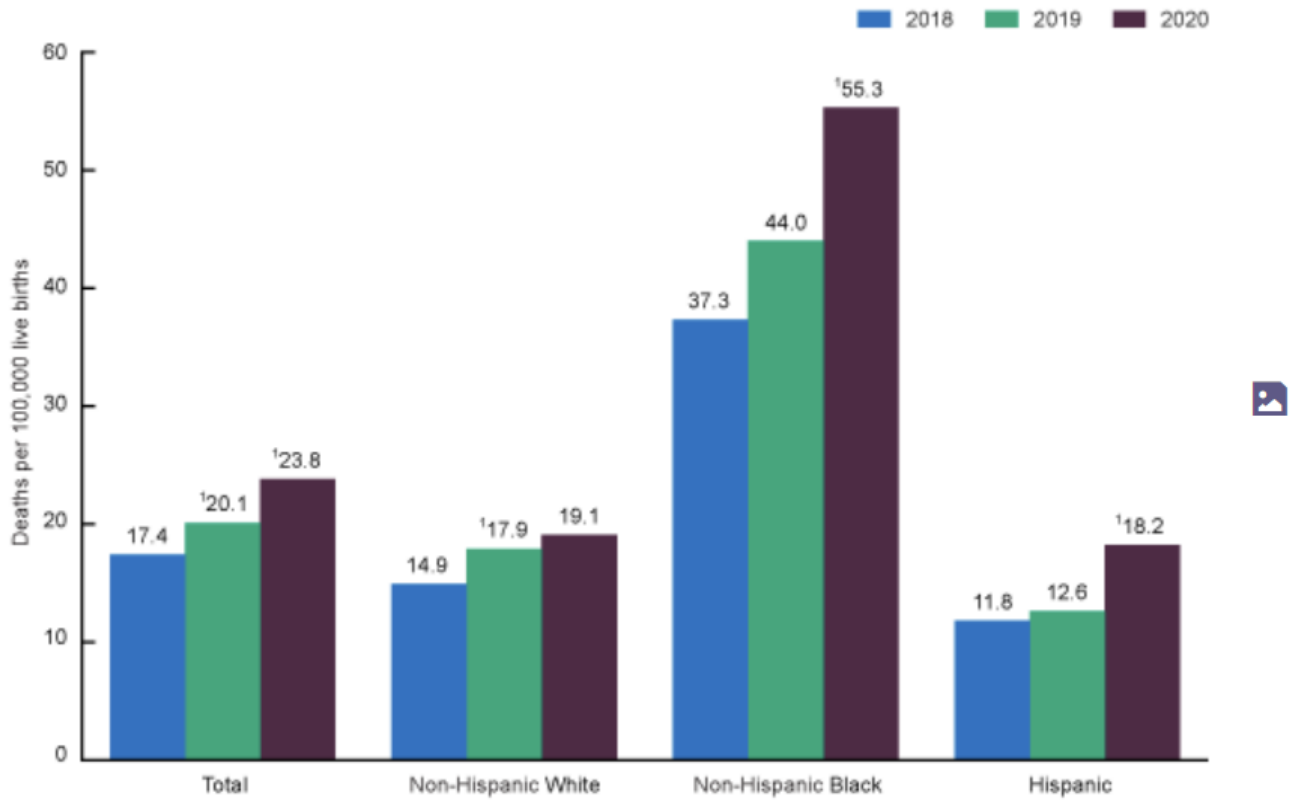
**Who? Why? When?**

Maternal mortality (who.int)

# Health Disparities

- Non-Hispanic blacks have the highest rate of maternal mortality, about 2.9 times higher than non-Hispanic whites.
- It is interesting to note that Hispanics have the lowest maternal mortality.
- One study connected the risk of maternal mortality to the patient's proximity to hospitals compared to the hospital's overall quality.
  - Howell, Elizabeth A., Natalia Egorova, Amy Balbierz, Jennifer Zeitlin, and Paul L. Hebert. "Site of Delivery Contribution to Black-White Severe Maternal Morbidity Disparity." *American journal of obstetrics and gynecology* 215, no. 2 (August 2016): 143–152.

Figure 1. Maternal mortality rates, by race and Hispanic origin: United States, 2018–2020




[1]Statistically significant increase in rate from previous year ($p < 0.05$).

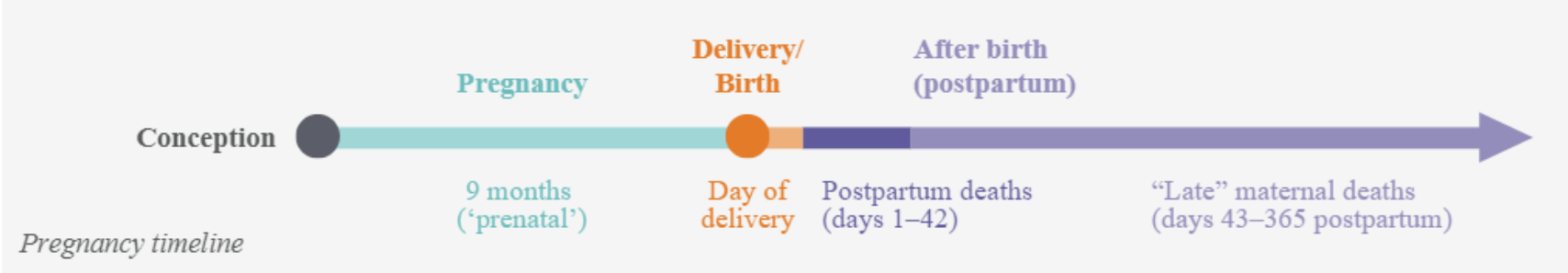
NOTE: Race groups are single race.

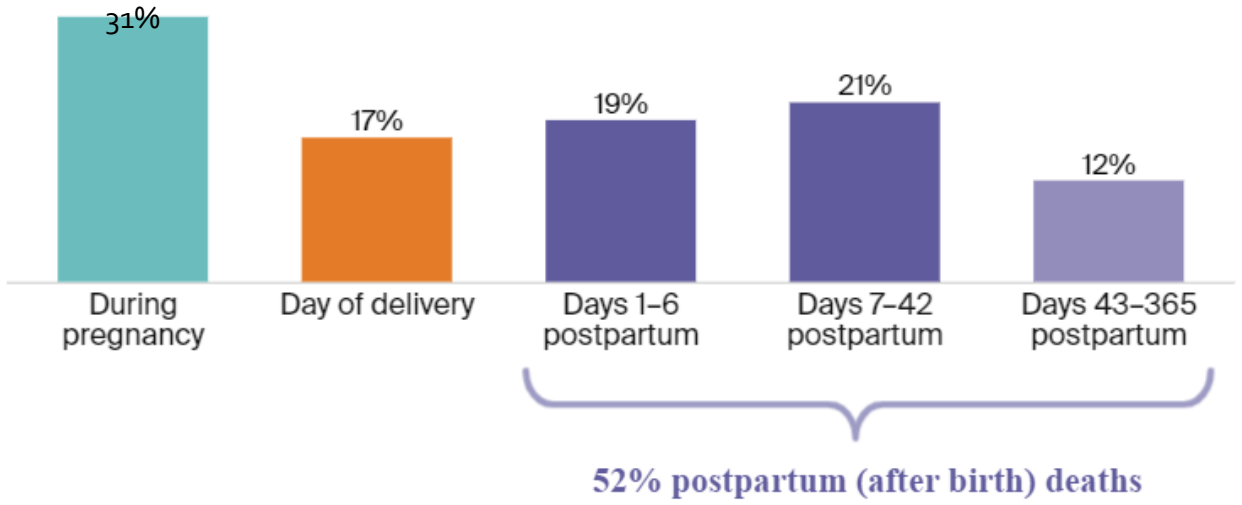
SOURCE: National Center for Health Statistics, National Vital Statistics System, Mortality.

Maternal Mortality Maternity Care US Compared 10 Other Countries | Commonwealth Fund

Exhibit 2

# Timing of U.S. Maternal and Pregnancy-Related Deaths, 2011–2015




Data: Centers for Disease Control and Prevention Pregnancy-Related Mortality Surveillance data from: Emily E. Petersen et al., "Vital Signs: Pregnancy-Related Deaths, United States, 2011–2015, and Strategies for Prevention, 13 States, 2013–2017," *Morbidity and Mortality Weekly Report* 68, no. 18 (May 10, 2019): 423–29.

Source: Roosa Tikkanen et al., *Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries* (Commonwealth Fund, Nov. 2020). https://doi.org/10.26099/411v-9255

Maternal Mortality Maternity Care US Compared 10 Other Countries | Commonwealth Fund

Table 3. Leading underlying causes of pregnancy-related deaths, overall and by race-ethnicity, data from 14 maternal mortality review committees, 2008-2017.*

| | Total | | non-Hispanic Black | | non-Hispanic White | |
|---|---|---|---|---|---|---|
| Condition | N | % | n | % | n | % |
| Cardiovascular Conditions† | 58 | 13.8 | 22 | 13.9 | 27 | 13.4 |
| Hemorrhage | 55 | 13.1 | 17 | 10.8 | 27 | 13.4 |
| Infection | 48 | 11.4 | 16 | 10.1 | 25 | 12.4 |
| Embolism‡ | 40 | 9.5 | 16 | 10.1 | 16 | 8.0 |
| Cardiomyopathy | 39 | 9.3 | 22 | 13.9 | 16 | 8.0 |
| Mental Health Conditions§ | 37 | 8.8 | — | — | 30 | 14.9 |
| Preeclampsia and Eclampsia | 35 | 8.3 | 18 | 11.4 | 13 | 6.5 |

*Specific cause of death was missing or listed as "Unknown" for a total of 34 (7.5%) pregnancy-related deaths. Numbers are not presented when cell size is <5. Deaths among women not classified as non-Hispanic Black or non-Hispanic White are included in the total number of deaths.

Maternal Mortality Maternity Care US Compared 10 Other Countries | Commonwealth Fund

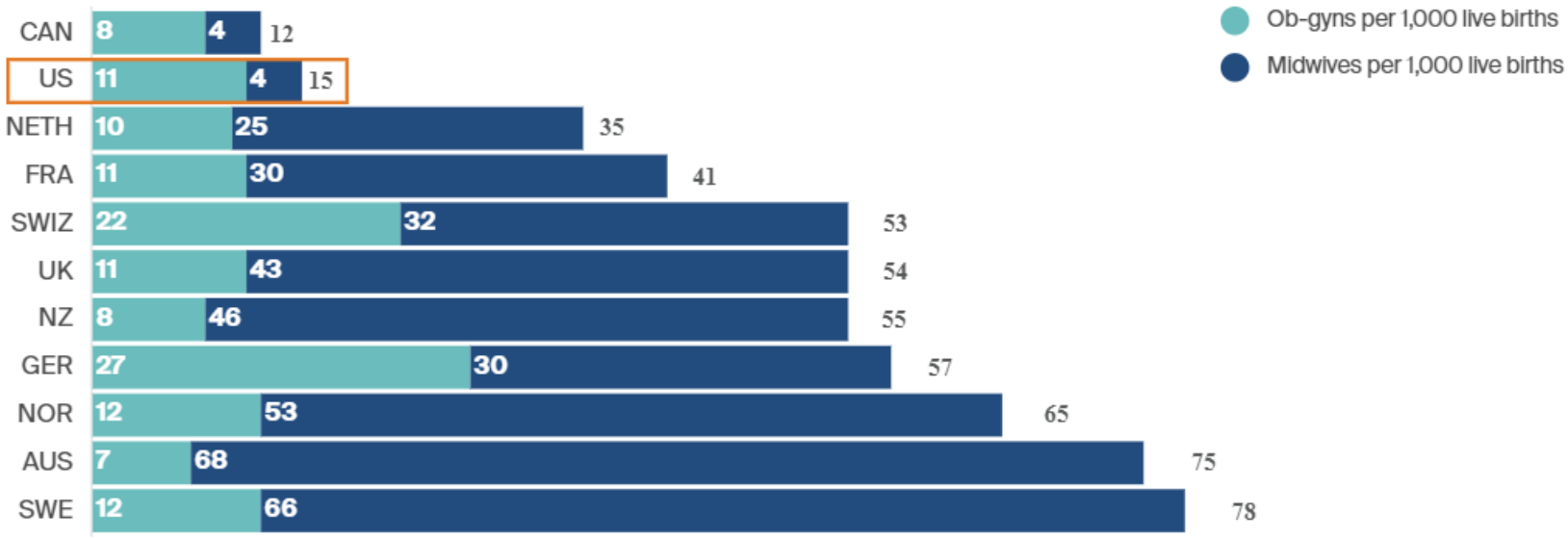
# Strategies for Change

- WHO recommends midwifery care as an evidence-based solution to improve the following outcomes:
  - Maternal (mother) and neonatal (baby) outcomes, including lower maternal mortality and morbidity and reduced stillbirths and preterm births.
  - More efficient use of health system resources, including lower use of unnecessary and potentially harmful interventions like C-sections for low-risk deliveries, epidurals, and instrument-assisted births.
  - Improved patient satisfaction and maternal psychosocial well-being outcomes, including those for postpartum depression.

Exhibit 3

# Maternal Care Workforce: Supply of Midwives and Ob-Gyns, 2018 or Latest Year

*Number of providers (head counts) per 1,000 live births**




Download data

* The "sum" figure shown to the right of horizontal bars may not reflect arithmetic sum of figures shown for Ob-Gyn and midwife providers because calculations were performed on exact figures, while the figure presents rounded figures.

Data: OECD Health Data 2020, representing "practicing midwives" except: Canadian data reflect "professionally active" midwives; U.S. data reflect midwives "licensed to practice." Data for professionals "licensed to practice" tend to be higher than data for "professionally active," while numbers of "practicing" professionals tend to be the lowest. Data for 2018 except 2017 for Australia, Canada, Sweden, and 2015 for the U.S. Reflects midwifery professionals and midwifery associate professionals as defined by the International Standard Classification of Occupations (ISCO-08 codes 2222 and 3222, respectively). U.S. data reflect certified nurse-midwives (CNM), certified midwives (CM), and certified professional midwives (CPM) by the AMCB, and the NARM, but excludes noncertified midwives (i.e., lay midwives). "Sum" does not reflect total maternity care workforce, since primary care physicians/family practitioners also deliver some care in many countries (not shown here).

Maternal Mortality Maternity Care US Compared 10 Other Countries | Commonwealth Fund

# Medicaid Expansion

- Adoption of Medicaid Expansion Is Associated with Lower Maternal Mortality - PubMed (nih.gov)
- Conclusions: Although maternal mortality overall continues to increase in the United States, the maternal mortality ratio among Medicaid expansion states has increased much less compared with nonexpansion states. These results suggest that Medicaid expansion could be contributing to a relative decrease in the maternal mortality ratio in the United States. The decrease in the maternal mortality ratio is greater when maternal mortality estimates include late maternal deaths, suggesting that sustained insurance coverage after childbirth as well as improved preconception coverage could be contributing to decreasing maternal mortality.

# Louisiana Perinatal Quality Collaborative

- Louisiana was 47th out of 48 states for maternal mortality in 2018.
- Rates of mortality among blacks was 4 times higher than whites.
- The Louisiana Perinatal Quality Collaborative (LaPQC) was launched with a goal of decreasing severe maternal morbidity by 20% in two years.
- In 2020, the state had surpassed the goal in maternal hemorrhage, reducing severe morbidity by 35%.
- Morbidity due to hypertensive disorders had decreased 12% overall but had increased 8% in black patients.
- Louisiana Department of Health reports sustained improvements in reducing maternal morbidity | La Dept. of Health

# California Pregnancy Mortality Surveillance System (CA-PMSS)

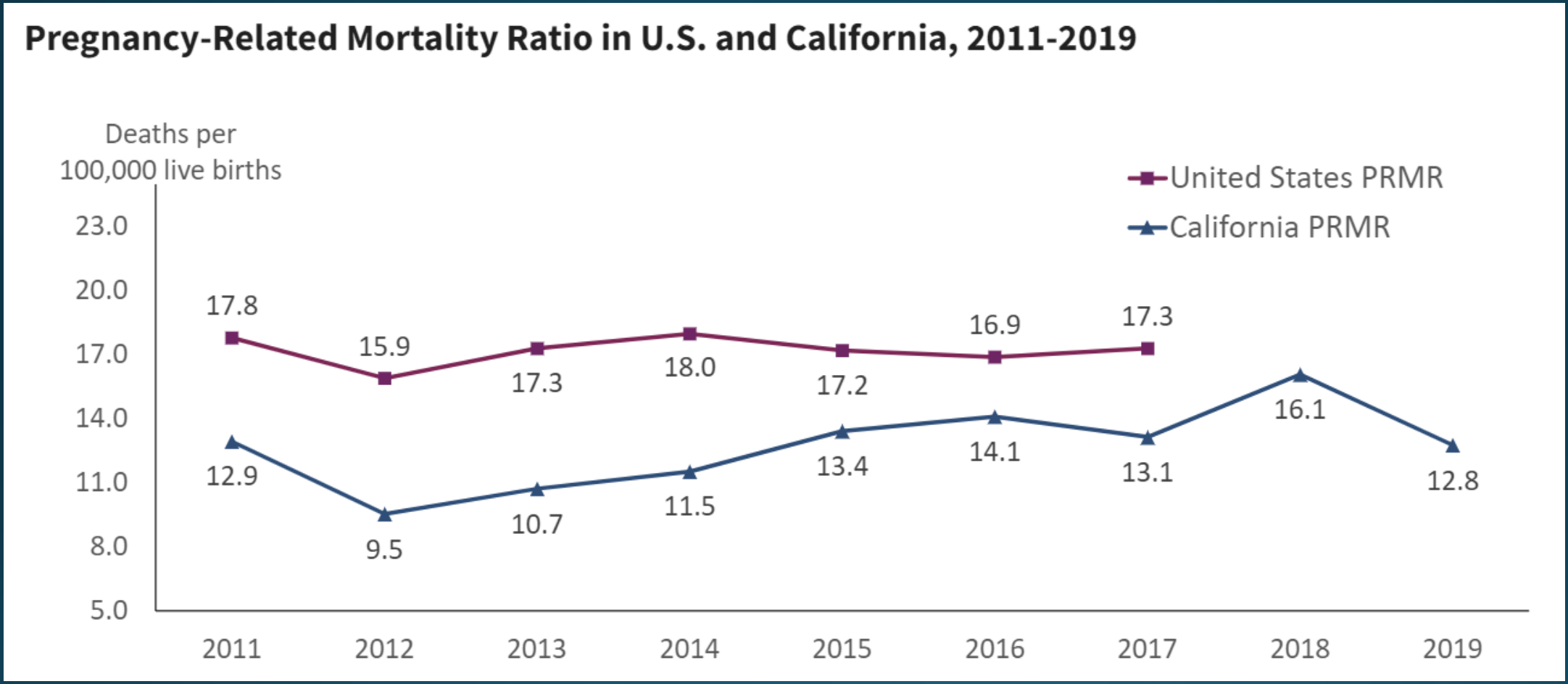
- CA-PMSS is a statewide surveillance of deaths among Californians who were pregnant within the prior year.
- In addition to surveillance, California has developed a number of programs to support pregnant women and improve outcomes.

# California Supporting Programs

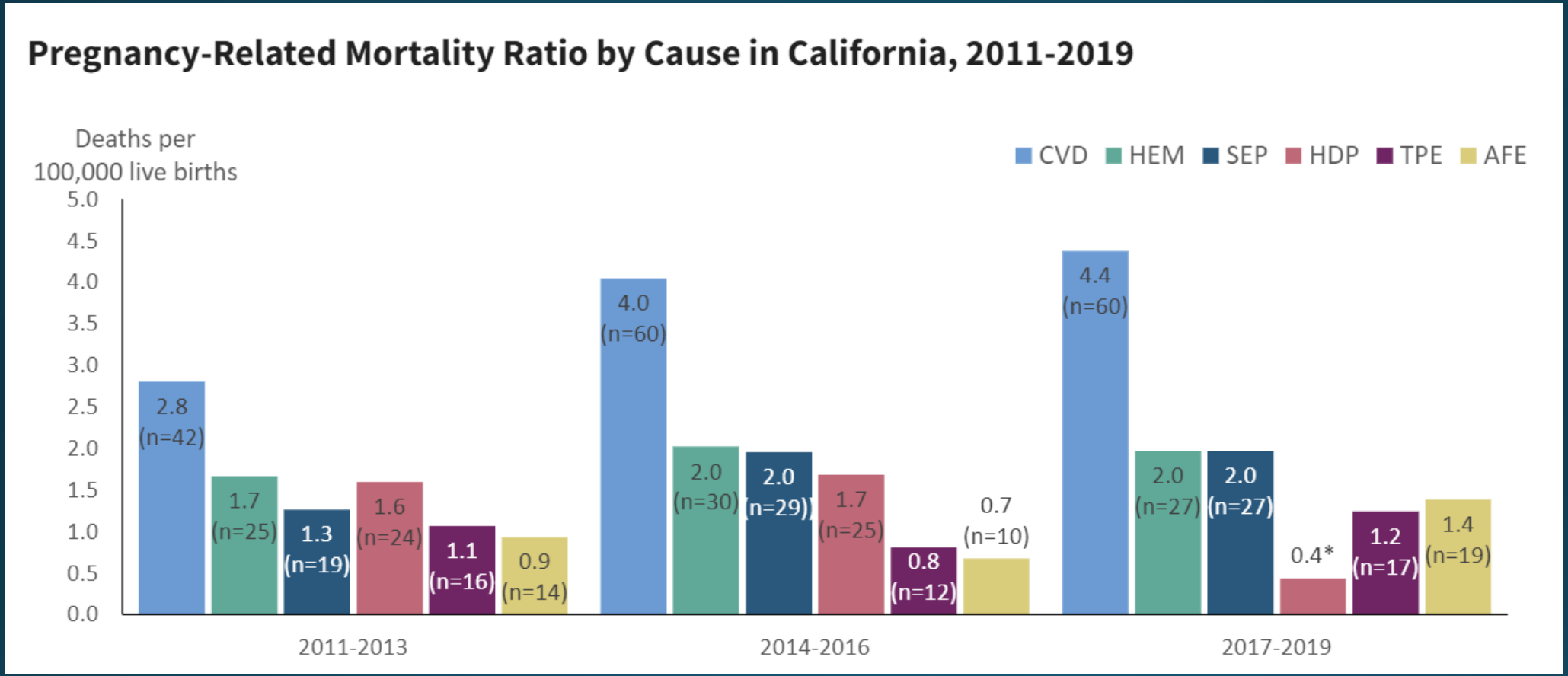
- Pregnancy-Related Mortality Dashboard
- Pregnancy-Associated Mortality Review
- Black Infant Health Program
- Perinatal Equity Initiative
- Perinatal Health Equity Outreach and Education Toolkit
- CDAPP Sweet Success
- California Home Visiting Program
- Maternal Mental Health
- Opioids + Pregnancy

# Initiatives to Reduce Health Disparities

- Black Infant Health Program is an evidence-informed intervention with a group-based approach. Provides:
  - Childcare for BIH participants
  - Door-to-door transportation for participants
  - One-on-one case management-only option for participants who are unable to attend BIH group sessions.
- Perinatal Equity Initiative
  - Funding in 11 counties to implement at least two of five public health interventions with evidence-based promise in reducing racial health disparities in birth outcomes among Black people.




The California Pregnancy Mortality Surveillance System




Abbreviations: CVD = Cardiovascular disease; Hem = Hemorrhage; Sepsis = Sepsis or infection; HDP = Hypertensive disorders of pregnancy; TPE = Thrombotic pulmonary embolism; AFE = Amniotic fluid embolism.

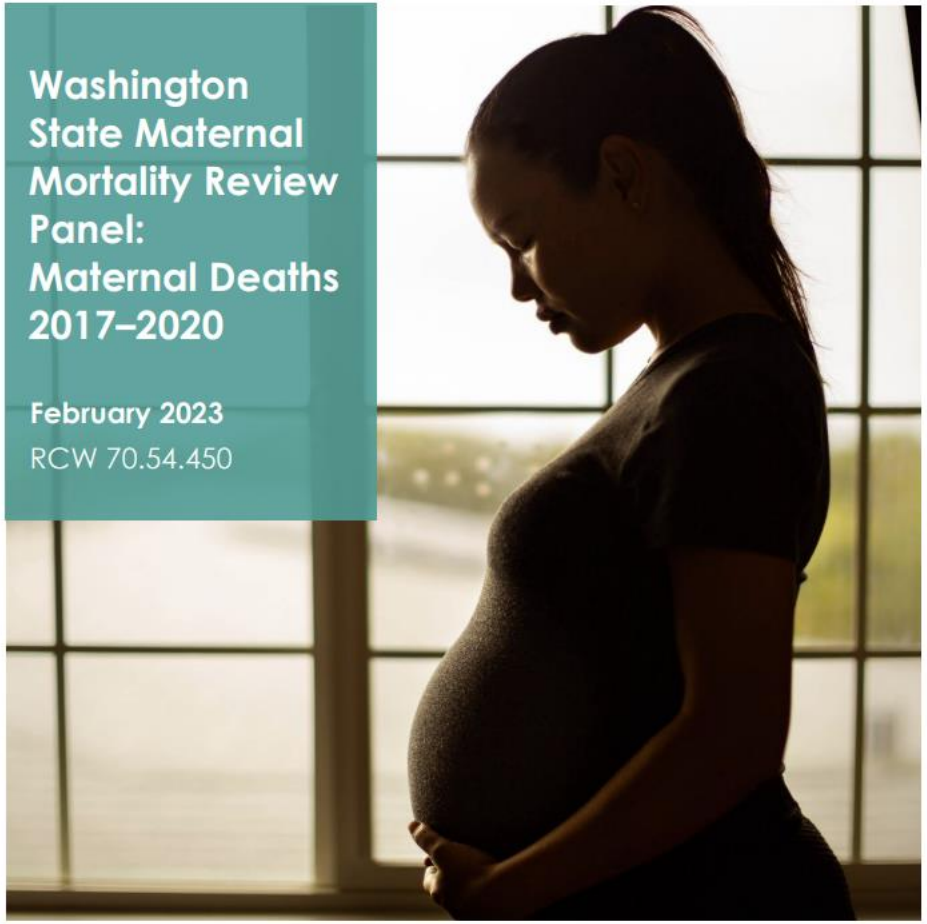
The California Pregnancy Mortality Surveillance System

Report to the Legislature

# Washington State Maternal Mortality Review Panel: Maternal Deaths 2017–2020

**February 2023**

RCW 70.54.450



Prepared by the

**Prevention and Community Health Division**

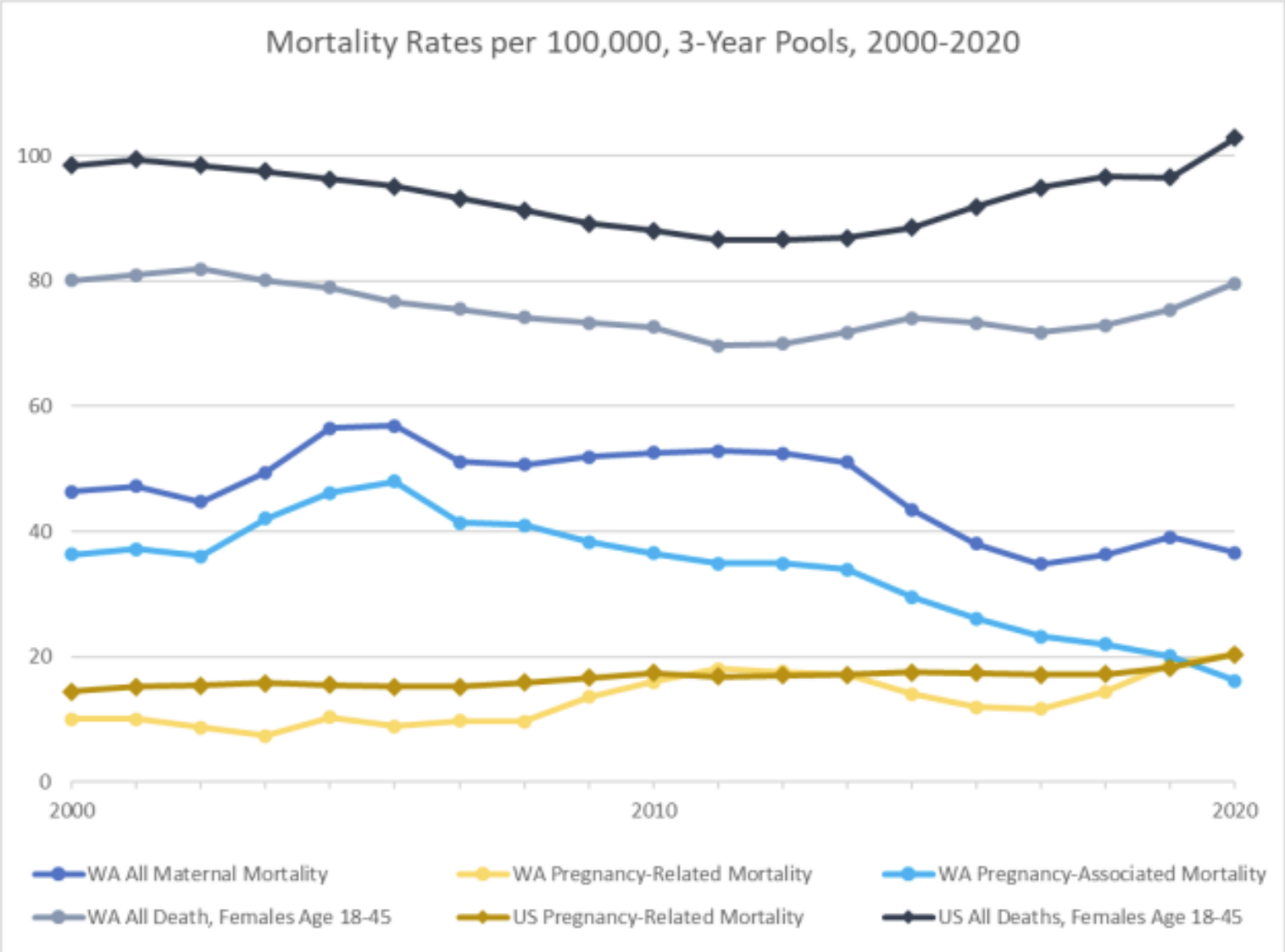
Washington State Department of HEALTH

Washington State Maternal Mortality Review Panel: Maternal Deaths 2017-2020

# Washington 2017-2020 Report

- Maternal mortality was not increasing like it was nationally
- The leading underlying cause of death among pregnancy-related deaths (N=30) were behavioral health conditions, including suicide and overdose (30%), hemorrhage (20%) and hypertensive disorders in pregnancy (10%)
- The pregnancy-related death ratio was 11.2 deaths per 100,000 live births
- The majority of pregnancy-related deaths occurred during pregnancy or delivery (30%), or within 42 days after the end of pregnancy (35%)
- Conclusion was that 60% of the pregnancy-related deaths were preventable.

**Figure 3: Mortality Rate (deaths per 100,000), Washington State and United States, 2000–2020**




Washington State Maternal Mortality Review Panel: Maternal Deaths 2017-2020

## Table A1: Counts, Maternal Mortality Rate (deaths per 100,000 live births) and 95% Confidence Limits for Rate for Pregnancy-Associated Deaths and Select Subgroups, Washington State, 2014-2020

| | | Pregnancy-Associated Deaths | | | All Pregnancy-Related Deaths | | | Pregnancy-Associated Deaths Due to Suicide | | | Pregnancy-Associated Deaths Due to Accidental Substance Overdose | | | Total Live Births |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Count | Rate* | 95% CI+ | Count | Rate* | 95% CI+ | Count | Rate* | 95% CI+ | Count | Rate* | 95% CI+ | |
| *All People* | | 224 | 37 | 32, 42 | 97 | 16 | 13, 19 | 19 | 3 | 2, 5 | 23 | 4 | 2, 5 | 609,624 |
| *Maternal Age* | <25 | 52 | 41 | 31, 53 | 18 | 14 | 8, 21 | 4 | 3 | 1, 7 | 7 | 6 | 2, 10 | 127,259 |
| | 25-29 | 43 | 25 | 18, 32 | 15 | 9 | 5, 13 | 2 | 1 | 0, 3 | 4 | 2 | 1, 5 | 175,002 |
| | 30-34 | 70 | 37 | 29, 47 | 33 | 18 | 12, 24 | 7 | 4 | 1,7 | 10 | 5 | 3, 9 | 187,793 |
| | 35-40 | 44 | 45 | 33, 59 | 23 | 24 | 15, 34 | 4 | 4 | 1, 9 | 2 | 2 | 0, 6 | 97,795 |
| | 40+ | 15 | 69 | 39, 109 | 8 | 37 | 16, 67 | 2 | 9 | 1, 26 | 0 | 0 | 0 | 21,622 |
| *Race/Ethnicity* | Hispanic | 40 | 36 | 26, 48 | 21 | 19 | 12, 28 | 1 | 1 | 0, 3 | 2 | 2 | 0, 5 | 112,034 |
| | Black | 22 | 78 | 49, 114 | 10 | 36 | 17, 61 | 2 | 7 | 1, 20 | 2 | 7 | 1, 20 | 28,057 |
| | White | 110 | 31 | 25, 37 | 46 | 13 | 9, 17 | 11 | 3 | 2, 5 | 15 | 4 | 2, 7 | 356,028 |
| | American Indian/ Alaska Native | 22 | 263 | 165, 384 | 7 | 84 | 34, 156 | 0 | 0 | 0 | 4 | 48 | 13, 105 | 8,353 |
| | Asian American | 14 | 23 | 13, 37 | 5 | 8 | 3, 17 | 3 | 5 | 1, 12 | 0 | 0 | 0 | 60,669 |
| | Native Hawaiian/ Pacific Islander | 7 | 85 | 34, 158 | 4 | 48 | 13, 106 | 0 | 0 | 0 | 0 | 0 | 0 | 8,261 |
| | Multiple race | 8 | 31 | 13, 56 | 4 | 16 | 4, 34 | 2 | 8 | 1, 22 | 0 | 0 | 0 | 25,734 |
| | Not Specified | 1 | 10 | 0, 35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10,487 |
| *Insurance* | Medicaid | 157 | 66 | 56, 77 | 66 | 28 | 22, 35 | 12 | 5 | 3, 8 | 17 | 7 | 4, 11 | 236,921 |
| | Private Insurance | 50 | 16 | 12, 20 | 24 | 8 | 5, 11 | 7 | 2 | 1, 4 | 4 | 1 | 0, 3 | 316,349 |
| | Other | 8 | 20 | 9, 36 | 6 | 15 | 6, 29 | 0 | 0 | 0 | 0 | 0 | 0 | 39,865 |
| | Unknown/None | 9 | 55 | 25, 96 | 1 | 6 | 0, 22 | 0 | 0 | 0 | 2 | 12 | 1, 34 | 16,488 |
| *Residence* | Urban | 187 | 34 | 30, 40 | 82 | 15 | 15 | 17 | 3 | 2, 5 | 20 | 4 | 2, 5 | 543,000 |
| | Rural | 37 | 57 | 40, 77 | 15 | 23 | 23 | 2 | 3 | 0, 9 | 3 | 5 | 1, 11 | 64,833 |

*Rate is per 100,000 live births

+95% CI calculated using Gamma method

Washington State Maternal Mortality Review Panel: Maternal Deaths 2017-2020

# Recommendations to reduce mortality

UNDO RACISM & BIAS

1. Address racism, discrimination, bias, and stigma in perinatal care.

ADDRESS MENTAL HEALTH & SUBSTANCE USE DISORDER

2. Increase access to mental health and substance use disorder prevention, screening, and treatment for pregnant and parenting people.

ENHANCE HEALTH CARE QUALITY AND ACCESS

3. Expand equitable and high-quality health care by improving care integration, expanding telehealth services, and increasing reimbursement.

STRENGTHEN CLINICAL CARE

4. Strengthen the quality and availability of perinatal clinical and emergency care that is comprehensive, coordinated, culturally appropriate, and adequately staffed.

MEET BASIC HUMAN NEEDS

5. Meet basic needs of pregnant and parenting people by prioritizing access to housing, nutrition, income, transportation, child care, care navigation, and culturally relevant support services.

ADDRESS & PREVENT VIOLENCE

6. Prevent violence in the perinatal period through survivor-centered and culturally appropriate coordinated services.

Washington State Maternal Mortality Review Panel: Maternal Deaths 2017-2020

# Finland Retrospective Population Study

- Decreasing mortality during pregnancy and for a year after while mortality after termination of pregnancy remains high: a population-based register study of pregnancy-associated deaths in Finland 2001-2012 - PubMed (nih.gov)
- Results: The age-adjusted mortality rate during pregnancy and within 1 year after the end of pregnancy was 28.4/100 000 pregnancies, and it had significantly decreased compared with the period 1987-2000 [risk ratio (RR) 0.75 (95% CI, 0.65-0.88)]. Mortality in non-pregnant fertile-age females was 48.1/100 000 person-years. Mortality for diseases and medical conditions during and after pregnancy decreased by 26% [RR 0.74 (95% CI, 0.59-0.92)] and for external causes by 23% [RR 0.77 (95% CI, 0.62-0.95)]. The mortality rate for suicides was 3.3/100 000 in ongoing pregnancies and pregnancies ending in birth while it was 21.8/100 000 after termination of pregnancy and 10.2/100 000 among non-pregnant women.

**Table 4.** Age-adjusted mortality rates* by cause in Finland comparing years 1987–2000 and 2001–2012

| Cause | Ongoing pregnancy or birth | Termination of pregnancy | Miscarriage** | Total | Non-pregnant |
|---|---|---|---|---|---|
| **All deaths** | | | | | |
| 1987–2000 | 29.3 | 83.3 | 52.2 | 37.8 | 59.0 |
| 2001–2012 | 21.3 | 74.6 | 33.7 | 28.4 | 48.1 |
| Change % | −27 | −10 | −36 | −25 | −18 |
| RR (95% CI) | 0.73 | 0.90 | 0.64 | 0.75 | 0.82 |
| | (0.59–0.89) | (0.69–1.17) | (0.43–0.96) | (0.65–0.88) | (0.79–0.84) |
| **Medical causes*** ** | | | | | |
| 1987–2000 | 18.7 | 23.0 | 17.6 | 18.4 | 33.6 |
| 2001–2012 | 11.4 | 13.4 | 20.5 | 13.6 | 27.4 |
| Change % | −39 | −42 | 16 | −26 | −18 |
| RR (95% CI) | 0.61 | 0.58 | 1.16 | 0.74 | 0.82 |
| | (0.46–0.80) | (0.33–1.03) | (0.65–2.08) | (0.59–0.92) | (0.78–0.85) |
| **All external causes**** ** | | | | | |
| 1987–2000 | 10.6 | 60.2 | 34.6 | 19.4 | 25.2 |
| 2001–2012 | 8.1 | 49.5 | 22.8 | 14.8 | 20.0 |
| Change % | −23 | −18 | −34 | −23 | −21 |
| RR (95% CI) | 0.77 | 0.82 | 0.66 | 0.77 | 0.79 |
| | (0.55–1.07) | (0.6–1.13) | (0.41–1.07) | (0.62–0.95) | (0.76–0.83) |
| **Accidents** | | | | | |
| 1987–2000 | 4.1 | 18.2 | 13.8 | 7.2 | 11.0 |
| 2001–2012 | 3.8 | 20.4 | 11.1 | 6.2 | 7.6 |
| Change % | −7 | 12 | −19 | −15 | −31 |
| RR (95% CI) | 0.93 | 1.12 | 0.81 | 0.85 | 0.69 |
| | (0.56–1.55) | (0.66–1.91) | (0.39–1.66) | (0.61–1.19) | (0.64–0.74) |
| **Suicides** | | | | | |
| 1987–2000 | 5.8 | 33.9 | 16.5 | 10.2 | 12.0 |
| 2001–2012 | 3.3 | 21.8 | 11.4 | 7.1 | 10.2 |
| Change % | −43 | −36 | −31 | −30 | −15 |
| RR (95% CI) | 0.57 | 0.64 | 0.69 | 0.70 | 0.85 |
| | (0.35–0.94) | (0.41–1.02) | (0.35–1.38) | (0.52–0.94) | (0.79–0.91) |
| **Homicides** | | | | | |
| 1987–2000 | 0.8 | 8.1 | 4.4 | 2.0 | 2.2 |
| 2001–2012 | 0.9 | 6.8 | – | 1.3 | 1.6 |
| Change % | 17 | −16 | −100 | −37 | −24 |
| RR (95% CI) | 1.17 | 0.84 | | 0.63 | 0.76 |
| | (0.39–3.50) | (0.35–1.98) | | (0.32–1.27) | (0.64–0.90) |

RR, risk ratio.

*Deaths per 100 000 pregnancies or deaths per 100 000 person-years.

**Including ectopic pregnancies.

***Disease or medical condition.

****Unintentional and intentional incidents.

# Obstetric Care Deserts

# Conclusions

- Apples to apples
  - When comparing data, make sure you understand which measure is being used – MMR vs PRMR vs PAMR
- US maternal mortality is rising, and there are significant racial differences in outcomes that have remained after interventions
- US outcomes are significantly poorer with much higher expenditures than other developed countries
- Some states have decreased their PRMR with focused programs
- Causes of death differ between MMR and PRMR with mental health issues playing a stronger role in PRMR
- One population-based study shows pregnancy and birth to be favorable for overall female mortality

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