

“Understanding U.S. Maternal Mortality in the Context of the Ongoing Crisis in Women’s Health”

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Boston University School of Public Health

October 12, 2025

ACNM Annual Meeting

Palm Springs, California



Collaborators 1974-2025

Outline

1. **Understanding the Language of Maternal Mortality**

- Alternative measures of maternal mortality and their implications

2. **The Current Status of Maternal Mortality in the U.S.**

- US maternal mortality over time
- Comparing the US to the world
- Racial and geographic disparities in the United States

3. **Maternal Mortality & Women's Health**

- Maternal mortality as the tip of the iceberg
- The role of mental health and substance use in maternal mortality and deaths to women of reproductive age

4. **Where the solutions can come from.**

- The role midwives can play
- Expanding access to freestanding birth centers
- The politics of maternal mortality

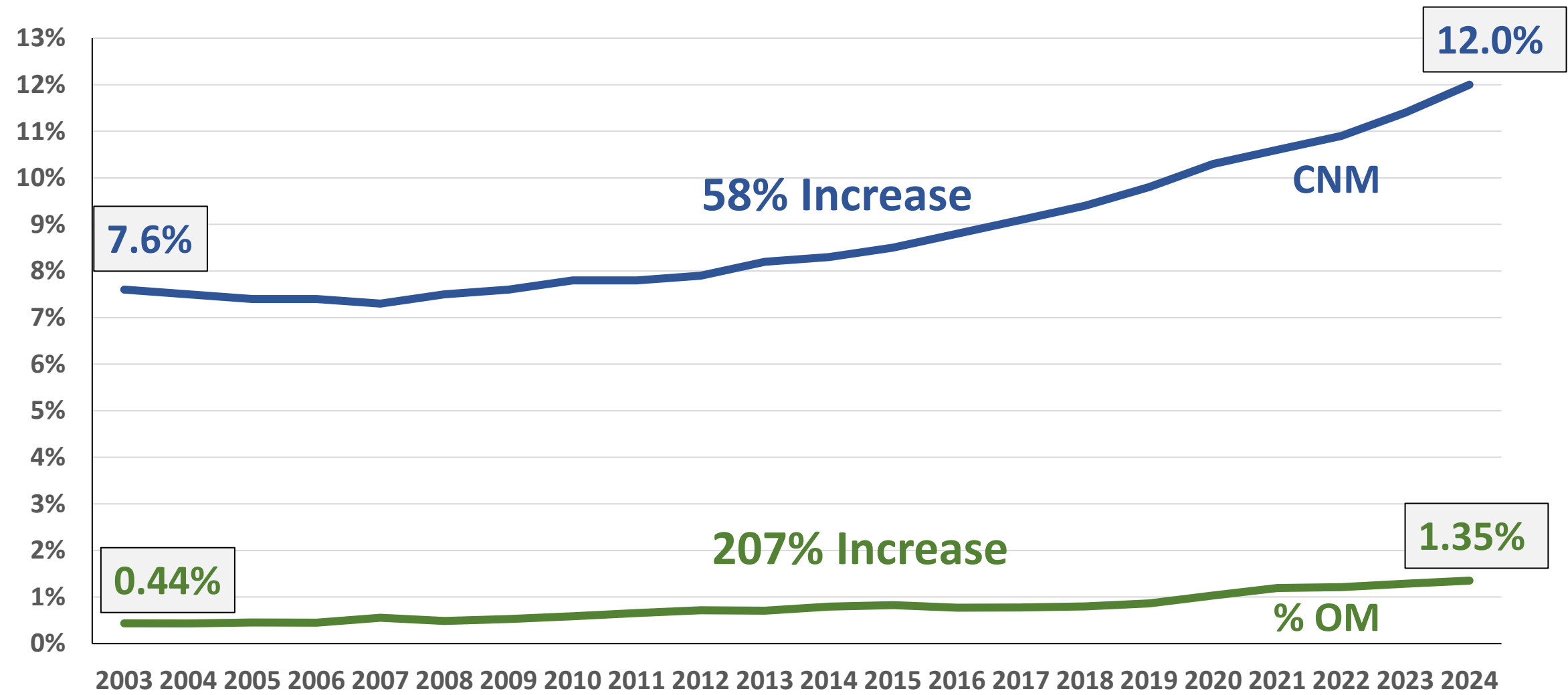
Warning: This presentation is data heavy and moves quickly.

Glad to answer questions and these slides will be available from a website I'll post at the end of this session.

To begin: a quick aside with new 2024 data



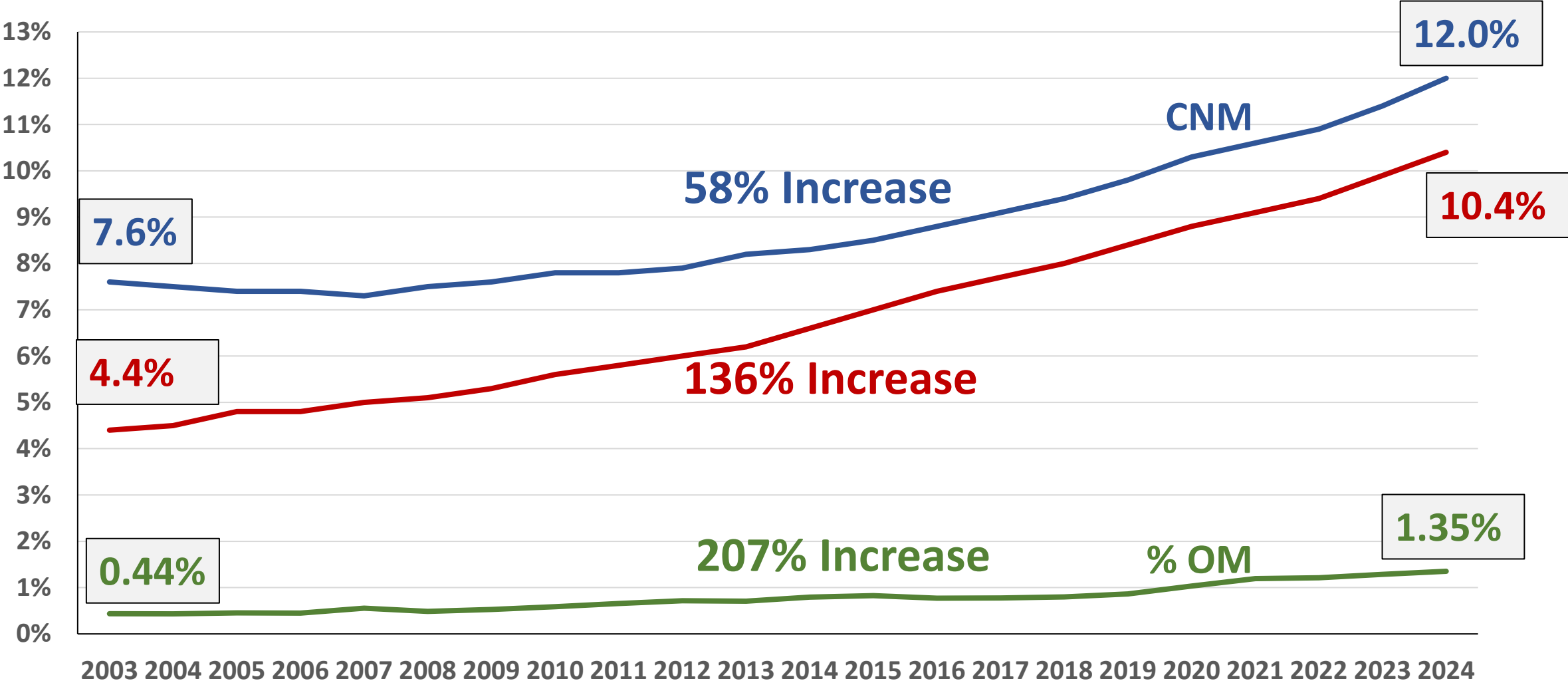
Proportion of U.S. Births Attended by CNMs & OMs, 2003-2024



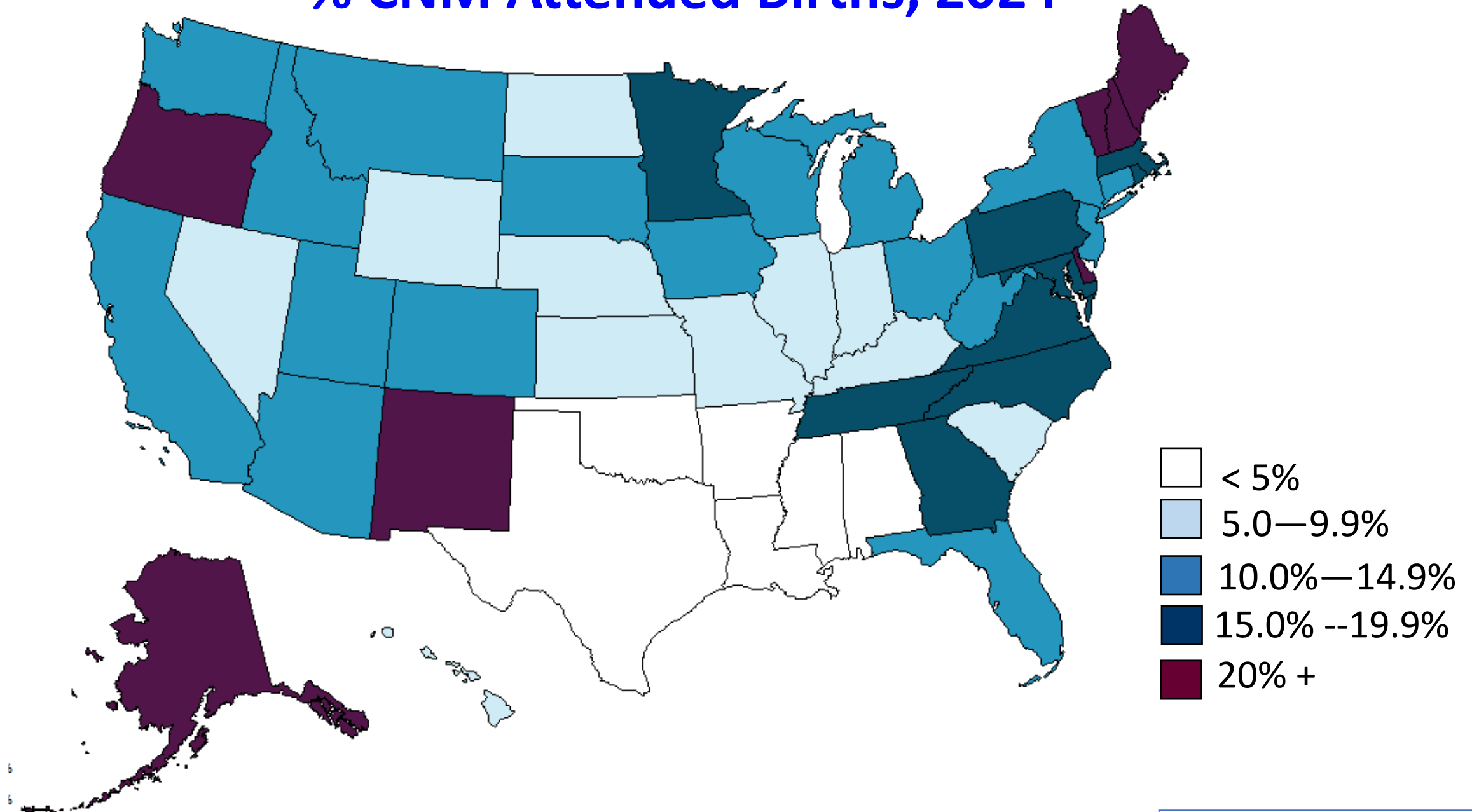
OM – other midwife



Proportion of U.S. Births Attended by CNMs & Oms & ??, 2003-2024



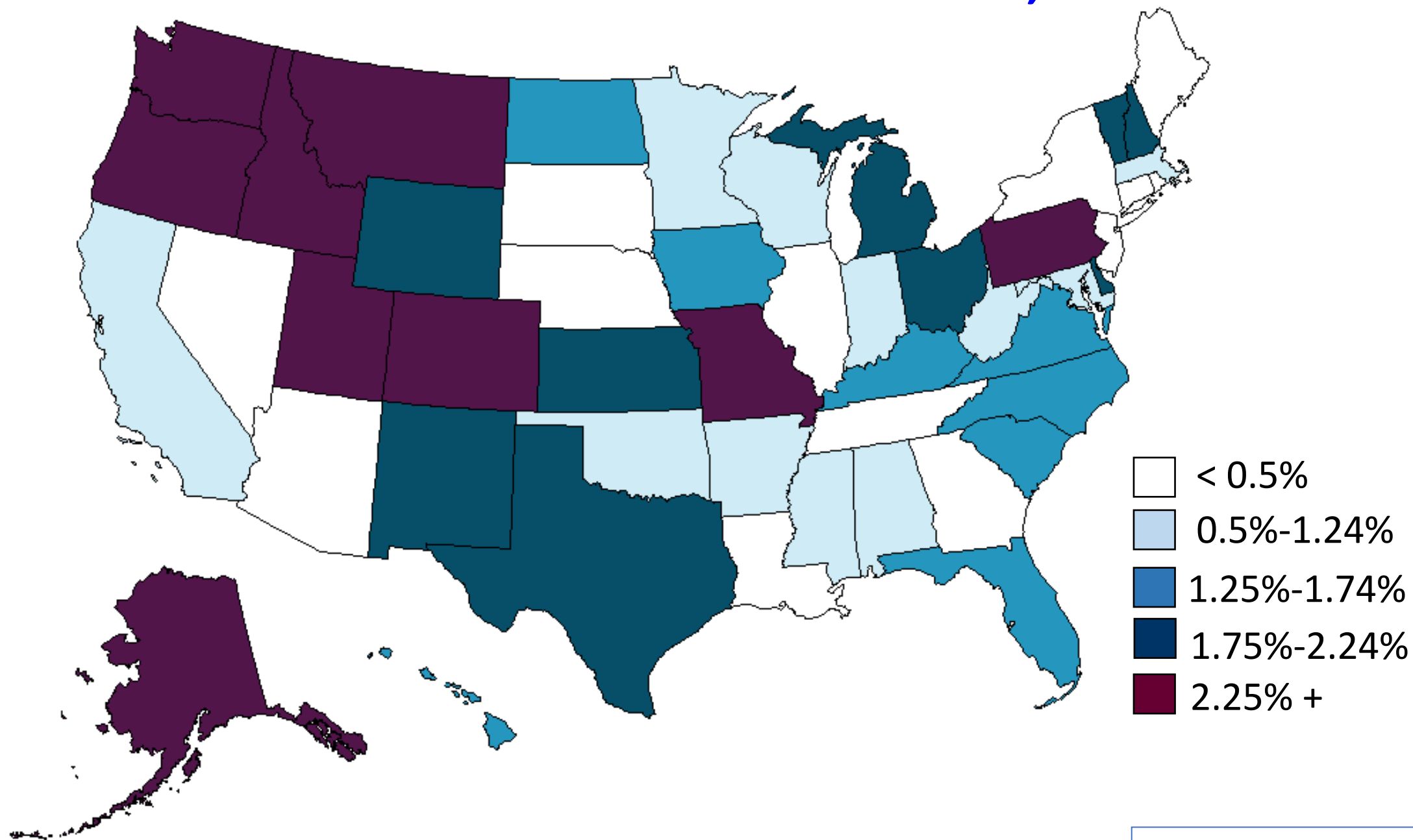
% CNM Attended Births, 2024



Source: CDC Wonder; Map by Ruby Barnard Mayers

BirthByTheNumbers.org

“Other” Midwife attended births, 2024



Source: CDC Wonder; Map by Ruby Barnard Mayers

BirthByTheNumbers.org



1. Understanding the terms of maternal mortality

The three widely used definitions of maternal mortality:

1. Pregnancy associated death

2. Pregnancy related death

3. Maternal mortality



Three Definitions (in the U.S.)

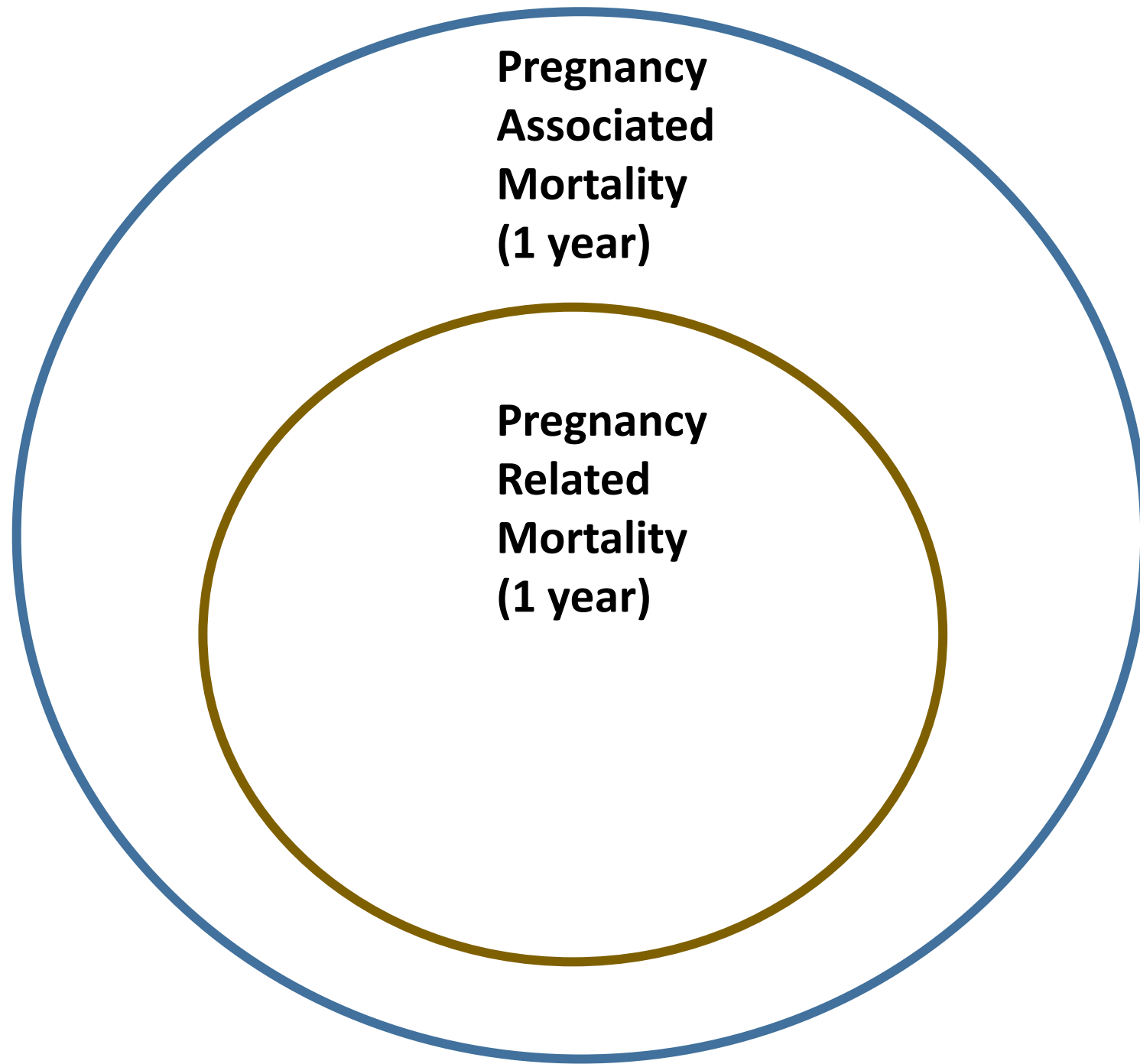
- **Pregnancy Associated Death** – The death of a woman while pregnant or *within one year* of termination of pregnancy, *irrespective of cause*. (*WHO calls these “pregnancy related”*). *Starting point for analyses*.
- **Pregnancy Related Death** – the death of a woman during pregnancy or *within one 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 by CDC for U.S. trends*.
- **Maternal Mortality** – 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. *Used in international comparisons*.

All 3 reported as a ratio per 100,000 births.

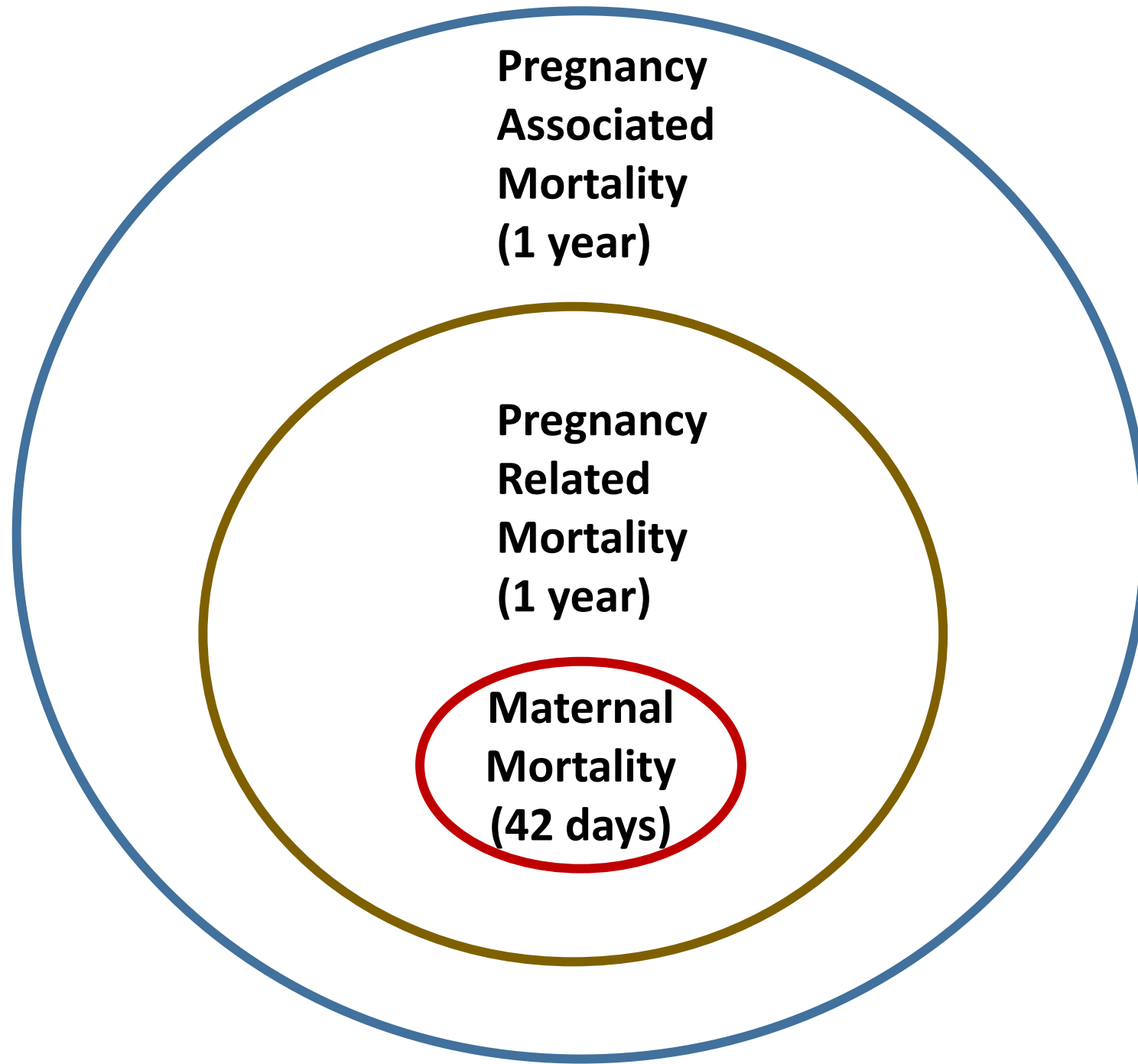


**Pregnancy
Associated
Mortality
(1 year)**

**Pregnancy
Associated
Mortality:**
**All Deaths women
of reprod. age
pregnancy to 1
year ppm**



**Pregnancy
Related
Mortality:**
All Deaths
women of
reprod. age
pregnancy to
1 year ppm
Related to the
pregnancy



Maternal Mortality:
All Deaths women
of reprod. age
pregnancy to **42**
days ppm Related
to the pregnancy



3 Different U.S. Sources & Different Measures

- **U.S. National Vital Stat. System** – Maternal Mortality
- **CDC Pregnancy Related Mortality System** – Pregnancy Related Mortality. ***IN REPORTING NATIONAL RATES, HERE WE WILL RELY ON THIS MEASURE WHENEVER POSSIBLE, ADJUSTING IT TO 42 DAYS PPM FOR COMPARISON.***
- **State Maternal Mortality Review Committees** – Pregnancy Associated, Pregnancy Related & Maternal Mortality, but primarily Pregnancy Related Mortality

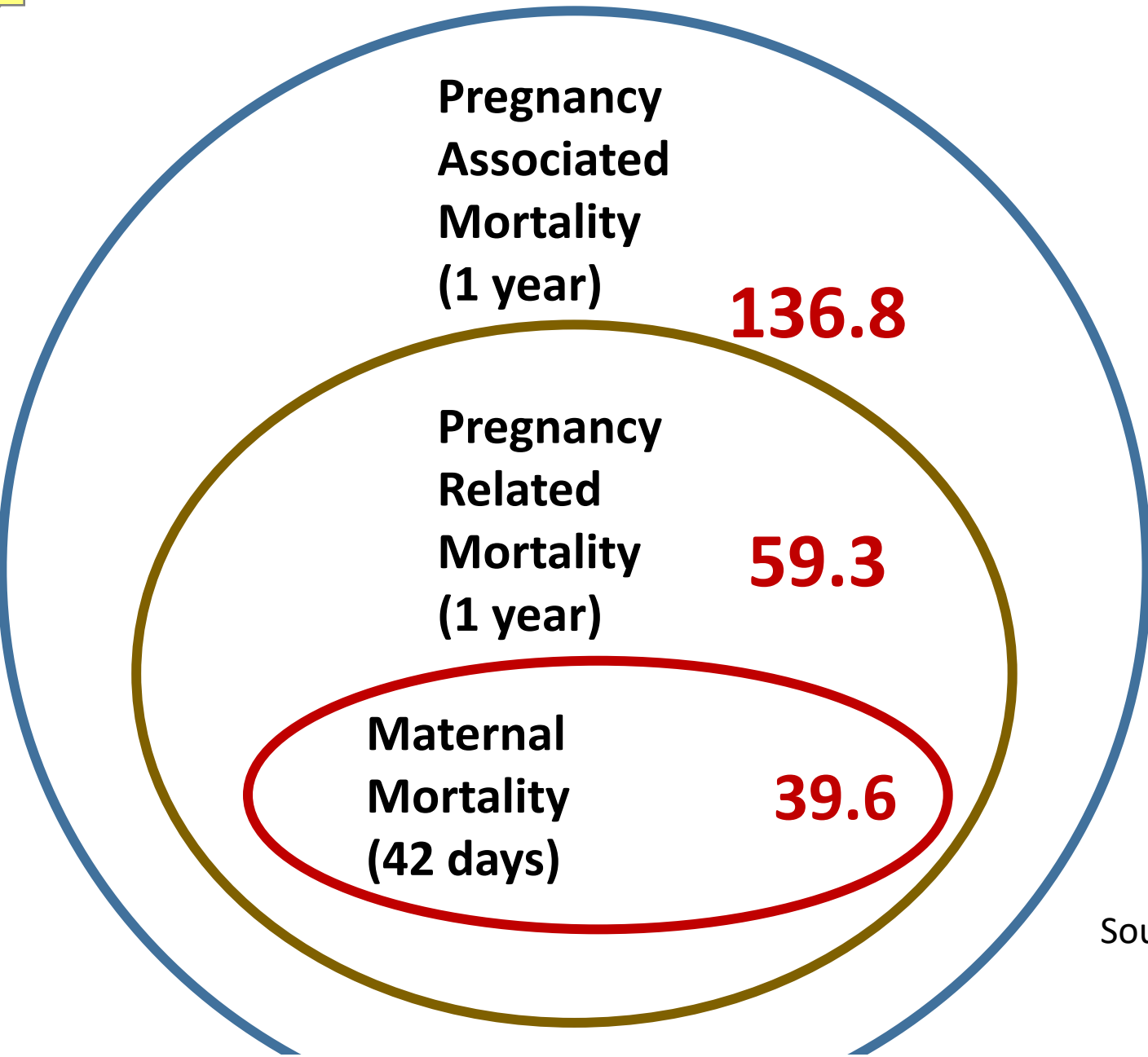


US Maternal Mortality Surveillance

	CDC – National Vital Statistics System (NVSS)	CDC – Pregnancy Mortality Surveillance System (PMSS)	State and Local Maternal Mortality Review Committees (MMRCs)
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, etc.
Time Frame	During pregnancy – 42 days	During pregnancy – 365 days	During pregnancy – 365 days
Source of Classification	ICD-10 codes	Medical epidemiologists	Multidisciplinary committees
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



Illustrating the Differences in Measures of Maternal Death: Same State (Tennessee); Same Years; 4 different results.



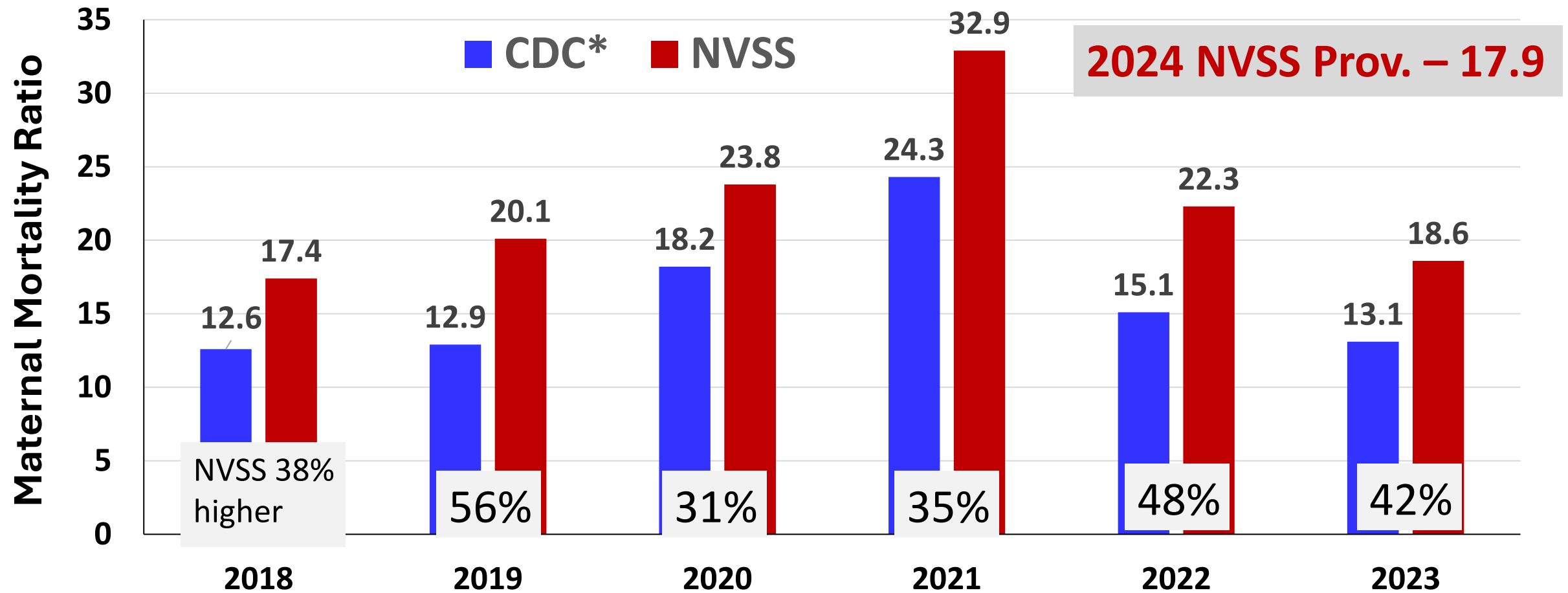
Using NVSS Data on Tenn.
Maternal Mortality for 2020-2022:
124 Deaths; 242,671 births
Rate – **51.1**/100,000

Sources: *Maternal Mortality in Tennessee 2024* & NVSS.

Mortality Rates from the Tenn. MMRC. per 100,000 births, 2020-22



Comparing CDC* & NVSS Estimates of U.S. Maternal Mortality, 2018 – 2023 & 2024 prov.



NVSS – National Vital Statistics System; **CDC** – Pregnancy Mortality Surveillance System

* Based on the reported pregnancy related rate limited to 42 days postpartum. Figure adjusted based on CDC report estimating 70.0% of maternal deaths occurring during pregnancy and up to 42 days postpartum.

BirthByTheNumbers.org

Sources: NVSS Hoyert. Maternal mortality rates in the United States, 2023. NCHS Health E-Stats. 2025; CDC: adapted from https://www.cdc.gov/maternal-mortality/php/pregnancy-mortality-surveillance-data/?CDC_AAref_Val=https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm

U.S. Maternal Mortality in Different Measurement Systems

	State Comparisons of Maternal Deaths through 1 year Postpartum ^a		
	National Vital Statistics System	State Maternal Mortality Review Committees ^b	% NVSS Higher
	Florida		
2018-2020	27.8	18.9	47.0%
	Georgia		
2018-2020	45.9	30.1	52.5%
	Indiana		
2018-2020	36.9	17.8	107.4 %
	Louisiana		
2018-2019	39.6	24.5	61.6%
	New York		
2018	28.7	18.2	57.7%
	Tennessee		
2020-2022	55.1	39.6	39.1%

a. PMSS state rates are not presented for comparison because CDC cannot, based on contracts with the states to supply their data to CDC, publish specific state rates.

b. Rates drawn from state MMRC reports from states averaging at least 50,000 births annually and which published reports that included data on the years 2018 - 2022. To stabilize estimates, when available, multiple years were combined.

Source: Measuring Maternal Mortality. JAMA. 2023

In Summary

- *Pay close attention to which measurement of maternal mortality is being used and how they've measured it.*
- *Different measures will yield different results, and it is on the reader to understand the differences.*
- *Each source has its own strengths & limits*



2. The Current Status of Maternal Mortality in the U.S.

How did we get here?



U.S. in a Comparative Context, 1910, 1927, 2023

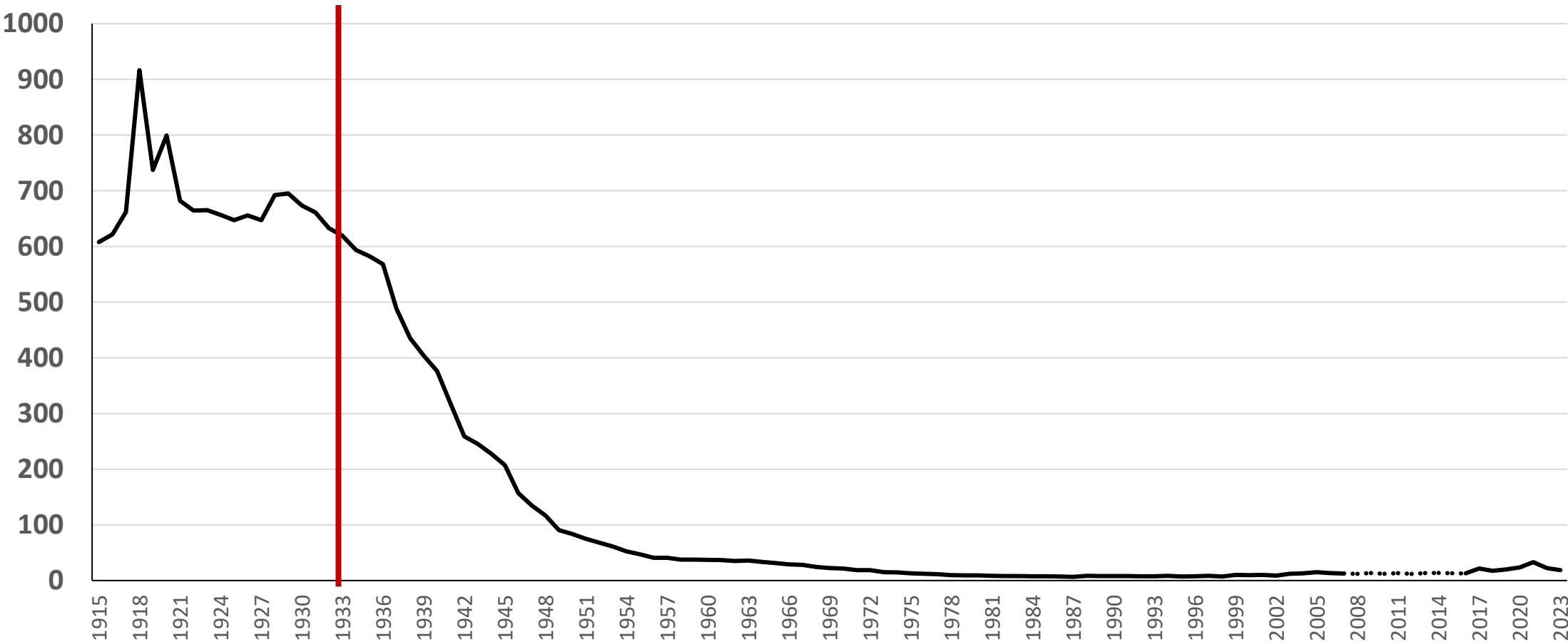
	1901-1910 ¹	1927 ²	2023 ³
	per 100K births	per 100K births	per 100K births
Norway	290	245	1
Australia	530	592	2
Sweden	230	278	4
Northern Ireland	550	480	4
Italy	270	264	6
New Zealand	460	491	7
France	520	287	7
England & Wales ⁴	410	411	8
United States⁵	650	647	17

Sources & Notes:

1. Meigs. *Maternal Mortality in U.S. & other countries*. 1917; 2. Tandy. *Comparability of Maternal Mortality Rates in the United States and Certain Foreign Countries*. 1933; 3. WHO. *Trends in Maternal Mortality, 2000-2023*; 4. UK rate in 2023; 5. Based on 10 reporting areas (CT,ME,MA,MI,NH,PN,RI,VT,NYC, DC) in 1910 & about 90% of all births in 1927.



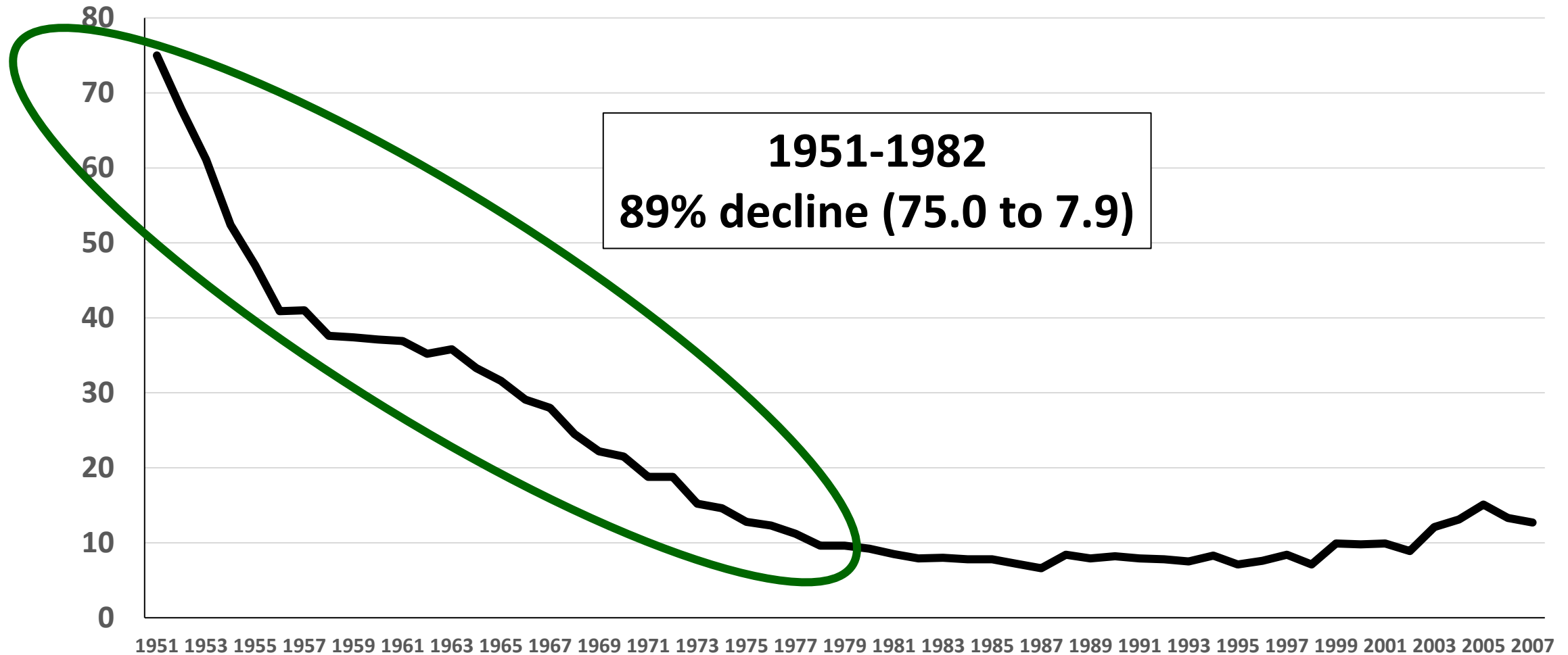
U.S. Maternal Mortality (per 100,000 births), 1915-2023



Sources: NCHS. Maternal Mortality and Related Concepts. Vital & Health Statistics. Series 33; #3. & annual data reports. 1915-1960 data from NCHS. *Vital Statistics Rates In The United States 1940-1960*. NOTE: Shifts in measurement (e.g. not all states were part of registration system prior to 1933) accounts for some of the variation over time. 2007-2016 based on 2 year estimates of the pregnancy related mortality rate: Petersen E. *MMWR*.9/6/19; 2017: Rossen. *Impact of Pregnancy Checkbox, U.S. 1999-2017*.NCHS.VitalHlthStat.3(44);2020.; 2018: U.S. Hoyert DL Health E-Stat.Hyattsville, MD: NCHS. 2/2022; CDC Wonder Mortality File.

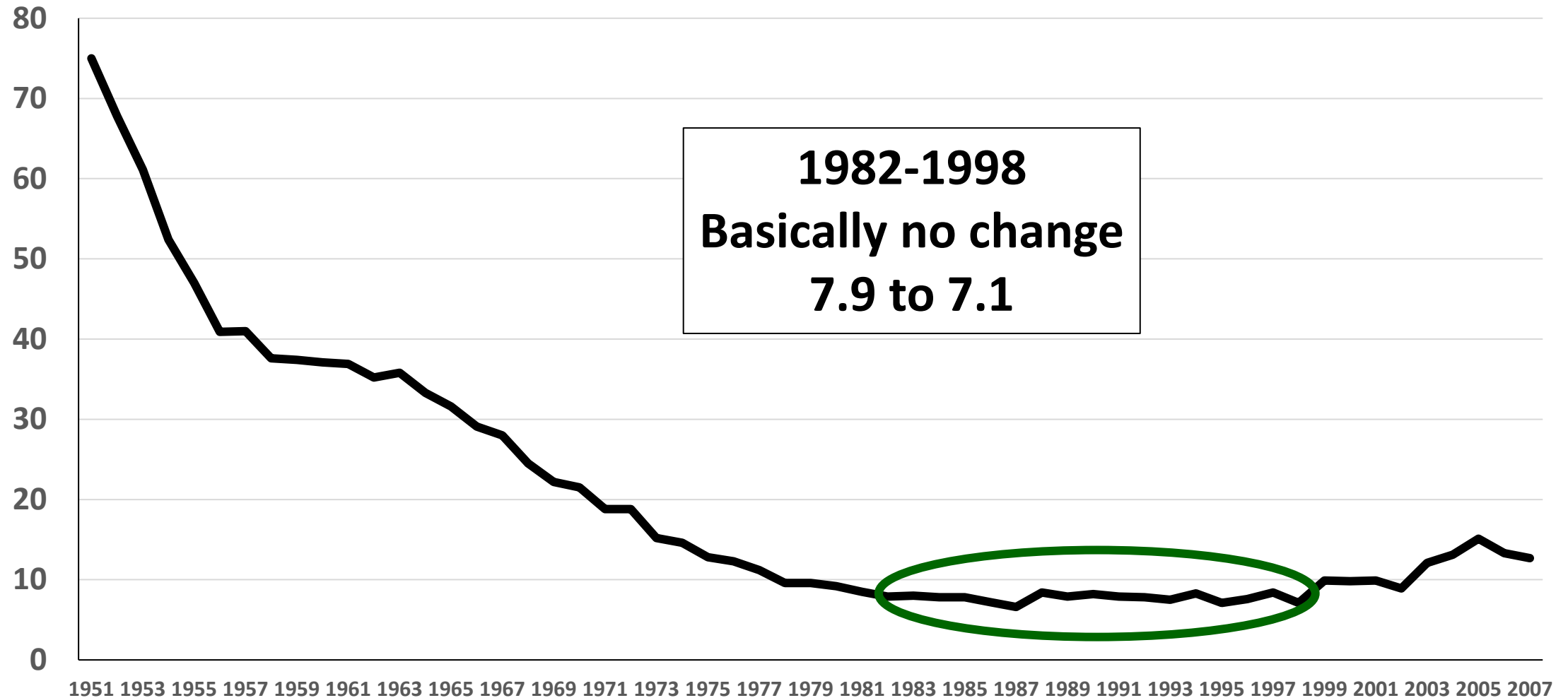


U.S. Maternal Mortality (per 100,000 live births), 1951-2007



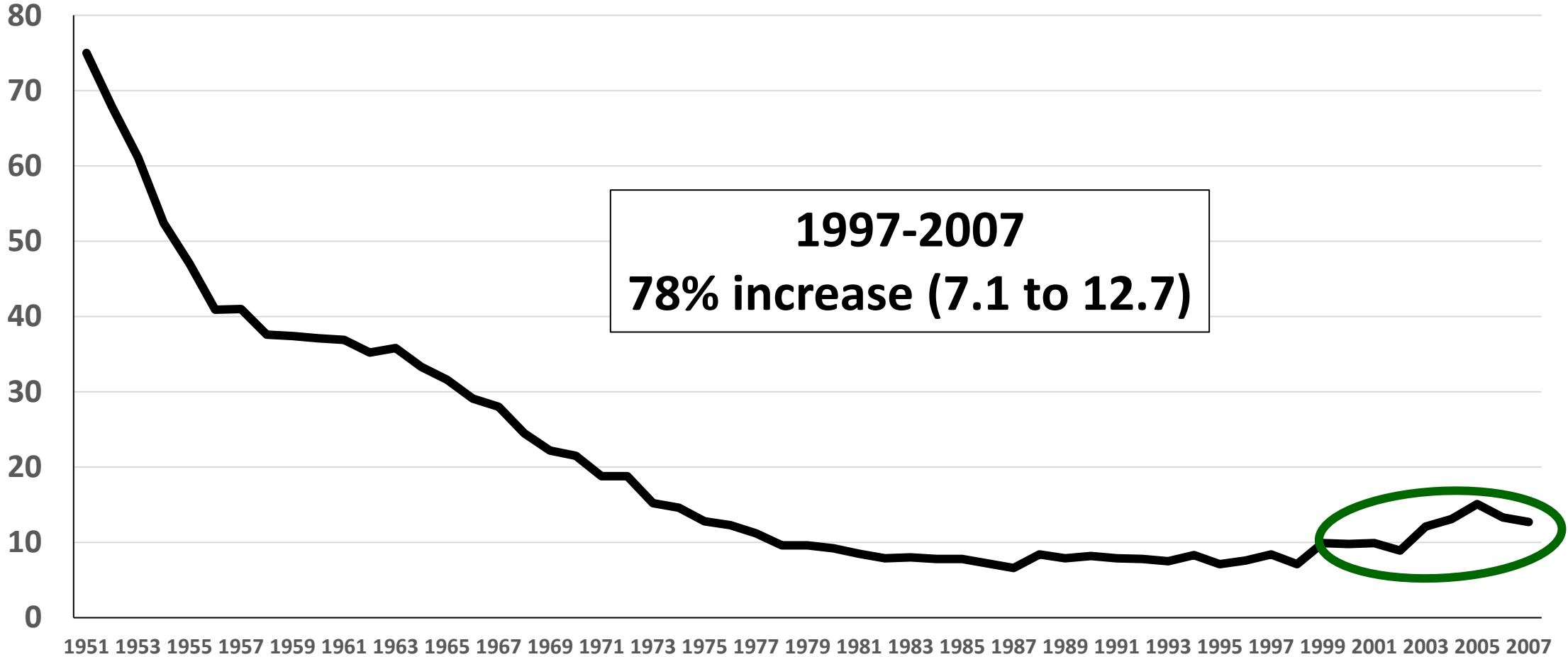


U.S. Maternal Mortality (per 100,000 live births), 1951-2007





U.S. Maternal Mortality (per 100,000 live births), 1951-2007





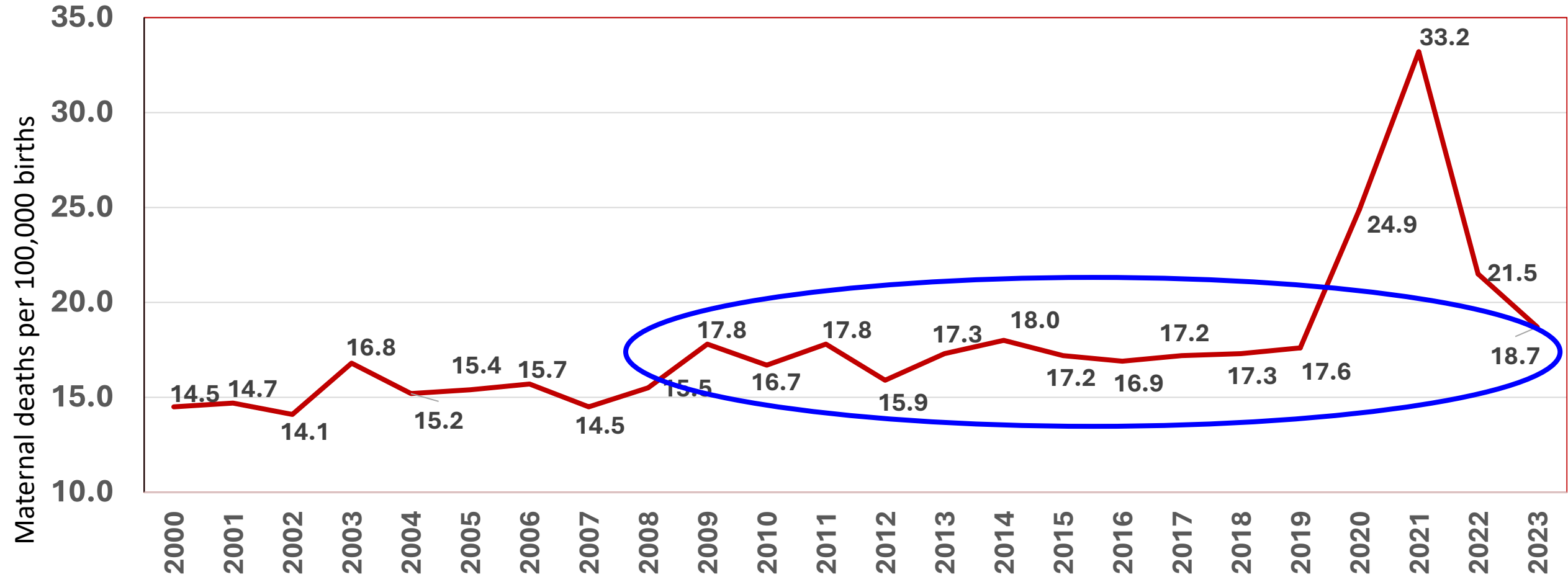
How did the U.S. get to the point where they stopped publishing a maternal mortality rate?

Efforts to avoid poor case ascertainment led to over-ascertainment

So where are we now?



U.S. Pregnancy Related Mortality Ratio (per 100K births), 2000-2023

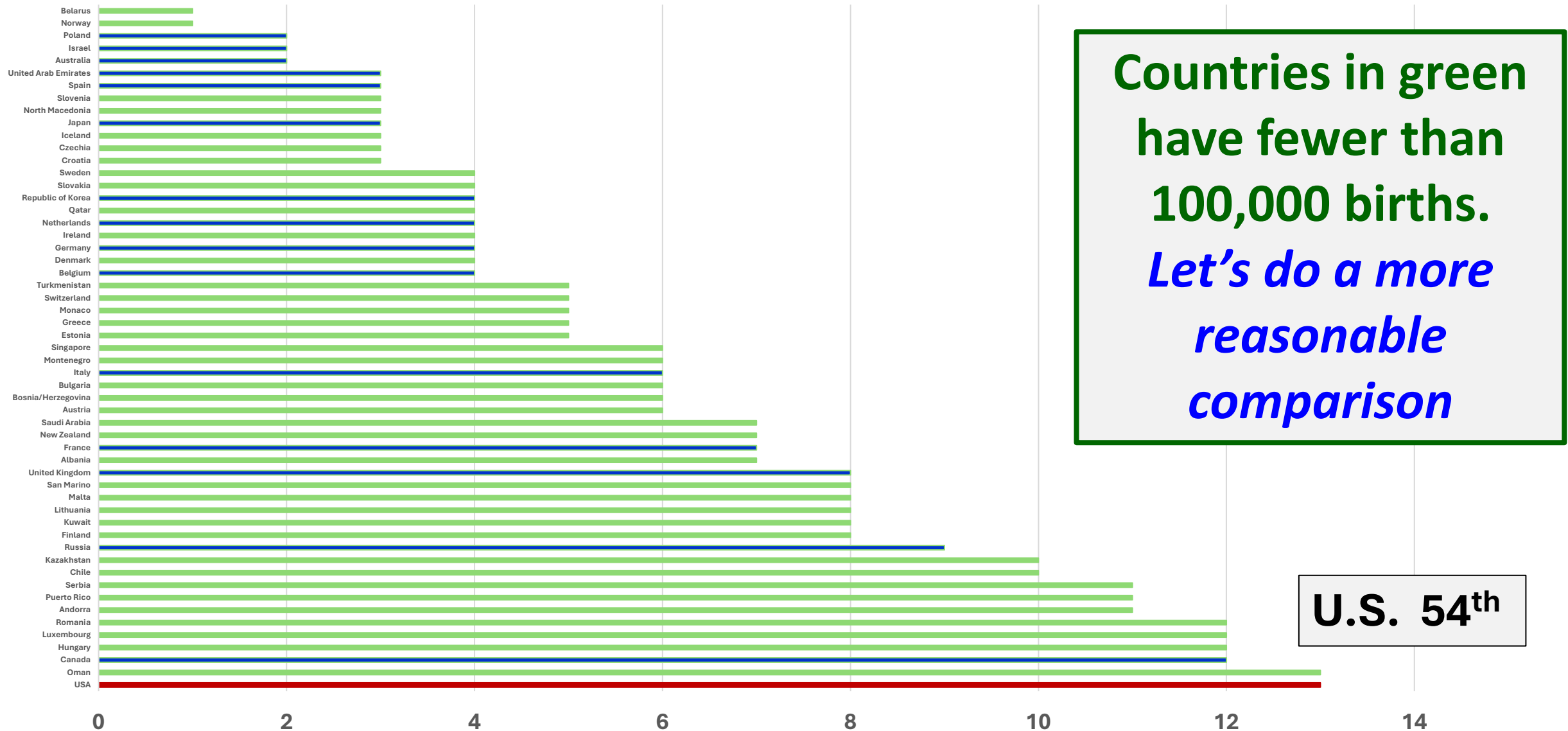


Source: 2000-2023 –CDC Pregnancy Related Mortality Surveillance System; Includes deaths during pregnancy to 1 year postpartum



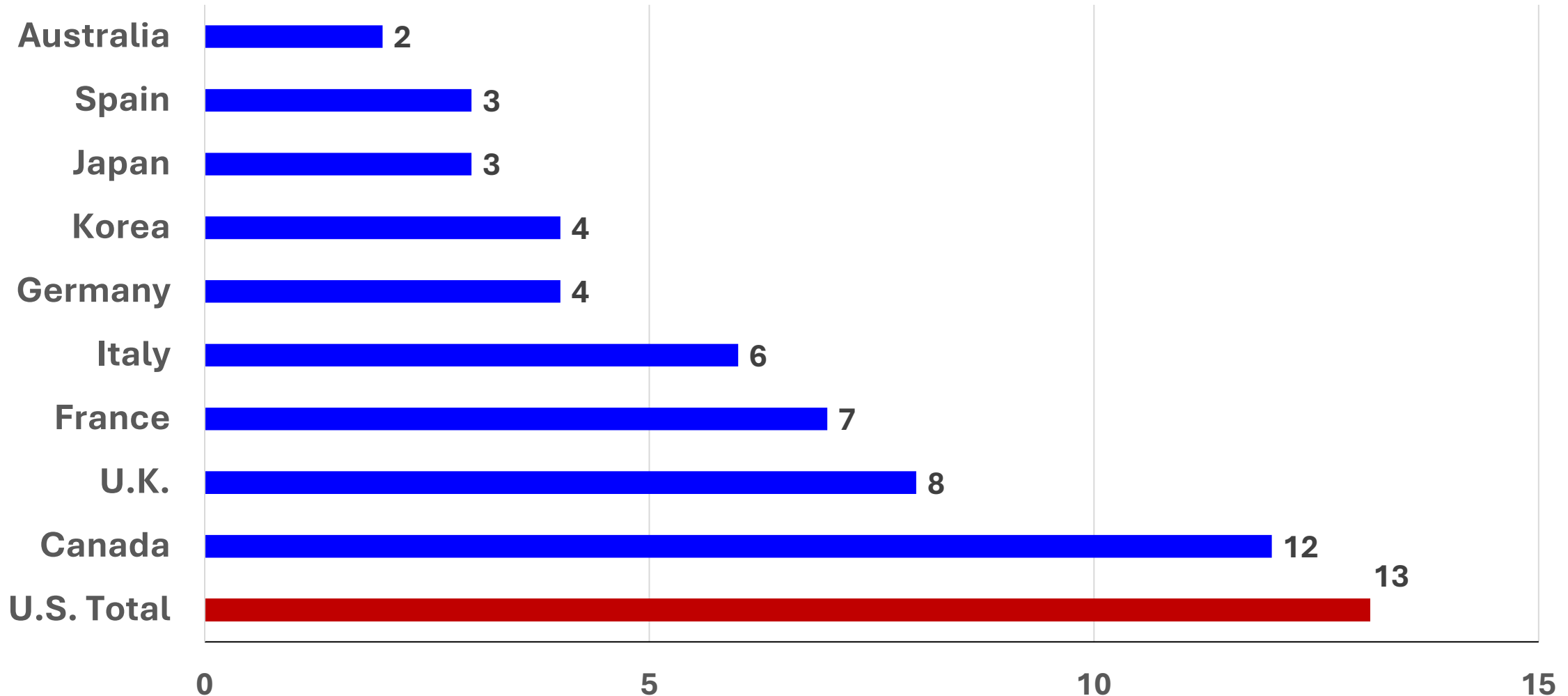
Maternal Mortality Ratios (per 100,000 births), 2023

Using the most conservative measure (PMSS) we have of U.S. maternal mortality





U.S. Maternal Mortality Ratio (per 100,000 births)* Compared to Industrialized Countries with 300,000+ births, 2023

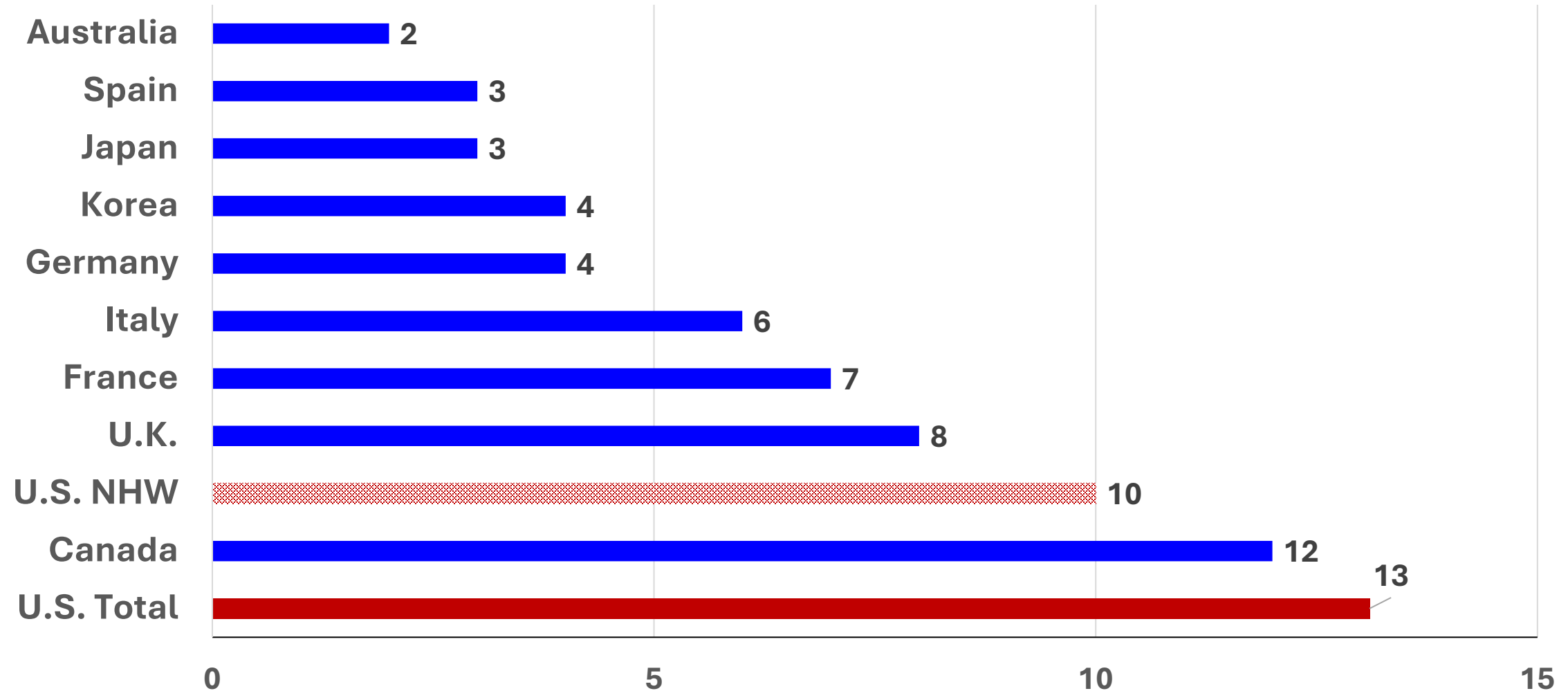


Sources: WHO Trends in Mortality estimates 2000-2023 & U.S.
Pregnancy Related Mortality Rate adjusted to 42 days postpartum

www.birthbythenumbers.org



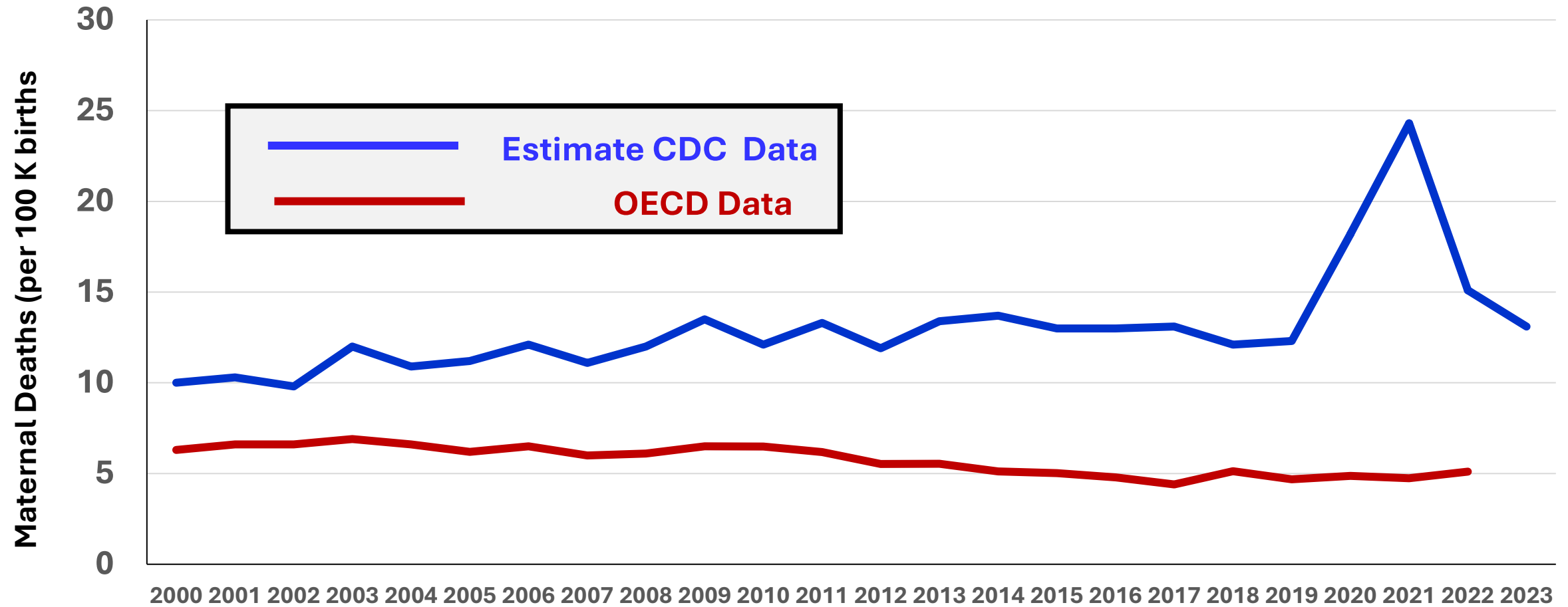
U.S. Maternal Mortality Ratio (per 100,000 births)* Compared to Industrialized Countries with 300,000+ births, 2023



Sources: WHO Trends in Mortality estimates 2000-2023 & U.S. Pregnancy Related Mortality Rate adjusted to 42 days postpartum



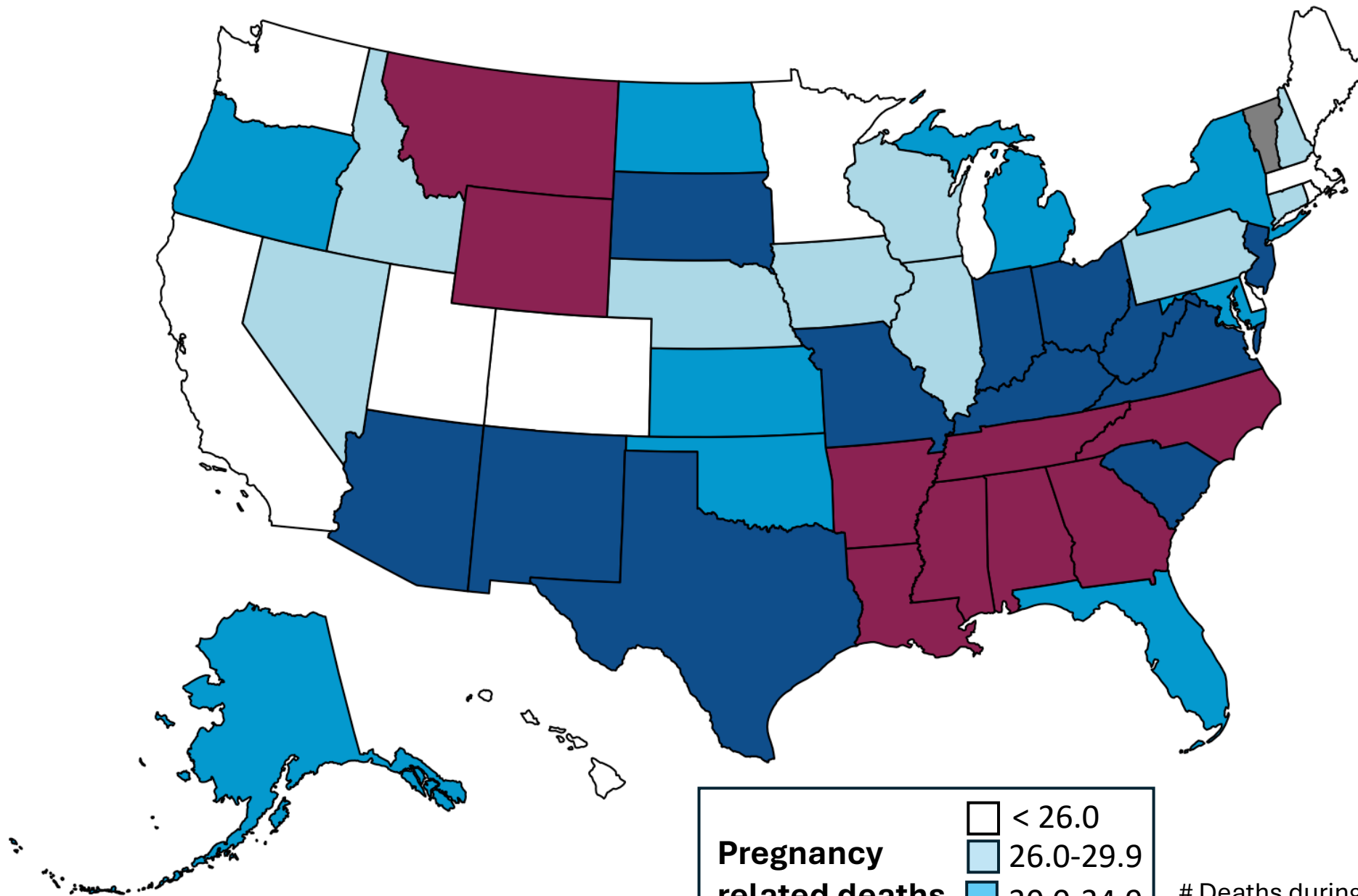
*Maternal Mortality Ratio (per 100K births), 2000-2023, U.S. & Comparable Countries**



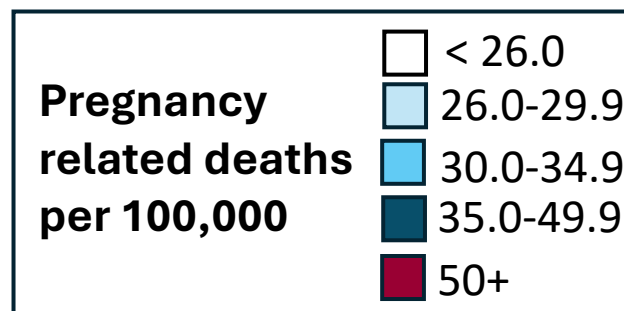
* Countries with **300,000+** births (2024): Australia, Canada, France, Germany, Italy, Japan, S. Korea, Spain, United Kingdom

Sources: OECD Health Data 2025; & U.S. Estimated from Pregnancy Mortality Surveillance System

www.birthbythenumbers.org



State pregnancy-related mortality rates 2019 - 2023

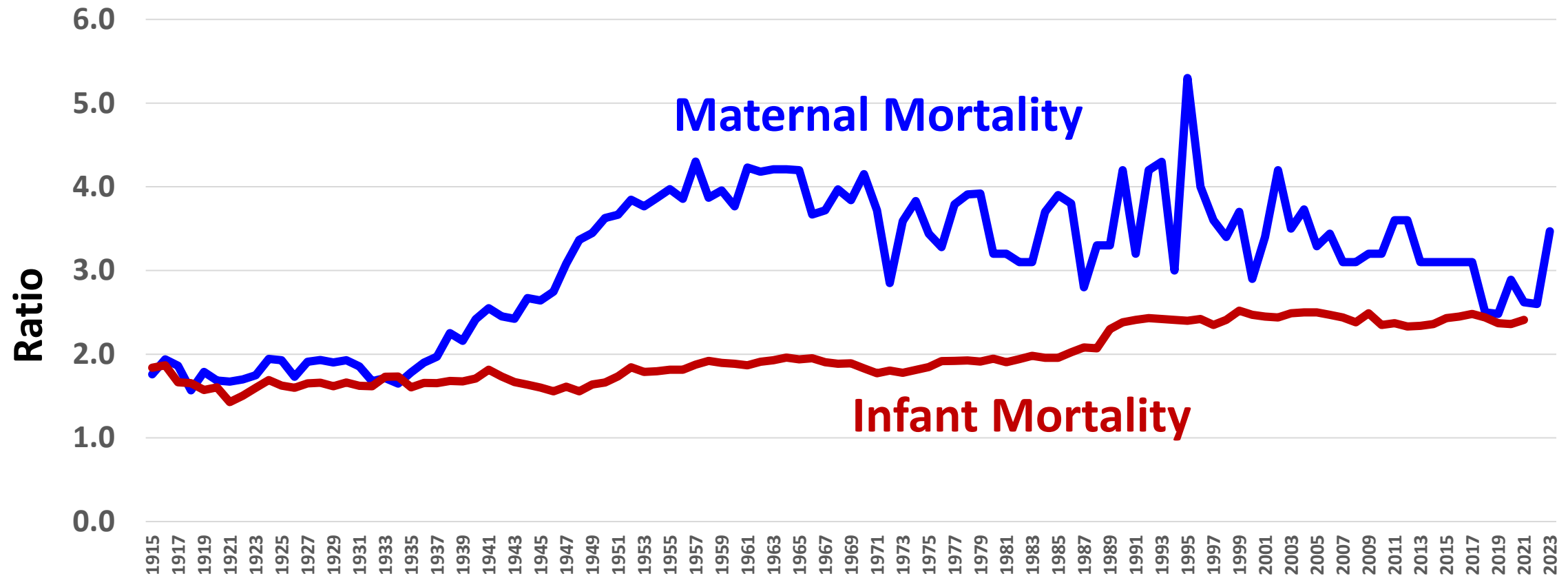


Deaths during pregnancy through 1 year postpartum
* Vermont with < 10 pregnancy related deaths, 2019-2023, excluded

[BirthByTheNumbers.org](https://www.birthingthenumbers.org)

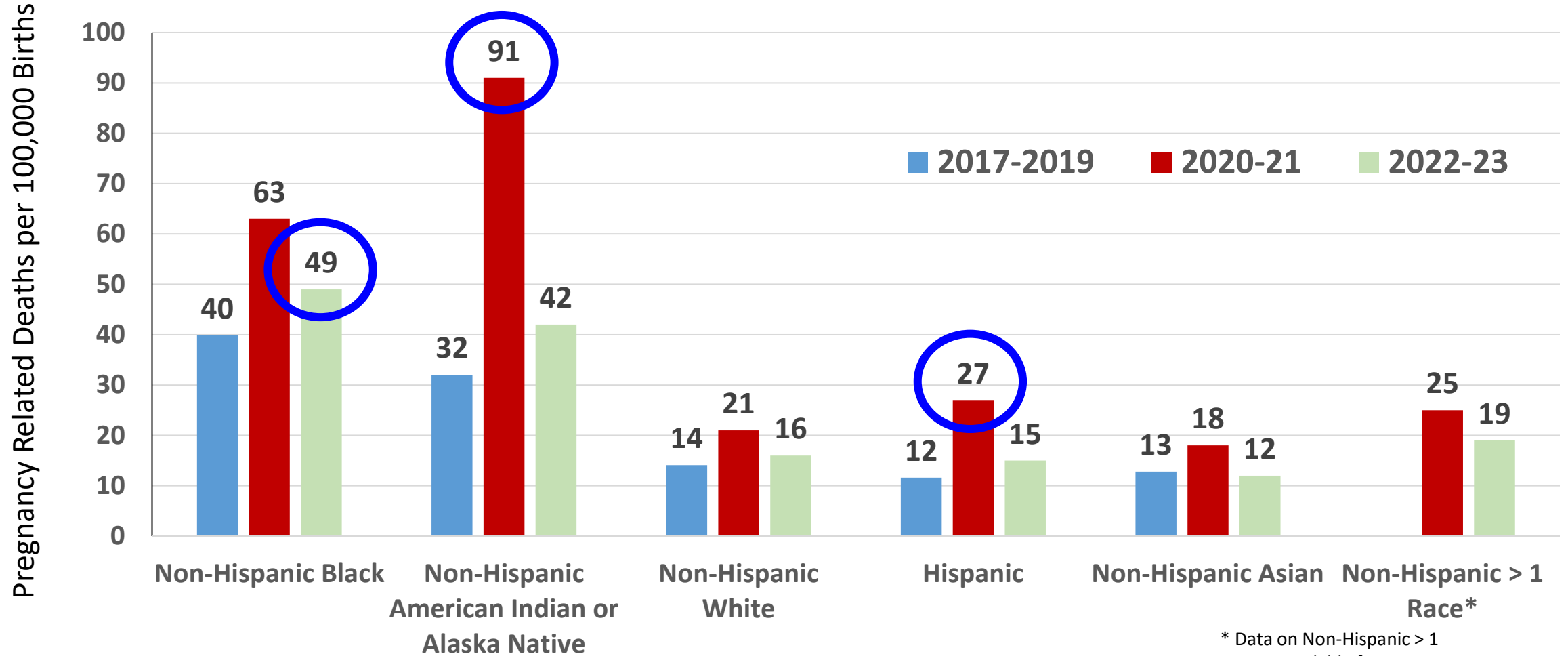
The Persistence of Racial Disparities

Black to White Ratios, U.S. Infant & Maternal Mortality, 1915-2023



Source: NCHS. Maternal Mortality and Related Concepts. Vital & Health Statistics. Series 33; #3. & annual data reports. 1915-1960 data from NCHS. *Vital Statistics Rates In The United States 1940-1960*. NOTE: Shifts in measurement (e.g. not all states were part of registration system prior to 1933; infant race was based on race of the child until 1980 & then race of the mother post 1980) accounts for some of the variation over time. 2007-2016 based on 2 year estimates of the pregnancy related mortality rate: Petersen E. *MMWR*.9/6/19.

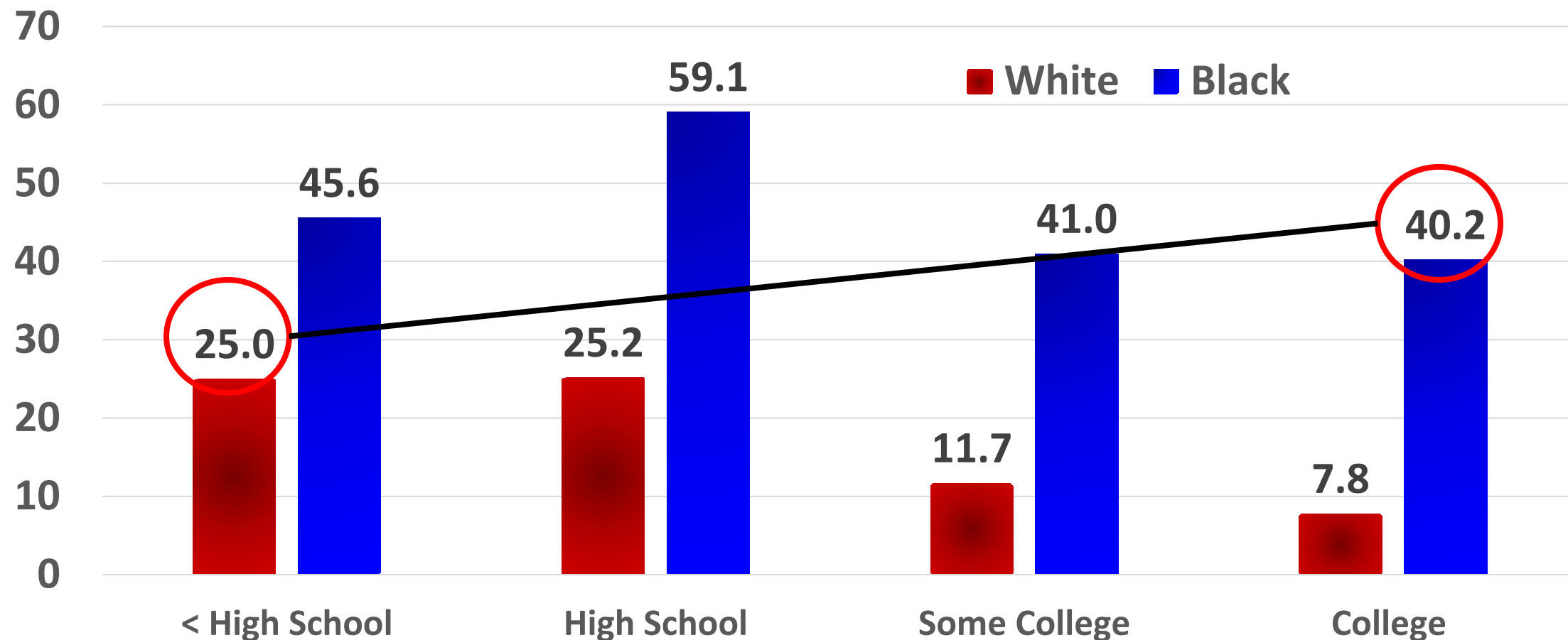
U.S. Pregnancy Related Mortality by Race, 2017-2023.



Source: CDC Pregnancy Related Mortality Surveillance System.

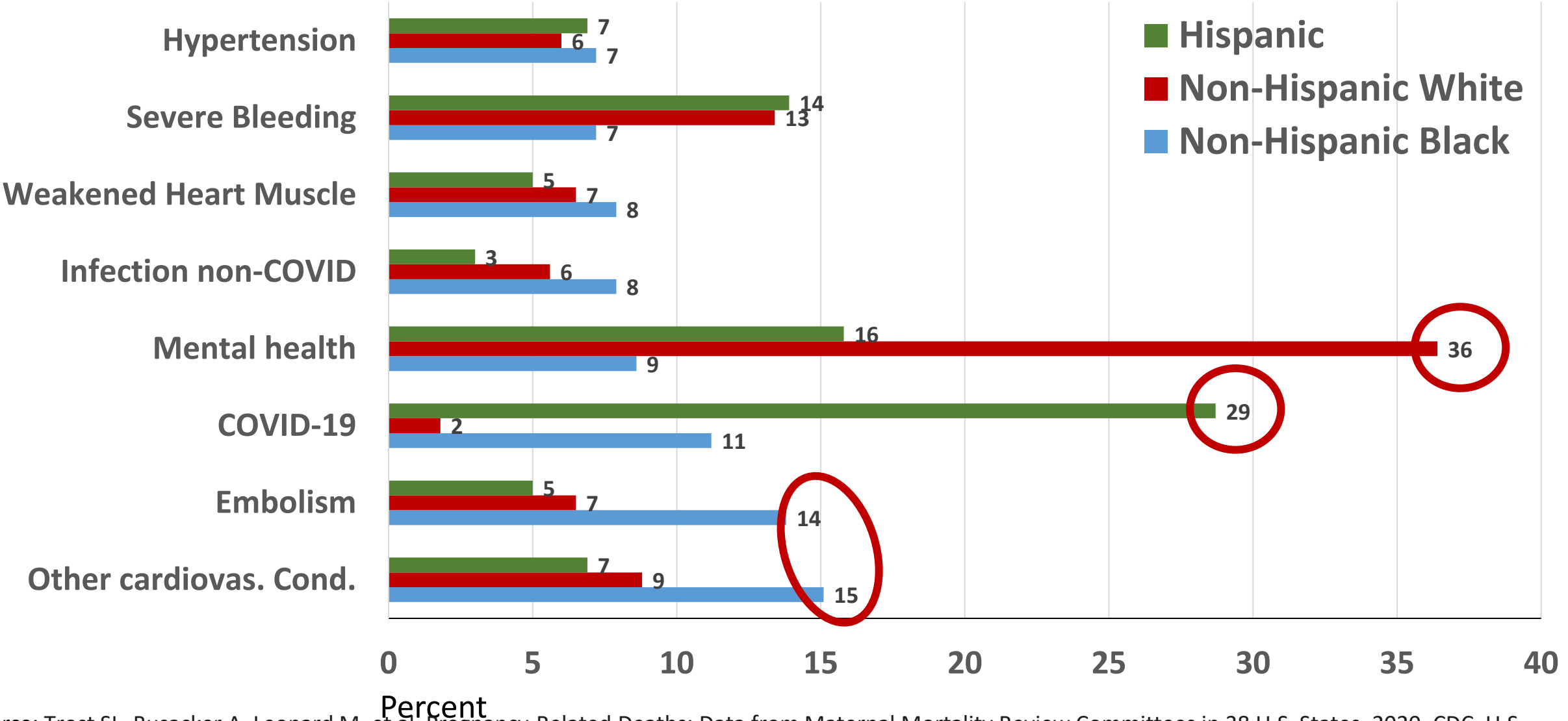
https://www.cdc.gov/maternal-mortality/php/pregnancy-mortality-surveillance-data/?CDC_AAref_Val=https%3A%2F%2Fwww.cdc.gov%2Fmaternal-mortality%2Fphp%2Fpregnancy-mortality-surveillance%2F%3FCDC_AAref_Val%3Dhttps%3A%2F%2Fwww.cdc.gov%2Fproductivehealth%2Fmaternal-mortality%2Fpregnancy-mortality-surveillance-system.htm&cove-tab=0

Pregnancy-related mortality ratios (per 100,000 live births) by race/ethnicity, U.S. 2007-2016



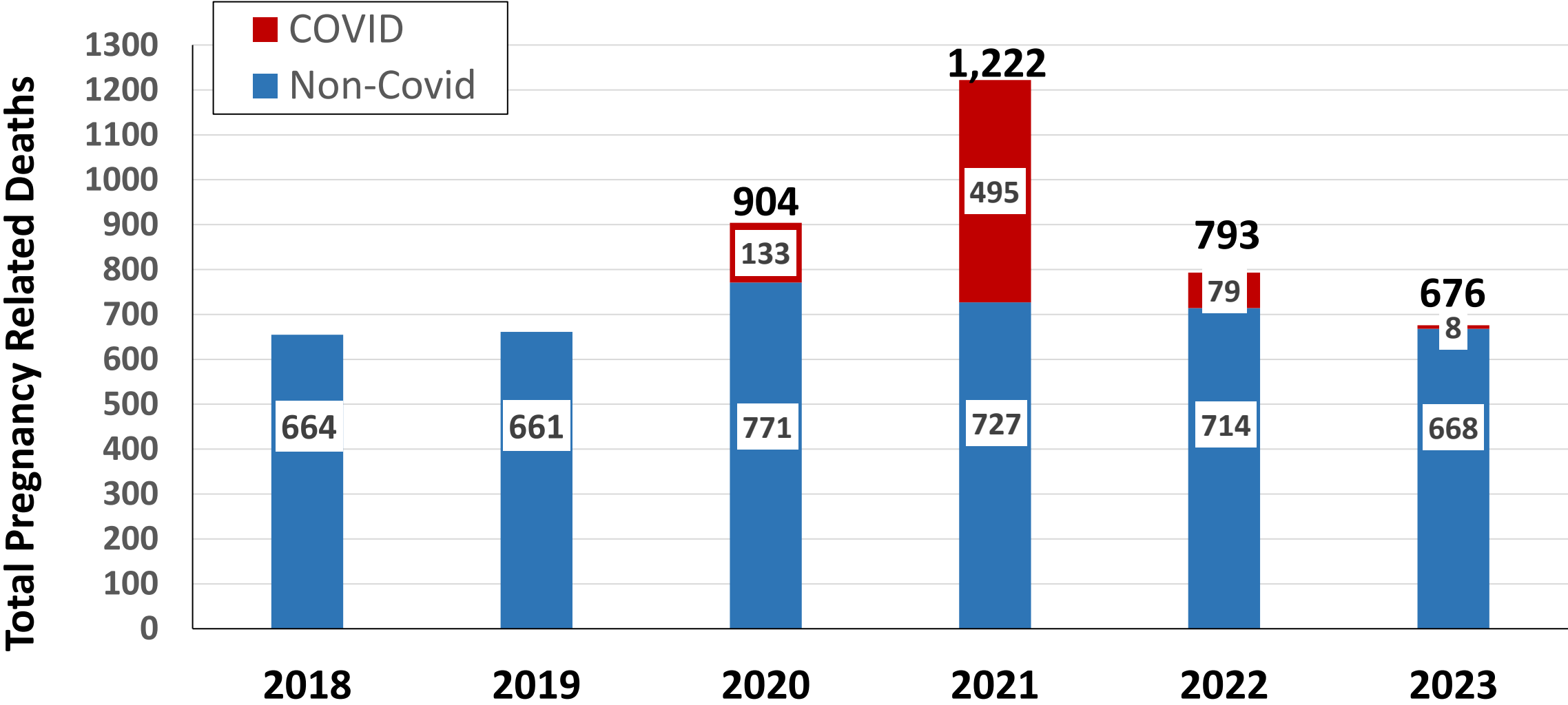
Source: Petersen E et al. Racial/Ethnic Disparities in Pregnancy-Related Deaths — United States, 2007–2016. *MMWR* 2/7/19; 68 (35): 762-765.

Underlying causes of pregnancy-related deaths (2020).





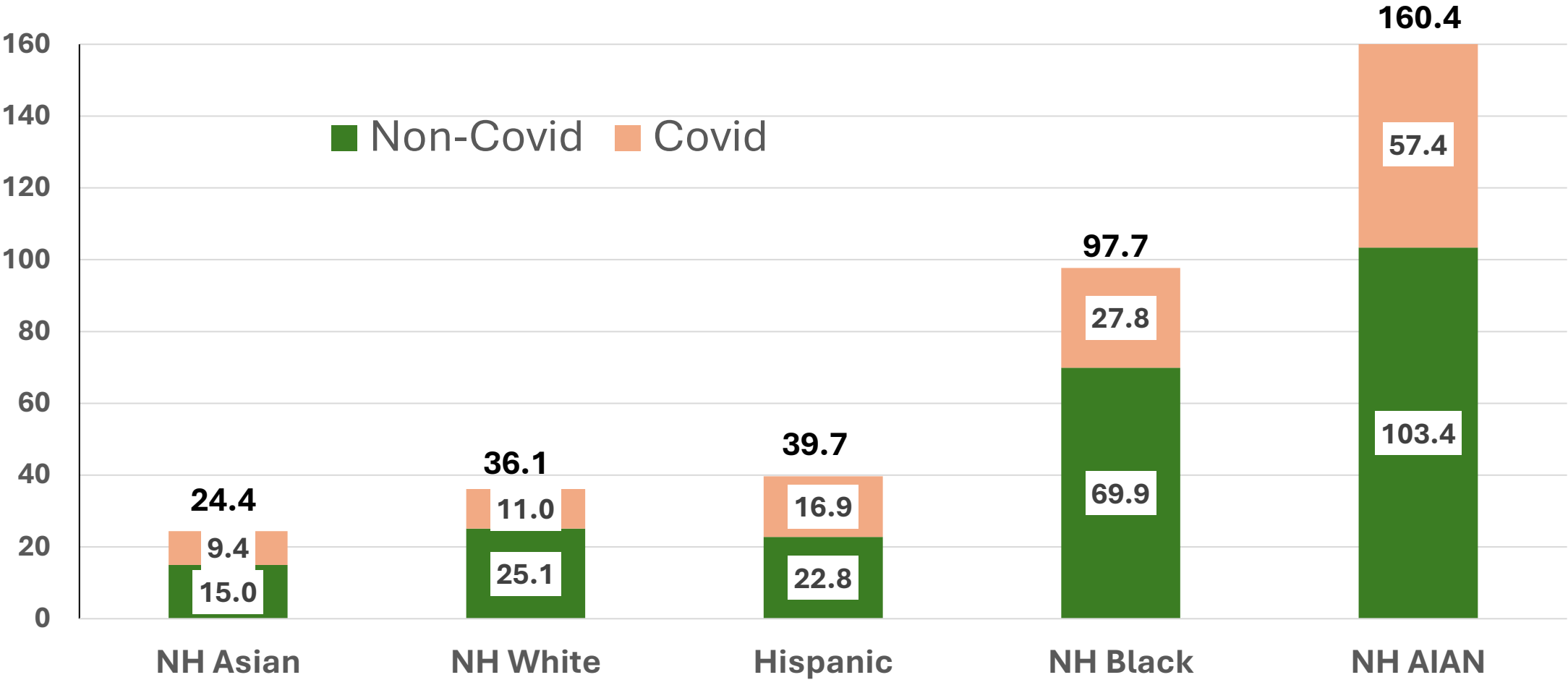
COVID & Pregnancy Related* Deaths, 2018-2024



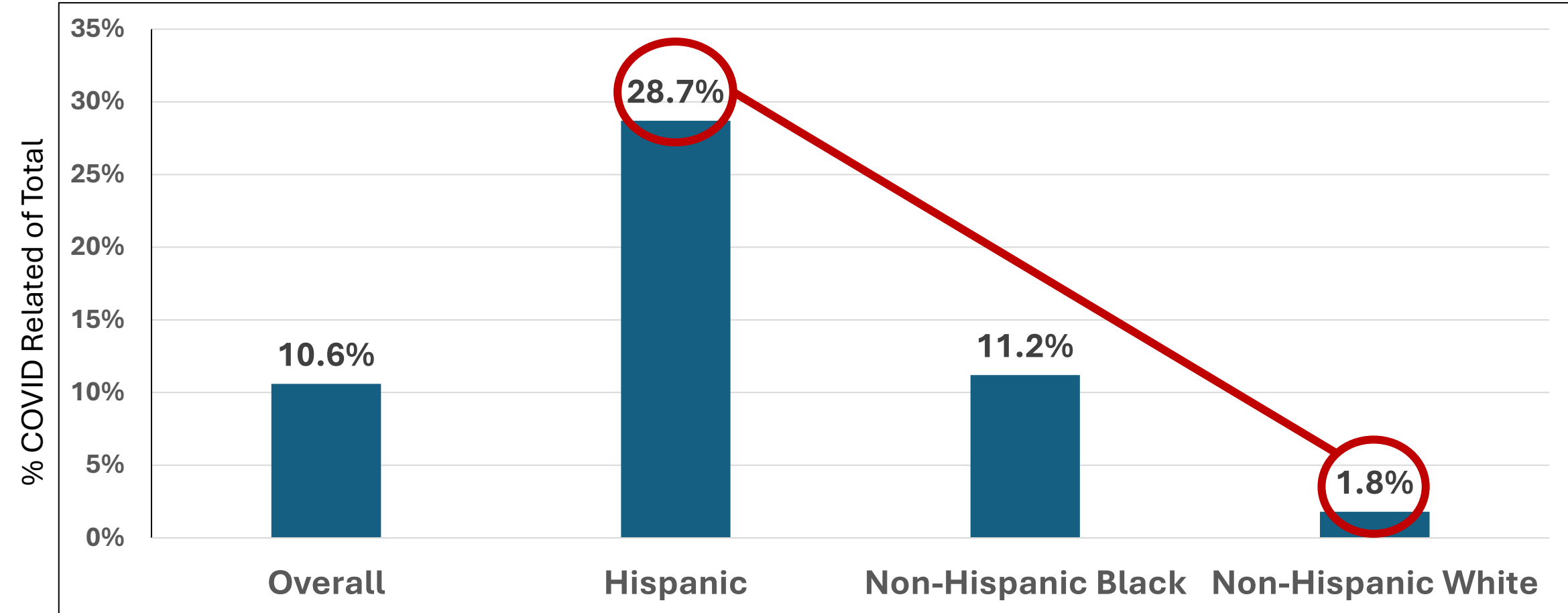
Source: CDC Pregnancy Related Mortality Surveillance System.
https://www.cdc.gov/maternal-mortality/php/pregnancy-mortality-surveillance-data/?CDC_AAref_Val=https%3A%2F%2Fwww.cdc.gov%2Fmaternal-mortality%2Fphp%2Fpregnancy-mortality-surveillance%2F%3FCDC_AAref_Val%3Dhttps%3A%2F%2Fwww.cdc.gov%2Fproductivehealth%2Fmaternal-mortality%2Fpregnancy-mortality-surveillance-system.htm&cove-tab=0



Non-Covid and Covid Related Pregnancy-Related Deaths by Race-Ethnicity, 2021



Percent COVID Related Maternal Deaths by Race/Ethnicity* from MMRC analyses, 2020



* Insufficient number of cases to be reported among Non-Hispanic Asian and American Indian/Alaskan Natives

Sources: 38 State MMRCs – Trost SL, Busacker A, Leonard M, et al. Pregnancy-Related Deaths: Data from Maternal Mortality Review Committees in 38 U.S. States, 2020. CDC, U.S. DHHS; 2024.

<https://www.cdc.gov/maternal-mortality/php/data-research/index.html#:~:text=Data%20on%20525%20pregnancy%2Drelated,Non%2DHispanic%20Black>

www.birthingthenumbers.org

3. Maternal Mortality as an Indicator of a Public Health Problem beyond Pregnancy

Not just about maternal mortality

National Vital
Statistics Reports

Volume 74, Number 4

June 10, 2025



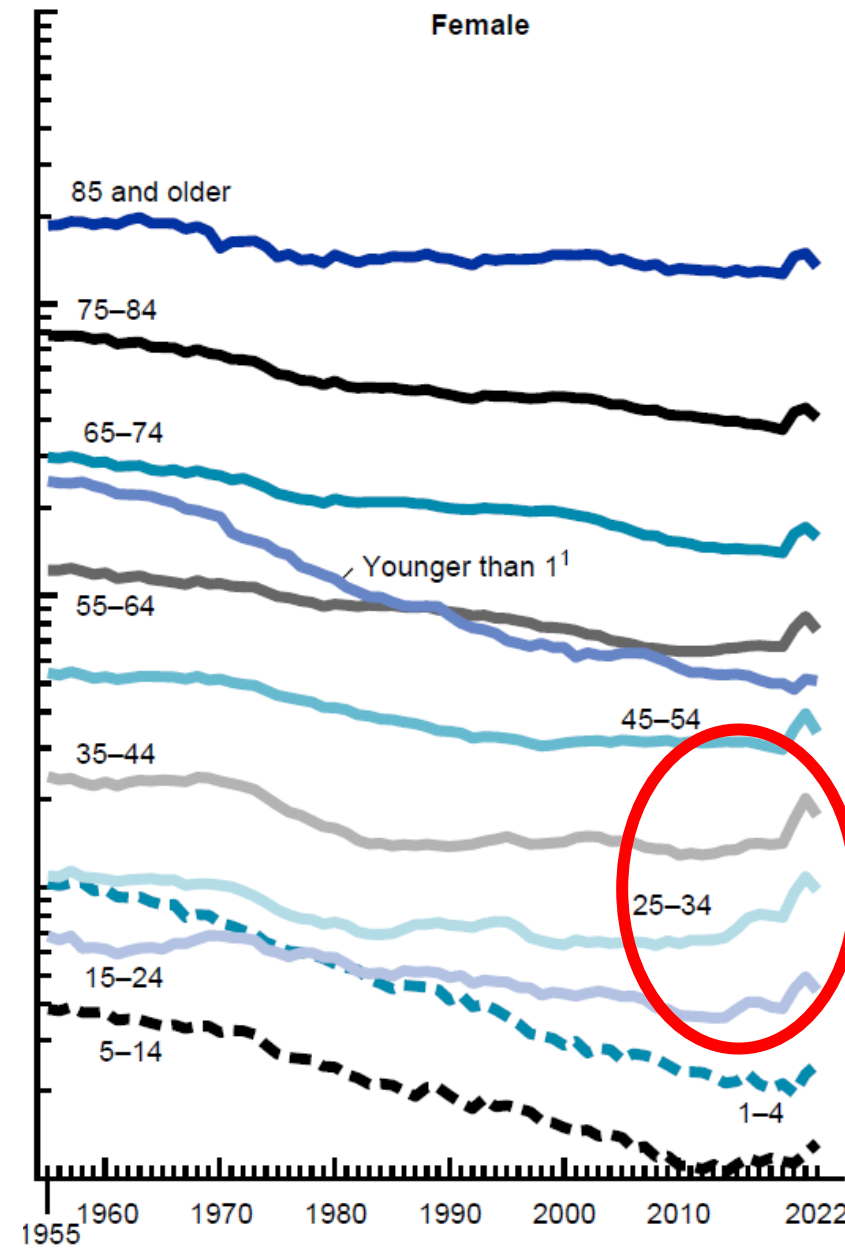
Deaths: Final Data for 2022

STAT

Maternal deaths represent the **canary in the coal mine** for women's health

By Eugene Declercq and Neel Shah

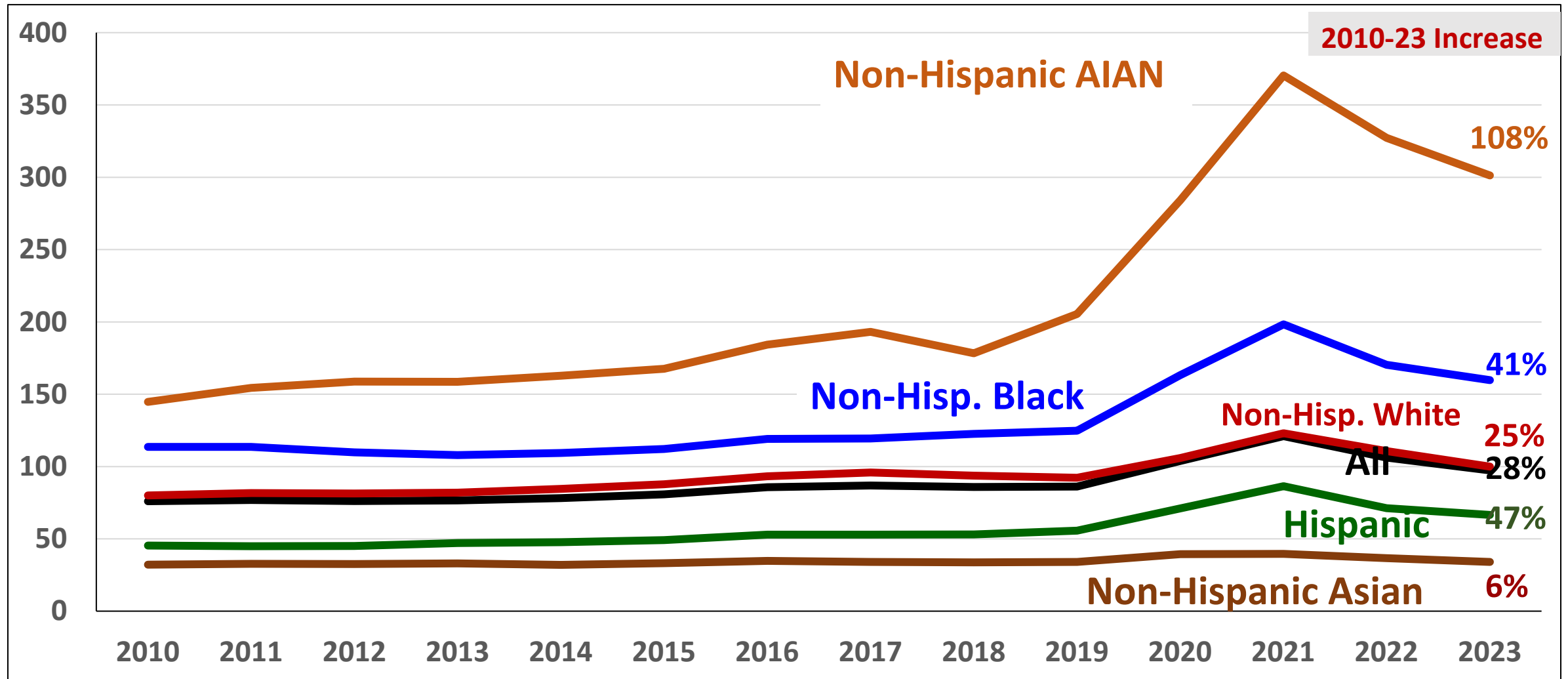
August 22, 2018





The Problem is Bigger than Maternal Mortality

Overall Deaths rates (per 100K), Females 15-44, 2010-2023



All Female Deaths 15-44

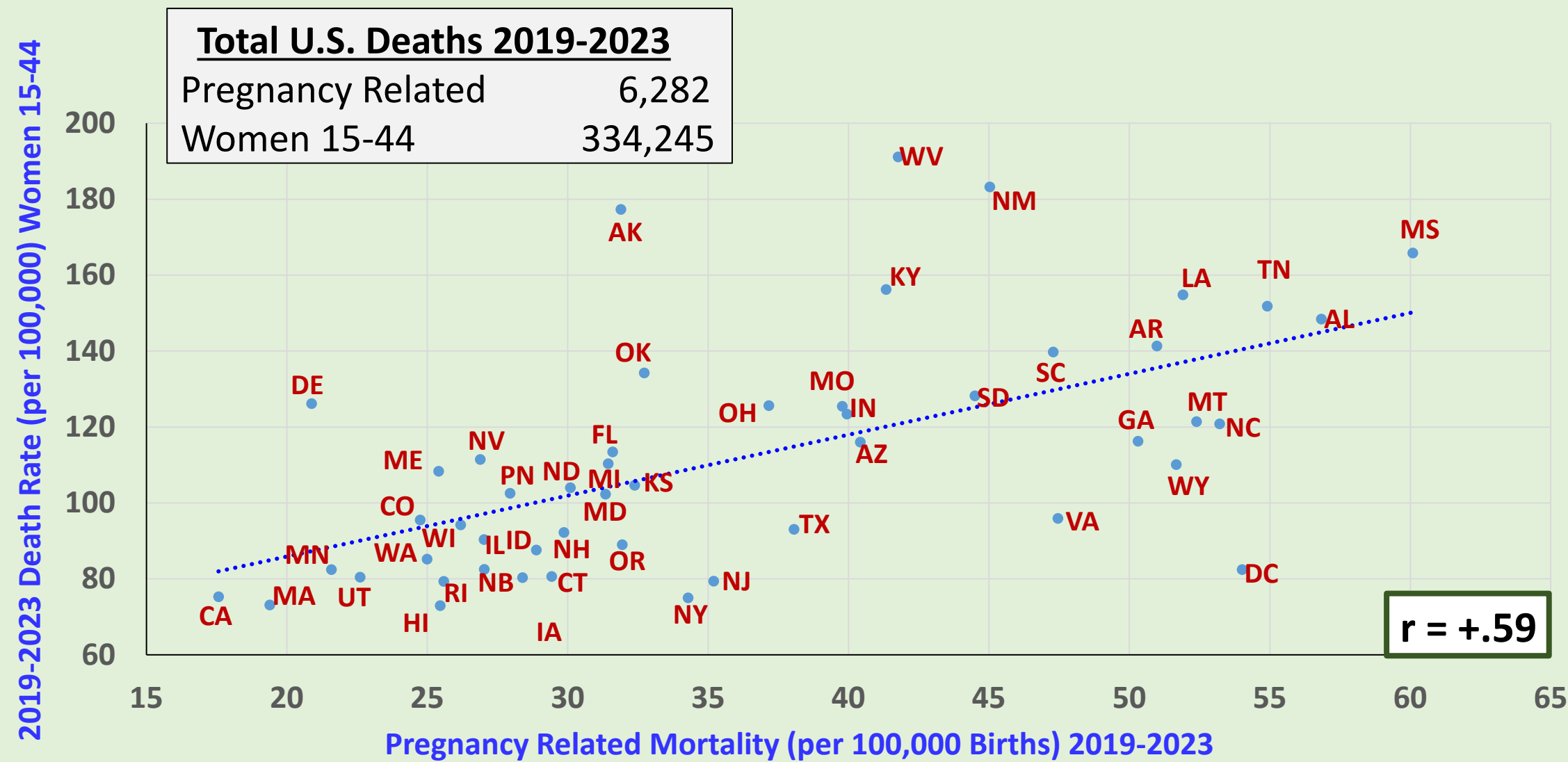
2010 -- 47,427; 2023 – 64,181 (COVID 612)

www.birthbythenumbers.org

Source: CDC Wonder



Relationship Between Pregnancy Related Mortality and Overall Death Rate for Women 15-44, U.S. States*, 2019-2023





Problem is Bigger than Maternal Mortality

*Top 10 Causes of Death for Women **15-44** in 2023*

	2023 Total Deaths	% of total	Rate per 100 K	% Change in rate 2010-2023	Proportion of 2010-23 Increase
All causes	64,181	100%	97.3	28.0%	---
Accidents (unintentional inj.)	21,315	33.2%	32.3	73.7%	57.9%
Malignant neoplasms	8,704	13.6%	13.2	-9.6%	-2.4%
Diseases of heart	5,050	7.9%	7.7	5.5%	3.0%
Intentional self-harm (suicide)	4,619	7.2%	7.0	27.3%	6.9%
Assault (homicide)	2,615	4.1%	4.0	33.3%	4.3%
Chronic liver disease and cirrhosis	2,579	4.0%	3.9	143.8%	9.4%
Diabetes mellitus	1,461	2.3%	2.2	29.4%	2.4%
Cerebrovascular diseases	1,235	1.9%	1.9	0.0%	0.1%
Pregnancy, childbirth & puerperium	1,038	1.6%	2.6	33.3%	1.7%
All other causes (residual)	15,565	24.3%	23.6	28.0%	16.7%

Sources: CDC, NCHS. Underlying Cause of Death 1999-2023 on CDC WONDER Detailed Mortality Database, released in 2025. Accessed at <http://wonder.cdc.gov/ucd-icd10.html> on Feb. 2, 2025

www.birthingthenumbers.org



Problem is Bigger than Maternal Mortality

*Top 10 Causes of Death for Women **15-44** in 2023*

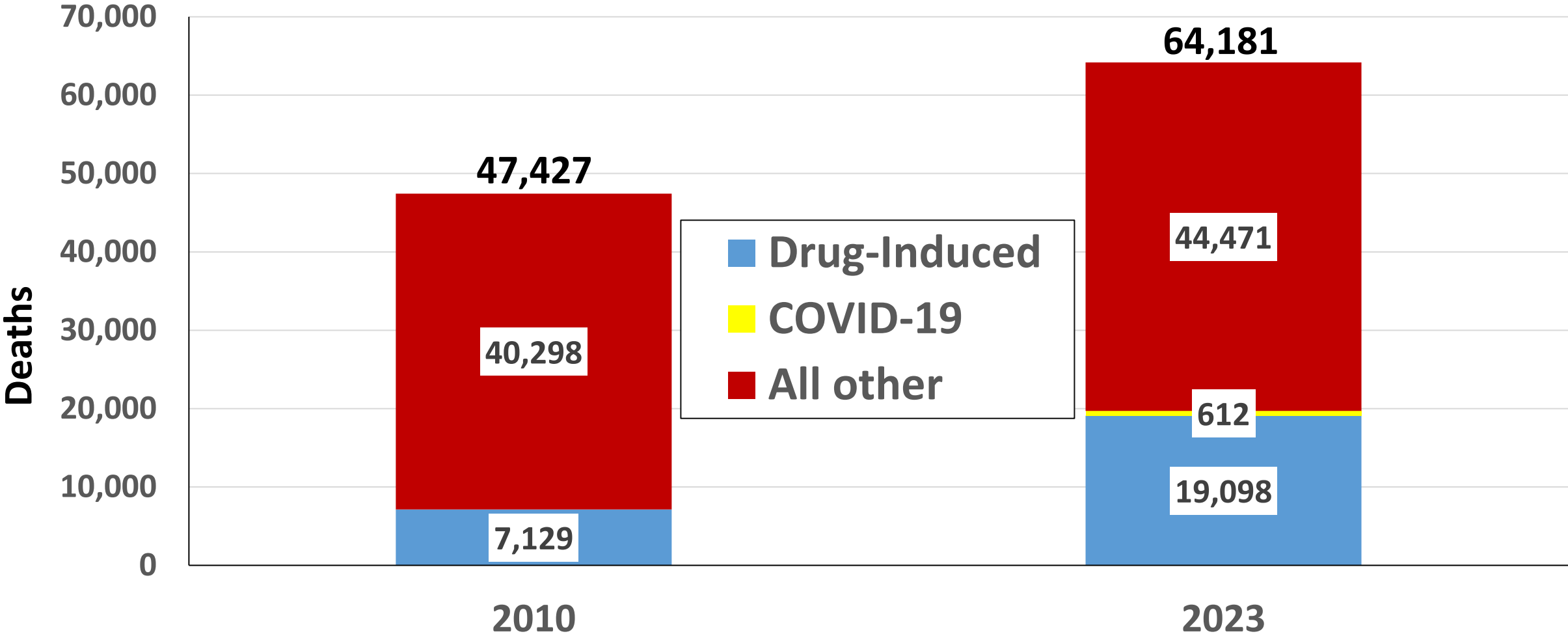
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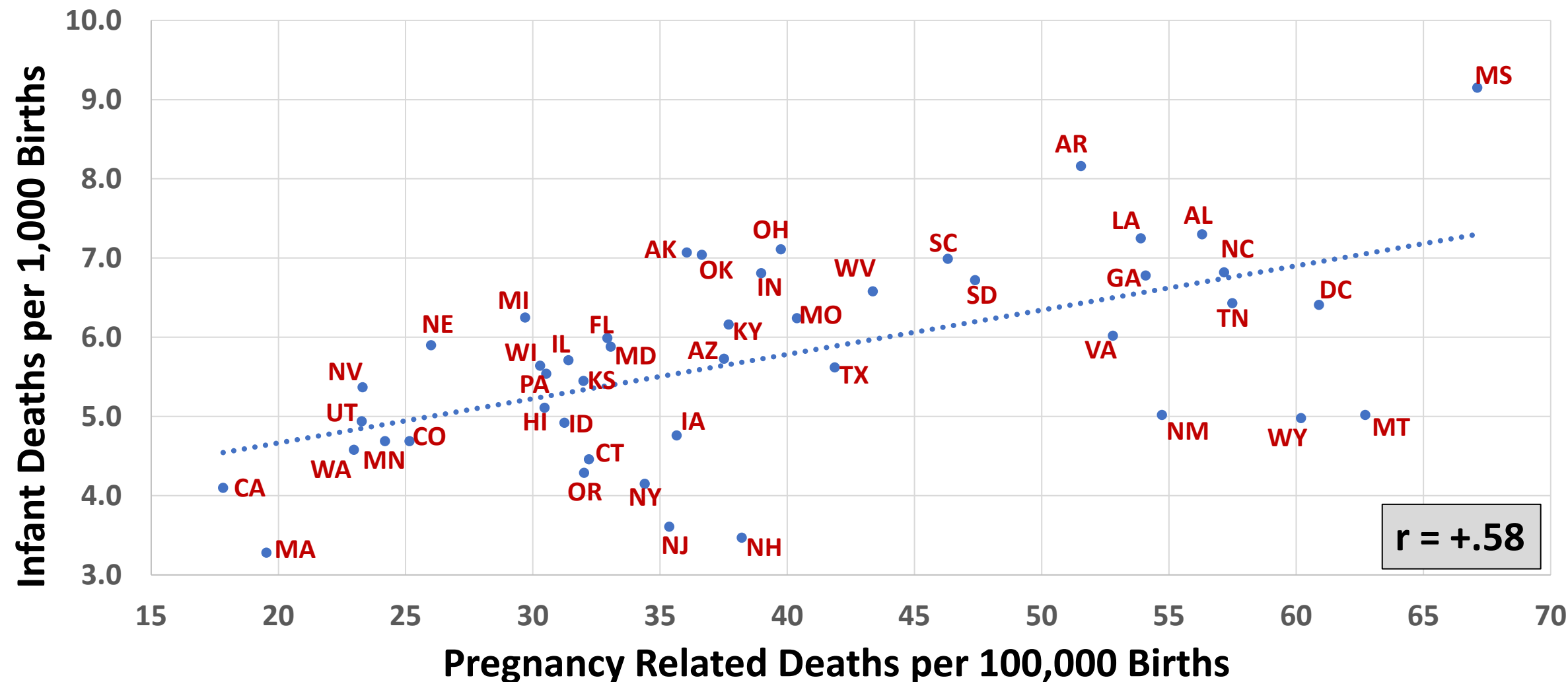


Drugs were involved in 72 percent of the increase in non-COVID deaths of women ages 15 to 44 between 2010 and 2023.

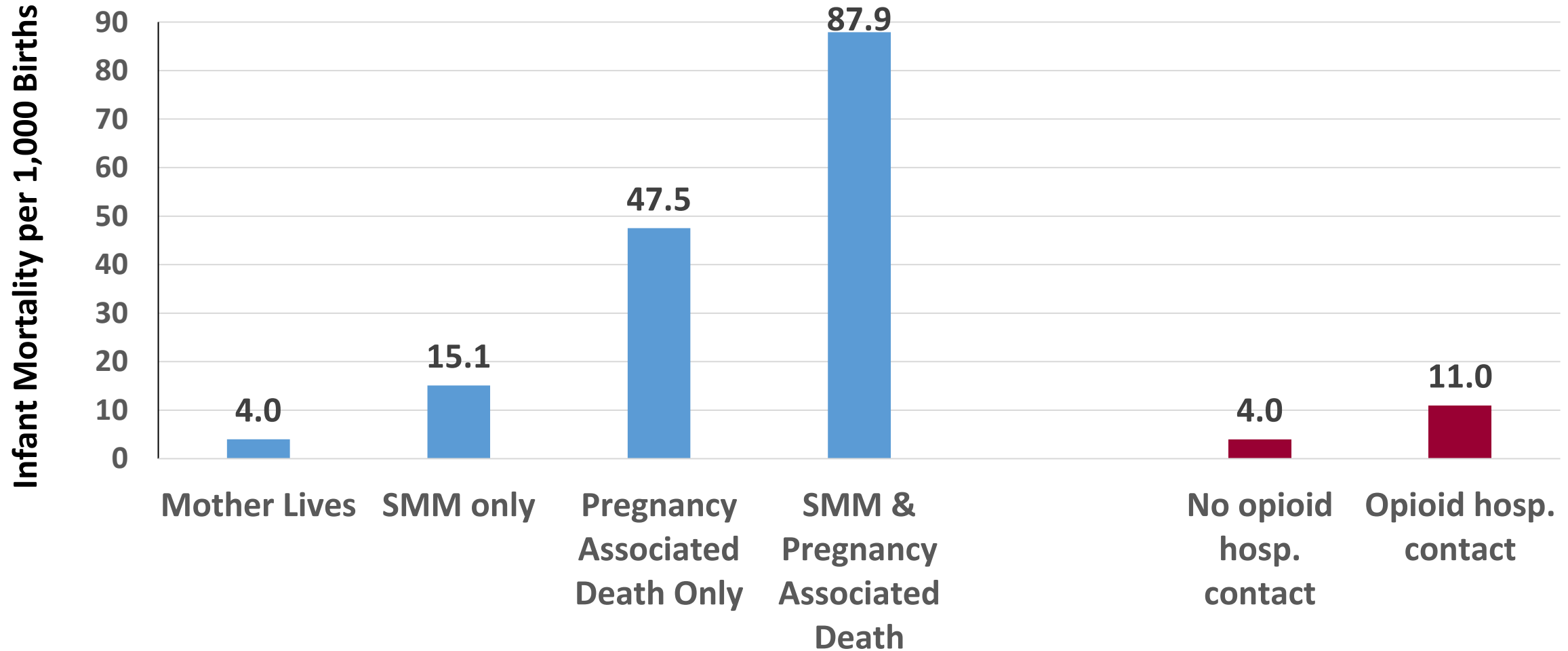


What about their babies?

Pregnancy related and infant mortality rates, 2021-2023.



Relationship Between Pregnancy Associated Death and Infant Death, Mass. 1999-2020

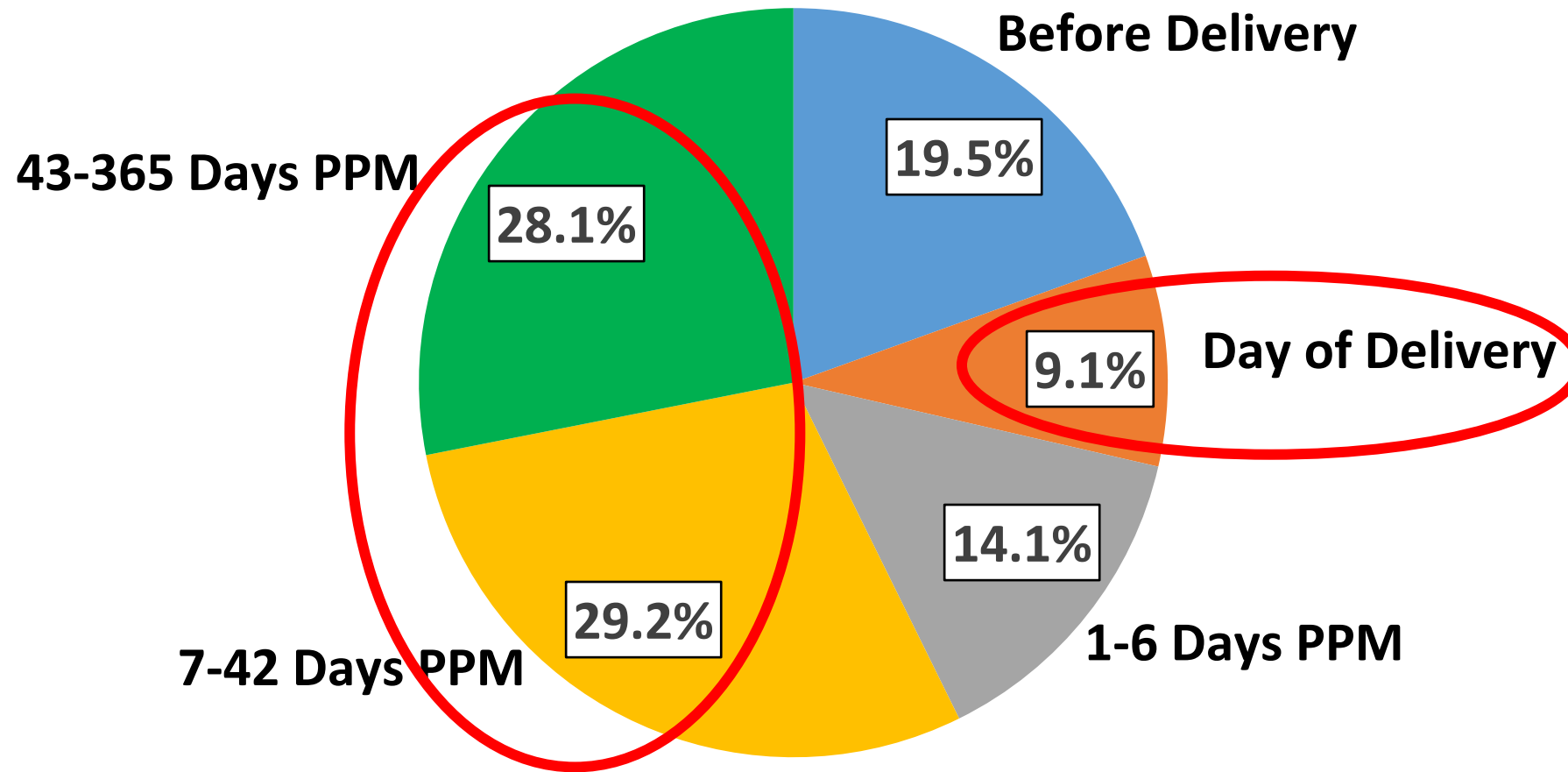


SMM – Severe Maternal Morbidity

So what can we do about all this?

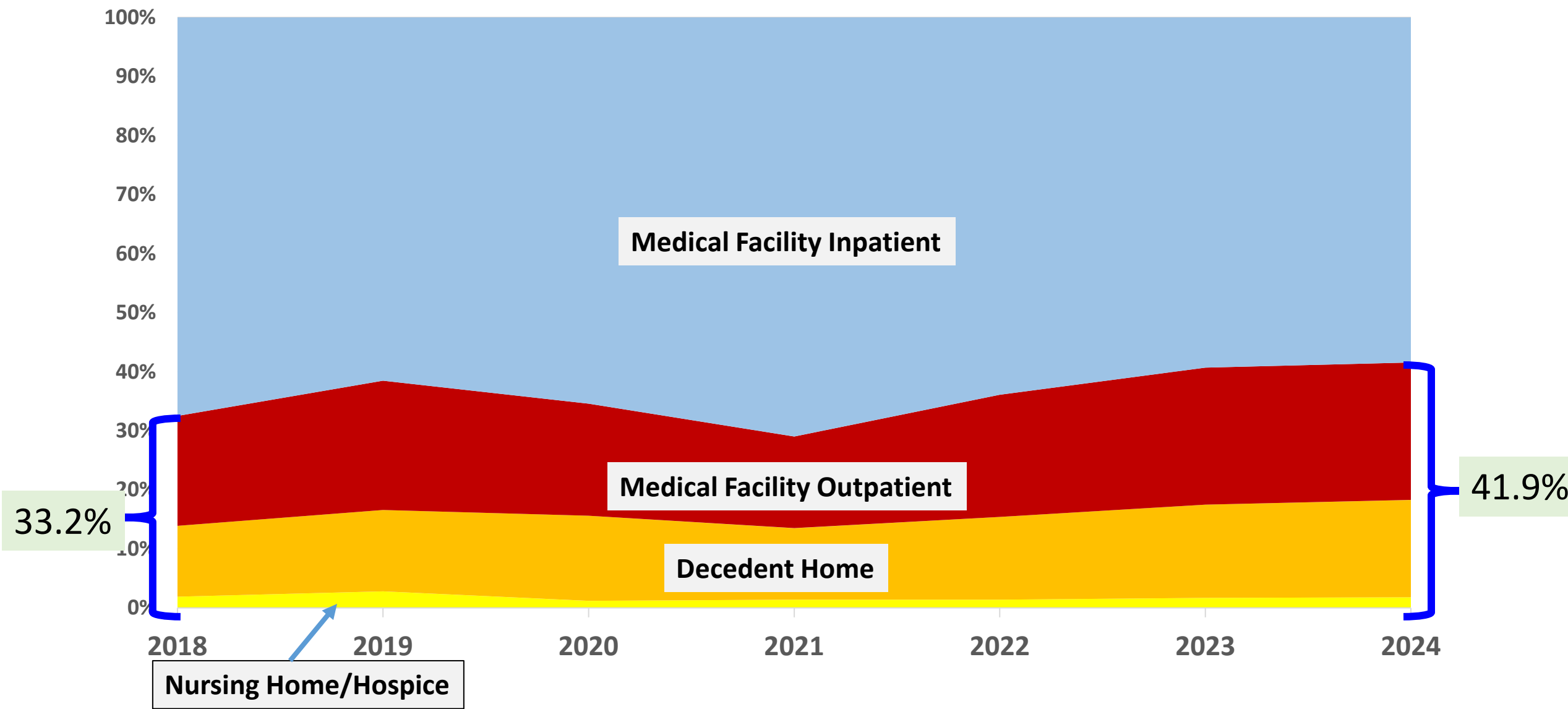
4. So what can we do?

Timing of Maternal Deaths (2021)



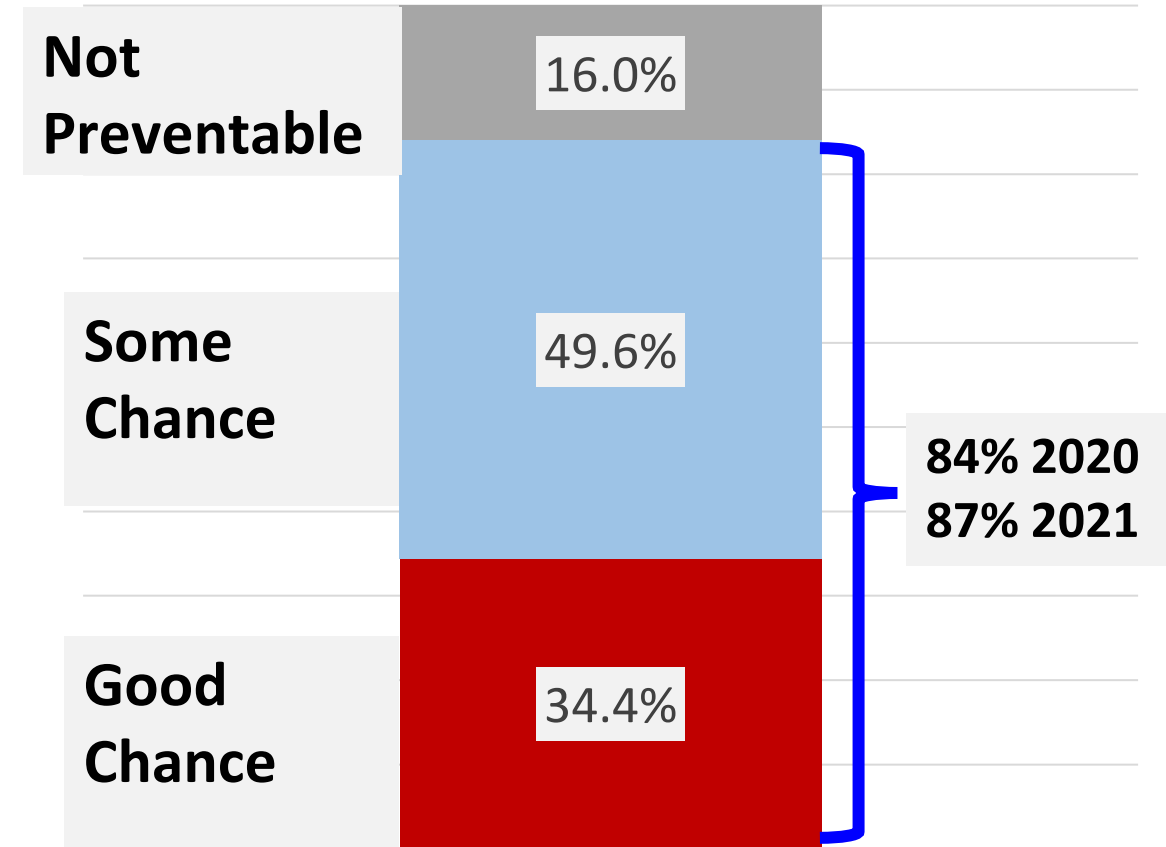
Source: CDC. Pregnancy-Related Deaths: Data from Maternal Mortality Review Committees. <https://www.cdc.gov/maternal-mortality/php/data-research/mmrc/index.html>. Access 8/24/25

Where U.S. pregnancy related deaths happen, 2018-2024



Focus on Community Preventability

- **Definition:** A death is considered preventable if the committee determines there was at least **some chance of the death being averted** by one or more reasonable changes to patient, family, provider, facility, system and/or community factors.



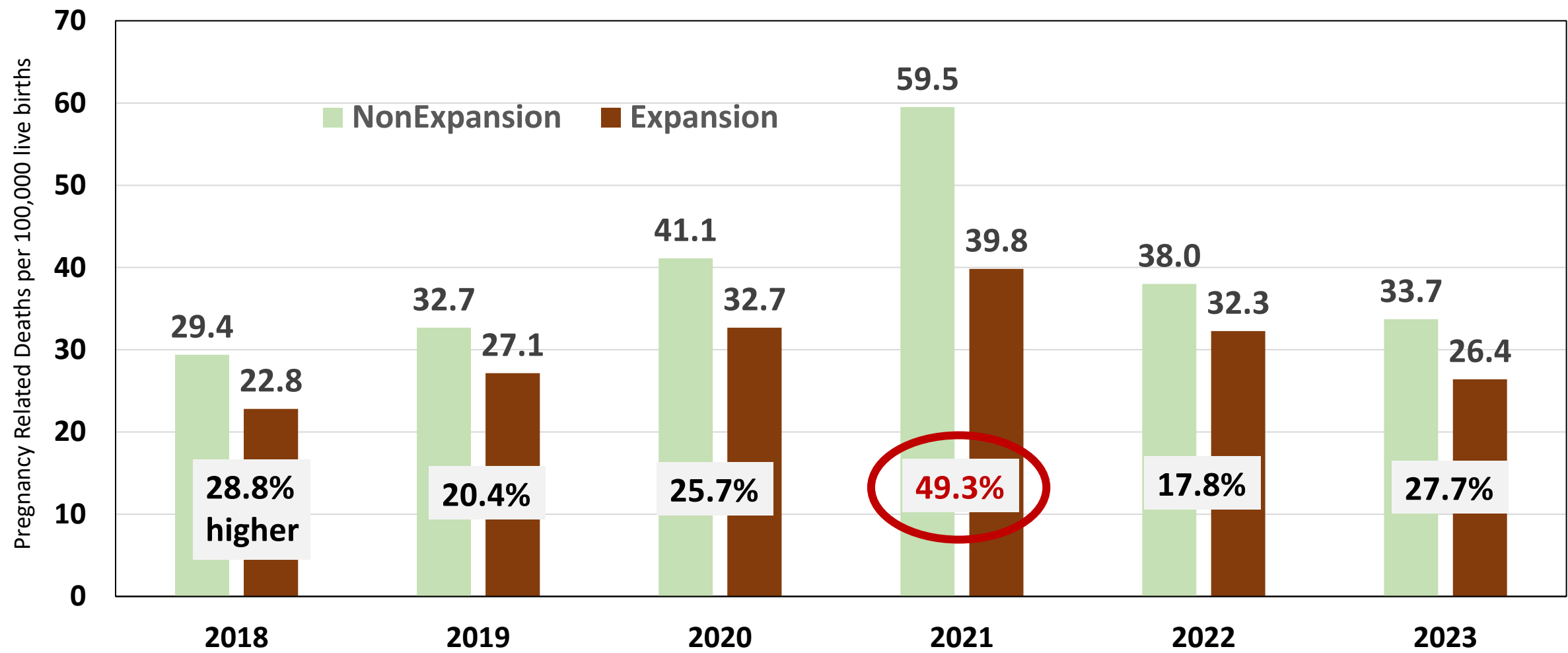
So what would result in prevention?

- **Clinical** – *70% of women who died ppm in Mass. had a hospital contact between the birth hospitalization & their death*
 - Improving clinical care
 - AIMS bundles
 - Perinatal Quality Collaboratives
 - Integration of Midwives
- **Social** – greater focus on postpartum care for at-risk women
 - Substance use programs that extend into postpartum & provide residential support
- **Political**
 - Insurance
 - Access to providers (more midwives)

Insurance: Only two states had not adopted a twelve-month extension of Medicaid postpartum coverage eligibility as of January 2025.

Alabama	Louisiana	North Dakota	Not Fully Implemented
Alaska	Maine	Ohio	
Arizona	Maryland	Oklahoma	
California	Massachusetts	Oregon	
Colorado	Michigan	Pennsylvania	Arkansas
Connecticut	Minnesota	Rhode Island	Wisconsin
Delaware	Mississippi	South Carolina	
District of Columbia	Missouri	South Dakota	
Florida	Montana	Tennessee	
Georgia	Nebraska	Texas	
Hawaii	Nevada	Utah	Refused ACA Medicaid Expansion
Idaho	New Hampshire	Vermont	
Illinois	New Jersey	Virginia	
Indiana	New Mexico	Washington	
Iowa	New York	West Virginia	
Kansas	North Carolina	Wyoming	
Kentucky			

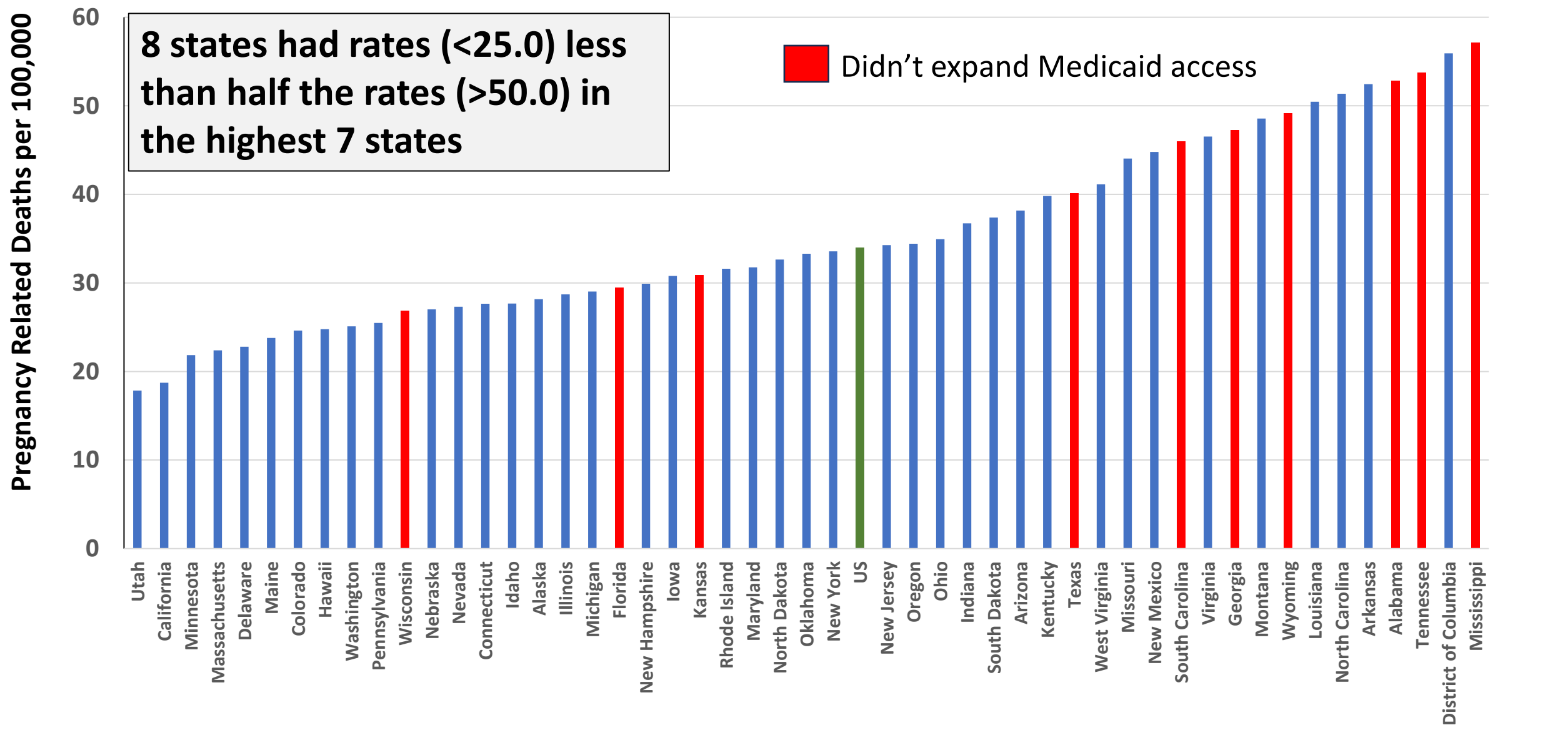
Insurance: Pregnancy-related mortality in states that have **expanded Medicaid** eligibility is 18 to 49 percent higher than in states that have not.



* Non-Expansion States in 2024: Alabama, Florida, Georgia, Kansas, Mississippi, South Carolina, Tennessee, Texas, Wisconsin, and Wyoming

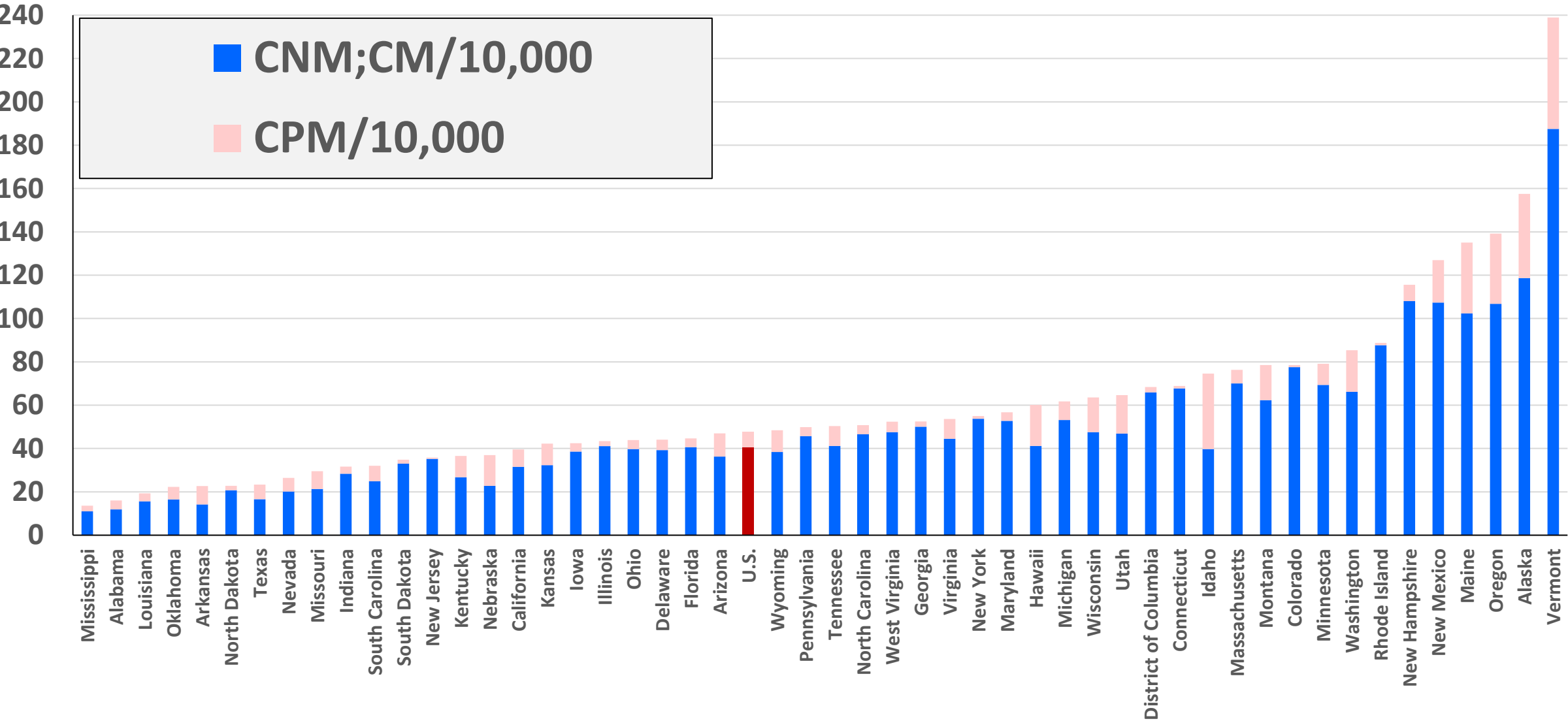
Source: NVSS data in CDC Wonder Mortality File

Insurance: State Pregnancy Related Mortality, 2020-2024*





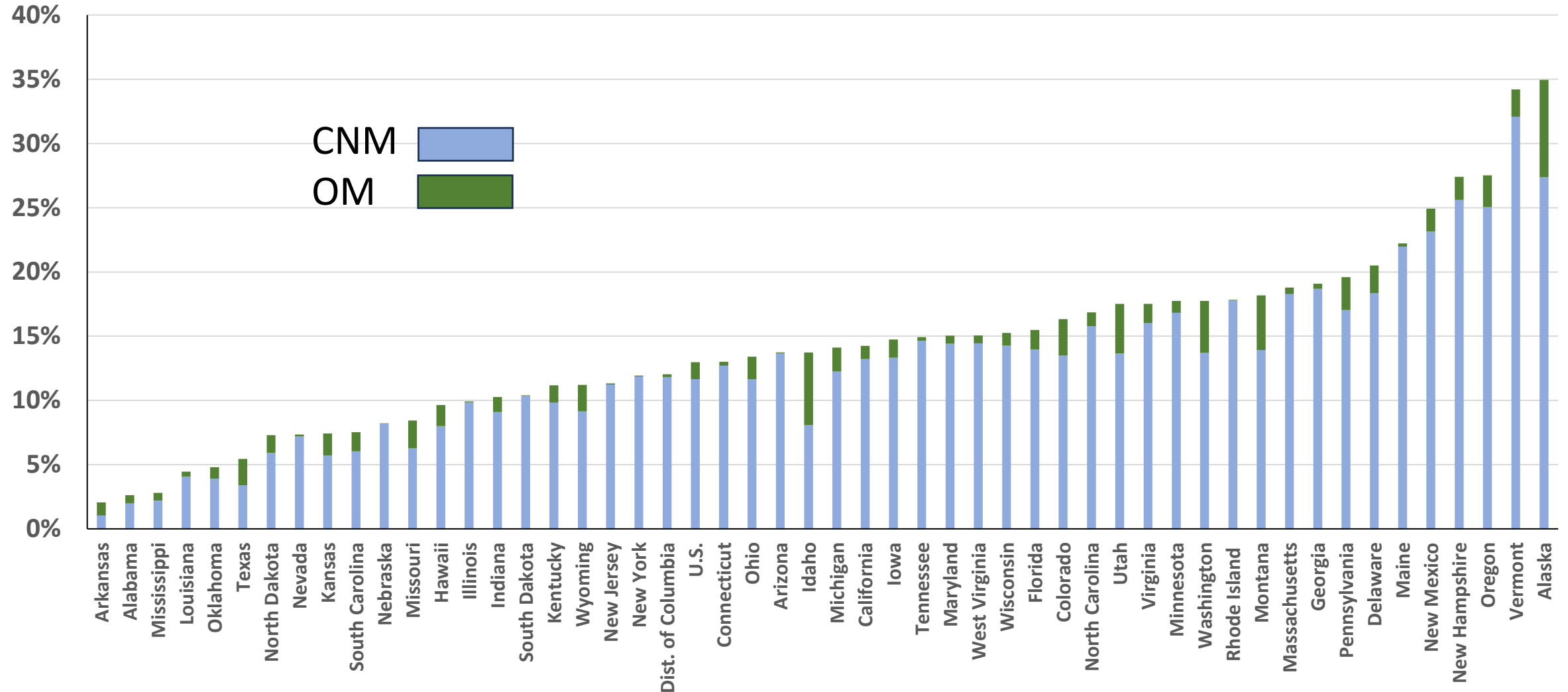
Access: Total Midwives per State (per 10,000 births) 2023-24



Sources: CNM American Midwifery Certification Board (8/24); CPM-North American Registry 2023 Annual Report
Birth denominator based on 2023 births
BirthByTheNumbers.org

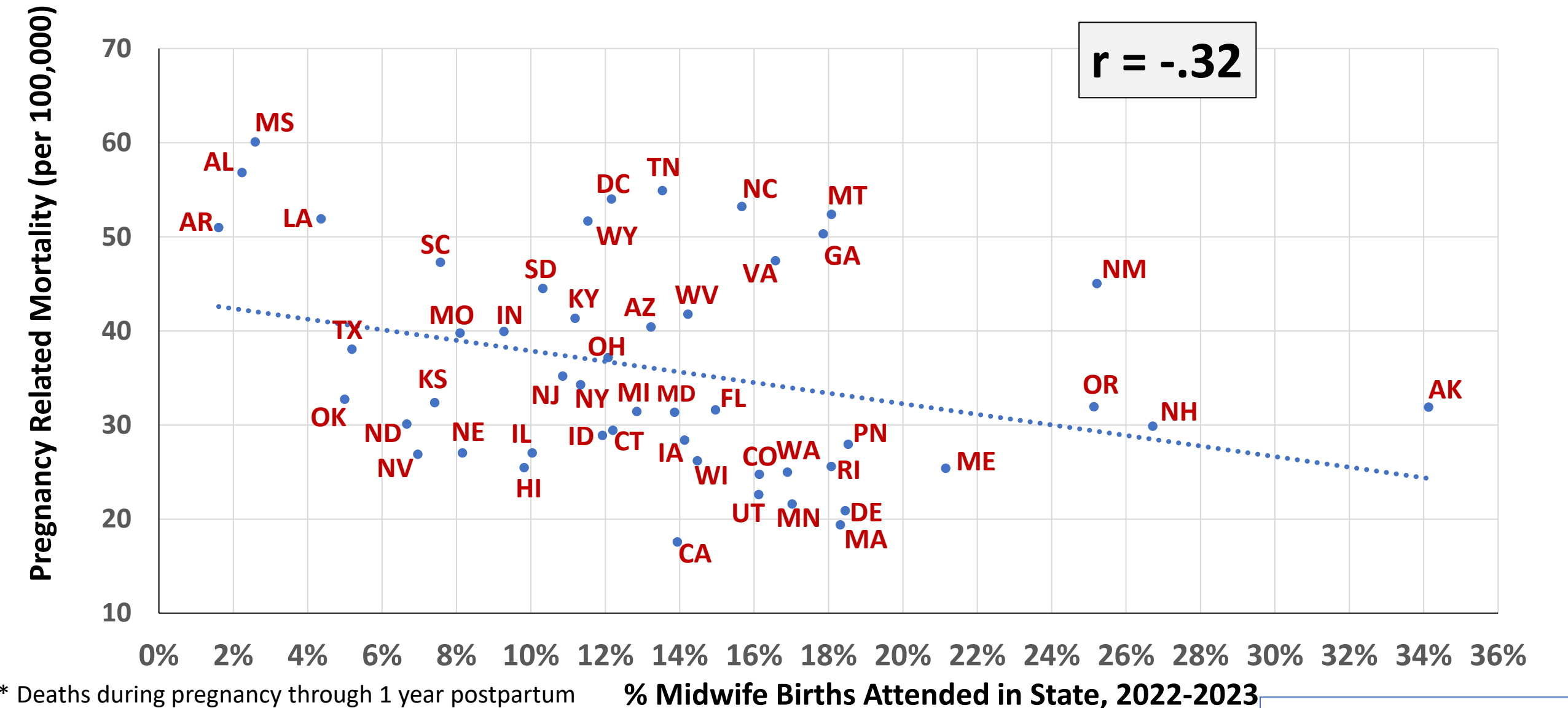


Access: Percent Certified Nurse Midwife & Other Midwife attended births by State, 2023-24





Access: Relationship Between % Midwife Attended Births (2022-23) & Pregnancy Related Mortality* (per 100,000 births), U.S. States, 2019-23



* Deaths during pregnancy through 1 year postpartum

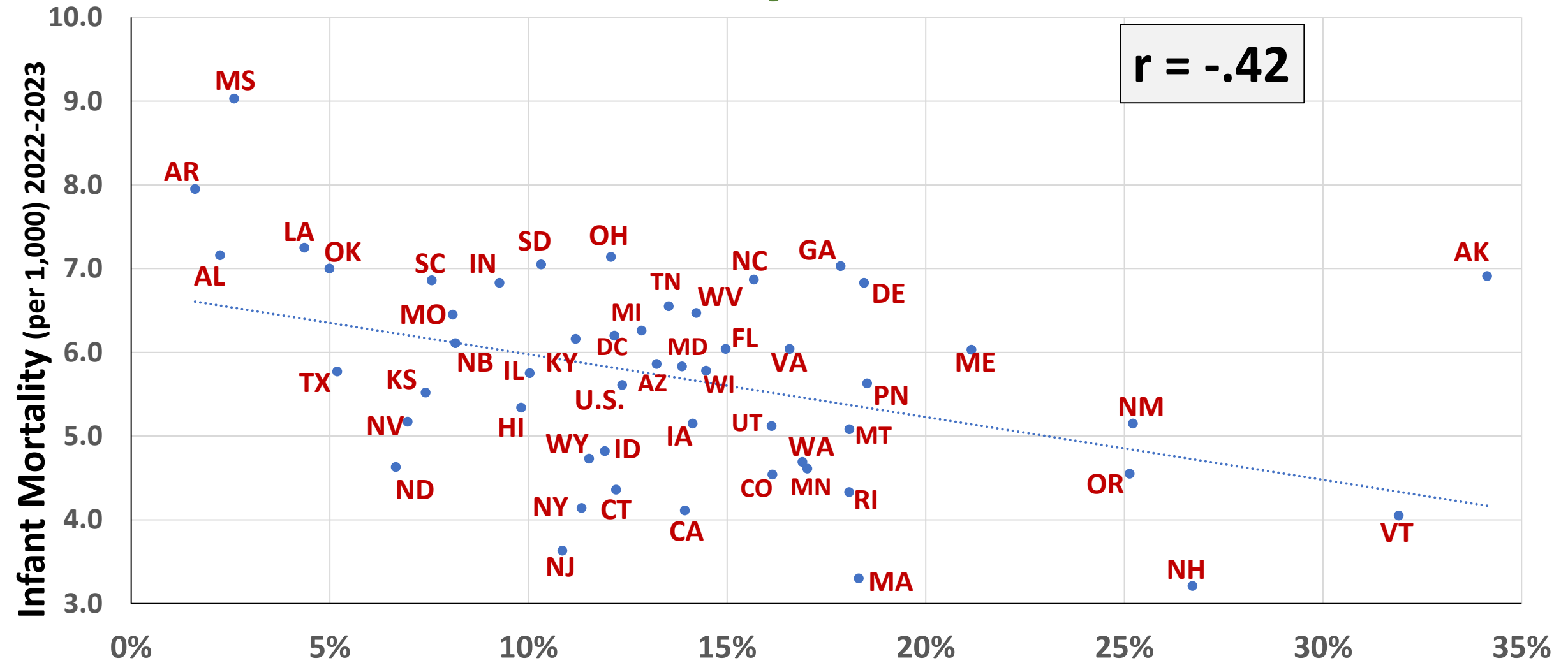
% Midwife Births Attended in State, 2022-2023

Source: CDC Wonder Birth & Death Data (Vermont excluded with <10 deaths)

BirthByTheNumbers.org



Access: Relationship Between Midwife Attended Births & State Infant Mortality (per 1,000 births), 2022-2023



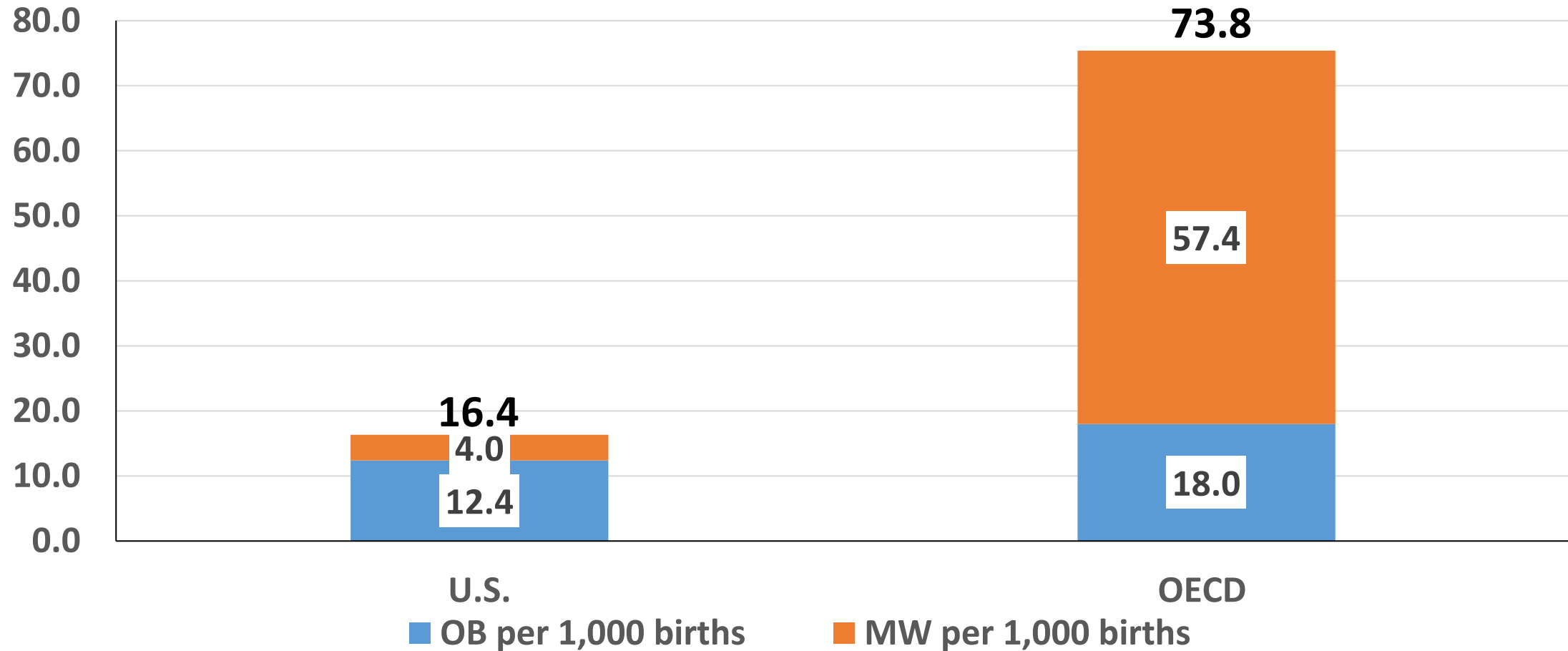
Source: CDC Wonder Birth & Infant Mortality Data

% Total Midwife Births in State (2022-23)

BirthByTheNumbers.org



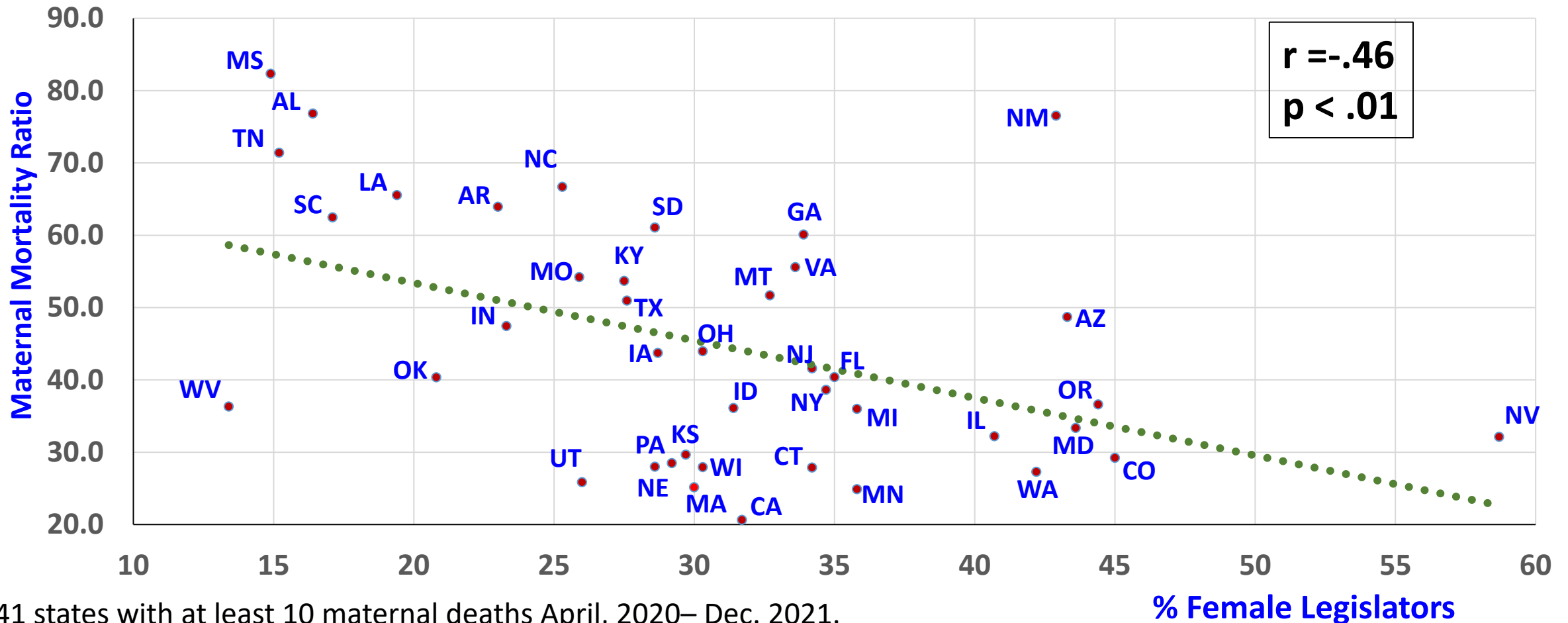
Access: Maternity Care Providers per 1,000 Births, U.S. & Comparison* OECD Countries (2023)



Source: OECD Health Database, 2024. *Comparison countries (based on 100,000+ births & OECD data on midwives licensed to practice): Australia, Belgium Canada, Czech Rep., Israel , Italy, Netherland, S. Korea, Spain, Sweden, UK.



Bonus: Pregnancy Related Mortality (per 100,000 births) 2020-2021* and % Female State Legislators 2021

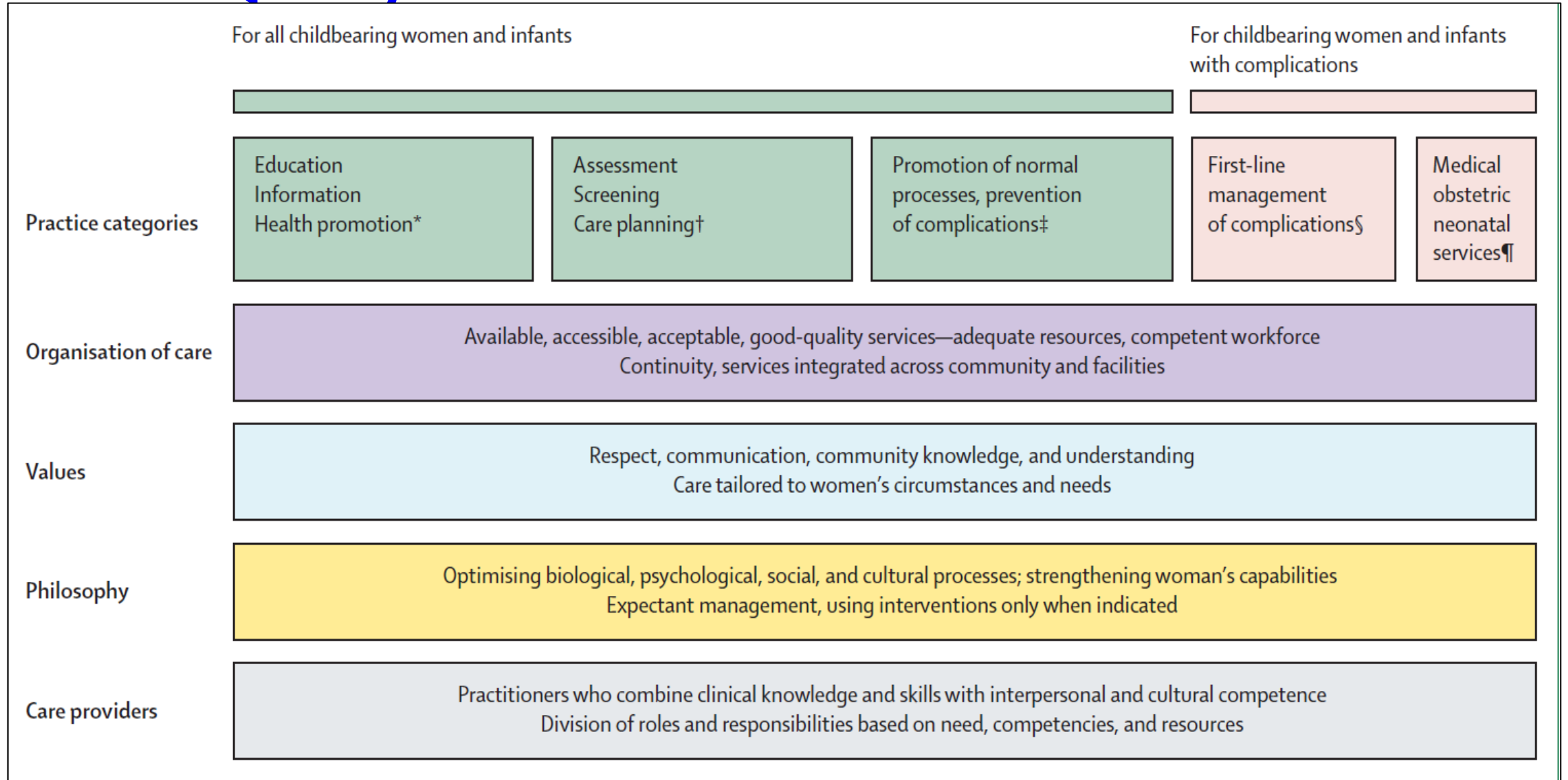


* 41 states with at least 10 maternal deaths April, 2020– Dec. 2021.

Sources: % Female Legis – Nat’l Conf State Legisl.; Pregnancy Related Mortality – CDC Wonder

www.birthingthenumbers.org

Quality Maternal & Newborn Care Framework



Source: Renfrew et al. Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. *Lancet* 2014;
[https://doi.org/10.1016/S0140-6736\(14\)60789-3](https://doi.org/10.1016/S0140-6736(14)60789-3)

Summary

- Need to rethink maternity care the way midwives do – from a **lifespan and community** as well as a clinical perspective. Craft policies that keep **women of all ages within the health and social system** to prevent problems that lead to pregnancy associated deaths.
- Rethink maternal mortality as not separate from women's health care in general, but as an opportunity to engage with women who might not otherwise be interested in becoming involved in the health care system.
- Form alliances & advocate **with key stakeholder (CNMs, CMs & CPMs)** to advance your mutual policy interests, focusing on what you agree on rather than what divides you.
- Broaden educational resources to expand and diversify the midwifery workforce – and **then have respect** for what your colleagues who aren't like you are doing.



www.birthbythenumbers.org

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