

The Contemporary Challenge of Maternal Mortality in the U.S.

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www.birthbythenumbers.org

OER Staff Meeting

Maternal & Child Health Bureau

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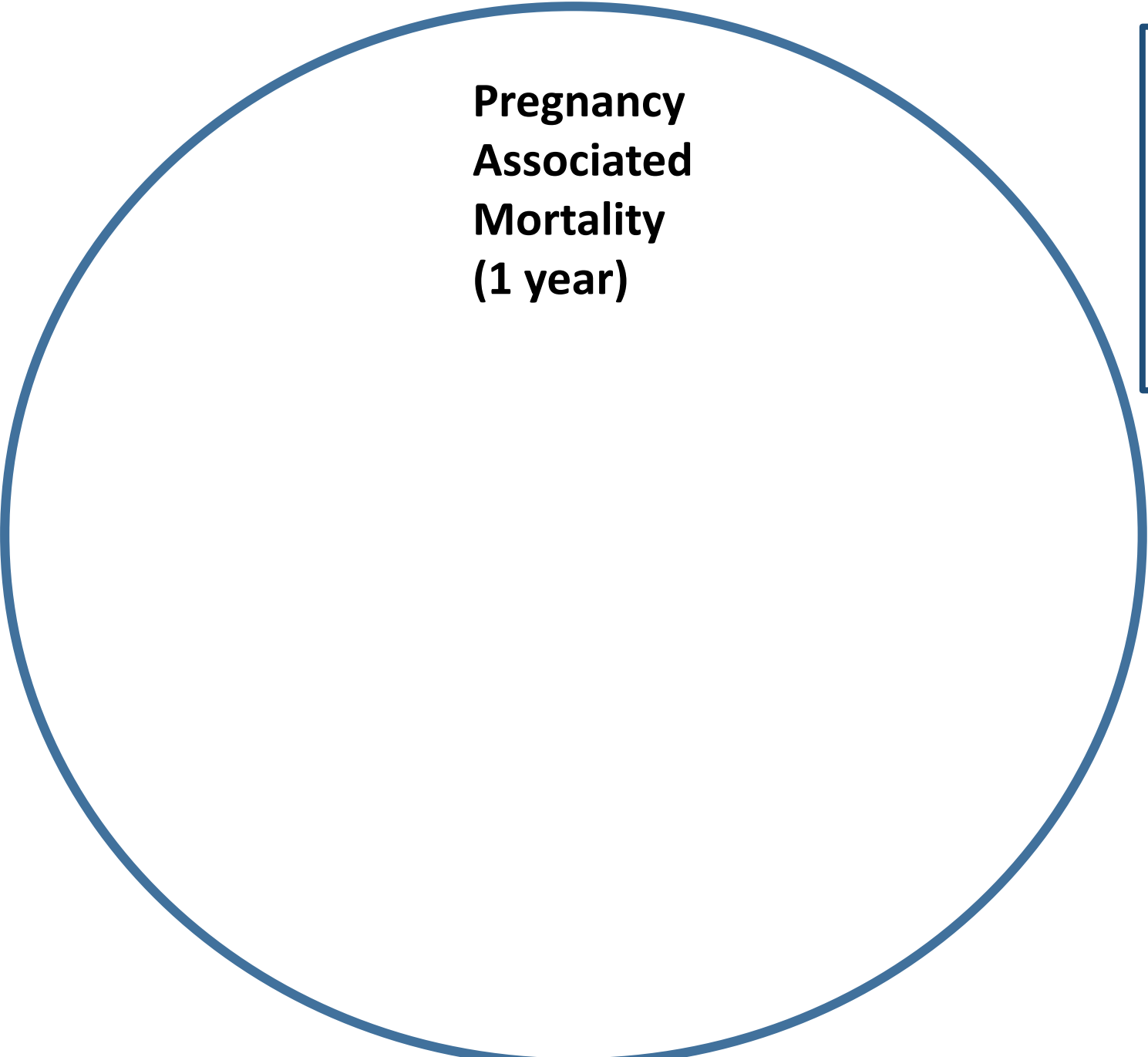
Outline of the Presentation

1. Clarifying Definitions
2. Historical Context
3. The Strange Case of the Pregnancy Checkbox
4. The Pregnancy Mortality Surveillance System
5. Comparing the U.S. to the Rest of the World
6. The Persistence of Racial Disparities
7. Maternal Mortality as a Public Health Problem
 - a. The Timing of Maternal Deaths
8. The Issue is Broader than Maternal Mortality
9. The Way Forward

1. Definitions – the multiple measures of maternal death

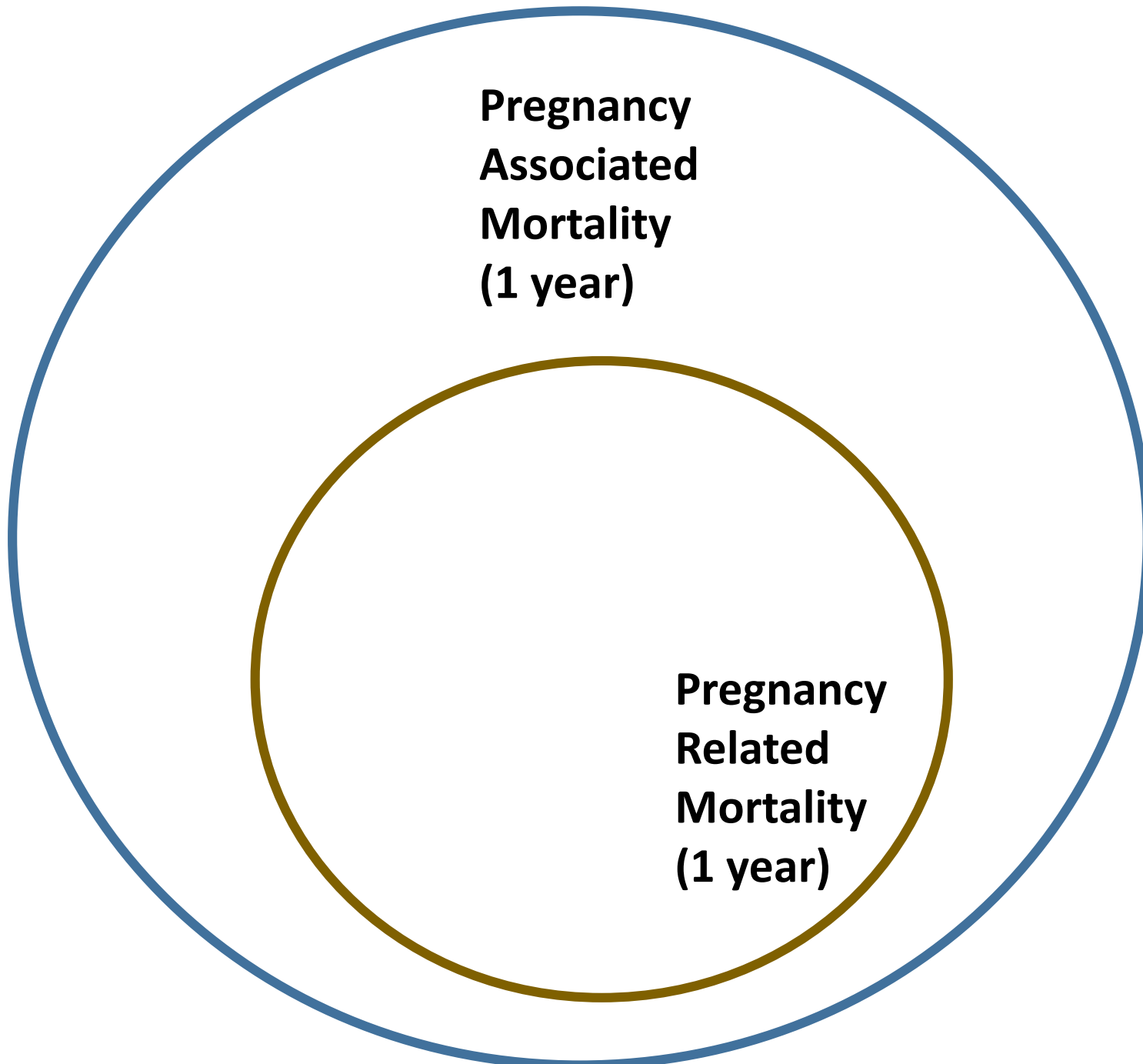
Three Definitions (in the U.S.)

- **Pregnancy Associated Death** – The death of a women while pregnant or *within one year* of termination of pregnancy, *irrespective of cause*. (*WHO calls these “pregnancy related”*). *Starting point for analyses.*
- **Maternal Mortality Ratio** – 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. Typically reported as a ratio per 100,000 births. *Used in international comparisons.*
- **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.*

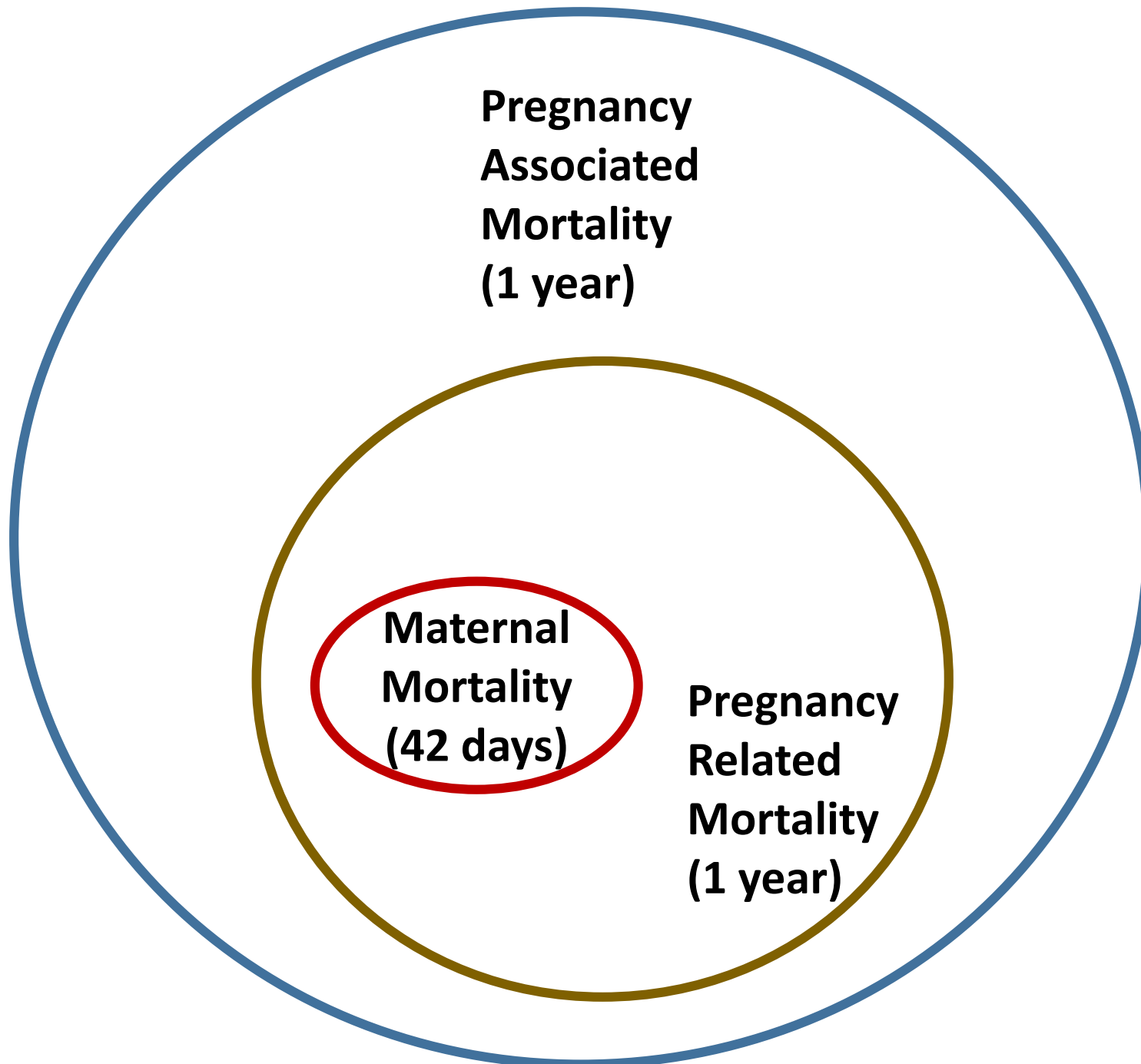


**Pregnancy
Associated
Mortality
(1 year)**

**All Deaths
women of
reprod. age
pregnancy to 1
year ppm**

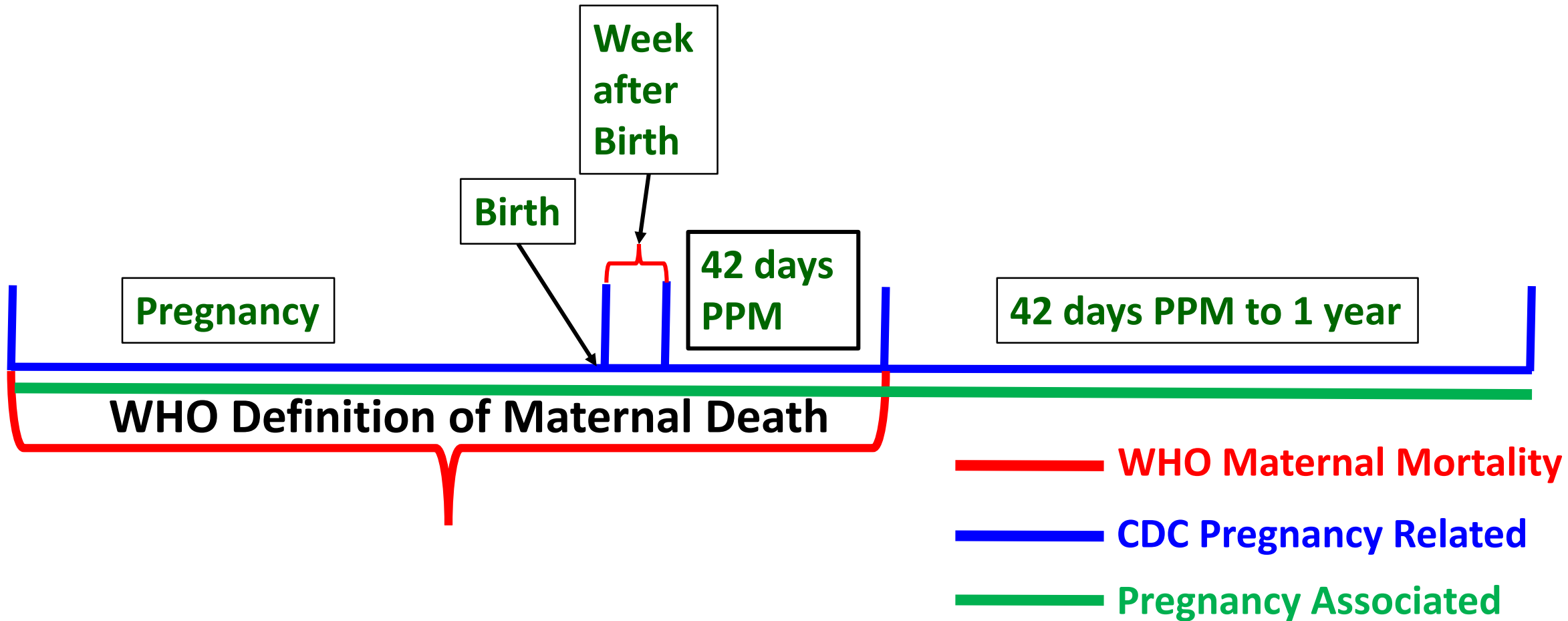


**All Deaths
women of
reprod. age
pregnancy to
1 year ppm
Related to the
pregnancy**



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

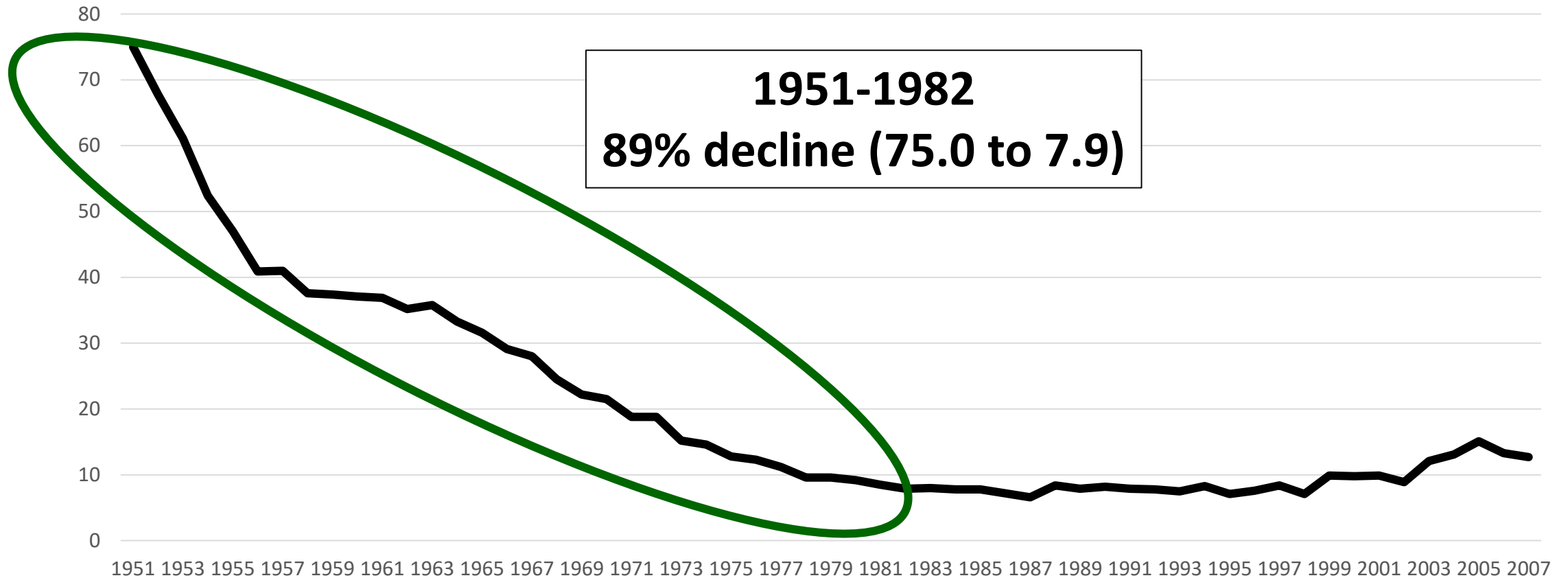
Timeline of Maternal Mortality Definitions



PPM – postpartum –period after the birth

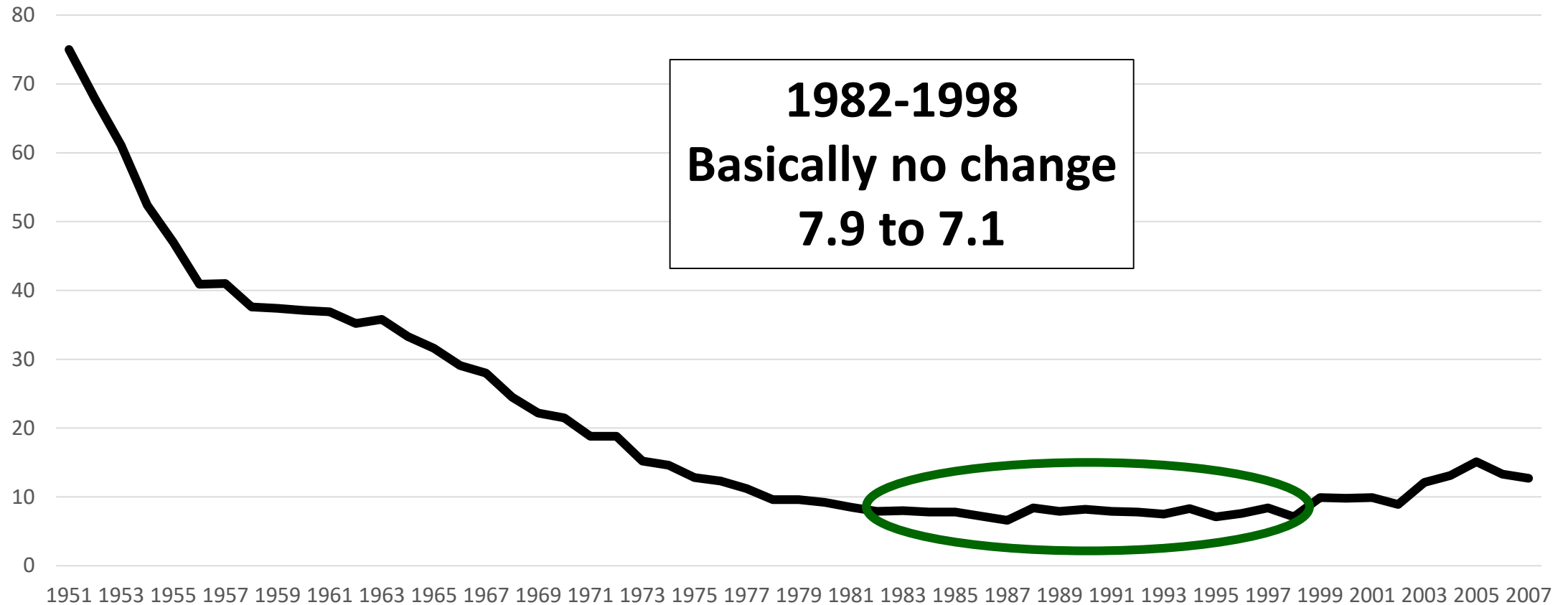
2. The Historical Trend in U.S. Maternal Mortality

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



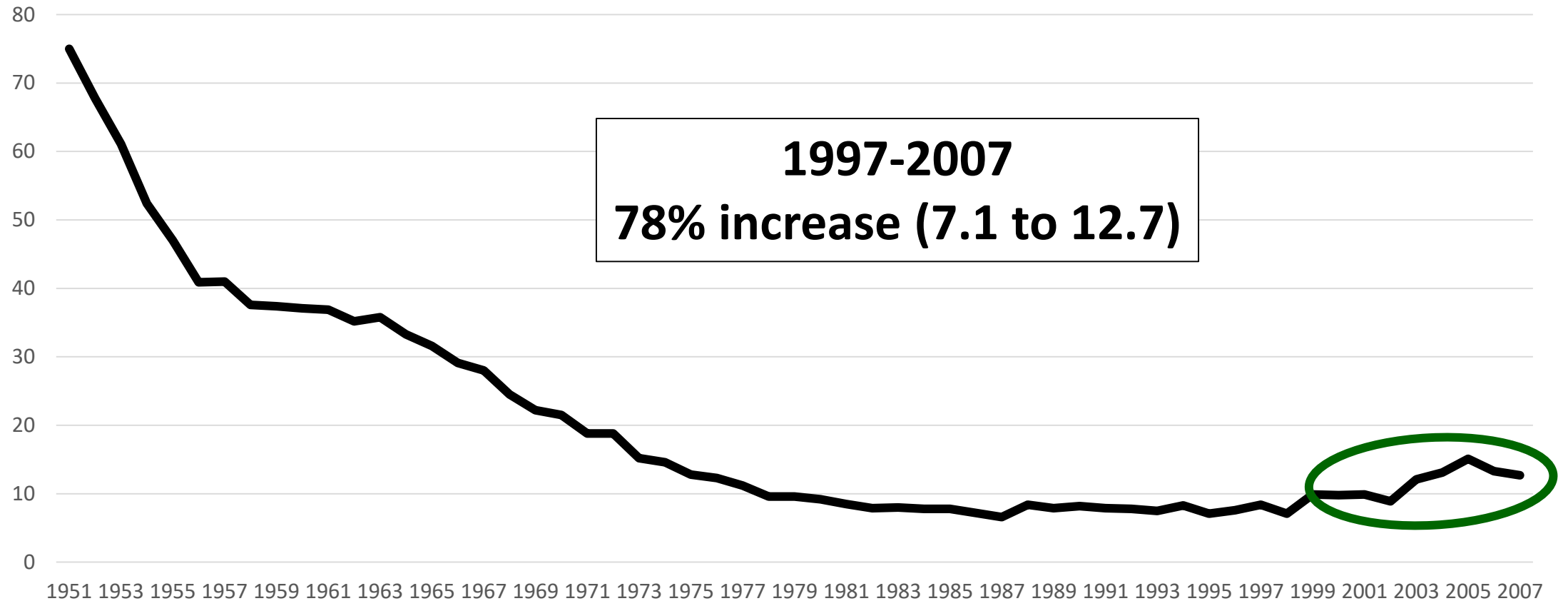
Source: NCHS. Deaths: Final Data. Annual Reports.

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



Source: NCHS. Deaths: Final Data. Annual Reports.

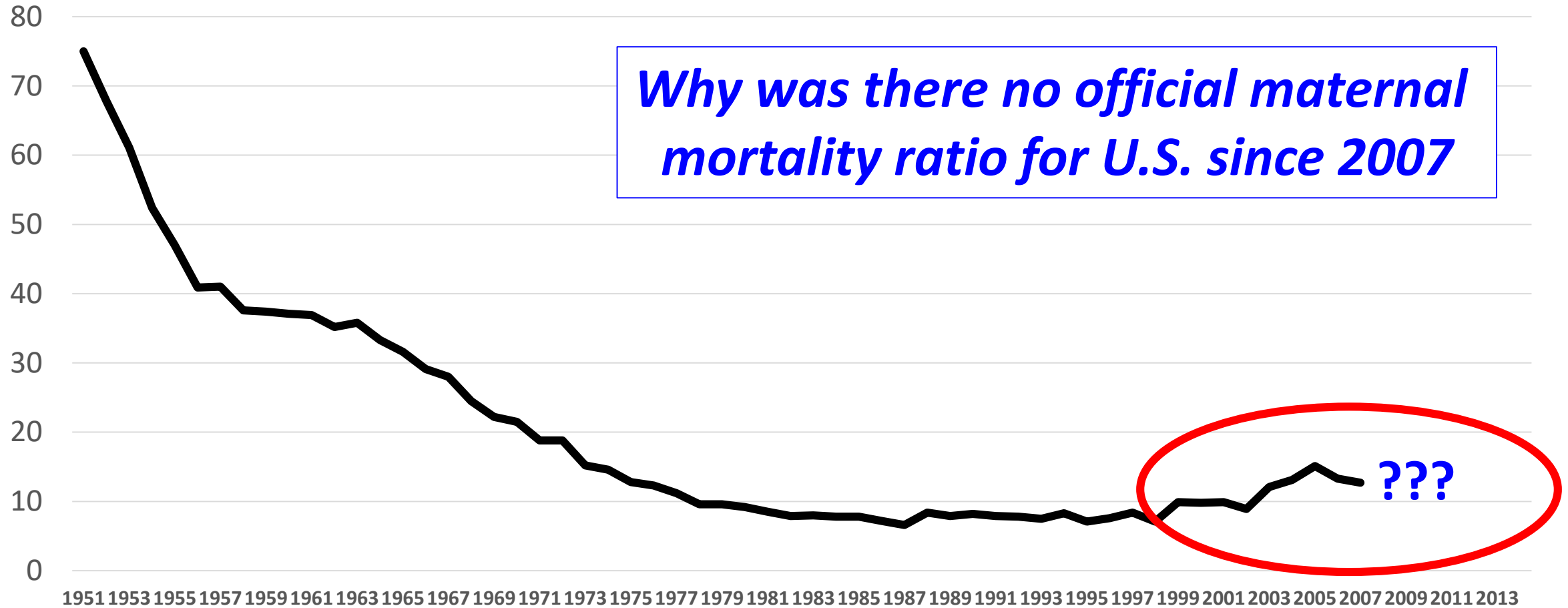
U.S. Maternal Mortality (per 100,000 live births), 1951-2007



Source: NCHS. Deaths: Final Data. Annual Reports.

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

Why was there no official maternal mortality ratio for U.S. since 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***

3. The Case of the Pregnancy Checkbox

“This difficulty [in measuring maternal mortality] would be solved easily if universal birth and stillbirth registration was practiced and if death certificates required a statement as to the association of the puerperal state.”

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“This difficulty [in measuring maternal mortality] would be solved easily if universal birth and stillbirth registration was practiced and if death certificates required a statement as to the association of the puerperal state.”

Committee on Maternal Welfare. Maternal Mortality in Philadelphia 1931-1933 (1934)

The Check Box

Determining Pregnancy Status to Improve Maternal Mortality Surveillance

Andrea P. MacKay, MSPH, Roger Rochat, MD, Jack C. Smith, MS, Cynthia J. Berg, MD, MPH

Objective: More than half of pregnancy-related deaths are not identified through routine surveillance methods. The purpose of this study was to evaluate the effectiveness of the pregnancy check box on death certificates in ascertaining pregnancy-related deaths.

Methods: Data derived from the Centers for Disease Control and Prevention's ongoing Pregnancy Mortality Surveillance System were used to identify states that included a check box on the death certificate in 1991 and 1992. Death certificates from those states were evaluated to determine the number and proportion of pregnancy-related deaths identified by a marked check box. Characteristics of death were also examined.

Results: Sixteen states and New York City included a check box or question specifically asking about pregnancy of the decedent. Of the 425 pregnancy-related deaths identified in the 17 reporting areas, 124 (29%) were determined to be pregnancy-related deaths only because of the pregnancy status information provided in the check box. The proportion of deaths identified only by a marked check box ranged from less than 5% for four states to 40% or more for seven states.

Conclusions: The availability of pregnancy status information on death certificates is a simple and effective aid in ascertaining a pregnancy-related death, when no other indicators of pregnancy appear on the death certificate. Routine use of the pregnancy check box for all states would lead to substantially increased classification of maternal deaths and more accurate classification of the causes of and risk factors for maternal deaths.

***16 States
already had a
checkbox as far
back as 1991-
1992, but with
different
wording***

Table III. Separate questions related to pregnancy on state certificates in 2003

Alabama.	Was there a pregnancy in last 42 days? (Specify Yes, No, or Unknown)
California	If female, pregnant in last year? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Florida	If female, was there a pregnancy in the past 3 months? <input type="checkbox"/> Yes <input type="checkbox"/> No If female aged 10–54: <input type="checkbox"/> not pregnant within past year <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> not pregnant, but pregnant within 42 days of death <input type="checkbox"/> not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> unknown if pregnant within the past year
Idaho.	If female, was there a pregnancy in past three months? <input type="checkbox"/> Yes <input type="checkbox"/> No
Illinois	Was decedent pregnant or 90 days postpartum? (Yes or no)
Indiana.	If female, was there a pregnancy in the past 12 months? (Specify yes or no)
Iowa	If female, was there a pregnancy in the past 12 months? <input type="checkbox"/> Yes <input type="checkbox"/> No
Kentucky	If deceased was female 10–49, was she pregnant in the last 90 days? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Louisiana	If female: Was decedent pregnant in the past 12 months? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Maryland	<i>Separate fields on dates of death and delivery support capability to compute the other categories in the standard.</i> Was female pregnant: At death? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> unknown In last 12 months? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> unknown
Minnesota.	Had decedent been pregnant within 90 days prior to death? <input type="checkbox"/> Yes <input type="checkbox"/> No
Mississippi	If deceased was female 10–49, was she pregnant in the last 90 days? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Missouri	If female: <input type="checkbox"/> not pregnant within past year <input type="checkbox"/> not pregnant but pregnant with 42 days of death <input type="checkbox"/> not pregnant but pregnant 43 days to 1 year before death <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> unknown if pregnant within past year
Montana.	If female, was there a pregnancy in the past 3 months? <input type="checkbox"/> Yes <input type="checkbox"/> No
Nebraska	If female, was she pregnant at death, or any time 90 days prior to death? <input type="checkbox"/> Yes <input type="checkbox"/> No
New Jersey	Was decedent pregnant within last 6 weeks? <input type="checkbox"/> Yes <input type="checkbox"/> No
New Mexico	If female: <input type="checkbox"/> not pregnant within 1 year of death <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> not pregnant at death, but pregnant within 42 days of death <input type="checkbox"/> not pregnant at death, but pregnant 43 days to 1 year before death <input type="checkbox"/> unknown if pregnant within 1 year of death
New York City	<i>Also have date of outcome, so could compute intervals if needed.</i> If female: <input type="checkbox"/> not pregnant within last year <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> not pregnant, but pregnant within 42 days of death <input type="checkbox"/> not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> unknown if pregnant within past year
New York State	<i>Also have date of delivery, so could compute intervals if needed.</i>
North Dakota	Was deceased pregnant within 18 months of death? <input type="checkbox"/> Yes <input type="checkbox"/> No
Texas	Was decedent pregnant at time of death <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown within last 12 months <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Virginia	If female, was there a pregnancy in past 3 months? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown

Time periods used:
42 days;
6 weeks;
3 months;
90 days;
12 mos;
“last year”

Source: Hoyert . *Maternal Mortality and Related Concepts*. NCHS. Vital Health Stat 3(33). 2007. p.12.

LOCAL FILE NO.		U.S. STANDARD CERTIFICATE OF DEATH		STATE FILE NO.	
1. DECEDENT'S LEGAL NAME (Include AKA's if any) (First, Middle, Last)		2. SEX		3. SOCIAL SECURITY NUMBER	
4a. AGE-Last Birthday (Years)		4b. UNDER 1 YEAR Months Days		4c. UNDER 1 DAY Hours Minutes	
5. DATE OF BIRTH (Mo/Day/Yr)		6. BIRTH-PLACE (City and State or Foreign Country)			
7a. RESIDENCE-STATE		7b. COUNTY		7c. CITY OR TOWN	
7d. STREET AND NUMBER		7e. APT. NO.		7f. ZIP CODE	
7g. INSIDE CITY LIMITS? <input type="checkbox"/> Yes <input type="checkbox"/> No					
8. EVER IN US ARMED FORCES? <input type="checkbox"/> Yes <input type="checkbox"/> No		9. MARITAL STATUS AT TIME OF DEATH <input type="checkbox"/> Married <input type="checkbox"/> Married, but separated <input type="checkbox"/> Widowed <input type="checkbox"/> Divorced <input type="checkbox"/> Never Married <input type="checkbox"/> Unknown		10. SURVIVING SPOUSE'S NAME (If wife, give name prior to first marriage)	
11. FATHER'S NAME (First, Middle, Last)		12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)			
13a. INFORMANT'S NAME		13b. RELATIONSHIP TO DECEDENT		13c. MAILING ADDRESS (Street and Number, City, State, Zip Code)	
14. PLACE OF DEATH (Check only one: see instructions)					
IF DEATH OCCURRED IN A HOSPITAL: <input type="checkbox"/> Inpatient <input type="checkbox"/> Emergency Room/Outpatient <input type="checkbox"/> Dead on Arrival					
IF DEATH OCCURRED SOMEWHERE OTHER THAN A HOSPITAL: <input type="checkbox"/> Hospice facility <input type="checkbox"/> Nursing home/Long term care facility <input type="checkbox"/> Decedent's home <input type="checkbox"/> Other (Specify):					
15. FACILITY NAME (If not institution, give street & number)		16. CITY OR TOWN, STATE, AND ZIP CODE		17. COUNTY OF DEATH	
18. METHOD OF DISPOSITION: <input type="checkbox"/> Burial <input type="checkbox"/> Cremation <input type="checkbox"/> Donation <input type="checkbox"/> Entombment <input type="checkbox"/> Removal from State <input type="checkbox"/> Other (Specify):		19. PLACE OF DISPOSITION (Name of cemetery, crematory, other place)			
20. LOCATION-CITY, TOWN, AND STATE		21. NAME AND COMPLETE ADDRESS OF FUNERAL FACILITY			
22. SIGNATURE OF FUNERAL SERVICE LICENSEE OR OTHER AGENT				23. LICENSE NUMBER (Of Licensee)	
ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH				24. DATE PRONOUNCED DEAD (Mo/Day/Yr)	
25. TIME PRONOUNCED DEAD				26. SIGNATURE OF PERSON PRONOUNCING DEATH (Only when applicable)	
27. LICENSE NUMBER				28. DATE SIGNED (Mo/Day/Yr)	
29. ACTUAL OR PRESUMED DATE OF DEATH (Mo/Day/Yr) (Spell Month)		30. ACTUAL OR PRESUMED TIME OF DEATH		31. WAS MEDICAL EXAMINER OR CORONER CONTACTED? <input type="checkbox"/> Yes <input type="checkbox"/> No	
CAUSE OF DEATH (See instructions and examples)					
32. PART I. Enter the chain of events—diseases, injuries, or complications—that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.					
IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. _____ Due to (or as a consequence of): _____					
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST b. _____ Due to (or as a consequence of): _____					
c. _____ Due to (or as a consequence of): _____					
d. _____					
PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I					
33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No					
34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No					
35. DID TOBACCO USE CONTRIBUTE TO DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> Probably <input type="checkbox"/> No <input type="checkbox"/> Unknown		36. IF FEMALE: <input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Unknown if pregnant within the past year		37. MANNER OF DEATH <input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined	
38. DATE OF INJURY (Mo/Day/Yr) (Spell Month)		39. TIME OF INJURY		40. PLACE OF INJURY (e.g., Decedent's home, construction site, restaurant, wooded area)	
41. INJURY AT WORK? <input type="checkbox"/> Yes <input type="checkbox"/> No					
42. LOCATION OF INJURY: State: _____ City or Town: _____					
Street & Number: _____		Apartment No.: _____		Zip Code: _____	
43. DESCRIBE HOW INJURY OCCURRED: _____		44. IF TRANSPORTATION INJURY, SPECIFY: <input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Native Hawaiian <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify): _____			
45. CERTIFIER (Check only one): <input type="checkbox"/> Certifying physician-To the best of my knowledge, death occurred due to the cause(s) and manner stated. <input type="checkbox"/> Pronouncing & Certifying physician-To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner stated. <input type="checkbox"/> Medical Examiner/Coroner-On the basis of examination, and/or investigation, in my opinion, death occurred at the time, date, and place, and due to the cause(s) and manner stated.					
Signature of certifier: _____					
46. NAME, ADDRESS, AND ZIP CODE OF PERSON COMPLETING CAUSE OF DEATH (Item 32)					
47. TITLE OF CERTIFIER		48. LICENSE NUMBER		49. DATE CERTIFIED (Mo/Day/Yr)	
50. FOR REGISTRAR ONLY- DATE FILED (Mo/Day/Yr)					
51. DECEDENT'S EDUCATION-Check the box that best describes the highest degree or level of school completed at the time of death. <input type="checkbox"/> 8th grade or less <input type="checkbox"/> 9th - 12th grade; no diploma <input type="checkbox"/> High school graduate or GED completed <input type="checkbox"/> Some college credit, but no degree <input type="checkbox"/> Associate degree (e.g., AA, AS) <input type="checkbox"/> Bachelor's degree (e.g., BA, AB, BS) <input type="checkbox"/> Master's degree (e.g., MA, MS, MEng, MEd, MSc, MEdA) <input type="checkbox"/> Doctorate (e.g., PhD, EdD) or Professional degree (e.g., MD, DDS, DVM, LLB, JD)		52. DECEDENT OF HISPANIC ORIGIN? Check the box that best describes whether the decedent is Spanish/Hispanic/Latino. Check the "No" box if decedent is not Spanish/Hispanic/Latino. <input type="checkbox"/> No, not Spanish/Hispanic/Latino <input type="checkbox"/> Yes, Mexican, Mexican American, Chicano <input type="checkbox"/> Yes, Puerto Rican <input type="checkbox"/> Yes, Cuban <input type="checkbox"/> Yes, other Spanish/Hispanic/Latino (Specify) _____		53. DECEDENT'S RACE (Check one or more races to indicate what the decedent considered himself or herself to be) <input type="checkbox"/> White <input type="checkbox"/> Black or African American <input type="checkbox"/> American Indian or Alaska Native (Name of the enrolled or principal tribe) _____ <input type="checkbox"/> Asian Indian <input type="checkbox"/> Chinese <input type="checkbox"/> Filipino <input type="checkbox"/> Japanese <input type="checkbox"/> Korean <input type="checkbox"/> Vietnamese <input type="checkbox"/> Other Asian (Specify) _____ <input type="checkbox"/> Native Hawaiian <input type="checkbox"/> Guamanian or Chamorro <input type="checkbox"/> Samoan <input type="checkbox"/> Other Pacific Islander (Specify) _____ <input type="checkbox"/> Other (Specify) _____	
54. DECEDENT'S USUAL OCCUPATION (Indicate type of work done during most of working life. DO NOT USE RETIRED).					
55. KIND OF BUSINESS/INDUSTRY					

Revised (2003) U.S. Standard Certificate of Death

PART II (Other significant conditions)

- Enter all diseases or conditions contributing to death that were not reported in the chain of events in Part I and that did not result in the underlying cause of death. See attached examples.
- If two or more possible sequences resulted in death, or if two conditions seem to have added together, report in Part I the one that, in your opinion, most directly caused death. Report in Part II the other conditions or diseases.

CHANGES TO CAUSE OF DEATH

Should additional medical information or autopsy findings become available that would change the cause of death originally reported, the original death certificate should be amended by the certifying physician by immediately reporting the revised cause of death to the State Vital Records Office.

ITEMS 33-34 - AUTOPSY

- 33 - Enter "Yes" if either a partial or full autopsy was performed. Otherwise enter "No."
- 34 - Enter "Yes" if autopsy findings were available to complete the cause of death; otherwise enter "No". Leave item blank if no autopsy was performed.

ITEM 35 - DID TOBACCO USE CONTRIBUTE TO DEATH?

Check "yes" if, in your opinion, the use of tobacco contributed to death. Tobacco use may contribute to deaths due to a wide variety of diseases; for example, tobacco use contributes to many deaths due to emphysema or lung cancer and some heart disease and cancers of the head and neck. Check "no" if, in your clinical judgment, tobacco use did not contribute to this particular death.

ITEM 36 - IF FEMALE, WAS DECEDENT PREGNANT AT TIME OF DEATH OR WITHIN PAST YEAR?

This information is important in determining pregnancy-related mortality.

ITEM 37 - MANNER OF DEATH

- Always check Manner of Death, which is important: 1) in determining accurate causes of death; 2) in processing insurance claims; and 3) in statistical studies of injuries and death.
- Indicate "Pending investigation" if the manner of death cannot be determined whether due to an accident, suicide, or homicide within the statutory time limit for filing the death certificate. This should be changed later to one of the other terms.
- Indicate "Could not be Determined" ONLY when it is impossible to determine the manner of death.

To improve case identification:

U.S. Standard Pregnancy Question, 2003 (sort of)

Checkbox format:

IF FEMALE:

- ☐ Not pregnant within past year
- ☐ Pregnant at time of death
- ☐ Not pregnant, but pregnant within 42 days of death
- ☐ Not pregnant, but pregnant 43 days to 1 year before death
- ☐ Unknown if pregnant within the past year

Meant to solve 2 problems:

- (1) Most states had no such question; and*
- (2) Different questions used in different states*

Delays in Adoption of the U.S. Standard Pregnancy Question among States

	New Adopters*	Total
2003	4	4
2004	7	11
2005	7	18
2006	4	22
2007	2	24
2008	7	31
2009	0	31
2010	4	35
2011	2	37
2012	4	41
2013	1	42
2014	5	47
2015	2	49
2016	1	50
2017	1	51

CA, ID, MT, NY	2003
New Jersey	2004
Florida	2005
Texas	2006
Ohio	2007
Massachusetts	9/2014
Alabama	2016
W. VA	2017

* Note: Some states adopted change in the middle of the calendar year.

Recent Increases in the U.S. Maternal Mortality Rate

Disentangling Trends From Measurement Issues

Marian F. MacDorman, PhD, Eugene Declercq, PhD, Howard Cabral, PhD, and Christine Morton, PhD

RESULTS: The estimated maternal mortality rate (per 100,000 live births) for 48 states and Washington, DC (excluding California and Texas, analyzed separately) increased by 26.6%, from 18.8 in 2000 to 23.8 in 2014. California showed a declining trend, whereas Texas had a sudden increase in 2011–2012. Analysis of the measurement change suggests that U.S. rates in the early 2000s were higher than previously reported.

Correcting for Impact of Adding Pregnancy Box

$$\text{Correction factor} = \frac{\text{Sum of the number of maternal deaths in each state for 2 years following the revision date}}{\text{Sum of the number of maternal deaths in each state for the 2 years preceding the revision date}}$$

Also did tests involving 1 year and 3 year periods with little change

Impact of adding the pregnancy checkbox was to approximately double a state's maternal mortality rate

2nd Article in Series – Causes of Maternal Death in the NVSS

Original Research

Trends in Maternal Mortality by Sociodemographic Characteristics and Cause of Death in 27 States and the District of Columbia

Marian F. MacDorman, PhD, Eugene Declercq, PhD, and Marie E. Thoma, PhD

Obstet Gynecol 2017;129:811–8

Underlying cause of death

Total maternal deaths (during pregnancy or within 42 days after the end of pregnancy) (A34, O00-O95, O98-O99)

Total direct obstetric causes (A34, O00-O92)

Pregnancy with abortive outcome (O00-O07)

Ectopic pregnancy (O00)

Hypertensive disorders (O10-O16)

Pre-existing hypertension (O10)

Eclampsia and pre-eclampsia (O11, O13-O16)

Obstetric Hemorrhage (O20, O43.2, O44-O46, O67, O71.0-O71.1, O71.3-O71.4, O71.7, O72)

Pregnancy-related infection (O23, O41.1, O75.3, O85, O86, O91)

Puerperal sepsis (O85)

Other obstetric complications (O21-O22, O24-O28, O30-O41.0, O41.8-O43.1, O43.8-O43.9, O47--O66, O68-O70, O71.2, O71.5, O71.6, O71.8, O71.9, O73, O75.0-O75.2, O75.4-O75.9, O87-O90, O92)

Diabetes mellitus in pregnancy (O24)

Liver disorders in pregnancy (O26.6)

Other specified pregnancy-related conditions (O26.8)

Obstetric embolism (O88)

Cardiomyopathy in the puerperium (O90.3)

Anesthesia-related complications (O29, O74, O89)

Total indirect causes (O98-O99)

Mental disorders and diseases of the nervous system (O99.3)

Diseases of the circulatory system (O99.4)

Diseases of the respiratory system (O99.5)

Other specified diseases and conditions (O99.8)

Obstetric death of unspecified cause (O95)

Late maternal causes (43 days-1 year after the end of pregnancy) (O96-O97)

**Maternal Death
ICD-10 Codes**

Over Ascertainment??

- Research into the cause of death category finds much of the increase is coming from *less specific ICD-10 codes*.
- Other specified pregnancy-related conditions (O26.8)
- Other obstetric complications (O21–O22, O24–O41.0, O41.8–O43.1, O43.8–O43.9, O47–O66, O68–O70, O71.2, O71.5, O71.6, O71.8, O71.9, O73–O75.2, O75.4–O75.9, O87–O90, O92)
- Other specified diseases and conditions (O99.8)
- Obstetric death of unspecified cause (O95)

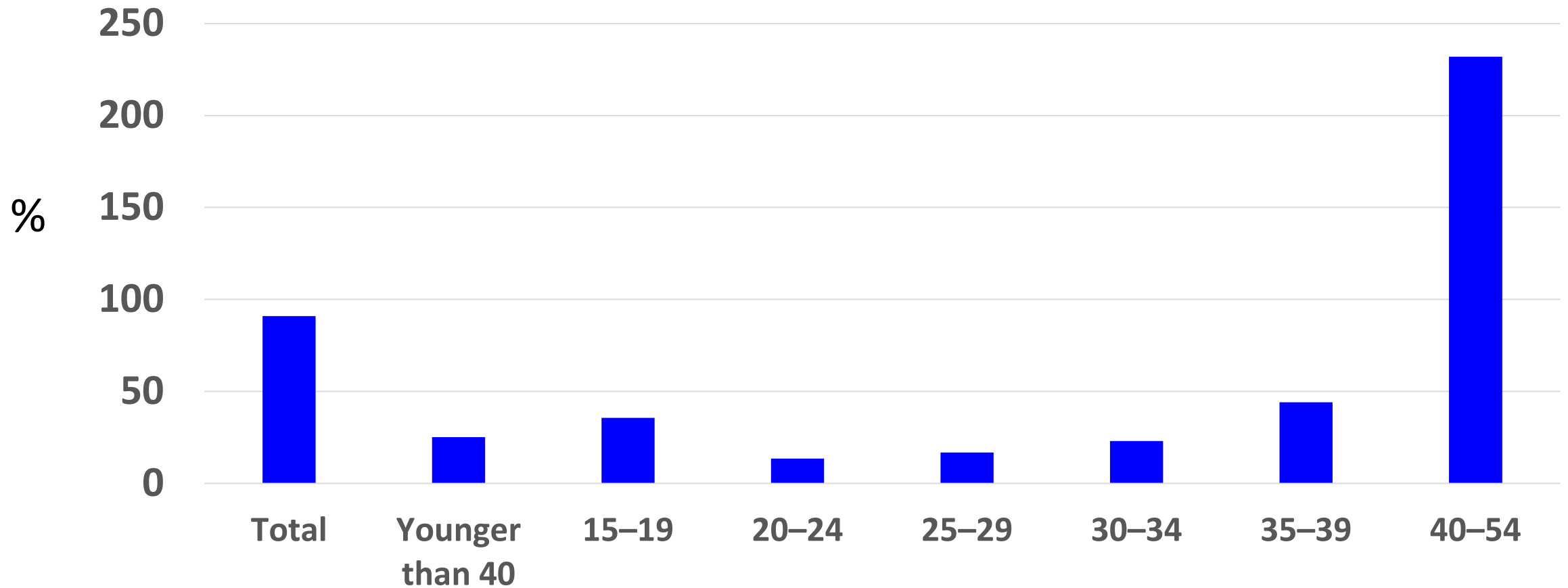
Assessing the impact of ill-defined causes on maternal deaths and mortality rates by cause of death, 27 states and DC, 2008-2009 to 2013-2014

Underlying cause of death (ICD-10 category)	2008-9		2013-14		Percent change 2008-9 to 2013-14
	Number of deaths	Rate~	Number of deaths	Rate~	
Total maternal (A34, O00-O05, O98-O99)	780	20.6	907	25.4	23.3
Ill-defined causes (O26.8, O95, O99.8)	266	7.0	371	10.4	47.9
Total maternal minus ill-defined causes (Remainder)	514	13.5	536	15.0	10.6
Total direct obstetric (A34, O00-O92)	527	13.9	595	16.6	19.7
Other specified pregnancy-related conditions (O26.8)	130	3.4	212	5.9	73.0
Total direct obstetric minus O26.8 (Remainder)	397	10.5	383	10.7	2.3
Total indirect causes (O98-O99)	202	5.3	294	8.2	54.4
Other specified diseases and conditions (O99.8)	85	2.2	141	3.9	75.9
Total indirect causes minus O99.8 (Remainder)	117	3.1	153	4.3	38.7

Impact of Random Error in Checking the Pregnancy Checkbox

		Female Deaths	# Maternal
	# Maternal Deaths	Natural Causes	Deaths w/ 1% False Positives
Total	907	82,572	
<40	618	15,553	774
15–19	26	929	35
20–24	119	1,619	135
25–29	152	2,568	178
30–34	177	4,092	218
35–39	144	6,345	207
40–54	289	67,019	959

Impact of a 1% Random Coding Error on Maternal Mortality Rates



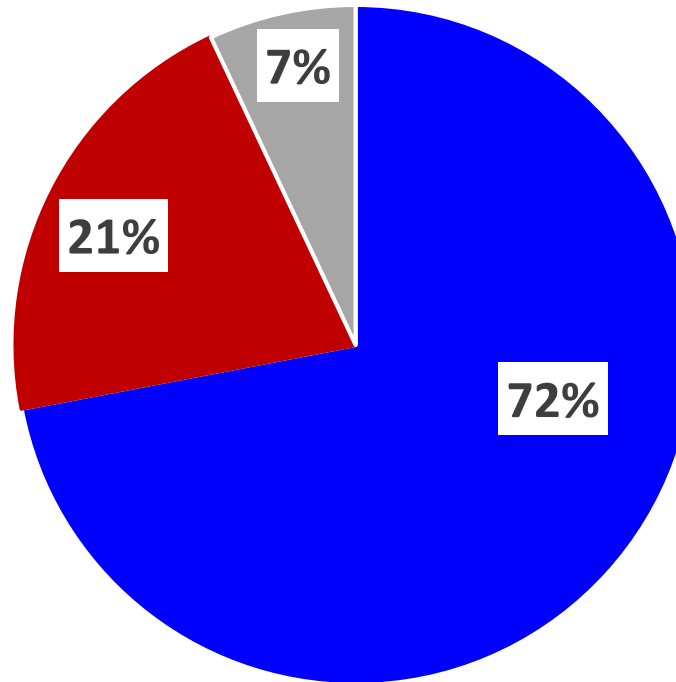
Who completes death certificates?

- *Death certificates can be signed by a medical examiner, a primary physician, an attending physician, a non-attending physician, a nurse practitioner, a forensic pathologist or a coroner, but it varies according to state law. In Texas, for example, a justice of the peace can sign. Typically, deaths have to be recorded with local health departments within 72 hours of the death, and to the state within five to seven days.*
- *Only about 8% of death certifications involve an autopsy*

Over-ascertainment: Results of a 4 state study (Georgia, Louisiana, Michigan, and Ohio)

Pregnancy Checkbox Accuracy

In 28% of cases with pregnancy checkbox checked, not certain woman was pregnant

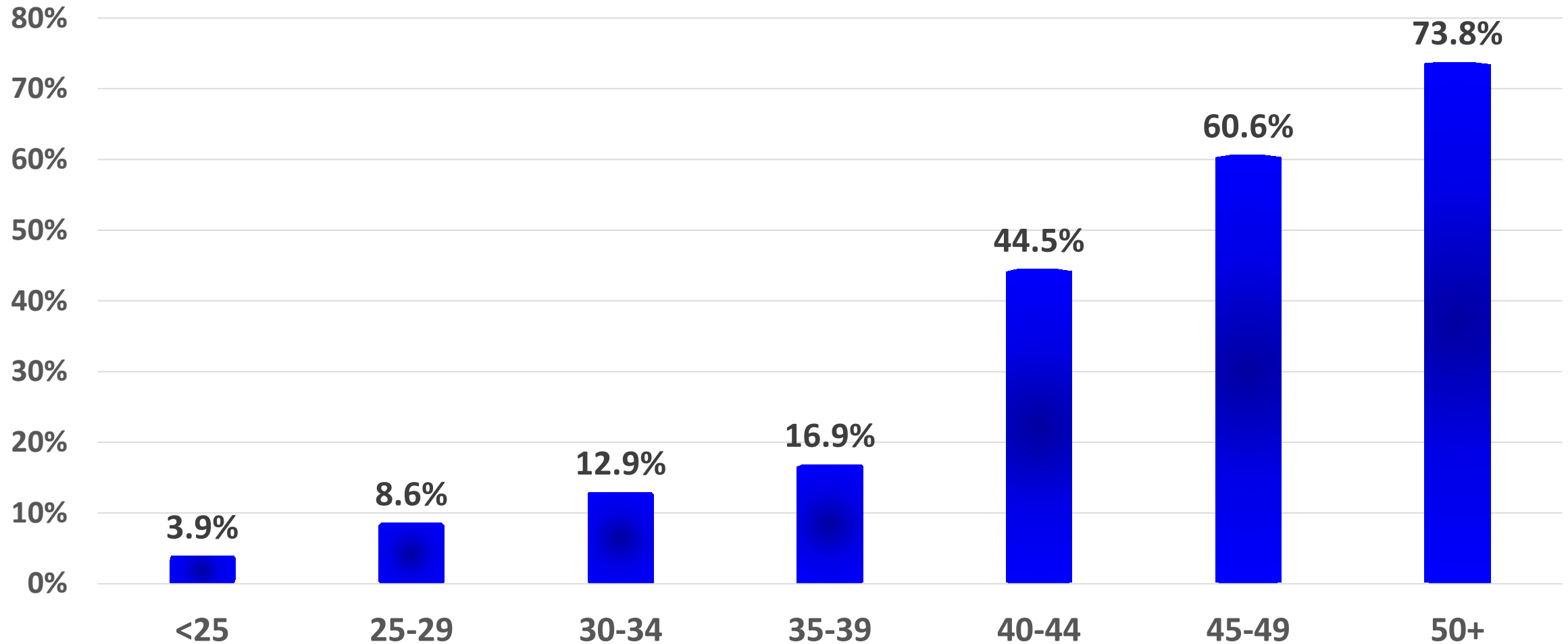


■ Pregnant ■ Not Pregnant ■ Unable to confirm

Source: A. Daymude. Checking the pregnancy checkbox: Evaluation of a four-state quality assurance pilot. *Birth* 2019 online & Catalano A. Validity of the Pregnancy Checkbox. *AJOG*.2019.online.

www.birthbythenumbers.org

False Positives on the Pregnancy Checkbox by Age



Source: Adapted from Catalano A. Validity of the Pregnancy Checkbox. *AJOG*.2019.online.

Impact of the Checkbox – Better and Worse Ascertainment

- While the checkbox contributed to errors, the Four Committee data show that the *checkbox also improved identification of pregnancy-related deaths. Without the pregnancy checkbox, approximately:*
- *50% of pregnancy-related deaths that occurred during pregnancy*
- *11% of pregnancy-related deaths that occurred within 42 days of the end of pregnancy, and*
- *8% of pregnancy-related deaths that occurred within 43 days to 1 year of the end of pregnancy*
would have been missed.

Summary

- *The introduction of the pregnancy checkbox served its stated purpose – it identified cases that would have been otherwise missed.*
- *Unfortunately, it also led to a significant overcounting of women's death as maternal deaths.*

4. The Pregnancy Related Mortality Surveillance System

Pregnancy Mortality Surveillance System



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™



CDC A-Z INDEX ▾

Reproductive Health

Reproductive Health

About Us



Data and Statistics



Emergency Preparedness



Maternal and Child Health
Epidemiology Program



Pregnancy Risk Assessment
Monitoring System

Infertility



Assisted Reproductive
Technology (ART)

Depression Among Women



Maternal and Infant Health



Pregnancy Complications



Weight Gain During
Pregnancy

Tobacco Use and Pregnancy



Pregnancy-Related Deaths



Pregnancy Mortality Surveillance System

Perinatal Quality
Collaboratives



Preterm Birth



[CDC](#) > [Reproductive Health](#) > [Maternal and Infant Health](#) > [Pregnancy-Related Deaths](#)

Pregnancy Mortality Surveillance System



When did CDC start conducting national surveillance of pregnancy-related deaths?

CDC initiated national surveillance of pregnancy-related deaths in 1986 because more clinical information was needed to fill data gaps about causes of maternal death.

How does CDC define pregnancy-related deaths?

For reporting purposes, a pregnancy-related death is defined as the death of a woman while pregnant or within 1 year of pregnancy termination—regardless of the duration or site of the pregnancy—from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

How are the data collected and coded?

Each year, CDC requests the 52 reporting areas (50 states, New York City, and Washington DC) to voluntarily send copies of death certificates for all women who died during pregnancy or within 1 year of pregnancy, and copies of the matching birth or fetal death certificates, if they have the ability to perform such record links. All of the information obtained is summarized, and medically trained epidemiologists determine the cause and time of death related to the pregnancy. Causes of death are coded by using a system established in 1986 by the American College of Obstetricians and Gynecologists and the Centers for Disease Control and Prevention Maternal Mortality Study Group.

How are the data used?

Data are analyzed by CDC scientists. Information about causes of pregnancy-related deaths and risk factors associated with these deaths is released periodically through peer-reviewed literature, CDC's *Morbidity and Mortality Weekly Reports*, and the CDC Web site. This information helps clinicians and public health professionals to better understand circumstances surrounding pregnancy-related deaths and to take appropriate actions to prevent them.



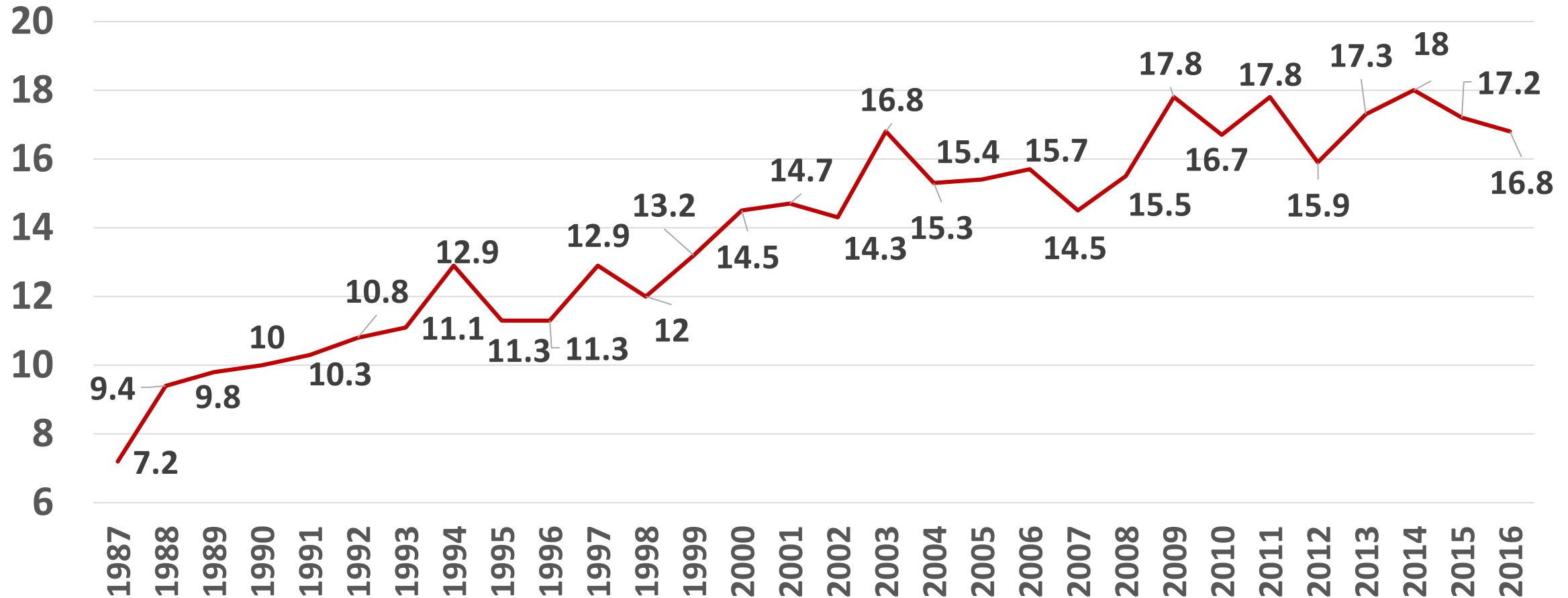
Data for CDCs Pregnancy Related Mortality System

*Each year, CDC requests the 52 reporting areas (50 states, New York City, and Washington DC) to **voluntarily send copies of death certificates for all women who died during pregnancy or within 1 year of pregnancy, and copies of the matching birth or fetal death certificates**, if they have the ability to perform such record links. All of the information obtained is summarized, and medically trained epidemiologists determine the cause and time of death related to the pregnancy. Causes of death are coded by using a system established in 1986 by the American College of Obstetricians and Gynecologists and the Centers for Disease Control and Prevention Maternal Mortality Study Group.*

Our best existing measure

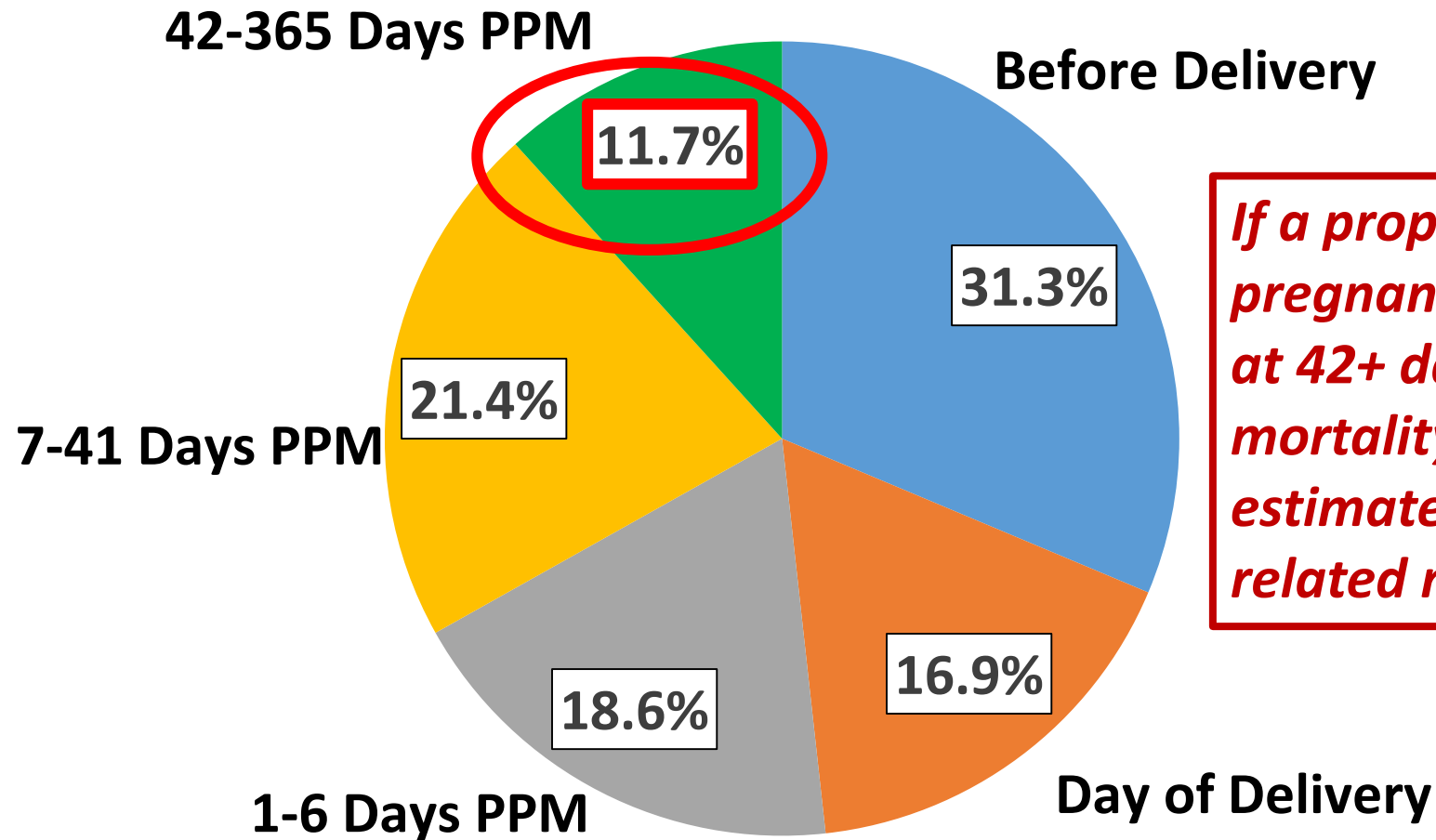
Pregnancy Related Mortality, U.S., 1987-2016

Pregnancy Related Mortality Ratio (per 100,000 births)



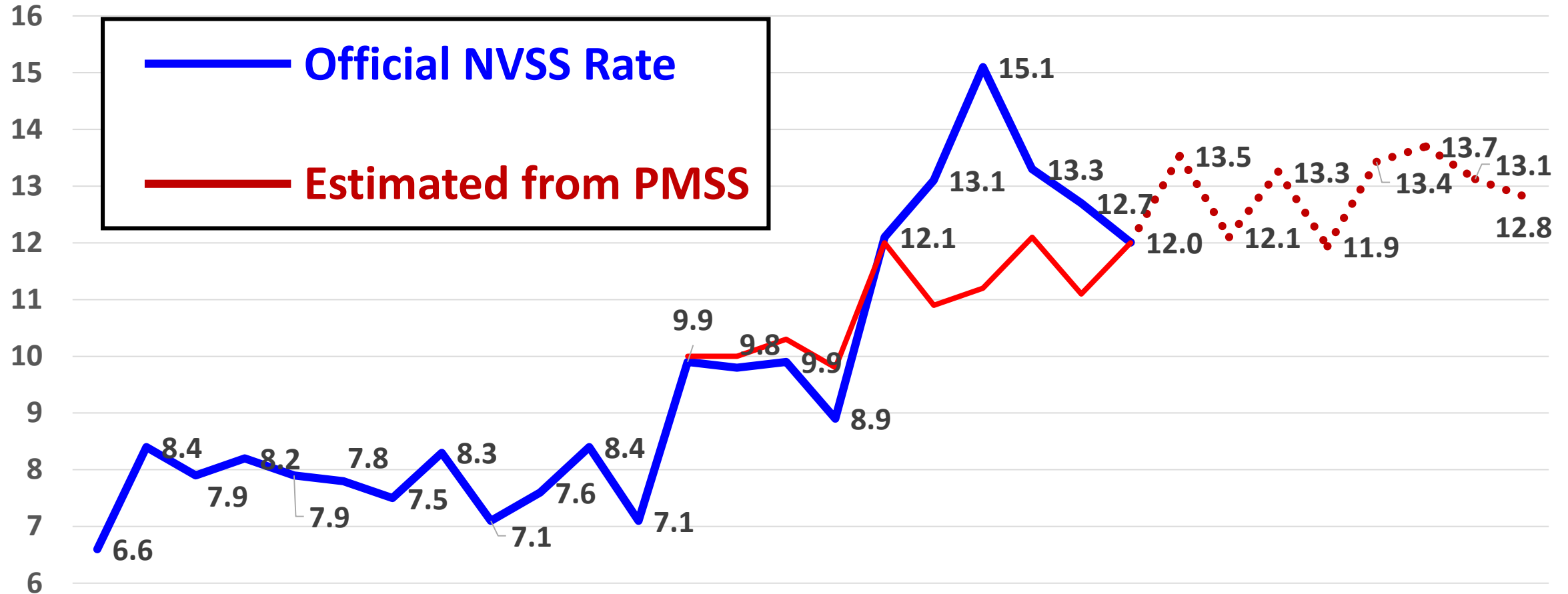
Source: CDC. Adapted from Creanga. Pregnancy-Related Mortality in the United States. *Obstet Gynecol* 2017 & Petersen E. et al. Vital Signs: Pregnancy-Related Deaths, U.S., 2011–2015,. *MMWR* .vol.68. May 7, 2019. 1-7 & Petersen E et al. Racial/Ethnic Disparities in Pregnancy Related Deaths – U.S. 2007-'16. *MMWR* 9/6/19.

Timing of Maternal Deaths



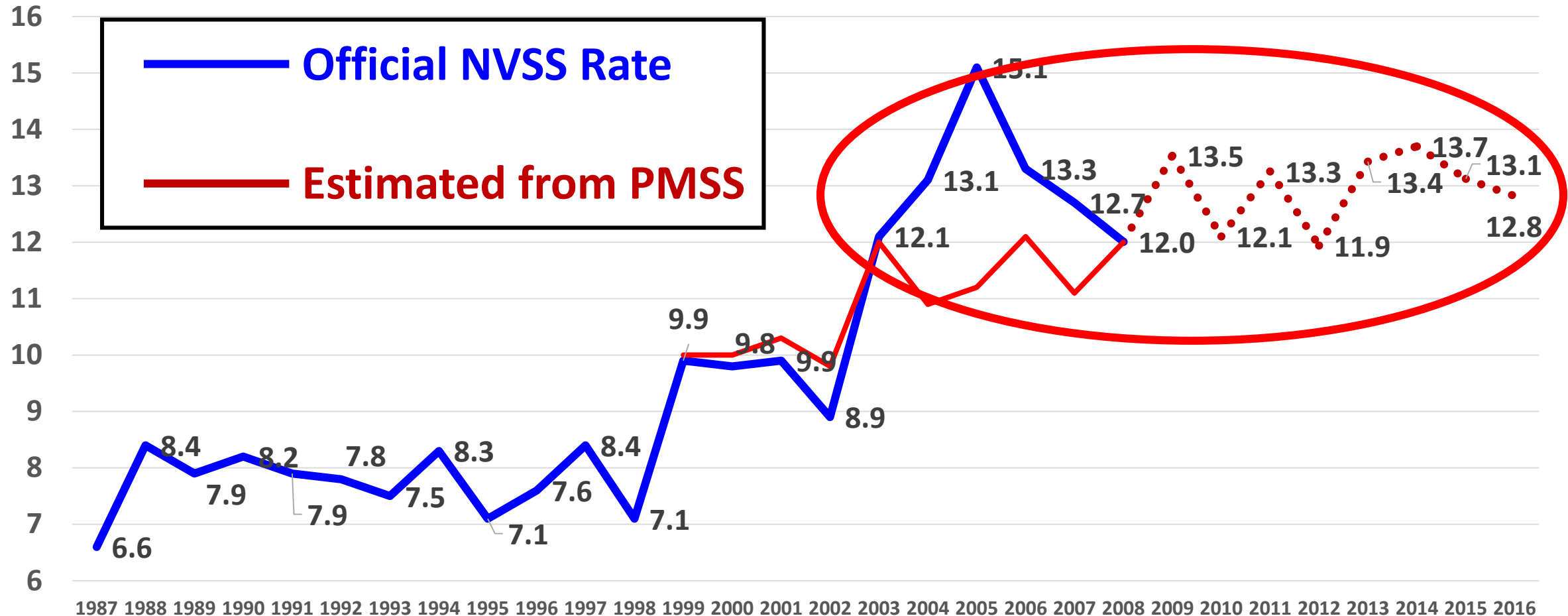
If a proportion of the pregnancy related deaths occur at 42+ days, then the maternal mortality ratio can be estimated using the pregnancy related mortality rate.

Maternal Mortality Ratios (per 100,000 live births), U.S. 1987-2016*



* 1987-2007 based on official NVSS reported ratio; 2008-2016 estimated based on Pregnancy-Related Mortality Ratio limited to 42 days postpartum

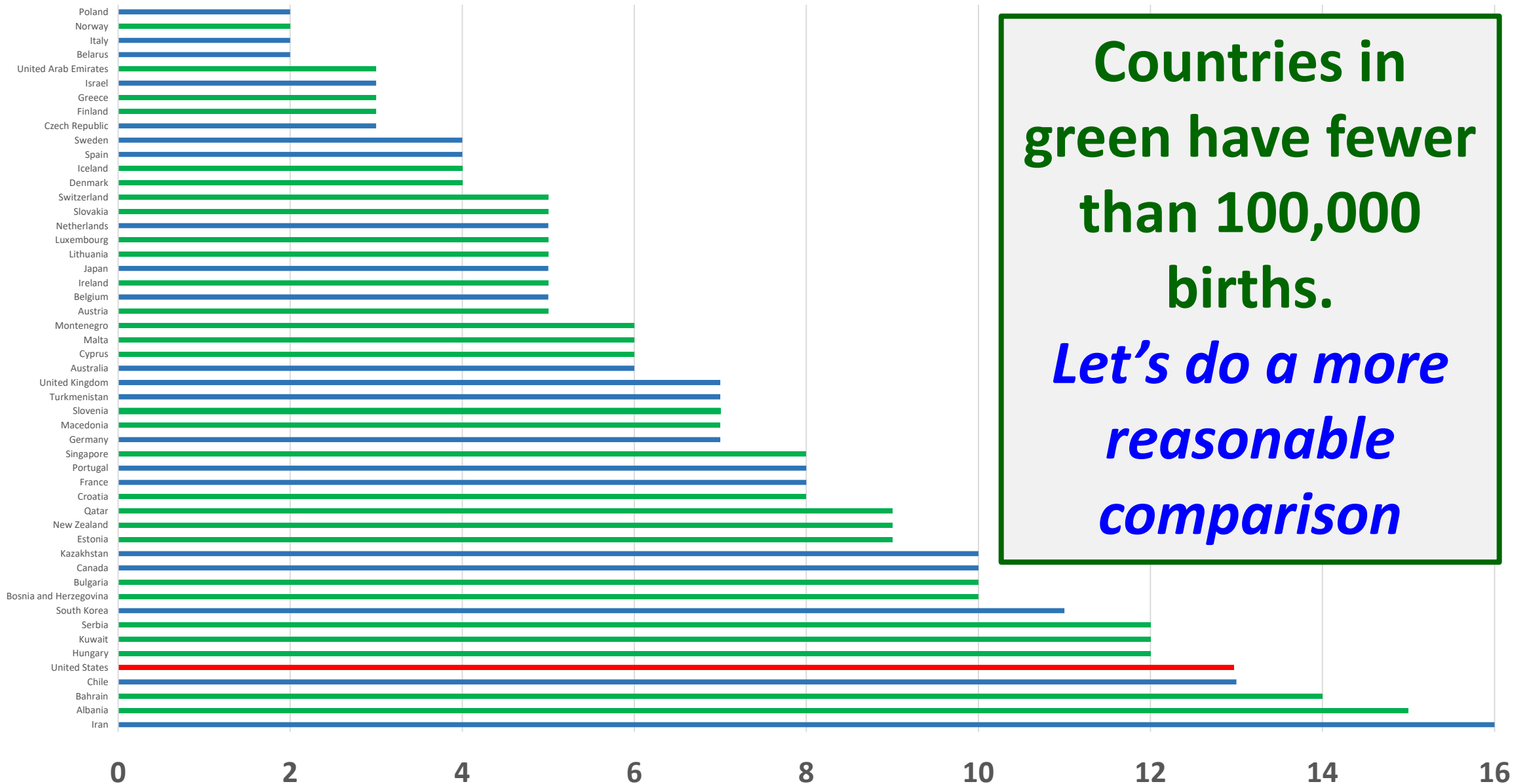
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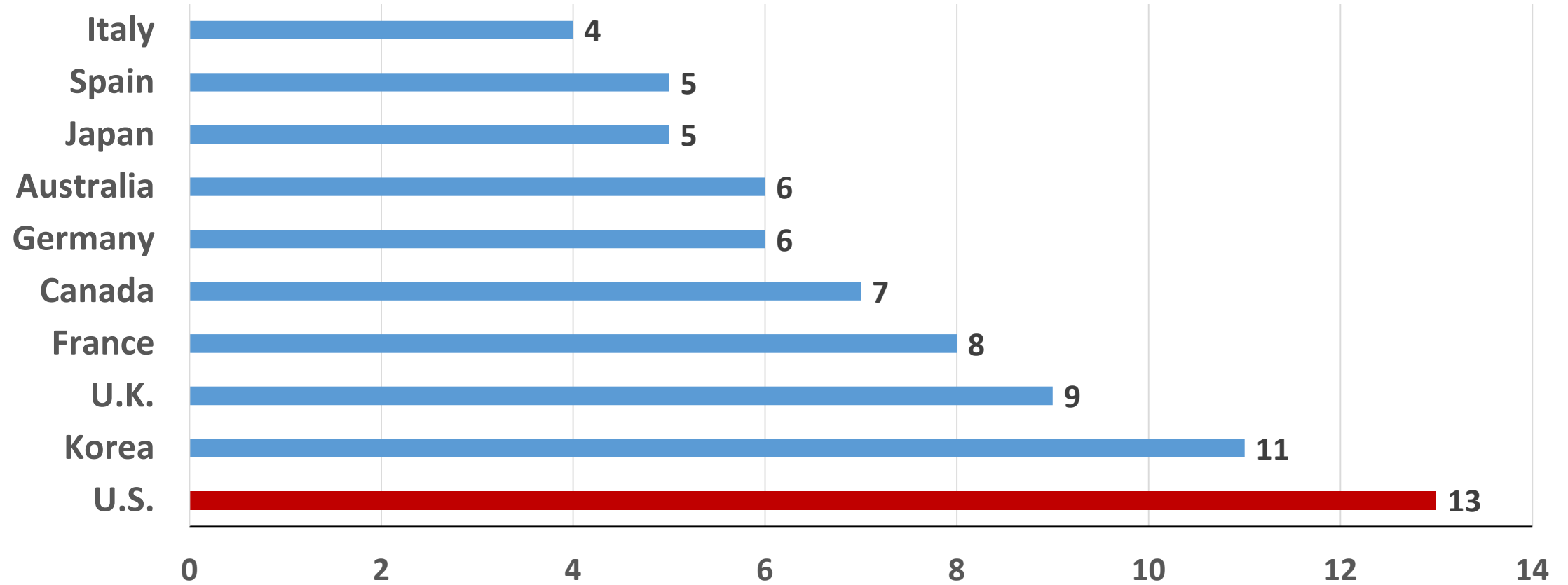
5. Comparing the U.S. to the Rest of the World

Maternal Mortality Ratios (per 100,000 births), 2017



Source: WHO. *Trends In Maternal Mortality, 2000-2017*. (Geneva, 2019)

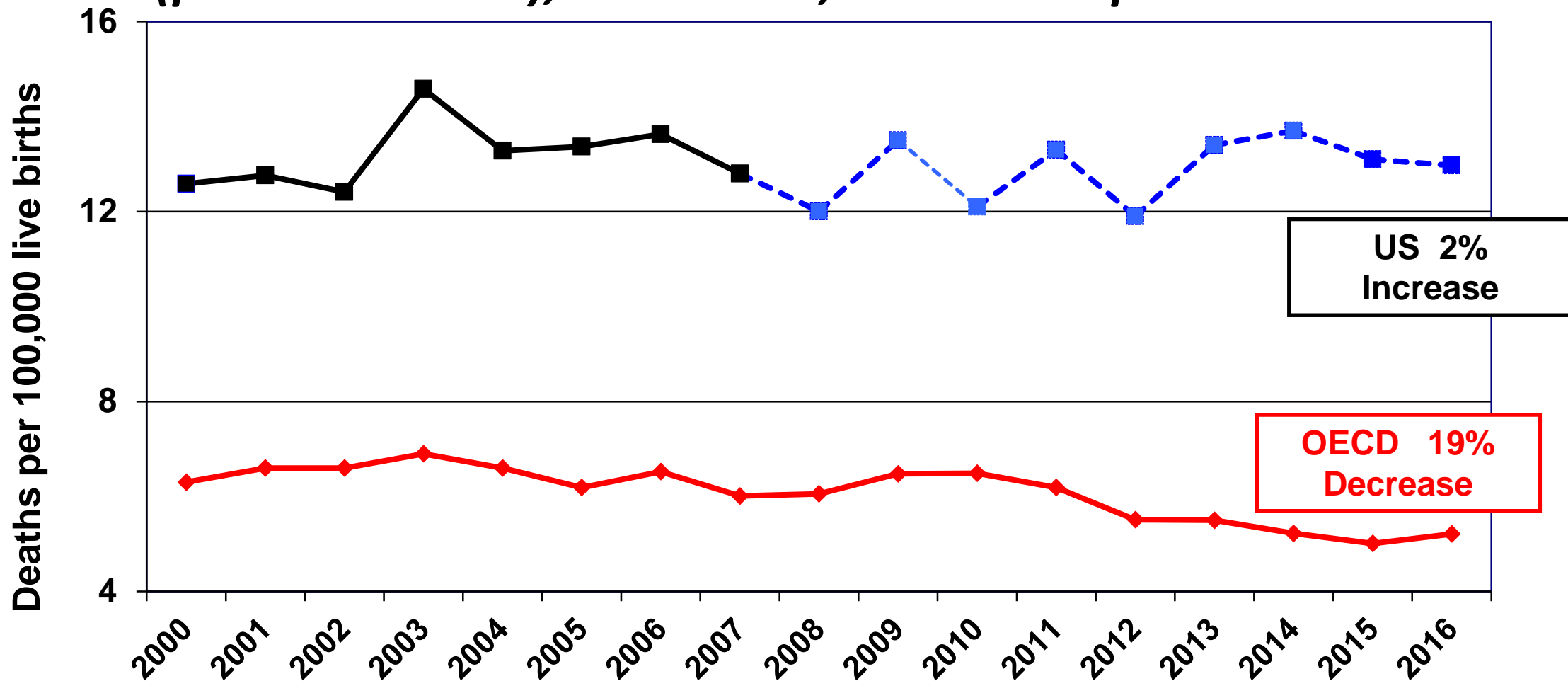
U.S. MMR (per 100,000 births) Compared to Countries with 300,000+ births, 2015-16



Source: WHO. *Trends In Maternal Mortality, 2000-2017*. & U.S. Estimated from Pregnancy Mortality Surveillance System

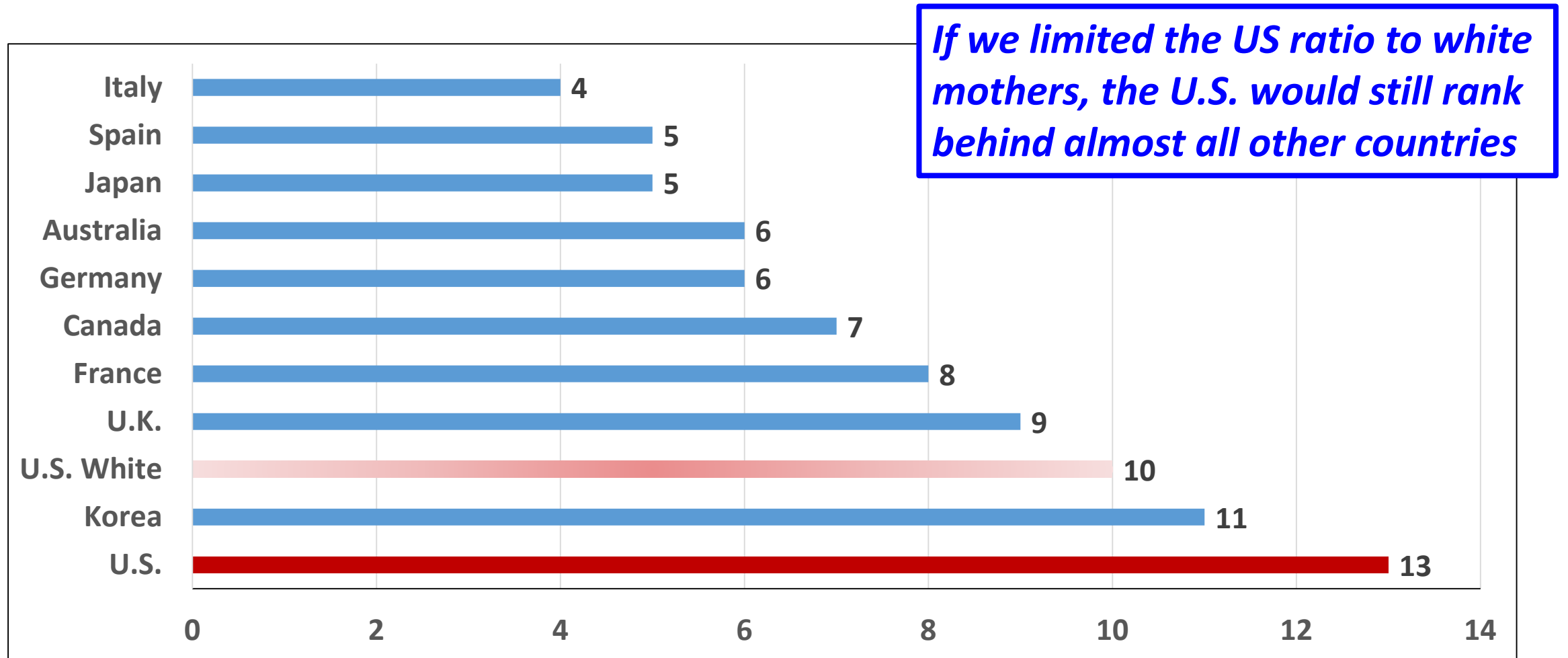
Trends for US vs Comparable Countries

*MMR (per 100K births), 2000-2016, U.S. & Comparable Countries **



* Countries with **300,000+** births (2017): Australia, Canada, France, Germany, Italy, Japan, S. Korea, Spain, United Kingdom

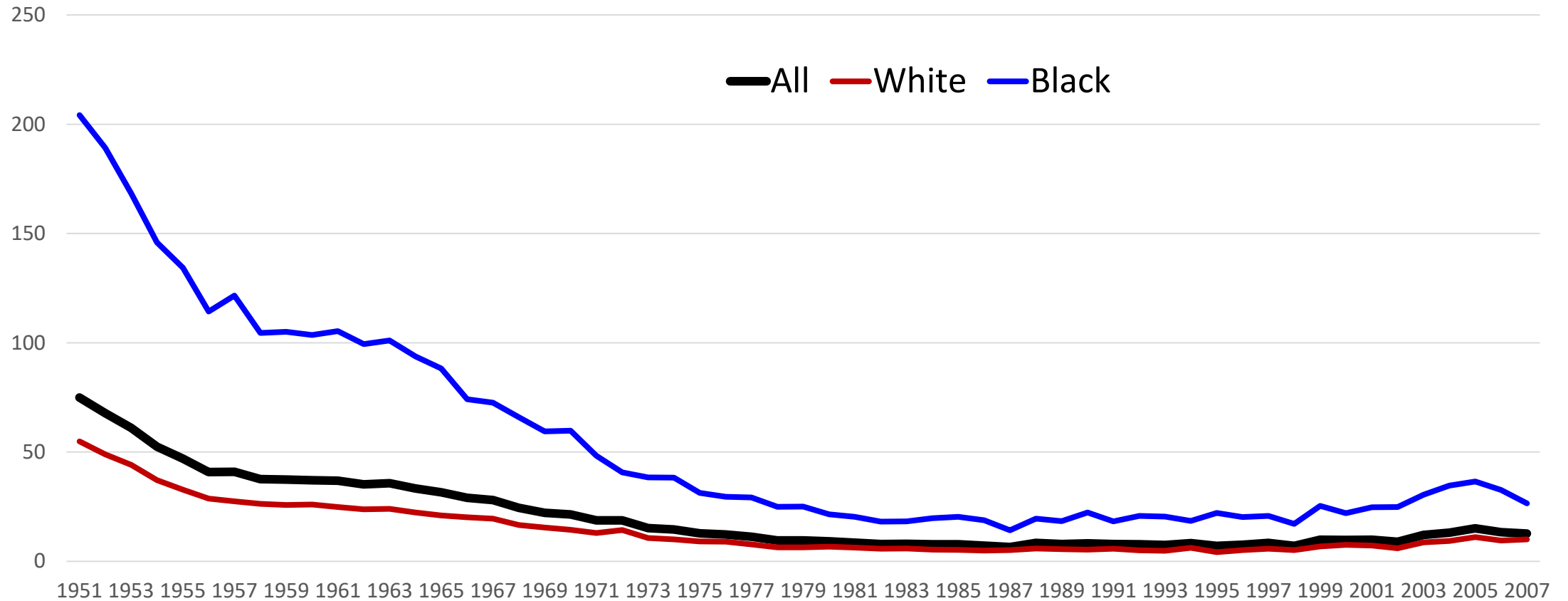
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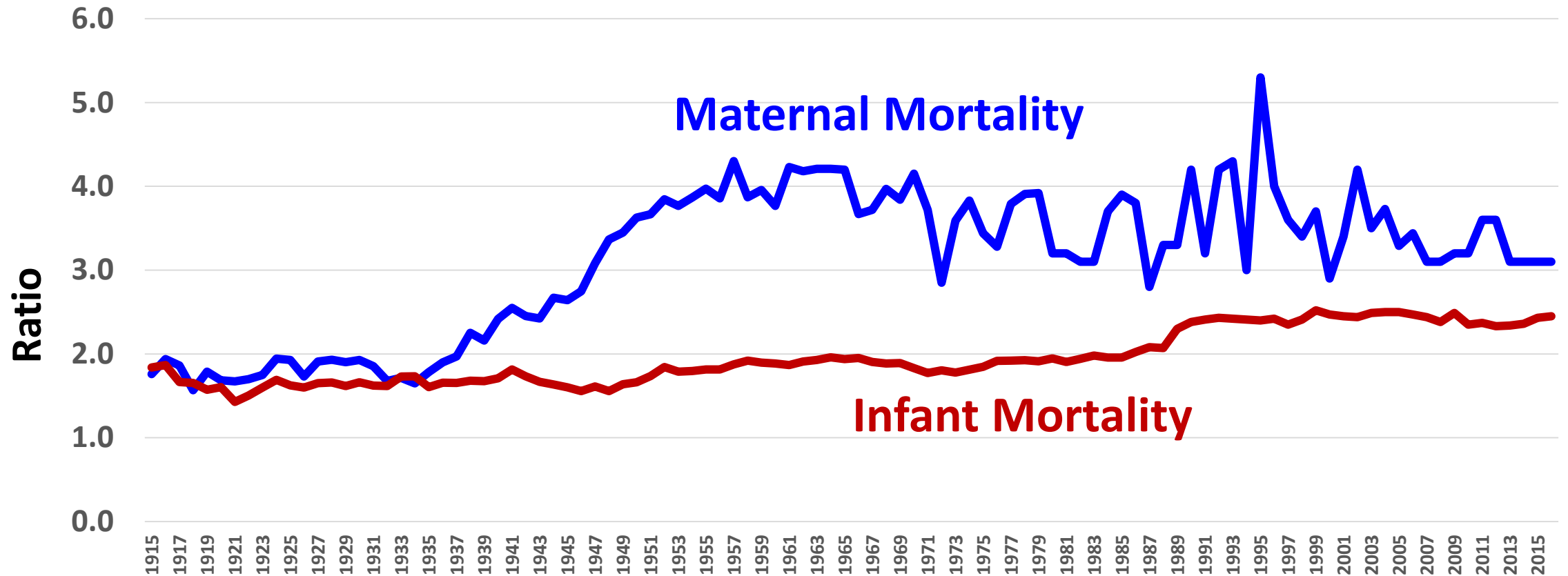
Source: WHO. *Trends In Maternal Mortality, 2000-2017*. & U.S. Estimated from Pregnancy Mortality Surveillance System

6. The Persistence of Racial Disparities

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

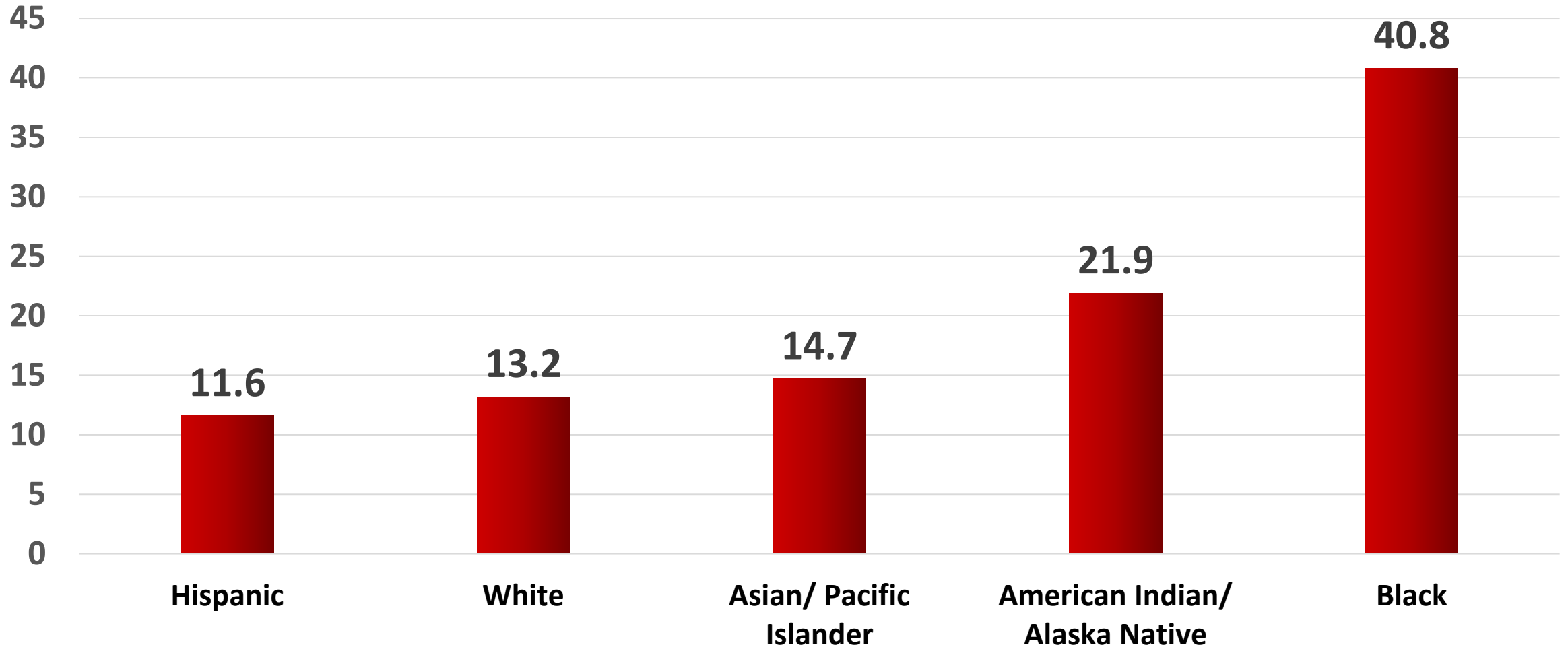


Black to White Ratios, U.S. Infant & Maternal Mortality, 1915-2016



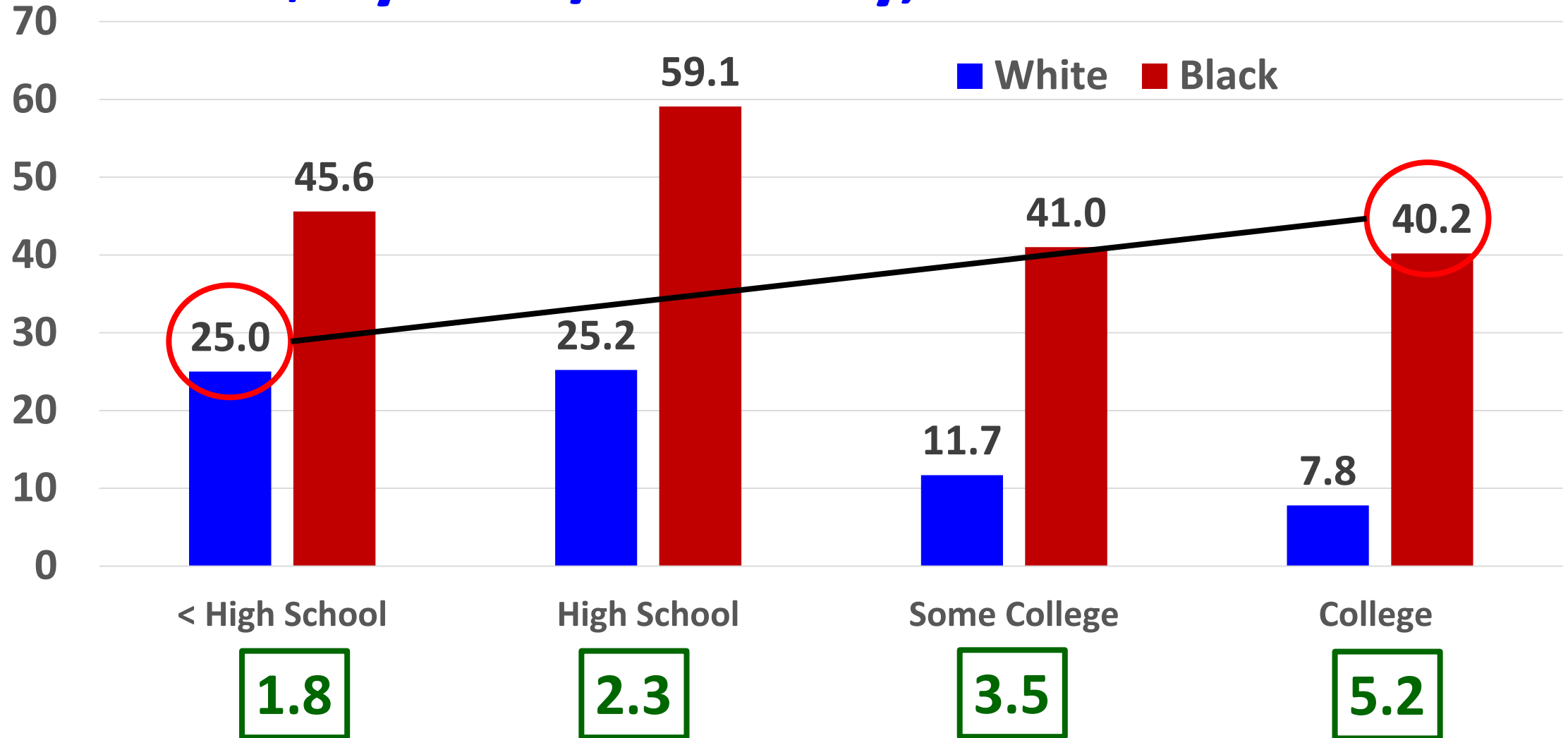
Source: NCHS. Maternal Mortality and Related Concepts. Vital & Health Statistics. Series 33; #3. & annual data reports. 1915-1960 data from NCHS. *Vital Statistics Rates In The United States 1940-1960*. NOTE: Shifts in measurement (e.g. not all states were part of registration system prior to 1933; infant 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.

Pregnancy Related Mortality Ratios by Race, U.S., 2015-2016



Source: Petersen E. et al. Racial/Ethnic Disparities in Pregnancy-Related Deaths — U.S., 2007–2016 . *MMWR*. 9/6/19; 68(35):762-765.

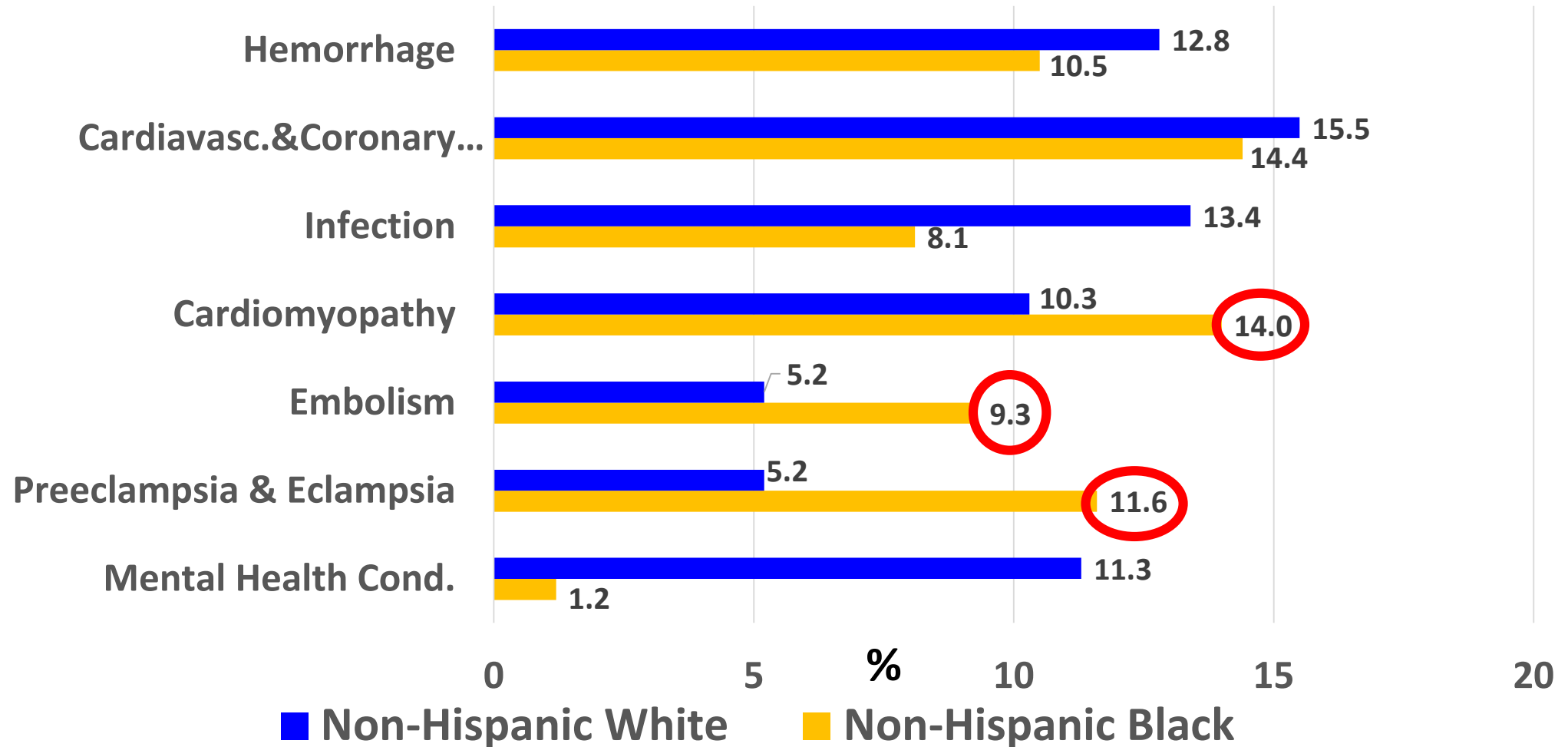
Pregnancy-related mortality ratios (per 100,000 live births) by race/ethnicity, U.S. 2007-2016



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

Manifestation of Racial Disparities

*Leading Underlying Causes of **Pregnancy-Related Deaths**, by **Race-Ethnicity***

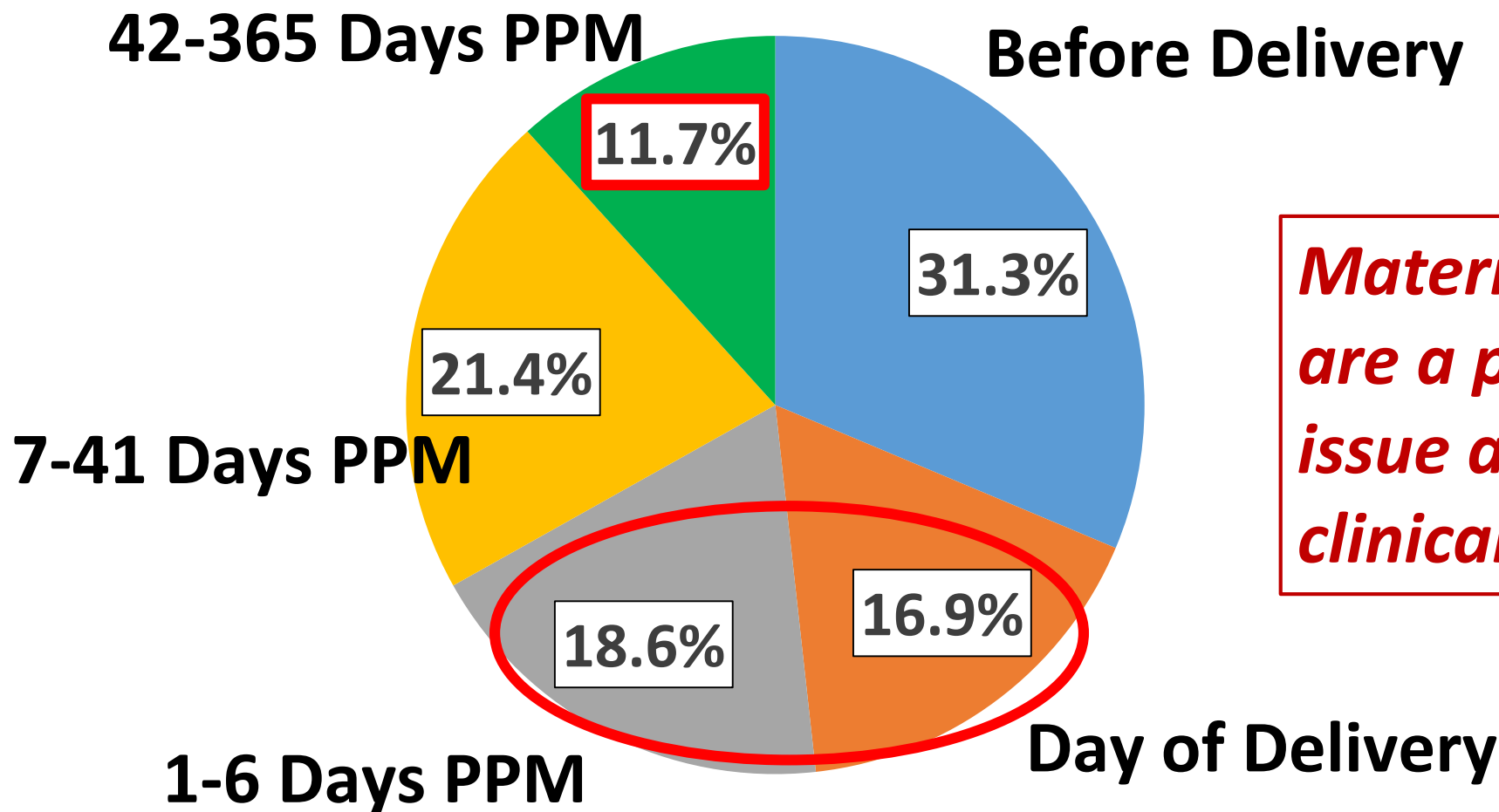


Source: CDC. 2018. *Report from 9 Maternal Mortality Review Committees.*

7. Maternal Mortality as a Public Health Problem: *Timing & Causes of Death*

Remember this chart?

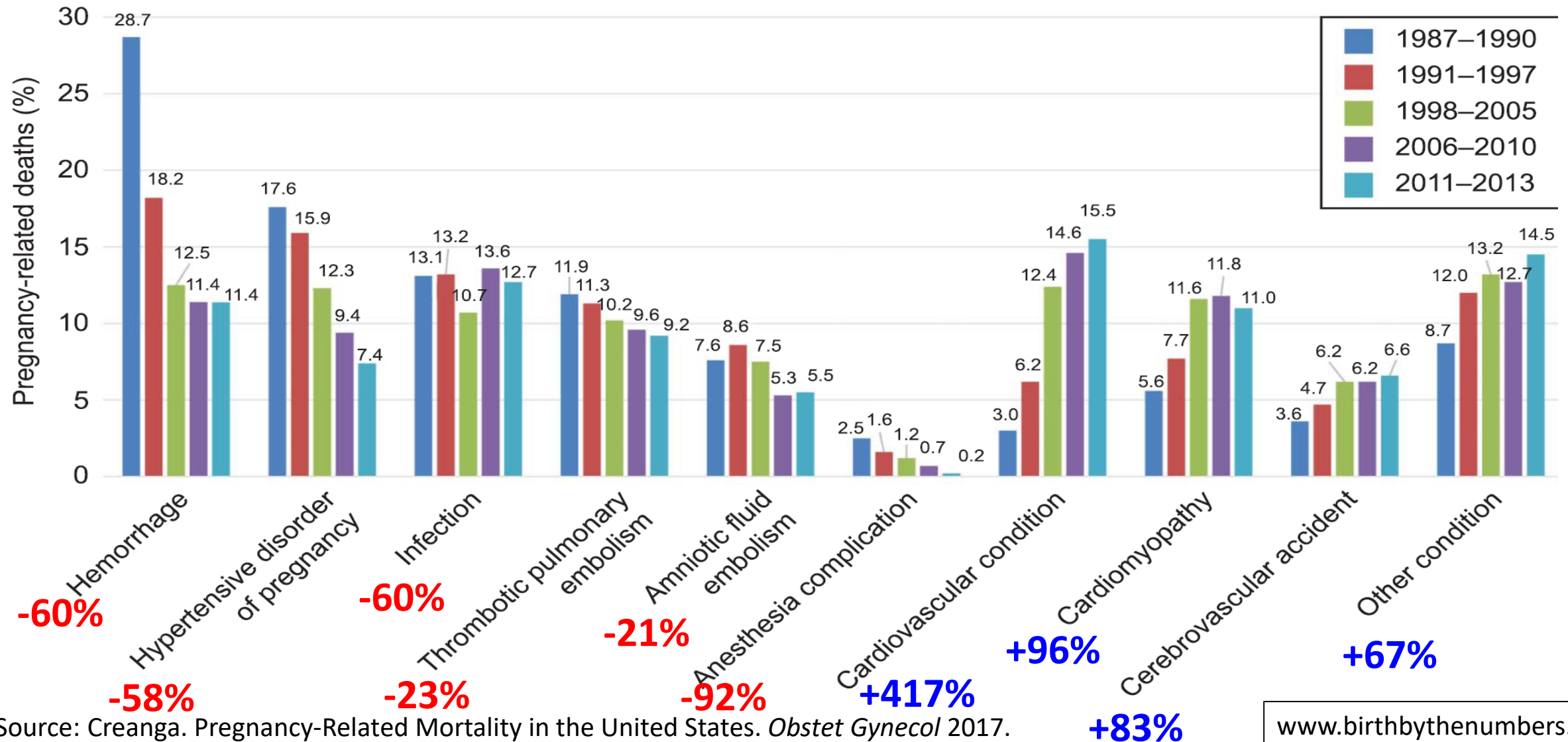
Timing of Pregnancy Related Deaths



Source: Petersen E. et al. Vital Signs: Pregnancy-Related Deaths, United States, 2011–2015, and Strategies for Prevention, 13 States, 2013–2017. *MMWR* .vol.68. May 7, 2019. 1-7.

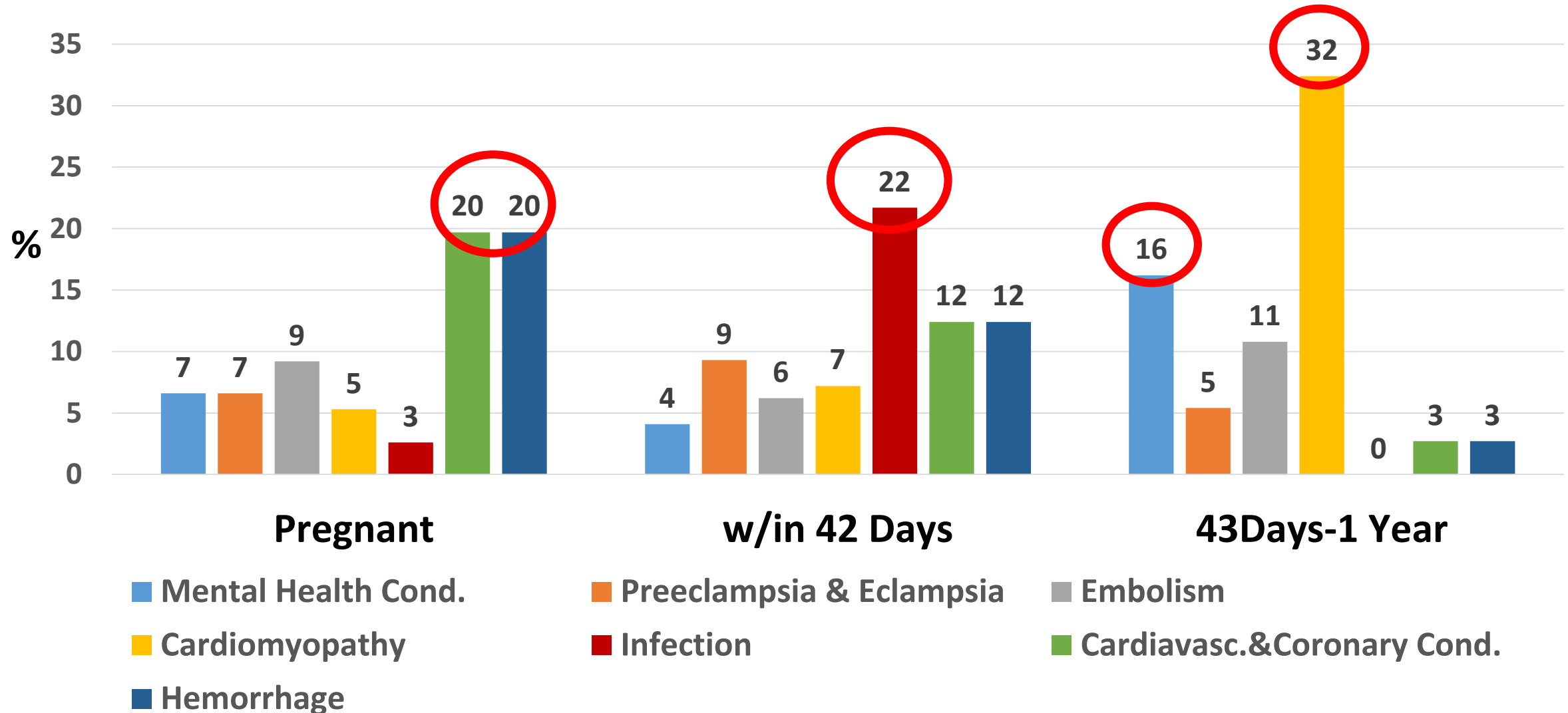
Maternal Mortality as a Public Health Approach

*Cause-specific proportionate **Pregnancy-Related** mortality: United States, 1987–2013.*



Moving to a Public Health Approach

*Underlying Causes of Pregnancy-Related Deaths, by **Timing of Death***



Source: CDC. 2018. *Report from 9 Maternal Mortality Review Committees.*

8. The Issue is Broader than Maternal Mortality

Not just about maternal mortality

National Vital Statistics Reports

Volume 68, Number 9



June 24, 2019

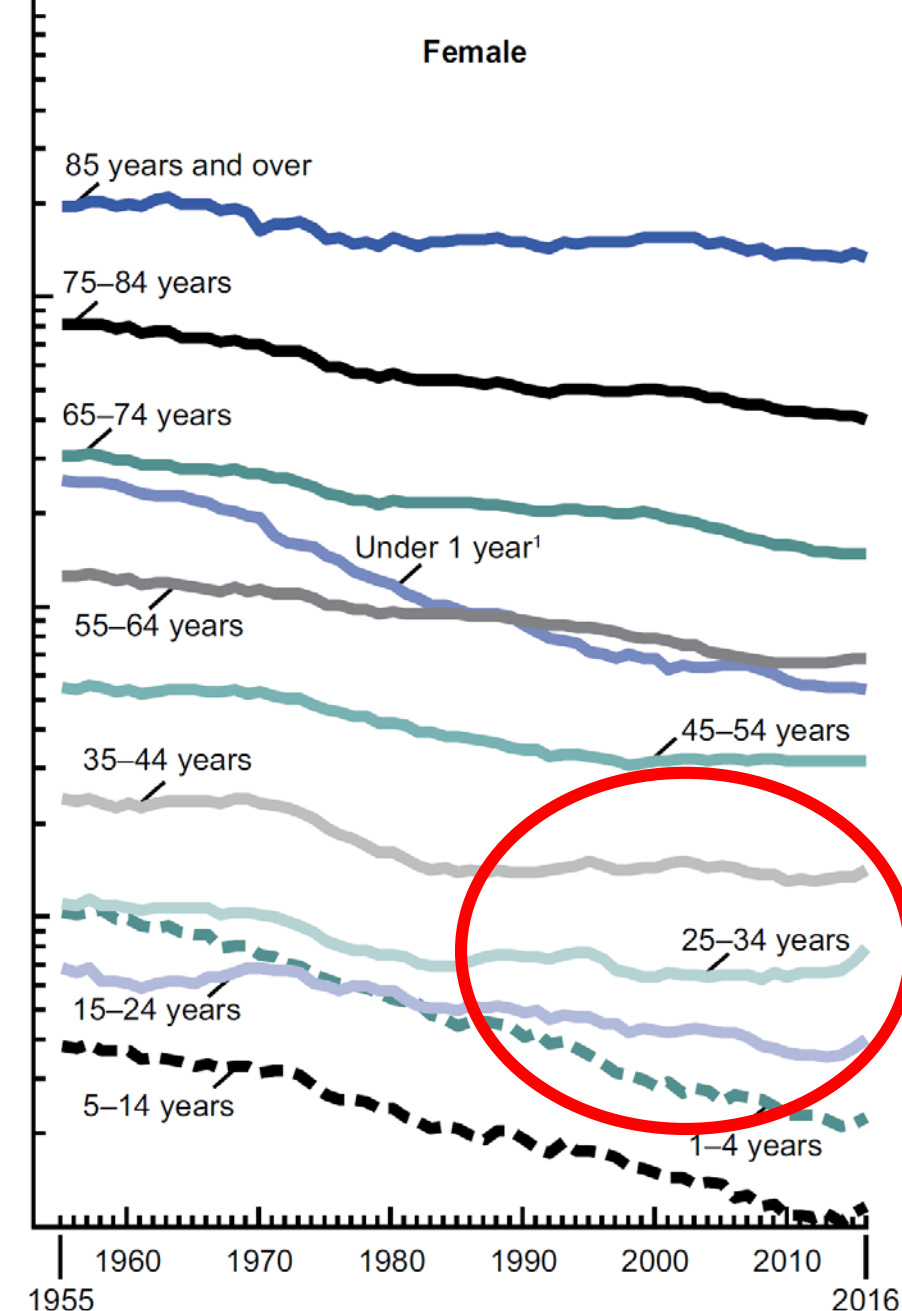
Deaths: Final Data for 2017

STAT

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

By Eugene Declercq and Neel Shah

August 22, 2018

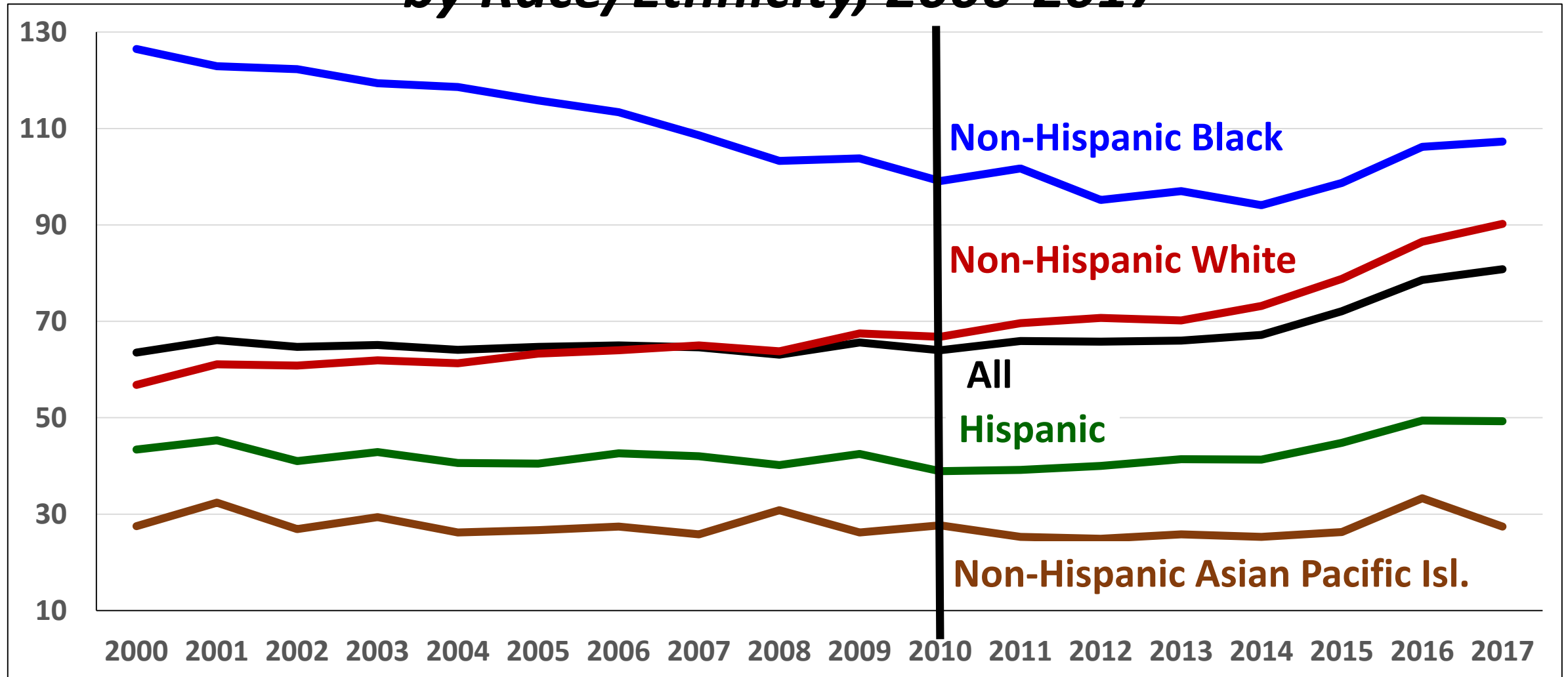


Births in U.S. by Maternal Age, 2018

Age	# Births	%
<20	181,607	4.8%
20-24	726,175	19.2%
25-29	1,099,491	29.0%
30-34	1,090,697	28.8%
35+	693,742	18.3%
Total	3,791,712	100.0%

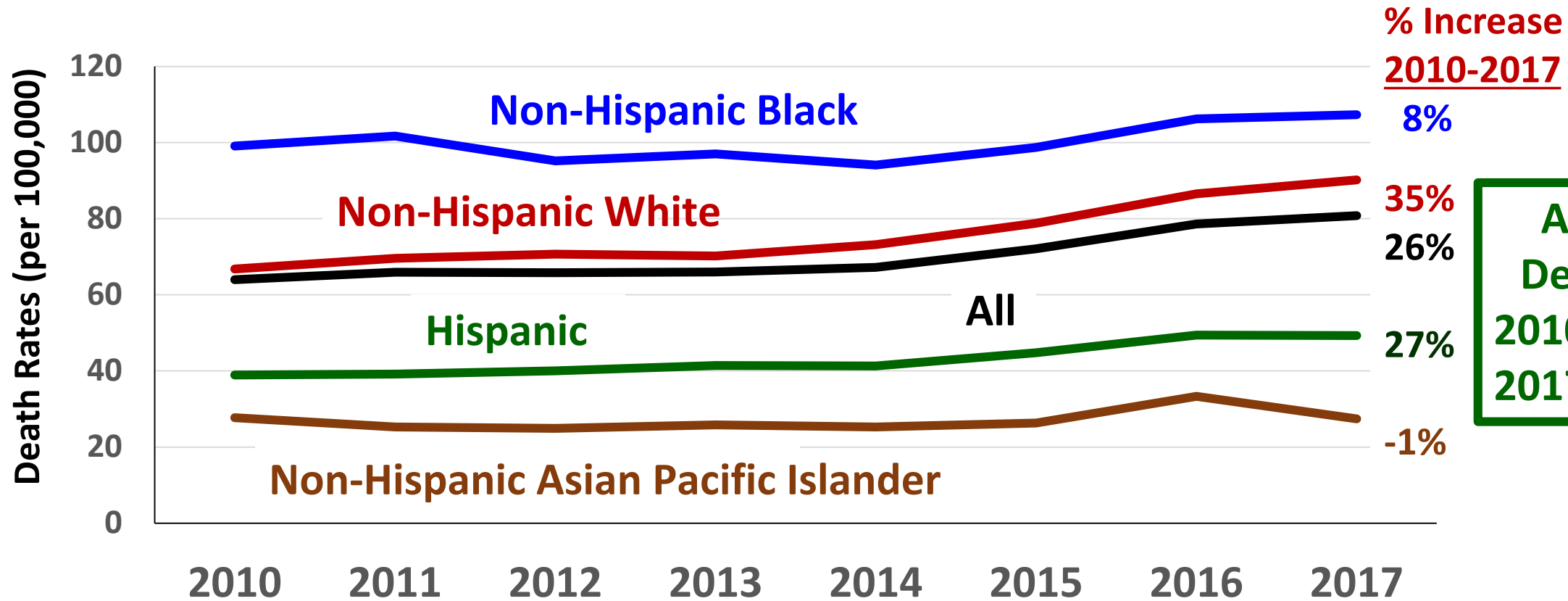
The Problem is Bigger than Maternal Mortality

*Overall Deaths rates (per 100K), Females 25-34,
by Race/Ethnicity, 2000-2017*



The Problem is Bigger than Maternal Mortality

*Overall Deaths rates (per 100K), Females 25-34,
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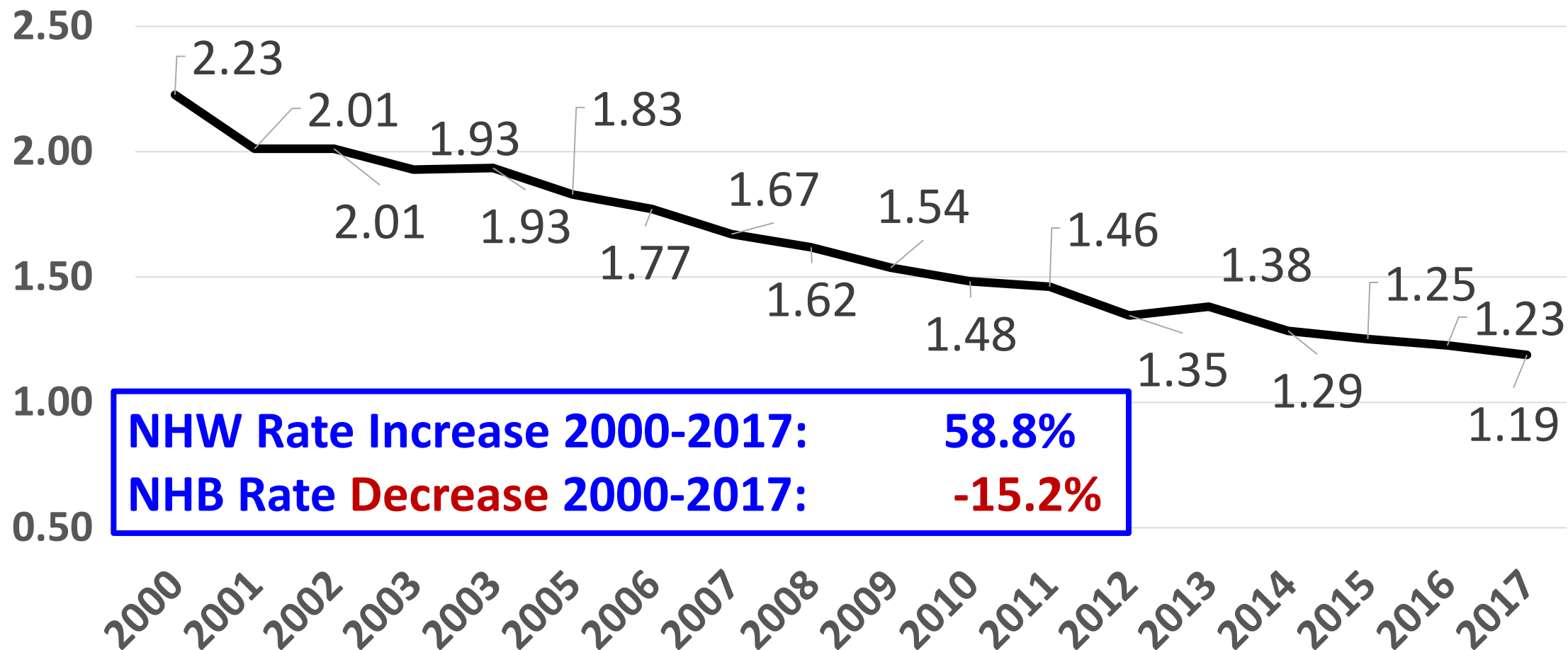


**All Female
Deaths 25-34**

2010	13,067
2017	18,066

NOTE: Pregnancy related mortality rate increased by <1% 2010-2017

Ratio of Black/White Female Death Rates, Women 25-34, 2000-2017



Problem is Bigger than Maternal Mortality

Top 10 Causes of Death for Women **25-34** in 2017

	Total Deaths	% of total	Rate per 100 K	% Change in rate 2010-2017	Proportion of 2010-17 Increase
All causes	18,066	100.0	80.8	26.3%	---
Accidents (unintentional inj.)	6,668	36.9	29.8	61.1%	58.0%
Malignant neoplasms	1,926	10.7	8.6	-4.4%	1.8%
Intentional self-harm (suicide) .	1,600	8.9	7.2	35.8%	10.2%
Diseases of heart	1,232	6.8	5.5	12.2%	4.4%
Assault (homicide)	881	4.9	3.9	18.2%	3.9%
Pregnancy, childbirth & puerperium	512	2.8	2.3	27.8%	2.9%
Chronic liver disease and cirrhosis	367	2.0	1.6	23.1%	2.1%
Diabetes mellitus	352	1.9	1.6	23.1%	1.9%
Cerebrovascular diseases	254	1.4	1.1	-8.3%	0.0%
Septicemia	192	1.1	0.9	0.0%	0.2%
All other causes (residual)	4,082	22.6	18.3	11.6%	

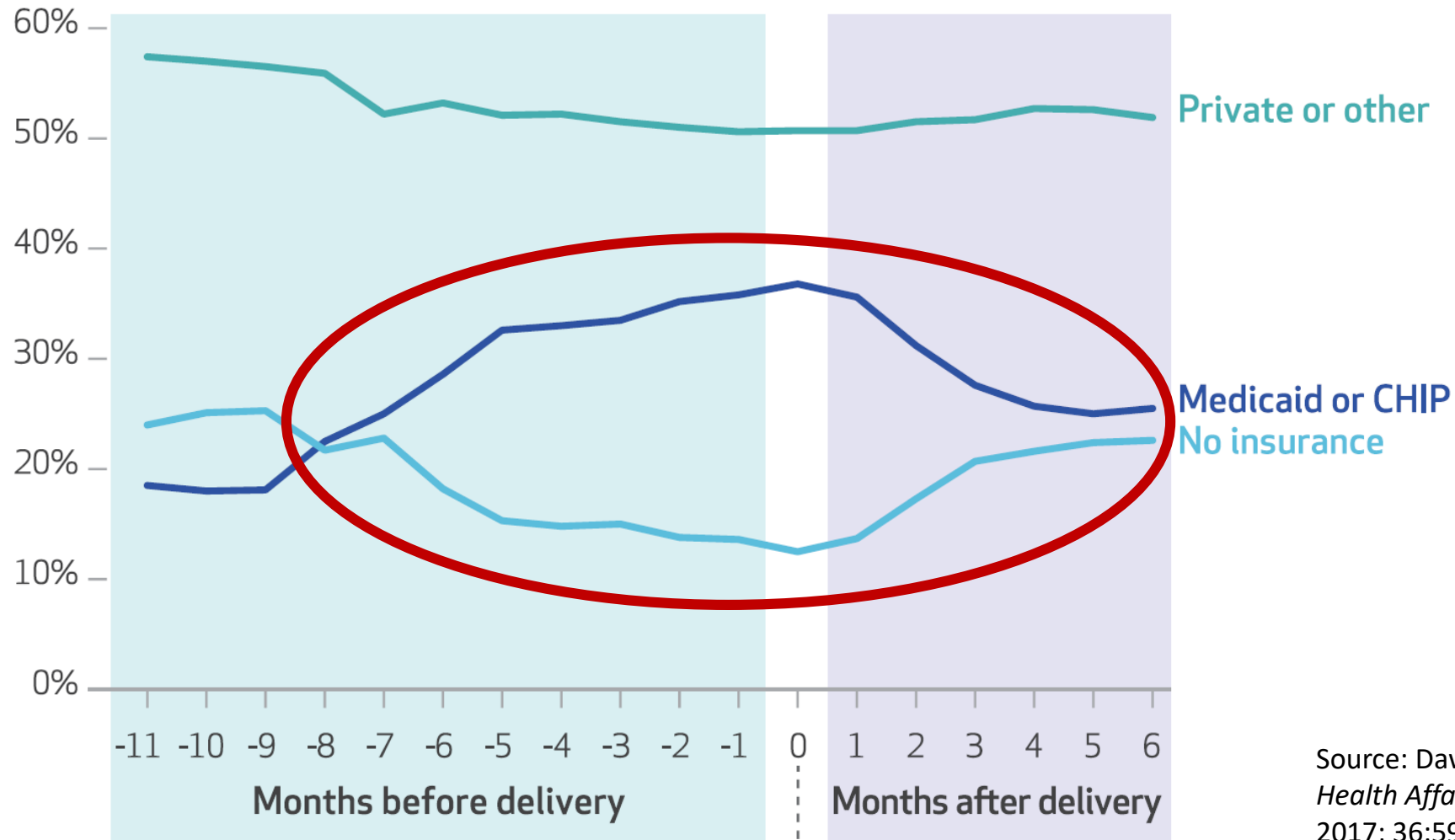
Sources: Heron M. *Deaths: Leading causes for 2010*. National vital statistics reports; vol62 no 6. Hyattsville,MD: National Center for Health Statistics. 2013 & 2017 data from CDC, NCHS, Underlying Cause of Death 1999-2017 on CDC WONDER Online Database, released December, 2018; Accessed 11/7/2019.

9. The Way Forward

9. The Way Forward

Keeping Women in the System

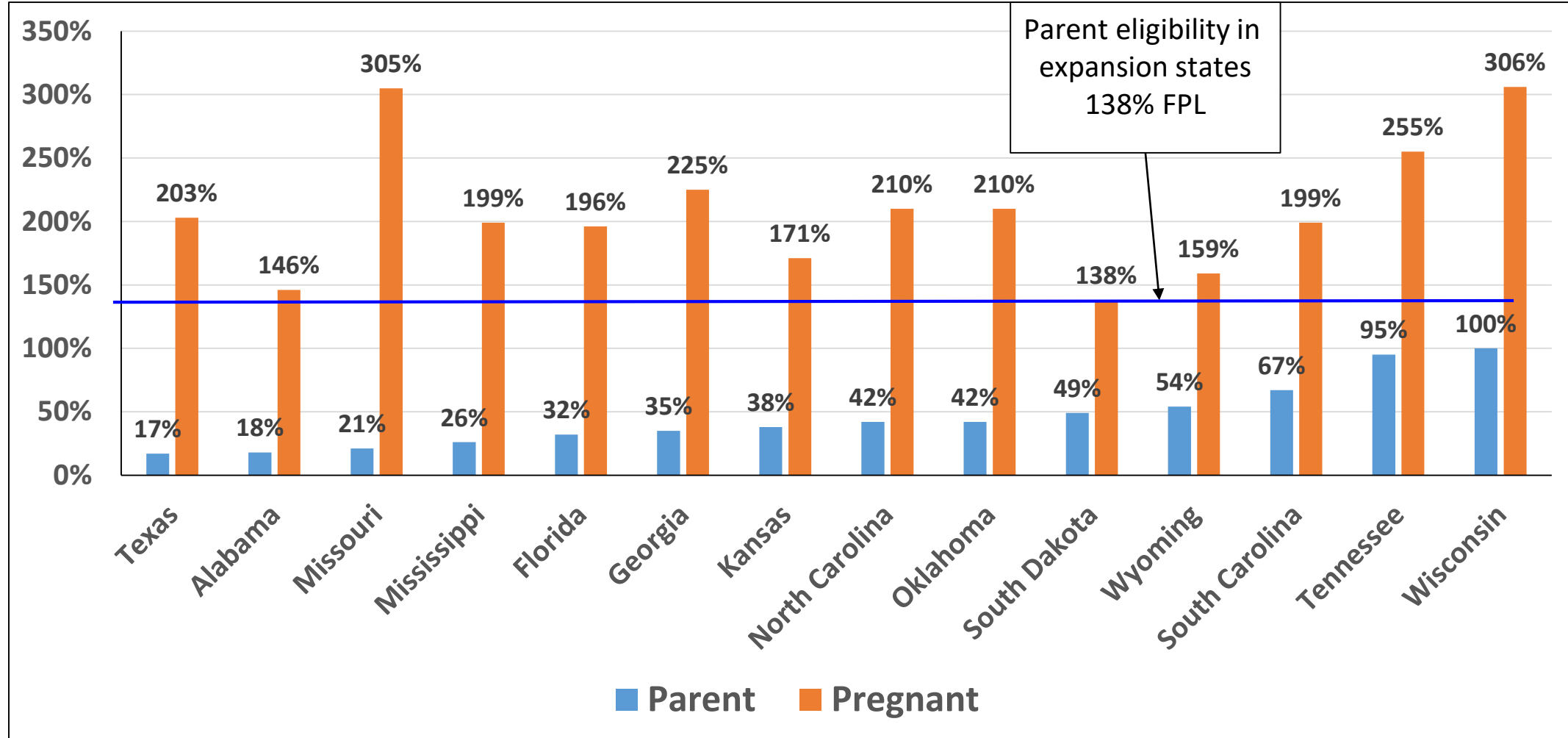
Percentages of women who gave birth in the period 2005-13, by health insurance type and month before or after delivery



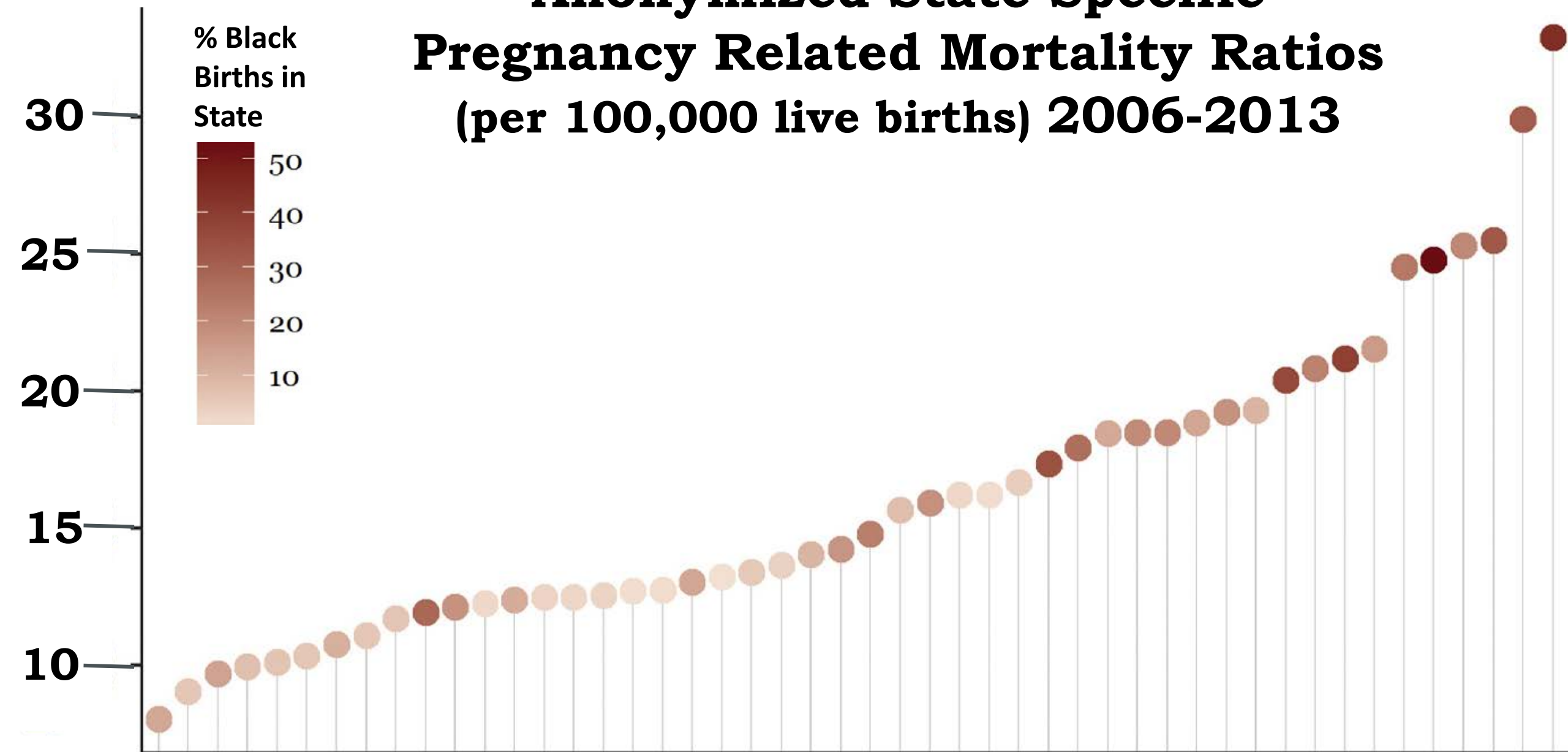
Source: Daw J.
Health Affairs
2017; 36:598-606

Medicaid Eligibility for Parent vs Pregnant Women in Non-Expansion States

Medicaid eligibility thresholds, 2019



Anonymous State Specific Pregnancy Related Mortality Ratios (per 100,000 live births) 2006-2013



Source: Kramer M.et.al. *Am J OBGYN*.2019.609

Four Policy Recommendations

- 1. Use Maternal Mortality Review Committees to **explore pregnancy associated deaths** for causes and possible bases for prevention;*
- 2. Use linked datasets to examine women's health **through the lifecourse** and identify critical moments (e.g. pregnancy?) where intervention might matter;*
- 3. **Fund a systematic process for listening to women** tell us about their lives and experiences **in pregnancy and beyond** to craft sustainable solutions that are meaningful to them.*
- 4. Craft policies that keep **women of all ages** within the health and social system to prevent problems that lead to pregnancy associated deaths.*



DC NATIONAL RALLY

A PRE-MOTHER'S DAY MOVEMENT TO MAKE SURE ALL MOMS GET THE CARE THEY DESERVE

Saturday May 3rd
On the National Mall,

1:00 - 3:30 PM

*Our country's most inspiring moms
(and their families)...
sounding off...
on a rock concert stage...
in the heart of the nation's capital.*



Learn more at www.MarchforMoms.org

May 3, 2020

NATIONAL MATERNAL HEALTH WEEK

MAY 5th-12th, 2019



forMoms

#BeyondMothersDay

- Promote State & Federal Legislative Efforts to Improve Maternal Health
- Drive Media Attention on State of Maternal Health
- Seek City, State and National Proclamations
- Organize Visits in DC on Capitol Hill May 10th
- Rally on National DC Mall on May 11th
- Livestream the Rally on Facebook Live
- Curate and Promote Daily Themes Related to Maternal Health

www.birthingthenumbers.org



Lee



Maya



Ruby



Corey



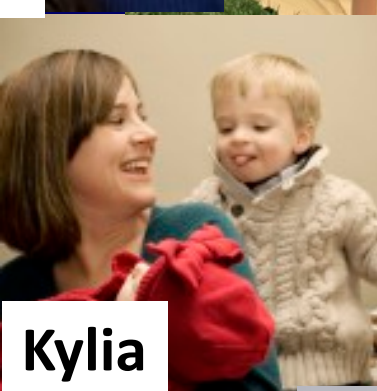
Lucy



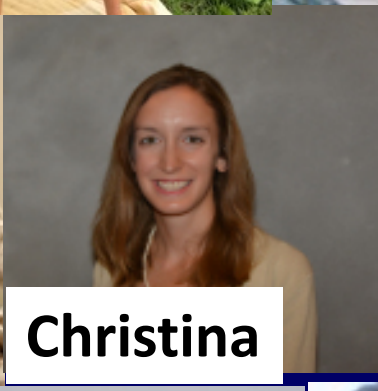
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Jordy



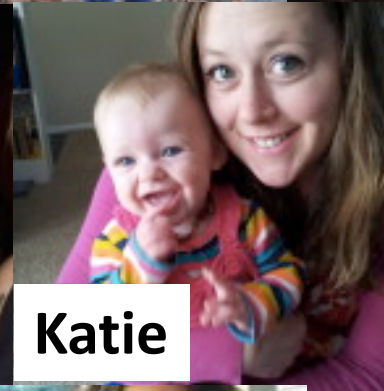
Kylia



Christina



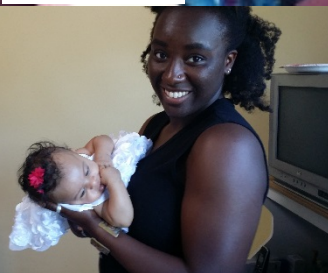
Sarah



Katie



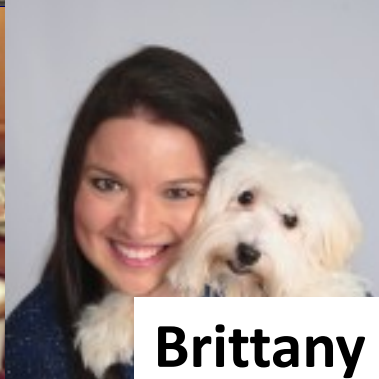
Sheridan



Ebere



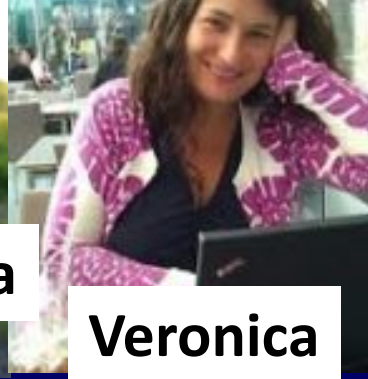
Allison



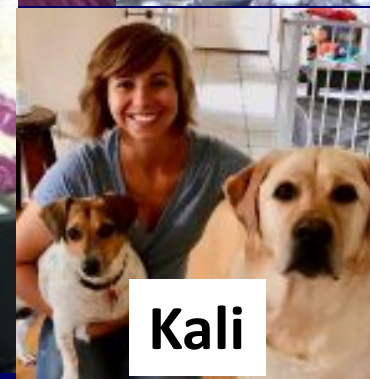
Brittany



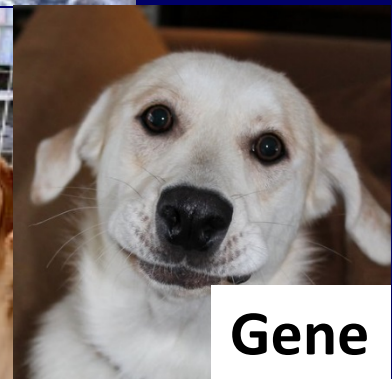
Jessica



Veronica



Kali



Gene

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