

There's a Crisis in U.S. Maternal Mortality – Are Midwives the Solution?

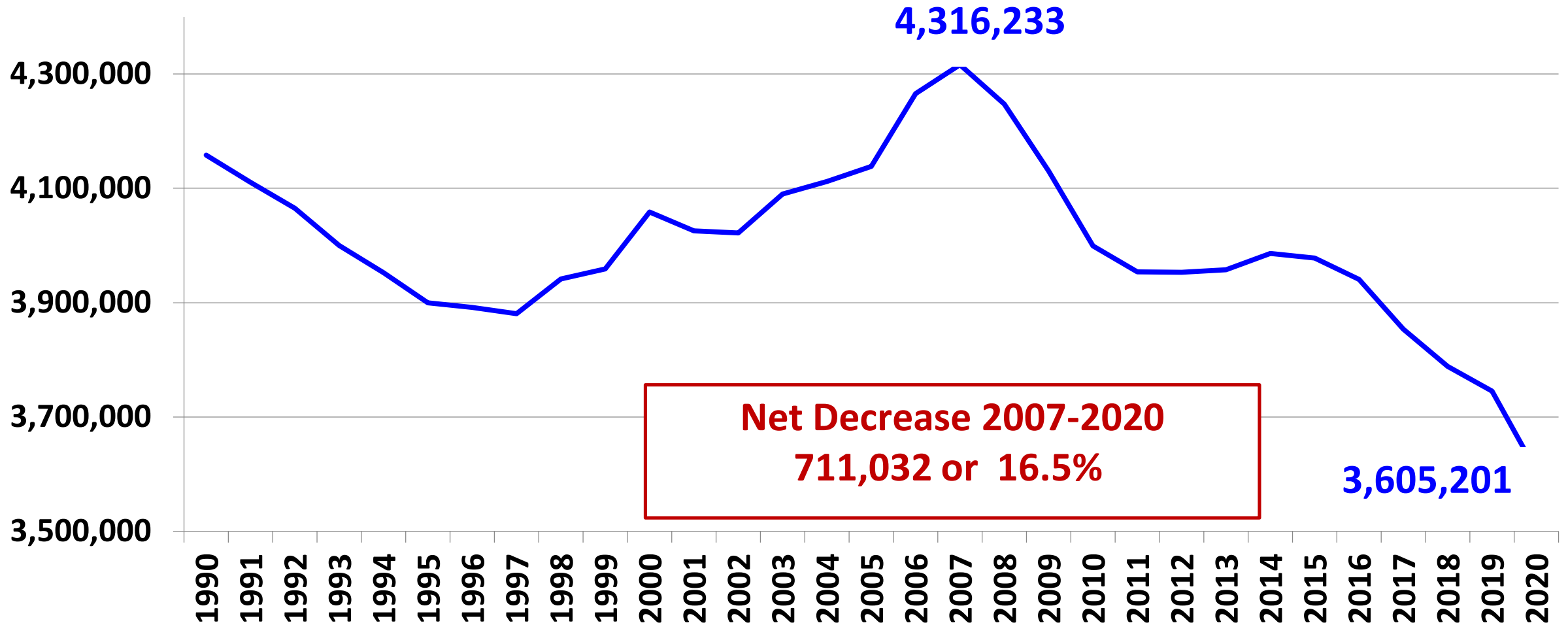
Gene Declercq, PhD

Boston University School of Public Health

AKPQC and MCDR Joint Summit

April 16, 2021

Total U.S. Births, 1990-2020*

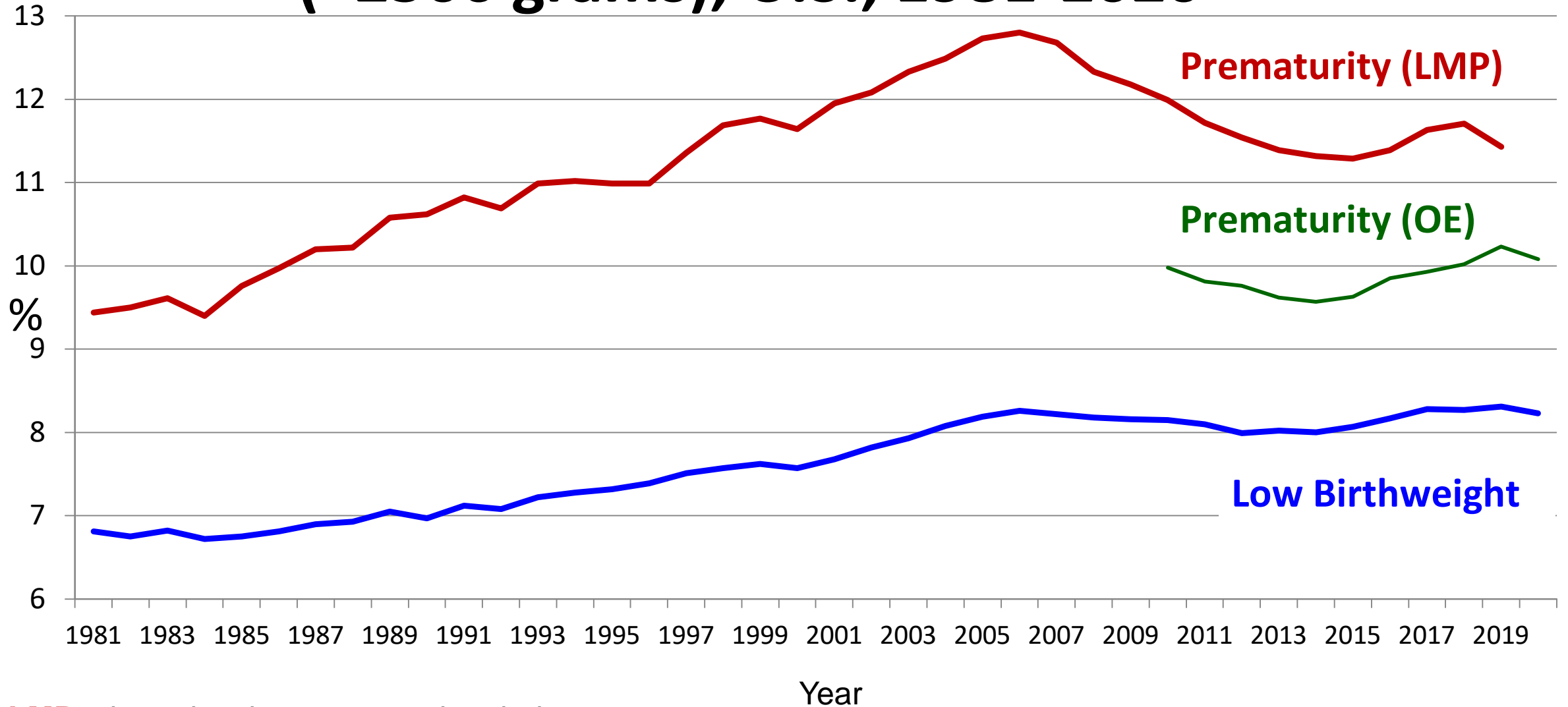


Source: Annual NCHS Reports on Births

*2020 data is preliminary

BirthByTheNumbers.org

Prematurity (<37 weeks) and Low Birthweight (<2500 grams), U.S., 1981-2020*

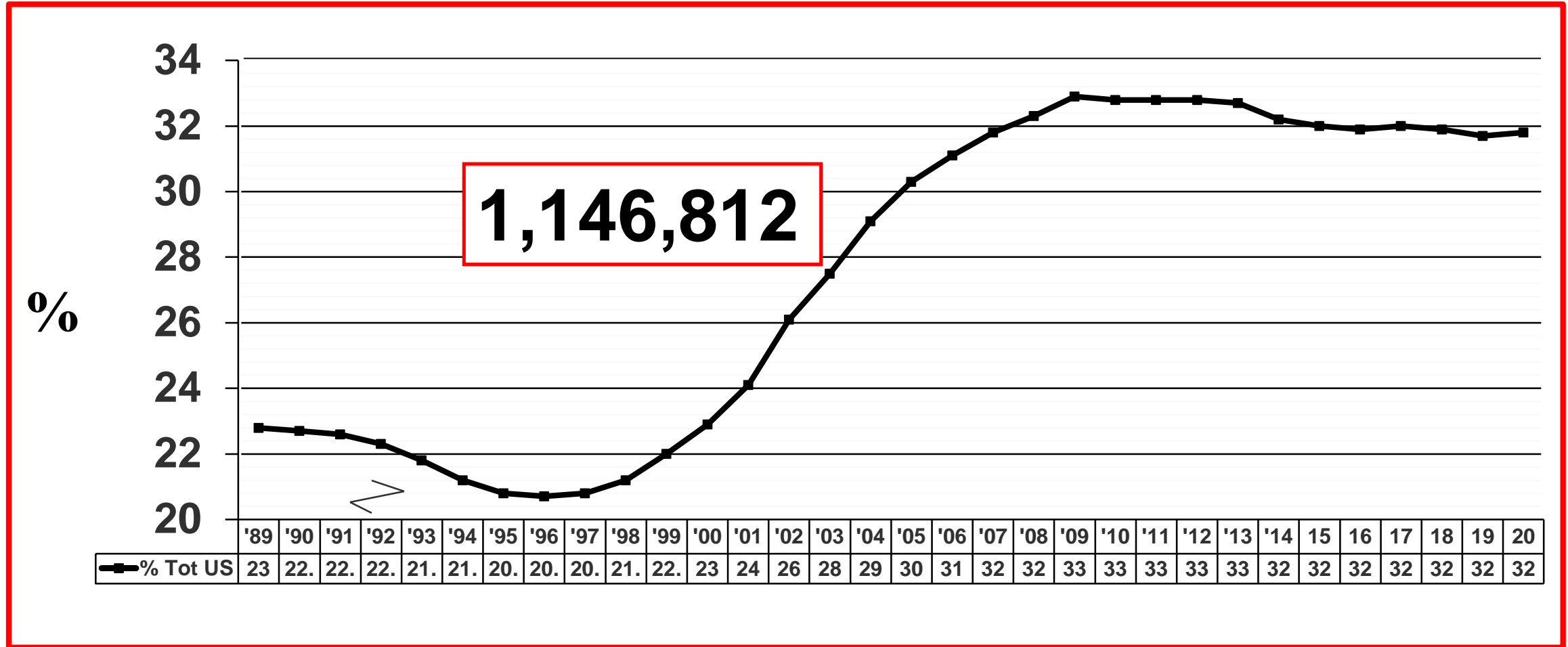


LMP – based on last menstrual period

OE – based on obstetric estimate

*2020 preliminary

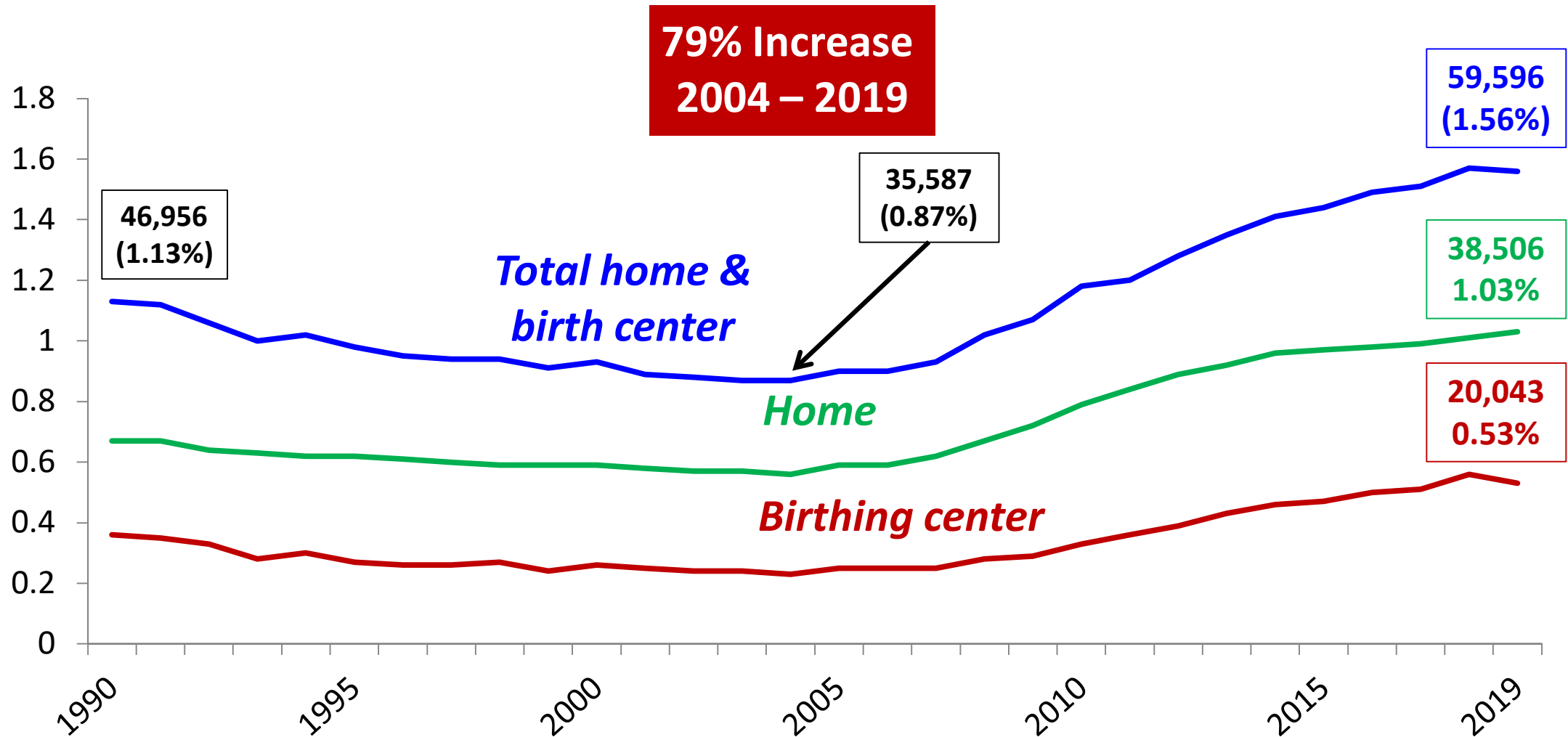
US Cesarean Rates, 1989-2020*



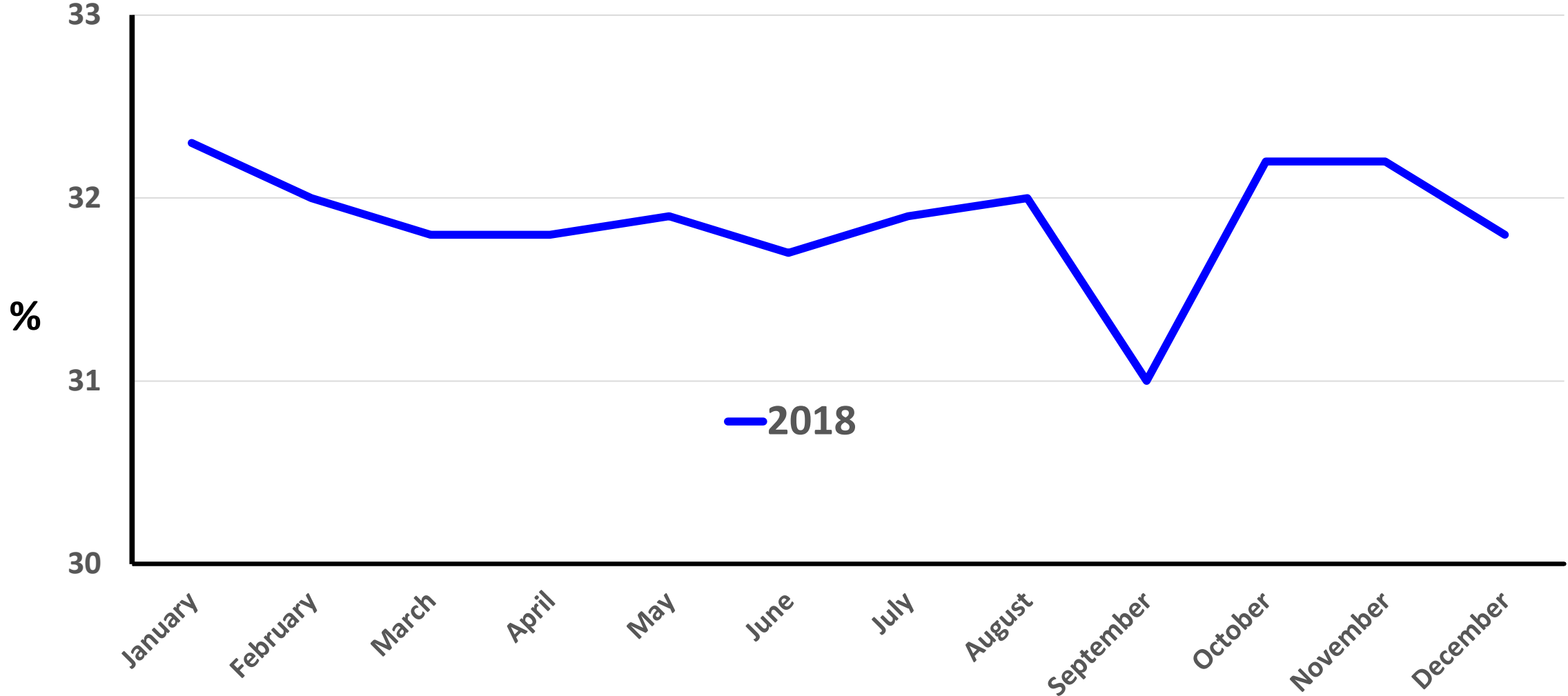
If the 2020 cesarean rate (31.8%) was the same as in 1996 (20.7%), there would have been 401,000 fewer cesareans in the U.S. in '20.

*2020 preliminary

Percent of all births at home, or in a birthing center, United States, 1990-2019

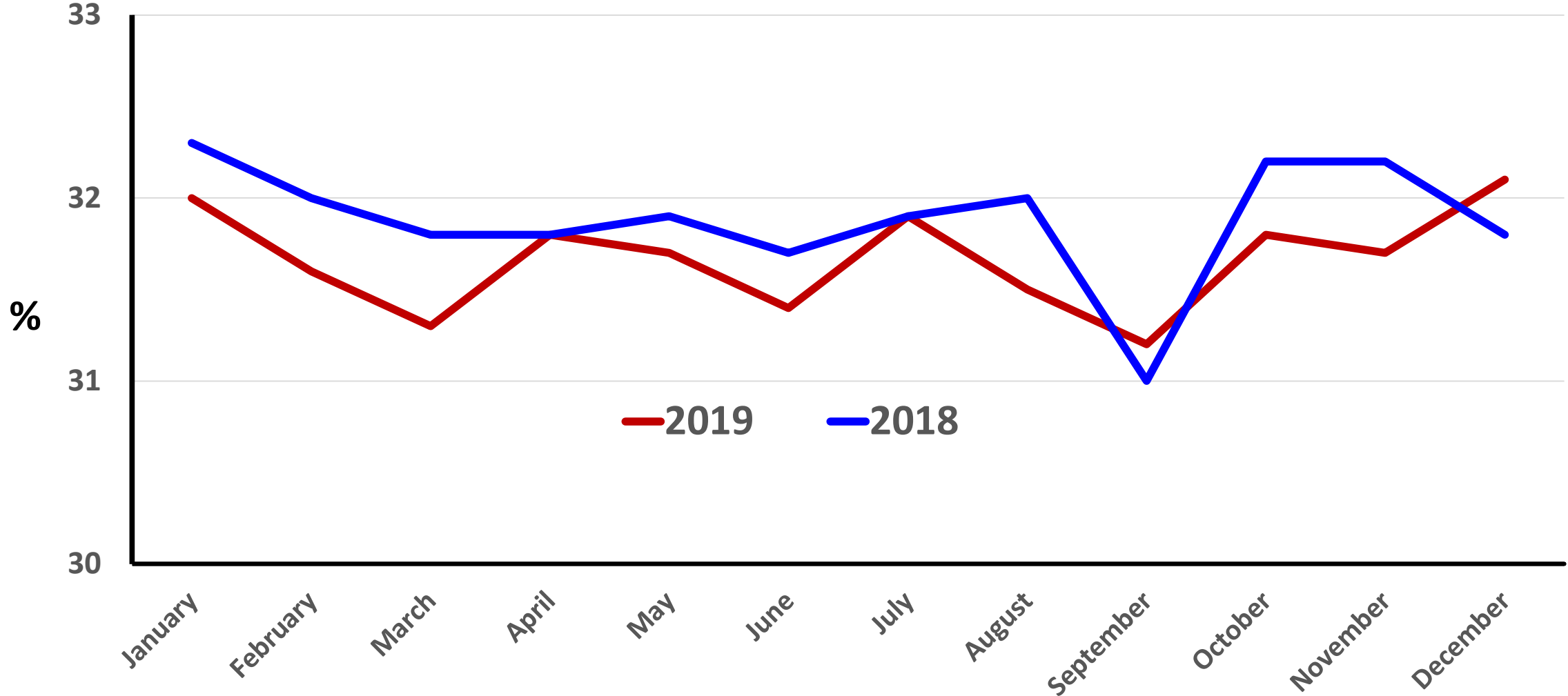


Cesarean Rates by Month, U.S., 2018, 2019, 2020



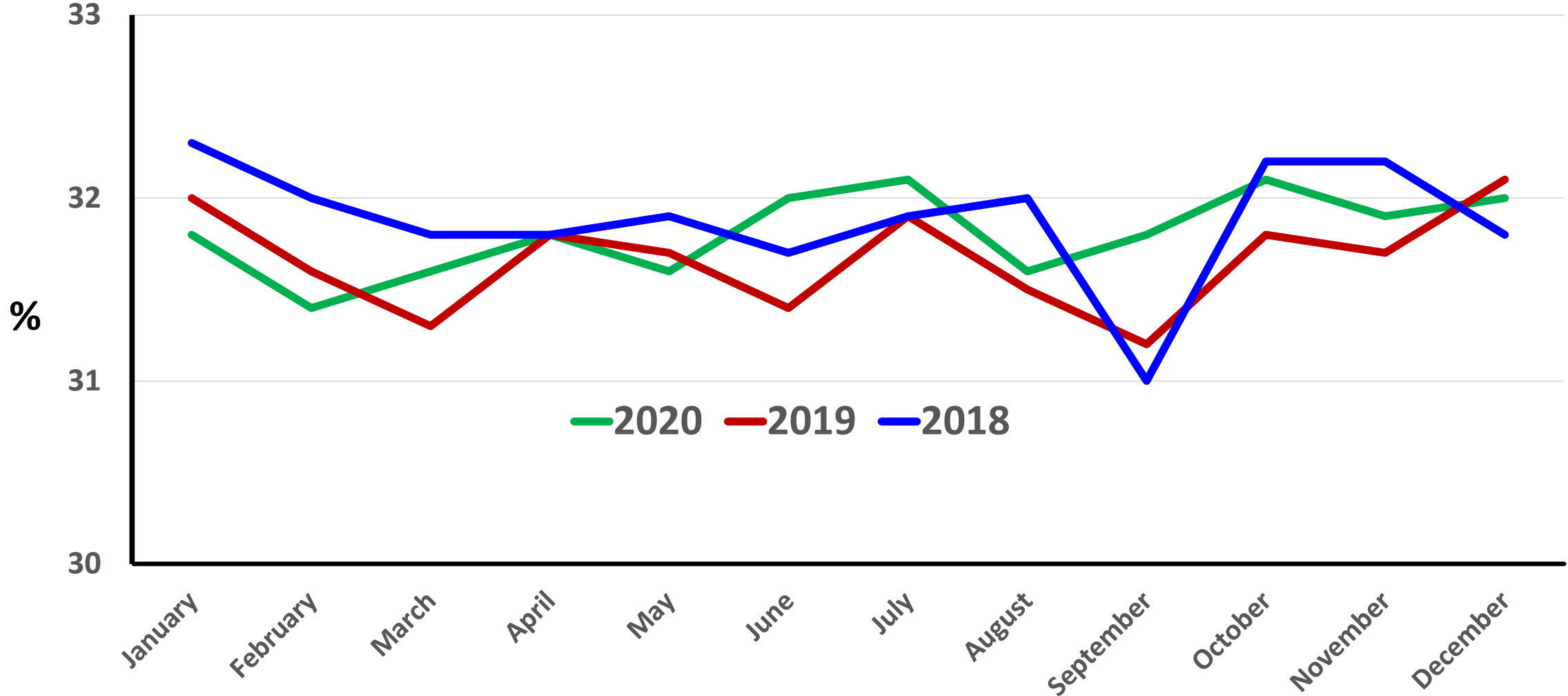
Source: NCHS COVID-19 Birth Data and Resources. <https://www.cdc.gov/nchs/covid19/covid-birth.htm>

Cesarean Rates by Month, U.S., 2018, 2019, 2020



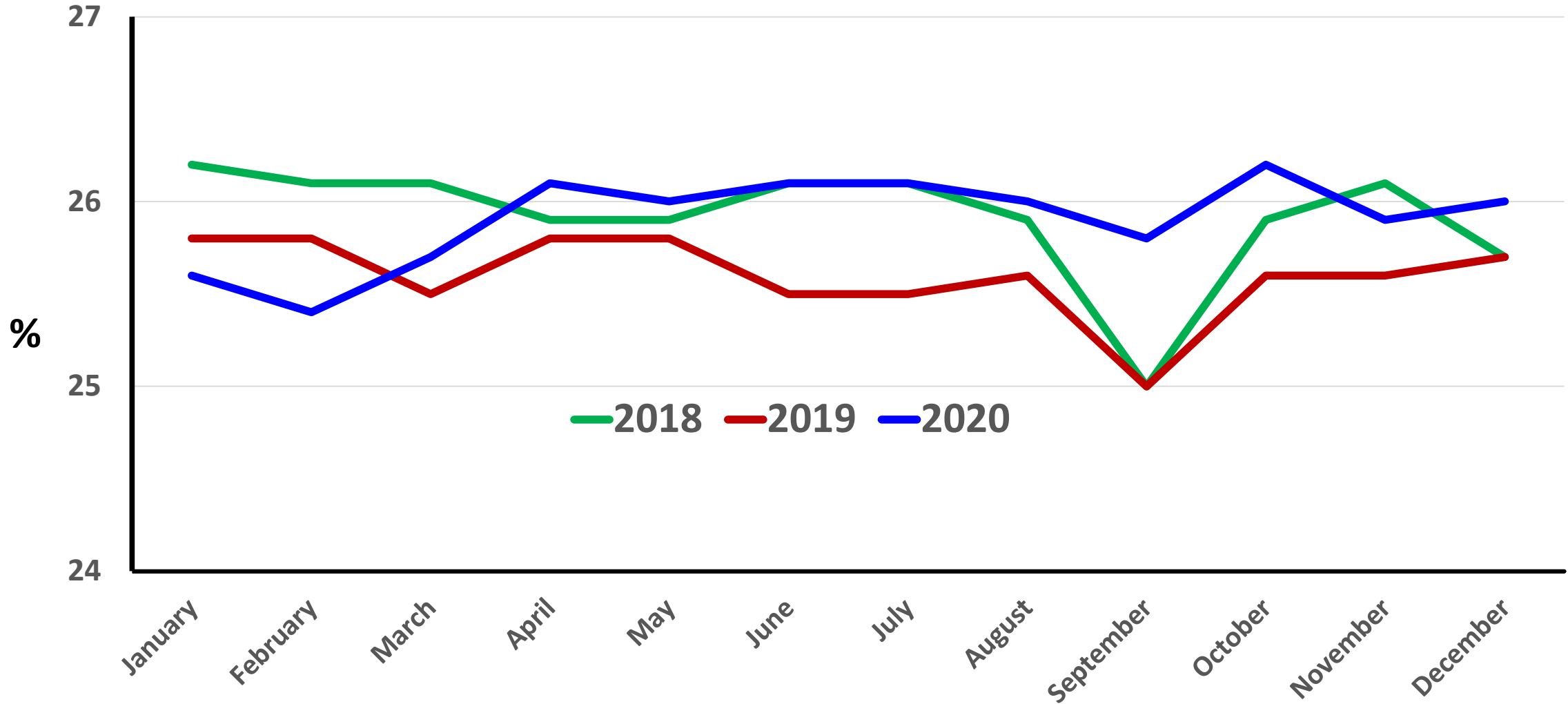
Source: NCHS COVID-19 Birth Data and Resources. <https://www.cdc.gov/nchs/covid19/covid-birth.htm>

Cesarean Rates by Month, U.S., 2018, 2019, 2020



Source: NCHS COVID-19 Birth Data and Resources. <https://www.cdc.gov/nchs/covid19/covid-birth.htm>

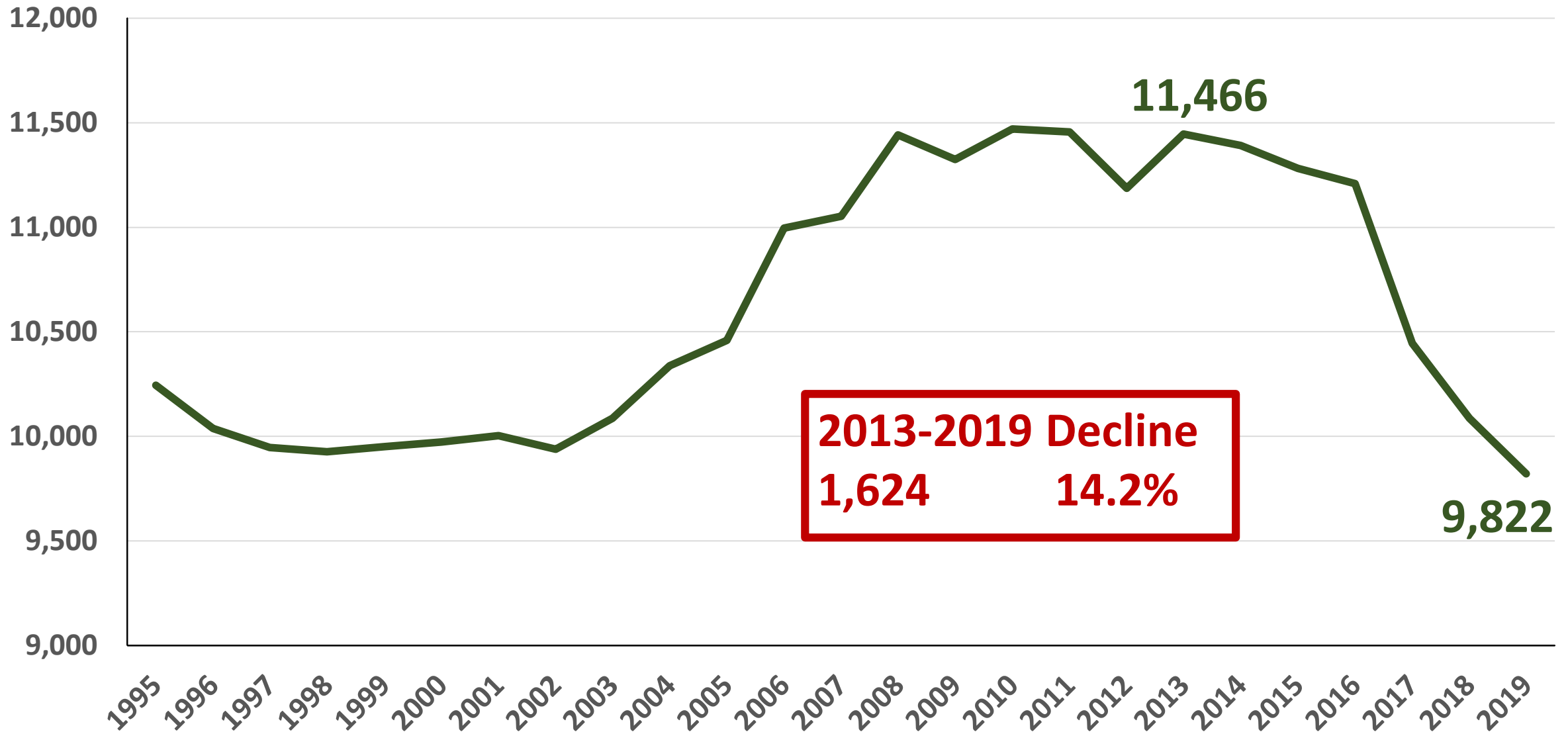
NTSV Cesarean Rates by Month, U.S., 2018, 2019, 2020



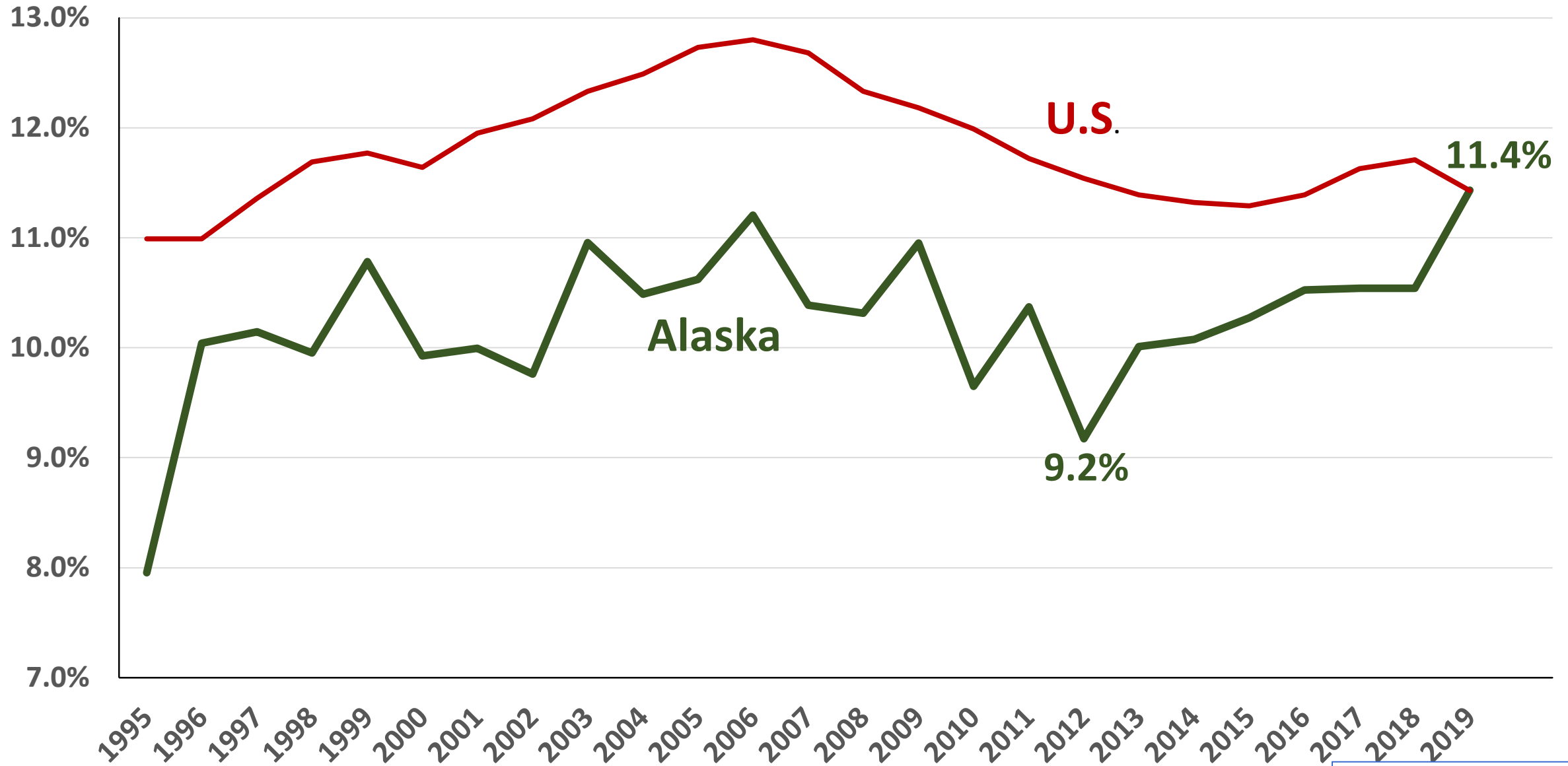
Source: NCHS COVID-19 Birth Data and Resources. <https://www.cdc.gov/nchs/covid19/covid-birth.htm>

The Alaskan Context (from an outsider)

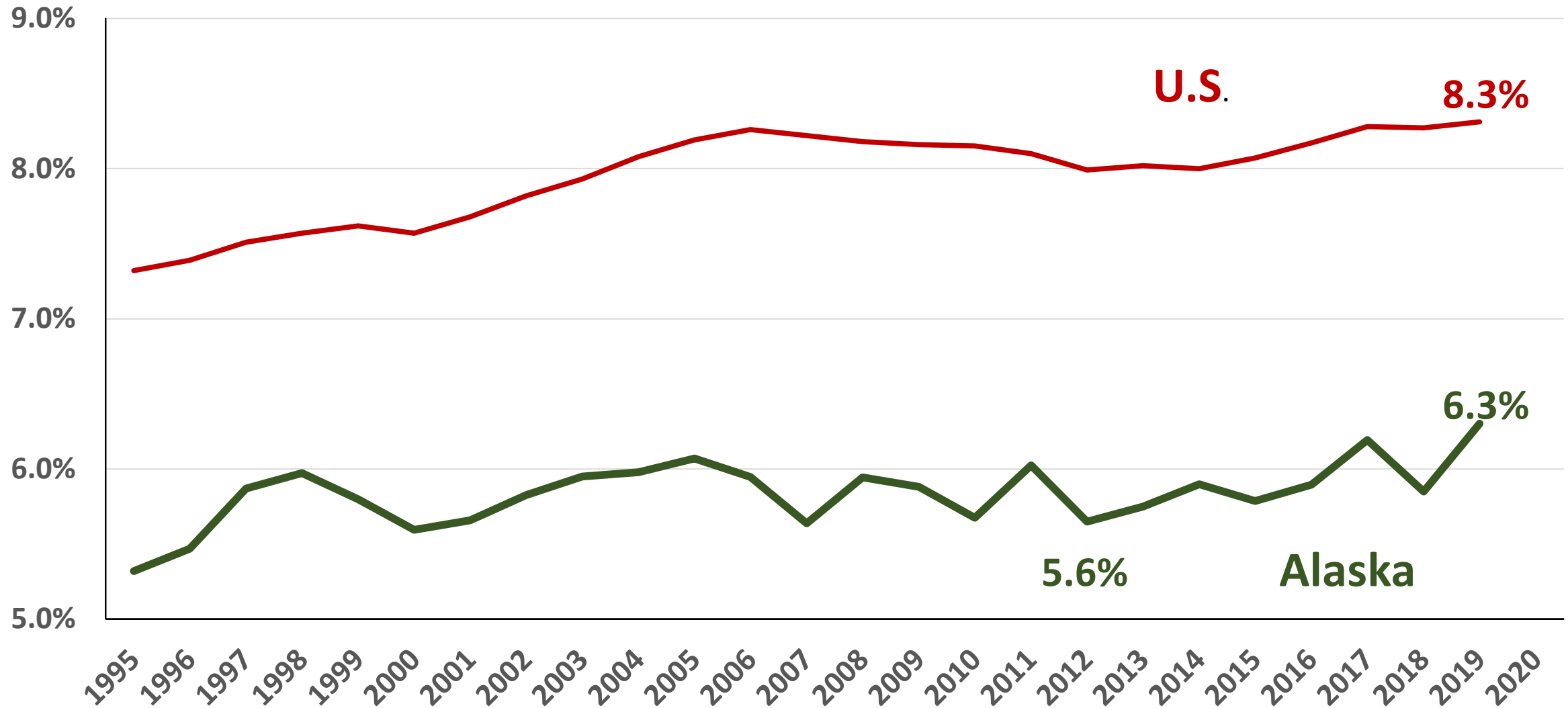
Births in Alaska, 1995-2019



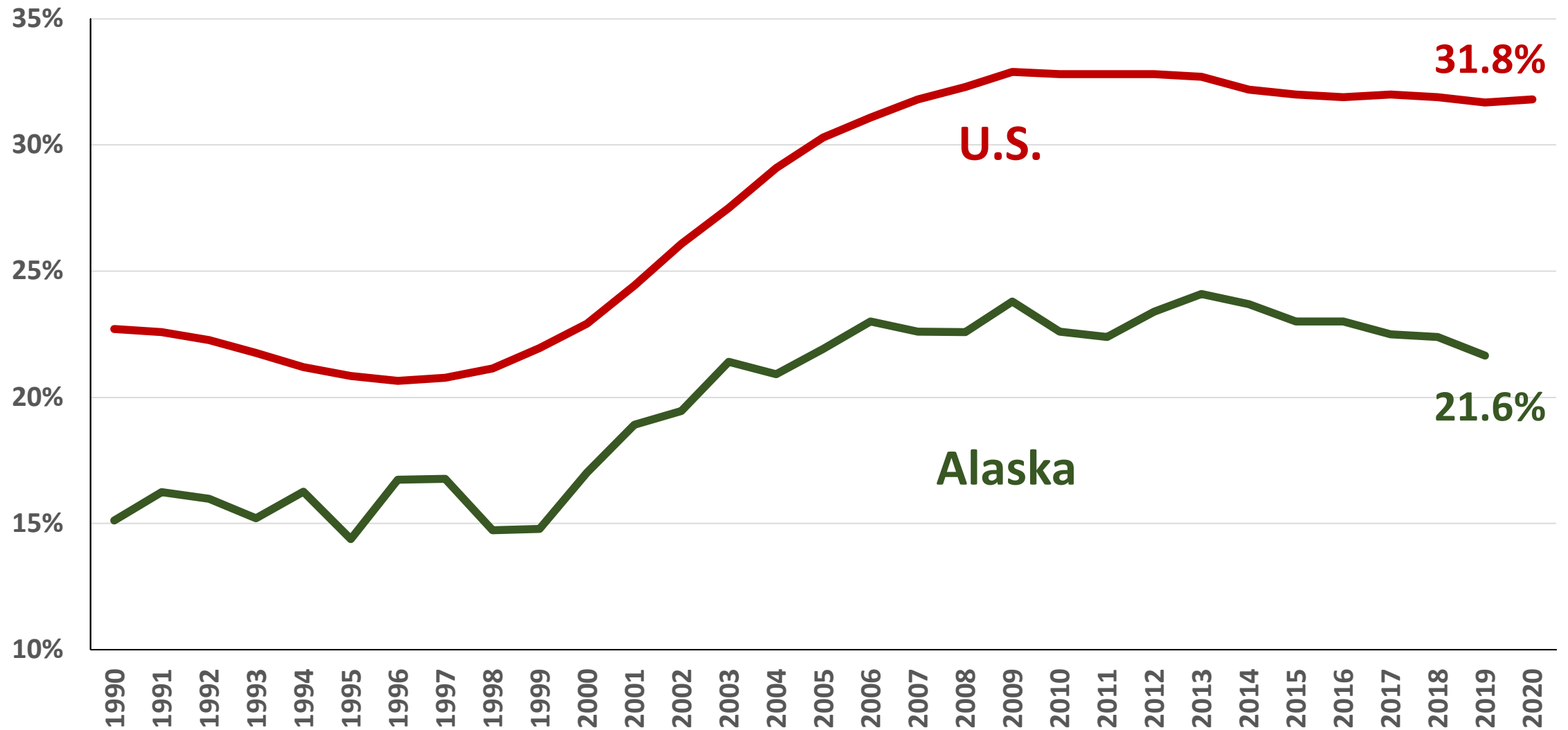
Premature Births in Alaska & U.S., 1995-2019



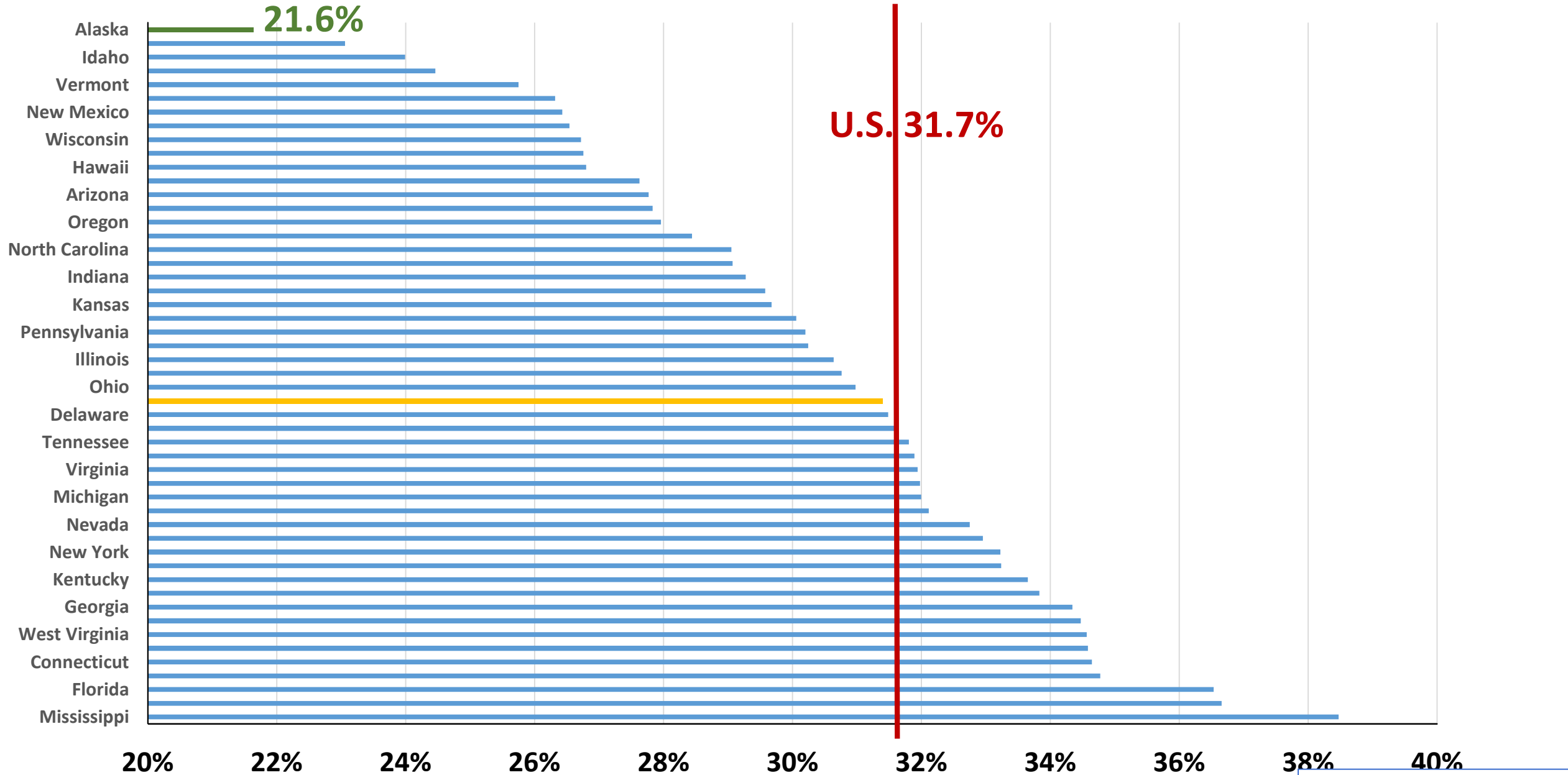
Low Birthweight (<2500gms) Births in Alaska & U.S., 1995-2020



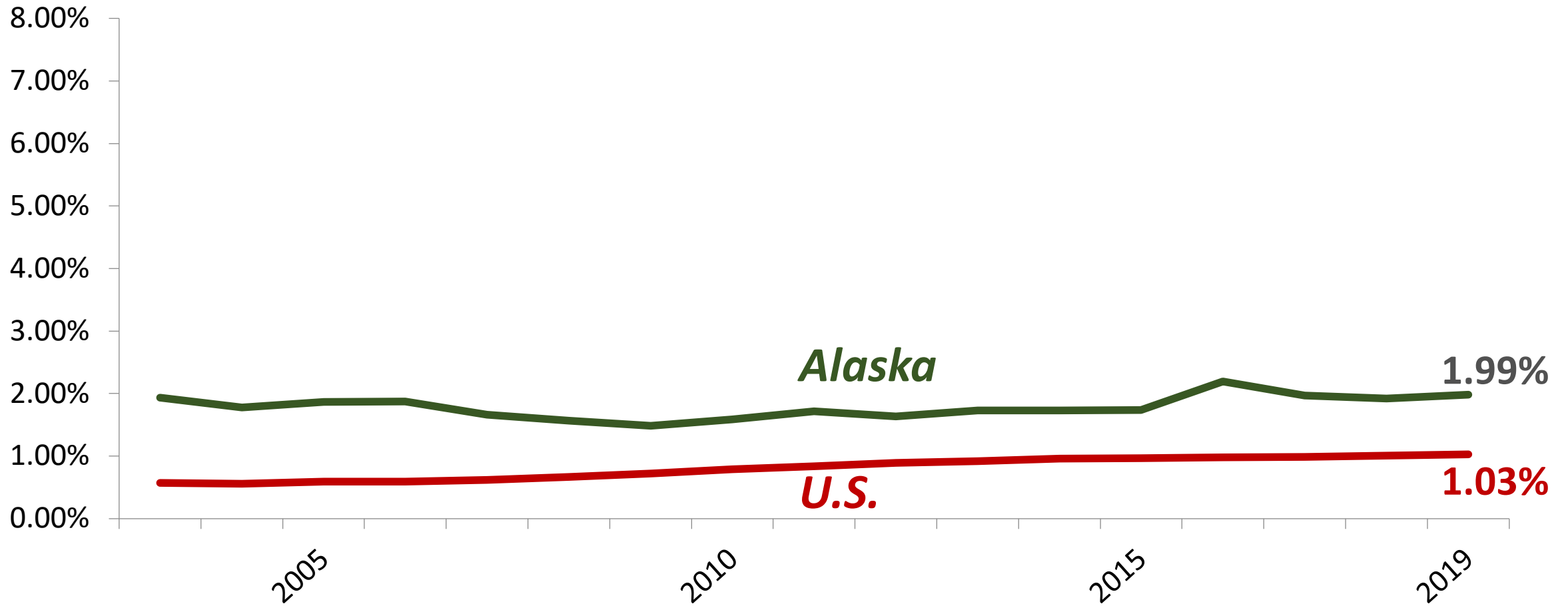
Cesarean Rates U.S. and Alaska, 1990-2019



Cesarean Rates by State, 2019



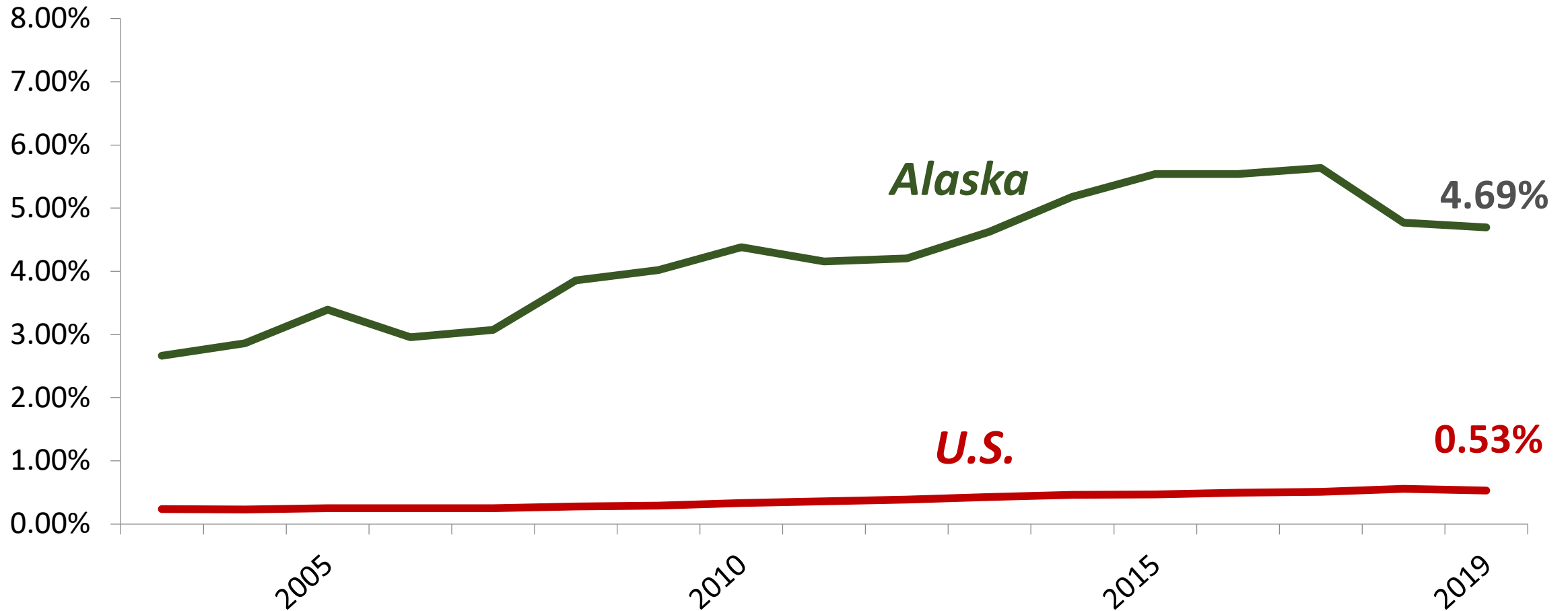
Percent of all births at home, Alaska & United States, 2003-2019



Source: NCHS Annual Birth Reports

BirthByTheNumbers.org

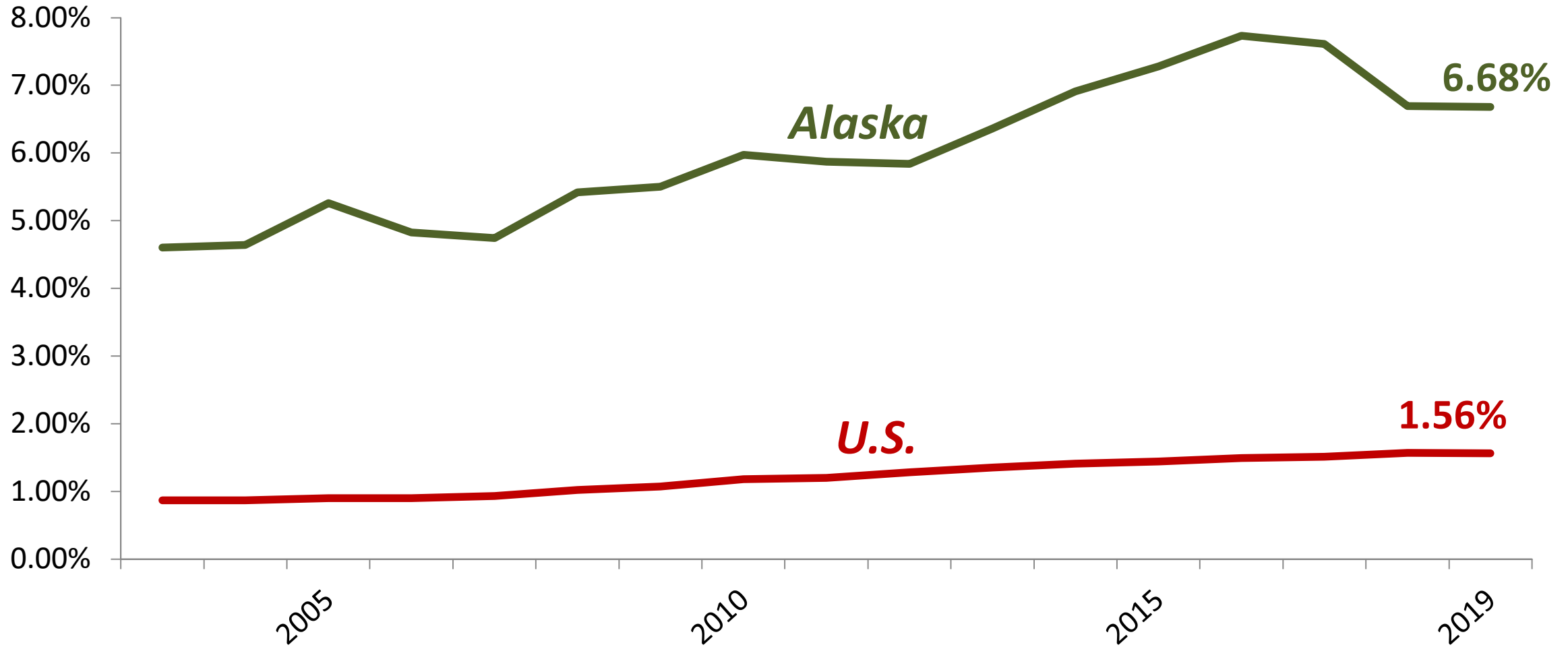
Percent of all births at a birthing center, Alaska & United States, 2003-2019



Source: NCHS Annual Birth Reports

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

Percent of all births out of hospital, Alaska & United States, 2003-2019



Source: NCHS Annual Birth Reports

BirthByTheNumbers.org

The three widely used definitions of maternal mortality:

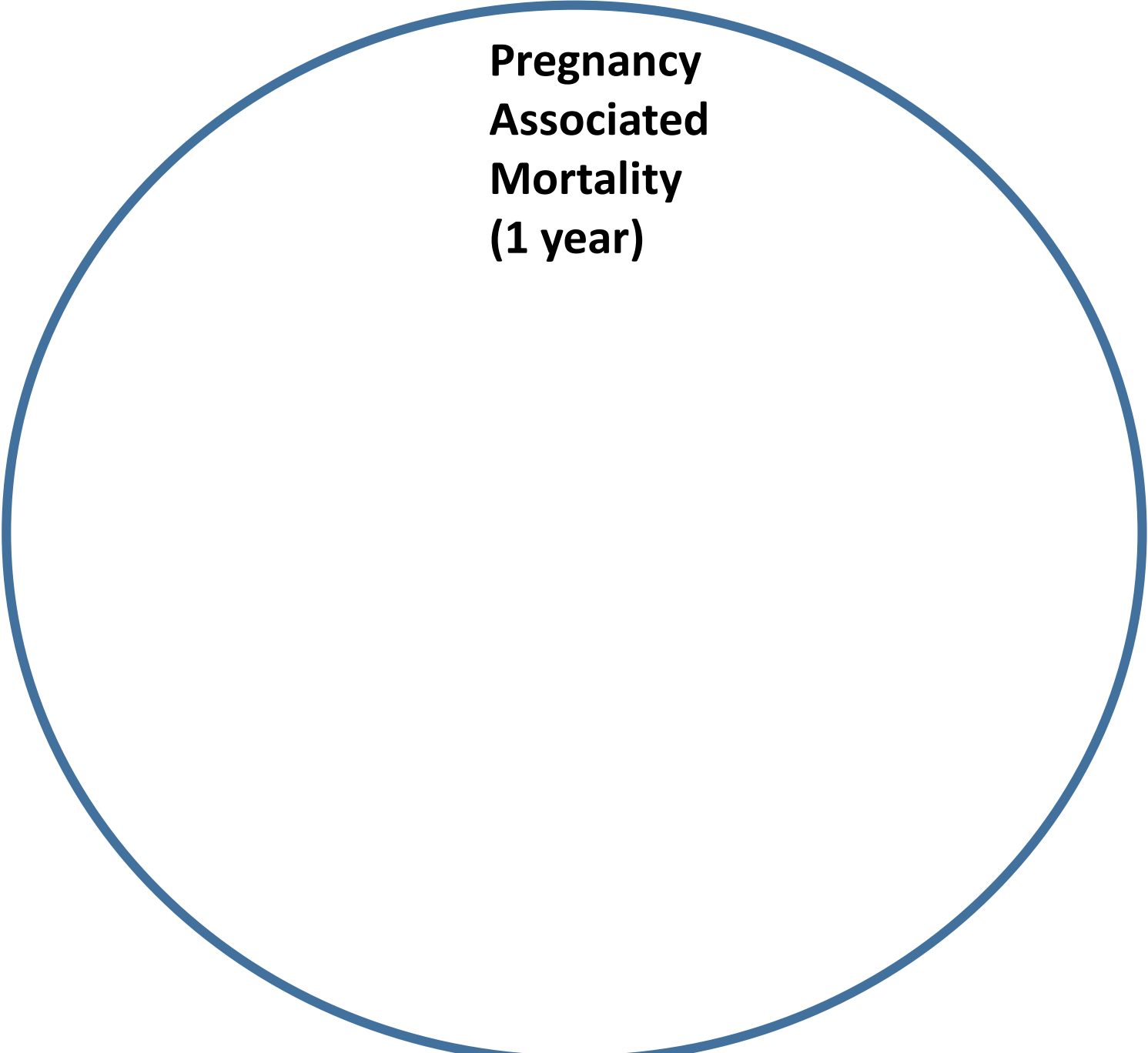
1. Pregnancy associated death

2. Pregnancy related death

3 Maternal mortality

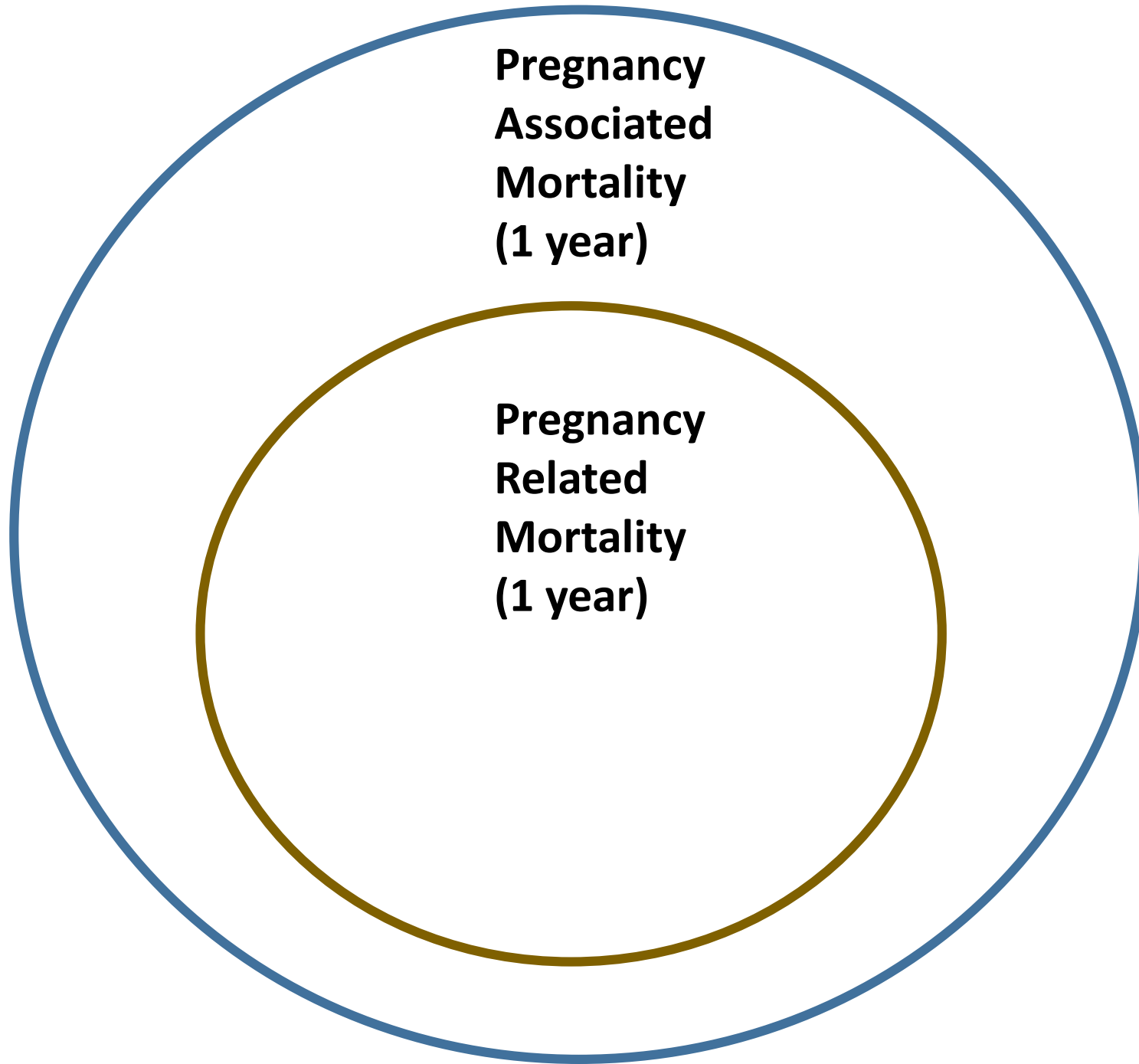
Three Definitions (in the U.S.)

- **Pregnancy Associated Death** – The death of a 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)**

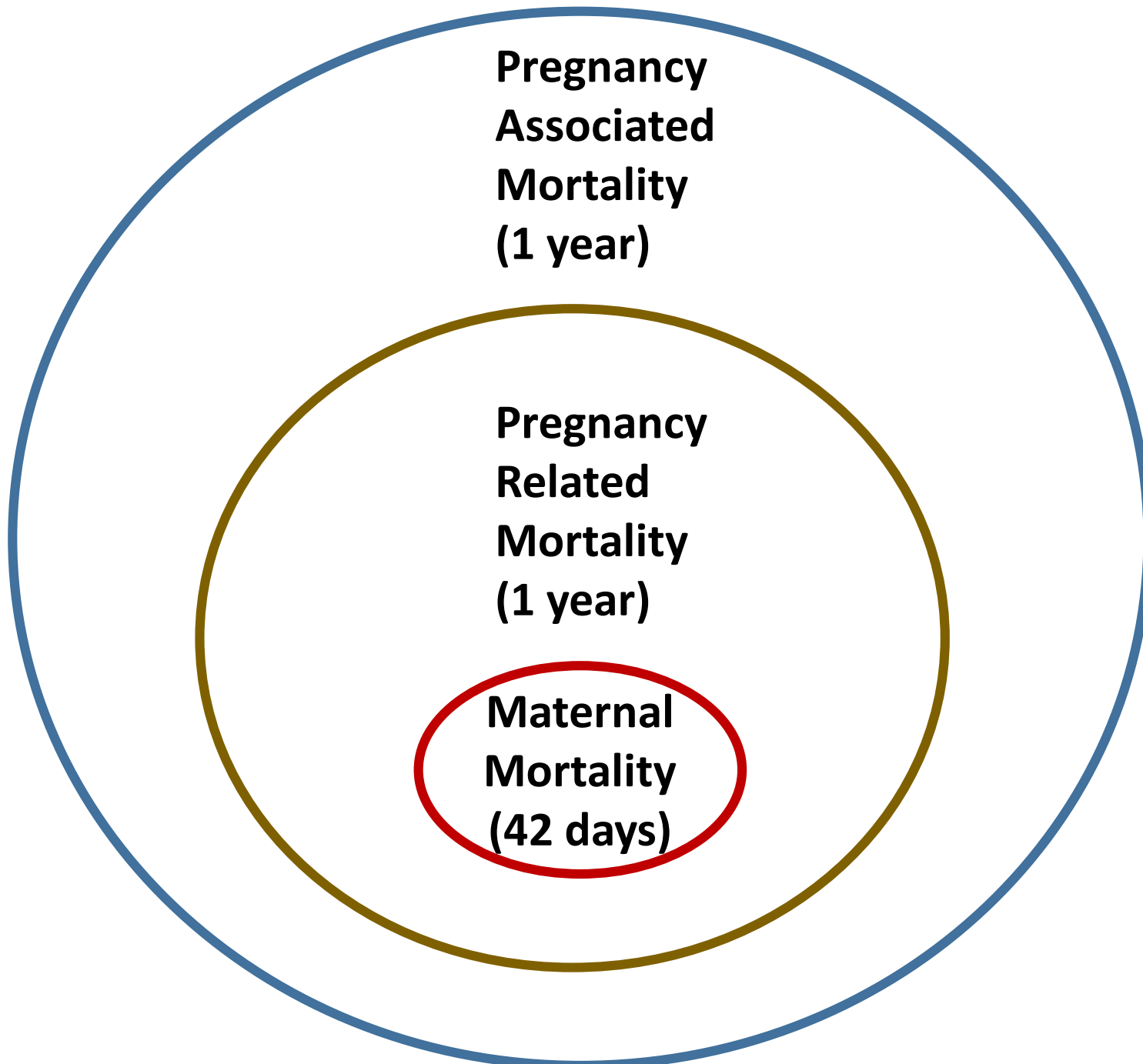
**Pregnancy
Associated
Mortality:
All Deaths women
of reprod. age
pregnancy to 1
year ppm**



**Pregnancy
Associated
Mortality
(1 year)**

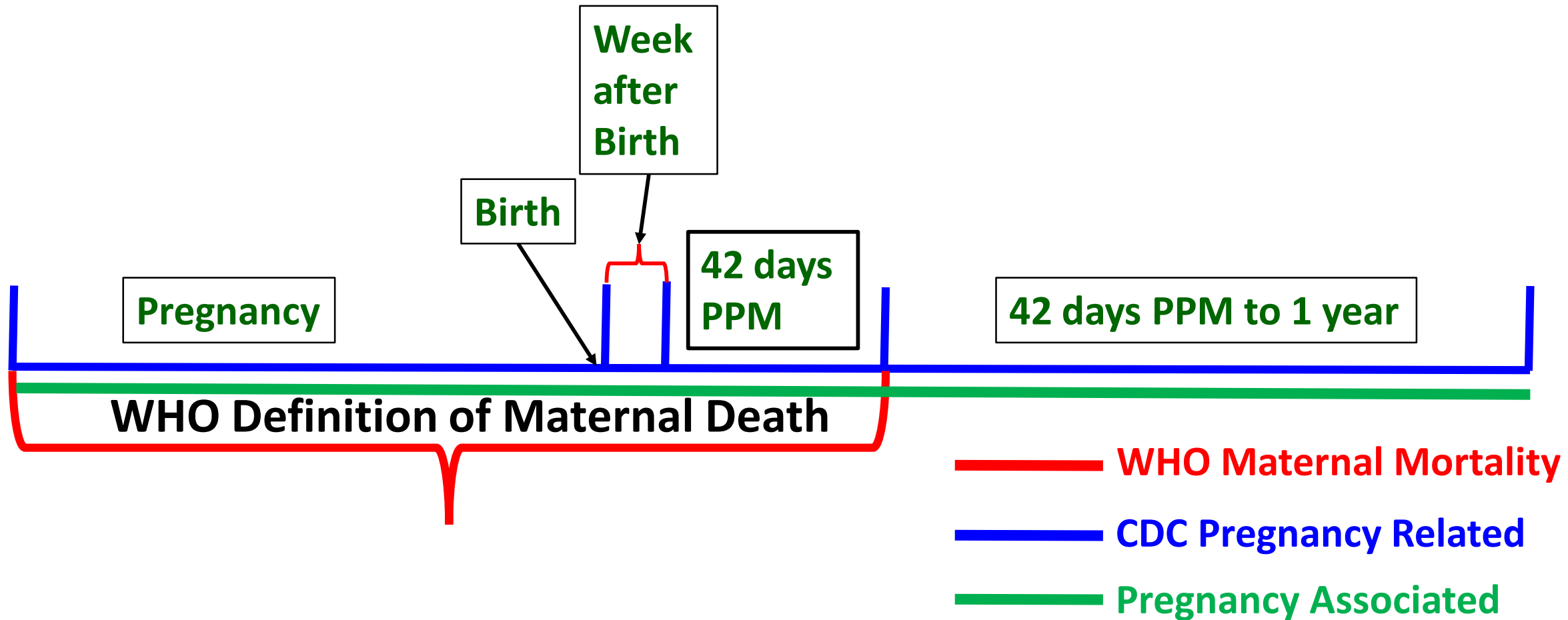
**Pregnancy
Related
Mortality
(1 year)**

**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**

Timeline of Maternal Mortality Definitions



PPM – postpartum – period after the birth

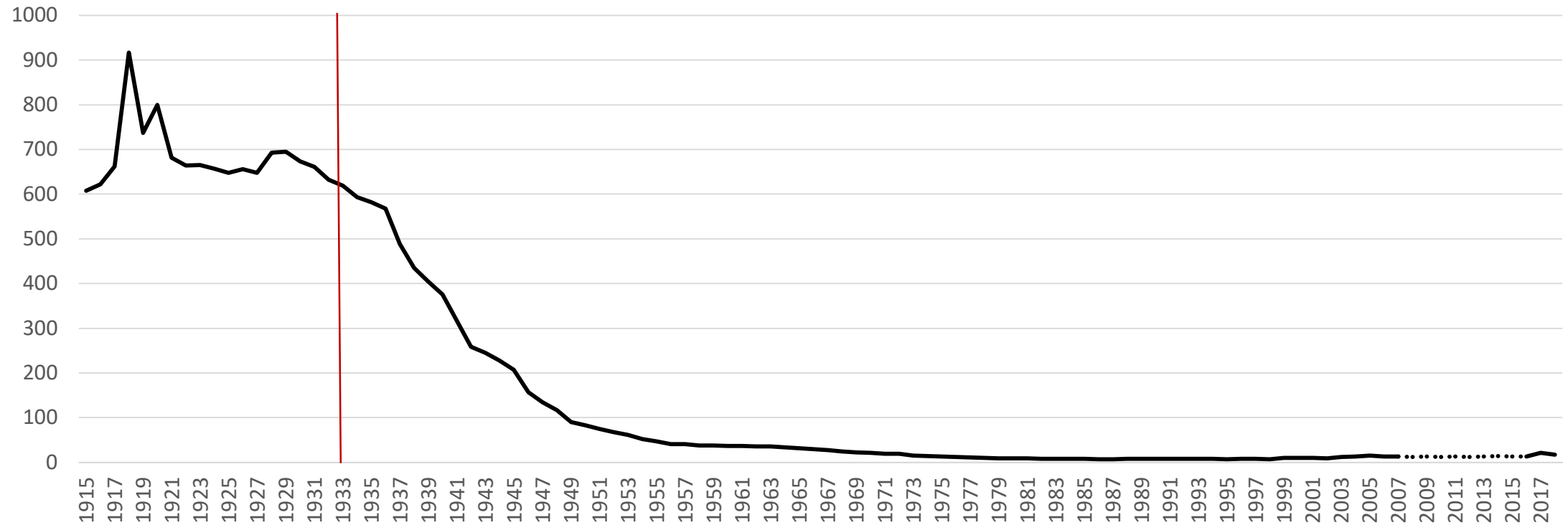
Declaring Premature Victory

“An examination of the rates for the different states indicates areas in which further improvement can be expected, but it is clear that maternal mortality is no longer a nationwide problem.....Childbearing has been made quite safe.”

- Maternal Deaths One in a Thousand. *JAMA, 1950; 144: 1096-7.*

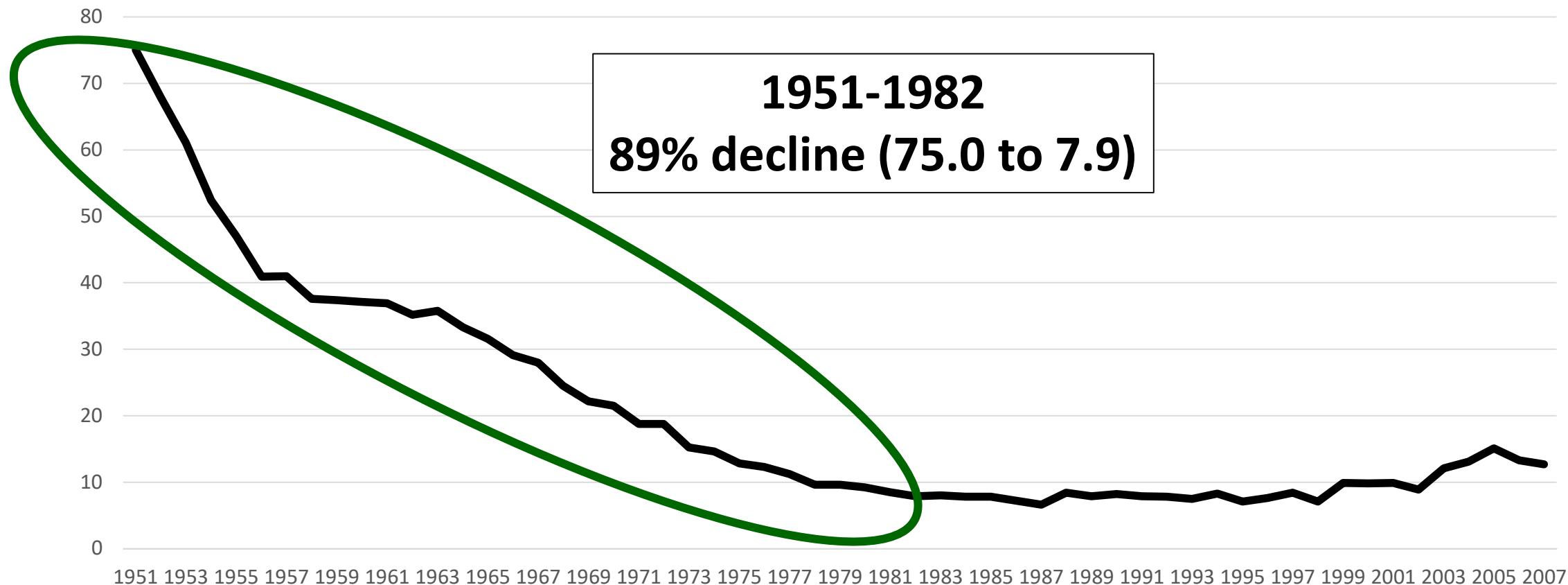
At the time the maternal mortality rate was 100 per 100,000

U.S. Maternal Mortality (per 100,000 births), 1915-2018



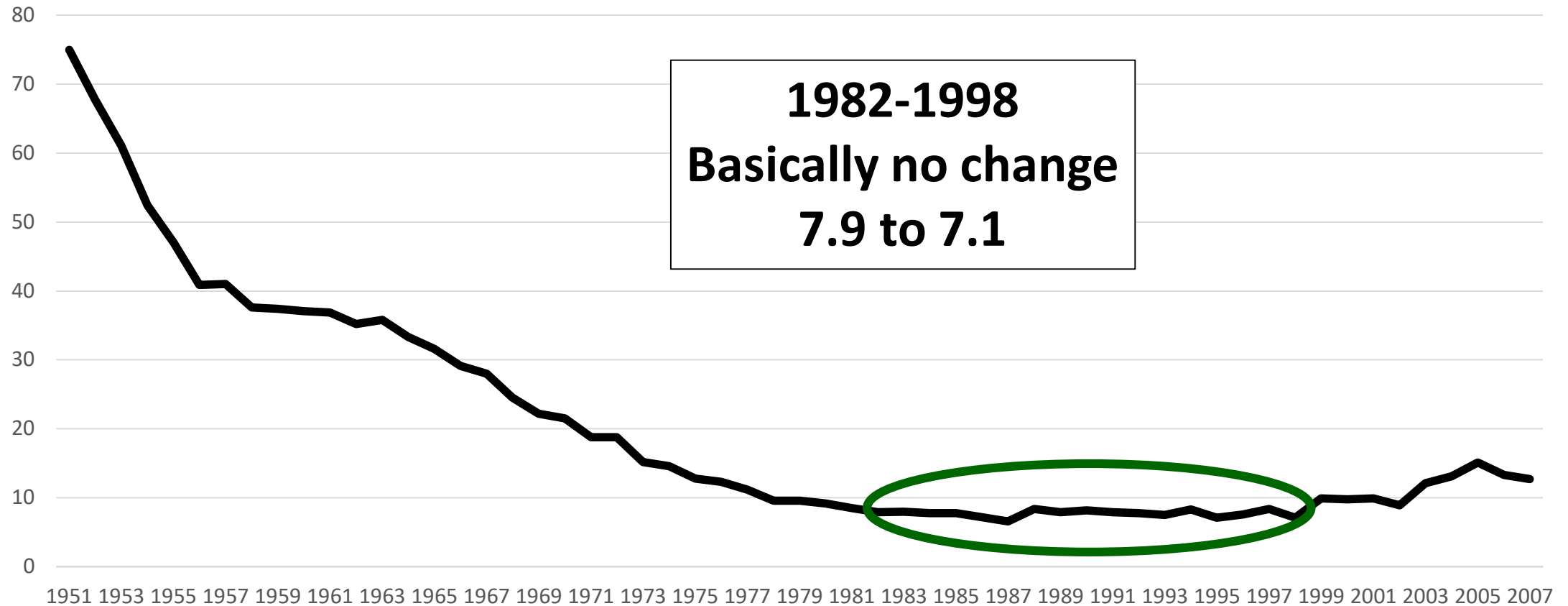
Sources: NCHS. Maternal Mortality and Related Concepts. Vital & Health Statistics. Series 33; #3. & annual data reports. 1915-1960 data from NCHS. *Vital Statistics Rates In The United States 1940-1960*. NOTE: Shifts in measurement (e.g. not all states were part of registration system prior to 1933) 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 etal. *NVSR*; vol 69 no 2. Hyattsville, MD: NCHS. 1/30/2020.

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



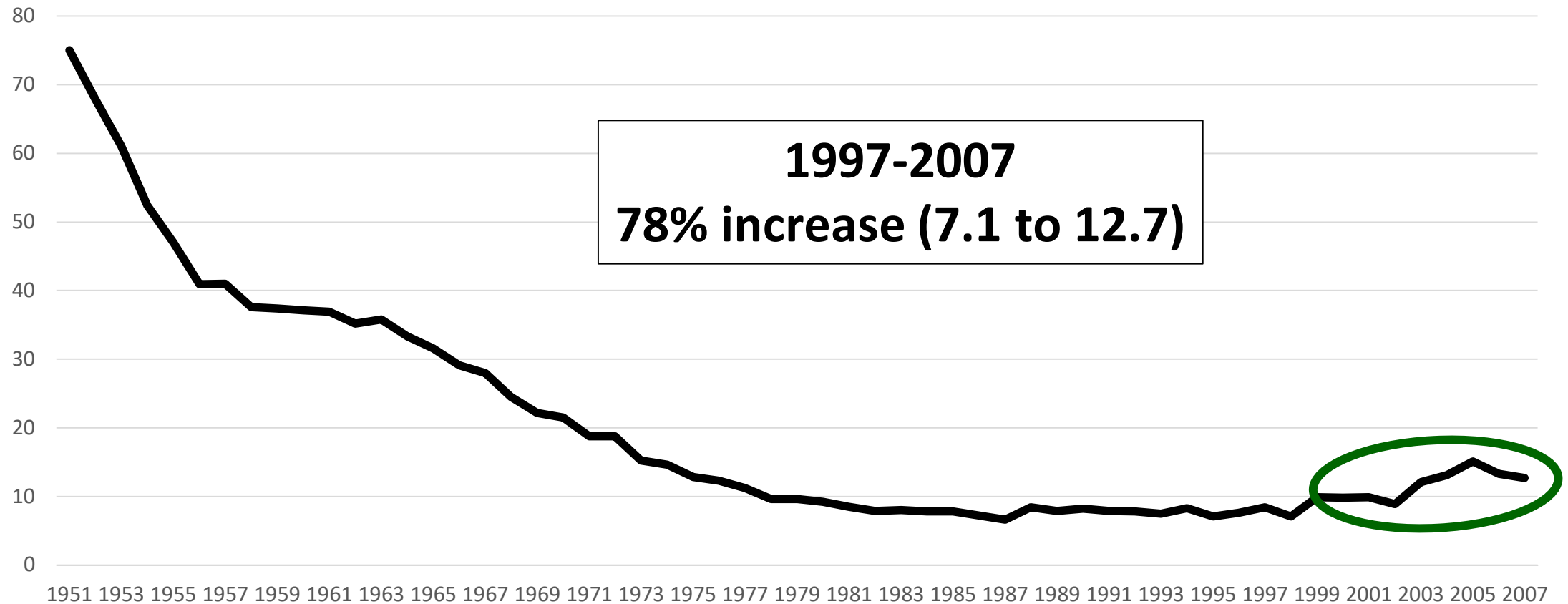
Source: NCHS. Deaths: Final Data. Annual Reports.

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



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

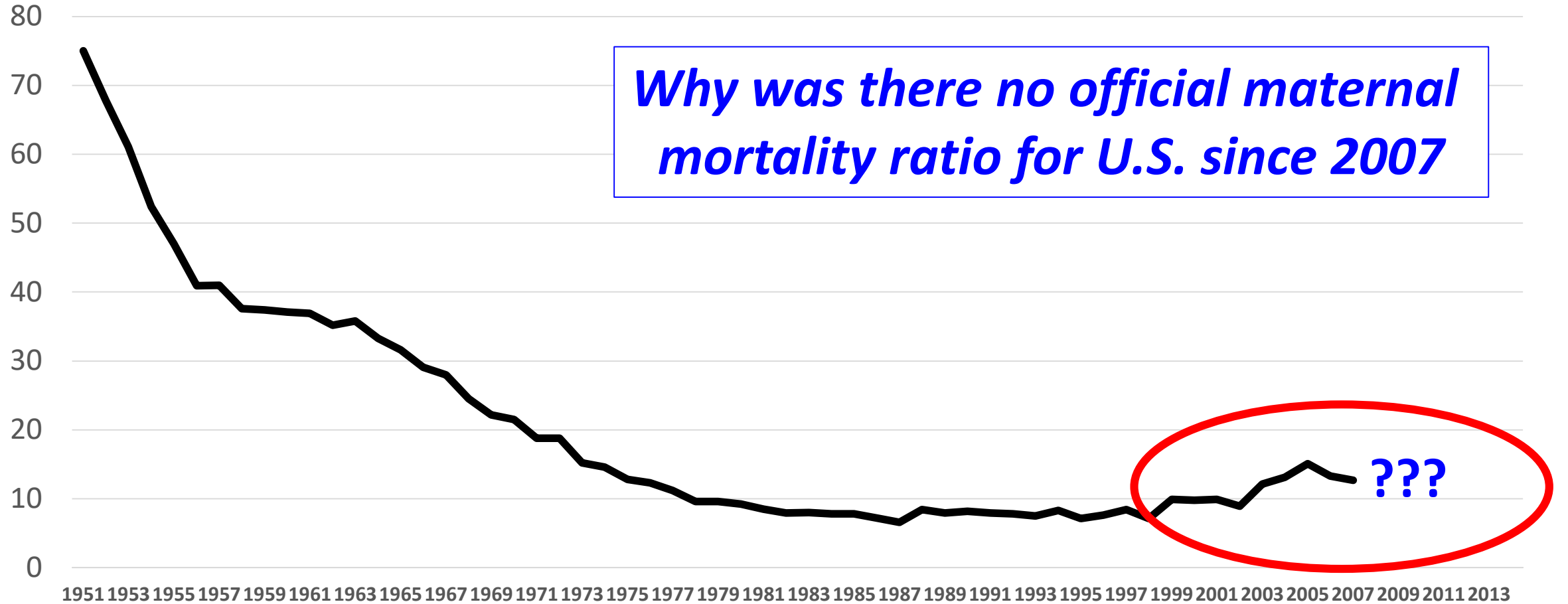
U.S. Maternal Mortality (per 100,000 live births), 1951-2007



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

but there has been a functional system all along.....

The Pregnancy Related Mortality Surveillance System

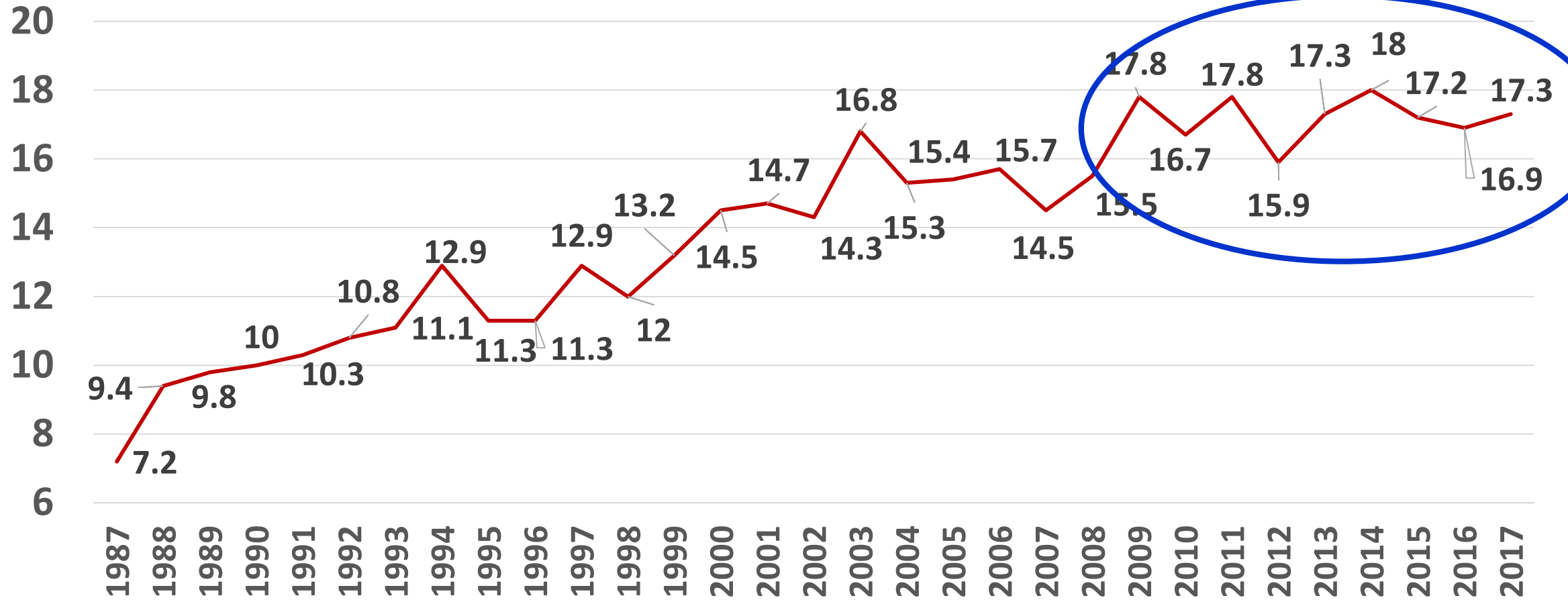
Data for CDCs Pregnancy Related Mortality System

*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., 1987-2017

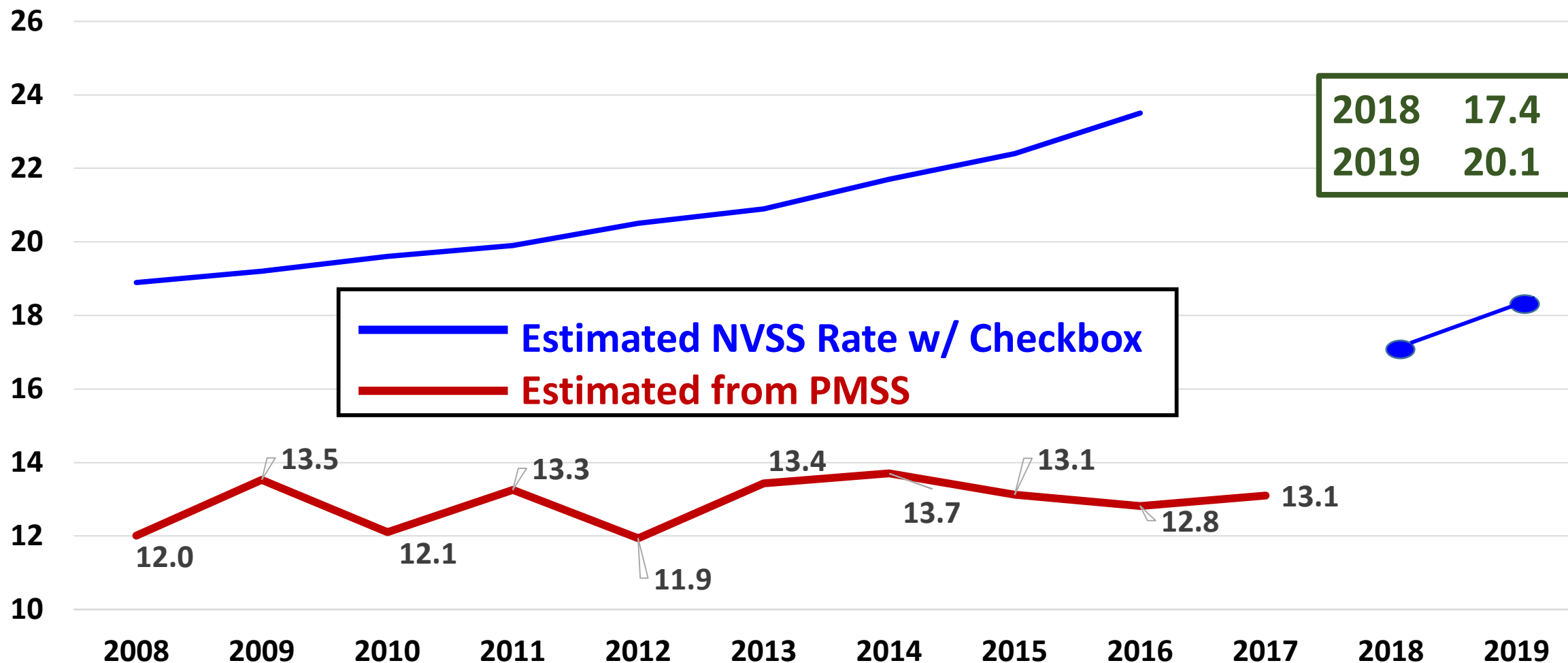
Pregnancy Related Mortality Ratio (per 100,000 births)



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.

So is the maternal mortality going up in the U.S.?

Maternal Mortality Ratios (per 100,000 live births), U.S. 2009-2016



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

Source: Hoyert DL et al. Maternal mortality in the United States: Changes in coding, publication, and data release, 2018. National Vital Statistics Reports; vol 69 no 2. Hyattsville, MD: National Center for Health Statistics. 2020.

www.birthbythenumbers.org

Summary

- The Pregnancy Related Maternal Mortality System provides a reasonable alternative to the National Vital Statistics System and it has documented a steady increase in maternal deaths from 1987 to 2009.
- It has also shown a plateauing of the ratio from 2008-2017.
- The question is whether that plateauing is at an acceptable level and for that we need to place the U.S. in a comparative context.

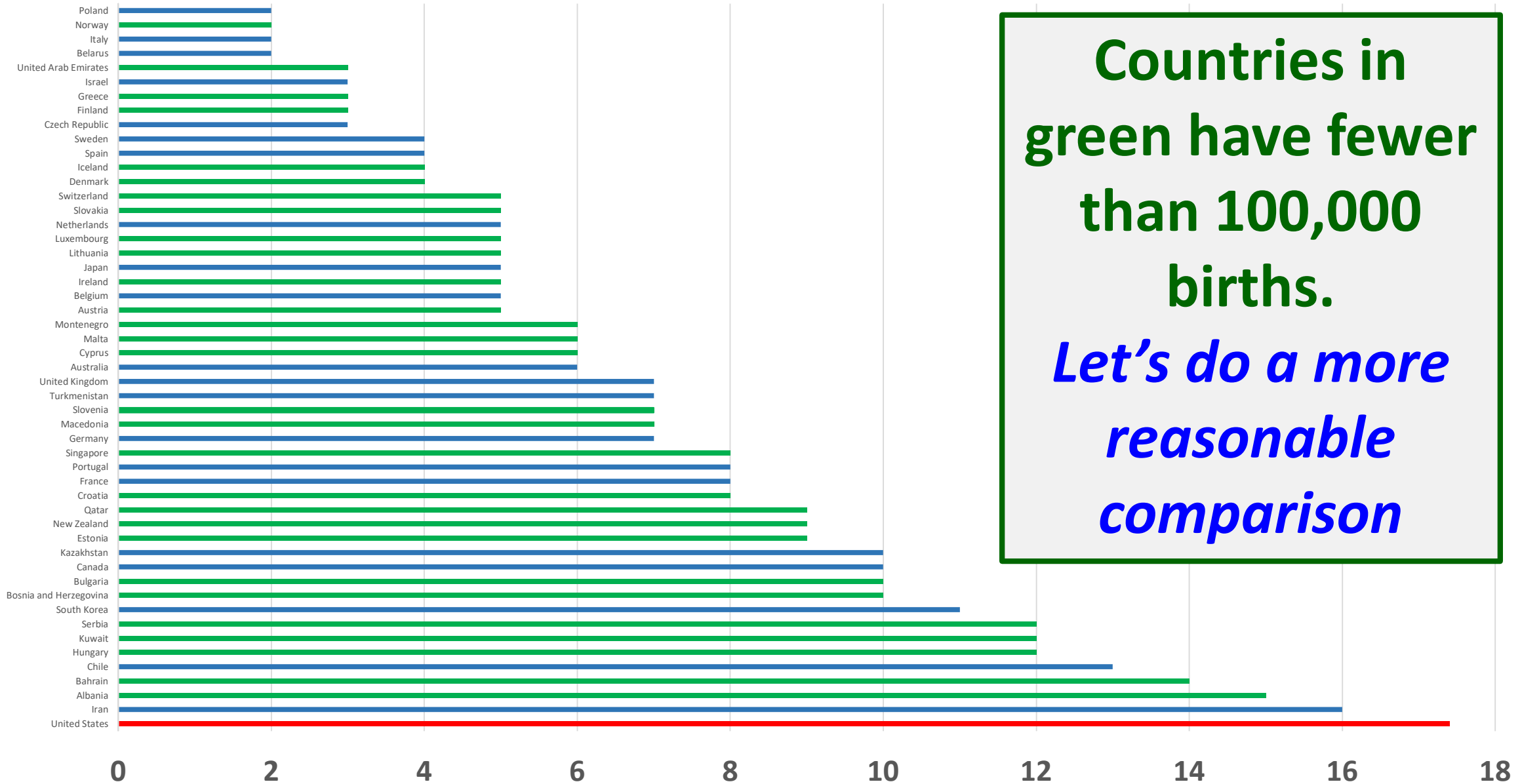
U.S. in a Comparative Context, 1910, 1927, 2018

	1901-1910 ¹	1927 ²	2018 ³
	per 100K births	per 100K births	per 100K births
Norway	290	245	2
Northern Ireland	550	480	2
New Zealand	460	491	2
Italy	270	264	4
Sweden	230	278	4
Australia	530	592	5
England & Wales ⁴	410	411	7
France	520	287	8
United States ⁵	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. OECD Health Data.2021 4. UK rate in 2017; 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.

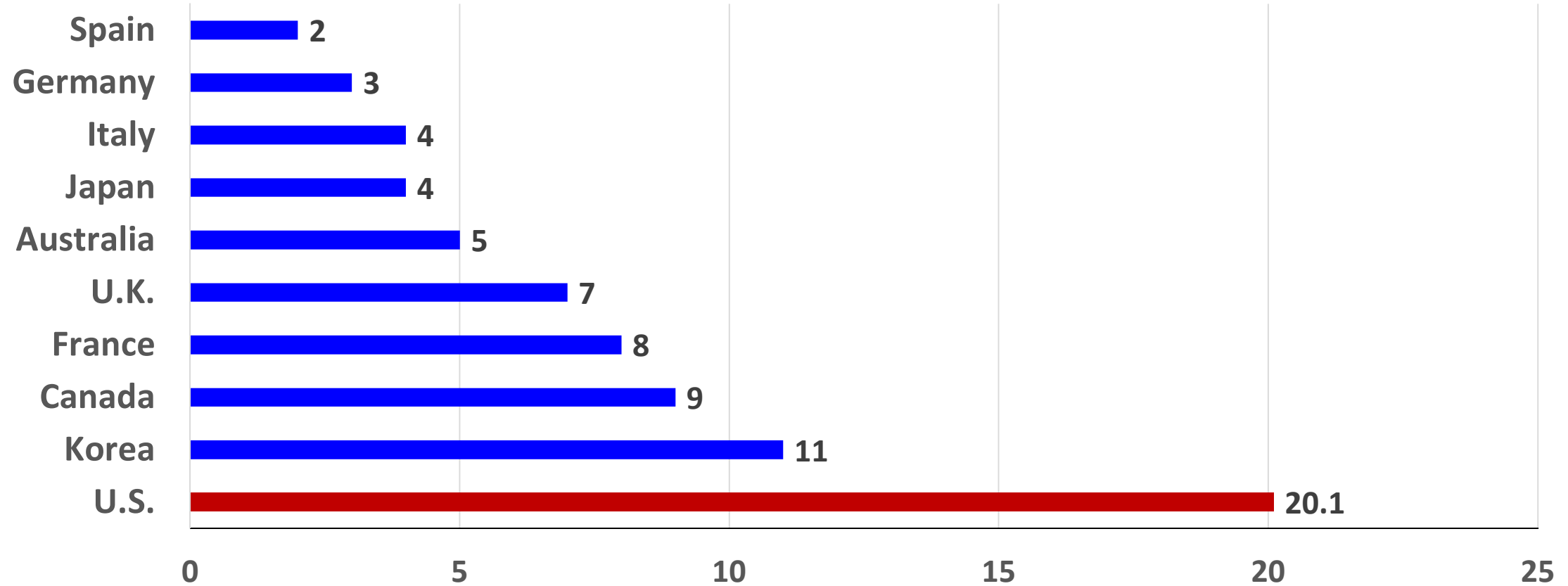
Maternal Mortality Ratios (per 100,000 births), 2017-18



Countries in green have fewer than 100,000 births.
Let's do a more reasonable comparison

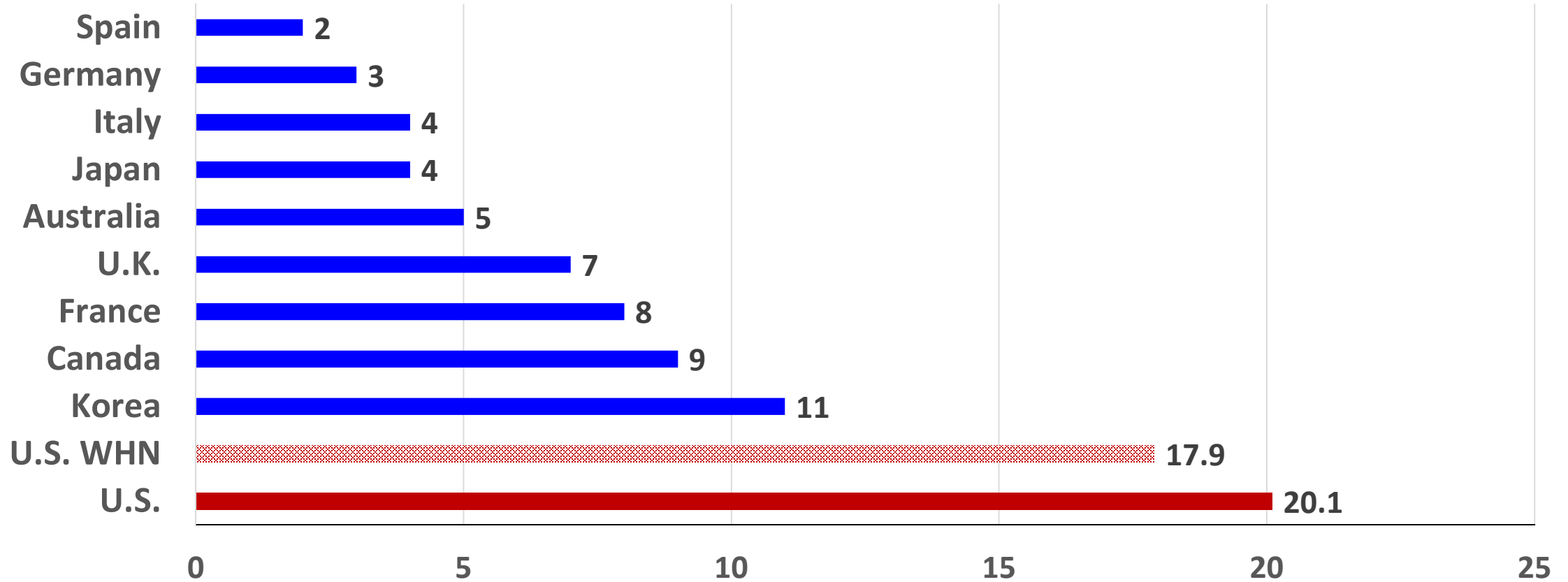
Source: WHO. *Trends In Maternal Mortality, 2000-2017*. (Geneva, 2019)

U.S. Maternal Mortality Ratio (per 100,000 births) Compared to Industrialized Countries with 300,000+ births, 2018-19



Source: OECD Health Data 2021 & U.S. Hoyert DL. Maternal mortality rates in the U.S., 2019. NCHS Health E-Stats. 2021.

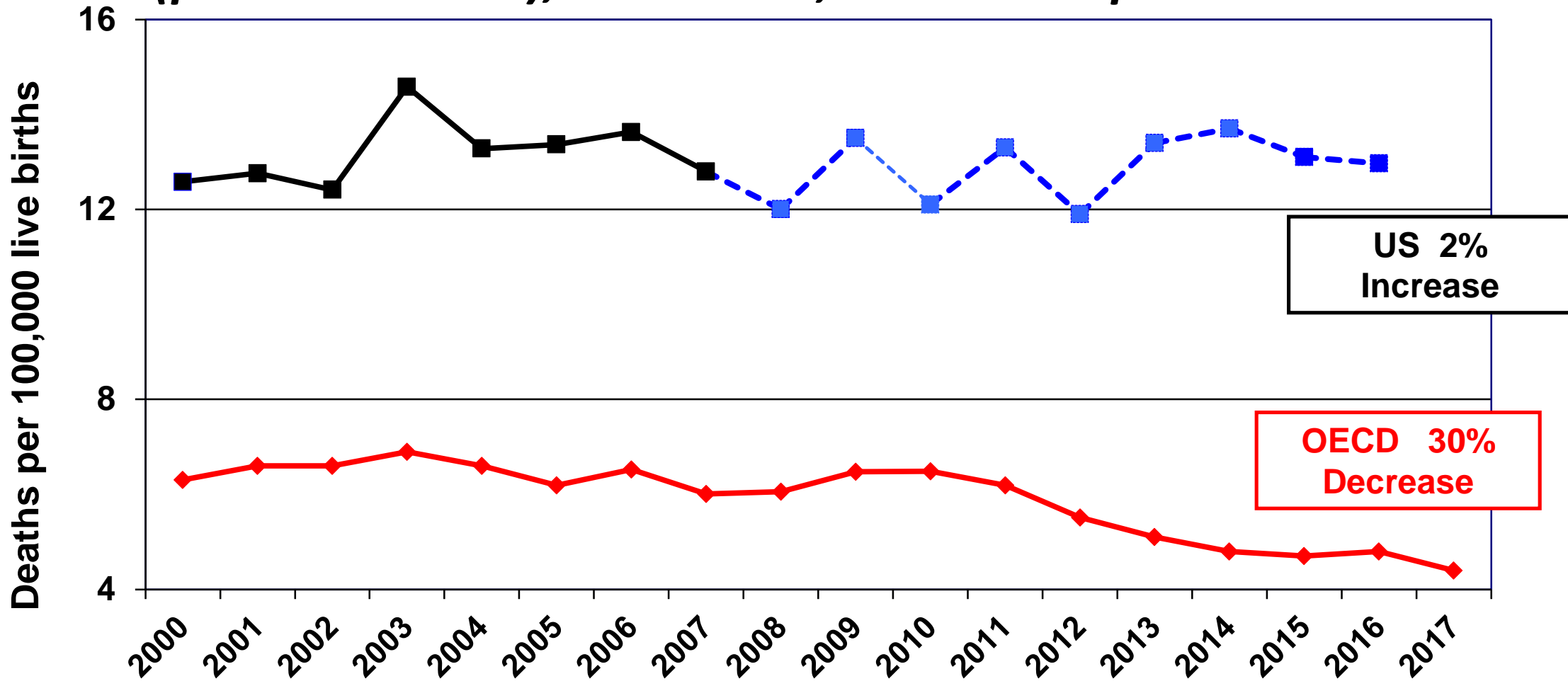
U.S. Maternal Mortality Ratio (per 100,000 births) Compared to Industrialized Countries with 300,000+ births, 2018-19



Source: OECD Health Data 2021 & U.S. Hoyert DL. Maternal mortality rates in the U.S., 2019. NCHS Health E-Stats. 2021.

Trends for US vs Comparable Countries

*MMR (per 100K births), 2000-2017, U.S. & Comparable Countries **

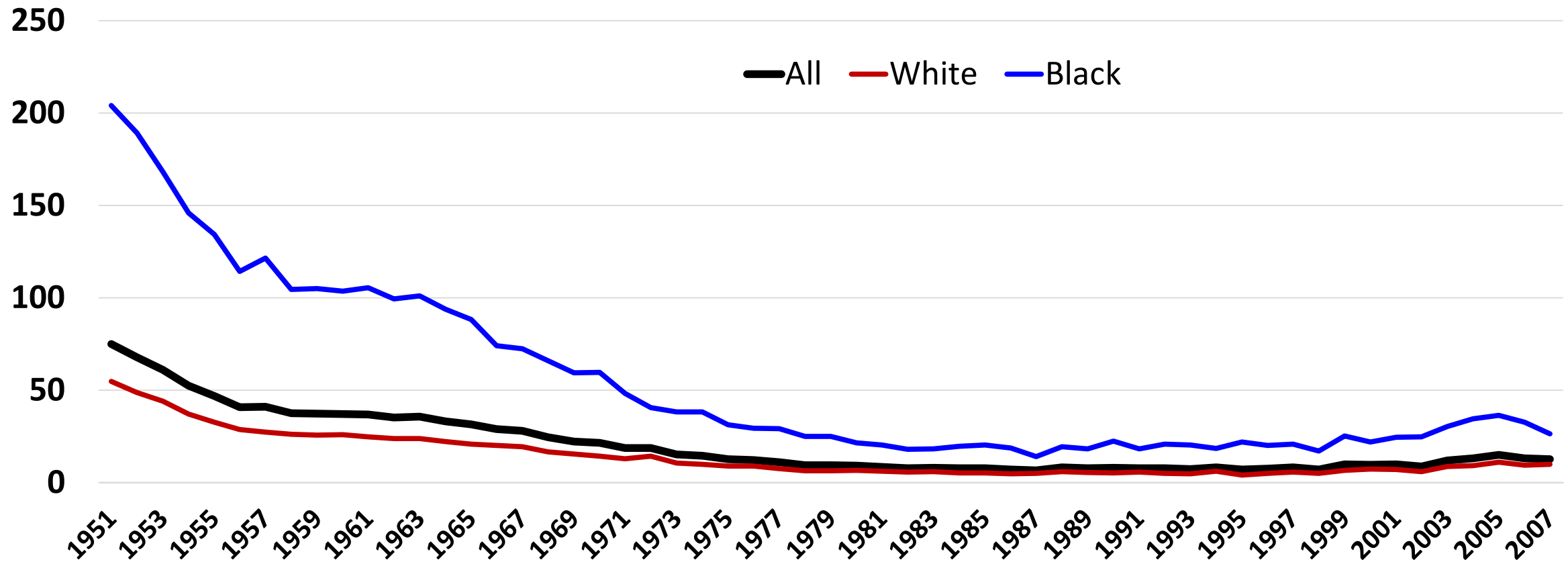


* Countries with **300,000+** births (2017): Australia, Canada, France, Germany, Italy, Japan, S. Korea, Spain, United Kingdom

Summary

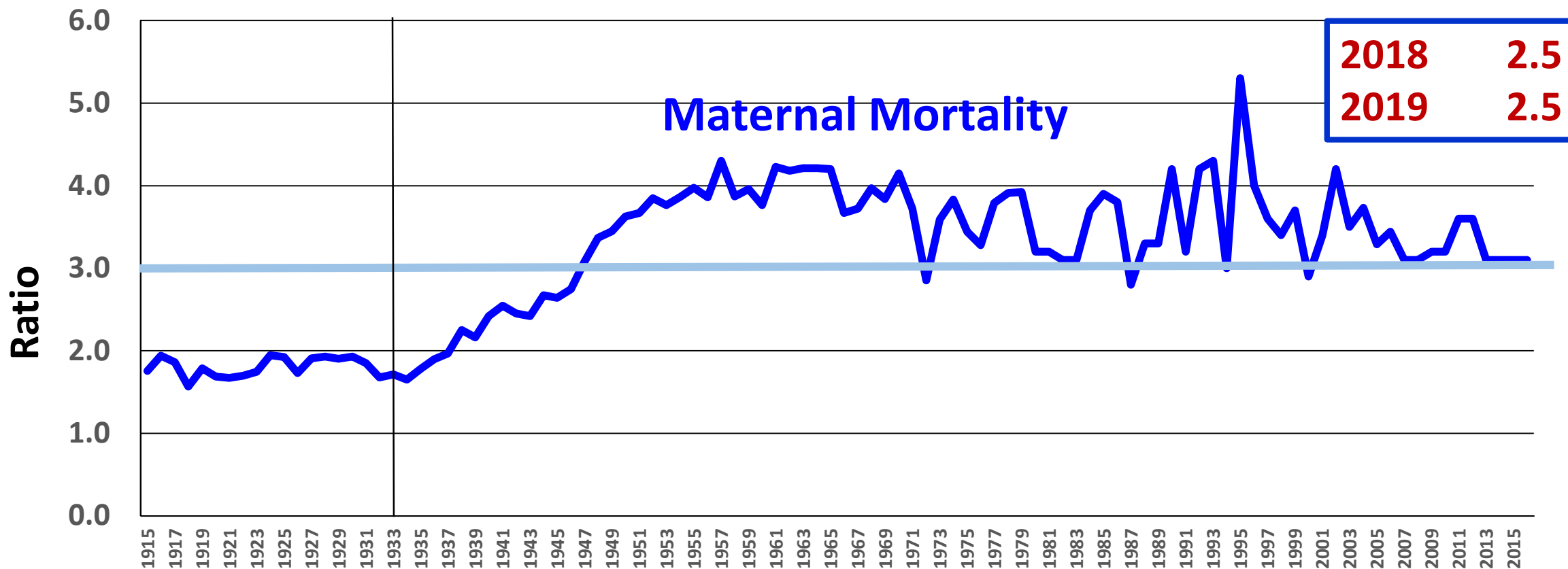
- No matter how you structure a comparison, the U.S. fares poorly in cross-national comparisons.
- If you include all countries, the U.S. ranks in the 50s; if you limit it to large wealthy countries, the U.S. ranks 10th...out of 10 countries.
- In terms of comparative trends, the U.S. in 2000 had a maternal mortality rate double the average for the comparison countries and over the next 16 years fell further behind.

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



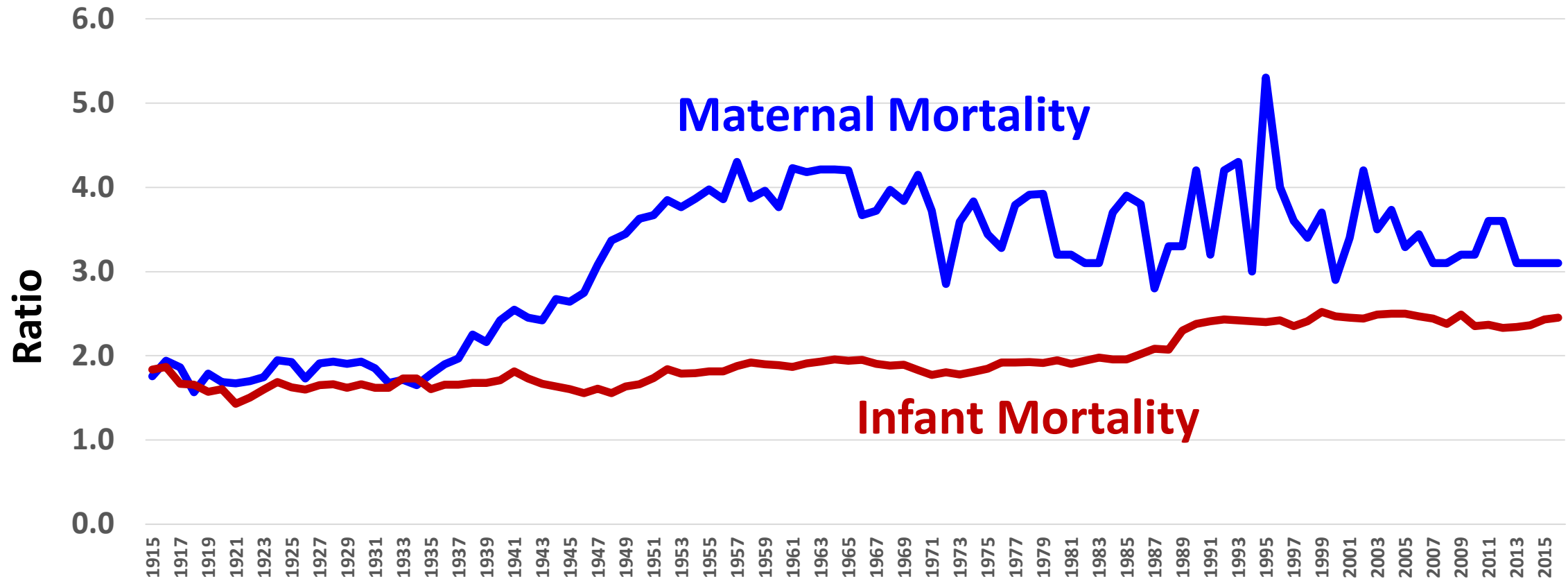
Source: NCHS. Maternal Mortality and Related Concepts. Vital & Health Statistics. Series 33; #3. & annual data reports. 1915-1960 data from NCHS. *Vital Statistics Rates In The United States 1940-1960*. NOTE: Shifts in measurement (e.g. not all states were part of registration system prior to 1933; infant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

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



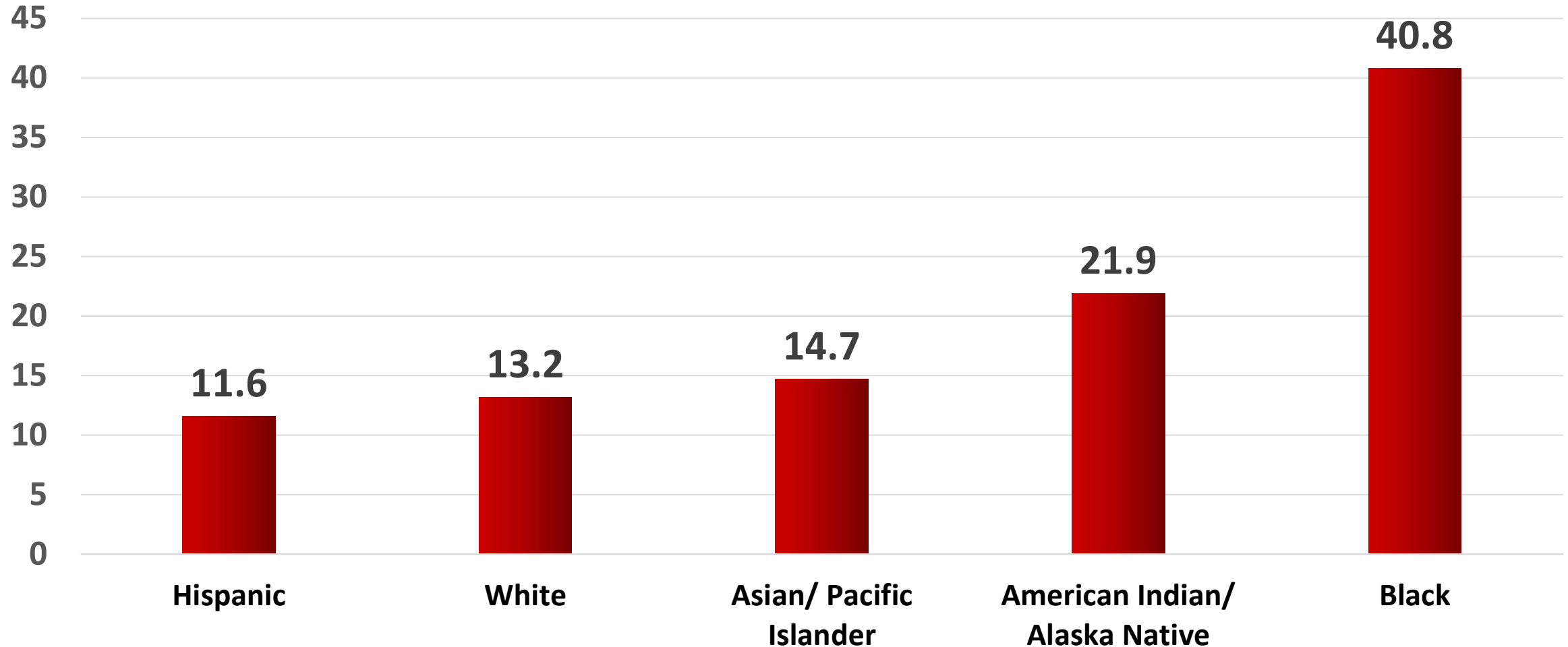
Source: NCHS. Maternal Mortality and Related Concepts. Vital & Health Statistics. Series 33; #3. & annual data reports. 1915-1960 data from NCHS. *Vital Statistics Rates In The United States 1940-1960*. NOTE: Shifts in measurement (e.g. not all states were part of registration system prior to 1933; infant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

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



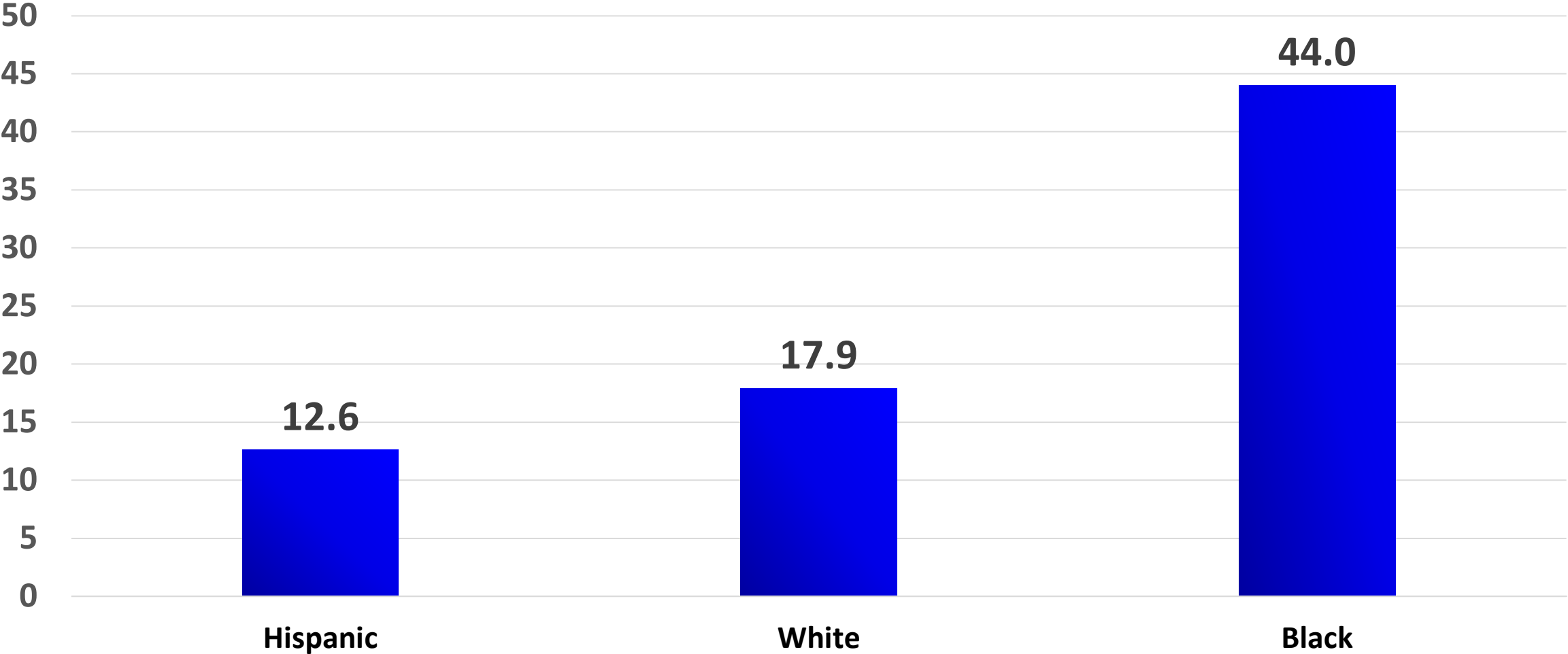
Source: NCHS. Maternal Mortality and Related Concepts. Vital & Health Statistics. Series 33; #3. & annual data reports. 1915-1960 data from NCHS. *Vital Statistics Rates In The United States 1940-1960*. NOTE: Shifts in measurement (e.g. not all states were part of registration system prior to 1933; infant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



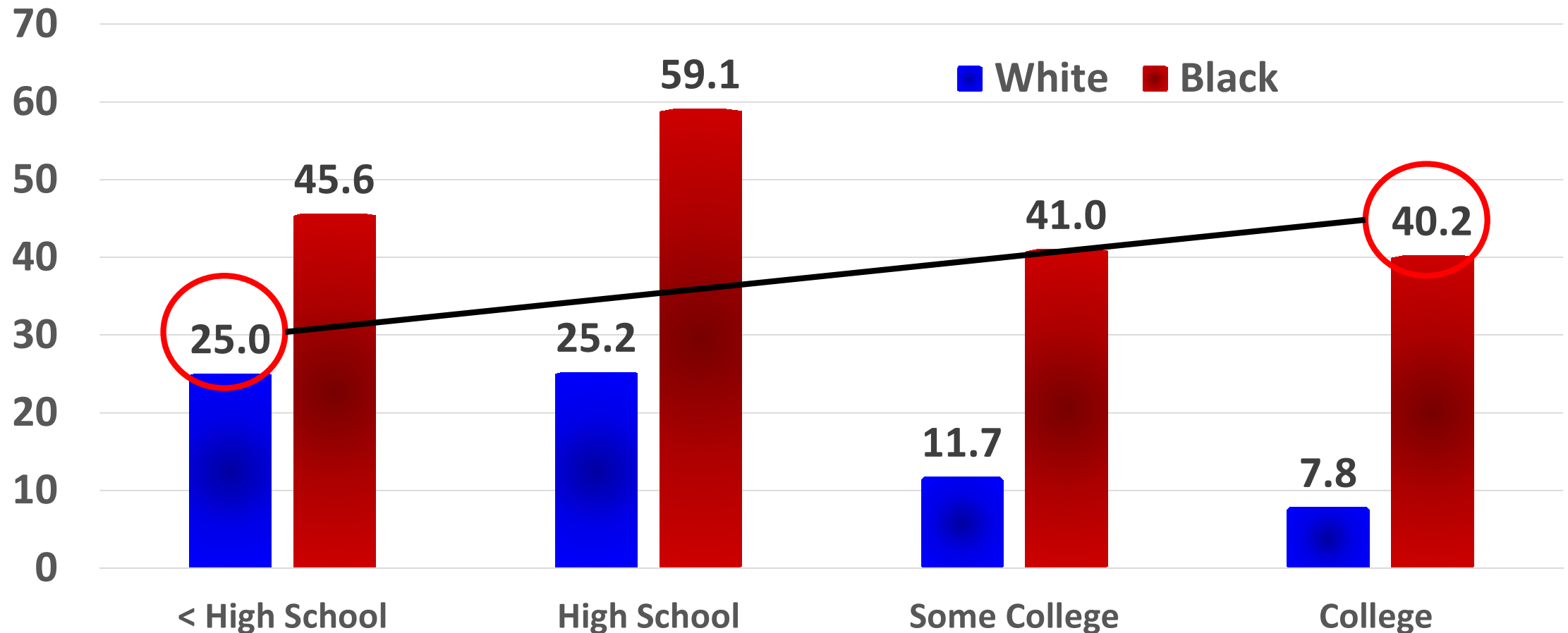
Source: Petersen E. et al. Racial/Ethnic Disparities in Pregnancy-Related Deaths — U.S., 2007–2016 . *MMWR*. 9/6/19; 68(35):762-765.

Maternal Mortality Ratios by Race, U.S., 2019



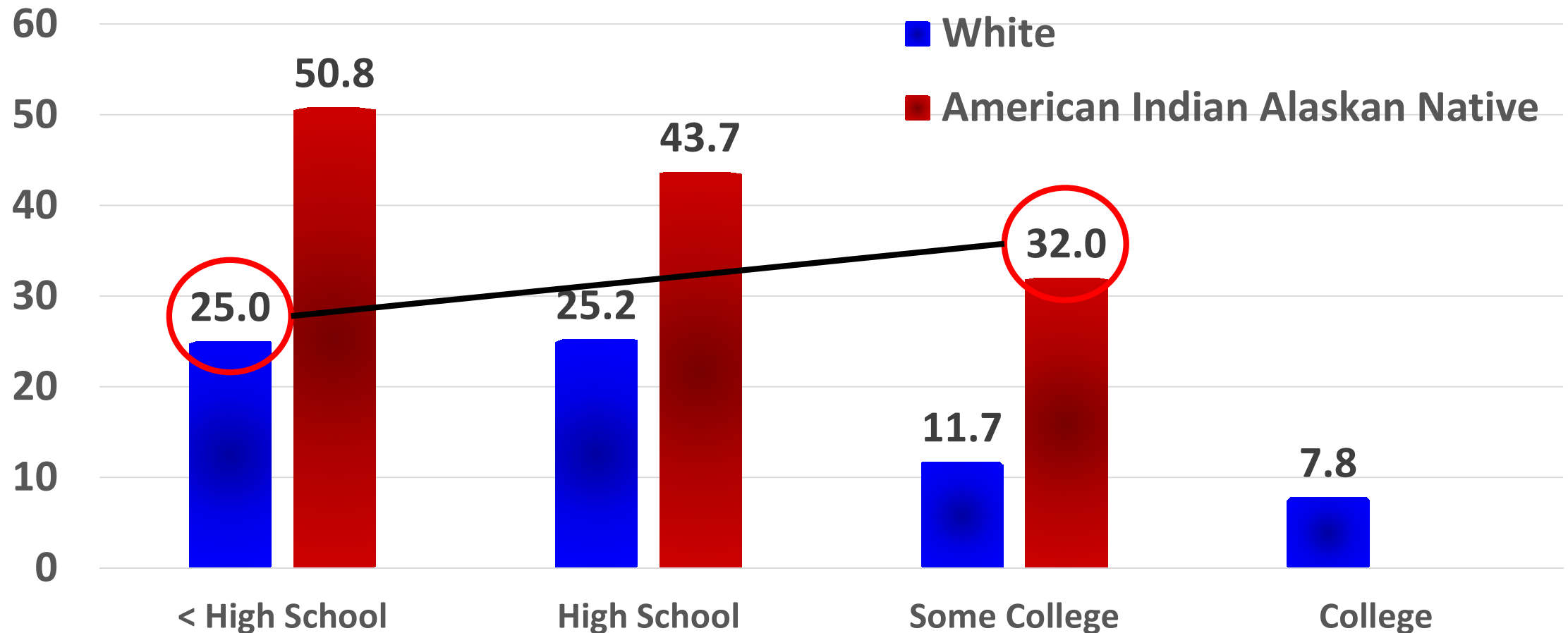
Source: Hoyert DL. Maternal mortality rates in the U.S., 2019. NCHS Health E-Stats. 2021..

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.

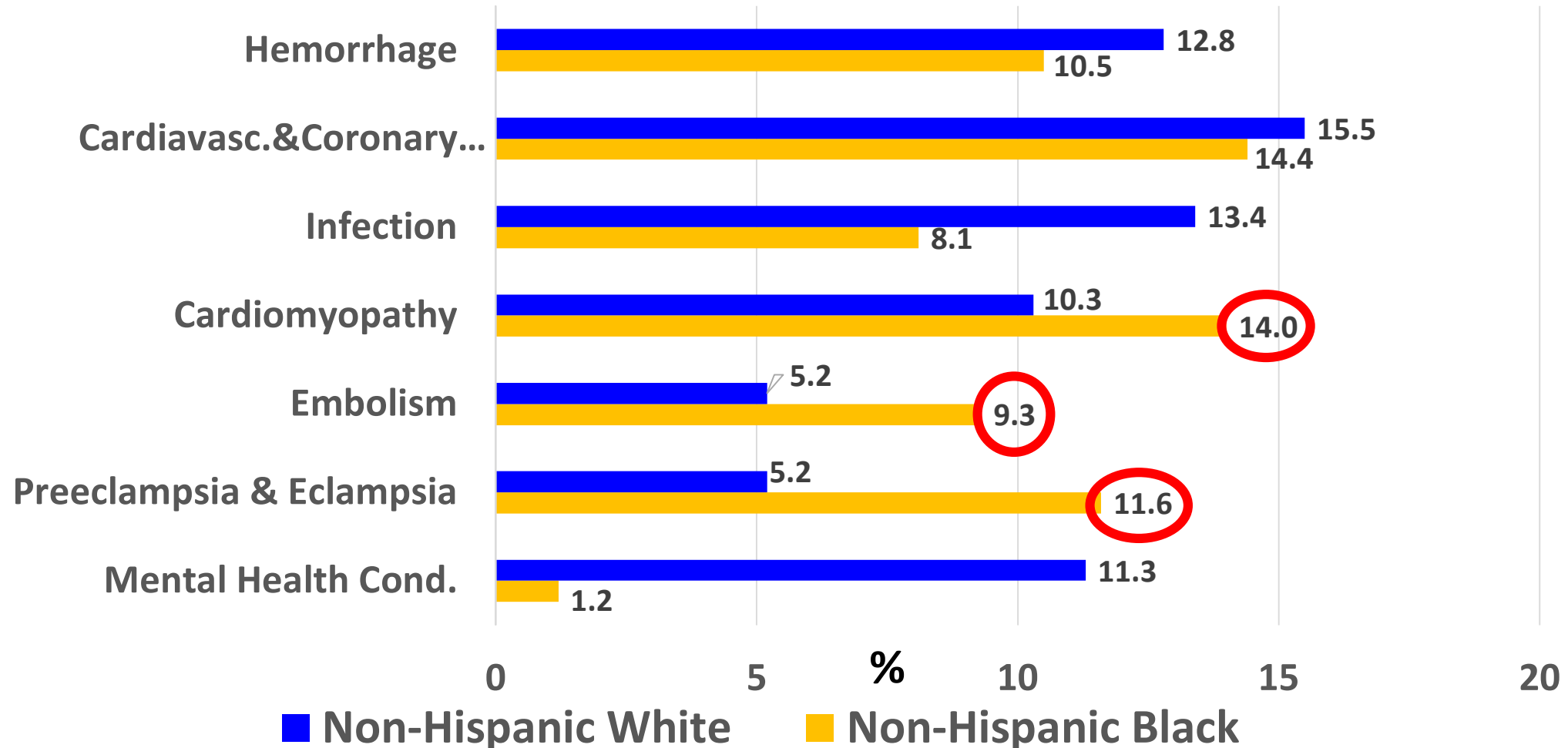
Pregnancy-related mortality ratios (per 100,000 live births) by race/ethnicity, U.S. 2007-2016



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

Manifestation of Racial Disparities

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



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

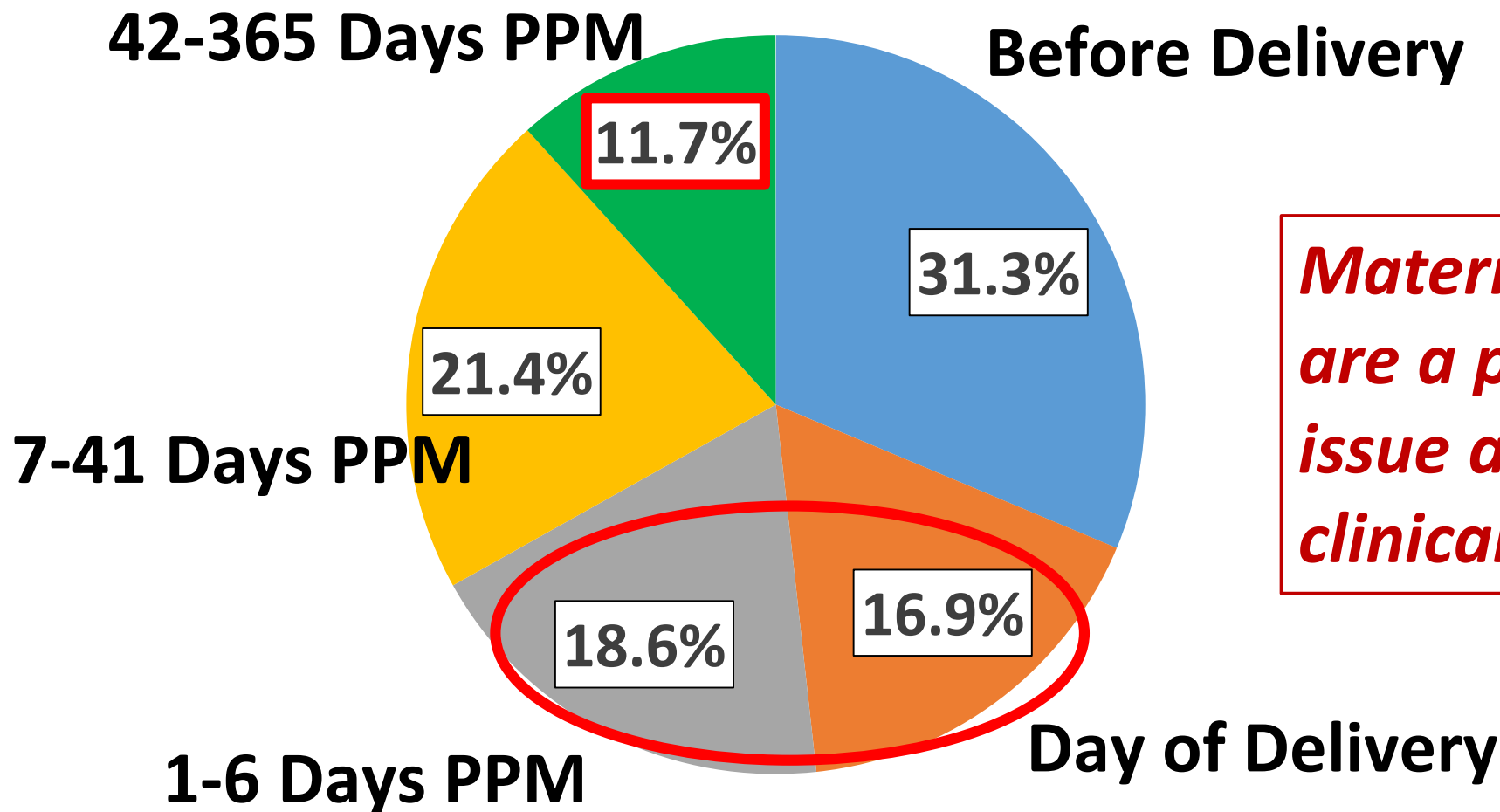
Summary

- Racial disparities in maternal mortality have existing in the U.S. as long as data has been collected.
- The consistency of the disparity with Black maternal mortality ratios 3 to 4 times that of White maternal mortality for decades reflects the lack of progress made in the U.S.
- Presently, the disparity does not reflect SES differences, with maternal education providing no protection for Black mothers.
- The maternal mortality ratios for American Indian/Alaskan natives were also far higher than those for white and Hispanic mothers.

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

Remember this chart?

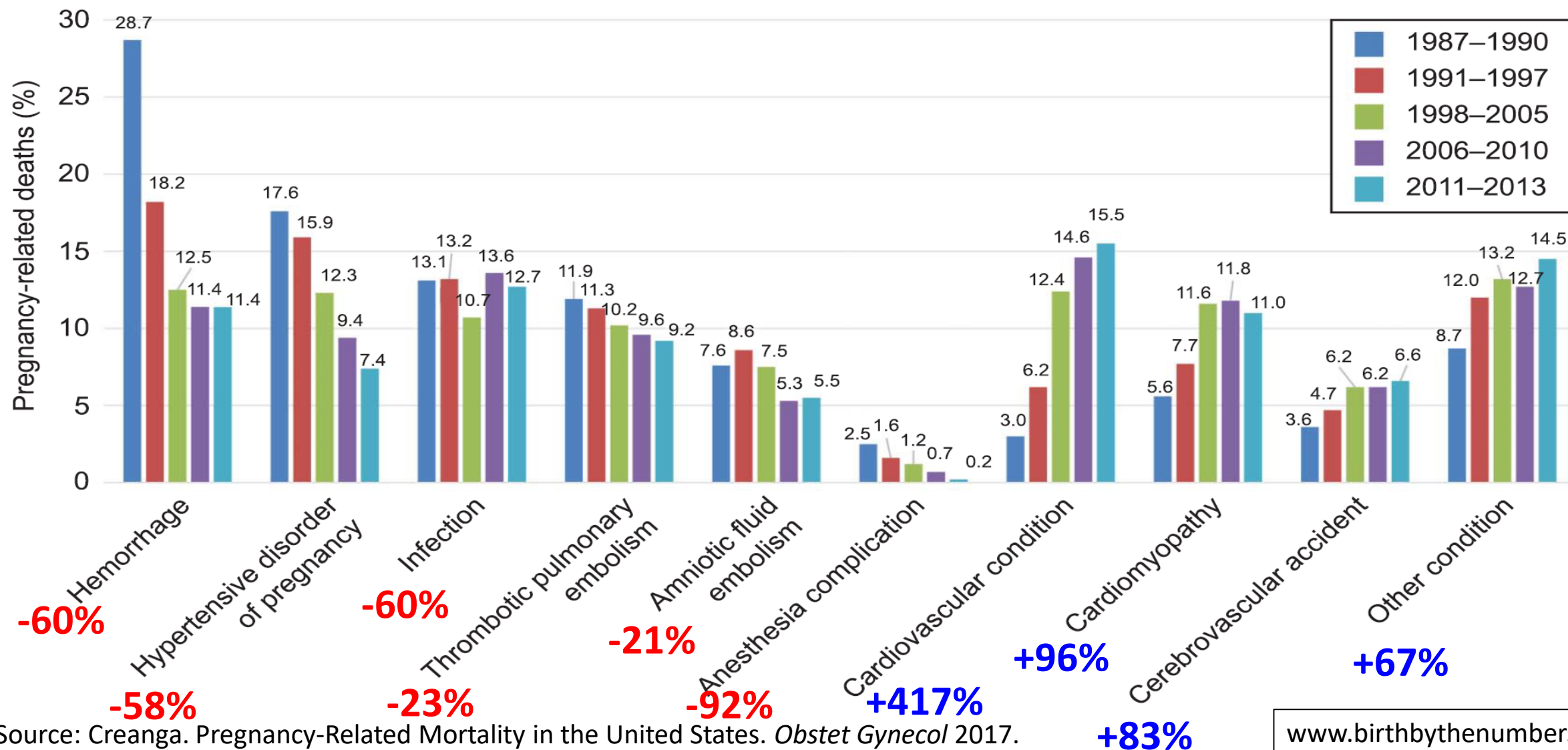
Timing of Pregnancy Related Deaths



Maternal deaths are a public health issue as much as a clinical care issue.

Maternal Mortality as a Public Health Approach

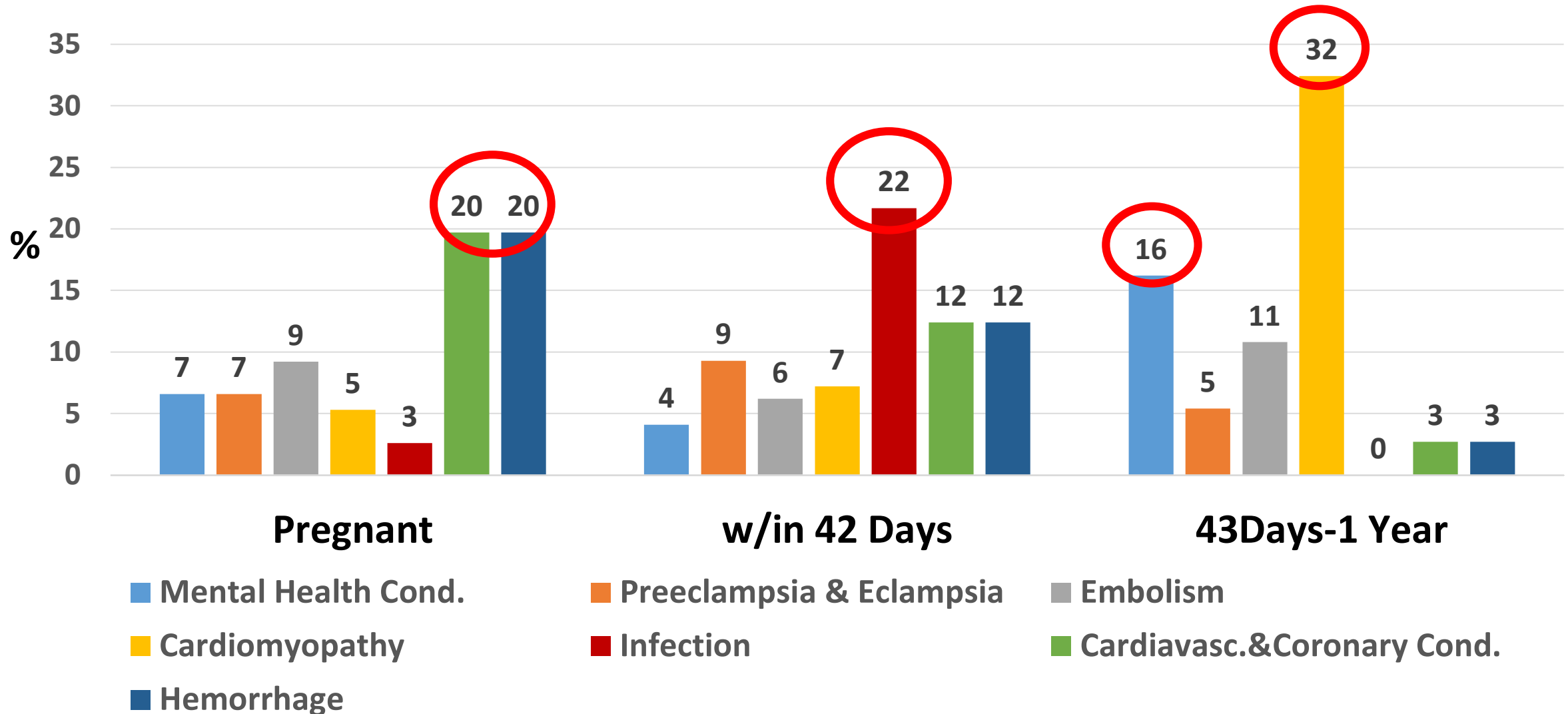
Cause-specific proportionate *Pregnancy-Related* mortality: United States, 1987–2013.



Source: Creanga. Pregnancy-Related Mortality in the United States. *Obstet Gynecol* 2017.

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.*

Summary

- If only a third of maternal deaths occur at the time of birth, solutions have to look beyond the birth hospitalization to improve outcomes.
- We have made considerable strides in improving care at the time of birth. The recent increases have been largely among cardiovascular conditions, many of which only manifest after the birth.
- There are clearly different patterns of causes of death by timing indicating a need for more nuanced approaches.
- Research into the underlying causes of death suggests a need for a greater focus on maternal mental health, particularly in the postpartum period.

Not just about maternal mortality

National Vital Statistics Reports



Volume 69, Number 13

January 12, 2021

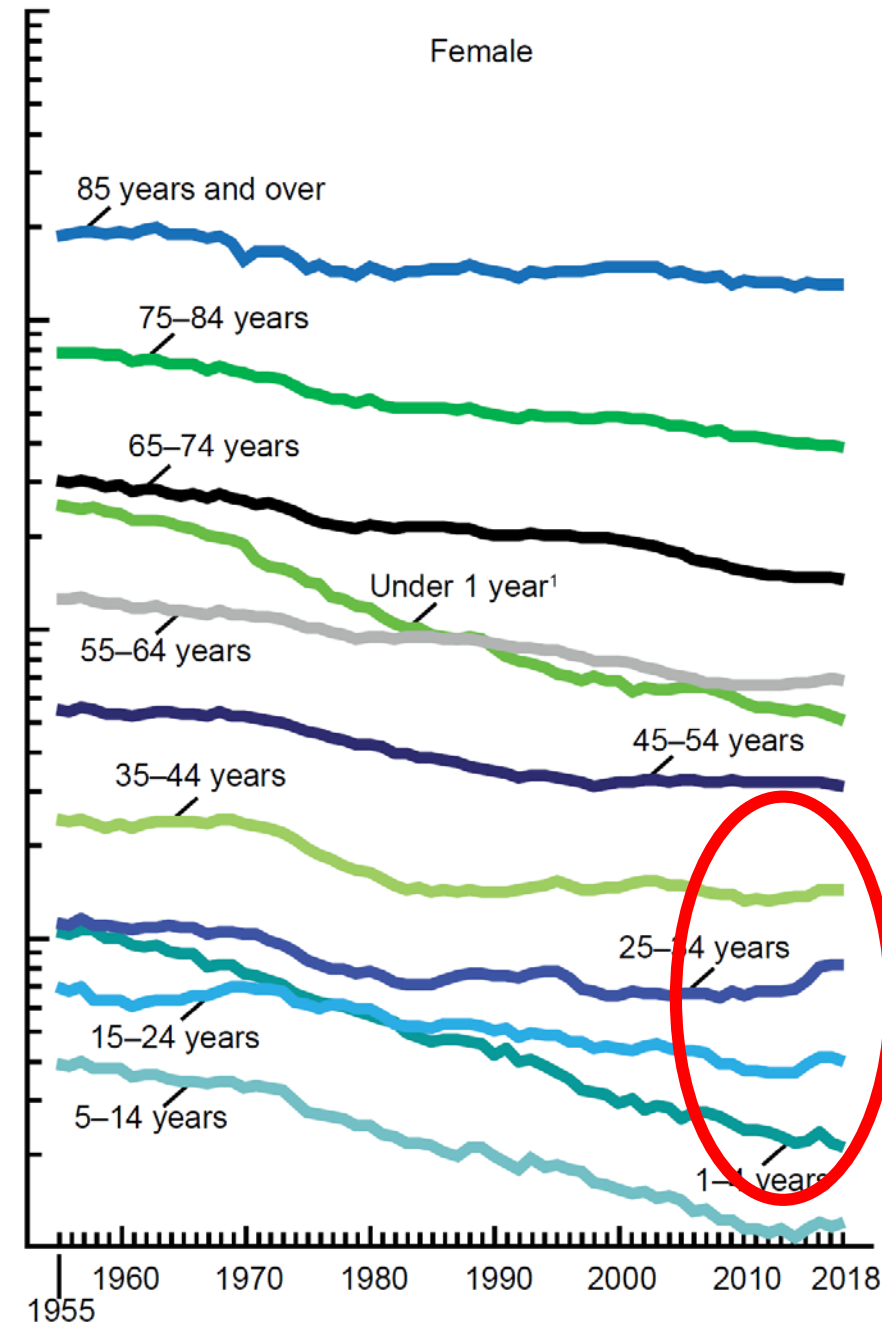
Deaths: Final Data for 2018

STAT

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

By Eugene Declercq and Neel Shah

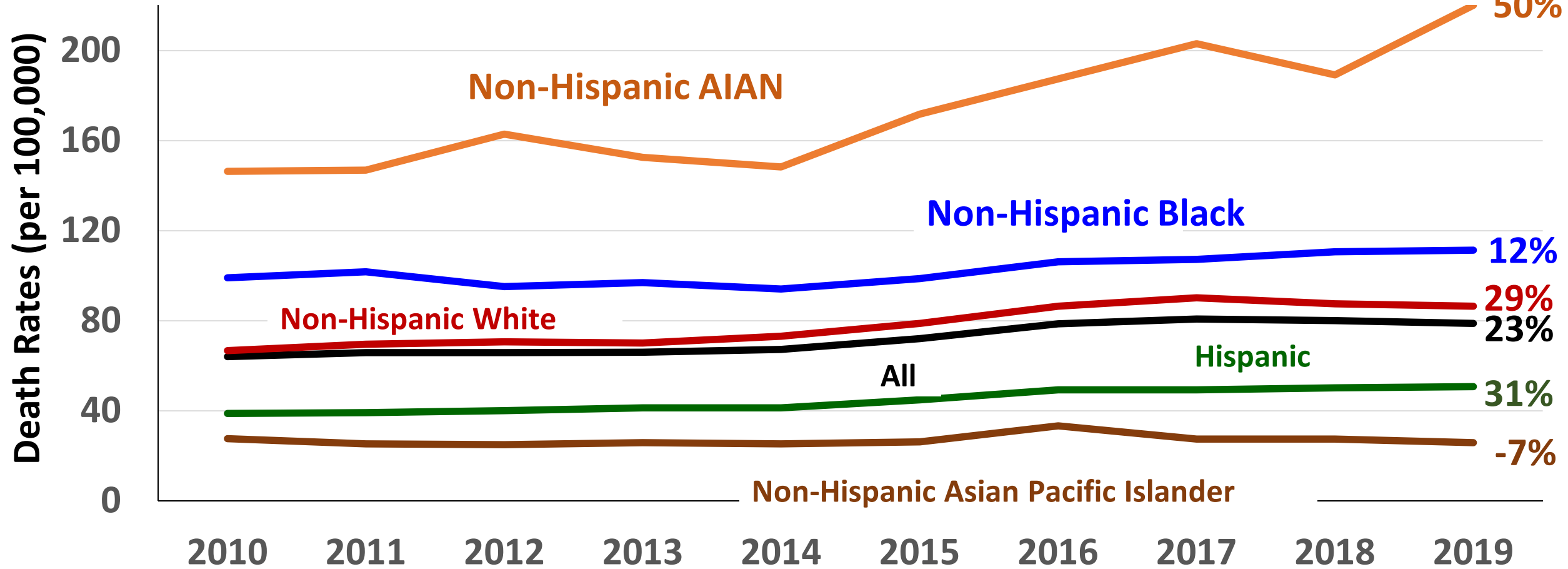
August 22, 2018



The Problem is Bigger than Maternal Mortality

Deaths rates (per 100K), Females **25-34**, by Race/Ethnicity, 2010-19

**% Increase
2010-2019**



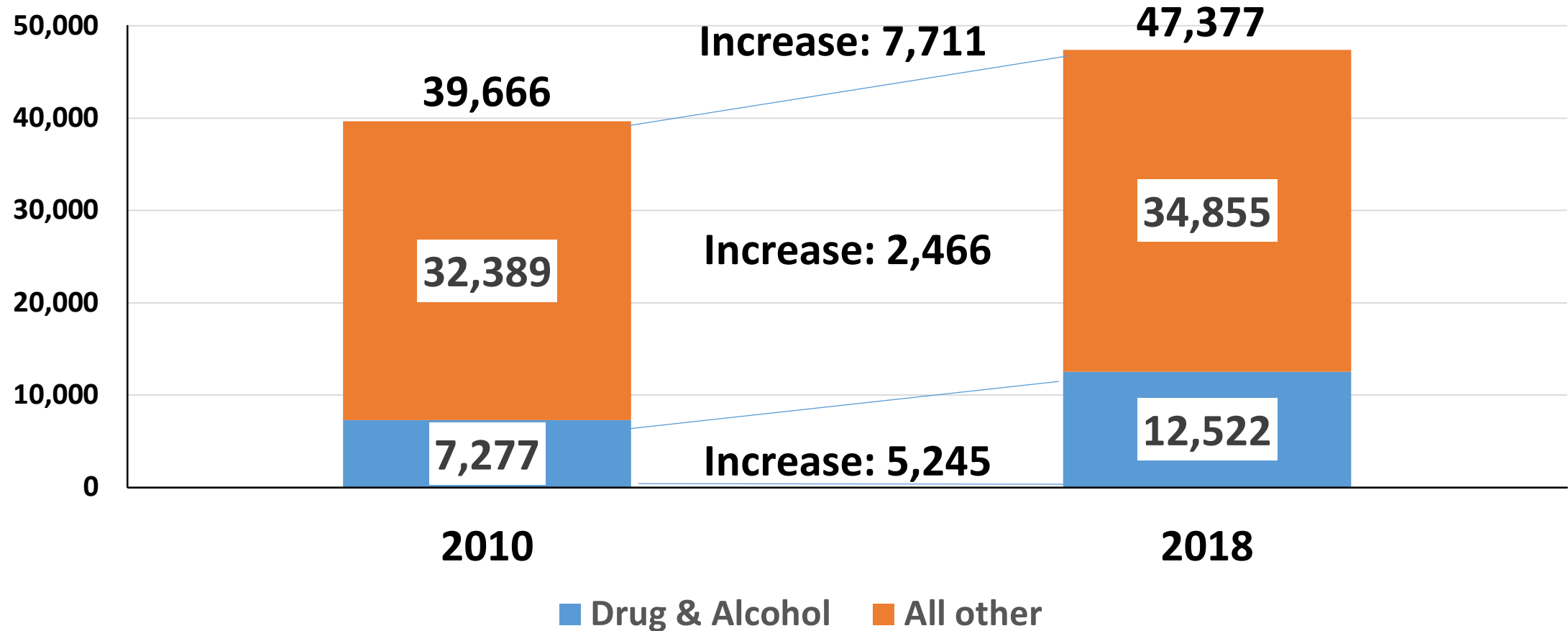
NOTE: Pregnancy related mortality rate increased by <1% 2010-2016

**All Female Deaths 25-34
2010 -- 13,067; 2019 -- 17,827**

Source: NCHS.CDC Wonder Online Database

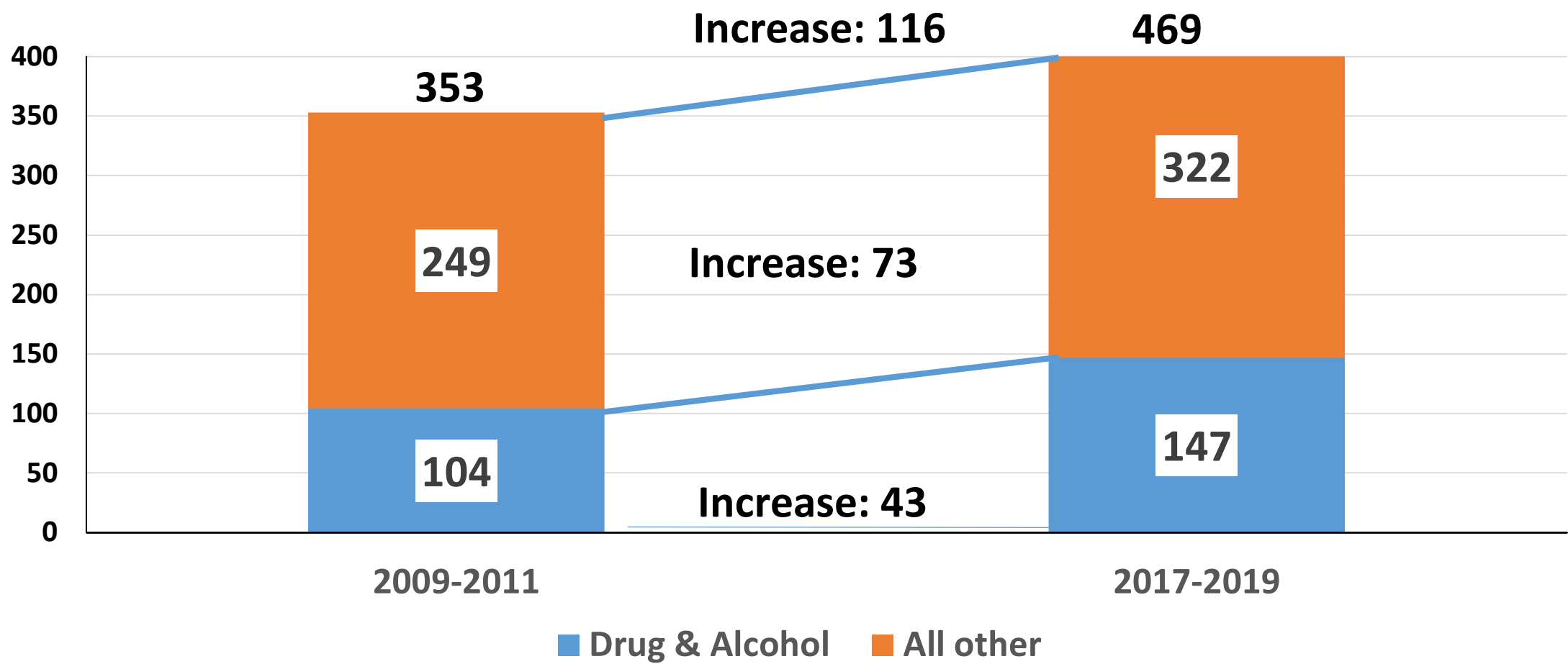
www.birthingthenumbers.org

Increases in Female Deaths (25-44) 2010-2019: 68% of the overall increase came from Drug & Alcohol Causes, U.S.



Sources: CDC, NCHS. CDC WONDER Online Detailed Mortality Database, released in 2020. Accessed at <http://wonder.cdc.gov/ucd-icd10.html> on Mar 9, 2020 10:27:59 PM

Increases in Female Deaths (25-44) 2009-11 & 2017-19: 37% of the overall increase came from Drug & Alcohol Causes, Alaska

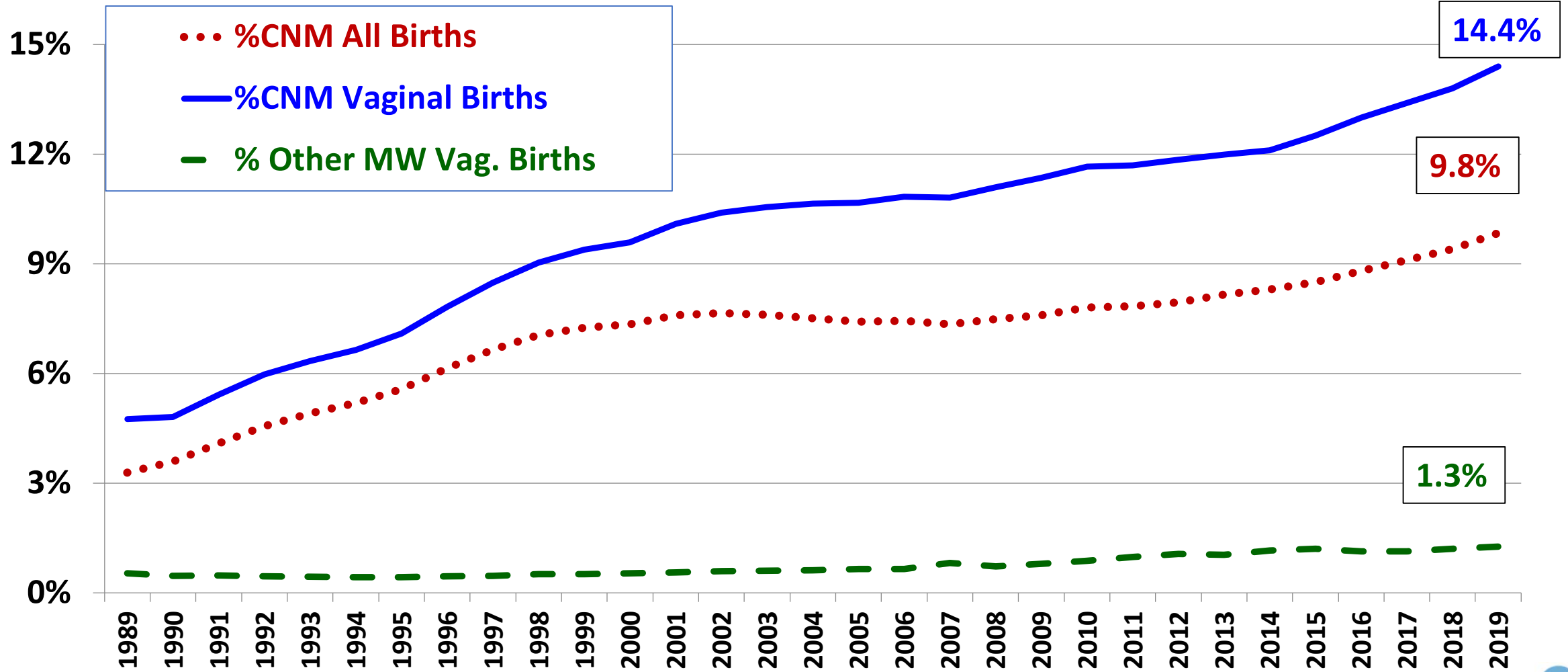


Sources: CDC, NCHS. CDC WONDER Online Detailed Mortality Database, released in 2020. Accessed at <http://wonder.cdc.gov/ucd-icd10.html> on Mar 9, 2020 10:27:59 PM

Summary

- **Profound problems with maternal mortality overall**
- **Wide, consistent racial inequities**
- **Maternal mortality is as much a public health challenge as it is a clinical one**
- **Problem with maternal health is a subset of the larger problem with the health of women of reproductive age**

Midwife Attended Births 1989-2019

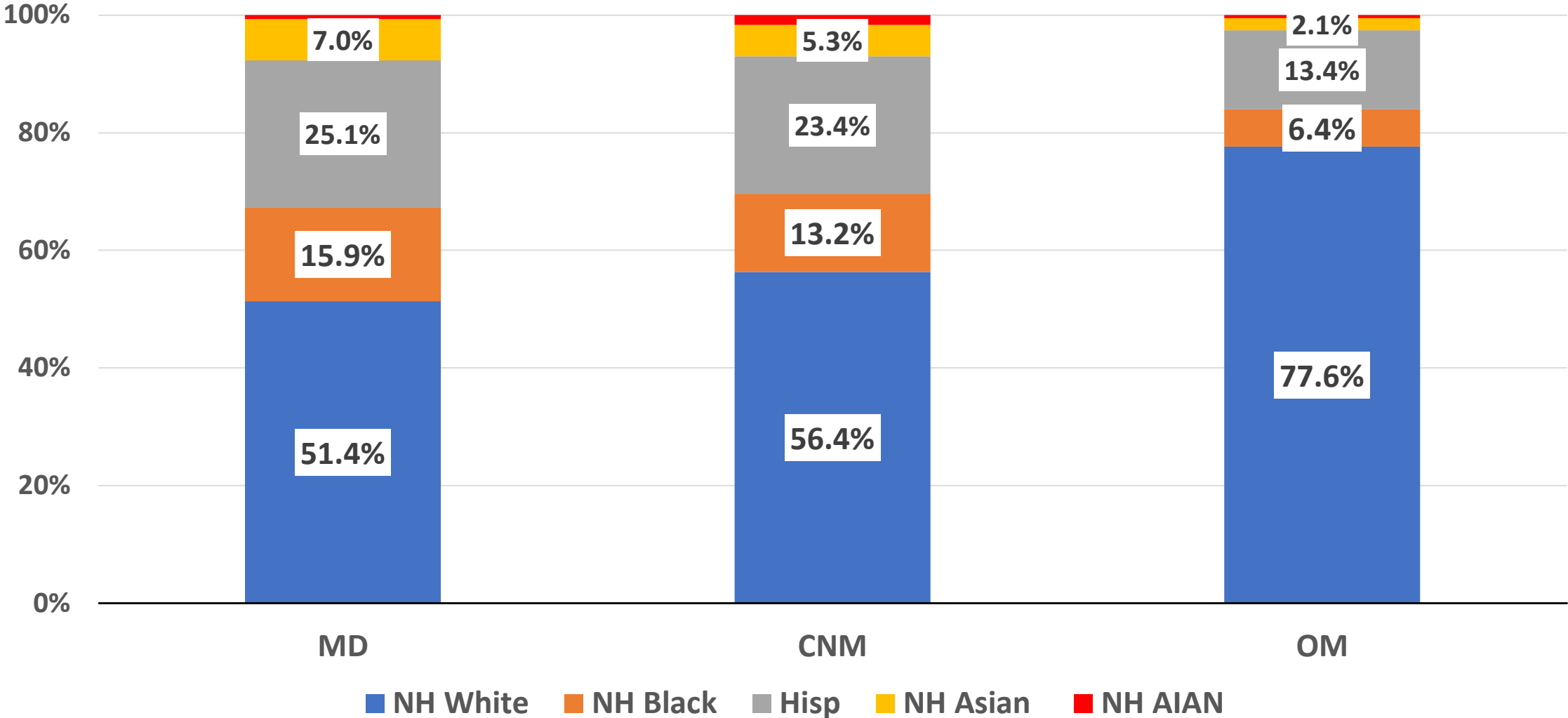


Source: NCHS Annual Birth Reports & Natality Datasets

BirthByTheNumbers.org

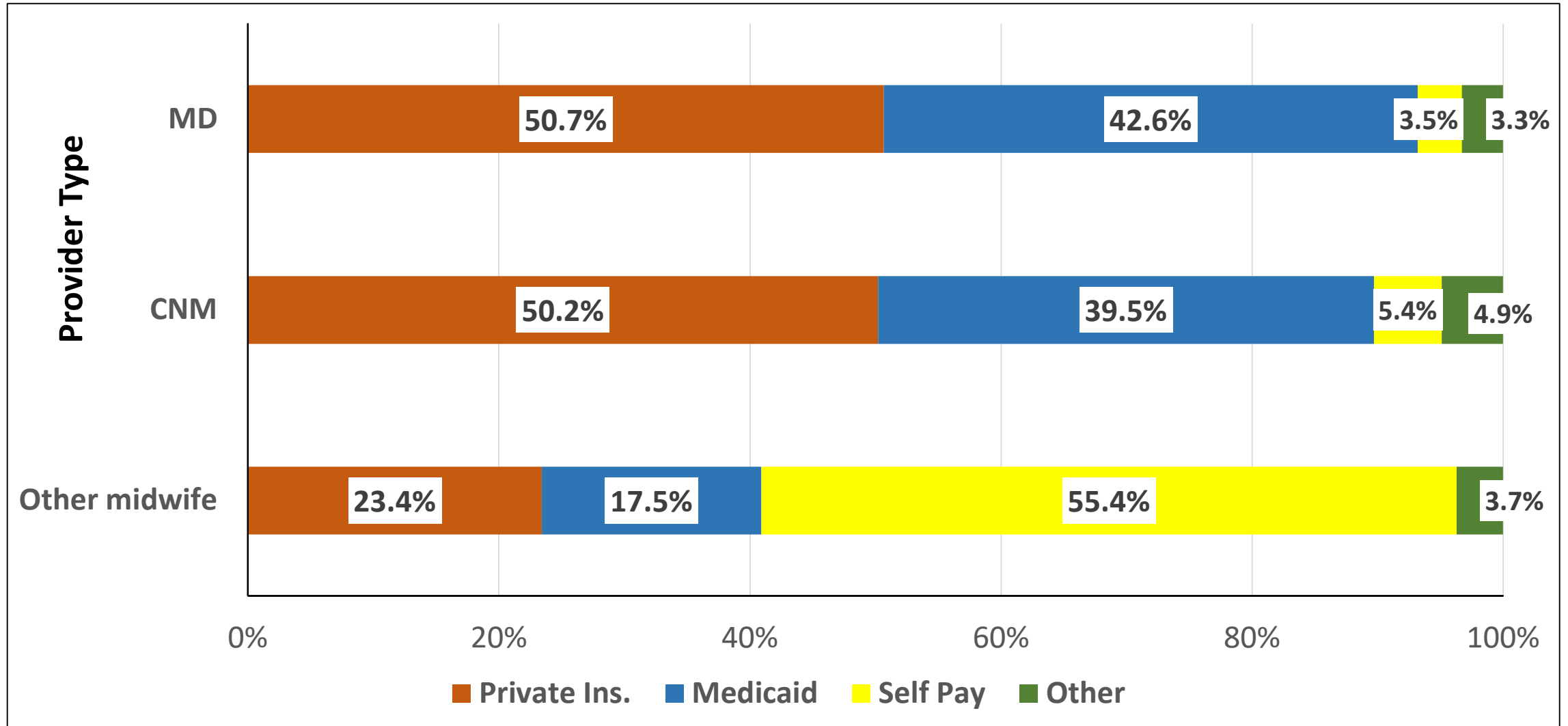


Medical Attendant by Mother's Race/Ethnicity (2019)

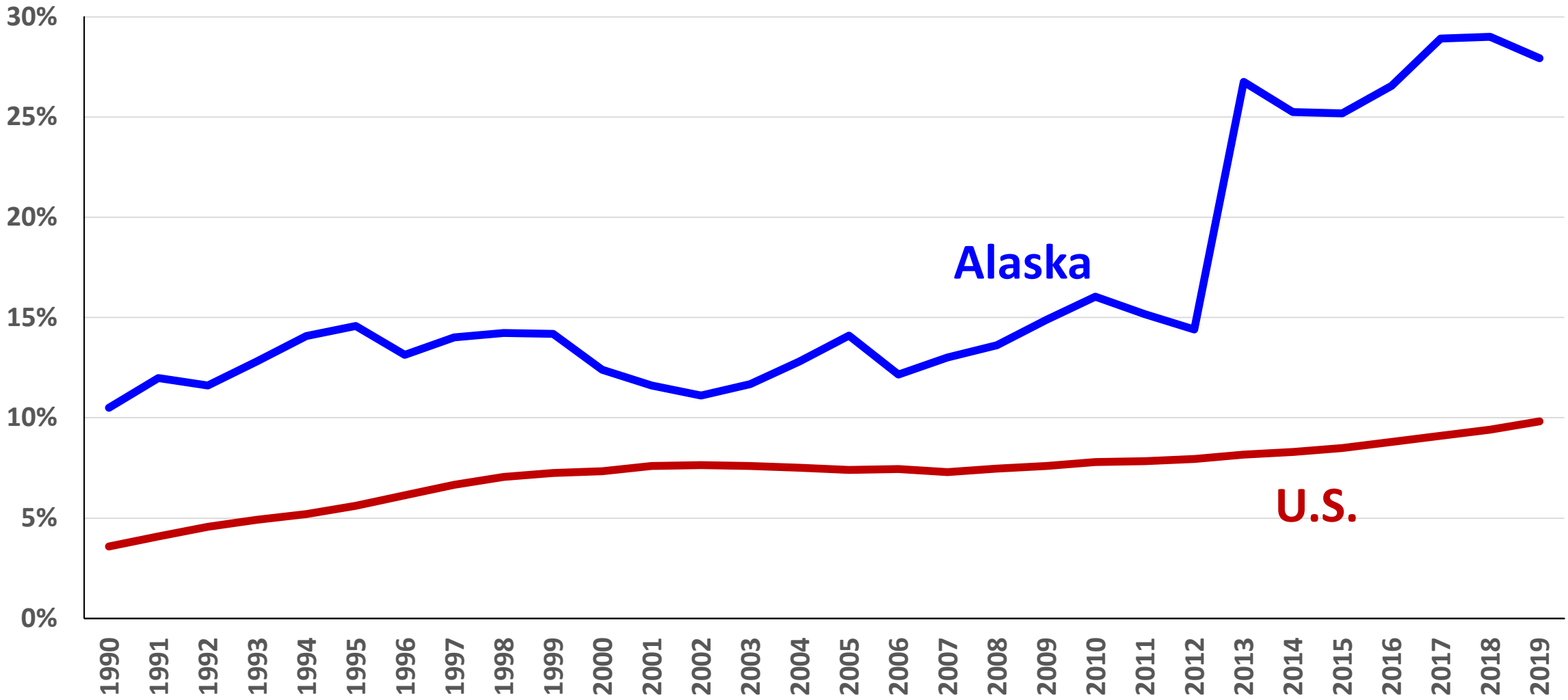


Source: US DHHS, CDC, NCHS, Division of Vital Statistics, Birth public-use data. Accessed on September 25, 2019.

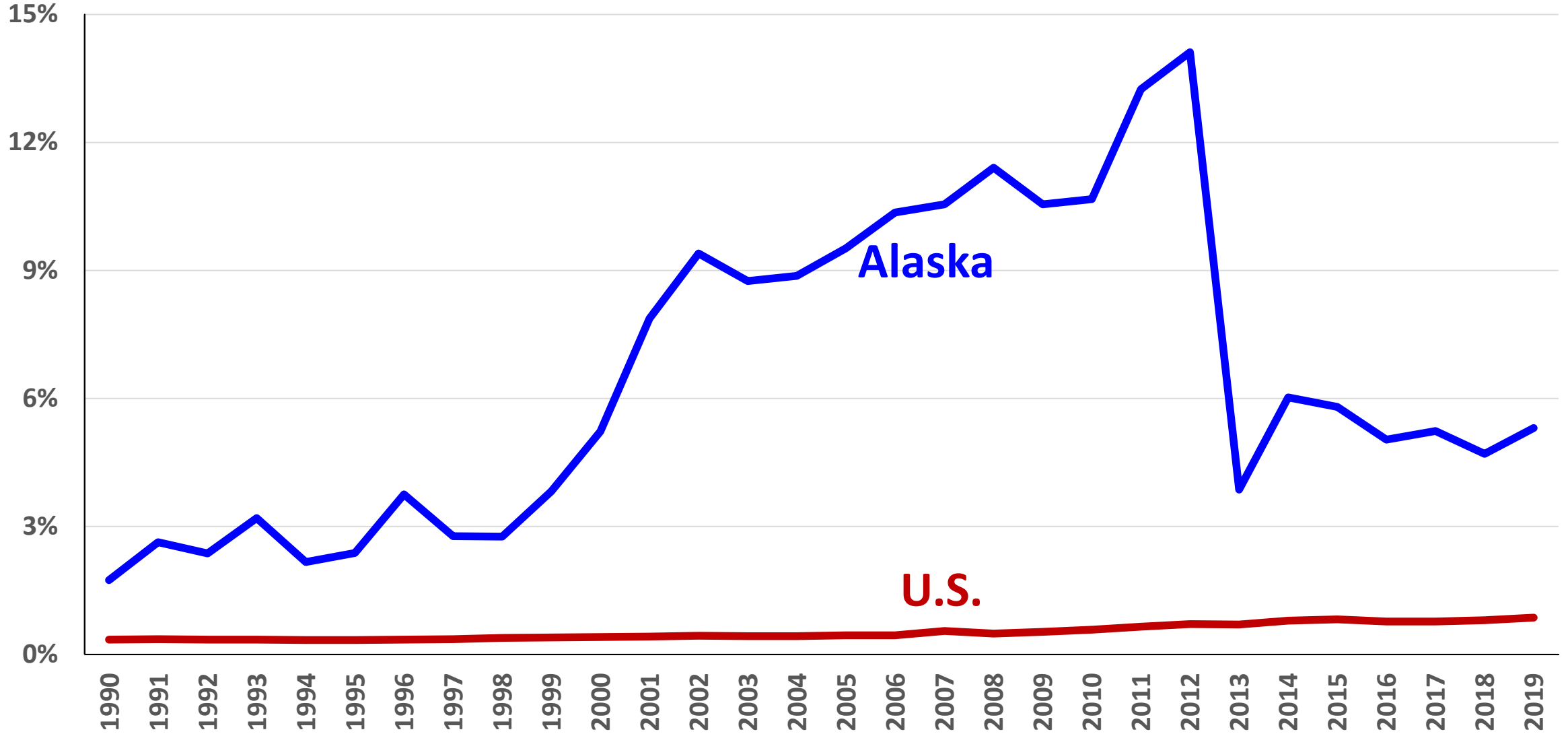
Medical Attendant by Mother's Insurance Type (2019)



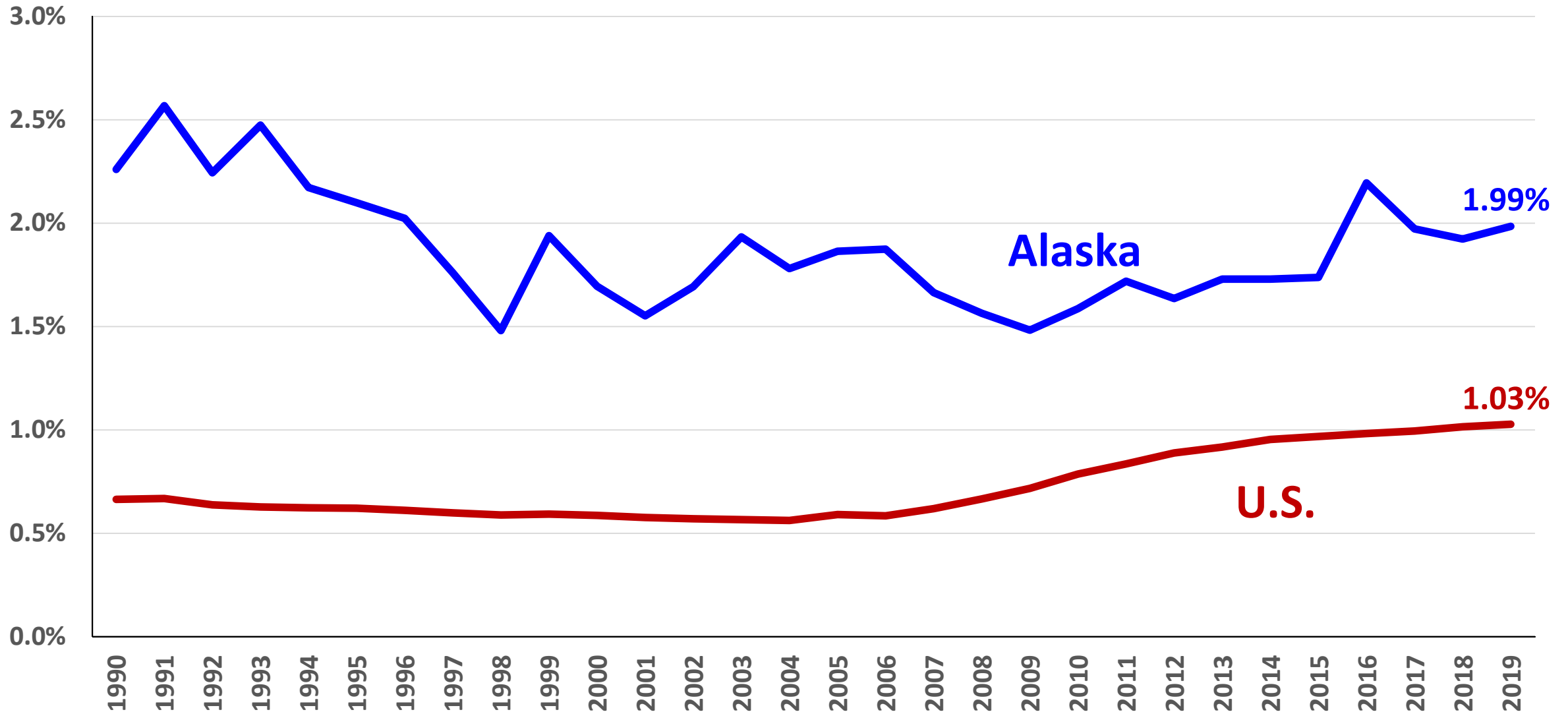
CNM Attended Births, Alaska & U.S. 1990-2019



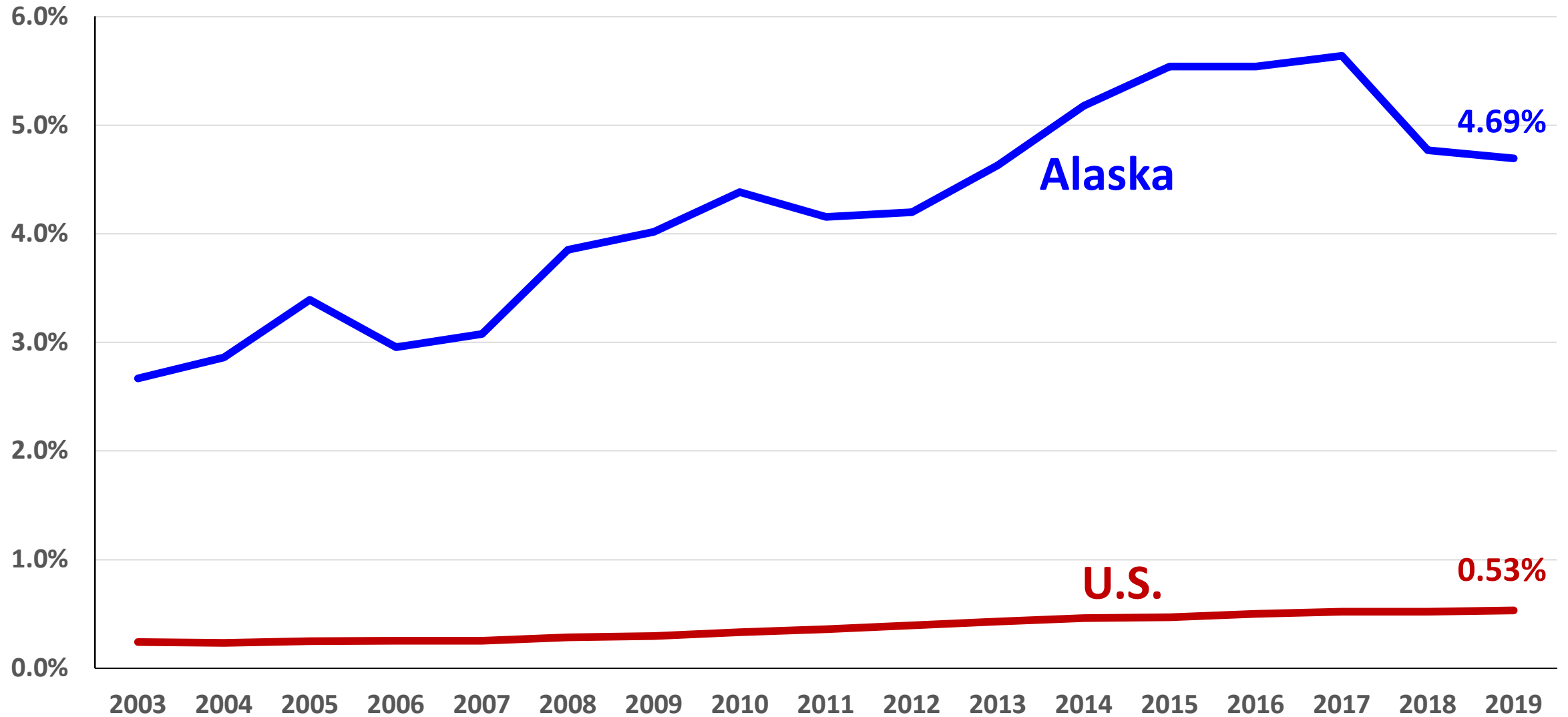
“Other” Midwife Attended Births, Alaska & U.S. 1990-2019



Home Births, Alaska & U.S. 1990-2019

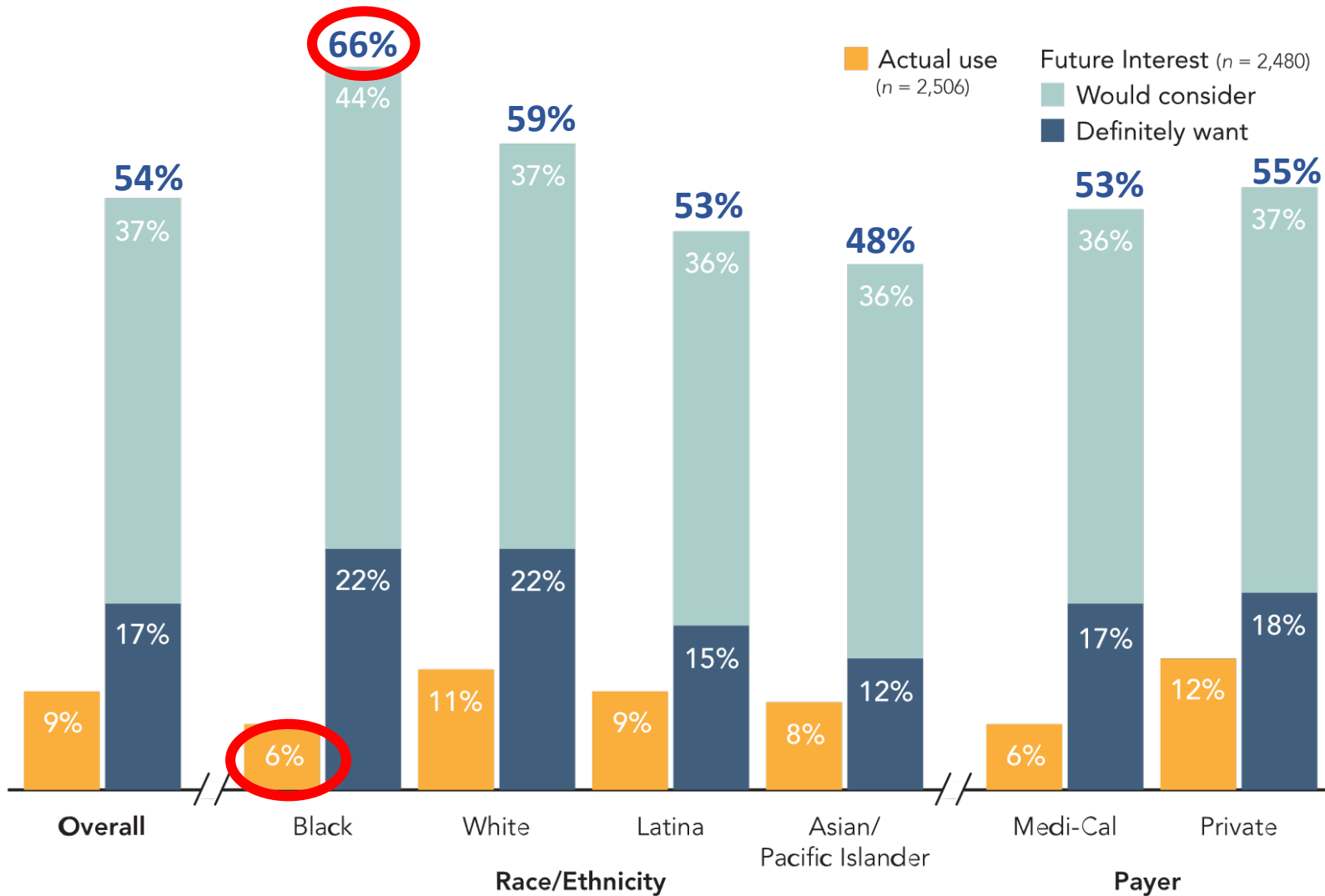


Birth Center Births, Alaska & U.S. 2003-2019



Most Women Open to Using Midwife for Future Birth

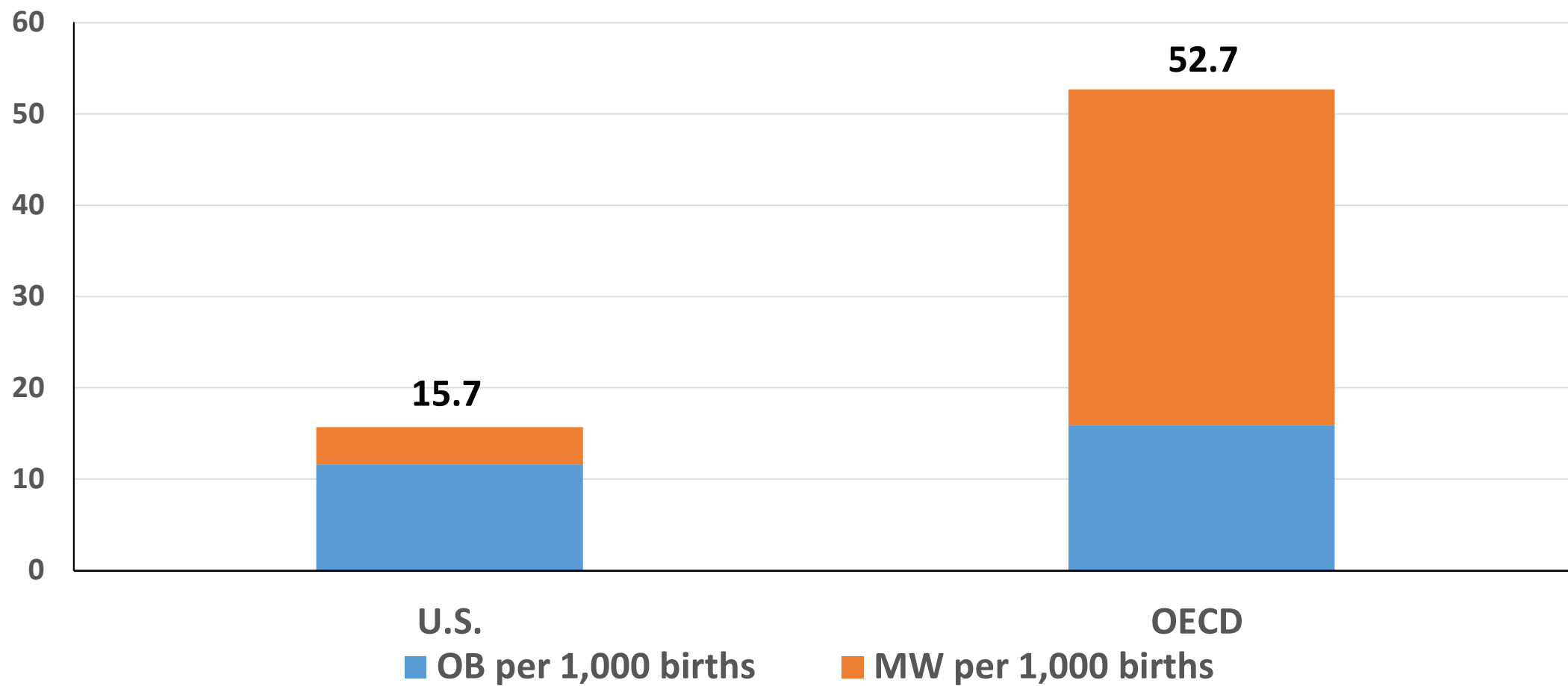
Midwife Use: Actual Use as Birth Attendant in 2016 & Future Interest by Race/Ethnicity & Payer, CA, 2016



Midwives are commonly used in high-income countries with strong maternal outcomes.

- Survey revealed lack of knowledge about midwives.*
- Studies show midwives have similar outcomes and fewer interventions than doctors.*

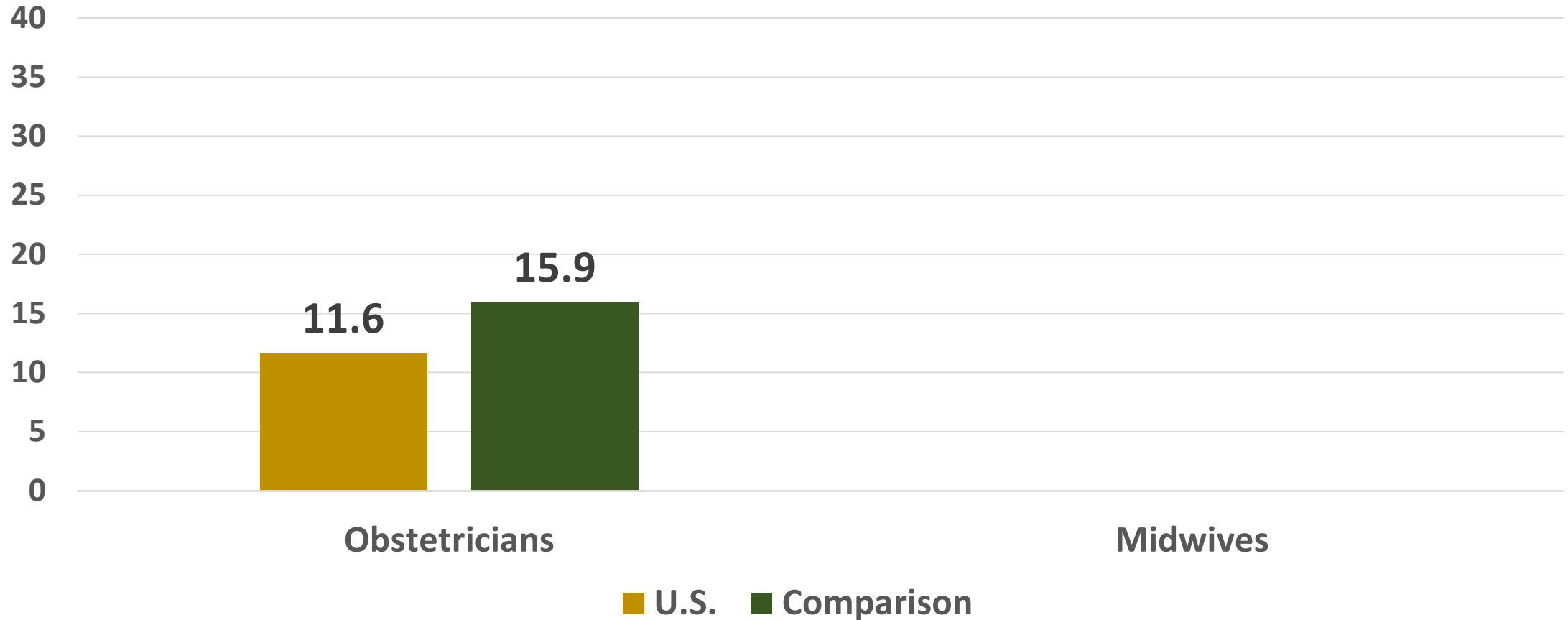
Maternity Care Providers per 1,000 Births, U.S. & Comparison* OECD Countries, 2018



* Source: OECD Health Database, 2021. Comparison countries: Australia, Canada, France, Germany, Italy, Japan, S. Korea, Spain, UK.

How can midwives help?

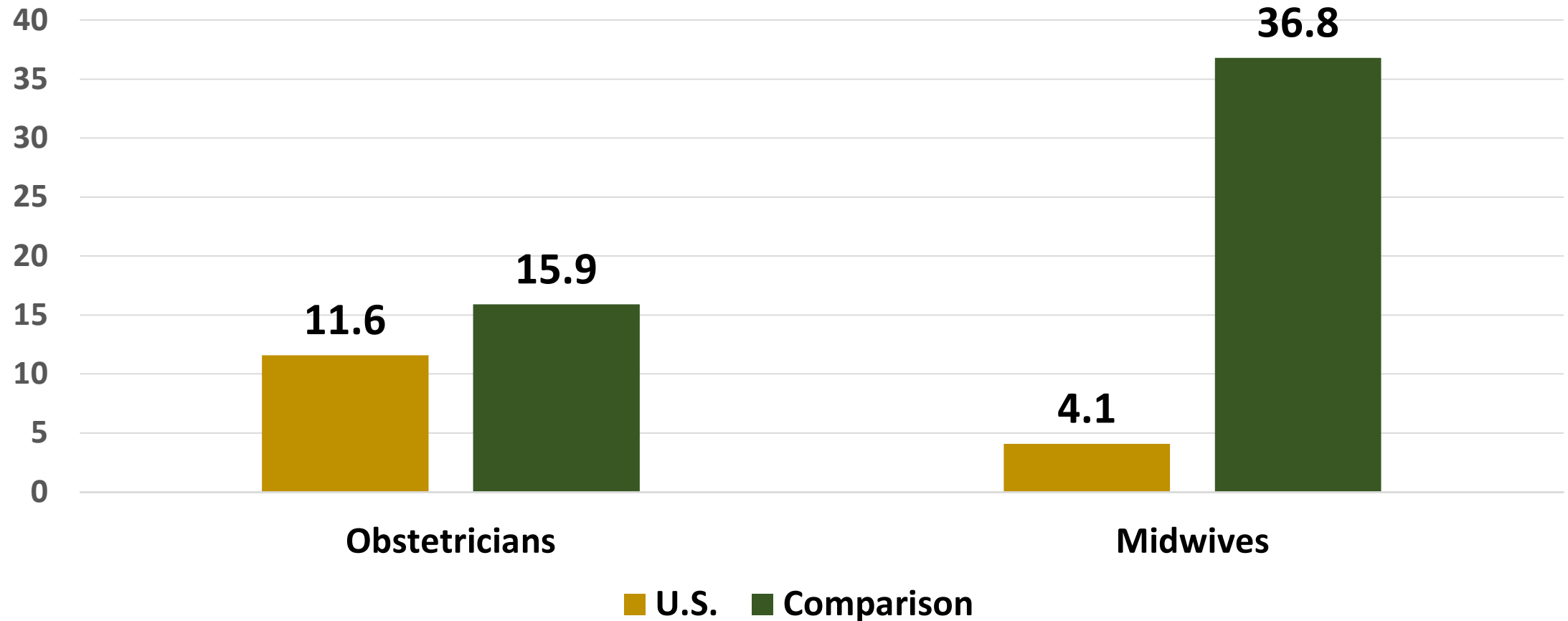
Obstetrician & Midwifery Workforce (per 1,000 births), U.S. & Comparable Countries (2015-2018)



Comparison countries (>300K births): Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, United Kingdom.

How can midwives help?

Obstetrician & Midwifery Workforce (per 1,000 births), U.S. & Comparable Countries (2015-2018)

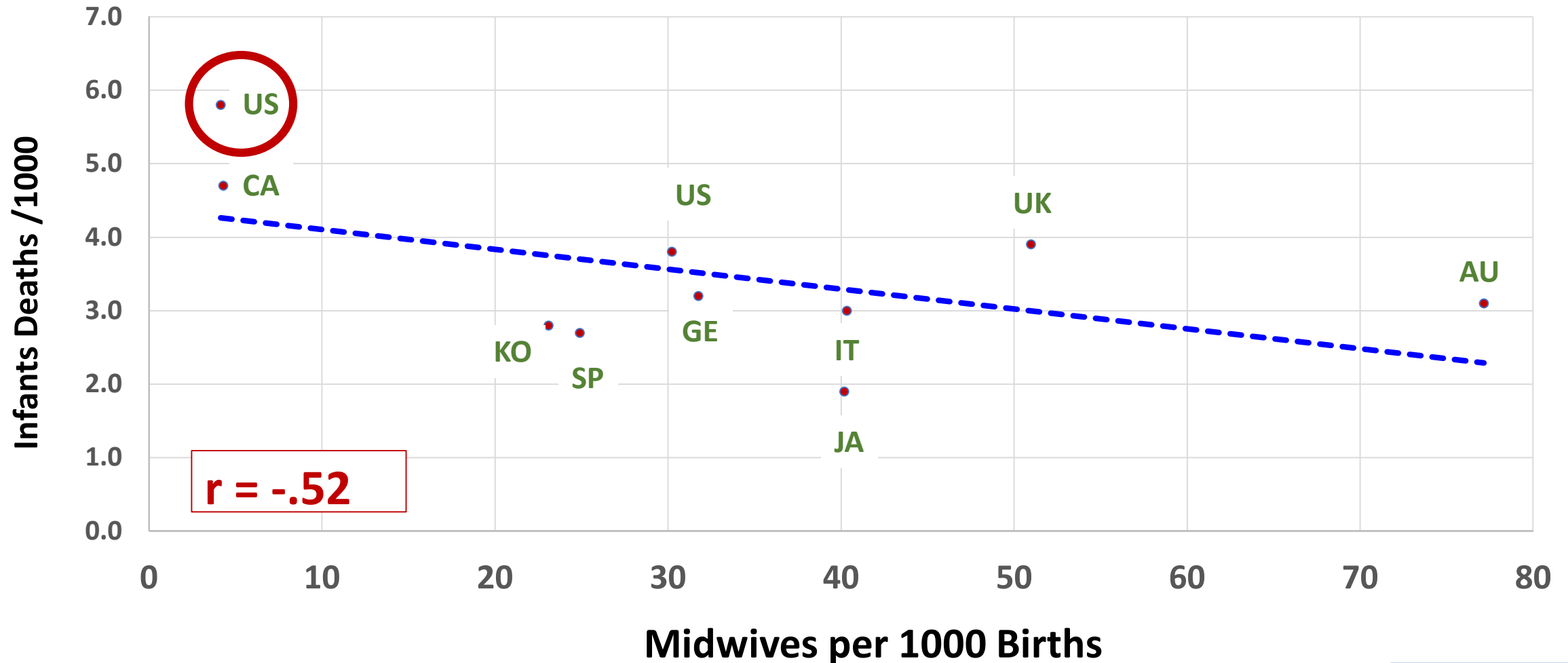


Comparison countries: Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, United Kingdom

Source: OECD Health Data, 2021.

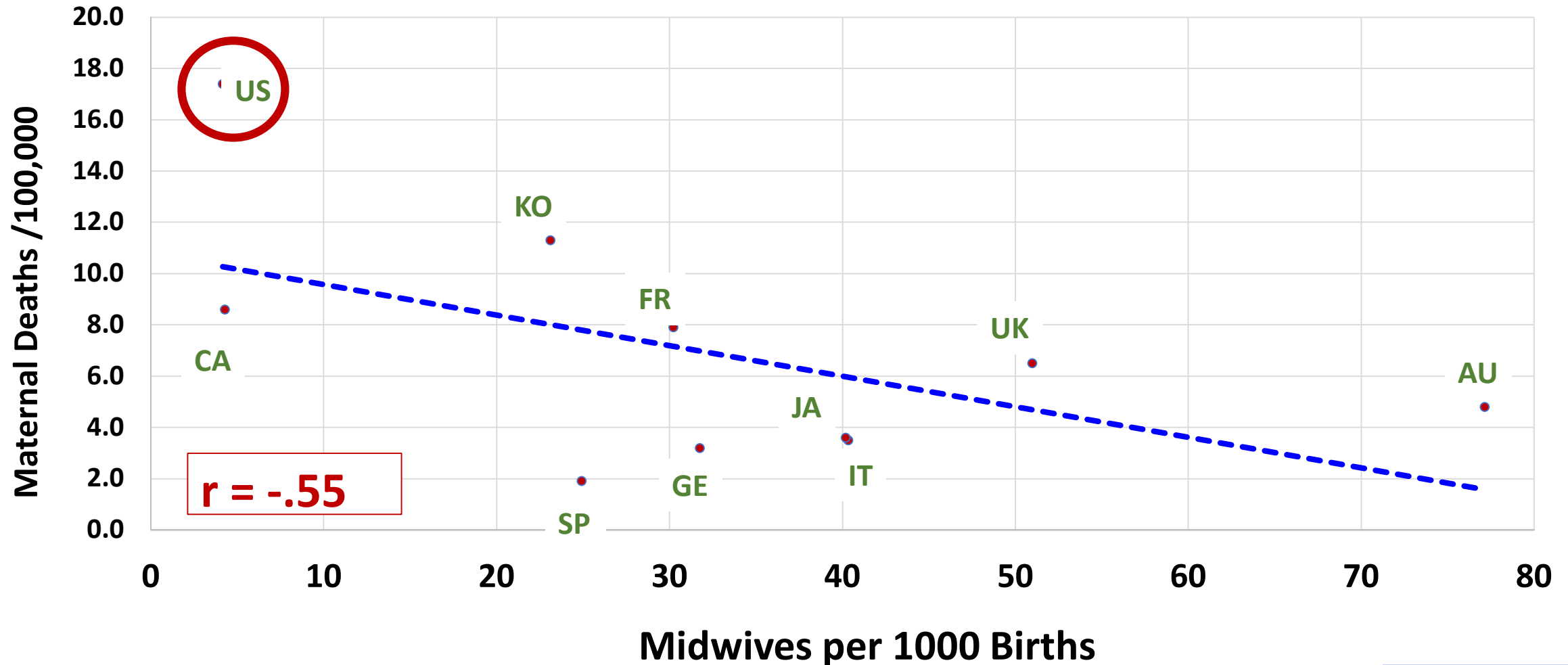
How can midwives help?

Midwifery Workforce Size & Infant Mortality, OECD, 2018

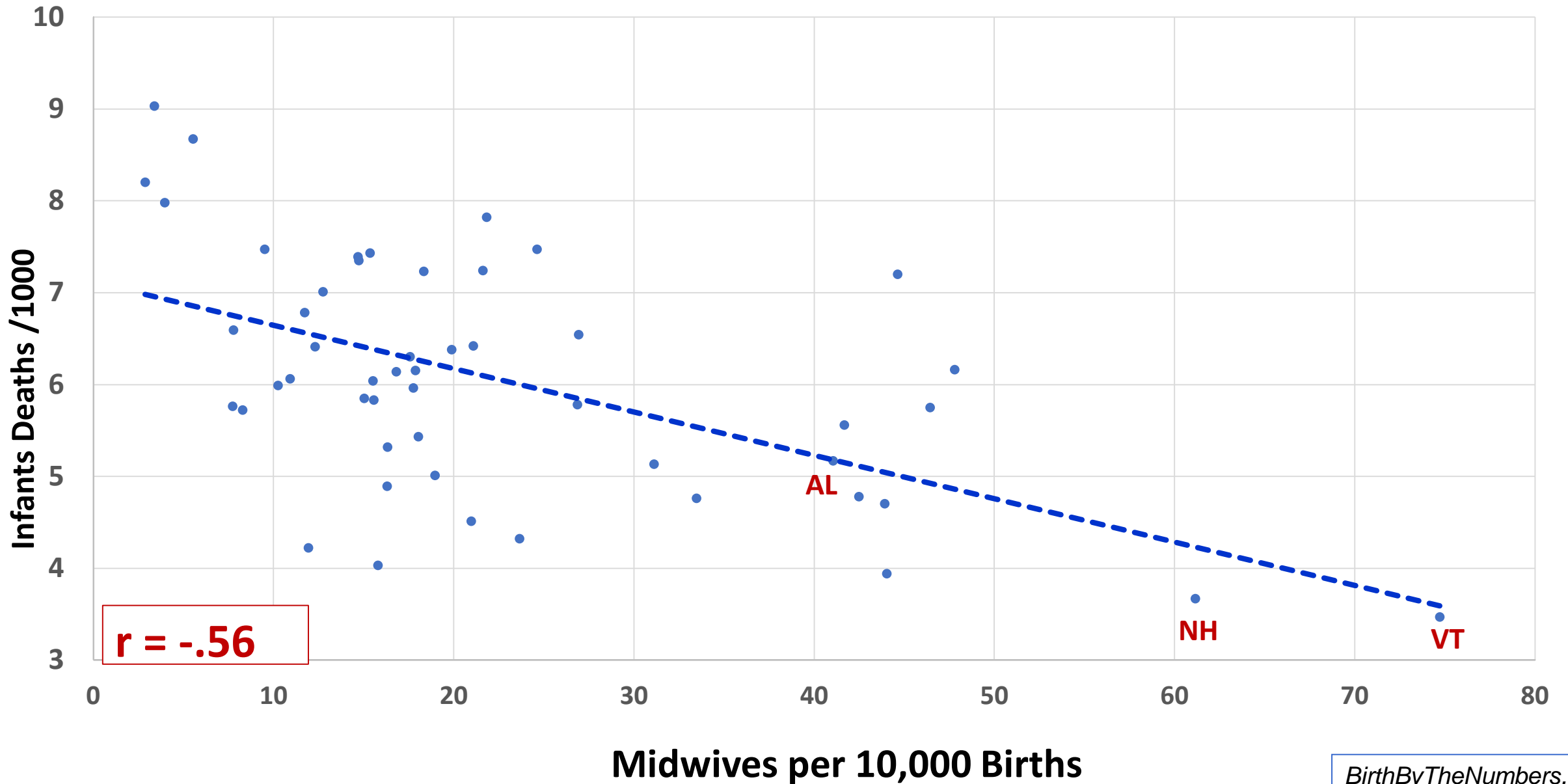


How can midwives help?

Maternity Workforce Size & Maternal Mortality, 2018

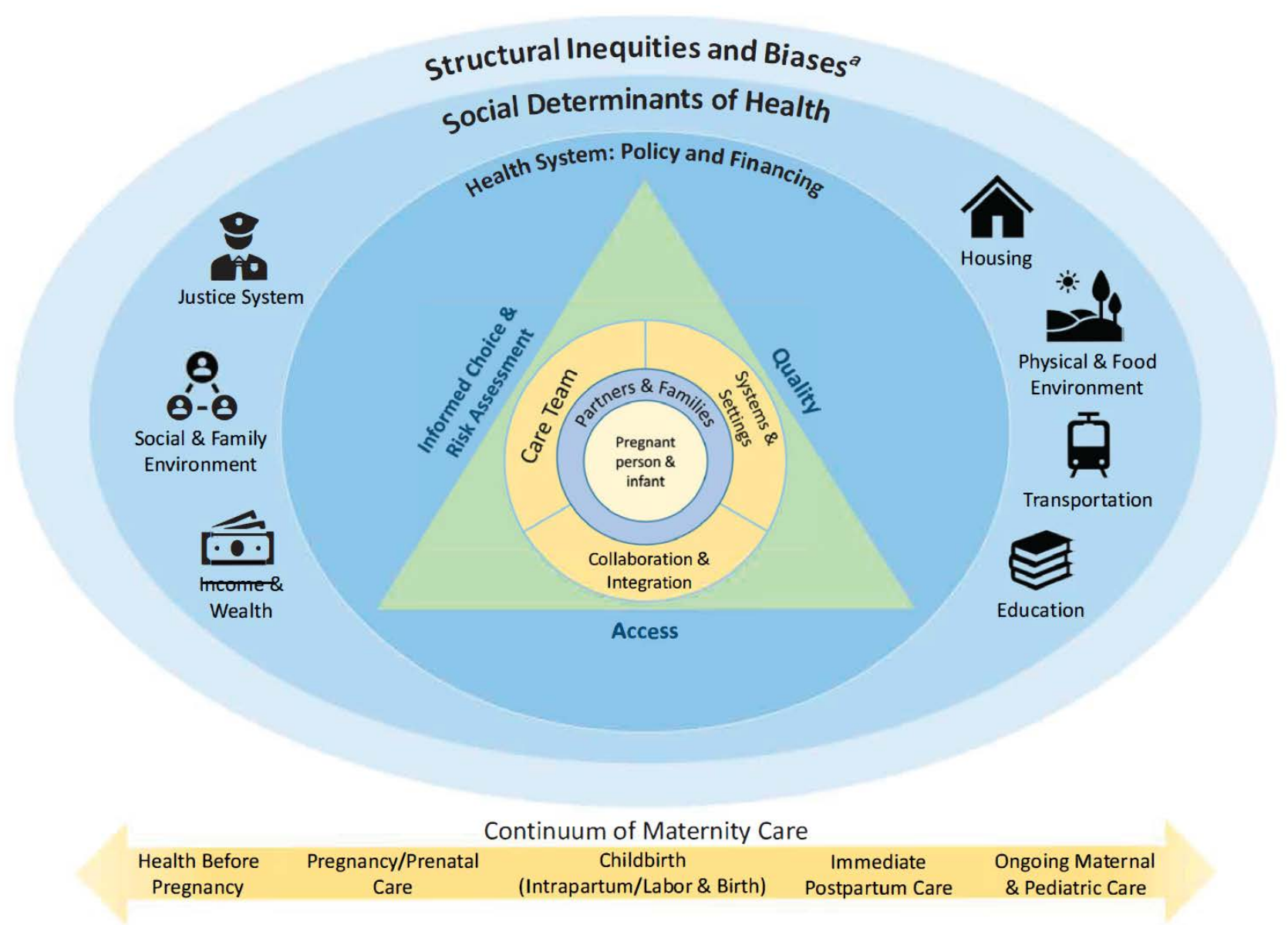


Midwifery Workforce Size & Infant Mortality U.S. States, 2016



So how do midwives make a difference?

Through the linkage of community, facilities and focus on whole women care.



Source: National Academies of Sciences, Engineering and Medicine, 2020.

For all childbearing women and infants

For childbearing women and infants with complications

Practice categories

Education
Information
Health promotion

Assessment
Screening
Care planning

Promotion of normal
processes, prevention
of complications

First-line
management
of complications

Medical
obstetric
neonatal
services

Organisation of care

Available, accessible, acceptable, good-quality services—adequate resources, competent workforce
Continuity, services integrated across community and facilities

Values

Respect, communication, community knowledge, and understanding
Care tailored to women's circumstances and needs

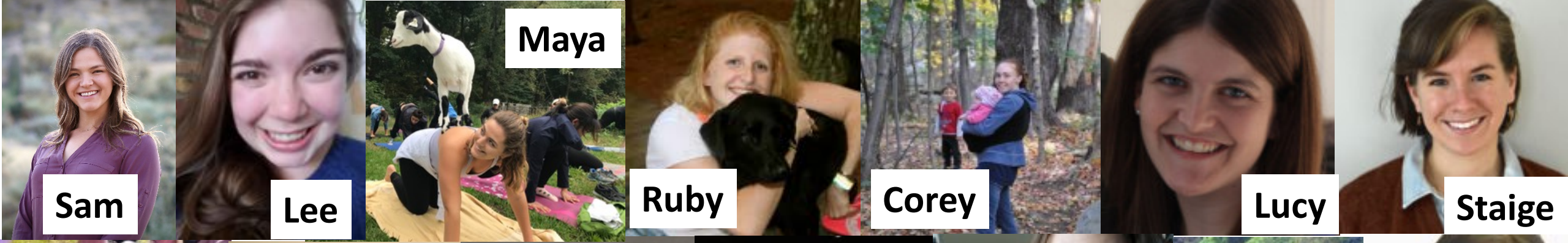
Philosophy

Optimising biological, psychological, social, and cultural processes; strengthening woman's capabilities
Expectant management, using interventions only when indicated

Care providers

Practitioners who combine clinical knowledge and skills with interpersonal and cultural competence
Division of roles and responsibilities based on need, competencies, and resources

Quality Maternal & Newborn Care Framework



Sam

Lee

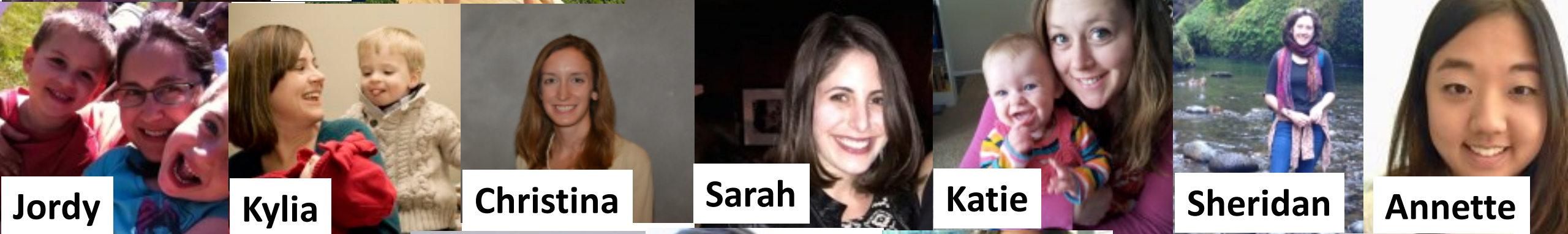
Maya

Ruby

Corey

Lucy

Staige



Jordy

Kyliia

Christina

Sarah

Katie

Sheridan

Annette



Ebere

Allison

Brittany

Jessica

Veronica

Kali

Isabelle

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Twitter: [@BirthNumbers](https://twitter.com/BirthNumbers)

FACEBOOK: www.facebook.com/BirthByTheNumbers