

Mortality Data Release: Maternal Mortality Highlight

Amy Branum, Ph.D.

January 30, 2020



National Center for Health Statistics (NCHS): What We Do

- **Monitor the nation's health by collecting, analyzing, and disseminating health data to:**
 - Compare across time, populations, providers, & geographic areas
 - Identify health problems, risk factors, & disease patterns
 - Inform actions & policies to improve the health of the American people
 - Administer cross-cutting, comprehensive, & foundational data collections that address the full range of public health issues including emerging concerns
- **As the designated Federal statistical agency for health, NCHS provides data that are unavailable elsewhere for informed decision-making**

Data Systems



**National Vital
Statistics
System**



**National
Health
Interview
Survey**



**National
Health and
Nutrition
Examination
Survey**



**National
Health Care
Surveys**



National Vital Statistics System (NVSS) and the Vital Statistics Cooperative Program (VSCP)

- States register all births and deaths
- NCHS receives vital records from jurisdictions on birth, death, and fetal death
- Federal-State contractual arrangement
 - 50 States, New York City, District of Columbia and 5 US territories
 - Federal government provides funding, coordination, and standards
 - States maintain autonomy in their operations, but collect and provide data according to standard specifications and agreed upon timelines

Maternal Mortality

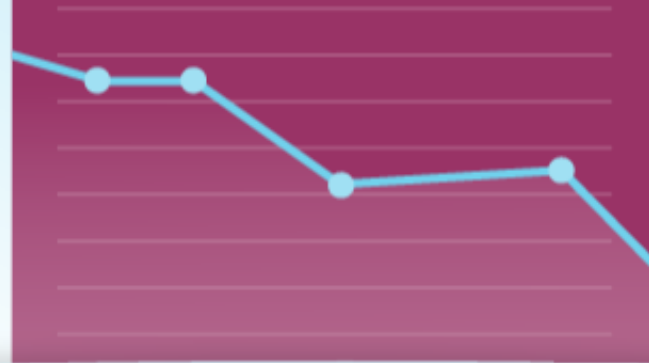
NCHS HAS RESUMED ANNUAL PUBLICATION OF OFFICIAL MATERNAL MORTALITY STATISTICS



official
statistics



extensive
evaluation
of data



information on
changes in
reporting methods

CAUSE OF DEATH (See instructions and examples)

36. IF FEMALE:

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

• now available •

Maternal Mortality Data at NCHS

- NCHS suspended publication of the maternal mortality rate in 2007
- NCHS is publishing an official maternal mortality rate for 2018
- Definition of Maternal Death – NCHS uses WHO definition of a maternal death: death of a woman while pregnant or within 42 days of termination of pregnancy
- NCHS uses ICD-10 codes to classify cause of a maternal death

Maternal Mortality Data in the National Vital Statistics System (NVSS)

- Before 2003, research showed underreporting of maternal deaths in the NVSS
- Some states had introduced pregnancy checkbox items to capture pregnancy or recent pregnancy to improve reporting
 - Lack of standardization among the various state death certificates
- The 2003 revision of the US Standard Death Certificate added the pregnancy checkbox item— recommended for use in all states by the HHS Secretary

Pregnancy Checkbox

U.S. STANDARD CERTIFICATE OF DEATH

LOCAL FILE NO. STATE FILE NO.

1. OCCIDENTAL DEATH NUMBER (NATIONAL CENTER FOR HEALTH STATISTICS)

2. SEX

3. SOCIAL SECURITY NUMBER

4a. AGE LAST BIRTHDAY (Years)

4b. UNDER 1 YEAR

4c. UNDER 1 DAY

5. DATE OF BIRTH (month/day/year)

6. BIRTHPLACE (City and State or Foreign Country)

7a. RESIDENCE STATE

7b. COUNTY

7c. CITY OR TOWN

8a. STREET AND NUMBER

8b. APT. NO.

8c. ZIP CODE

8d. HOUSE CITY LIMITED

9. YES

9. NO

10. MARRIAGE PORTICET

11. MARITAL STATUS AT TIME OF DEATH

12. SURVIVING SPOUSE'S NAME (State, plus name, plus the marriage)

13. Single

13. Married

13. Married, but separated

13. Widowed

13. Divorced

13. Never Married

13. Unknown

14. FATHER'S SSN

15a. INFORMANT

15b. OCCASION

15c. RELATIONSHIP

16. METHOD OF DEATH

17. LOCATION

18. SIGNATURE

19. ITEMS 24-28 WHO PROM

20. SIGNATURE

21. ACTUAL OR

21. DECEASED

22. PART I. On the (CIRCLED) cause—disease, injury, or complication that directly caused the death. DO NOT enter terminal events such as cardiac arrest, asphyxia, or cerebral death without showing the etiologic DO NOT abbreviate. Enter only one cause on a line. Add additional (See Instructions)

23. IMMEDIATE CAUSE (Final disease or condition resulting in death)

24. SEQUELAE (If applicable, if any, leading to the cause listed on line 23. Enter the underlying final cause (disease or injury) that led to the events resulting in death.)

25. PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I

26. WERE AN AUTOPSY PERFORMED?

27. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THIS CAUSE OF DEATH?

28. DID TOBACCO USE CONTRIBUTE TO DEATH?

29. NUMBER OF DEATHS

30. IF FEMALE:

31. IF FEMALE:

32. DATE OF BIRTH

33. TIME OF DEATH

34. SIGNATURE OF PHYSICIAN

35. BIRTH AT WORK?

36. LOCATION OF BIRTH

37. STREET & NUMBER

38. CITY OR TOWN

39. ZIP CODE

36. IF FEMALE:

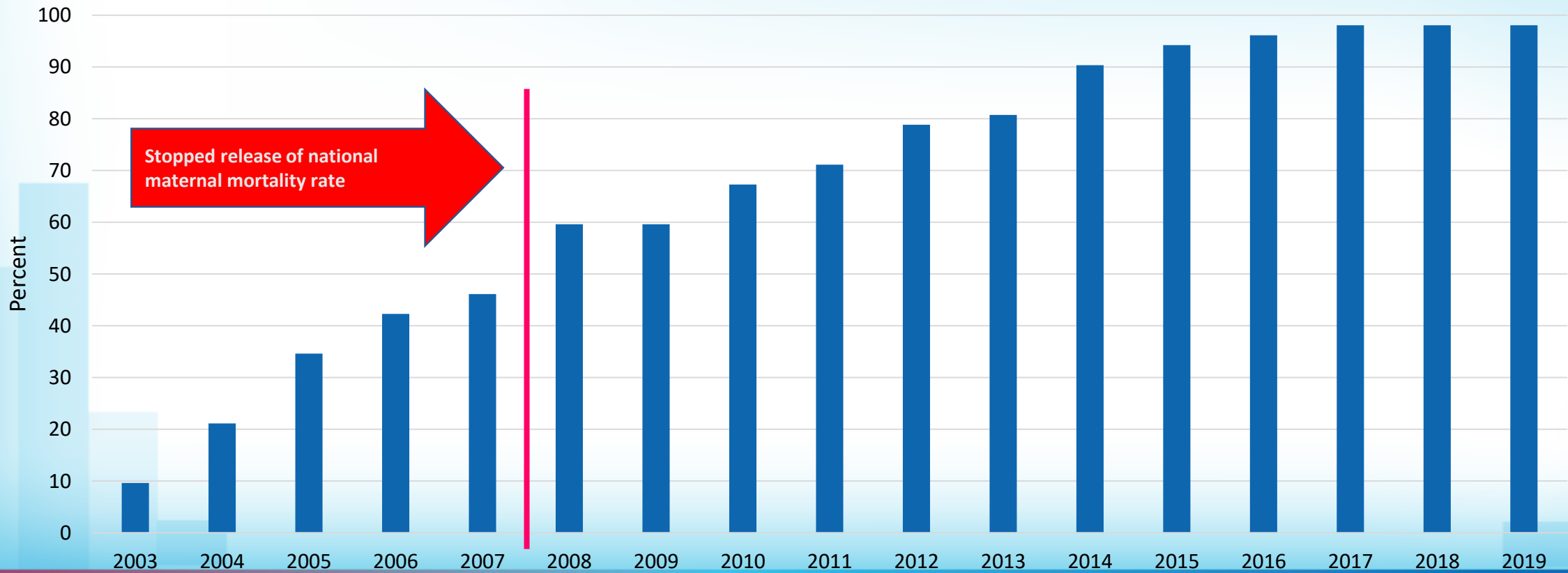
- Not pregnant within past year
- Pregnant at time of death
- Not pregnant, but pregnant within 42 days of death
- Not pregnant, but pregnant 43 days to 1 year before death
- Unknown if pregnant within the past year

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- Not pregnant within past year
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- 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

Implementation of the 2003 revision of the US Standard Death Certificate

Cumulative percent of jurisdictions with standard pregnancy checkbox item



Note: As of 2018, all states had implemented the 2003 certificate but California did not use the standard pregnancy item.

Issues and Consequences of Implementing the Pregnancy Checkbox

- The addition of the pregnancy checkbox led to the identification of previously unreported maternal deaths
 - As more states added the checkbox, the total number of identified deaths in the U.S. increased
 - The increasing use of the checkbox complicated our ability to see trends in the actual number of maternal deaths
- The checkbox was frequently checked in error
 - Research on selected states identified both false positives and false negatives, though more false positives than false negatives
- As the checkbox became more universal, NCHS evaluated how the checkbox was used

Evaluation of the Effect of Checkbox Implementation

- One new report from NCHS: 2015 – 2016, NCHS recoded the maternal deaths without the checkbox:
 - Found the effect of checkbox implementation increased reporting, especially for older women
 - The cause of death distribution leads us to believe that the majority are not maternal deaths for older women
 - For many of these older women, the checkbox was likely checked in error

- Another new report from NCHS: Modeling of errors and trends
 - Using log-binomial regression models, NCHS found that the increase in maternal mortality in the United States is not likely due to a true increase in the underlying extent of maternal mortality
 - The majority of the observed increase in the MMR is attributed to changes in data collection methods (that is, the gradual adoption of the checkbox over this period)
 - Data visualization will be available soon

Number of Births and Deaths with Positive Pregnancy Responses in the Checkbox

National Vital Statistics Reports



Volume 69, Number 2

January 30, 2020

Maternal Mortality in the United States: Changes in Coding, Publication, and Data Release, 2018

by Donna L. Hoyert, Ph.D., and Arialdi M. Miniño, M.P.H., Division of Vital Statistics

Abstract

This report describes changes in how the National Center for Health Statistics (NCHS) will code, publish, and release maternal mortality data and presents official 2018 maternal mortality estimates using a new coding method. Due to the incremental implementation of the pregnancy status checkbox item on the 2003 revised U.S. Standard Certificate of Death, NCHS last published an official estimate of the U.S. maternal mortality rate in 2007. As of 2018, implementation of the revised certificate, including its pregnancy checkbox, is complete for all 50 states (noting that California implemented a different checkbox than that on the U.S. Standard Certificate of Death), allowing NCHS to resume the routine publication of maternal mortality statistics. However, an evaluation of data quality indicated some errors with the reporting of maternal deaths (deaths within 42 days of pregnancy) following adoption of the checkbox, including overreporting of maternal deaths among older women. Therefore, NCHS has adopted a new method (to be called the 2018 method) for coding maternal deaths to mitigate these probable errors. The 2018 method involves further restricting application of the pregnancy checkbox to decedents aged 10–44 years from the previous age group of 10–54. In addition, the 2018 method restricts assignment of maternal codes to the underlying

Introduction

Maternal mortality is a high-profile health indicator used in domestic and international settings (1–3). In the United States, the National Center for Health Statistics' (NCHS) National Vital Statistics System (NVSS) is the source for official mortality statistics, including those on maternal mortality. NCHS uses the World Health Organization (WHO) definition for maternal mortality: deaths of women while pregnant or within 42 days of being pregnant, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (i.e., neither caused nor complicated by the woman being pregnant at the time of or within 1 year of death). The classification of deaths involving pregnancy, childbirth and puerperium specifically excludes external causes (i.e., accidents, homicides, and suicides) as incidental. Late maternal deaths (occurring between 43 days and 1 year of death) are also not included as part of the WHO definition of maternal mortality. NVSS has produced maternal mortality statistics for more than a century based on causes of death reported on death certificates. Over time, other data collection efforts emerged, such as the Pregnancy Mortality Surveillance System in 1986, and evidence demonstrated that the NVSS data underestimated

Age	Births	Deaths
40–44	134,540	145
45–49	10,329	89
50–54	780	148
55–59	74	33
60–64	7	51
65–69	–	45
70–74	–	51
75–79	–	46
80–84	–	42
85 and over	–	147

– Quantity zero.

NOTE: Alabama, Alaska, Colorado, Hawaii, Massachusetts, North Carolina, Virginia, and West Virginia did not have the standard checkbox in 2013.

SOURCE: Data from 2013

Current Strategy and Coding Method

- Coding Change: Further age restriction for checkbox-only cases
 - Changed the restriction from 10-54 to 10-44
 - No age restriction when obstetric conditions are reported on the death certificate, i.e., maternal deaths due to an explicit obstetric condition will be counted regardless of age
- Resume annual publication of national maternal mortality rates with the release of the 2018 mortality data and continuing to improve the data and reduce errors

Multiple Options for Analysis

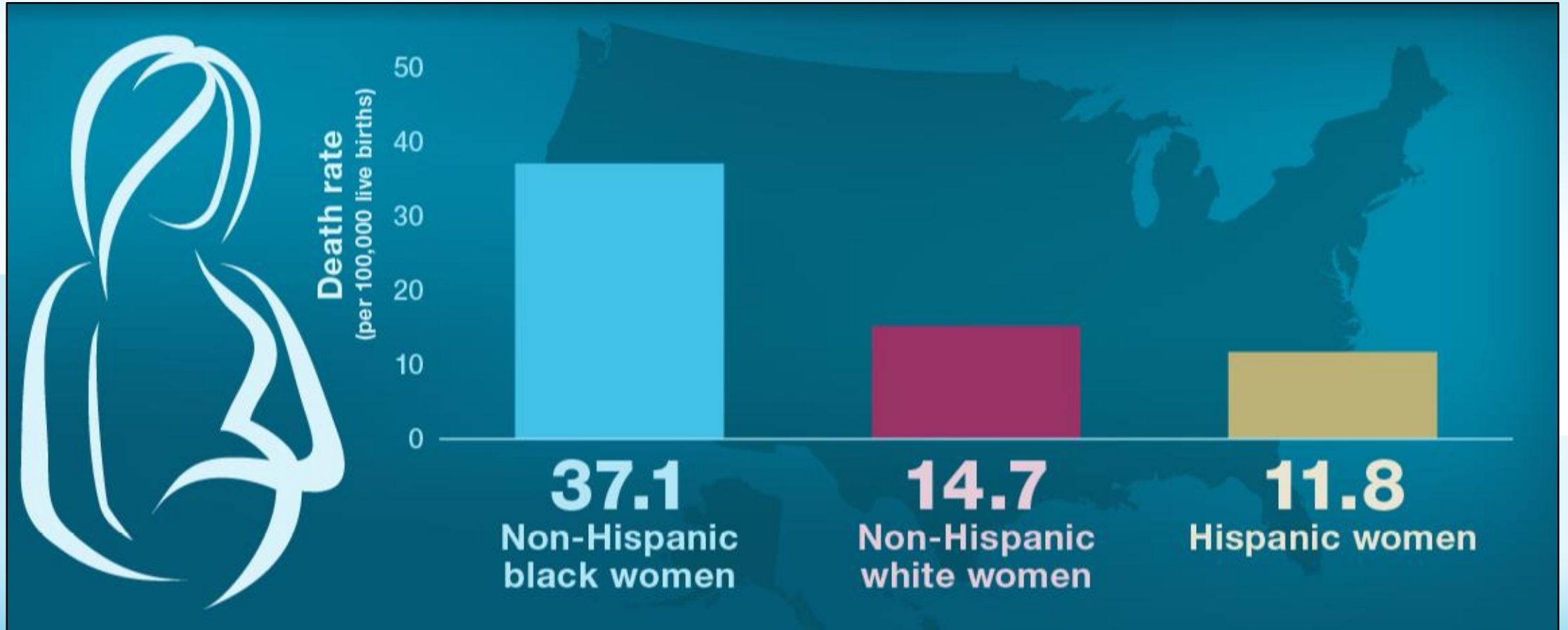
- Data for 2015-2018 released and made available to researchers
 - Coded using the original method
 - Recoded data without a checkbox item
 - Recoded previously released data using the new coding method
- Increases the availability of trend data to evaluate the addition of the checkbox for multiple years where all or most deaths will be coded under both sets of rules
- For checkbox only cases, we retain the original codes in addition to the coding that reflects the checkbox

National Maternal Mortality Rate for 2018

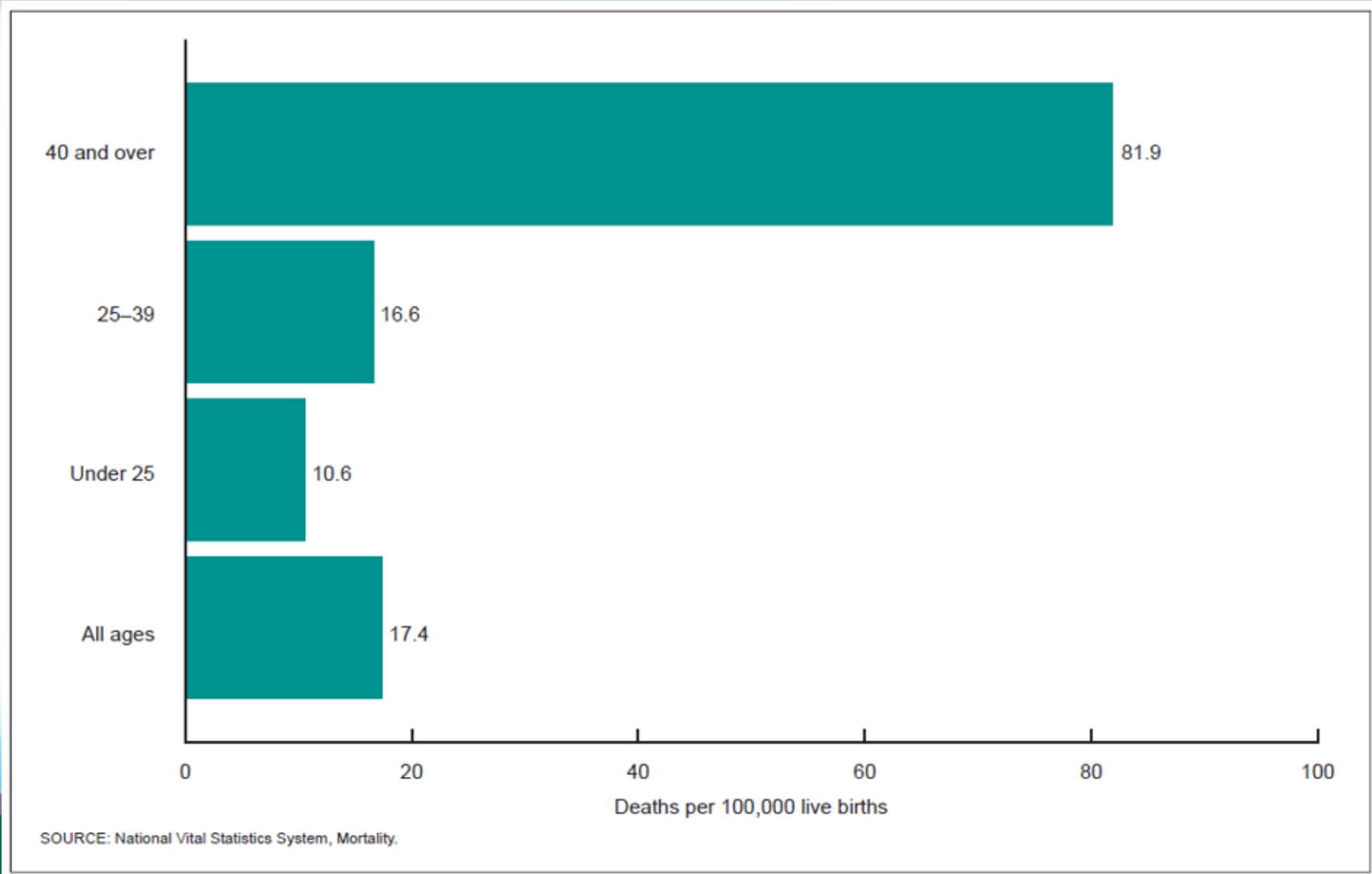


17.4 deaths
per 100,000 LIVE BIRTHS

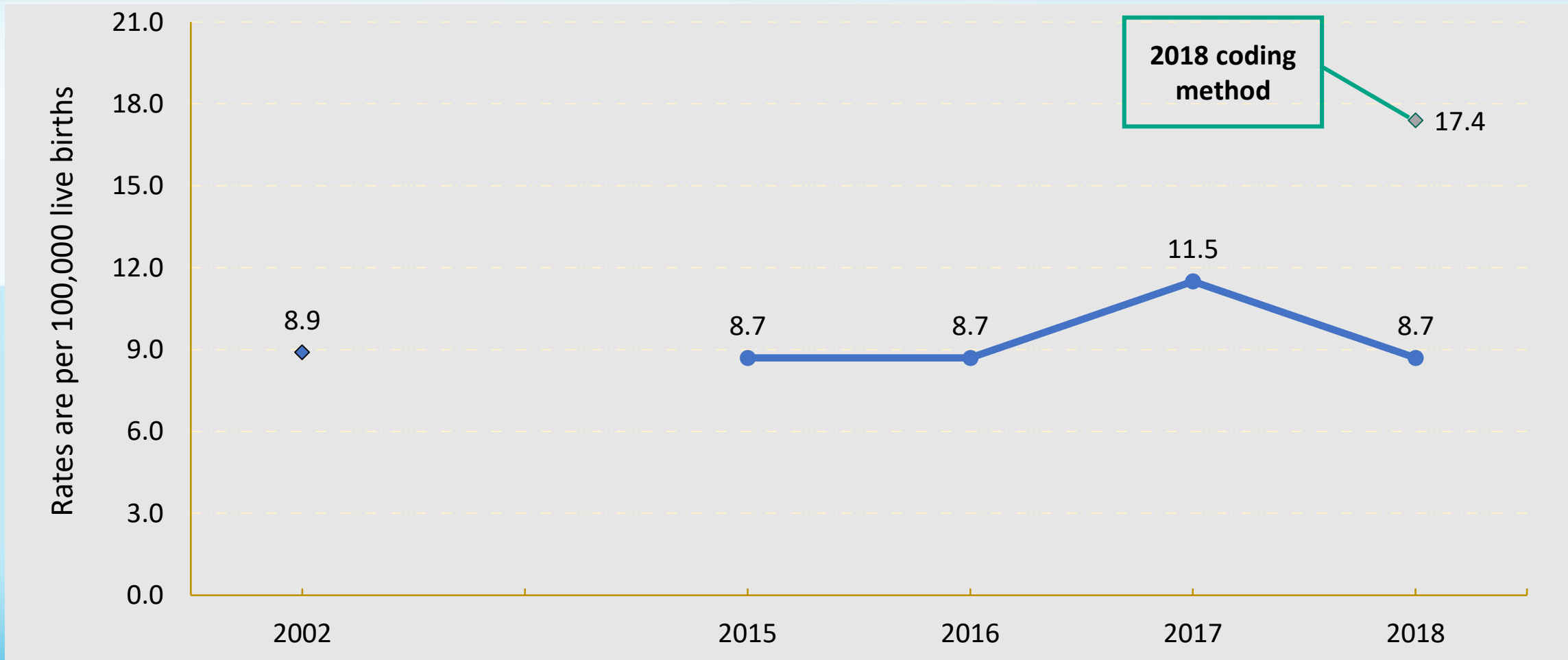
2018 Race Differences for Maternal Mortality



2018 Age Differences for Maternal Mortality



Maternal Mortality Rates without the Pregnancy Checkbox



NOTE: Trend line uses the coding method prior to 2003. Data for 2002 are included for comparison with the 2015–2018 values.

Planned Improvements in the Collection of Maternal Mortality Data

- Enhance understanding of errors in the pregnancy checkbox and how to correct these errors
 - Examine existing EDR systems to see if improvements in design could help improve the data
 - Develop web service designed to prompt the cause of death certifier to confirm the information provided in the checkbox item
- Encourage cooperation between state vital records and state maternal and child health agencies
 - Rapid assessment of deaths of women of reproductive age
 - Linkages for deaths of women of reproductive age with birth and fetal death records
- New information derived from the assessment must then be incorporated in the vital statistics system

Maternal Mortality Reports and Products

Maternal Mortality STATISTICS **NEW**

CDC Centers for Disease Control and Prevention
National Center for Health Statistics

Maternal Mortality

National Vital Statistics Reports
Volume 68, Number 1
January 2020

Vital and Health Statistics
Series 3, Number 44
January 2020

The Impact of the Pregnancy Checkbox and Misclassification on Maternal Mortality Trends in the United States, 1999–2017
Analytical and Epidemiological Studies

NCHS released maternal mortality statistics for 2018, following an extensive review of data quality, and new coding instructions for death certificates based on this review.

Detailed Evaluation of Changes in Data Collection Methods
Implementation of New Coding Methods
Data Files and Resources
Maternal Mortality Reports
Frequently Asked Questions
Contact NCHS
CDC-INFO

Additional Mortality Data Releases

Final 2018 mortality data brief

<https://www.cdc.gov/nchs/products/databriefs/db355.htm>

Mortality in the United States, 2018

Jiaquan Xu, M.D., Sherry L. Murphy, B.S., Kenneth D. Kochanek, M.A., and Elizabeth Arias, Ph.D.

Key findings

Data from the National Vital Statistics System

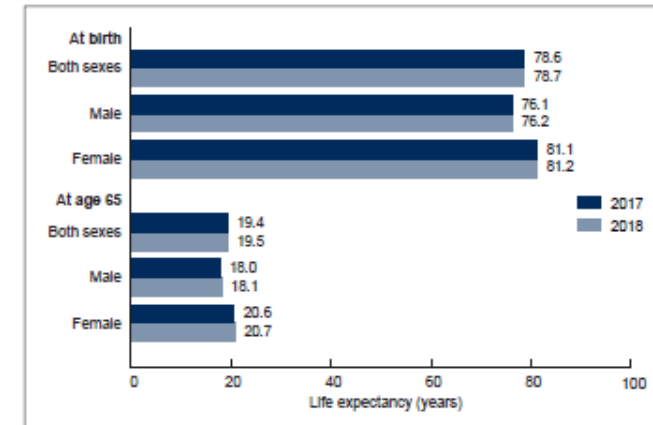
- Life expectancy for the U.S. population in 2018 was 78.7 years, an increase of 0.1 year from 2017.
- The age-adjusted death rate decreased by 1.1% from 731.9 deaths per 100,000 standard population in 2017 to 723.6 in 2018.
- The 10 leading causes of death in 2018 remained the same as in 2017. From 2017 to 2018, age-adjusted death rates decreased for 6 of 10 leading causes of death and increased for 2.
- Age-specific death rates decreased from 2017 to 2018 for age groups 15–24, 25–34, 45–54, 65–74, 75–84, and 85 and over.
- The infant mortality rate decreased 2.3% from 579.3 infant deaths per 100,000 live births in 2017 to 566.2 in 2018.
- The 10 leading causes of infant death in 2018 remained the same as in 2017.

This report presents final 2018 U.S. mortality data on deaths and death rates by demographic and medical characteristics. These data provide information on mortality patterns among U.S. residents by variables such as sex, age, race and Hispanic origin, and cause of death. Life expectancy estimates, 10 leading causes of death, age-specific death rates, and 10 leading causes of infant death were analyzed by comparing 2018 and 2017 final data (1).

How long can we expect to live?

In 2018, life expectancy at birth was 78.7 years for the total U.S. population—an increase of 0.1 year from 78.6 years in 2017 (Figure 1). For males, life expectancy changed from 76.1 in 2017 to 76.2 in 2018—an increase of 0.1 year. For females, life expectancy increased 0.1 year from 81.1 years in 2017 to 81.2 in 2018.

Figure 1. Life expectancy at selected ages, by sex: United States, 2017 and 2018



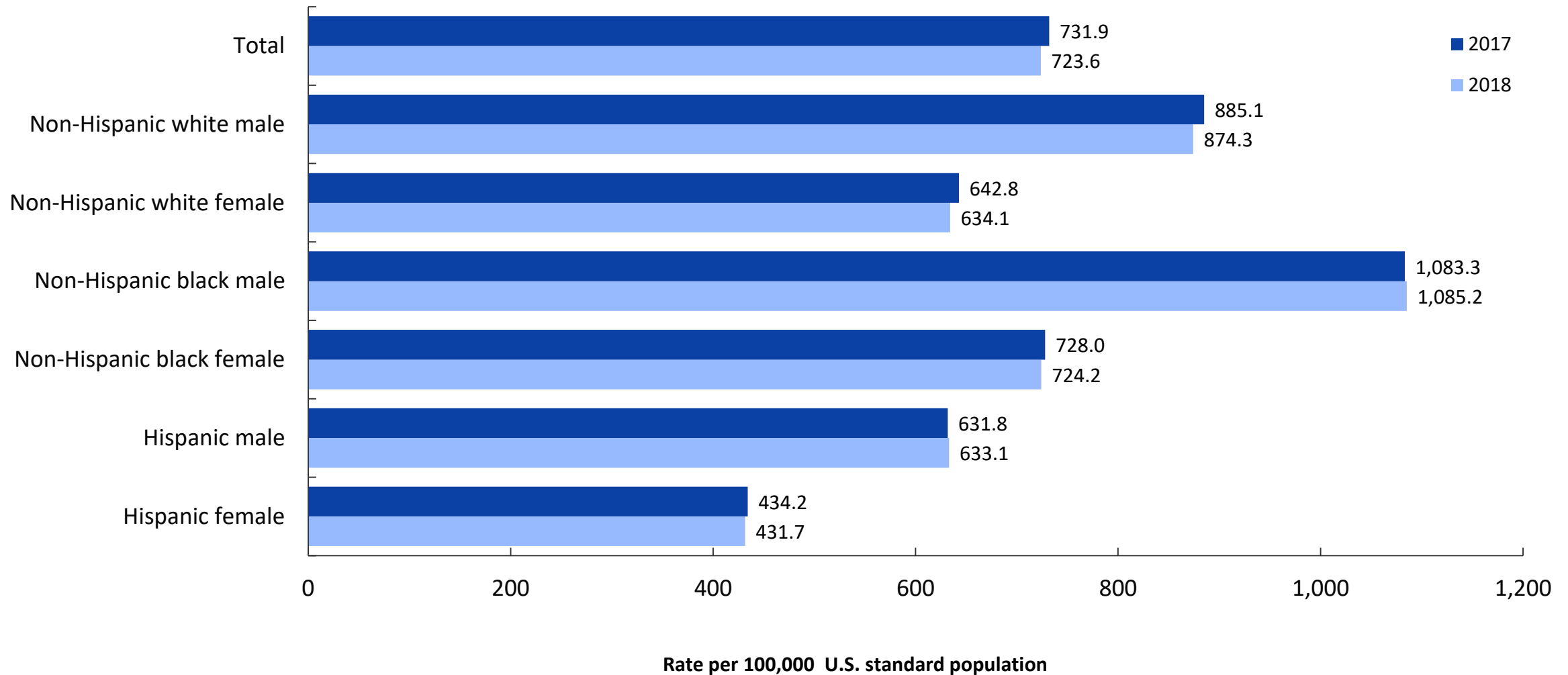
NOTE: Access data table for Figure 1 at https://www.cdc.gov/nchs/data/databriefs/db355_table-608.pdf.
SOURCE: NCHS, National Vital Statistics System, Mortality.



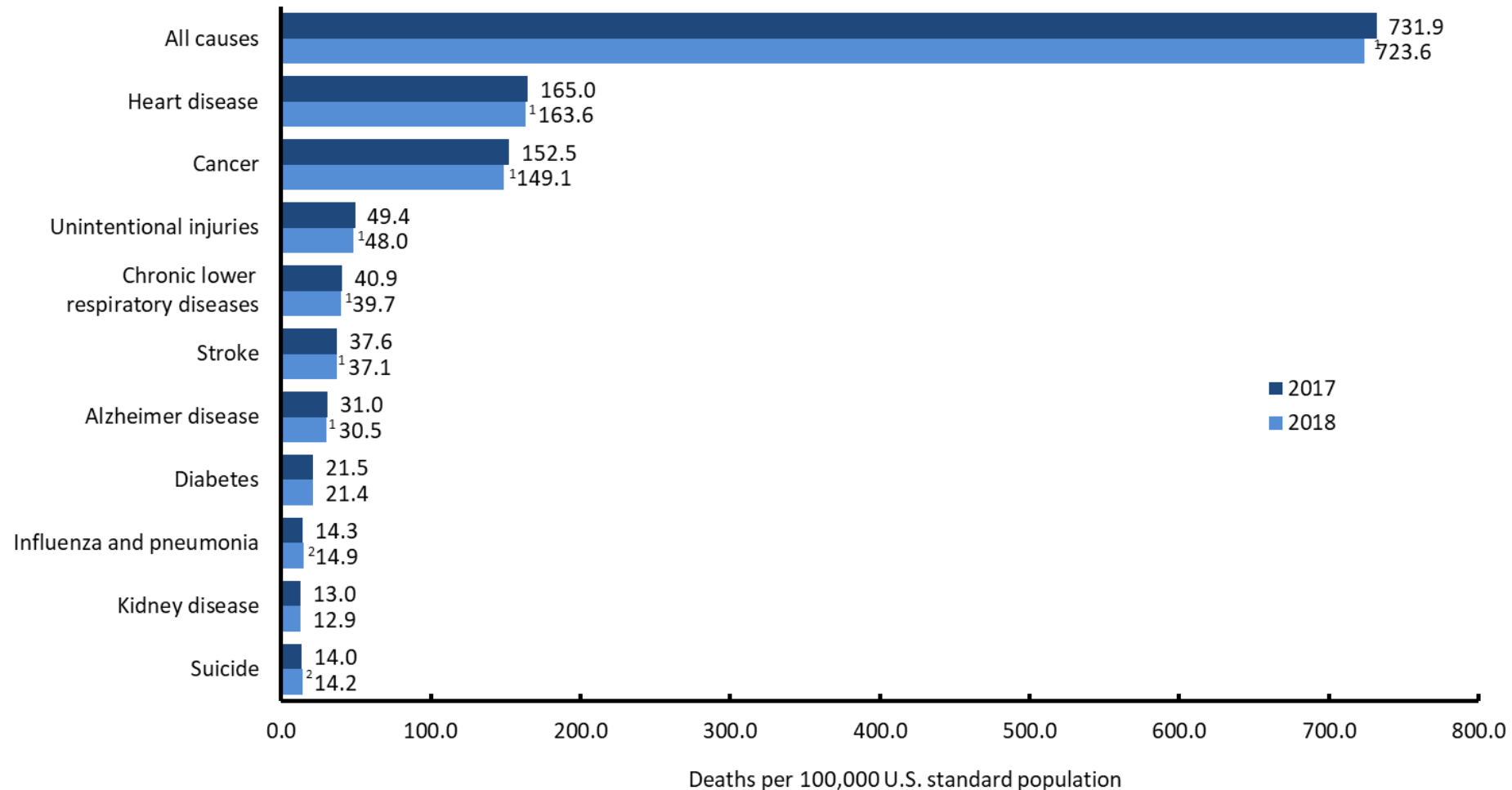
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Health Statistics



Mortality Rate, by race and ethnicity and sex

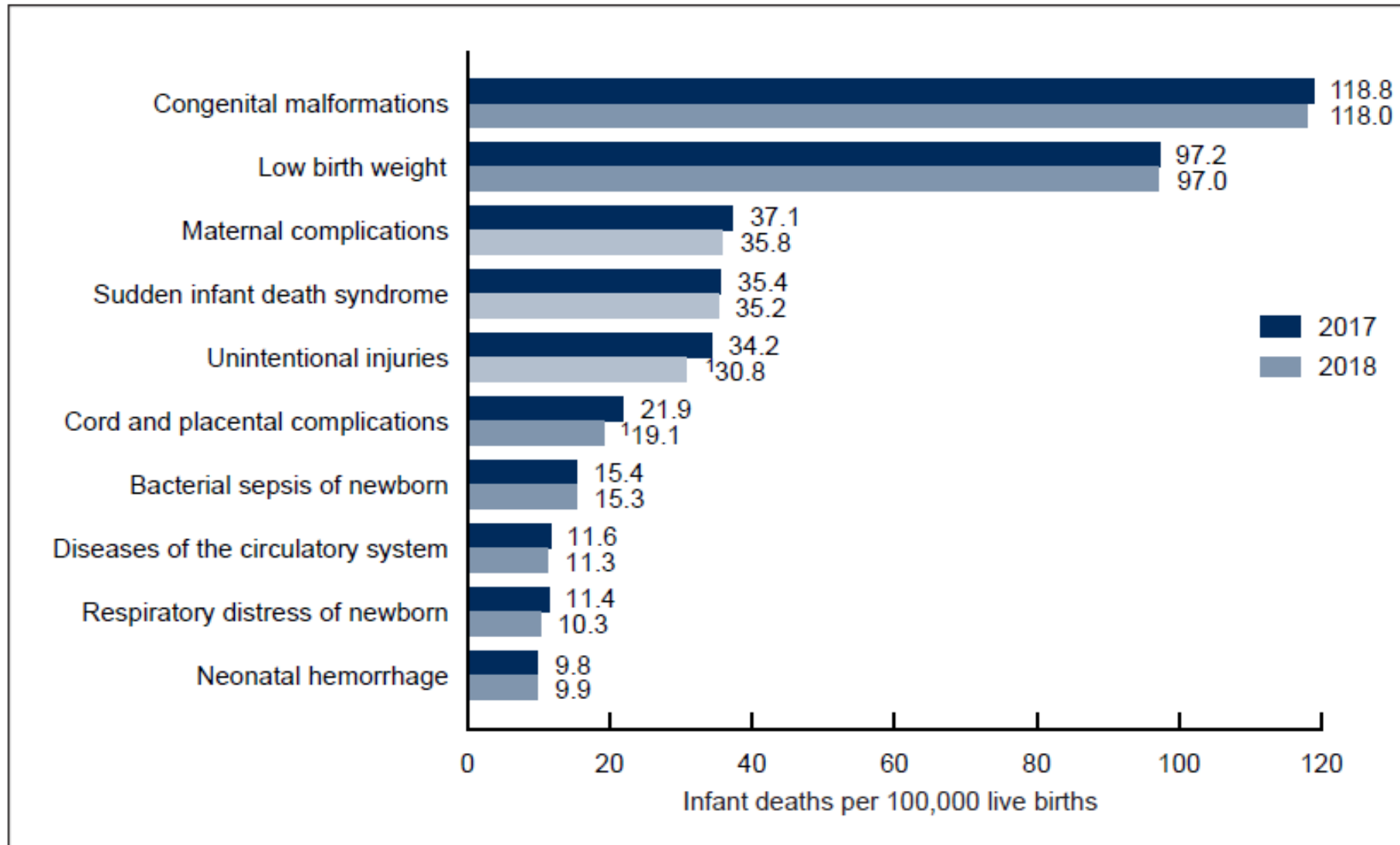


Mortality Rates for All Causes and the 10 Leading Causes of Death



Source: <https://www.cdc.gov/nchs/products/databriefs/db355.htm>

Infant Mortality Rates for the 10 Leading Causes of Infant Death in 2018



2018 Drug Overdose Data Brief

<https://www.cdc.gov/nchs/products/databriefs/db356.htm>

Drug Overdose Deaths in the United States, 1999–2018

Holly Hedegaard, M.D., Arialdi M. Miniño, M.P.H., and Margaret Warner, Ph.D.

Key findings

Data from the National Vital Statistics System, Mortality

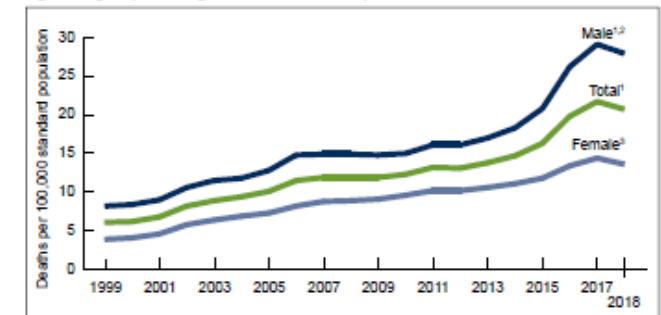
- In 2018, there were 67,367 drug overdose deaths in the United States, a 4.1% decline from 2017 (70,237 deaths).
- The age-adjusted rate of drug overdose deaths in 2018 (20.7 per 100,000) was 4.6% lower than in 2017 (21.7).
- For 14 states and the District of Columbia, the drug overdose death rate was lower in 2018 than in 2017.
- The rate of drug overdose deaths involving synthetic opioids other than methadone (drugs such as fentanyl, fentanyl analogs, and tramadol) increased by 10%, from 9.0 in 2017 to 9.9 in 2018.
- From 2012 through 2018, the rate of drug overdose deaths involving cocaine more than tripled (from 1.4 to 4.5) and the rate for deaths involving psychostimulants with abuse potential (drugs such as methamphetamine) increased nearly 5-fold (from 0.8 to 3.9).

Deaths from drug overdose continue to contribute to mortality in the United States (1–5). This report uses the most recent data from the National Vital Statistics System (NVSS) to update trends in drug overdose deaths for all drugs and for specific drugs and drug types, and to identify changes in rates by state from 2017 to 2018.

In 2018, the age-adjusted rate of drug overdose deaths in the United States was 4.6% lower than the rate in 2017.

- In 2018, there were 67,367 drug overdose deaths in the United States (Figure 1), 4.1% fewer deaths than in 2017 (70,237).
- The rate in 2018 (20.7) was 4.6% lower than the rate in 2017 (21.7).
- The age-adjusted rate of drug overdose deaths increased from 6.1 per 100,000 standard population in 1999 to 21.7 in 2017. The rate increased

Figure 1. Age-adjusted drug overdose death rates, by sex: United States, 1999–2018



¹Significant increasing trend from 1999 through 2016 with different rates of change over time, $p < 0.05$. Rate in 2018 was significantly lower than in 2017.

²Rates for males were significantly higher than rates for females for all years, $p < 0.05$.

³Significant increasing trend from 1999 through 2018 with different rates of change over time, $p < 0.05$. Rate in 2018 was significantly lower than in 2017.

NOTES: Deaths are classified using the International Classification of Diseases, 10th Revision. Drug-poisoning (overdose) deaths are identified using underlying cause-of-death codes X40–X44, X50–X54, X85, and Y10–Y14. The number of drug overdose deaths in 2018 was 67,367. Access data table for Figure 1 at: https://www.cdc.gov/nchs/data/databriefs/db356_tables-006.pdf#1.

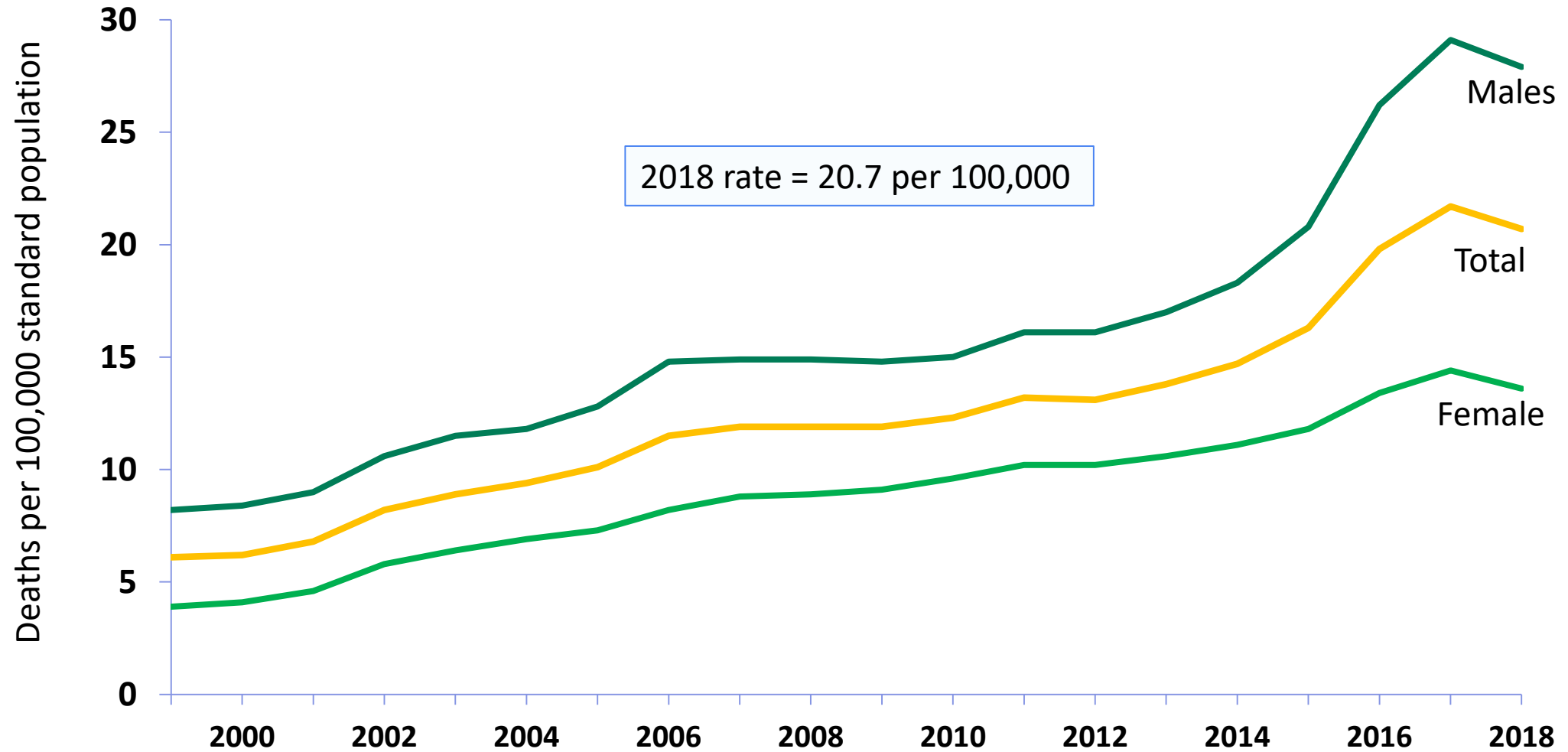
SOURCE: NCHS, National Vital Statistics System, Mortality.



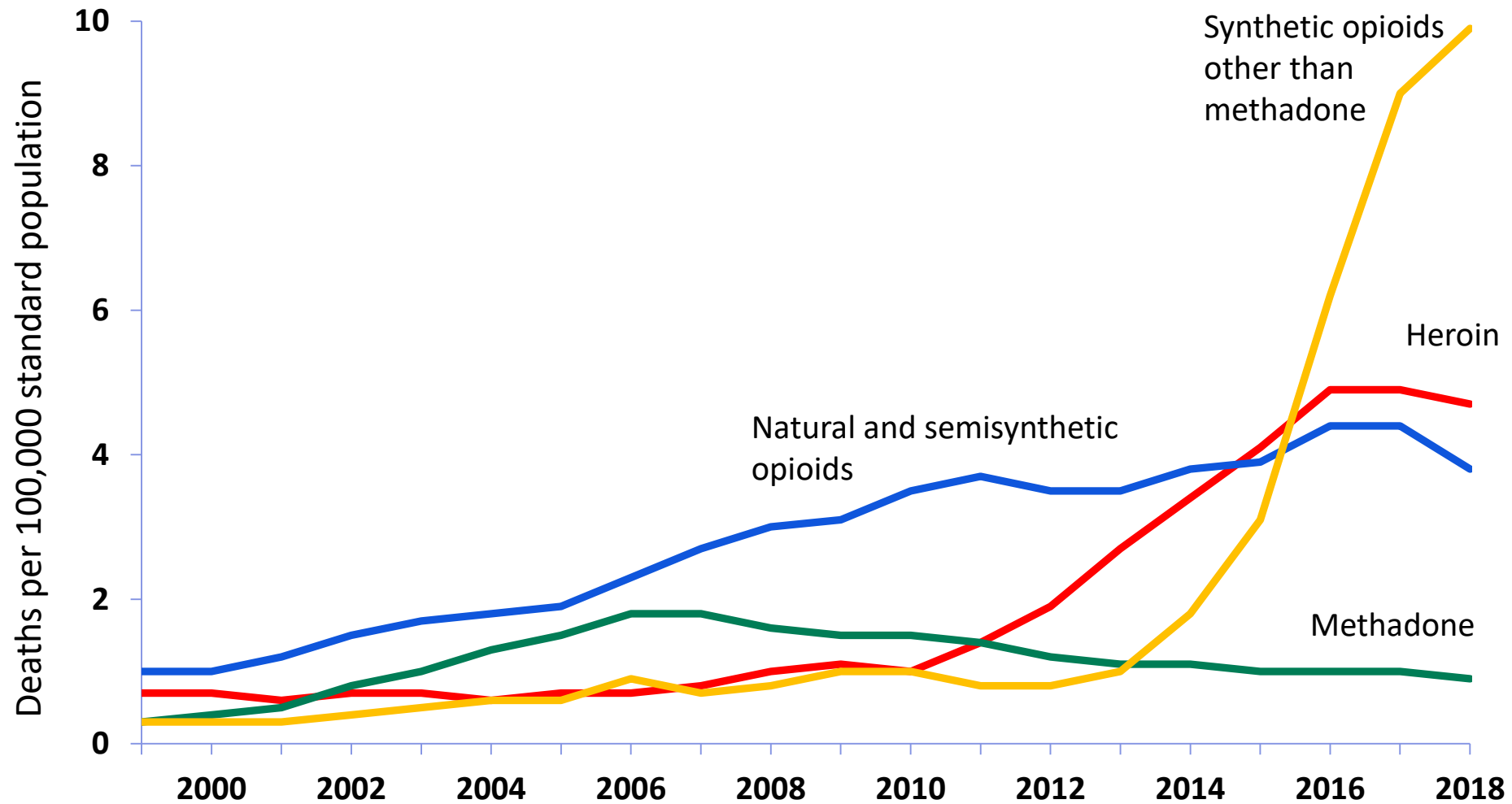
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Health Statistics



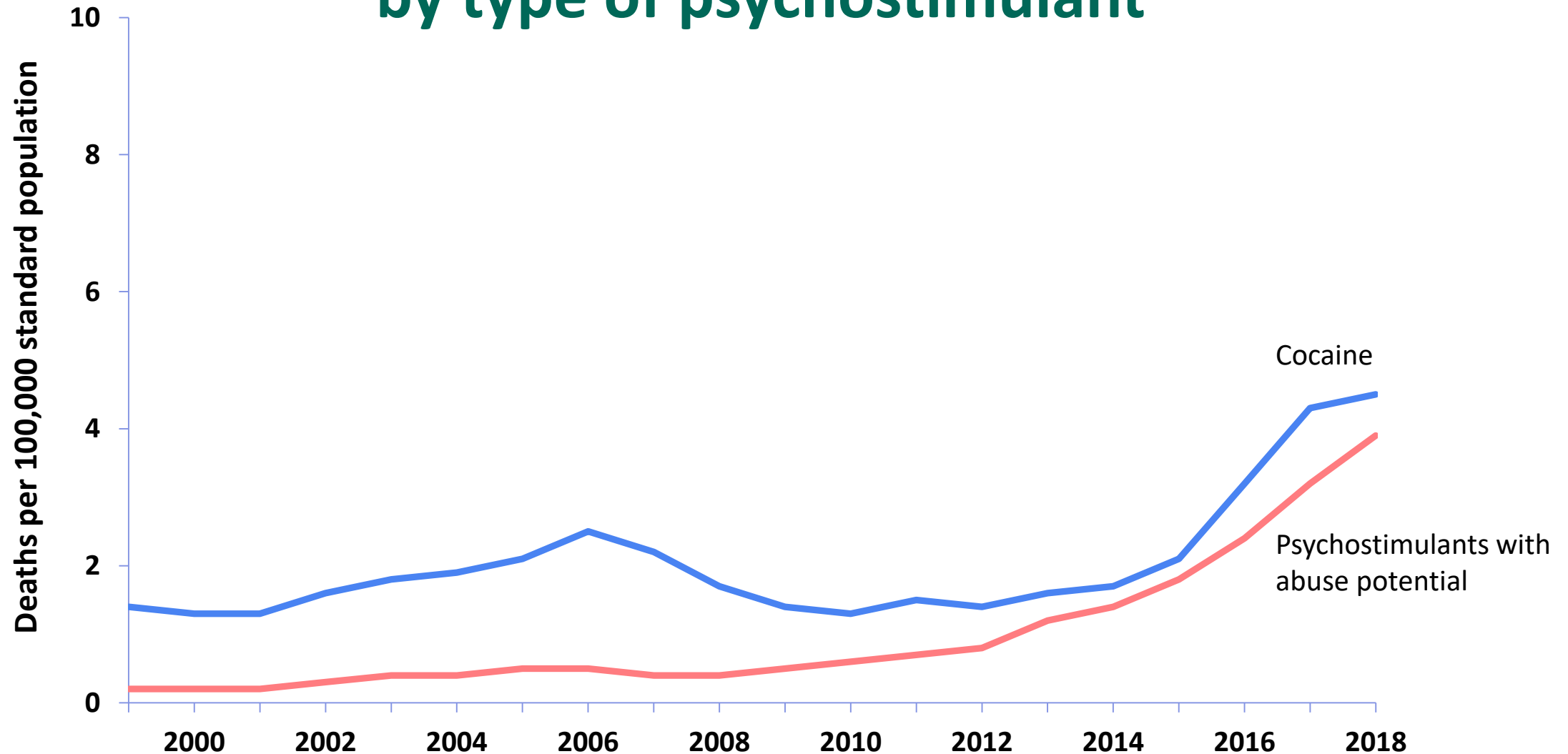
Age-adjusted drug overdose death rates, by sex



Drug overdose death rates involving opioids, by type of opioid



Drug overdose death rates involving psychostimulants, by type of psychostimulant



Monthly Provisional Drug Overdose Death Surveillance

National Center for Health Statistics

CDC > NCHS > National Vital Statistics System > Vital Statistics Rapid Release
> Surveillance Activities



Vital Statistics Rapid Release

Provisional Drug Overdose Death Counts

Provisional Drug Overdose Death Counts

Recent improvements in timeliness and data quality over the last year have prompted a re-evaluation of the length of time that data quality requirements have had to be met for states to be included in “Figure 2. 12 Month-ending Provisional Number of Drug Overdose Deaths by Drug or Drug Class.” As a result of this re-evaluation, trends for additional states are presented in Figure 2. Additional states will be added as they meet data quality and timeliness requirements. Please see the **Technical Notes** of the dashboard for more information.

This data visualization presents provisional counts for drug overdose deaths based on a current flow of mortality data in the National Vital Statistics System. Counts for the most recent final annual data are provided for

On This Page

[Dashboard](#)

[Data Tables for Current Dashboard](#)

[Technical notes](#)

[Nature and sources of data](#)

[Cause-of-death classification and definition of drug deaths](#)

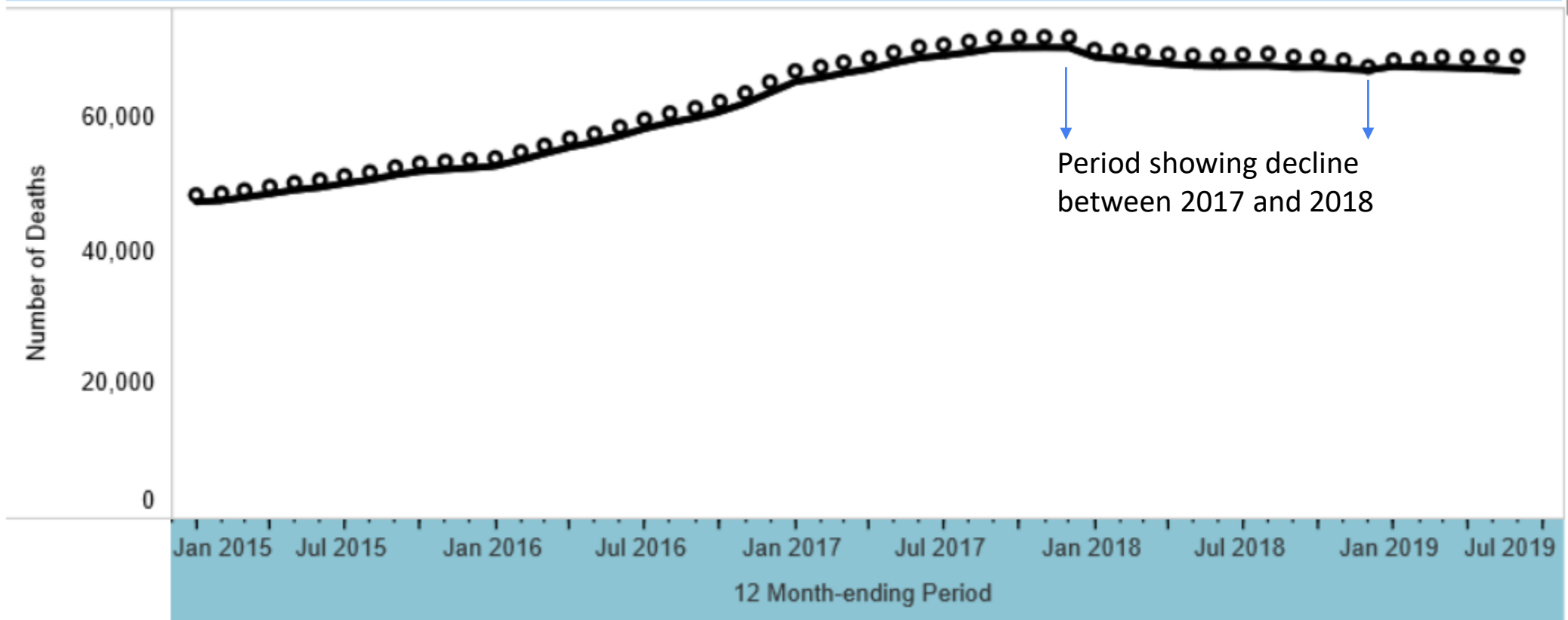
[Selection of specific states and other jurisdictions to report](#)

[Percent of records pending investigation](#)

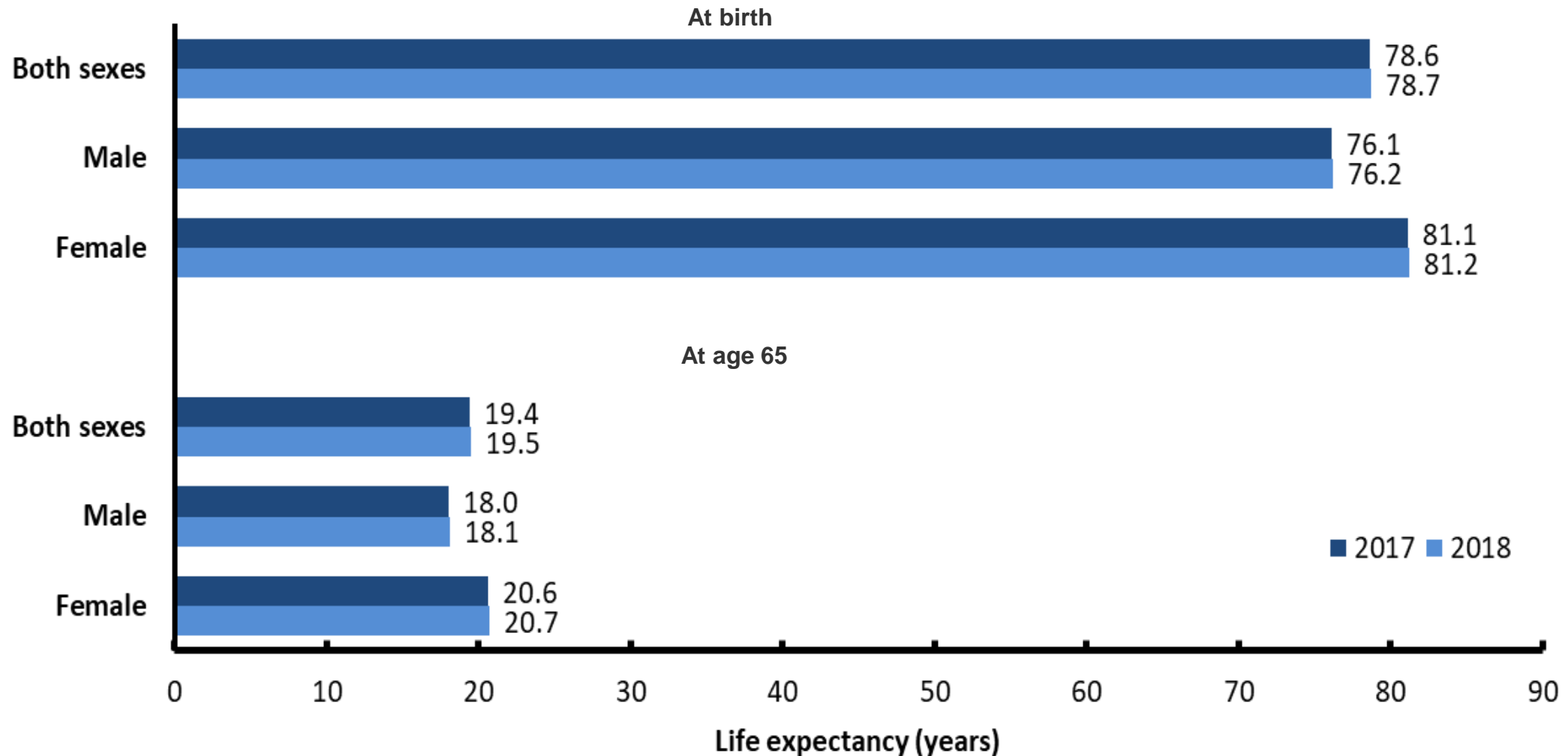
<https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>

12 Month-ending Provisional Number of Drug Overdose Deaths

Figure 1a. 12 Month-ending Provisional Counts of Drug Overdose Deaths: United States



Life Expectancy at Selected Ages, by sex



Life Expectancy Report

NATIONAL CENTER FOR HEALTH STATISTICS

Health E-Stats



JANUARY
2020

Changes in Life Expectancy at Birth, 2010–2018

by Kenneth D. Kochanek, M.A., Robert N. Anderson, Ph.D., and Elizabeth Arias, Ph.D., Division of Vital Statistics

<https://www.cdc.gov/nchs/data/hestat/life-expectancy/lifeexpectancy-H.pdf>

Life Expectancy at Birth, by sex

Year	Total	Male	Female
2010	78.7	76.2	81.0
2011	78.7	76.3	81.1
2012	78.8	76.4	81.2
2013	78.8	76.4	81.2
2014	78.9	76.5	81.3
2015	78.7	76.3	81.1
2016	78.7	76.2	81.1
2017	78.6	76.1	81.1
2018	78.7	76.2	81.2

Percent Contribution to the Changes in Life Expectancy, by cause of death and sex, 2014 – 2017

Total		Male		Female	
Cause of death	Percent	Cause of death	Percent	Cause of death	Percent
Positive contribution					
Cancer	63.4	Cancer	65.3	Cancer	62.7
Heart disease	8.5	Viral hepatitis	7.2	Heart disease	8.2
Influenza and pneumonia	6.7	Influenza and pneumonia	7.0	Influenza and pneumonia	6.3
Viral hepatitis	6.3	HIV disease	4.7	Viral hepatitis	5.3
HIV disease	4.0	Heart disease	3.7	Perinatal conditions	5.2
Other causes	11.2	Other causes	12.1	Other causes	12.3
Positive total	100.0	Positive total	100.0	Positive total	100.0
Negative contribution					
Unintentional injuries	50.6	Unintentional injuries	52.5	Unintentional injuries	40.1
Alzheimer disease	10.7	Suicide	8.8	Alzheimer disease	22.7
Suicide	7.8	Homicide	8.6	CLRD	4.6
Homicide	7.5	Alzheimer disease	5.9	Stroke	4.3
Diabetes	2.8	Diabetes	3.3	Suicide	3.9
Other causes	20.6	Other causes	20.9	Other causes	24.4
Negative total	100.0	Negative total	100.0	Negative total	100.0

Percent Contribution to Changes in Life Expectancy, by cause of death and sex, 2017 – 2018

Total		Male		Female	
Cause of death	Percent	Cause of death	Percent	Cause of death	Percent
Positive contribution					
Cancer	30.2	Unintentional injuries	32.9	Cancer	27.9
Unintentional injuries	25.4	Cancer	30.8	Unintentional injuries	16.1
CLRD	9.3	Homicide	8.4	Heart disease	13.3
Heart disease	7.0	CLRD	6.0	CLRD	12.7
Homicide	4.7	Viral hepatitis	3.0	Stroke	4.4
Other causes	23.4	Other causes	18.9	Other causes	25.6
Positive total	100.0	Positive total	100.0	Positive total	100.0
Negative contribution					
Influenza and pneumonia	27.4	Influenza and pneumonia	24.4	Influenza and pneumonia	28.3
Suicide	12.3	Suicide	11.6	Nutritional deficiencies	15.2
Nutritional deficiencies	10.5	Chronic liver disease	8.3	Suicide	7.7
Chronic liver disease	8.5	Kidney disease	8.2	Parkinson disease	7.4
Parkinson disease	7.2	Diabetes	7.0	Chronic liver disease	6.2
Other causes	34.1	Other causes	40.5	Other causes	35.2
Negative total	100.0	Negative total	100.0	Negative total	100.0

Source: <https://www.cdc.gov/nchs/data/hestat/life-expectancy/lifeexpectancy-H.pdf>

Mortality Reports

- ❖ Mortality in the United States, 2018:
<https://www.cdc.gov/nchs/data/databriefs/db355-h.pdf>
- ❖ Drug Overdose Deaths in the United States, 1999 – 2018:
<https://www.cdc.gov/nchs/data/databriefs/db356-h.pdf>
- ❖ Changes in Life Expectancy at Birth, 2010 – 2018:
<https://www.cdc.gov/nchs/data/hestat/life-expectancy/lifeexpectancy-H.pdf>
- ❖ Evaluation of the Pregnancy Status Checkbox on the Identification of Maternal Deaths: https://www.cdc.gov/nchs/data/nvsr/nvsr69/nvsr69_01-508.pdf
- ❖ The Impact of the Pregnancy Checkbox and Misclassification on Maternal Mortality Trends in the United States, 1999 – 2017:
https://www.cdc.gov/nchs/data/series/sr_03/sr03_044-508.pdf
- ❖ Maternal Mortality in the United States: Changes in Coding, Publication, and Data Release, 2018: https://www.cdc.gov/nchs/data/nvsr/nvsr69/nvsr69_02-508.pdf

Questions?

- Please submit your questions via the chat window in the Skype application
- The facilitator will address questions as time allows. Questions not answered may be forwarded to paoquery@cdc.gov

www.cdc.gov/nchs

<https://www.cdc.gov/nchs/maternal-mortality/>