

Infant Mortality in the United States, 2017: Data From the Period Linked Birth/Infant Death File

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Abstract

Objectives—This report presents 2017 infant mortality statistics by age at death, maternal race and Hispanic origin, maternal age, maternal state of residence, gestational age, and leading causes of death. Trends in infant mortality are also examined.

Methods—Descriptive tabulations of data are presented and interpreted for infant deaths and infant mortality rates using the 2017 period linked birth/infant death file; the linked birth/infant death file is based on birth and death certificates registered in all states and the District of Columbia.

Results—A total of 22,341 infant deaths were reported in the United States in 2017. The U.S. infant mortality rate was

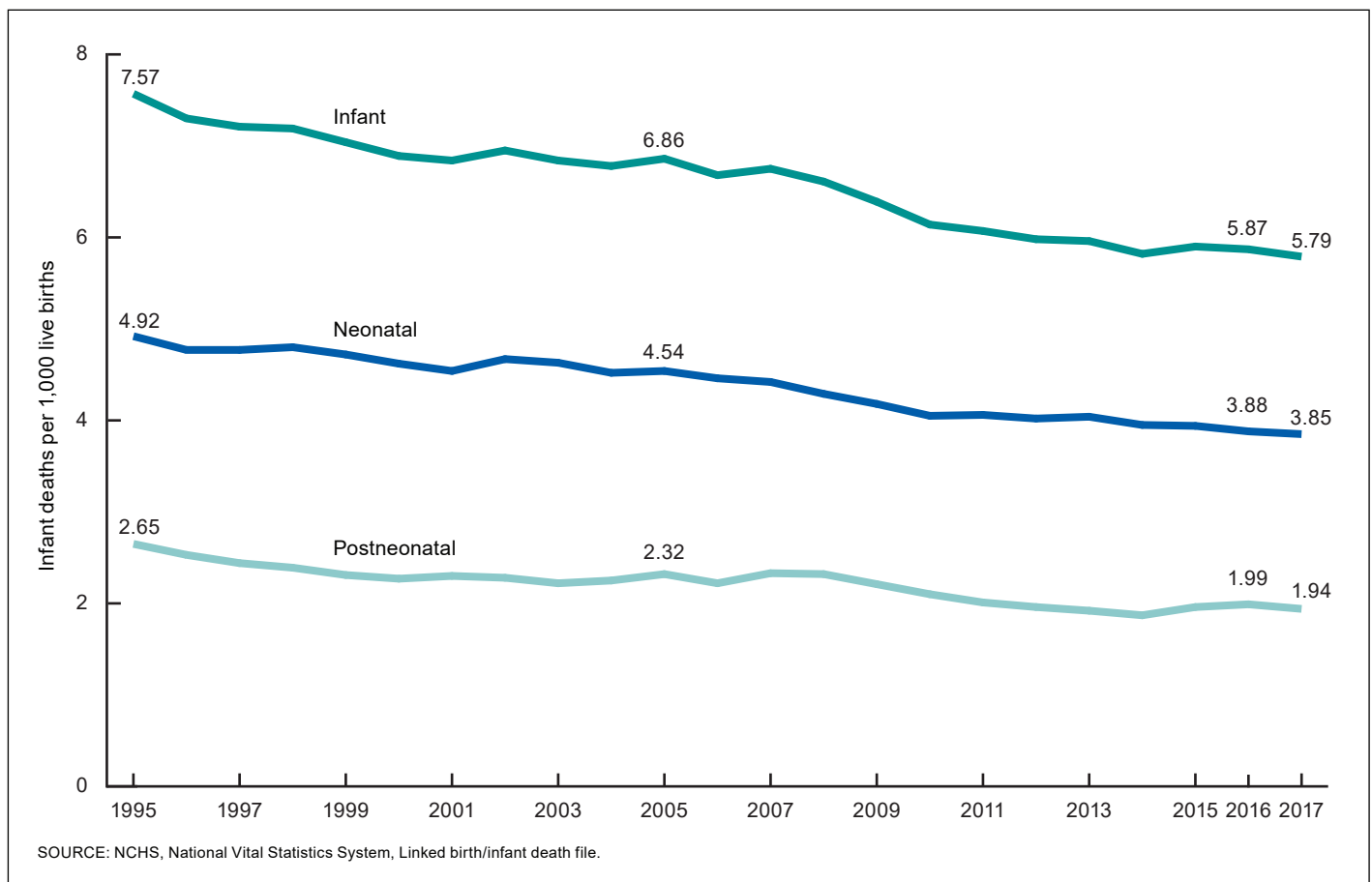


Figure 1. Infant, neonatal, and postneonatal mortality rates: United States, 1995–2017



5.79 infant deaths per 1,000 live births, not statistically different from the rate of 5.87 in 2016. The neonatal and postneonatal mortality rates for 2017 (3.85 and 1.94, respectively) were also essentially unchanged from 2016. The 2017 infant mortality rate for infants of non-Hispanic black women (10.97) was more than twice as high as that for infants of non-Hispanic white (4.67), non-Hispanic Asian (3.78), and Hispanic (5.10) women. Infant mortality rates by state for 2017 ranged from a low of 3.66 in Massachusetts to a high of 8.73 in Mississippi. Infants born very preterm (less than 28 weeks of gestation) had the highest mortality rate (384.39), 183 times as high as that for infants born at term (37–41 weeks of gestation) (2.10). The five leading causes of infant death in 2017 were the same as in 2016; cause of death rankings and mortality rates varied by maternal race and Hispanic origin. Preterm-related causes of death accounted for 34% of the 2017 infant deaths, unchanged from 2016.

Keywords: infant death • maternal and infant characteristics • vital statistics

Introduction

This report presents infant mortality statistics based on data from the 2017 period linked birth/infant death file. Infant mortality and mortality rates are described by age at death, maternal race and Hispanic origin, maternal age, state of residence, gestational age, leading causes of death, and preterm-related causes of death in the United States. Infant mortality trends are also presented by selected characteristics. In the linked file, information from the death certificate is linked to information from the birth certificate for each infant under 1 year of age who died in the 50 states, the District of Columbia, Puerto Rico, or Guam during 2017 (1). The purpose of the linkage is to use variables available from the birth certificate to conduct more detailed analyses of infant mortality patterns (2,3). For 2017, linked birth/infant death data are not available for American Samoa, the Commonwealth of the Northern Marianas, and the U.S. Virgin Islands.

The period linked file for 2017 marks the first data year for which the linked birth data for infant deaths for all 50 states and the District of Columbia are based on the 2003 revision of the U.S. Standard Certificate of Live Birth, and, accordingly, the first year for which national data on race and Hispanic-origin categories based on 1997 Office of Management and Budget (OMB) standards are available (4). This report replaces the earlier annual *National Vital Statistics Report* series on infant mortality (5) and has been redesigned to streamline the presentation of results.

The linked birth/infant death data set is the preferred source for examining infant mortality by race and Hispanic origin. Infant mortality rates by race and Hispanic origin are more accurately measured from the birth certificate compared with the death certificate. Some rates calculated from the mortality file differ from those published using the linked file. A more detailed discussion of differences is presented in [reference 1](#).

Methods

Data shown in this report are based on birth and infant death certificates registered in all states, the District of Columbia, Puerto Rico, and Guam. As part of the Vital Statistics Cooperative Program, each state provides matching birth and death certificate numbers to the National Center for Health Statistics for each infant under 1 year of age who died in the state during 2017. Further discussion of the process of linking births and deaths occurring in different states and file production can be found in the methodology section of the “User Guide to the 2017 Period Linked Birth/Infant Death Public Use File” (1).

In 2017, 99.6% of all infant death records were successfully linked to their corresponding birth records. These records were weighted to adjust for the 0.4% of infant death records that were not linked to their corresponding birth certificates (see [Technical Notes](#) and [reference 1](#)).

Information on births for age and race of mother is imputed if it is not reported on the birth certificate. In 2017, race of mother was imputed for 6.1% of births; mother’s age was imputed for 0.01% of births (2,3).

The race and Hispanic-origin groups shown in this report follow the 1997 OMB standards and differ from the bridged-race categories shown in previous reports (4). The new categories are: non-Hispanic single-race white, non-Hispanic single-race black or African American, non-Hispanic single-race American Indian or Alaska Native (AIAN), non-Hispanic single-race Asian, non-Hispanic single-race Native Hawaiian or Other Pacific Islander (NHOPI), and Hispanic (for brevity, text references omit the term “single-race”). Race and Hispanic origin are reported separately on the birth certificate. Data are shown in most cases for four specified Hispanic groups: Mexican, Puerto Rican, Cuban, and Central and South American. See [reference 3](#) for additional details on Hispanic origin. Because single-race data were not available for the entire United States in 2016 for the linked file, comparisons between 2017 and 2016 by race are not made in this report. This report also presents, for the first time, national data on race and Hispanic-origin categories based on the 1997 OMB standards (4). The 2003 revision of the U.S. Standard Certificate of Live Birth allows the reporting of five race categories either alone (i.e., single race) or in combination (i.e., more than one race or multiple races) for each parent (6), in accordance with the 1997 revised OMB standards (4). For further details on race reporting, see [reference 3](#). [Tables I–1](#) through [I–3](#) present bridged-race categories for selected demographic and health items.

Cause-of-death statistics are classified in accordance with the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (ICD–10) (7) (see [Technical Notes](#)). Preterm-related infant deaths, which are not included in the standard ranking of cause of death, are also shown. This measure was developed out of concern that standard approaches to categorizing the underlying cause of death may not adequately estimate the impact of preterm birth on infant mortality rates (8,9). A cause of death was considered preterm-related if 75% or more of total infant deaths attributed to that cause were deaths of infants born preterm (at under 37 weeks of gestation), and the cause of death was a direct consequence of preterm birth

based on a clinical evaluation and review of the literature (8,9). Preterm-related causes of death, as well as all other specific causes of death, are presented as infant deaths per 100,000 live births.

Data by maternal and infant characteristics

This report presents descriptive tabulations of infant mortality data by a variety of maternal and infant characteristics. These tabulations are useful for understanding the basic relationships between risk factors and infant mortality, unadjusted for the possible effects of other variables. In reality, women with one risk factor may often have other risk factors as well. For example, teenage mothers are more likely to be unmarried and of a low-income status; mothers who do not receive prenatal care are more likely to be of a low-income status and uninsured. The preferred method for disentangling the multiple interrelationships among risk factors is multivariate analysis; however, an understanding of the basic relationships between risk factors and infant mortality is a necessary precursor to more sophisticated types of analyses and may help identify high-risk subgroups for prevention. This report presents several key risk factors for infant mortality: age at death, maternal race and Hispanic origin, maternal age, maternal state of residence, gestational age, and leading causes of death. For brevity, additional selected risk factors of interest (sex, birthweight, plurality, and nativity) are presented in report tables, but are not discussed in this report.

Race and Hispanic origin—Infant mortality rates are presented by race and Hispanic origin of the mother. The linked file is useful for computing accurate infant mortality rates for this purpose because the race and Hispanic origin of the mother from the birth certificate are used in both the numerator and denominator of the infant mortality rate. In contrast, for rates based on the vital statistics mortality file, race information for the denominator is the race of the mother as reported on the birth certificate, whereas the race information for the numerator is the race of the decedent as reported on the death certificate (2,3,10). For more detail on the reliability of race and Hispanic-origin data from the linked file compared with the mortality file, see [reference 10](#).

Statistical significance—Text statements have been tested for statistical significance, and a statement that a given infant mortality rate is higher or lower than another rate indicates that the rates are significantly different using a two-tailed z test at the alpha level of 0.05. Information on the methods used to test for statistical significance, as well as information on differences between period and cohort data, the weighting of the linked file, maternal age, period of gestation, birthweight, and cause-of-death classification are available in [reference 1](#) and the [Technical Notes](#).

Results

Trends in infant mortality and infant age at death

- In 2017, there were 22,341 infant deaths reported in the United States; the U.S. infant mortality rate was 5.79 deaths per 1,000 live births, not statistically different from the rate of 5.87 in 2016 ([Figure 1](#), [Table 1](#)).
- The U.S. infant mortality rate has generally trended downward since 1995 (the first year the linked birth/infant death file has been available), and has declined 16% since 2005, the most recent high (6.86).
- The 2017 neonatal mortality rate (infant deaths at less than 28 days) was 3.85, not significantly different from the rate in 2016 (3.88); the neonatal mortality rate has generally declined since 1995 and is down 15% since 2005 (4.54).
- The 2017 postneonatal mortality rate (infant deaths at 28 days or greater) was 1.94, not statistically different from the postneonatal mortality rate in 2016 (1.99); the postneonatal mortality rate has also generally declined since 1995, and is down 16% since 2005 (2.32).

Race and Hispanic origin

- In 2017, infant mortality continues to vary by race; infants of non-Hispanic black women had the highest mortality rate (10.97 infant deaths per 1,000 births), followed by infants of non-Hispanic AIAN (9.21), non-Hispanic NHOPI (7.64), Hispanic (5.10), non-Hispanic white (4.67), and non-Hispanic Asian (3.78) women ([Figure 2](#), [Table 2](#)).
- Infants of non-Hispanic black women also had the highest neonatal mortality rate in 2017 (7.16) compared with infants of the other race and Hispanic-origin groups; the lowest neonatal mortality rate was for infants of non-Hispanic Asian women (2.71).
- In 2017, postneonatal mortality rates were higher for infants of non-Hispanic black (3.82), non-Hispanic NHOPI (3.82), and non-Hispanic AIAN (4.41) women than for infants of Hispanic (1.54), non-Hispanic white (1.63), and non-Hispanic Asian (1.08) women; infants of non-Hispanic Asian women had the lowest postneonatal mortality rate.
- Among Hispanic-origin subgroups in 2017, infants of Puerto Rican women had the highest infant mortality rate (6.48), followed by infants of Mexican (5.05), Central and South American (4.48), and Cuban (3.98) women ([Table 2](#)).

Maternal age

- Mortality rates were highest for infants of women under age 20 (9.01 infant deaths per 1,000 births), decreased through infants of women aged 30–34 (4.76), and then increased among infants born to older mothers (5.35 and 6.97 for women aged 35–39 and 40 and over, respectively) ([Table 2](#)).
- Mortality rates for infants of women under age 20 were 89% higher than those for infants of women aged 30–34, the group with the lowest rates.

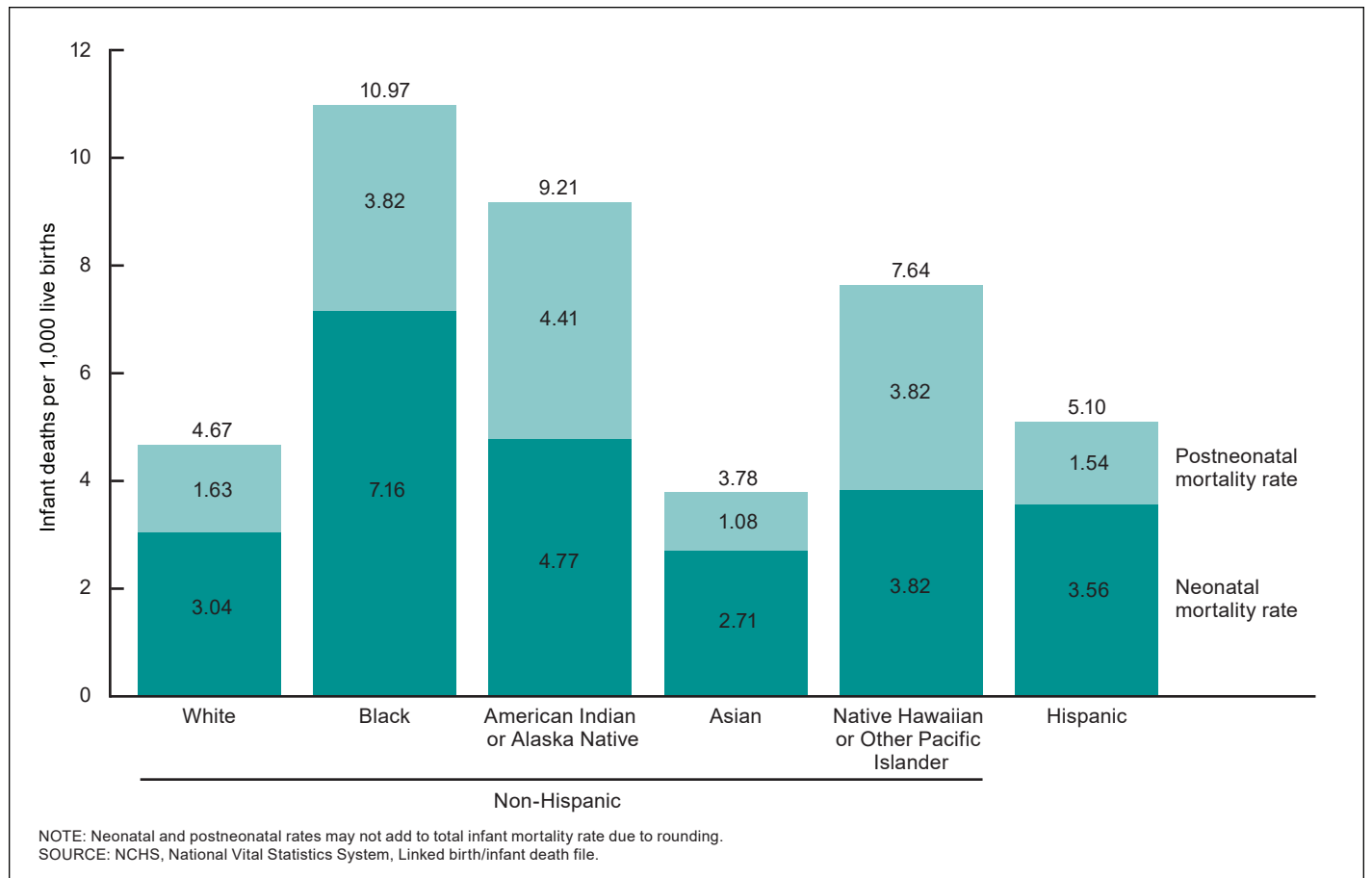


Figure 2. Infant, neonatal, and postneonatal mortality rates, by race and Hispanic origin: United States, 2017

State

- By state, infant mortality ranged from a low of 3.66 infant deaths per 1,000 births in Massachusetts to a high of 8.73 in Mississippi (Figure 3, Table 3).
- Eleven states had infant mortality rates significantly lower than the national infant mortality rate of 5.79: California, Colorado, Connecticut, Idaho, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, North Dakota, and Washington.
- Fifteen states and the District of Columbia had infant mortality rates significantly higher than the U.S. infant mortality rate: Alabama, Arkansas, Georgia, Indiana, Kentucky, Louisiana, Maryland, Michigan, Mississippi, North Carolina, Ohio, Oklahoma, South Carolina, South Dakota, and Tennessee.

Gestational age

- In 2017, 67% of infant deaths were to infants born preterm (less than 37 weeks of gestation) (Table 2, Table A).
- Infant mortality rates were highest for infants born before 28 weeks of gestation (384.39 infant deaths per 1,000 births), rates declined through 41 weeks (1.51), and then increased at 42 weeks or more (3.98).
- In 2017, the mortality rate for infants born before 28 weeks of gestation was 183 times the rate for term infants (37–41 weeks of gestation) (2.10).

Leading causes of infant death

- In 2017, the five leading causes of all infant deaths were congenital malformations (21% of infant deaths), disorders related to short gestation and low birthweight (17%), maternal complications (6%), sudden infant death syndrome

Table A. Infant mortality rate, by gestational age: United States, 2015–2017

Year	Less than 32 weeks	32–33 weeks	34–36 weeks	37–41 weeks	42 weeks or more
Deaths per 1,000 live births					
2017	187.56	20.50	8.50	2.10	3.98
2016	190.15	20.12	8.65	2.19	4.31
2015	193.54	20.79	8.76	2.17	4.20

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

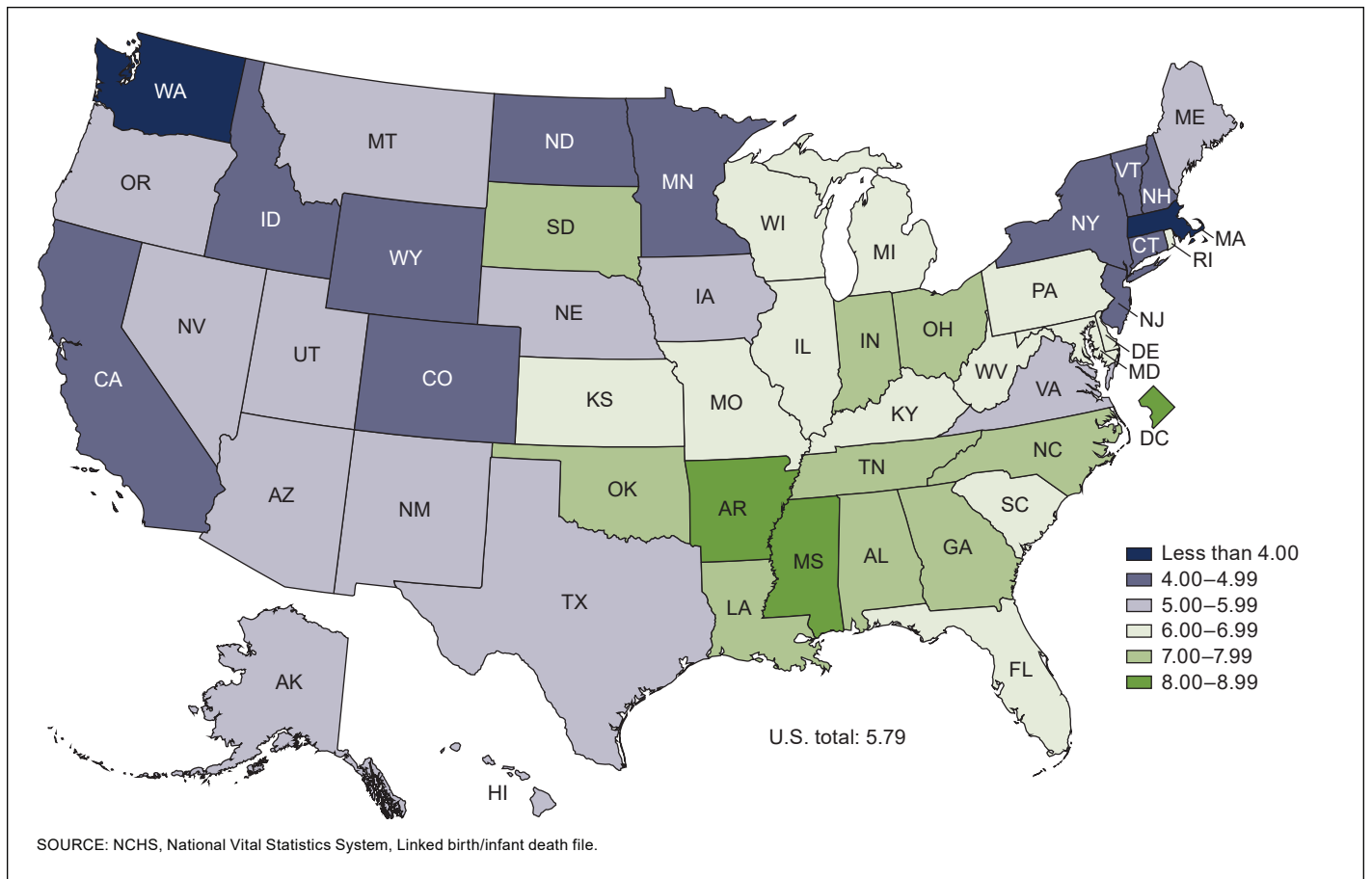


Figure 3. Infant mortality rates, by state: United States, 2017

(SIDS) (6%), and unintentional injuries (6%) (Table 4).

- In 2017, mortality rates for the five leading causes of infant death were 119.2 infant deaths per 100,000 births for congenital malformations, 97.4 for disorders related to short gestation and low birthweight, 37.2 for maternal complications, 35.3 for SIDS, and 34.1 for unintentional injuries.
- From 2016 through 2017, infant mortality rates for SIDS declined (38.0 infant deaths per 100,000 live births to 35.3), whereas rates for unintentional injuries increased (30.8 to 34.1).
- The five leading causes of death by race and Hispanic origin and Hispanic subgroup were the same as for all infants except for non-Hispanic Asian and Central and South American infants (Table 5).
- Infants of non-Hispanic black women had the highest mortality rates for disorders related to short gestation and low birthweight (241.5) and maternal complications (83.3).
- Infants of non-Hispanic Asian women had the lowest mortality rates of all race and Hispanic-origin groups for congenital malformations (84.7) and unintentional injuries (10.0). Infants of non-Hispanic white women had the lowest mortality rates for maternal complications (23.6); infants of non-Hispanic white and non-Hispanic Asian women had the lowest mortality rates for low birthweight (63.2 and 65.0, respectively).

Preterm-related causes of death

- In 2017, 7,675 out of 22,341 infant deaths (34%) in the United States were preterm-related, unchanged from 2016 (34%) (Table 6, Table B).
- The total preterm-related infant mortality rate was 199.1 infant deaths per 100,000 live births in 2017, which was not statistically different from the 2016 rate (201.6); the preterm-related infant mortality rate declined 8% from 2010 (216.3) through 2017 (Figure 4).
- In 2017, 41% of deaths for infants of non-Hispanic black women and 44% of deaths for infants of Cuban women were due to preterm-related causes; the percentage of infant deaths due to preterm-related causes was lowest for infants of non-Hispanic AIAN (26%), non-Hispanic NHOPI (28%), and non-Hispanic white (29%) women.
- The preterm-related infant mortality rate for non-Hispanic black women (454.1) was more than three times as high as that for non-Hispanic white women (135.1). (Trends in the preterm-related infant mortality rate by bridged race of mother are shown in Table 1-3.)

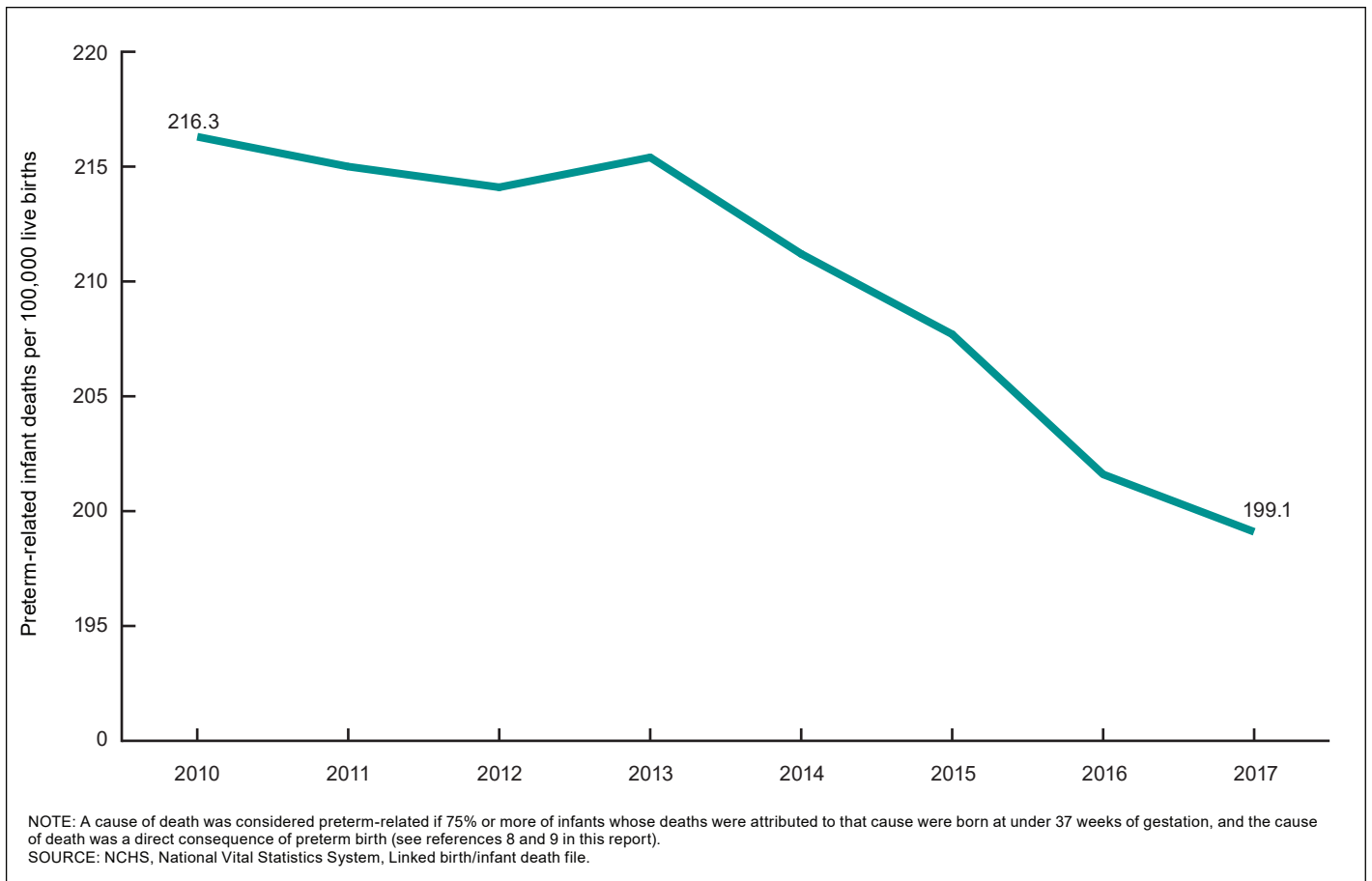


Figure 4. Preterm-related cause of death infant mortality rate: United States, 2010–2017

Table B. Percentages and rates for preterm-related infant deaths: United States, 2010–2017

Year	Percent	Deaths per 100,000 live births
2017	34.4	199.1
2016	34.4	201.6
2015	35.2	207.7
2014	36.3	211.2
2013	36.1	215.4
2012	35.8	214.1
2011	35.4	215.0
2010	35.2	216.3

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

References

- National Center for Health Statistics. User guide to the 2017 period linked birth/infant death public use file. Hyattsville, MD. 2019. Available from: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/periodlinked/LinkPE17Guide.pdf.
- Martin JA, Hamilton BE, Osterman MJK, Driscoll AK, Drake P. Births: Final data for 2017. National Vital Statistics Reports; vol 67 no 8. Hyattsville, MD: National Center for Health Statistics. 2018.
- National Center for Health Statistics. User guide to the 2017 natality public use file. Hyattsville, MD. 2018. Available from: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2017.pdf.
- Office of Management and Budget. Revisions to the standards for the classification of federal data on race and ethnicity. Fed Regist 62(210):58782–90. 1997.
- Mathews TJ, MacDorman MF, Thoma ME. Infant mortality statistics from the 2013 period linked birth/infant death data set. National Vital Statistics Reports; vol 64 no 9. Hyattsville, MD: National Center for Health Statistics. 2015.
- National Center for Health Statistics. 2003 revisions of the U.S. Standard Certificates and Reports. Available from: https://www.cdc.gov/nchs/nvss/vital_certificate_revisions.htm.
- World Health Organization. International statistical classification of diseases and health problems, 10th revision (ICD–10). 2nd ed. Geneva, Switzerland. 2004.
- Callaghan WM, MacDorman MF, Rasmussen SA, Qin C, Lackritz EM. The contribution of preterm birth to infant mortality rates in the United States. Pediatrics 118(4):1566–73. 2006.
- MacDorman MF, Callaghan WM, Mathews TJ, Hoyert DL, Kochanek KD. Trends in preterm-related infant mortality by race and ethnicity, United States, 1999–2004. Int J Health Serv 37(4):635–41. 2007.
- Xu JQ, Murphy SL, Kochanek KD, Bastian B, Arias E. Deaths: Final data for 2016. National Vital Statistics Reports; vol 67 no 5. Hyattsville, MD: National Center for Health Statistics. 2018. Available from: https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_05.pdf.
- National Center for Health Statistics. U.S. Standard Certificate of Live Birth. 2003. Available from: <https://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf>.

12. Kochanek KD, Murphy SL, Xu JQ, Arias E. Deaths: Final data for 2017. *National Vital Statistics Reports*; vol 68 no 9. Hyattsville, MD: National Center for Health Statistics. 2019.
13. Martin JA, Osterman MJK, Kirmeyer SE, Gregory ECW. Measuring gestational age in vital statistics data: Transitioning to the obstetric estimate. *National Vital Statistics Reports*; vol 64 no 5. Hyattsville, MD: National Center for Health Statistics. 2015.
14. National Center for Health Statistics. National Vital Statistics System. Instructions for classifying the underlying cause of death, 2017. NCHS Instruction Manual, part 2a. Hyattsville, MD.
15. National Center for Health Statistics. National Vital Statistics System. ICD–10 ACME decision tables for classifying underlying causes of death, 2016. NCHS Instruction Manual, part 2c. Hyattsville, MD.
16. National Center for Health Statistics. Mortality multiple cause-of-death public use data file documentation (published annually). Hyattsville, MD. 2016.
17. World Health Organization. Manual of the international statistical classification of diseases, injuries, and causes of death, ninth revision. Geneva, Switzerland. 1977.
18. Anderson RN, Miniño AM, Hoyert DL, Rosenberg HM. Comparability of cause of death between ICD–9 and ICD–10: Preliminary estimates. *National Vital Statistics Reports*; vol 49 no 2. Hyattsville, MD: National Center for Health Statistics. 2001.
19. National Center for Health Statistics. Comparability of cause-of-death classification between ICD revisions. 2008.
20. National Center for Health Statistics. National Vital Statistics System. ICD–10 cause-of-death lists for tabulating mortality statistics (updated March 2011 to include WHO updates to ICD–10 for data year 2011). NCHS Instruction Manual: part 9. Hyattsville, MD. 2011.

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Table 1. Live births, infant, neonatal, and postneonatal deaths and mortality rates: United States, 1995–2017

Year	Number				Deaths per 1,000 live births		
	Live births	Infant deaths	Neonatal deaths	Postneonatal deaths	Infant	Neonatal	Postneonatal
2017	3,855,500	22,341	14,844	7,497	5.79	3.85	1.94
2016	3,945,875	23,157	15,303	7,854	5.87	3.88	1.99
2015	3,978,497	23,462	15,672	7,786	5.90	3.94	1.96
2014	3,988,076	23,211	15,737	7,474	5.82	3.95	1.87
2013	3,932,181	23,446	15,893	7,553	5.96	4.04	1.92
2012	3,952,841	23,654	15,887	7,767	5.98	4.02	1.96
2011	3,953,590	24,001	16,065	7,936	6.07	4.06	2.01
2010	3,999,386	24,572	16,193	8,379	6.14	4.05	2.10
2009	4,130,665	26,408	17,261	9,148	6.39	4.18	2.21
2008	4,247,726	28,075	18,238	9,837	6.61	4.29	2.32
2007	4,316,233	29,153	19,094	10,059	6.75	4.42	2.33
2006	4,265,593	28,509	19,041	9,468	6.68	4.46	2.22
2005	4,138,573	28,384	18,782	9,602	6.86	4.54	2.32
2004	4,112,059	27,860	18,602	9,258	6.78	4.52	2.25
2003	4,090,007	27,995	18,935	9,060	6.84	4.63	2.22
2002	4,021,825	27,970	18,791	9,179	6.95	4.67	2.28
2001	4,026,036	27,523	18,275	9,248	6.84	4.54	2.30
2000	4,058,882	27,961	18,733	9,227	6.89	4.62	2.27
1999	3,959,417	27,865	18,701	9,164	7.04	4.72	2.31
1998	3,941,553	28,325	18,915	9,410	7.19	4.80	2.39
1997	3,880,894	27,968	18,507	9,461	7.21	4.77	2.44
1996	3,891,494	28,419	18,556	9,863	7.30	4.77	2.53
1995	3,899,589	29,505	19,186	10,319	7.57	4.92	2.65

NOTES: Infant deaths are weighted to adjust for the 0.4% of infant death records that were not linked to their corresponding birth certificates; the neonatal and postneonatal mortality rates combined may not exactly add to totals due to rounding.

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

Table 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and race and Hispanic origin of mother: United States, 2017

Characteristic	Non-Hispanic						Hispanic					
	Total	White	Black	American Indian or Alaska Native ¹	Asian	Native Hawaiian or Other Pacific Islander	Total ²	Mexican	Puerto Rican	Cuban	Central and South American	
Infant deaths per 1,000 live births in specified group												
Total	5.79	4.67	10.97	9.21	3.78	7.64	5.10	5.05	6.48	3.98	4.48	
Age at death												
Total neonatal	3.85	3.04	7.16	4.77	2.71	3.82	3.56	3.50	4.34	2.95	3.19	
Early neonatal (less than 7 days)	3.10	2.39	5.85	3.91	2.25	3.08	2.94	2.88	3.42	2.40	2.73	
Late neonatal (7–27 days)	0.75	0.66	1.31	0.87	0.46	*	0.62	0.62	0.92	*	0.46	
Postneonatal	1.94	1.63	3.82	4.41	1.08	3.82	1.54	1.55	2.13	1.03	1.29	
Sex												
Male	6.32	5.17	12.01	7.58	4.12	7.87	5.40	5.38	6.99	3.83	4.48	
Female	5.24	4.15	9.90	10.86	3.42	7.38	4.78	4.71	5.95	4.14	4.50	
Period of gestation (weeks)												
Less than 34	116.87	100.26	141.93	130.01	104.90	126.98	116.22	117.26	123.35	102.56	113.56	
Less than 28	384.39	379.58	380.21	409.92	387.88	493.69	381.78	388.45	392.00	375.00	377.31	
28–31	43.78	43.83	44.54	*	29.81	*	44.35	43.68	40.74	*	47.70	
32–33	20.50	19.88	22.47	*	14.66	*	20.24	22.63	*	*	18.43	
34–36	8.50	8.35	9.93	14.87	6.20	*	7.59	8.01	6.09	*	6.91	
37–41	2.10	1.93	3.50	4.22	1.17	3.46	1.72	1.75	2.10	1.08	1.46	
37–38	3.22	3.00	4.81	6.37	1.76	*	2.72	2.82	3.10	*	2.27	
39–40	1.66	1.57	2.86	2.86	0.92	*	1.29	1.29	1.50	*	1.13	
41	1.51	1.33	2.52	*	*	–	1.25	1.14	*	–	*	
42 or more	3.98	3.24	*	–	–	–	*	*	*	–	*	
Birthweight												
Less than 2,500 grams	46.84	41.10	56.98	60.10	32.69	58.82	48.19	49.99	48.02	40.02	46.55	
Less than 1,500 grams	208.91	195.23	216.44	248.84	191.44	272.73	216.20	222.19	214.90	206.52	213.64	
1,500–2,499 grams	13.17	13.42	13.14	20.50	8.09	*	13.55	14.82	10.01	*	13.91	
2,500 grams or more	2.03	1.89	3.40	4.52	1.08	3.11	1.62	1.63	2.00	1.11	1.34	
2,500–4,499 grams	2.03	1.89	3.39	4.53	1.08	3.17	1.61	1.63	1.97	1.12	1.31	
4,500 grams or more	2.31	2.00	*	*	–	–	*	*	*	*	*	
Plurality												
Single births	5.15	4.16	9.70	8.54	3.21	7.51	4.59	4.54	5.91	3.49	4.03	
Twin births	22.51	16.45	38.51	33.67	21.76	*	23.59	24.54	23.50	*	20.25	
Triplet and higher-order births	69.95	66.70	86.44	–	*	–	71.66	76.49	*	–	*	

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and race and Hispanic origin of mother: United States, 2017—Con.

Characteristic	Non-Hispanic						Hispanic				
	Total	White	Black	American Indian or Alaska Native ¹	Asian	Native Hawaiian or Other Pacific Islander	Total ²	Mexican	Puerto Rican	Cuban	Central and South American
Infant deaths per 1,000 live births in specified group—Con.											
Age of mother											
Under 20	9.01	8.50	13.00	15.78	*	*	6.70	6.48	8.53	*	4.84
20–24	6.95	6.11	11.41	8.17	4.81	9.98	5.06	4.87	6.96	*	4.35
25–29	5.54	4.57	10.43	8.51	3.35	*	4.65	4.57	5.04	4.09	4.14
30–34	4.76	3.75	10.57	7.06	3.55	*	4.47	4.58	5.88	4.00	3.99
35–39	5.35	4.10	10.21	10.89	3.94	*	5.78	5.65	8.05	*	5.29
40–54	6.97	5.31	13.56	*	4.82	*	7.13	8.04	*	–	6.45
Mother's place of birth											
Born in the 50 states and the District of Columbia	6.06	4.75	11.62	9.29	3.83	9.08	5.33	5.17	6.31	4.02	4.84
Born elsewhere	4.62	3.19	7.13	*	3.78	6.80	4.78	4.83	6.81	3.96	4.43
Live births											
Total	3,855,500	1,992,461	560,715	29,957	249,250	9,426	898,764	512,126	70,813	23,362	145,614
Sex											
Male	1,972,885	1,022,316	285,040	15,310	128,520	4,954	457,788	260,530	36,219	12,010	74,353
Female	1,882,615	970,145	275,675	14,647	120,730	4,472	440,976	251,596	34,594	11,352	71,261
Period of gestation (weeks)											
Less than 34	106,417	45,761	27,274	923	5,453	252	23,025	12,570	2,351	585	3,408
Less than 28	25,913	9,200	8,548	213	1,246	51	5,605	3,012	625	144	811
28–31	35,476	15,429	9,070	304	483	79	7,635	4,167	761	188	1,132
32–33	45,028	21,132	9,656	406	2,456	122	9,785	5,391	965	253	1,465
34–36	276,309	134,561	50,750	2,622	15,797	740	63,368	35,590	5,580	1,528	9,839
37–41	3,457,455	1,803,063	480,661	26,273	227,567	8,376	809,882	462,440	62,732	21,210	131,954
37–38	1,001,601	481,048	162,072	8,629	69,989	2,697	247,788	141,772	19,366	5,970	39,729
39–40	2,214,983	1,180,394	290,803	16,059	145,139	5,050	513,342	293,475	39,221	14,197	83,460
41	240,871	141,621	27,786	1,585	12,439	629	48,752	27,193	4,145	1,043	8,765
42 or more	12,560	8,025	1,585	80	366	42	2,034	1,221	121	36	359
Not stated	2,759	1,051	445	59	67	16	455	305	29	3	54
Birthweight											
Less than 2,500 grams	319,748	139,651	78,126	2,479	21,259	731	66,937	36,089	6,872	1,724	10,140
Less than 1,500 grams	54,989	21,262	16,850	430	2,852	110	11,443	6,121	1,275	276	1,657
1,500–2,499 grams	264,759	118,389	61,276	2,049	18,407	621	55,494	29,968	5,597	1,448	8,483
2,500 grams or more	3,533,652	1,851,905	482,265	27,463	227,910	8,691	831,573	475,872	63,916	21,634	135,436
2,500–4,499 grams	3,492,927	1,826,141	479,007	26,919	226,779	8,510	822,921	470,509	63,402	21,406	134,175
4,500 grams or more	40,725	25,764	26,919	544	1,131	181	35,827	5,363	514	228	1,261
Not stated	2,100	905	324	15	81	4	254	165	25	4	38
Plurality											
Single births	3,723,273	1,919,433	537,062	29,144	241,884	9,186	876,109	499,957	68,564	22,610	142,223
Twin births	128,310	70,704	22,982	802	7,216	237	22,041	11,816	2,170	732	3,308
Triplet and higher-order births	3,917	2,324	671	11	150	3	614	353	79	20	83

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and race and Hispanic origin of mother: United States, 2017—Con.

Characteristic	Non-Hispanic						Hispanic				
	Total	White	Black	American Indian or Alaska Native ¹	Asian	Native Hawaiian or Other Pacific Islander	Total ²	Mexican	Puerto Rican	Cuban	Central and South American
Age of mother											
Live births—Con.											
Under 20	196,294	72,253	40,629	2,916	1,736	493	70,128	42,098	5,859	825	8,683
20–24	764,780	342,954	148,091	8,565	16,633	2,405	219,206	129,890	19,957	4,117	27,124
25–29	1,123,577	594,375	167,778	9,171	63,004	2,838	255,130	145,561	21,037	7,579	38,175
30–34	1,091,917	627,425	122,564	5,948	97,984	2,254	207,352	114,507	14,632	6,995	39,338
35–39	554,796	297,050	65,129	2,754	56,402	1,181	116,353	63,162	7,578	3,053	25,318
40–54	124,136	58,404	16,524	603	13,491	255	30,595	16,908	1,750	793	6,976
Mother's place of birth											
Born in the 50 states and the District of Columbia	2,959,123	1,854,098	464,028	29,594	44,161	3,414	466,967	281,960	50,423	10,209	24,601
Born elsewhere	888,825	135,876	94,607	321	204,400	5,884	430,816	229,785	20,112	13,144	120,892
Not stated	7,552	2,487	2,080	42	689	128	981	381	278	9	121
Infant deaths											
Total	22,341	9,306	6,152	276	943	72	4,583	2,588	459	93	653
Age at death											
Total neonatal	14,844	6,061	4,012	143	675	36	3,198	1,795	307	69	465
Early neonatal (less than 7 days)	11,971	4,755	3,278	117	560	29	2,640	1,476	242	56	398
Late neonatal (7–27 days)	2,873	1,306	734	26	115	7	560	319	65	13	67
Postneonatal	7,497	3,246	2,140	132	268	36	1,383	792	151	24	188
Sex											
Male	12,467	5,281	3,423	116	530	39	2,474	1,402	253	46	333
Female	9,874	4,025	2,728	159	413	33	2,110	1,186	206	47	321
Period of gestation (weeks)											
Less than 34	12,437	4,588	3,871	120	572	32	2,676	1,474	290	60	387
Less than 28	9,961	3,492	3,250	87	483	25	2,140	1,170	245	54	306
28–31	1,553	676	404	19	52	5	339	182	31	5	54
32–33	923	420	217	14	36	2	198	122	14	1	27
34–36	2,350	1,123	504	39	98	8	481	285	34	10	68
37–41	7,263	3,488	1,681	111	267	29	1,396	810	132	23	192
37–38	3,221	1,443	779	55	123	11	675	400	60	10	90
39–40	3,678	1,856	832	46	133	18	660	379	59	13	94
41	364	189	70	10	11	–	61	31	13	–	8
42 or more	50	26	15	–	–	–	6	1	2	–	2
Not stated	241	81	80	5	6	3	22	17	1	–	3

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and race and Hispanic origin of mother: United States, 2017—Con.

Characteristic	Non-Hispanic						Hispanic				
	Total	White	Black	American Indian or Alaska Native ¹	Asian	Native Hawaiian or Other Pacific Islander	Total ²	Mexican	Puerto Rican	Cuban	Central and South American
Birthweight							Infant deaths—Con.				
Less than 2,500 grams	14,976	5,740	4,452	149	695	43	3,226	1,804	330	69	472
Less than 1,500 grams	11,488	4,151	3,647	107	546	30	2,474	1,360	274	57	354
1,500–2,499 grams	3,488	1,589	805	42	149	13	752	444	56	12	118
2,500 grams or more	7,188	3,499	1,641	124	246	27	1,344	774	128	24	181
2,500–4,499 grams	7,093	3,448	1,625	122	246	27	1,325	765	125	24	177
4,500 grams or more	94	51	16	2	–	–	19	9	3	–	4
Not stated	178	67	59	2	3	2	13	10	1	–	1
Plurality											
Single births	19,178	7,989	5,209	249	777	69	4,019	2,271	405	79	573
Twin births	2,888	1,163	885	27	157	3	520	290	51	14	67
Triplet and higher-order births	274	155	58	–	9	–	44	27	3	–	13
Age of mother											
Under 20	1,769	614	528	46	17	2	470	273	50	6	42
20–24	5,319	2,095	1,689	70	80	24	1,109	632	139	14	118
25–29	6,222	2,718	1,750	78	211	16	1,186	665	106	31	158
30–34	5,200	2,351	1,296	42	348	16	926	524	86	28	157
35–39	2,966	1,219	665	30	222	13	672	357	61	14	134
40–54	865	310	224	9	65	1	218	136	16	–	45
Mother's place of birth											
Born in the 50 states and the District of Columbia	17,946	8,806	5,391	275	169	31	2,491	1,459	318	41	119
Born elsewhere	4,103	434	675	1	772	40	2,061	1,111	137	52	535
Not stated	292	66	85	–	2	1	31	18	4	–	–

* Rate does not meet NCHS standards of reliability; based on fewer than 20 deaths in the numerator.

– Quantity zero.

¹Includes Aleut and Eskimo persons.

²Includes other and unknown Hispanic origin not stated, not shown separately.

NOTES: Infant deaths are weighted, so numbers may not exactly add to totals due to rounding. Not stated responses were included in totals but were not distributed among groups for rate computations. Race and Hispanic origin are reported separately on birth certificates. Race categories are consistent with the 1997 Office of Management and Budget standards. Persons of Hispanic origin may be of any race.

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

Table 3. Infant mortality rates: United States and each state, 2017

[By place of residence]

Area	Rate	Infant deaths	Live births
		Deaths per 1,000 births	
United States ¹	5.79	22,341	3,855,500
Alabama	7.38	435	58,941
Alaska	5.74	60	10,445
Arizona	5.70	467	81,872
Arkansas	8.10	304	37,520
California	4.20	1,981	471,658
Colorado	4.49	289	64,382
Connecticut	4.51	159	35,221
Delaware	6.26	68	10,855
District of Columbia	8.16	78	9,560
Florida	6.10	1,364	223,630
Georgia	7.18	928	129,243
Hawaii	5.42	95	17,517
Idaho	4.55	101	22,181
Illinois	6.12	915	149,390
Indiana	7.22	593	82,170
Iowa	5.31	204	38,430
Kansas	6.02	220	36,519
Kentucky	6.59	361	54,752
Louisiana	7.06	431	61,018
Maine	5.85	72	12,298
Maryland	6.43	461	71,641
Massachusetts	3.66	259	70,702
Michigan	6.78	755	111,426
Minnesota	4.80	329	68,595
Mississippi	8.73	326	37,357
Missouri	6.26	457	73,034
Montana	5.51	65	11,799
Nebraska	5.54	143	25,821
Nevada	5.85	209	35,756
New Hampshire	4.21	51	12,116
New Jersey	4.45	451	101,250
New Mexico	5.85	139	23,767
New York	4.58	1,053	229,737
North Carolina	7.03	845	120,125
North Dakota	4.38	47	10,737
Ohio	7.18	983	136,832
Oklahoma	7.79	391	50,214
Oregon	5.34	233	43,631
Pennsylvania	6.08	837	137,745
Rhode Island	6.20	66	10,638
South Carolina	6.52	372	57,029
South Dakota	7.75	94	12,134
Tennessee	7.29	591	81,016
Texas	5.85	2,236	382,050
Utah	5.89	286	48,585
Vermont	4.77	27	5,655
Virginia	5.90	592	100,391
Washington	3.88	340	87,562
West Virginia	6.96	130	18,675
Wisconsin	6.39	415	64,975
Wyoming	4.64	32	6,903
Puerto Rico	6.75	164	24,310
Guam	7.30	24	3,287

¹Does not include Puerto Rico or Guam.

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

Table 4. Infant deaths, percentage of deaths, and infant mortality rates, by five leading causes of infant death: United States, 2010–2017

Year	Congenital malformations (Q00–Q99)			Short gestation and low birth weight, not elsewhere classified (P07)			Maternal complications of pregnancy (P01)			Sudden infant death syndrome (R95)			Accidents (unintentional injuries) (V01–X59)		
	Number	Percent	Rate (deaths per 100,000 live births)	Number	Percent	Rate (deaths per 100,000 live births)	Number	Percent	Rate (deaths per 100,000 live births)	Number	Percent	Rate (deaths per 100,000 live births)	Number	Percent	Rate (deaths per 100,000 live births)
2017	4,596	20.6	119.2	3,757	16.8	97.4	1,436	6.4	37.2	1,360	6.1	35.3	1,313	5.9	34.1
2016	4,823	20.8	122.2	3,926	17.0	99.5	1,407	6.1	35.7	1,498	6.5	38.0	1,217	5.3	30.8
2015	4,847	20.7	121.8	4,087	17.4	102.7	1,527	6.5	38.4	1,567	6.7	39.4	1,289	5.5	32.4
2014	4,754	20.5	119.2	4,172	18.0	104.6	1,580	6.8	39.6	1,541	6.6	38.6	1,163	5.0	29.2
2013	4,778	20.4	121.5	4,213	18.0	107.1	1,597	6.8	40.6	1,561	6.7	39.7	1,150	4.9	29.2
2012	4,967	21.0	125.7	4,214	17.8	106.6	1,518	6.4	38.4	1,676	7.1	42.4	1,163	4.9	29.4
2011	5,016	20.9	126.9	4,115	17.1	104.1	1,598	6.7	40.4	1,905	7.9	48.2	1,167	4.9	29.5
2010	5,115	20.8	127.9	4,151	16.9	103.8	1,563	6.4	39.1	2,058	8.4	51.5	1,107	4.5	27.7

NOTE: The five leading causes of death were the same during 2010–2017.

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

Table 5. Infant deaths and mortality rates for the five leading causes of infant death, by race and Hispanic origin of mother: United States, 2017

[Rates are per 100,000 live births in specified group]

Cause of death (based on the <i>International Statistical Classification of Diseases, 10th Revision, 1992</i>)	All races			White			Black			American Indian or Alaska Native			Asian ¹		
	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate
All causes	...	22,341	579.5	...	9,306	467.1	...	6,152	1,097.2	...	276	921.3	...	943	378.3
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	1	4,596	119.2	1	2,138	107.3	2	822	146.6	1	50	166.9	1	211	84.7
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	3,757	97.4	2	1,260	63.2	1	1,354	241.5	2	31	103.5	2	162	65.0
Newborn affected by maternal complications of pregnancy (P01)	3	1,436	37.2	5	470	23.6	3	467	83.3	5	10	*	3	83	33.3
Sudden infant death syndrome (R95)	4	1,360	35.3	3	688	34.5	5	391	69.7	4	23	76.8	8	19	*
Accidents (unintentional injuries) (V01–X59)	5	1,313	34.1	4	619	31.1	4	397	70.8	3	25	83.5	7	25	10.0

Cause of death (based on the <i>International Statistical Classification of Diseases, 10th Revision, 1992</i>)	Total Hispanic			Mexican			Puerto Rican			Central and South American ²		
	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate
All causes	...	4,584	509.9	...	2,588	505.3	...	459	648.2	...	653	448.4
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	1	1,199	133.4	1	727	142.0	2	66	93.2	1	190	130.5
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	764	85.0	2	419	81.8	1	87	122.9	2	114	78.3
Newborn affected by maternal complications of pregnancy (P01)	3	310	34.5	3	162	31.6	3	33	46.6	3	50	34.3
Sudden infant death syndrome (R95)	5	174	19.4	5	94	18.4	5	23	32.5	7	19	*
Accidents (unintentional injuries) (V01–X59)	4	186	20.7	4	104	20.3	4	25	35.3	4	24	16.5

... Category not applicable.

* Rate does not meet NCHS standards of reliability; based on fewer than 20 deaths in the numerator.

¹For non-Hispanic Asian persons, Bacterial sepsis of newborn (P36) was the fourth leading cause of death, with 40 deaths and a rate of 16.0. Diseases of the circulatory system (I00–I99) was the fifth leading cause of death, with 27 deaths and a rate of 10.8.

²For Central and South American persons, Newborn affected by complications of placenta, cord and membranes (P02) was the fifth leading cause of death, with 24 deaths and a rate of 16.5.

NOTES: Reliable cause-specific infant mortality rates cannot be computed for Cuban or non-Hispanic Native Hawaiian or Other Pacific Islander persons because of the small number of infant deaths. Race and Hispanic origin are reported separately on birth certificates. Race categories are consistent with the 1997 Office of Management and Budget standards. Persons of Hispanic origin may be of any race.

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

Table 6. Preterm-related infant mortality rates, by race and Hispanic origin of mother: United States, 2017

Race and Hispanic origin	Live births	Infant deaths	Deaths per 100,000 births	Percent of deaths
Total	3,855,500	7,675	199.1	34.4
Non-Hispanic				
White	1,992,461	2,691	135.1	28.9
Black	560,715	2,546	454.1	41.4
American Indian or Alaska Native	29,957	71	237.0	25.7
Asian	249,250	359	144.0	38.1
Native Hawaiian or Other Pacific Islander	9,426	20	212.2	27.8
Hispanic				
Total	898,764	1,617	179.9	35.3
Mexican	512,126	885	172.8	34.2
Puerto Rican	70,813	175	247.1	38.1
Cuban	23,362	41	175.5	44.1
Central or South American	145,614	244	167.6	37.4

NOTES: Preterm-related deaths are those where the infant was born preterm (before 37 completed weeks of gestation), with the underlying cause of death assigned to one of the following *International Statistical Classification of Diseases, 10th Revision* categories: K550, P000, P010, P011, P015, P020, P021, P027, P070–P073, P102, P220–P229, P250–P279, P280, P281, P360–P369, P520–P523, or P77. Race and Hispanic origin are reported separately on birth certificates. Race categories are consistent with the 1997 Office of Management and Budget standards. Persons of Hispanic origin may be of any race.

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

Technical Notes

Data source and 2003 revision

For information on the data source for the linked birth/infant death file, see [reference 1](#). For further information on the 2003 revision, see [reference 3](#) and the U.S. Standard Certificate of Live Birth (11).

Weighting

In 2017, a record weight was added to the United States linked file to compensate for the 0.4% of infant death records that could not be linked to their corresponding birth certificates. The percentage of records linked varied by registration area, ranging from 98.0% through 100.0% ([Table](#)). The number of infant deaths in the linked file for the 50 states and the District of Columbia was weighted to equal the sum of the linked plus unlinked infant deaths by state of occurrence of birth and age of death (less than 7 days, 7–27 days, and 28 days to under 1 year). The addition of the weight reduced the potential for bias in comparing infant mortality rates by characteristics.

The 2017 linked file started with 22,372 infant death records. Of these records, 22,280 were linked; 92 were unlinked because corresponding birth certificates could not be identified. The 22,372 linked and unlinked records contained records of infants whose mothers' usual place of residence was outside of the United States. These records were excluded to derive a weighted total of 22,341 infant deaths by place of residence for 2017.

Comparison of infant mortality data between the linked file and the vital statistics mortality file

The overall infant mortality rate from the 2017 period linked file of 5.79 is the same as that from the 2017 vital statistics mortality file (5.79) (12). The number of infant deaths in the linked file (22,280) differs slightly from the number in the mortality file (22,335) (12). Differences in numbers of infant deaths between the two data sources are primarily due to geographic coverage differences. For the vital statistics mortality file, all deaths occurring in the 50 states and the District of Columbia are included regardless of the place of birth of the infant. In contrast, to be included in the U.S. linked file, both the birth and death must occur in the 50 states and the District of Columbia (the territory linked file is a separate file). Also, weighting of the linked file may contribute to small differences in numbers and rates by specific variables between these two data sets.

Period of gestation

Beginning with the 2014 data year, the National Center for Health Statistics (NCHS) transitioned to a new standard for estimating the gestational age of the newborn. The new measure—the obstetric estimate of gestation at delivery (OE)—replaces the measure based on the date of the last normal menses (13). Accordingly, gestational age data shown in this report are based on OE. National data based on OE data are available only

from data year 2007 forward. Information on and discussion of the reasons for the change, and a detailed comparison of the two measures, are presented elsewhere (13).

Table. Percentage of infant deaths linked to their corresponding birth records, by state of occurrence of death: United States and each state, 2017

Area	Percent
United States ¹	99.6
Alabama	100.0
Alaska	98.0
Arizona	98.9
Arkansas	100.0
California	98.3
Colorado	100.0
Connecticut	98.8
Delaware	100.0
District of Columbia	100.0
Florida	99.8
Georgia	99.8
Hawaii	100.0
Idaho	100.0
Illinois	100.0
Indiana	99.3
Iowa	100.0
Kansas	100.0
Kentucky	100.0
Louisiana	100.0
Maine	100.0
Maryland	100.0
Massachusetts	100.0
Michigan	99.9
Minnesota	100.0
Mississippi	100.0
Missouri	99.5
Montana	100.0
Nebraska	99.4
Nevada	100.0
New Hampshire	100.0
New Jersey	99.7
New Mexico	100.0
New York	99.8
New York City	100.0
North Carolina	100.0
North Dakota	100.0
Ohio	100.0
Oklahoma	100.0
Oregon	100.0
Pennsylvania	100.0
Rhode Island	100.0
South Carolina	100.0
South Dakota	100.0
Tennessee	100.0
Texas	98.7
Utah	100.0
Vermont	100.0
Virginia	99.5
Washington	99.7
West Virginia	100.0
Wisconsin	99.7
Wyoming	100.0

¹Excludes data for Puerto Rico, U.S. Virgin Islands, and Guam.

SOURCE: NCHS, National Vital Statistics System, Linked birth/infant death file.

Sex, birthweight, plurality, and nativity

For detailed definitions and more information on sex, birthweight, plurality, and nativity, refer to [references 1 and 3](#).

Cause-of-death classification

The mortality statistics presented in this report were compiled in accordance with the World Health Organization (WHO) regulations, which specify that member nations classify and code causes of death in accordance with the current revision of the *International Statistical Classification of Diseases* (ICD). ICD provides the basic guidance to code and classify causes of death and also details disease classification and provides definitions, tabulation lists, the format of the death certificate, and the rules for coding cause of death. Cause-of-death data presented in this report were coded by procedures outlined in annual issues of the *NCHS Instruction Manual* (14,15).

In this report, tabulations of cause-of-death statistics are based solely on the underlying cause of death. Generally, more medical information is reported on death certificates than is directly reflected in the underlying cause of death. This is captured in NCHS multiple cause-of-death statistics (16,17). For more information on underlying cause of death data and comparisons between ICD–9 and ICD–10, see [reference 1](#), “Comparability of Cause of Death Between ICD–9 and ICD–10: Preliminary Estimates,” and “Comparability of Cause-of-death Classification Between ICD Revisions” (18,19).

Tabulation lists and cause-of-death ranking

The cause-of-death rankings for ICD–10 are based on the List of 130 Selected Causes of Infant Death. The tabulation lists and rules for ranking leading causes of death are published in the *NCHS Instruction Manual, Part 9, ICD–10 Cause-of-Death Lists for Tabulating Mortality Statistics, Effective 1999* (20).

Preterm-related cause of death

Preterm-related causes of death are those causes that have a direct etiological connection to preterm birth. For an underlying cause of death to be considered preterm-related, 75% or more of infants whose deaths were attributed to that cause had to be born preterm, and the cause of death had to be a direct consequence of preterm birth based on a clinical evaluation and review of the literature (8). The cause-of-death categories included in this grouping are shown in the note in [Table 6](#). Causes that are incidental to preterm birth (e.g., a motor vehicle accident to a preterm infant) are not included. Further details on the development of this cause-of-death grouping are available in related publications (8,9).

Computation of rates

For information and discussion on computations of rates, see [reference 1](#) and the “*User Guide to the 2010 Natality Public Use File*.”

Random variation in infant mortality rates

For information and discussion on random variation and significance testing for linked data, see [reference 1](#) and the “*User Guide to the 2010 Natality Public Use File*.”

Availability of the linked file

Linked file data are available for download at: https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm. Linked period file data may also be accessed via the Centers for Disease Control and Prevention’s (CDC) Wide-ranging Online Data for Epidemiologic Research, available from: <https://wonder.cdc.gov/lbd.html>. Beginning with 2005, the public-use file no longer includes geographic detail; such files are available upon special request (see the Division of Vital Statistics data release policy). Data are also available in issues of *Vital and Health Statistics, Series 20*; *National Vital Statistics Reports*; and *Data Briefs* from the NCHS website.

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