

Infant Mortality in the United States, 2018: Data From the Period Linked Birth/Infant Death File

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Abstract

Objectives—This report presents 2018 infant mortality statistics by age at death, maternal race and Hispanic origin, maternal age, gestational age, leading causes of death, and maternal state of residence. 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

2018 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 21,498 infant deaths were reported in the United States in 2018. The U.S. infant mortality rate was 5.67 infant deaths per 1,000 live births, lower than the rate of 5.79 in 2017 and an historic low in the country. The neonatal and postneonatal mortality rates for 2018 (3.78 and 1.89, respectively) demonstrated a nonsignificant decline compared

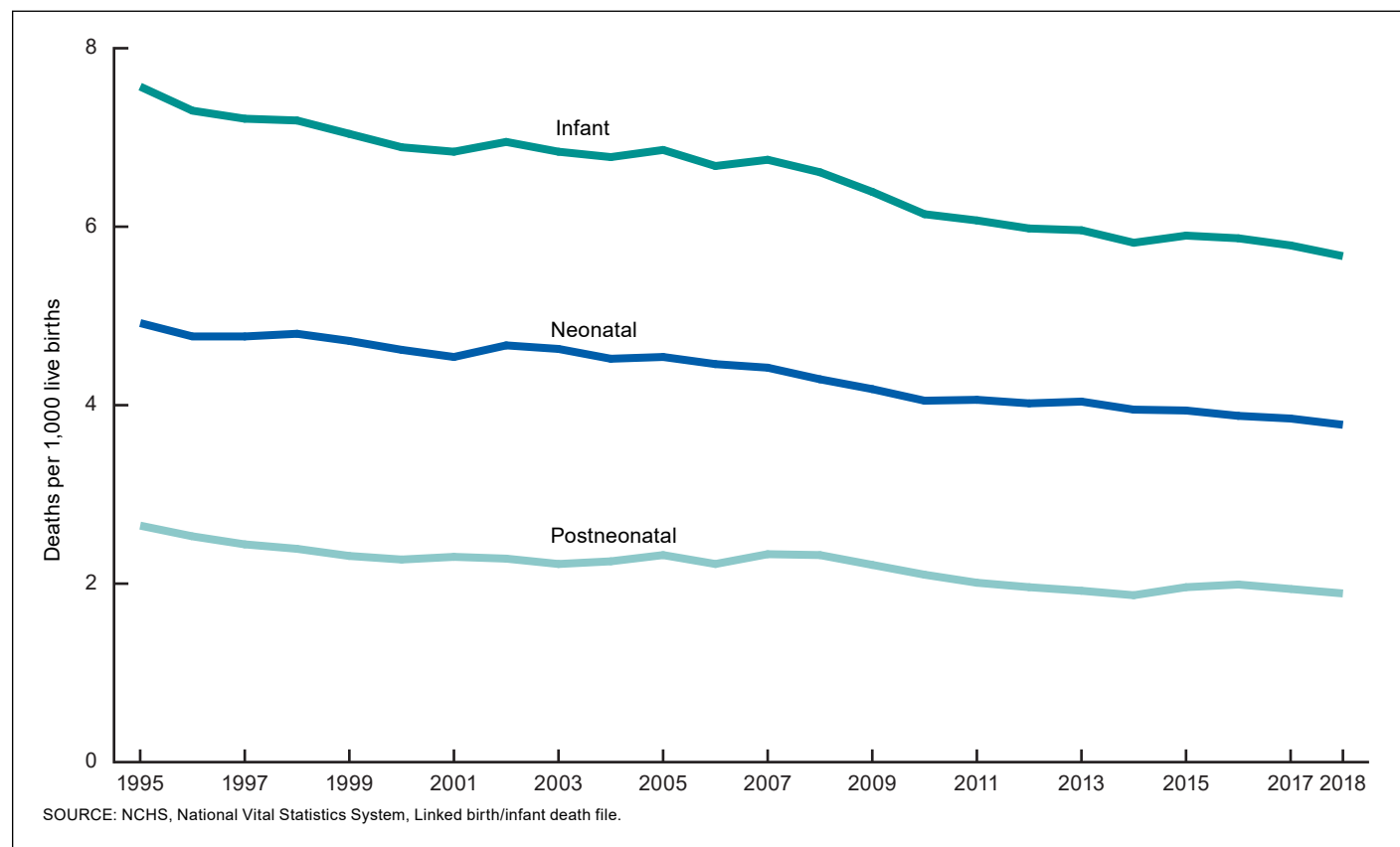


Figure 1. Infant, neonatal, and postneonatal mortality rates: United States, 1995–2018



with 2017 (3.85 and 1.94, respectively). The 2018 mortality rate declined for infants of Hispanic women compared with the 2017 rate; changes in rates for other race and Hispanic-origin groups were not statistically significant. The 2018 infant mortality rate for infants of non-Hispanic black women (10.75) was more than twice as high as that for infants of non-Hispanic white (4.63), non-Hispanic Asian (3.63), and Hispanic women (4.86). Infants born very preterm (less than 28 weeks of gestation) had the highest mortality rate (382.20), 186 times as high as that for infants born at term (37–41 weeks of gestation) (2.05). The five leading causes of infant death in 2018 were the same as in 2017; cause-of-death rankings and mortality rates varied by maternal race and Hispanic origin. Infant mortality rates by state for 2018 ranged from a low of 3.50 in New Hampshire to a high of 8.41 in Mississippi.

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

Introduction

This report presents infant mortality statistics based on data from the 2018 period linked birth/infant death file. Infant mortality and mortality rates are described by age at death, maternal race and Hispanic origin, maternal age, gestational age, leading causes of death, and maternal state of residence 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 2018 (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 2018, linked birth/infant death data are not available for American Samoa, the Commonwealth of the Northern Marianas, and the Virgin Islands.

The period linked file for 2017 marked the first data year for which the linked birth data for infant deaths for all 50 states and the District of Columbia were based on the 2003 revision of the U.S. Standard Certificate of Live Birth (4), 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 were available (5).

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. More details can be found elsewhere (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 for each infant under 1 year of age who died during 2018 to the National Center for Health Statistics. 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 2018 Period/2017 Cohort Linked Birth/Infant Death Public Use File” (1).

In 2018, 99.3% of all infant death records were successfully linked to their corresponding birth records. These records were weighted to adjust for the 0.7% 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 2018, race of mother was imputed for 6.3% 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 (5). The 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. Comparisons between 2018 and 2017 by race and Hispanic origin are made in this report. 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 (5). For further details on race reporting, see reference 3.

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](#)).

The preterm-related cause-of-death section included in the 2017 report has been removed to further simplify the annual report. This topic may be explored in future topic-specific reports.

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 [mother's place of birth]) 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, while the race information for the numerator is the race of the decedent as reported on the death certificate (2,3,8). For more detail on the reliability of race and Hispanic-origin data from the linked file compared with the mortality file, see reference 8.

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 2018, 21,498 infant deaths were reported in the United States, a decline of 4% from 2017 (22,341); the infant mortality rate declined to 5.67 deaths per 1,000 live births in 2018, down 2% from the 2017 rate of 5.79, making the 2018 infant mortality rate the lowest reported in U.S. history ([Figure 1](#), [Table 1](#)).
- The U.S. infant mortality rate has trended downward since 1995 (the first year the period linked birth/infant death file was available), and has declined 17% since 2005, the most recent high (6.86).
- The 2018 neonatal mortality rate (infant deaths at less than 28 days) declined 2% to 3.78, not significantly different from the rate in 2017 (3.85); the neonatal mortality rate has declined since 1995 and is also down 17% since 2005 (4.54).
- The 2018 postneonatal mortality rate (infant deaths at 28 days or greater) declined 3% to 1.89, not statistically different from the postneonatal mortality rate in 2017 (1.94); the postneonatal mortality rate has also declined since 1995, and is down 19% since 2005 (2.32).

Race and Hispanic origin

- Mortality rates for infants of Hispanic women declined 5% from 2017 to 2018 (from 5.10 to 4.86 infant deaths per 1,000 births). Declines in rates for infants born to non-Hispanic white (4.67 to 4.63), non-Hispanic black (10.97 to 10.75), non-Hispanic AIAN (9.21 to 8.15), and non-Hispanic Asian (3.78 to 3.63) women were not statistically significant. The increase in the rate for infants of non-Hispanic NHOPi women (7.64 to 9.39) was also not statistically significant ([Tables 1](#) and [2](#), [Figure 2](#)).
- Among Hispanic-origin subgroups, mortality rates for infants of Puerto Rican women declined 13% from 2017 to 2018 (6.48 to 5.61); declines in mortality rates for infants of Mexican, Central and South American, and Cuban women were not significant between 2017 and 2018.
- In 2018, infant mortality continued to vary by race; infants of non-Hispanic black women had the highest mortality rate (10.75), followed by infants of non-Hispanic NHOPi (9.39), non-Hispanic AIAN (8.15), Hispanic (4.86), non-Hispanic white (4.63), and non-Hispanic Asian (3.63) women.
- Infants of non-Hispanic black women also had the highest neonatal mortality rate in 2018 (7.06) compared with infants of other race and Hispanic-origin groups; the lowest mortality rate was for infants of non-Hispanic Asian women (2.67).
- In 2018, postneonatal mortality rates were higher for infants of non-Hispanic AIAN (4.02), non-Hispanic NHOPi (4.01), and non-Hispanic black women (3.69) than for infants of non-Hispanic white (1.63), Hispanic (1.43), and non-Hispanic Asian (0.96) women.
- Among Hispanic-origin subgroups in 2018, infants of Puerto Rican women had the highest infant mortality rate (5.61), followed by infants of Mexican (4.89), Central and South American (4.02), and Cuban (3.83) women.

Maternal age

- Changes in infant mortality from 2017 to 2018 varied by maternal age. The rate declined 6% for infants of women aged 35–39, declined nonsignificantly for infants of women under age 25 and 30–34, and increased nonsignificantly for infants of women aged 25–29 and 40 and over ([Figure 3](#), [Table 2](#)).
- Mortality rates were highest for infants of females under age 20 (8.65 infant deaths per 1,000 births). Then rates decreased for each subsequent maternal age group through infants of women aged 30–34 (4.62), and increased among infants born to older mothers (5.04 and 6.99 for women aged 35–39 and 40 and over, respectively).

Gestational age

- Infant mortality rates for infants born at all gestational age categories did not change significantly between 2017 and 2018 ([Table 2](#), [Table A](#)) (4).
- In 2018, 66% of infant deaths occurred among infants born preterm (less than 37 weeks of gestation), essentially unchanged from 2017.

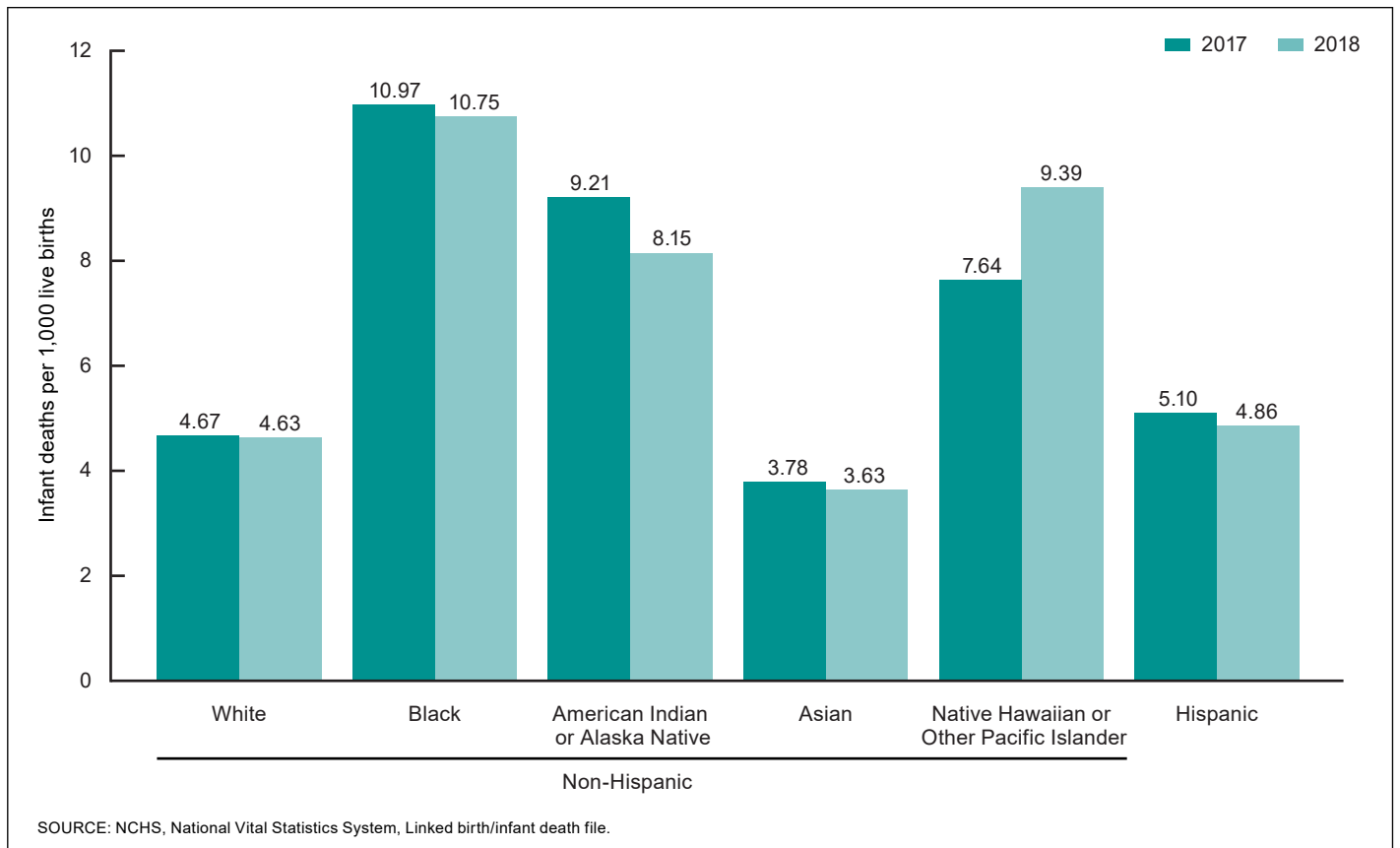


Figure 2. Infant mortality rates, by race and Hispanic origin: United States, 2017–2018

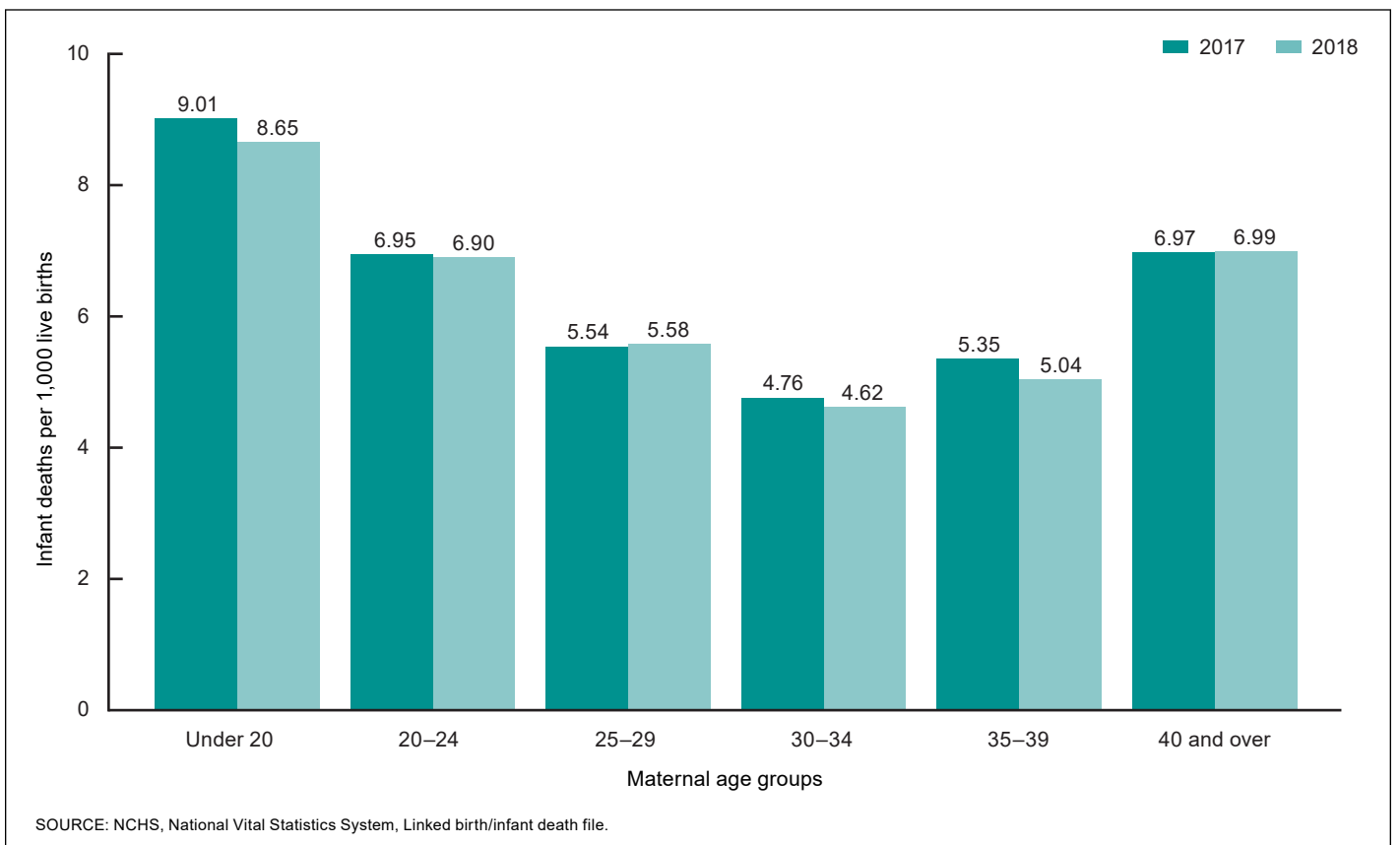


Figure 3. Infant mortality rates, by maternal age: United States, 2017–2018

Table A. Infant mortality rate, by gestational age: United States, 2015–2018

Year	Less than 32 weeks	32–33 weeks	34–36 weeks	37–41 weeks	42 weeks or more
Deaths per 1,000 live births					
2018	185.79	21.95	8.21	2.05	5.39
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.

Leading causes of infant death

- In 2018, the five leading causes of all infant deaths were the same as those in 2017: congenital malformations (21% of infant deaths), disorders related to short gestation and low birthweight (17%), maternal complications (6%), sudden infant death syndrome (SIDS) (6%), and unintentional injuries (5%) (Table 3).
- From 2017 through 2018, infant mortality rates for unintentional injuries declined from 34.1 infant deaths per 100,000 births to 30.8; declines in rates for congenital malformations (119.2 to 118.7), disorders related to short gestation and low birthweight (97.4 to 97.1), maternal complications (37.2 to 36.2), and SIDS (35.3 to 35.1) were not significant.

- Infants of non-Hispanic black women had the highest mortality rates for disorders related to short gestation and low birthweight (247.5), maternal complications (77.7), and SIDS (69.6) (Table 4).
- Infants of non-Hispanic Asian women had the lowest mortality rates of all race and Hispanic-origin groups for congenital malformations (76.4), unintentional injuries (11.6), and SIDS (9.6). Infants of non-Hispanic white and non-Hispanic Asian women had the lowest mortality rates for maternal complications (22.8 and 29.9, respectively).

State

- By state, infant mortality ranged from a low of 3.50 infant deaths per 1,000 births in New Hampshire to a high of 8.41 in Mississippi (Figure 4, Table 5).

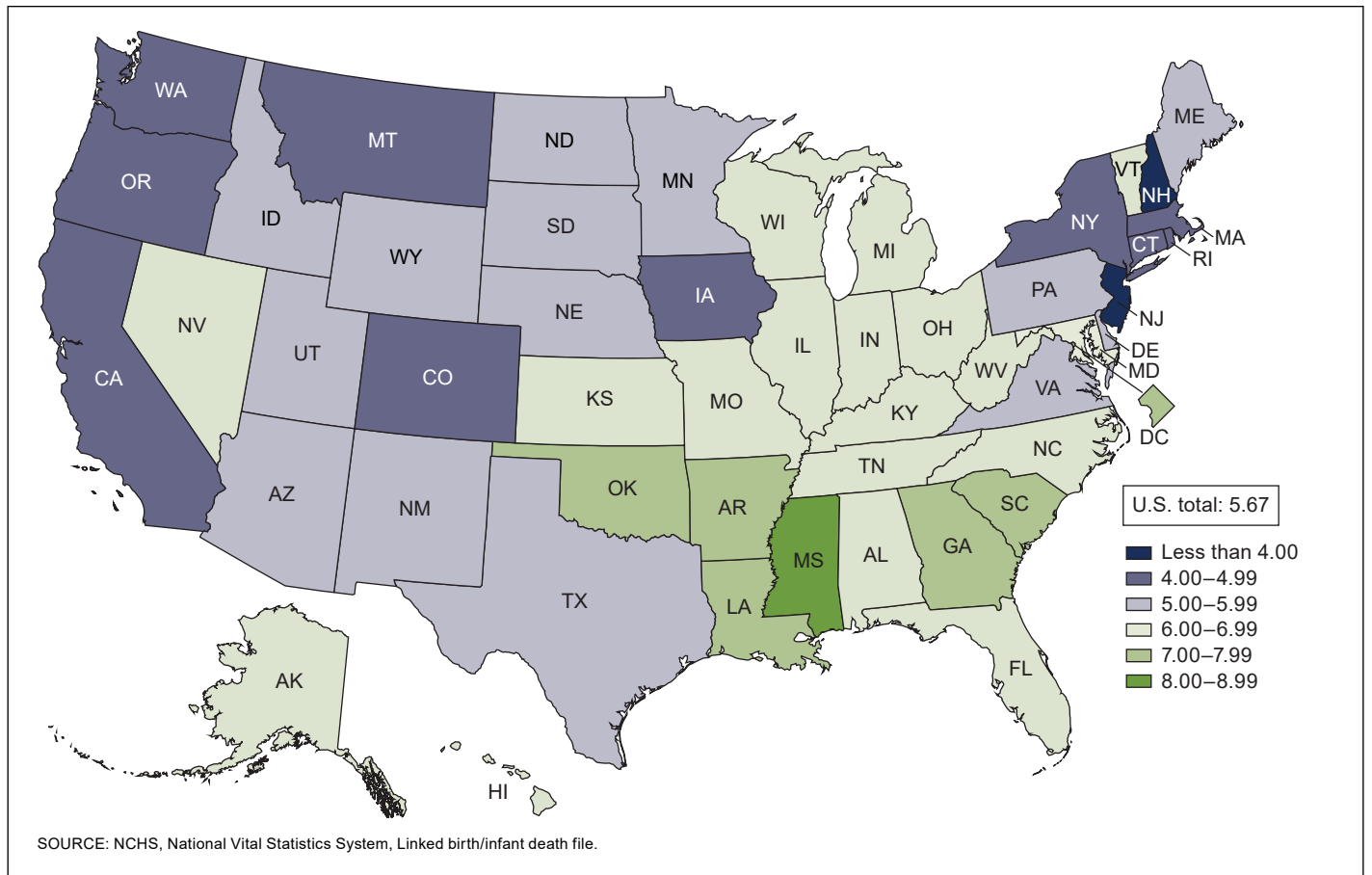


Figure 4. Infant mortality rates, by state: United States, 2018

- Ten states had infant mortality rates significantly lower than the national infant mortality rate of 5.67: California, Colorado, Connecticut, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Oregon, and Washington.
- Sixteen states had infant mortality rates significantly higher than the U.S. infant mortality rate: Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Louisiana, Michigan, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, and West Virginia.

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Table 1. Live births, infant, neonatal, and postneonatal deaths and mortality rates: United States, 1995–2018, and by race and Hispanic origin, 2017–2018

Year and race and Hispanic origin	Number				Deaths per 1,000 live births		
	Live births	Infant deaths	Neonatal deaths	Postneonatal deaths	Infant	Neonatal	Postneonatal
All race and Hispanic-origin groups							
2018	3,791,712	21,498	14,329	7,169	5.67	3.78	1.89
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	23,458	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	4,112,055	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
Non-Hispanic, single race							
White:							
2018	1,956,413	9,059	5,873	3,186	4.63	3.00	1.63
2017	1,992,461	9,306	6,061	3,246	4.67	3.04	1.63
Black:							
2018	552,029	5,933	3,897	2,037	10.75	7.06	3.69
2017	560,715	6,152	4,012	2,140	10.97	7.16	3.82
American Indian or Alaska Native:							
2018	29,092	237	120	117	8.15	4.12	4.02
2017	29,957	276	143	132	9.21	4.77	4.41
Asian:							
2018	240,798	874	643	231	3.63	2.67	0.96
2017	249,250	943	675	268	3.78	2.71	1.08
Native Hawaiian or Other Pacific Islander:							
2018	9,476	89	51	38	9.39	5.38	4.01
2017	9,426	72	36	36	7.64	3.82	3.82

See footnotes at end of table.

Table 1. Live births, infant, neonatal, and postneonatal deaths and mortality rates: United States, 1995–2018, and by race and Hispanic origin, 2017–2018—Con.

Year	Number				Deaths per 1,000 live births		
	Live births	Infant deaths	Neonatal deaths	Postneonatal deaths	Infant	Neonatal	Postneonatal
Hispanic							
Total:							
2018	886,210	4,303	3,036	1,267	4.86	3.43	1.43
2017	898,764	4,583	3,198	1,383	5.10	3.56	1.54
Mexican:							
2018	495,831	2,426	1,690	736	4.89	3.41	1.48
2017	512,126	2,588	1,795	792	5.05	3.50	1.55
Puerto Rican:							
2018	71,614	402	290	112	5.61	4.05	1.56
2017	70,813	459	307	151	6.48	4.34	2.13
Cuban:							
2018	23,471	90	64	26	3.83	2.73	1.11
2017	23,362	93	69	24	3.98	2.95	1.03
Central and South American:							
2018	147,430	592	438	154	4.02	2.97	1.04
2017	145,614	653	465	188	4.48	3.19	1.29

NOTES: Infant deaths are weighted to adjust for the 0.7% 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. 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 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and race and Hispanic origin of mother: United States, 2018

Characteristics	Total	Non-Hispanic					Hispanic				
		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	5.67	4.63	10.75	8.15	3.63	9.39	4.86	4.89	5.61	3.83	4.02
Age at death											
Total neonatal	3.78	3.00	7.06	4.12	2.67	5.38	3.43	3.41	4.05	2.73	2.97
Early neonatal (less than 7 days)	3.05	2.39	5.71	3.16	2.09	4.85	2.82	2.84	3.38	2.56	2.38
Late neonatal (7–27 days)	0.73	0.61	1.35	0.96	0.58	*	0.60	0.57	0.66	*	0.59
Postneonatal	1.89	1.63	3.69	4.02	0.96	4.01	1.43	1.48	1.56	1.11	1.04
Sex											
Male	6.25	5.09	12.02	8.92	3.90	10.65	5.33	5.41	6.28	4.55	4.14
Female	5.07	4.15	9.44	7.42	3.34	7.90	4.36	4.36	4.91	3.08	3.89
Period of gestation (weeks)											
Less than 34	115.39	101.45	138.85	102.29	103.56	120.59	110.26	114.16	108.16	98.52	100.15
Less than 28	382.20	391.69	376.02	344.44	376.33	472.22	360.29	378.33	337.21	320.00	340.03
28–31	43.30	43.42	43.05	75.16	37.95	*	41.52	45.09	37.04	*	33.14
32–33	21.95	21.96	23.64	*	16.62	*	21.49	21.83	18.18	*	22.05
34–36	8.21	8.06	9.94	11.55	6.11	*	6.99	6.99	5.10	*	7.15
37–41	2.05	1.92	3.41	4.34	1.10	4.57	1.66	1.72	1.87	1.08	1.30
37–38	3.12	3.08	4.67	6.54	1.69	*	2.40	2.46	2.80	*	1.81
39–40	1.64	1.51	2.82	3.17	0.83	3.92	1.33	1.39	1.51	*	1.08
41	1.31	1.21	1.92	*	*	*	1.28	1.50	*	–	*
42 or more	5.39	4.67	*	–	*	*	*	*	–	–	*
Birthweight											
Less than 2,500 grams	45.89	41.26	56.22	51.37	30.69	56.34	44.74	47.05	41.19	38.74	40.55
Less than 1,500 grams	207.07	199.43	214.36	196.52	182.36	258.74	203.55	217.11	188.88	178.22	179.95
1,500–2,499 grams	13.26	13.63	14.04	21.20	8.00	*	12.66	13.51	8.51	*	13.06
2,500 grams or more	1.99	1.88	3.19	4.34	1.06	4.53	1.59	1.64	1.82	1.10	1.26
2,500–4,499 grams	1.98	1.87	3.19	4.27	1.06	4.50	1.59	1.62	1.80	1.11	1.26
4,500 grams or more	2.48	2.37	*	*	*	*	2.40	*	*	–	*
Plurality											
Single births	5.08	4.14	9.62	7.34	3.20	9.12	4.44	4.48	5.10	3.42	3.73
Twin births	21.47	16.92	35.02	38.16	16.80	*	20.04	21.23	21.02	*	15.49
Triplet and higher-order births	62.13	50.10	88.15	–	*	–	64.57	*	*	–	*

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, 2018—Con.

Characteristics	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											
Age of mother											
Under 20.....	8.65	8.46	12.33	8.47	*	*	6.35	6.62	5.39	*	5.45
20–24.....	6.90	6.07	11.09	9.31	4.84	*	5.12	4.89	6.03	*	4.36
25–29.....	5.58	4.67	10.70	7.43	3.11	9.01	4.43	4.52	5.01	4.09	3.43
30–34.....	4.62	3.61	10.06	7.86	3.47	10.96	4.39	4.53	5.85	3.64	3.44
35–39.....	5.04	4.10	9.87	7.53	3.61	*	4.89	4.87	5.31	*	4.19
40–54.....	6.99	5.58	13.31	*	5.86	–	6.33	6.61	*	*	6.61
Mother's place of birth											
Born in the 50 states and District of Columbia.....	5.99	4.70	11.44	8.11	4.50	9.86	5.14	4.98	5.36	3.72	3.94
Born elsewhere.....	4.36	3.32	6.83	*	3.38	8.54	4.49	4.73	6.14	3.92	4.03
Live births											
Total.....	3,791,712	1,956,413	552,029	29,092	240,798	9,476	886,210	495,831	71,614	23,471	147,430
Sex											
Male.....	1,938,179	1,003,045	279,914	14,806	124,082	4,790	450,950	252,104	36,607	12,089	74,881
Female.....	1,853,533	953,368	272,115	14,286	116,716	4,686	435,260	243,727	35,007	11,382	72,549
Period of gestation (weeks)											
Less than 34.....	104,031	44,287	27,008	919	5,089	340	22,637	12,150	2,293	609	3,425
Less than 28.....	24,945	8,665	8,348	180	1,124	72	5,490	2,889	602	150	797
28–31.....	34,386	14,764	8,804	306	1,739	119	7,467	3,948	756	203	1,177
32–33.....	44,700	20,858	9,856	433	2,226	149	9,680	5,313	935	256	1,451
34–36.....	275,746	133,555	50,931	2,424	15,540	776	63,549	35,179	5,489	1,547	10,205
37–41.....	3,398,110	1,770,366	472,316	25,600	219,793	8,313	797,905	447,254	63,694	21,276	133,432
37–38.....	1,005,405	482,550	163,530	8,709	68,689	2,674	248,463	139,137	20,009	6,269	40,950
39–40.....	2,169,016	1,156,775	283,202	15,478	139,802	5,106	503,429	282,706	39,746	13,968	84,217
41.....	223,689	131,041	25,584	1,413	11,302	533	46,013	25,411	3,939	1,039	8,265
42 or more.....	11,318	7,281	1,390	83	319	34	1,737	1,032	108	33	311
Not stated.....	2,507	924	384	66	57	13	382	216	30	6	57
Birthweight											
Less than 2,500 grams.....	314,568	135,467	77,853	2,336	20,690	852	66,475	35,263	6,749	1,678	10,358
Less than 1,500 grams.....	52,967	20,142	16,393	402	2,698	143	11,167	5,808	1,223	303	1,706
1,500–2,499 grams.....	261,601	115,325	61,460	1,934	17,992	709	55,308	29,455	5,526	1,375	8,652
2,500 grams or more.....	3,475,072	1,819,997	473,877	26,741	220,045	8,618	819,525	460,450	64,843	21,790	137,036
2,500–4,499 grams.....	3,435,633	1,795,057	470,700	26,219	218,936	8,449	811,199	455,255	64,327	21,558	135,875
4,500 grams or more.....	39,439	24,940	3,177	522	1,109	169	8,326	5,195	516	232	1,161
Not stated.....	2,072	949	299	15	63	6	210	118	22	3	36

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, 2018—Con.

Characteristics	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
Live births											
Plurality											
Single births	3,664,651	1,887,214	528,869	28,326	233,872	9,211	863,983	484,150	69,384	22,790	144,005
Twin births	123,536	67,203	22,502	760	6,784	250	21,654	11,399	2,188	675	3,292
Triplet and higher-order births	3,525	1,996	658	6	142	15	573	282	42	6	133
Age of mother											
Under 20	181,607	65,254	38,269	2,597	1,462	519	65,852	38,797	5,562	727	8,984
20–24	726,175	326,575	137,974	7,841	14,876	2,482	209,701	122,074	19,577	3,878	27,040
25–29	1,099,491	576,811	166,802	9,146	57,810	2,887	253,977	143,052	21,578	7,331	38,213
30–34	1,090,697	624,015	124,206	6,105	96,385	2,189	208,193	112,535	15,055	7,426	40,173
35–39	566,786	304,062	67,268	2,787	57,136	1,097	117,383	62,578	7,910	3,280	25,755
40–54	126,956	59,696	17,510	616	13,129	302	31,104	16,795	1,932	829	7,265
Mother's place of birth											
Born in the 50 states and District of Columbia	2,923,240	1,821,538	456,980	28,726	45,551	3,347	467,977	281,684	50,022	10,205	25,099
Born elsewhere	861,148	132,597	93,140	324	194,507	5,971	417,169	213,731	21,347	13,259	122,219
Not stated	7,324	2,278	1,909	42	740	158	1,064	416	245	7	112
Infant deaths											
Total	21,498	9,059	5,933	237	874	89	4,303	2,426	402	90	592
Age at death											
Total neonatal	14,329	5,873	3,897	120	643	51	3,036	1,690	290	64	438
Early neonatal (less than 7 days)	11,578	4,676	3,152	92	504	46	2,500	1,407	242	60	351
Late neonatal (7–27 days)	2,751	1,196	745	28	139	5	536	283	47	4	87
Postneonatal	7,169	3,186	2,037	117	231	38	1,267	736	112	26	154
Sex											
Male	12,105	5,104	3,365	132	484	51	2,405	1,364	230	55	310
Female	9,393	3,955	2,568	106	390	37	1,898	1,062	172	35	282
Period of gestation (weeks)											
Less than 34	12,004	4,493	3,750	94	527	41	2,496	1,387	248	60	343
Less than 28	9,534	3,394	3,139	62	423	34	1,978	1,093	203	48	271
28–31	1,489	641	379	23	66	3	310	178	28	10	39
32–33	981	458	233	8	37	4	208	116	17	2	32
34–36	2,263	1,077	506	28	95	6	444	246	28	7	73
37–41	6,979	3,394	1,612	111	242	38	1,326	771	119	23	174
37–38	3,135	1,487	763	57	116	17	597	342	56	8	74
39–40	3,550	1,750	800	49	116	20	670	392	60	15	91
41	293	158	49	4	11	1	59	38	3	0	8
42 or more	61	34	11	0	3	1	8	4	0	0	2
Not stated	190	60	54	5	7	2	29	17	6	0	1

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, 2018—Con.

Characteristics	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				
Less than 2,500 grams	14,437	5,589	4,377	120	635	48	2,974	1,659	278	65	420
Less than 1,500 grams	10,968	4,017	3,514	79	492	37	2,273	1,261	231	54	307
1,500–2,499 grams	3,469	1,572	863	41	144	11	700	398	47	11	113
2,500 grams or more	6,908	3,420	1,514	116	234	39	1,307	755	118	24	172
2,500–4,499 grams	6,811	3,361	1,503	112	233	38	1,287	739	116	24	171
4,500 grams or more	98	59	11	4	1	1	20	16	2	0	1
Not stated	152	50	42	2	4	1	22	12	5	1	1
Plurality											
Single births	18,627	7,822	5,087	208	748	84	3,832	2,169	354	78	537
Twin births	2,652	1,137	788	29	114	5	434	242	46	12	51
Triplet and higher-order births	219	100	58	0	12	0	37	15	1	0	4
Age of mother											
Under 20	1,571	552	472	22	6	8	418	257	30	4	49
20–24	5,011	1,983	1,530	73	72	19	1,073	597	118	17	118
25–29	6,138	2,695	1,785	68	180	26	1,126	646	108	30	131
30–34	5,036	2,250	1,250	48	334	24	915	510	88	27	138
35–39	2,855	1,246	664	21	206	11	574	305	42	9	108
40–54	887	333	233	4	77	0	197	111	14	3	48
Mother's place of birth											
Born in the 50 states and District of Columbia	17,506	8,569	5,226	233	205	33	2,407	1,404	268	38	99
Born elsewhere	3,754	440	636	3	657	51	1,875	1,010	131	52	493
Not stated	237	50	71	1	12	4	20	12	3	0	0

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

– Quantity zero.

¹Includes Aleut and Eskimo infants.

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 deaths, percentage of deaths, and infant mortality rates, by five leading causes of infant death: United States, 2010–2018

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)
2018	4,501	20.9	118.7	3,683	17.1	97.1	1,371	6.4	36.2	1,331	6.2	35.1	1,169	5.4	30.8
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 2010–2018.

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

Table 4. Infant deaths and mortality rates for the five leading causes of infant death, by race and Hispanic origin of mother: United States, 2018

[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 ¹			Asian ²		
	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate
All causes	21,498	567.0	...	9,059	463.0	...	5,933	1,074.8	...	237	814.7	...	874	363.0
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	1	4,501	118.7	1	2,178	111.3	2	866	156.9	1	45	154.7	1	184	76.4
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	3,683	97.1	2	1,215	62.1	1	1,366	247.5	2	27	92.8	2	151	62.7
Newborn affected by maternal complications of pregnancy (P01)	3	1,371	36.2	5	446	22.8	3	429	77.7	6	7	*	3	72	29.9
Sudden infant death syndrome (R95)	4	1,331	35.1	3	635	32.5	4	384	69.6	4	17	*	8	23	9.6
Accidents (unintentional injuries) (V01–X59)	5	1,169	30.8	4	580	29.7	5	320	58.0	3	23	79.1	6	28	11.6
Cause of death (based on the <i>International Statistical Classification of Diseases, 10th Revision, 1992</i>)	Total Hispanic ³			Mexican			Puerto Rican			Central and South American ⁴					
	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate			
All causes	4,303	485.6	...	2,426	489.3	...	402	561.3	...	592	401.6			
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	1	1,057	119.3	1	593	119.6	2	76	106.1	1	184	124.8			
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	714	80.6	2	399	80.5	1	80	111.7	2	98	66.5			
Newborn affected by maternal complications of pregnancy (P01)	3	336	37.9	3	189	38.1	3	41	57.3	3	43	29.2			
Sudden infant death syndrome (R95)	4	202	22.8	4	110	22.2	4	23	32.1	4	16	*			
Accidents (unintentional injuries) (V01–X59)	6	148	16.7	5	88	17.8	5	18	*	6	15	*			

... Category not applicable.

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

¹For non-Hispanic American Indian and Alaska Native infants, Bacterial sepsis of newborn (P36) was the fifth leading cause of death, with 9 deaths, and the rate does not meet NCHS standards of reliability.

²For non-Hispanic Asian infants, Bacterial sepsis of newborn (P36) was the fourth leading cause of death, with 33 deaths and a rate of 13.7. Newborn affected by complications of placenta, cord and membranes (P02) was the fifth leading cause of death, with 30 deaths and a rate of 12.5.

³For Hispanic infants, Newborn affected by complications of placenta, cord and membranes (P02) was the fifth leading cause of death, with 156 deaths and a rate of 17.6.

⁴For Central and South American infants, Newborn affected by complications of placenta, cord and membranes (P02) was tied with Sudden infant death syndrome (R95) as the fourth leading cause of death, with 16 deaths, and the rate does not meet NCHS standards of reliability.

NOTES: Reliable cause-specific infant mortality rates cannot be computed for Cuban or non-Hispanic Native Hawaiian or Other Pacific Islander infants because of the small number of 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 5. Infant mortality rates: United States and each state, 2018

[By place of residence]

Area	Rate	Infant deaths	Live births
		Deaths per 1,000 births	
United States ¹	5.67	21,498	3,791,712
Alabama.....	6.94	401	57,761
Alaska.....	6.25	63	10,086
Arizona.....	5.71	461	80,723
Arkansas.....	7.51	278	37,018
California.....	4.21	1,917	454,920
Colorado.....	4.75	299	62,885
Connecticut.....	4.20	146	34,725
Delaware.....	5.93	63	10,621
District of Columbia.....	7.38	68	9,212
Florida.....	6.04	1,339	221,542
Georgia.....	7.05	889	126,172
Hawaii.....	6.78	115	16,972
Idaho.....	5.05	108	21,403
Illinois.....	6.55	949	144,815
Indiana.....	6.72	549	81,646
Iowa.....	4.98	188	37,785
Kansas.....	6.37	231	36,261
Kentucky.....	6.05	326	53,922
Louisiana.....	7.65	456	59,615
Maine.....	5.52	68	12,311
Maryland.....	6.02	428	71,080
Massachusetts.....	4.18	289	69,109
Michigan.....	6.22	684	110,032
Minnesota.....	5.06	341	67,344
Mississippi.....	8.41	311	37,000
Missouri.....	6.35	465	73,269
Montana.....	4.78	55	11,513
Nebraska.....	5.77	147	25,488
Nevada.....	6.14	219	35,682
New Hampshire.....	3.50	42	11,995
New Jersey.....	3.80	385	101,223
New Mexico.....	5.69	131	23,039
New York.....	4.33	979	226,238
North Carolina.....	6.75	803	118,954
North Dakota.....	5.64	60	10,636
Ohio.....	6.94	938	135,134
Oklahoma.....	7.09	353	49,800
Oregon.....	4.22	178	42,188
Pennsylvania.....	5.94	806	135,673
Rhode Island.....	4.95	52	10,506
South Carolina.....	7.11	403	56,669
South Dakota.....	5.89	70	11,893
Tennessee.....	6.89	556	80,751
Texas.....	5.48	2,075	378,624
Utah.....	5.49	259	47,209
Vermont.....	6.44	35	5,432
Virginia.....	5.61	560	99,843
Washington.....	4.69	404	86,085
West Virginia.....	6.96	127	18,248
Wisconsin.....	6.12	392	64,098
Wyoming.....	5.33	35	6,562
Puerto Rico.....	6.53	140	21,424
Guam.....	11.69	37	3,165

¹Does not include Puerto Rico or Guam.

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 (9).

Weighting

In 2018, a record weight was added to the U.S. linked file to compensate for the 0.7% 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 96.7% 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 maternal and infant characteristics.

The 2018 linked file started with 21,531 infant death records. Of these records, 21,390 were linked; 141 were unlinked because corresponding birth certificates could not be identified. The 21,531 linked and unlinked records contained records of infants whose mothers' usual place of residence was outside of the United States; 33 records were excluded from linked file analyses for a weighted total of 21,498 infant deaths by place of residence for 2018.

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

The overall infant mortality rate from the 2018 period linked file of 5.67 is the same as that from the 2018 vital statistics mortality file (5.66) (10). The number of infant deaths in the linked file (21,390) differs slightly from the number in the mortality file (21,467) (10). 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)—

Table. Percentage of infant deaths linked to their corresponding birth records, by state of occurrence of death: United States and each state, 2018

Area	Percent
United States ¹	99.3
Alabama	100.0
Alaska	100.0
Arizona	97.8
Arkansas	99.6
California	98.6
Colorado	100.0
Connecticut	100.0
Delaware	100.0
District of Columbia	100.0
Florida	99.9
Georgia	99.9
Hawaii	99.2
Idaho	100.0
Illinois	100.0
Indiana	98.5
Iowa	100.0
Kansas	100.0
Kentucky	98.9
Louisiana	100.0
Maine	100.0
Maryland	99.7
Massachusetts	99.7
Michigan	99.9
Minnesota	100.0
Mississippi	100.0
Missouri	99.6
Montana	100.0
Nebraska	99.4
Nevada	100.0
New Hampshire	100.0
New Jersey	99.7
New Mexico	99.1
New York	99.8
New York City	99.8
North Carolina	100.0
North Dakota	100.0
Ohio	99.6
Oklahoma	99.4
Oregon	100.0
Pennsylvania	99.8
Rhode Island	100.0
South Carolina	100.0
South Dakota	100.0
Tennessee	100.0
Texas	96.7
Utah	99.7
Vermont	100.0
Virginia	100.0
Washington	100.0
West Virginia	99.2
Wisconsin	100.0
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.

replaces the measure based on the date of the last normal menses (11). 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 (11).

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* (12,13).

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 (14,15).

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* (16).

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”: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2010.pdf.

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”: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2010.pdf.

Availability of the linked file

Linked file data are available for download at the Vital Statistics Online Data Portal: 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: <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 *National Vital Statistics Reports* and *Data Briefs* from the NCHS website.

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