

Infant Mortality in the United States, 2019: Data From the Period Linked Birth/Infant Death File

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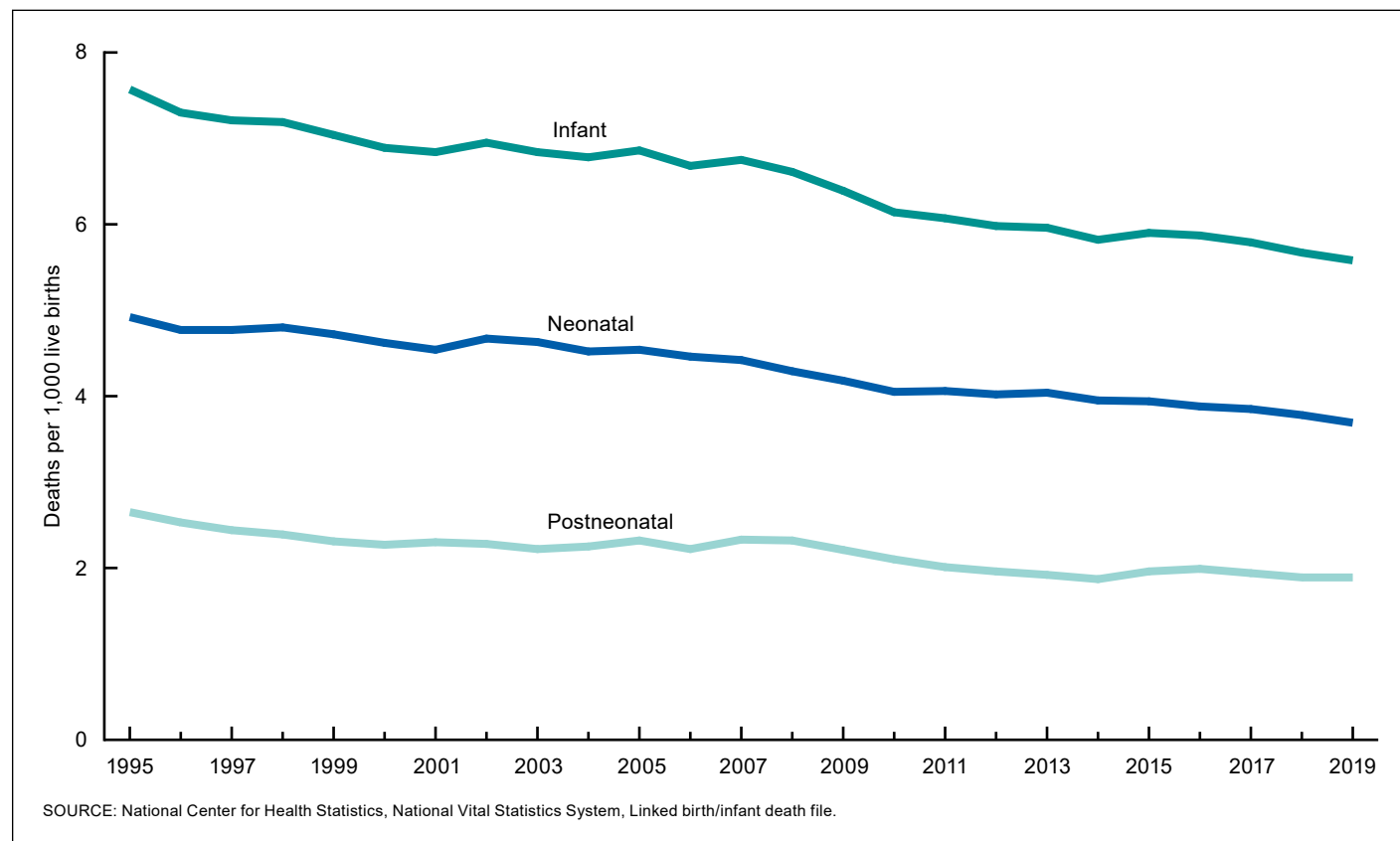
Abstract

Objectives—This report presents 2019 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 2019 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 20,927 infant deaths were reported in the United States in 2019, down 3% from 2018. The U.S. infant mortality rate was 5.58 infant deaths per 1,000 live

Figure 1. Infant, neonatal, and postneonatal mortality rates: United States, 1995–2019



births, a historic low for the country, although not significantly different from the rate of 5.67 in 2018. The neonatal mortality rate declined to 3.69 in 2019 from 3.78 in 2018, while the postneonatal mortality rate was unchanged from 2018 at 1.89. The mortality rate declined for infants of non-Hispanic white women in 2019 compared with 2018; declines in rates for the other race and Hispanic-origin groups were not significant. The 2019 infant mortality rate for infants of non-Hispanic black women (10.62) was more than twice as high as that for infants of non-Hispanic white (4.49), non-Hispanic Asian (3.38), and Hispanic (5.03) women. Infants born very preterm (less than 28 weeks of gestation) had the highest mortality rate (374.46), 184 times as high as that for infants born at term (37–41 weeks of gestation) (2.03). The five leading causes of infant death in 2019 were the same as in 2018. Infant mortality rates by state for 2019 ranged from a low of 3.21 in New Hampshire to a high of 8.71 in Mississippi.

Keywords: infant death • maternal and infant characteristics • vital statistics • National Vital Statistics System

Introduction

This report presents infant mortality statistics based on data from the 2019 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 age 1 year who died in the 50 states, District of Columbia (D.C.), Puerto Rico, or Guam during 2019 (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). The linked birth/infant death data set also 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.

For 2019, linked birth/infant death data are not available for American Samoa, Commonwealth of the Northern Marianas, and U.S. Virgin Islands. 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, D.C., 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 age 1 year who died during 2019 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 2019 Period/2018 Cohort Linked Birth/Infant Death Public Use File” (1).

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 D.C. 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 became available (5).

In 2019, 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 (1) (Technical Notes).

Information on births for age and race of mother is imputed if it is not reported on the birth certificate. In 2019, race of mother was imputed for 6.8% 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. Additional details on Hispanic origin are available (3). Comparisons between 2019 and 2018 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 for each parent (6)—either alone, as in single race, or in combination, as in more than one race or multiple races—in accordance with the 1997 revised OMB standards (5). Further details on race reporting are available (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) (Technical Notes).

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. However, women with one risk factor may often have other risk factors as well. For example, teen mothers are more likely to be unmarried and of a low-income status, while 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 the first step before more sophisticated types of analyses and may help identify high-risk subgroups for prevention efforts. This report presents several key risk factors for infant mortality: age at death, maternal race and Hispanic origin, maternal age, gestational age, leading causes of infant death, and maternal

state of residence. For brevity, additional selected risk factors (sex, birthweight, plurality, and nativity [mother's place of birth]) are presented in tables but 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 by these characteristics 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 race information for the numerator is the race of the decedent as reported on the death certificate (2,3,8). More detail on the reliability of race and Hispanic-origin data from the linked file compared with the mortality file is available (8).

Statistical significance—Statements in the text 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, also is available (1) (Technical Notes).

Results

Trends in infant mortality and infant age at death

- In 2019, 20,927 infant deaths were reported in the United States, a decline of 3% from 2018 (21,498). The infant mortality rate was 5.58 deaths per 1,000 live births in 2019, a nonsignificant decline from the 2018 rate of 5.67 and the lowest rate reported in U.S. history (Figure 1, Table 1).
- The U.S. infant mortality rate has generally trended downward since 1995 (the first year that the period linked birth/infant death file was available) and has declined 19% since 2005, the most recent high (6.86).
- The 2019 neonatal mortality rate (infant deaths at less than 28 days) declined 2% to 3.69 from 3.78 in 2018. The neonatal mortality rate has generally declined since 1995 and is also down 19% since 2005 (4.54).
- The 2019 postneonatal mortality rate (infant deaths at 28 days or more) was unchanged from 2018 (1.89). The postneonatal mortality rate has also generally declined since 1995 and is also down 19% since 2005 (2.32).

Race and Hispanic origin

- The mortality rate for infants of non-Hispanic white women declined 3% from 2018 to 2019 (from 4.63 to 4.49 infant deaths per 1,000 births). Declines in rates for infants born to non-Hispanic black (10.75 to 10.62), non-Hispanic AIAN (8.15 to 7.87), non-Hispanic Asian (3.63 to 3.38),

and non-Hispanic NHOPI (9.39 to 8.19) women were not significant. A nonsignificant increase was found in the mortality rate for infants of Hispanic women from 2018 to 2019 (4.86 to 5.03) (Tables 1 and 2, Figure 2).

- Among Hispanic-origin subgroups, the mortality rate for infants of Central and South American women increased 13% from 2018 to 2019 (4.02 to 4.53); declines in mortality rates for infants of Mexican and Cuban women were not significant between the 2 years. The increase in the mortality rate for infants of Puerto Rican women was not significant (5.61 to 6.17).
- In 2019, infant mortality continued to vary by race: Infants of non-Hispanic black women had the highest mortality rate (10.62), followed by infants of non-Hispanic NHOPI (8.19), non-Hispanic AIAN (7.87), Hispanic (5.03), non-Hispanic white (4.49), and non-Hispanic Asian (3.38) women.
- Infants of non-Hispanic black women also had the highest neonatal mortality rate in 2019 (6.85) compared with infants of the other race and Hispanic-origin groups; the lowest mortality rate was for infants of non-Hispanic Asian women (2.52).
- In 2019, postneonatal mortality rates were higher for infants of non-Hispanic AIAN (3.87), non-Hispanic black (3.77), and non-Hispanic NHOPI (3.17) women than for infants of non-Hispanic white (1.57), Hispanic (1.55), and non-Hispanic Asian (0.85) women.
- Among Hispanic-origin subgroups in 2019, infants of Puerto Rican women had the highest mortality rate (6.17), followed by infants of Mexican (4.96), Central and South American (4.53), and Cuban (4.14) women.

Maternal age

- No significant changes were found in mortality rates for infants of women in any maternal age group between 2018 and 2019. Rates declined for infants of women aged 20–39 and increased for infants of women under age 20 and aged 40 and over, but these changes were not significant (Figure 3, Table 2).
- Mortality rates were highest for infants of females under age 20 (8.68 infant deaths per 1,000 births), decreased to a low of 4.57 for infants of women aged 30–34, and then increased to 7.01 for infants of women aged 40 and over (the second-highest rate).

Gestational age

- Infant mortality rates declined from 2018 to 2019 for infants born at less than 32 weeks (185.79 to 180.40 infant deaths per 1,000 births) and at 32–33 weeks (21.95 to 19.21). Infant mortality rates for all other gestational age categories did not change significantly between 2018 and 2019 (Table, Table 2) (4).
- In 2019, 66% of infant deaths occurred among infants born preterm (less than 37 weeks of gestation), unchanged from 2018.

Figure 2. Infant mortality rate, by maternal race and Hispanic origin: United States, 2018–2019

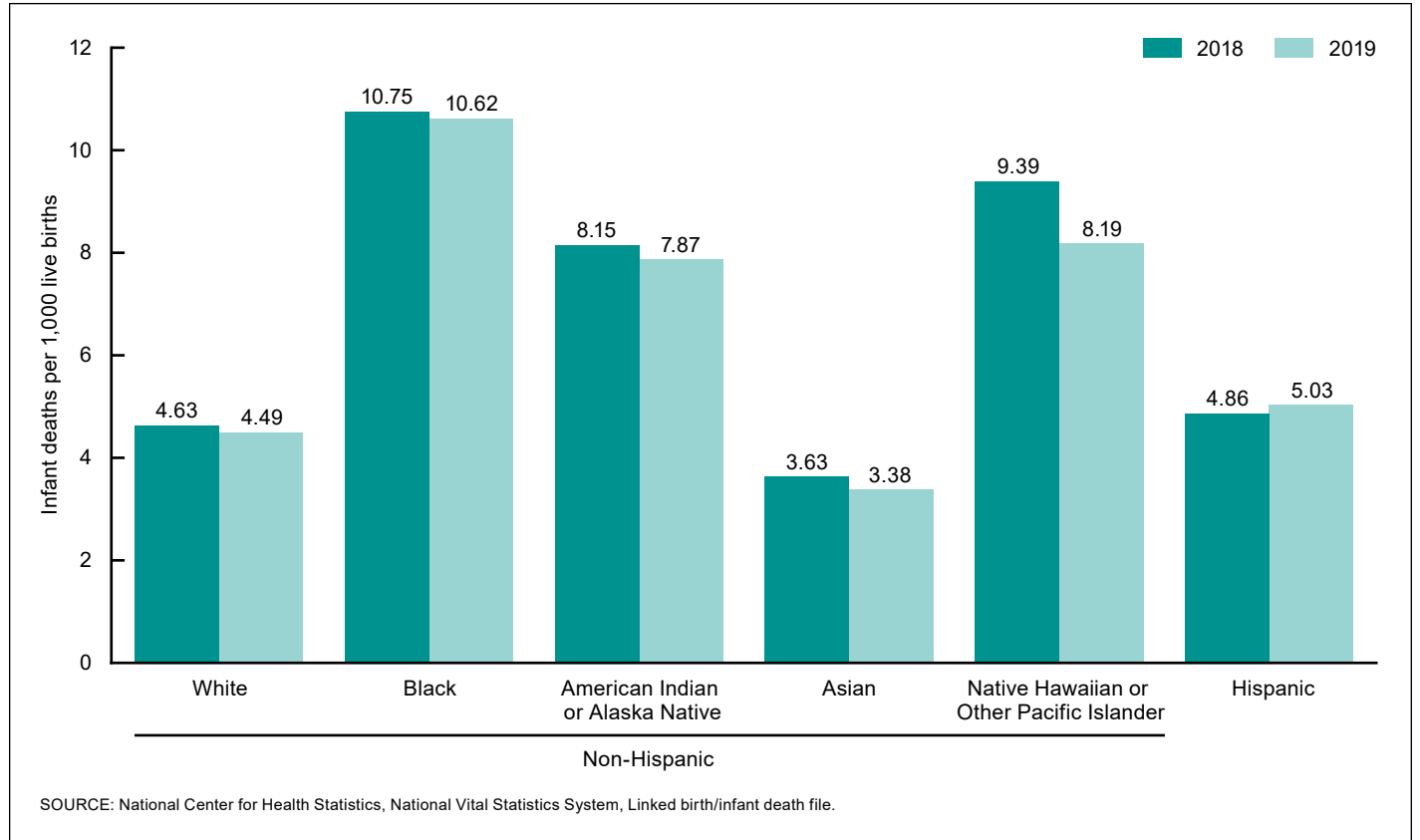


Figure 3. Infant mortality rate, by maternal age: United States, 2018–2019

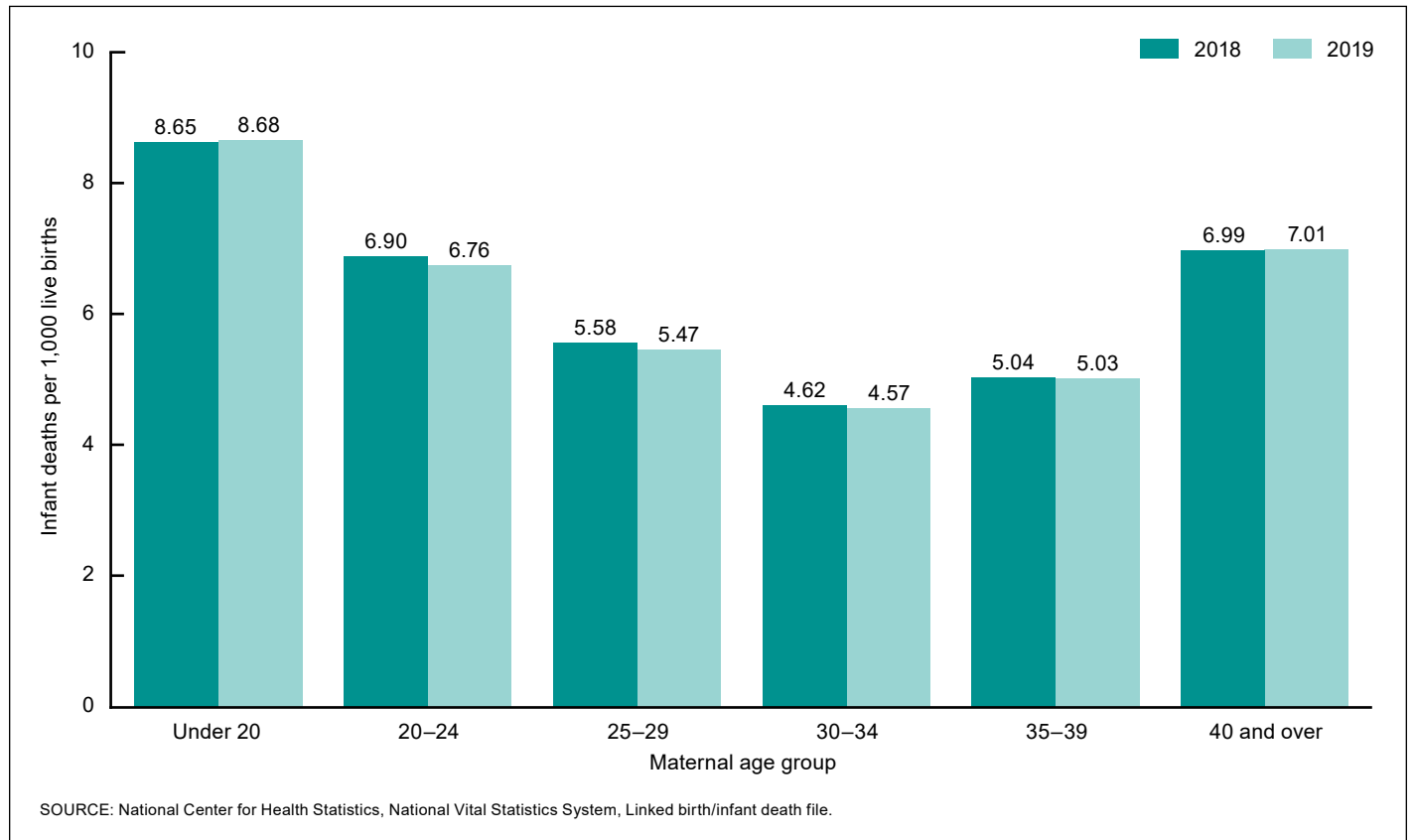


Table. Infant mortality rate, by gestational age: United States, 2015–2019

Year	Less than 32 weeks	32–33 weeks	34–36 weeks	37–41 weeks	42 weeks or more
Deaths per 1,000 live births					
2019.....	180.40	19.21	8.21	2.03	5.72
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: National Center for Health Statistics, National Vital Statistics System, Linked birth/infant death file.

Leading causes of infant death

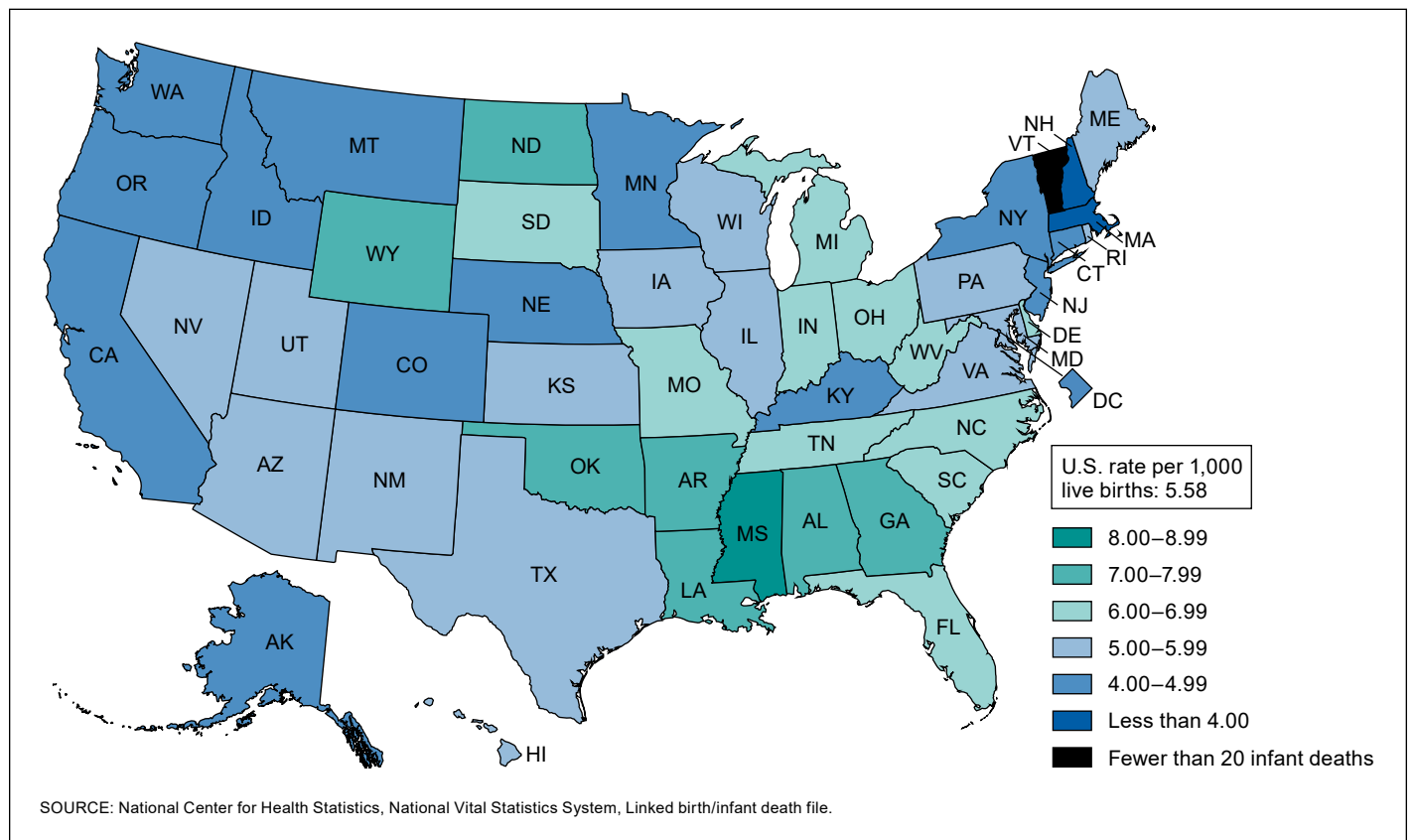
- In 2019, the five leading causes of all infant deaths were the same as those in 2018: congenital malformations (21% of infant deaths), disorders related to short gestation and low birth weight (17%), maternal complications (6%), sudden infant death syndrome (SIDS) (6%), and unintentional injuries (6%) (Table 3).
- From 2018 through 2019, infant mortality rates for unintentional injuries increased from 30.8 infant deaths per 100,000 births to 33.7, while infant mortality rates declined for disorders related to short gestation and low birth weight (97.1 to 92.3) and maternal complications (36.2 to 33.4). Declines in rates for congenital malformations (118.7 to 115.1) and SIDS (35.1 to 33.4) were not significant.

- Congenital malformations was the leading cause of death for infants born to non-Hispanic white (105.5), non-Hispanic AIAN (119.5), and Hispanic (127.5) women (Table 4).
- Disorders related to short gestation and low birth weight was the leading cause of death for infants of non-Hispanic black (237.0) and non-Hispanic Asian (75.0) women.

Infant mortality by state

- By state, infant mortality ranged from a low of 3.21 infant deaths per 1,000 births in New Hampshire to a high of 8.71 in Mississippi (Figure 4, Table 5).
- Twelve states had infant mortality rates significantly lower than the national infant mortality rate of 5.58: California, Colorado, Connecticut, Idaho, Kentucky, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Oregon, and Washington.

Figure 4. Infant mortality rate, by state: United States, 2019



- Fourteen states had infant mortality rates significantly higher than the U.S. infant mortality rate: Alabama, Arkansas, Florida, Georgia, Indiana, Louisiana, Michigan, Mississippi, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, and Tennessee.

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Table 1. Live births, infant, neonatal, and postneonatal deaths, and mortality rates: United States, 1995–2019, and by race and Hispanic origin, 2017–2019

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							
2019.....	3,747,540	20,927	13,834	7,093	5.58	3.69	1.89
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:							
2019.....	1,915,912	8,603	5,589	3,014	4.49	2.92	1.57
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:							
2019.....	548,075	5,821	3,754	2,067	10.62	6.85	3.77
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:							
2019.....	28,450	224	114	110	7.87	4.01	3.87
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:							
2019.....	238,769	806	602	204	3.38	2.52	0.85
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 Pacific Islander:							
2019.....	9,770	80	49	31	8.19	5.02	3.17
2018.....	9,476	89	51	38	9.39	5.38	4.01
2017.....	9,426	72	36	36	7.64	3.82	3.82

Table 1. Live births, infant, neonatal, and postneonatal deaths, and mortality rates: United States, 1995–2019, and by race and Hispanic origin, 2017–2019—Con.

Year and race and Hispanic origin	Number				Deaths per 1,000 live births		
	Live births	Infant deaths	Neonatal deaths	Postneonatal deaths	Infant	Neonatal	Postneonatal
Hispanic							
Total:							
2019.....	886,467	4,462	3,091	1,371	5.03	3.49	1.55
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:							
2019.....	496,716	2,462	1,693	769	4.96	3.41	1.55
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:							
2019.....	70,950	438	294	144	6.17	4.14	2.03
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:							
2019.....	23,668	98	65	33	4.14	2.75	1.39
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:							
2019.....	165,229	749	535	214	4.53	3.24	1.30
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 add to totals due to rounding.

SOURCE: National Center for Health Statistics, National Vital Statistics System, Linked birth/infant death file.

Table 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and by race and Hispanic origin of mother: United States, 2019

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	5.58	4.49	10.62	7.87	3.38	8.19	5.03	4.96	6.17	4.14	4.53
Age at death											
Total neonatal	3.69	2.92	6.85	4.01	2.52	5.02	3.49	3.41	4.14	2.75	3.24
Early neonatal (under 7 days)	2.97	2.31	5.55	3.13	2.11	4.50	2.80	2.73	3.44	1.99	2.64
Late neonatal (7–27 days)	0.72	0.61	1.30	0.88	0.41	*	0.68	0.68	0.70	*	0.59
Postneonatal	1.89	1.57	3.77	3.87	0.85	3.17	1.55	1.55	2.03	1.39	1.30
Sex											
Male	6.08	4.95	11.41	8.69	3.63	10.15	5.47	5.34	7.18	4.43	4.76
Female	5.06	4.01	9.80	7.10	3.11	5.90	4.57	4.55	5.15	3.84	4.30
Period of gestation (weeks)											
Less than 34	111.65	98.20	134.61	106.80	101.34	148.41	107.20	108.42	102.45	105.77	103.76
Less than 28	374.46	380.58	368.22	395.06	390.88	402.44	355.52	359.70	319.05	312.50	370.75
28–31	42.13	45.20	39.21	*	28.31	*	39.10	40.12	41.18	*	34.59
32–33	19.21	18.66	22.95	*	13.13	*	18.27	20.37	*	*	18.22
34–36	8.21	7.87	10.49	11.35	4.26	*	7.82	7.37	9.22	*	8.03
37–41	2.03	1.84	3.37	4.23	0.97	3.24	1.80	1.84	2.06	1.08	1.63
37–38	3.09	3.00	4.44	5.09	1.47	*	2.63	2.67	2.75	*	2.54
39–40	1.58	1.40	2.81	3.96	0.71	*	1.39	1.45	1.72	*	1.19
41	1.47	1.22	2.43	*	*	*	1.59	1.57	*	–	*
42 or more	5.72	5.23	*	*	*	–	*	*	*	–	*
Birthweight (grams)											
Less than 2,500	44.90	40.27	55.06	47.56	28.59	57.95	45.18	45.83	43.37	42.91	43.88
Less than 1,500	203.52	195.14	209.89	210.24	184.13	283.58	202.19	206.04	185.45	191.82	203.10
1,500–2,499	12.75	13.12	13.70	16.14	5.97	*	13.04	13.69	11.43	*	13.26
2,500 or more	1.97	1.81	3.19	4.40	0.93	3.99	1.71	1.74	2.02	1.14	1.54
2,500–4,499	1.97	1.81	3.19	4.37	0.93	4.07	1.70	1.72	2.02	1.15	1.53
4,500 or more	2.45	2.01	*	*	*	–	2.84	*	*	–	*
Plurality											
Single births	5.00	3.99	9.42	7.64	3.03	7.97	4.59	4.54	5.31	3.83	4.21
Twin births	21.77	17.61	36.48	*	15.23	*	21.04	21.33	30.09	*	16.60
Triplet and higher-order births	62.69	52.01	96.77	*	*	–	66.10	*	*	*	*

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and by race and Hispanic origin of mother: United States, 2019—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
Live births—Con.											
Age of mother											
Under 20	173,461	60,854	37,248	2,543	1,362	521	63,396	37,218	5,315	674	10,628
20–24	704,342	313,275	132,605	7,696	13,709	2,490	207,552	121,541	18,948	3,770	32,228
25–29	1,078,097	556,533	165,655	8,638	55,116	2,944	256,385	146,250	21,433	7,063	43,135
30–34	1,089,281	618,176	126,332	6,114	96,759	2,311	209,283	112,292	15,660	7,799	43,439
35–39	572,598	305,886	68,219	2,881	58,302	1,226	118,441	62,821	7,743	3,608	27,740
40–54	129,761	61,188	18,016	578	13,521	278	31,410	16,594	1,851	754	8,059
Mother's place of birth											
Born in the 50 states or District of Columbia	2,896,095	1,785,117	456,315	28,082	46,957	3,506	474,821	298,178	49,999	10,121	32,758
Born elsewhere	843,896	128,457	90,033	326	190,948	6,109	410,361	197,996	20,704	13,535	132,304
Not stated	7,549	2,338	1,727	42	864	155	1,285	542	247	12	167
Infant deaths											
Total	20,927	8,603	5,821	224	806	80	4,462	2,462	438	98	749
Age at death											
Total neonatal	13,834	5,589	3,754	114	602	49	3,092	1,693	294	65	535
Early neonatal (under 7 days)	11,124	4,424	3,041	89	504	44	2,486	1,354	244	47	437
Late neonatal (7–27 days)	2,710	1,165	713	25	98	5	606	339	50	18	98
Postneonatal	7,093	3,014	2,067	110	204	31	1,371	769	144	33	214
Sex											
Male	11,662	4,860	3,179	126	449	51	2,477	1,353	260	54	403
Female	9,265	3,743	2,642	99	357	28	1,985	1,108	179	44	346
Period of gestation (weeks)											
Less than 34	11,585	4,275	3,643	88	516	42	2,478	1,347	247	66	403
Less than 28	9,271	3,230	3,068	64	437	33	1,998	1,073	201	55	327
28–31	1,464	666	350	15	50	4	301	166	32	7	45
32–33	850	379	225	9	29	5	179	108	14	4	31
34–36	2,292	1,053	543	28	67	9	510	267	53	8	94
37–41	6,815	3,185	1,578	106	211	28	1,431	824	129	23	243
37–38	3,158	1,469	739	44	102	15	668	381	56	10	118
39–40	3,372	1,581	785	60	99	12	697	407	67	13	112
41	285	136	54	2	10	1	66	36	6	0	13
42 or more	54	32	9	1	1	0	10	5	1	0	4
Not stated	181	56	48	0	12	0	35	17	8	1	5

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths, by selected characteristics and by race and Hispanic origin of mother: United States, 2019—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 (grams)											
Less than 2,500	14,017	5,327	4,283	109	593	43	3,031	1,644	302	72	509
Less than 1,500	10,707	3,851	3,442	78	485	38	2,305	1,235	237	61	380
1,500–2,499	3,310	1,476	841	31	108	5	726	409	65	11	129
2,500 or more	6,767	3,231	1,500	115	203	36	1,403	803	129	25	236
2,500–4,499	6,678	3,185	1,488	112	202	36	1,381	786	128	25	233
4,500 or more	89	46	12	3	1	0	22	17	1	0	3
Not stated	142	44	37	0	10	0	28	15	7	1	4
Plurality											
Single births	18,102	7,380	4,947	212	704	76	3,963	2,199	365	88	680
Twin births	2,619	1,127	817	11	100	4	459	249	65	7	61
Triplet and higher-order births	206	97	57	1	3	0	39	14	8	3	7
Age of mother											
Under 20	1,505	505	448	16	19	6	426	250	40	0	59
20–24	4,761	1,861	1,448	66	62	17	1,077	596	128	16	171
25–29	5,895	2,498	1,703	77	196	17	1,161	660	128	31	147
30–34	4,978	2,200	1,306	37	281	21	929	502	71	29	187
35–39	2,879	1,231	686	19	189	17	619	308	54	21	133
40–54	909	308	229	8	59	1	251	145	16	1	52
Mother's place of birth											
Born in the 50 states or District of Columbia	16,922	8,172	5,048	222	170	26	2,528	1,544	315	42	130
Born elsewhere	3,810	389	722	2	629	52	1,914	908	122	56	619
Not stated	196	42	50	0	8	1	20	10	1	0	0

* Rate does not meet National Center for Health Statistics 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 add to totals due to rounding. Not stated responses are included in totals but not distributed among groups for rate computations. Race and Hispanic origin are reported separately on the birth certificate. Race categories are consistent with 1997 Office of Management and Budget standards. Persons of Hispanic origin may be of any race.

SOURCE: National Center for Health Statistics, 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, 2010–2019

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)
2019.....	4,313	20.6	115.1	3,460	16.5	92.3	1,250	6.0	33.4	1,251	6.0	33.4	1,264	6.0	33.7
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 2010–2019.

SOURCE: National Center for Health Statistics, 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, 2019

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

Cause of death (based on <i>International Classification of Diseases, 10th Revision, 1992</i>)	Non-Hispanic														
	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	20,927	558.4	...	8,603	449.0	...	5,821	1,062.1	...	224	787.3	...	806	337.6
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	1	4,313	115.1	1	2,021	105.5	2	779	142.1	1	34	119.5	2	163	68.3
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	3,460	92.3	2	1,091	56.9	1	1,299	237.0	3	21	73.8	1	179	75.0
Accidents (unintentional injuries) (V01–X59)	3	1,264	33.7	3	650	33.9	5	332	60.6	3	21	73.8	6	23	9.6
Sudden infant death syndrome (R95)	4	1,251	33.4	4	553	28.9	3	404	73.7	2	24	84.4	8	14	*
Newborn affected by maternal complications of pregnancy (P01)	5	1,250	33.4	5	422	22.0	4	366	66.8	5	14	*	3	63	26.4

Cause of death (based on <i>International 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	4,462	503.3	...	2,462	495.7	...	438	617.3	...	749	453.3
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	1	1,130	127.5	1	634	127.6	2	78	109.9	1	229	138.6
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	698	78.7	2	372	74.9	1	79	111.3	2	116	70.2
Accidents (unintentional injuries) (V01–X59)	5	176	19.9	5	102	20.5	5	19	*	5	23	13.9
Sudden infant death syndrome (R95)	4	193	21.8	4	110	22.1	4	26	36.6	9	13	*
Newborn affected by maternal complications of pregnancy (P01)	3	306	34.5	3	179	36.0	3	27	38.1	3	44	26.6

... Category not applicable.

* Rate does not meet National Center for Health Statistics standards of reliability; based on fewer than 20 deaths in the numerator.

¹For non-Hispanic Asian infants, Newborn affected by complications of placenta, cord and membranes (P02) was the fourth leading cause of death, with 37 deaths and a rate of 15.5. Bacterial sepsis of newborn (P36) was the fifth leading cause of death, with 30 deaths and a rate of 12.6.

²For Central and South American infants, Newborn affected by complications of placenta, cord and membranes (P02) was the fourth leading cause of death, with 27 deaths and a rate of 16.3.

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 the birth certificate. Race categories are consistent with 1997 Office of Management and Budget standards. Persons of Hispanic origin may be of any race.

SOURCE: National Center for Health Statistics, National Vital Statistics System, Linked birth/infant death file.

Table 5. Infant mortality rate: United States and each state, 2019

[By place of residence]

Area	Rate	Infant deaths	Live births
		Deaths per 1,000 births	
United States ¹	5.58	20,927	3,747,540
Alabama	7.71	452	58,615
Alaska	4.99	49	9,822
Arizona	5.43	431	79,375
Arkansas	7.00	256	36,564
California	4.23	1,889	446,479
Colorado	4.85	305	62,869
Connecticut	4.38	150	34,258
Delaware	6.44	68	10,562
District of Columbia	4.96	45	9,079
Florida	6.10	1,342	220,002
Georgia	7.02	887	126,371
Hawaii	5.12	86	16,797
Idaho	4.31	95	22,063
Illinois	5.67	794	140,128
Indiana	6.54	529	80,859
Iowa	5.02	189	37,649
Kansas	5.42	192	35,395
Kentucky	4.90	260	53,069
Louisiana	7.97	470	58,941
Maine	5.43	64	11,779
Maryland	5.84	410	70,178
Massachusetts	3.73	258	69,117
Michigan	6.38	688	107,886
Minnesota	4.53	299	66,027
Mississippi	8.71	319	36,636
Missouri	6.14	443	72,127
Montana	4.78	53	11,079
Nebraska	4.93	122	24,755
Nevada	5.67	199	35,072
New Hampshire	3.21	38	11,839
New Jersey	4.22	420	99,585
New Mexico	5.66	130	22,960
New York	4.33	959	221,539
North Carolina	6.78	805	118,725
North Dakota	7.46	78	10,454
Ohio	6.89	927	134,461
Oklahoma	7.00	344	49,143
Oregon	4.85	203	41,858
Pennsylvania	5.93	796	134,230
Rhode Island	5.90	60	10,175
South Carolina	6.89	393	57,038
South Dakota	6.99	80	11,449
Tennessee	6.96	560	80,450
Texas	5.48	2,069	377,599
Utah	5.27	247	46,826
Vermont	*	15	5,361
Virginia	5.81	566	97,429
Washington	4.26	362	84,895
West Virginia	6.12	111	18,136
Wisconsin	5.86	371	63,270
Wyoming	7.16	47	6,565
Puerto Rico	6.63	135	20,353
Guam	9.87	30	3,041

* Rate does not meet National Center for Health Statistics standards of reliability; based on fewer than 20 deaths in the numerator.

¹Does not include Puerto Rico or Guam.

SOURCE: National Center for Health Statistics, National Vital Statistics System, Linked birth/infant death file.

Technical Notes

Data source and 2003 revision

Information on the data source for the linked birth/infant death file is available elsewhere (1). Additionally, further information on the 2003 revision of the birth certificate is available (3); see also the U.S. Standard Certificate of Live Birth (9).

Weighting

In 2019, 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 96.0% through 100.0% (Table). The number of infant deaths in the linked file for the 50 states and District of Columbia (D.C.) was weighted to equal the sum of the linked plus unlinked infant deaths by state of occurrence of birth and age at death (under 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 2019 linked file started with 20,968 infant death records. Of these records, 20,814 were linked; 154 were unlinked because corresponding birth certificates could not be identified. The 20,968 linked and unlinked records contained records of infants whose mothers' usual place of residence was outside of the United States; 41 records were excluded from linked file analyses for a weighted total of 20,927 infant deaths by place of residence for 2019.

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

The overall infant mortality rate of 5.58 from the 2019 period linked file is the same as that from the 2019 vital statistics mortality file (5.58) (10). The number of infant deaths in the linked file (20,814) differs slightly from the number in the mortality file (20,921) (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 D.C. 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 D.C. (the territory linked file is a separate file). Weighting of the linked file also 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 (11). Accordingly, gestational age data shown in this report are based on OE. National data based on OE data are available only

Table. Percentage of infant deaths linked to corresponding birth records, by state of occurrence of death: United States and each state, 2019

Area	Percent linked by state of occurrence of death
United States ¹	99.3
Alabama	100.0
Alaska	100.0
Arizona	97.4
Arkansas	99.6
California	99.1
Colorado	100.0
Connecticut	100.0
Delaware	98.6
District of Columbia	100.0
Florida	100.0
Georgia	99.9
Hawaii	100.0
Idaho	100.0
Illinois	99.9
Indiana	99.6
Iowa	100.0
Kansas	100.0
Kentucky	99.2
Louisiana	100.0
Maine	100.0
Maryland	100.0
Massachusetts	100.0
Michigan	99.6
Minnesota	99.7
Mississippi	100.0
Missouri	99.2
Montana	100.0
Nebraska	99.3
Nevada	100.0
New Hampshire	100.0
New Jersey	100.0
New Mexico	98.3
New York	99.2
New York City	99.8
North Carolina	100.0
North Dakota	100.0
Ohio	100.0
Oklahoma	98.8
Oregon	99.5
Pennsylvania	100.0
Rhode Island	100.0
South Carolina	100.0
South Dakota	100.0
Tennessee	99.7
Texas	96.0
Utah	100.0
Vermont	100.0
Virginia	99.6
Washington	100.0
West Virginia	100.0
Wisconsin	100.0
Wyoming	100.0

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

SOURCE: National Center for Health Statistics, National Vital Statistics System, Linked birth/infant death file.

from data year 2007 forward. Information on and discussion of the reasons for the change, as well as a detailed comparison of the two measures, are presented elsewhere (11).

Sex, birthweight, plurality, and nativity

Detailed definitions and more information on sex, birthweight, plurality, and nativity are available elsewhere (1,3).

Cause-of-death classification

The mortality statistics presented in this report were compiled in accordance with World Health Organization (WHO) regulations, which specify that member nations classify and code causes of death according to the current revision of the *International Statistical Classification of Diseases (ICD)*. ICD provides the basic guidance to code and classify causes of death, details disease classification, and supplies 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* (16).

Computation of rates

Information on and discussion of computation of rates (1) is also available from the “User Guide to the 2010 Natality Public Use File” at: https://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 (1), see also the “User Guide to the 2010 Natality Public Use File” at: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/DVS/natality/UserGuide2010.pdf.

Availability of linked file

Linked file data are available for download from 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 Wide-ranging Online Data for Epidemiologic Research (CDC WONDER), 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 NCHS Division of Vital Statistics data release policy at: <https://www.cdc.gov/nchs/nvss/nvss-restricted-data.htm>). Data are also available in issues of *Vital and Health Statistics, Series 20; National Vital Statistics Reports*; and *Data Briefs*, from the NCHS website: <https://www.cdc.gov/nchs/products/index.htm>.

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