NVSS National Vital Statistics System

Vital Statistics Rapid Release

Report No. 37 ■ November 2024

Infant Mortality in the United States: Provisional Data From the 2023 Period Linked Birth/Infant Death File

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Abstract

Objectives—This report presents provisional 2023 data on infant mortality rates using the U.S. linked birth/infant death files. Infant mortality rates are shown by infant age at death, maternal race and Hispanic origin, maternal age, gestational age, sex of the newborn, maternal state of residence, and the 10 leading causes of infant death.

Methods—Data are from the period linked birth/infant death files, which link infant deaths with the corresponding birth certificates. Comparisons are made between provisional 2023 and final 2022 data. The linked birth/infant files are based on 100% of birth certificates and 98%–99% of infant death certificates registered in all states and the District of Columbia. For 2023, 1.2% of infant deaths remained unlinked. Infant deaths in states with less than 100% of infant death records linked to their respective birth records are weighted.

Results—In 2023, the U.S. provisional infant mortality rate was 5.61 infant deaths per 1,000 live births, unchanged from the rate in 2022. From 2022 to 2023, changes in the neonatal mortality rate (from 3.59 to 3.65) and the postneonatal mortality rate (from 2.02 to 1.96) were not statistically significant. Changes in infant mortality rates were not significant by most of the characteristics examined: maternal race and Hispanic origin, maternal age, gestational age, sex, or the 10 leading causes of infant death. By state, infant mortality rates increased in Nevada and Washington and declined in New Mexico and West Virginia.

Keywords: infant mortality rates • infant health • National Vital Statistics System

Introduction

This report presents provisional 2023 data on infant mortality rates based on the period linked birth/infant death file. The purpose of this file is to use variables from the birth certificate to conduct more detailed analyses of infant mortality patterns. 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. This report expands on items presented in the Quarterly Provisional Estimates of Infant Mortality, which provide provisional estimates by age at death and cause of death, based on infant deaths from provisional and final mortality and birth files (1). This report describes changes in infant mortality rates from 2022 to 2023 by infant age at death, maternal race and Hispanic origin, maternal age, infant sex, gestational age of the infant, maternal state of residence, and the 10 leading causes of infant death. Provisional data for 2023 are compared with final data for 2022 (2).

Methods

The linked period birth/infant death data are collected via the National Vital Statistics System. Findings are based on all linked birth/infant death records received and processed by the National Center for Health Statistics for the calendar year 2023 as of July 25, 2024. These records represent nearly 100% of linked period file birth/infant death records reported for 2023. In 2023 provisional linked birth/infant death data, 98.8% of infant death records were linked to the corresponding birth certificates. 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 at death (less than 7 days, 7–27 days, and 28 days to less than 1 year). The provisional data file differs from the final file in that it may not include the total final number of infant deaths linked to their corresponding birth certificates (for example, the 2022 provisional file included 20,295 unweighted, linked infant deaths, while the final file included 20,334), nor does it undergo the more comprehensive data quality review conducted for final data,

which focuses on consistency between cause of death and variables such as age at death and infant sex. Accordingly, infant mortality rates presented in this report may differ slightly from those based on final data.

Hispanic origin and race are reported separately on the birth certificate (3). Data shown by Hispanic origin include all people of Hispanic origin of any race. Data for non-Hispanic people are shown separately for each single-race group. Data by race are based on the revised standards issued by the Office of Management and Budget in 1997 (4). The race and Hispanic-origin groups shown are: single-race White non-Hispanic (subsequently, White), single-race Black non-Hispanic (subsequently, Black), single-race American Indian and Alaska Native non-Hispanic (subsequently, American Indian and Alaska Native), single-race Asian non-Hispanic (subsequently, Asian), single-race Native Hawaiian or Other Pacific Islander non-Hispanic (subsequently, Native Hawaiian or Other Pacific Islander), and Hispanic.

Gestational age is based on the obstetric estimate of gestation and is shown for seven categories: less than 28 weeks of gestation, less than 34 weeks of gestation, less than 37 weeks of gestation, 34–36 weeks of gestation, 37–38 weeks of gestation, 39–40 weeks of gestation, and 41 weeks of gestation or more.

Infant mortality rates by state are based on the mother's state of residence. The small number of infant deaths in some states by year can limit the ability to detect statistically significant changes between years and between states.

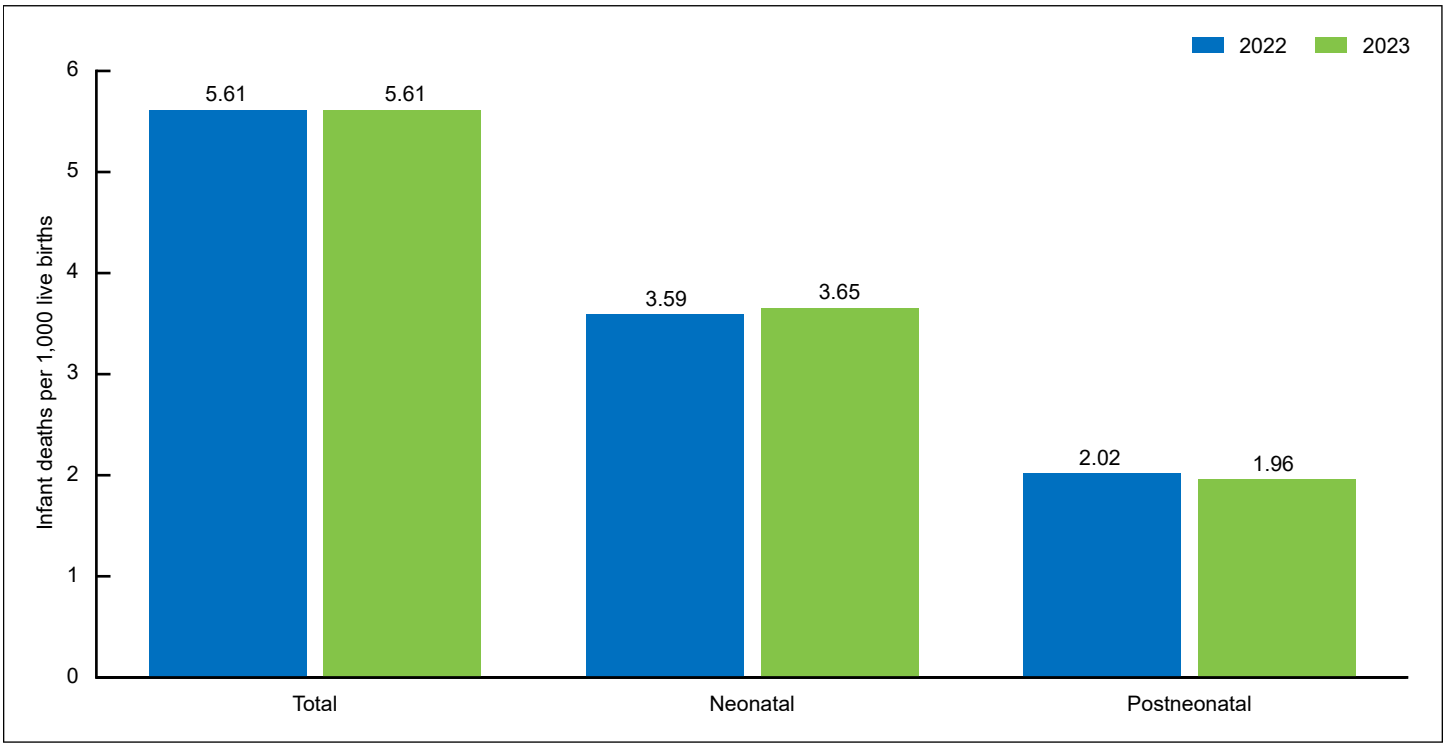
Provisional data for 2023 are compared with final data for 2022 (2). Differences between rates reported in the text are statistically significant at the 0.05 level unless otherwise noted. For information on the methods used to test for statistical significance, see the 2022 user guide (5).

Results

Total infant mortality rate and infant mortality rate by age at death

- In 2023, the provisional number of linked birth/infant deaths in the United States was 20,162, a decrease of 2% from 2022 (20,577); the number of births also declined 2% from 2022 to 2023 (3,667,758 to 3,596,017) (Table 1).
- The provisional infant mortality rate for 2023 was 5.61 infant deaths per 1,000 live births, unchanged from the rate in 2022 (Figure 1).
- Changes in the infant mortality rate by age at death were not significant; the provisional neonatal mortality rate (infant deaths at less than 28 days) was 3.65 in 2023 compared with 3.59 in 2022, and the provisional postneonatal mortality rate (infant deaths from 28 days through 364 days) was 1.96 compared with 2.02.

Figure 1. Infant mortality rate, by age at death: United States, 2022 final and 2023 provisional data



NOTES: Total rate is the number of infant deaths per 1,000 births. Neonatal rate is the number of deaths before 28 days per 1,000 live births. Postneonatal rate is the number of deaths from 28 to 364 days per 1,000 live births. There were no significant changes in rates from 2022 to 2023.
SOURCE: National Center for Health Statistics, National Vital Statistics System, linked birth/infant death file.

Maternal race and Hispanic origin

- Infant mortality rates did not change significantly among race and Hispanic-origin groups. The infant mortality rate for infants of American Indian and Alaska Native women in 2023 was 9.20 infant deaths per 1,000 live births, compared with 9.06 in 2022; for infants of Asian women, the rate was 3.44 compared with 3.51; for infants of Black women, the rate was 10.93 compared with 10.90; for infants of Native Hawaiian or Other Pacific Islander women, the rate was 8.21 compared with 8.50; for infants of White women, the rate was 4.48 compared with 4.52; and for infants of Hispanic women, the rate was 5.03 compared with 4.89 (Table 1, Figure 2).

Maternal age

- Changes in infant mortality rates among the maternal age groups from 2022 to 2023 were not significant: The mortality rate for infants of females younger than age 20 was 10.57 infant deaths per 1,000 live births in 2023 compared with 9.92 in 2022, for ages 20–24 was 7.23 compared with 7.13, for ages 25–29 was 5.24 compared with 5.37, for ages 30–34 was 4.59 for both years, for ages 35–39 was 4.94 compared with 4.99, and age 40 and older was 6.77 compared with 6.73 (Table 1).

Gestational age

- Mortality rates did not change significantly across any of the gestational age categories from 2022 to 2023. The rate for all preterm infants (less than 37 weeks of gestation) was 34.74 deaths per 1,000 live births in 2023 compared with 34.78 in 2022. The 2023 rate for infants born extremely preterm (less than 28 weeks) was 362.14 compared with 364.37 in 2022; for early preterm infants (less than 34 weeks of gestation), was 107.87 compared with 107.94; and for late preterm infants (34–36 weeks), was 8.31 compared with 8.29 (Table 1).
- The rate for infants born early term (37–38 weeks) was 3.22 in both 2023 and 2022; the 2023 rate for full-term infants (39–40 weeks) was 1.64 compared with 1.66 in 2022, and for late-term infants (41 or more weeks), the rate was 1.58 compared with 1.85.

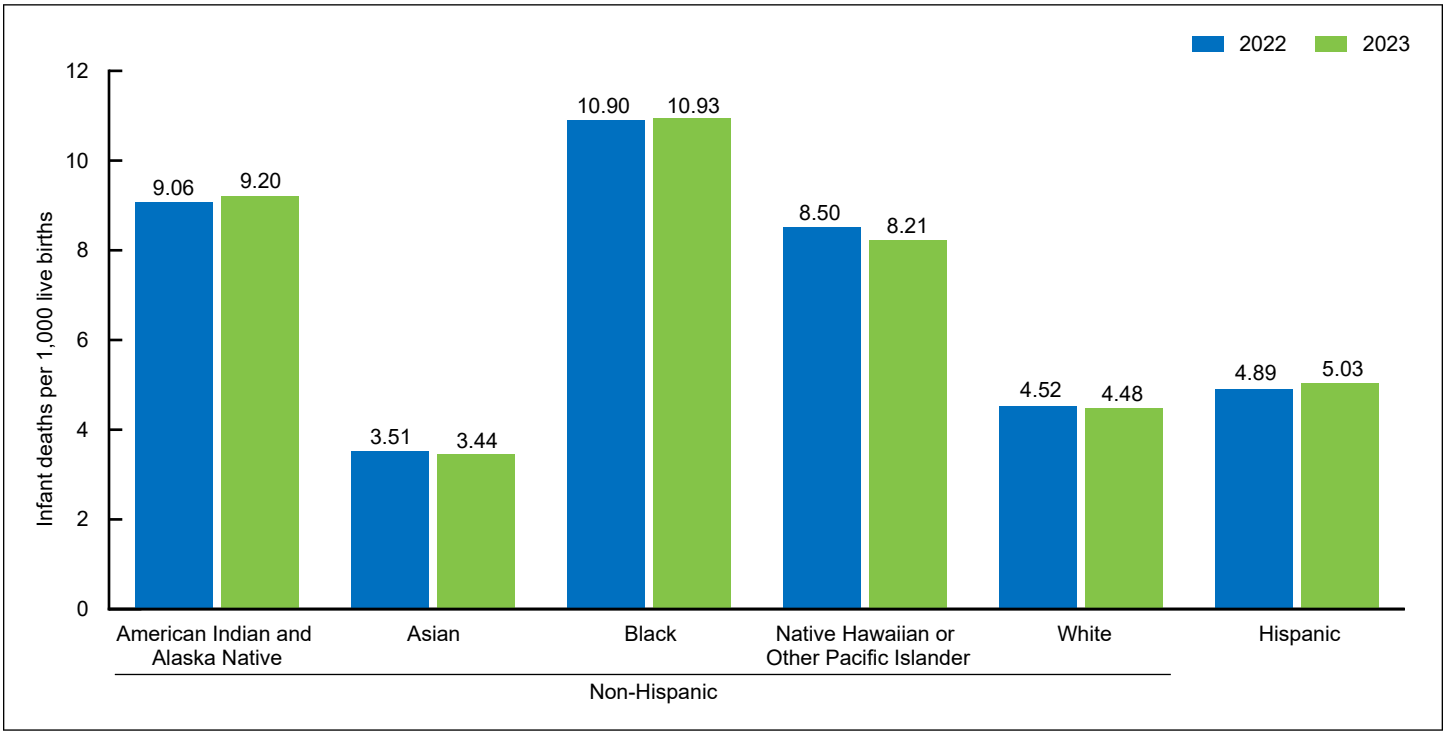
Infant sex

- Infant mortality rates did not change significantly for female or male infants from 2022 to 2023. In 2023, the infant mortality rate for female infants was 5.15 infant deaths per 1,000 live births compared with 5.12 in 2022; for male infants, the rate was 6.04 compared with 6.08 (Table 1).

State of residence

- Compared with 2022, the infant mortality rate in 2023 increased in two states (Nevada and Washington) and declined in two states (New Mexico and West Virginia). Changes

Figure 2. Infant mortality rate, by race and Hispanic origin: United States, 2022 final and 2023 provisional data



NOTES: People of Hispanic origin may be of any race. There were no significant changes in rates from 2022 to 2023.
SOURCE: National Center for Health Statistics, National Vital Statistics System, linked birth/infant death file.

in the remaining states and the District of Columbia were not significant (Table 2).

Leading causes of death

- From 2022 to 2023, changes in the infant mortality rate by the 10 leading causes of infant death were not significant: congenital malformations (112.0 infant deaths per 100,000 live births in 2023 compared with 109.2 in 2022); disorders related to short gestation and low birthweight (81.4 compared with 78.6); sudden infant death syndrome (40.0 compared with 41.7); unintentional injuries (35.9 compared with 36.8); maternal complications (31.9 compared with 33.1); and complications of placenta, cord and membranes (15.6 compared with 17.3); respiratory distress of the newborn (12.6 compared with 12.5); diseases of the circulatory system (9.9 compared with 9.8); and neonatal hemorrhage (9.5 compared with 9.2) (Table 3). From 2022 to 2023, the infant mortality rate for bacterial sepsis of newborn was unchanged (17.4).

Summary

The U.S. infant mortality rate was unchanged from 2022 to 2023 (5.61) following an increase of 3% from 2021 (5.44) to 2022 (5.61) (2); the rate had declined 22% from 2002 to 2021 (6). From 2021 to 2022, neonatal and postneonatal mortality rates increased, and mortality rates increased for infants of American Indian and Alaska Native women, infants of White women, infants of women ages 25–29, all preterm and full-term infants (37–41 weeks of gestation), and male infants. From 2022 to 2023, changes in infant mortality rates by age at death, maternal race and Hispanic origin, maternal age, gestational age, sex, or the 10 leading causes of infant death were not significant. Mortality rates declined in New Mexico and West Virginia and increased in Nevada and Washington.

This report provides more timely information than reports based on final linked birth/infant death file data and provides details by maternal and infant characteristics, such as maternal race and Hispanic origin and gestational age, which are unavailable in provisional mortality data releases.

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List of Detailed Tables

Report tables

Table 1. Number of infant deaths and infant mortality rate, by selected characteristics: United States, final 2022 and provisional 2023

Characteristic	2022			2023			Percent change
	Deaths	Births	Rate[1]	Deaths	Births	Rate[1]	
Total	20,577	3,667,758	5.61	20,162	3,596,017	5.61	0
Age at death							
Neonatal	13,158	3,667,758	3.59	13,113	3,596,017	3.65	2
Postneonatal	7,419	3,667,758	2.02	7,049	3,596,017	1.96	-3
Maternal race and Hispanic origin							
Non-Hispanic:							
American Indian and Alaska Native	233	25,721	9.06	226	24,571	9.20	2
Asian	768	218,994	3.51	742	215,738	3.44	-2
Black	5,573	511,439	10.90	5,374	491,494	10.93	0
Native Hawaiian or Other Pacific Islander	86	10,122	8.50	83	10,115	8.21	-3
White	8,324	1,840,739	4.52	8,008	1,787,051	4.48	-1
Hispanic	4,581	937,421	4.89	4,750	945,200	5.03	3
Maternal age							
Younger than 20	1,444	145,614	9.92	1,509	142,743	10.57	7
20–24	4,553	638,685	7.13	4,459	616,970	7.23	1
25–29	5,446	1,013,417	5.37	5,170	986,567	5.24	-2
30–34	5,137	1,118,787	4.59	5,040	1,098,052	4.59	0
35–39	3,024	606,598	4.99	2,988	604,631	4.94	-1
40 and older	973	144,657	6.73	996	147,054	6.77	1
Period of gestation (weeks)							
Less than 37	13,235	380,548	34.78	12,990	373,902	34.74	0
Less than 34	10,920	101,167	107.94	10,707	99,255	107.87	0
Less than 28	8,515	23,369	364.37	8,364	23,096	362.14	-1
34–36	2,315	279,381	8.29	2,282	274,647	8.31	0
37 or more:							
37–38	3,460	1,074,082	3.22	3,450	1,072,092	3.22	0
39–40	3,364	2,027,670	1.66	3,242	1,974,300	1.64	-1
41 or more	339	182,787	1.85	274	173,081	1.58	-15
Infant sex							
Female	9,186	1,793,312	5.12	9,044	1,756,223	5.15	1
Male	11,391	1,874,446	6.08	11,118	1,839,794	6.04	-1

[1]Deaths per 1,000 live births.

NOTES: Gestational age is based on the obstetric estimate. There were no significant changes in rates from 2022 to 2023.

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

Table 2. Number of infant deaths, births, and infant mortality rate, by state of residence: United States, final 2022 and provisional 2023

State	2022			2023			Percent change
	Deaths	Births	Rate[1]	Deaths	Births	Rate[1]	
Alabama	389	58,149	6.69	442	57,858	7.64	14
Alaska	62	9,359	6.62	65	9,015	7.21	9
Arizona	485	78,547	6.17	433	78,096	5.54	-10
Arkansas	272	35,471	7.67	290	35,264	8.22	7
California	1,724	419,104	4.11	1,642	400,108	4.10	0
Colorado	283	62,383	4.54	280	61,494	4.55	0
Connecticut	150	35,332	4.25	155	34,559	4.49	6
Delaware	81	10,816	7.49	64	10,427	6.14	-18
District of Columbia	44	8,075	5.45	55	7,896	6.97	28
Florida	1,342	224,433	5.98	1,351	221,410	6.10	2
Georgia	893	126,130	7.08	874	125,120	6.99	-1
Hawaii	90	15,535	5.79	72	14,808	4.86	-16
Idaho	118	22,391	5.27	98	22,397	4.38	-17
Illinois	718	128,350	5.59	738	124,820	5.91	6
Indiana	570	79,649	7.16	514	79,000	6.51	-9
Iowa	190	36,506	5.20	184	36,052	5.10	-2
Kansas	200	34,401	5.81	178	34,065	5.23	-10
Kentucky	302	52,315	5.77	342	51,984	6.58	14
Louisiana	416	56,479	7.37	392	54,927	7.14	-3
Maine	77	12,093	6.37	66	11,627	5.68	-11
Maryland	415	68,782	6.03	368	65,594	5.61	-7
Massachusetts	228	68,584	3.32	220	67,093	3.28	-1
Michigan	657	102,321	6.42	604	99,124	6.09	-5
Minnesota	288	64,015	4.50	292	61,715	4.73	5
Mississippi	316	34,675	9.11	308	34,459	8.94	-2
Missouri	467	68,985	6.77	411	67,123	6.12	-10
Montana	52	11,175	4.65	61	11,078	5.51	18
Nebraska	142	24,345	5.83	154	24,111	6.39	10
Nevada	149	33,193	4.49	187	31,794	5.88	†31
New Hampshire	42	12,077	3.48	35	11,936	2.93	-16
New Jersey	367	102,893	3.57	373	101,001	3.69	3
New Mexico	127	21,614	5.88	92	20,951	4.39	†-25
New York	885	207,774	4.26	821	203,612	4.03	-5
North Carolina	825	121,562	6.79	834	120,082	6.95	2
North Dakota	42	9,567	4.39	47	9,647	4.87	11
Ohio	912	128,231	7.11	909	126,896	7.16	1
Oklahoma	333	48,332	6.89	341	47,909	7.12	3
Oregon	177	39,493	4.48	177	38,298	4.62	3
Pennsylvania	741	130,252	5.69	707	126,951	5.57	-2
Rhode Island	40	10,269	3.90	47	9,805	4.79	23
South Carolina	391	57,820	6.76	402	57,729	6.96	3
South Dakota	87	11,201	7.77	71	11,201	6.34	-18
Tennessee	544	82,265	6.61	538	83,021	6.48	-2
Texas	2,228	389,741	5.72	2,263	387,945	5.83	2
Utah	230	45,768	5.03	235	45,019	5.22	4
Vermont	26	5,316	4.89	16	5,065	3.16	-35
Virginia	594	95,630	6.21	544	92,649	5.87	-5
Washington	362	83,333	4.34	408	80,932	5.04	†16
West Virginia	124	16,929	7.32	93	16,606	5.60	†-23
Wisconsin	348	60,049	5.80	345	59,754	5.77	-1
Wyoming	34	6,049	5.62	23	5,990	3.84	-32

† Signficant change in rate from 2022 to 2023 ($p < 0.05$)
[1]Deaths per 1,000 live births.

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

Table 3. Number of infant deaths and infant mortality rate, by 10 leading causes of infant death: United States, final 2022 and provisional 2023

Cause of death (ICD–10 code)	2022		2023		Percent change
	Deaths	Rate[1]	Deaths	Rate[1]	
Congenital malformations (Q00–Q99)	4,004	109.2	4,029	112.0	3
Short gestation and low birthweight nec (P07)	2,884	78.6	2,927	81.4	4
Sudden infant death syndrome (R95)	1,531	41.7	1,439	40.0	-4
Accidents (unintentional injures) (V01–X59)	1,351	36.8	1,290	35.9	-2
Maternal complications of pregnancy (P01)	1,213	33.1	1,146	31.9	-4
Complications of placenta, cord, membranes (P02)	634	17.3	561	15.6	-10
Bacterial sepsis of newborn (P36)	640	17.4	626	17.4	0
Respiratory distress of newborn (P22)	458	12.5	453	12.6	1
Diseases of the circulatory system (I00–I99)	358	9.8	357	9.9	1
Neonatal hemorrhage (P50–P52, P54)	337	9.2	343	9.5	3

[1]Deaths per 1,000 live births.

NOTES: Infant mortality rate is the number of infant deaths per 100,000 births. ICD–10 codes are from the *International Classification of Diseases, 10th Revision*. There were no significant changes in rates from 2022 to 2023.

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

Acknowledgments

This report was prepared in the Division of Vital Statistics under the general direction of Paul D. Sutton, Acting Director; Isabelle Horon, Acting Deputy Director; Robert N. Anderson, Chief, Statistical Analysis and Surveillance Branch; and Joyce Martin, Team Leader, Perinatal Research and Statistics Team, Statistical Analysis and Surveillance Branch. Rajesh Virkar, Chief of the Information Technology Branch and Steve J. Steimel, Annie S. Liu, Prameela Sathunuru, and Legesse Alemu provided computer programming support and statistical tables. Steve J. Steimel and Prameela Sathunuru of the Information Technology Branch also prepared the linked birth/infant death file. The Registration Methods and Data Acquisition, Classification and Evaluation Branch staff of the Division of Vital Statistics evaluated the quality of and acceptance procedures for the state data files on which this report is based. Michelle J.K. Osterman of the Statistical Analysis and Surveillance Branch provided content review.

Suggested citation

Ely DM, Driscoll AK. Infant mortality in the United States: Provisional data from the 2023 period linked birth/infant death file. Vital Statistics Rapid Release; no 37. Hyattsville, MD: National Center for Health Statistics. November 2024. DOI: https://dx.doi.org/10.15620/cdc/166707.