

Annual Summary of Vital Statistics: 2009

abstract

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The number of births in the United States decreased by 3% between 2008 and 2009 to 4 130 665 births. The general fertility rate also declined 3% to 66.7 per 1000 women. The teenage birth rate fell 6% to 39.1 per 1000. Birth rates also declined for women 20 to 39 years and for all 5-year groups, but the rate for women 40 to 44 years continued to rise. The percentage of all births to unmarried women increased to 41.0% in 2009, up from 40.6% in 2008. In 2009, 32.9% of all births occurred by cesarean delivery, continuing its rise. The 2009 preterm birth rate declined for the third year in a row to 12.18%. The low-birth-weight rate was unchanged in 2009 at 8.16%. Both twin and triplet and higher order birth rates increased. The infant mortality rate was 6.42 infant deaths per 1000 live births in 2009. The rate is significantly lower than the rate of 6.61 in 2008. Linked birth and infant death data from 2007 showed that non-Hispanic black infants continued to have much higher mortality rates than non-Hispanic white and Hispanic infants. Life expectancy at birth was 78.2 years in 2009. Crude death rates for children and adolescents aged 1 to 19 years decreased by 6.5% between 2008 and 2009. Unintentional injuries and homicide, the first and second leading causes of death jointly accounted for 48.6% of all deaths to children and adolescents in 2009. *Pediatrics* 2012;129:338–348

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KEY WORDS

birth, death, teenaged fertility, infant mortality, low birth weight, mortality, multiple births, cesarean rate, vital statistics, *International Classification of Diseases, Tenth Revision*, revised certificates

ABBREVIATIONS

CDC—Centers of Disease Control and Prevention

IMR—infant mortality rate

LBW—low birth weight

NCHS—National Center for Health Statistics

NMR—neonatal mortality rate

OMB—Office of Management and Budget

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This annual article is a long-standing feature in *Pediatrics* and provides a summary of the most current vital statistics data for the United States. We also include a special feature this year on the upcoming release of selected new items from the 2003 US Certificate of Live Birth.

METHODS

The data presented in this report were obtained from vital statistics records: birth certificates and death certificates for residents in all US states and the District of Columbia. Birth and death data for 2008 and birth data for 2009 are final. Mortality data for 2009 are preliminary and based on >96% of records. More complete descriptions of vital statistics data systems are available elsewhere.^{1–7}

Current vital statistics patterns and recent trends through 2008 and 2009 are presented according to age, race, and Hispanic origin, and other birth and death characteristics, as well. Hispanic origin and race are collected as separate items in vital records. Persons of Hispanic origin may be of any race. A number of reporting areas allow for multiple-race categories on birth and death certificates. However, until all areas revise their certificates to reflect updated reporting standards for race,⁸ multiple-race data are “bridged” back to single-race categories.^{2,4,9,10} For birth data, mother’s marital status was reported directly in all reporting areas but New York State and New York City in 2008 and 2009. Details about the reporting of marital status in New York and editing methods and imputations as applied to other items on the birth certificate are presented in publications of the National Center for Health Statistics (NCHS).¹¹

Cause-of-death statistics in this report are based solely on the underlying cause of death compiled in accordance with the *International Classification of*

Diseases, 10th Revision (ICD-10).¹² The underlying cause of death is defined as “(a) the disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury.”¹² For certain causes of death, such as unintentional injuries, homicides, suicides, drug-induced deaths, and sudden infant death syndrome, preliminary data may show lower numbers of death relative to final data for the same year. This is a function of the truncated nature of the preliminary file; cause-of-death information may not be available or may be incomplete when preliminary data are sent to NCHS, but is available later for final data processing.

Ranking for leading causes of death is based on number of deaths.¹³ Infant mortality refers to the death of an infant younger than 1 year. Infant mortality rates (IMRs) were computed by dividing the total number of infant deaths in each calendar year by the total number of live births in the same year. Neonatal mortality rates (NMRs) are shown for infant deaths that occurred at <28 days, and postneonatal mortality rates include infant deaths that occurred at 28 days to <1 year of age. The denominator for both rates is the number of live births.

The latest infant mortality statistics according to race and Hispanic origin are from 2007 period linked birth/infant death data.¹⁴ In this data set, the death certificate was linked with the corresponding birth certificate for each infant who died in the United States in 2007. The purpose of this linkage was to use additional variables available from the birth certificate, such as birth weight, to better interpret infant mortality patterns.

Birth data for 2009 are for selected items that were collected by using both the 1989 (unrevised) and the 2003 (revised) US Standard Certificates of Live

Birth. The 2003 revision is described in detail elsewhere.^{1,15,16} Twenty-eight states (California, Colorado, Delaware, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Michigan, Montana, Nebraska, New Hampshire, New Mexico, New York [including New York City], North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, and Wyoming) had implemented the revised birth certificates as of January 1, 2009 (accounting for 66% of 2009 births).¹

Mortality data for 2009 were collected by using both the 1989 (unrevised) and 2003 (current, or “revised”) versions of the US Standard Certificate of Death. The 2003 revision is described in detail elsewhere.^{3,4,16} A list of the 30 reporting areas with revised death certificates as of January 1, 2009, is available elsewhere.³ The remaining 21 areas reported data in 2009 on the basis of the 1989 “unrevised” death certificate. All mortality data items presented in this report are considered comparable between revisions; and revised and unrevised data are combined.

Population denominators for the calculation of birth, death, and fertility rates are estimates based on the population enumerated by the US Census Bureau as of April 1, 2000. Estimates for 2000–2009 and revised estimates for the intercensal period 1991–1999 were produced under a collaborative arrangement between the US Census Bureau and the NCHS. Birth and death rates for these periods were calculated by using reported population data for multiple-race persons bridged back to single-race categories.^{9,10} In addition, the 2000 census counts were modified to be consistent with the 1977 Office of Management and Budget (OMB) race categories.¹⁷

Data for the international comparisons of births and IMRs were obtained from the 2008 *United Nations Demographic*

TABLE 1 Vital Statistics of the United States, Selected Years: 1915–2008 (Final) and 2009 Birth (Final) and Death (Preliminary)

	Number			Rate ^a						
	2009	2008	2000	2009	2008	2000	1990	1980	1950	1915 ^b
Live births	4 130 665	4 247 694	4 058 814	13.5	14.0	14.4	16.7	15.9	24.1	29.5
Fertility rate	NA	NA	NA	66.7	68.6	65.9	70.9	68.4	106.2	125.0
Deaths	2 436 682	2 471 984	2 403 351	7.9	8.1	8.5	8.6	8.8	9.6	13.2
Age-adjusted rate	NA	NA	NA	7.4	7.6	8.7	9.4	10.4	14.5	21.7
Natural increase	1 693 983	1 775 710	1 655 463	5.5	5.8	5.9	8.1	7.1	14.5	16.3
Infant mortality	26 531	28 059	28 035	6.42	6.61	6.89	9.2	12.6	29.2	99.9
Population base (in thousands)	NA	NA	NA	307 007	304 060	281 422	248 710	226 546	150 697	100 546

2009 data for births are final. Data for 2008 and all earlier years are final. Populations are as of July 1 for 2008 and 2009, and as of April 1 in 1950, 1980, 1990, and 2000. Population for 1915 is the midyear estimate based on the April 15, 1910, census. NA, not applicable. Data sources: Centers for Disease Control and Prevention/NCHS, National Vital Statistics System, and the US Census Bureau.

^a Rates per 1000 population, except for fertility, which is per 1000 women aged 15 to 44 years of age, and infant mortality, which is per 1000 live births.

^b Birth rate was adjusted to include states not in registration area (10 states and the District of Columbia when started in 1915). Death rate is for death registration area. The IMR is for birth registration area.

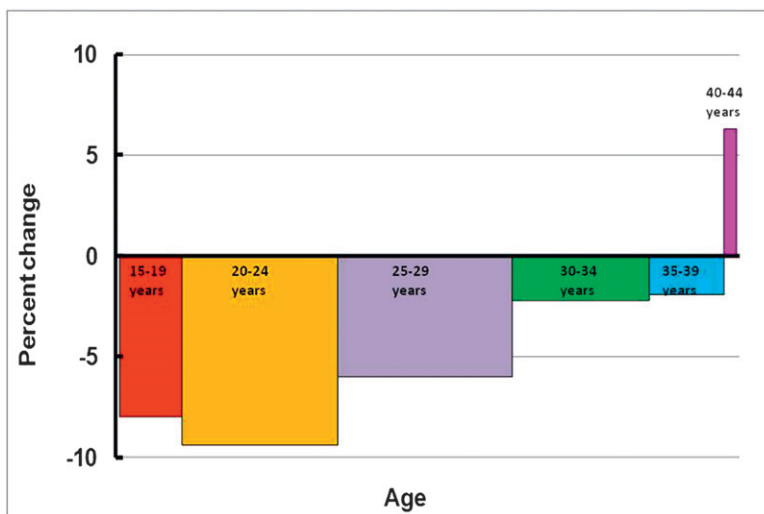


FIGURE 1

Percent change in birth rates by selected age of mother: United States, 2007–2009. Note: The area of each column represents the group's contribution to the overall change. Column widths are proportional to the number of births in 2007 in each group. See Sutton et al.¹⁹ Source: CDC/NCHS, National Vital Statistics System.

*Yearbook*¹⁸ and other sources, as described below.

NOTE: National data on prenatal care and smoking during pregnancy are not currently available and are not included in this article. An upcoming NCHS report will include detailed 2009 data on these topics for states that have implemented the 2003 revision of the US Standard Certificate of Live Birth.

NATURAL INCREASE

Nearly 1.7 million persons were added to the US population in 2009 as a result of natural increase, or the excess of

births over deaths (Table 1).^{1–4} The rate of natural increase was 5.5 persons per 1000 population in 2009.

BIRTHS

In 2009, there were 4 130 665 births, ~3% fewer than in 2008 (4 247 694) (Table 1).¹ The crude birth rate decreased by 4% in 2009 to 13.5 births per 1000 total population from 14.0 in 2008. The general fertility rate (the number of births per 1000 women aged 15–44 years) dropped 3% in 2009 to 66.7. Birth rates decreased among women of all age groups <40 years

between 2007 and 2009. Rates increased for women 40 and older (Fig 1).^{1,19} The total fertility rate in 2009 was 2007.0 births per 1000 women, a 4% decrease compared with the rate in 2008 (2084.5) (Table 2). The total fertility rate estimates the number of births that a hypothetical group of 1000 women would have if they experienced, throughout their childbearing years, the age-specific birth rates observed in a given year.

Racial and Ethnic Composition

The general fertility rate declined for the 3 largest race and Hispanic-origin groups in 2009, down 2% for non-Hispanic white women, 3% for non-Hispanic black women, and 6% for Hispanic women. The rates also declined by 3% for Native American women and 4% for Asian or Pacific Islander women. Fertility rates for these 5 groups ranged from a low of 58.5 births per 1000 women aged 15 to 44 for non-Hispanic white women to a high of 93.3 for Hispanic women in 2009 (Table 2).

Trends in Age-Specific Birth Rates

Teenaged Childbearing

The teenage birth rate (15–19 years) in 2009 is the lowest ever reported in the United States in the nearly 7 decades for which a consistent series of data are available.^{1,20} It dropped 6% from

TABLE 2 Age-Specific Birth Rates and Total Fertility Rates by Race and Hispanic Origin of Mother: United States, 2009

	Age-Specific Birth Rate by Age of Mother ^a								Total Fertility Rate ^b
	15–44 y ^c	15–17 y	18–19 y	20–24 y	25–29 y	30–34 y	35–39 y	40–44 y	
Total	66.7	20.1	66.2	96.3	110.5	97.7	46.5	10.1	2007.0
Non-Hispanic White	58.5	11.0	46.1	76.7	102.6	97.4	43.9	9.0	1780.0
Non-Hispanic Black	68.9	32.1	97.5	123.8	101.9	73.2	36.5	9.0	2026.0
Native American ^d	62.8	30.6	90.5	109.1	90.8	63.9	29.0	6.5	1779.5
Asian or Pacific Islander	68.7	7.1	25.8	57.5	110.5	123.3	68.1	15.8	1956.5
Hispanic ^e	93.3	41.0	114.0	151.2	145.0	108.2	56.1	14.0	2732.5

Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 OMB standards. Thirty-three states and the District of Columbia reported multiple-race data in 2009. Multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states. Data source: Centers for Disease Control and Prevention/NCHS, National Vital Statistics System, natality.

^a Rates per 1000 women in age-specific group.

^b Sum of age-specific birth rates times 5 (includes rates for ages 10–14, 15–19, and 45–49 years, not shown separately).

^c Relates the number of births to women of all ages (women aged 15–44 years).

^d Includes births to Aleuts and Eskimos.

^e Includes all persons of Hispanic origin of any race.

2008 to 2009. The 2009 rate was 39.1 births per 1000 teenagers aged 15 to 19 years, down from 41.5 in 2008. The birth rate for teenagers aged 15 to 17

years decreased 7% to 20.1 per 1000 in 2009, and the birth rate for older teenagers aged 18 to 19 years dropped 6% to 66.2 per 1000 (Table 3).

TABLE 3 Birth Rates for Teens According to Age, Race, and Hispanic Origin, United States, Selected Years: 1991–2009

Age, Race, and Hispanic Origin of Mother	Birth Rate ^a					Percent Change		
	2009	2008	2007	2005	1991	2007–2009	2005–2007	1991–2009
15–19 y								
All races	39.1	41.5	42.5	40.5	61.8	–8	5	–37
Non-Hispanic white ^b	25.6	26.7	27.2	25.9	43.4	–6	5	–41
Non-Hispanic black ^b	59.0	62.8	64.2	60.9	118.2	–8	5	–50
Asian or Pacific Islander	14.7	16.2	16.9	17.0	27.3	–13	— ^c	–46
Native American ^d	55.5	58.4	59.3	52.7	84.1	–6	13	–34
Hispanic ^{b,e}	70.1	77.5	81.8	81.7	104.6	–14	— ^c	–33
15–17 y								
All races	20.1	21.7	22.1	21.4	38.6	–9	3	–48
Non-Hispanic white ^b	11.0	11.5	11.8	11.5	23.6	–7	3	–53
Non-Hispanic black ^b	32.1	34.8	35.8	34.9	86.1	–10	3	–63
Asian or Pacific Islander	7.1	7.9	8.2	8.2	16.3	–13	— ^c	–56
Native American ^d	30.6	32.5	31.8	30.5	51.9	–4	— ^c	–41
Hispanic ^{b,e}	41.0	46.1	47.9	48.5	69.2	–14	–1	–41
18–19 y								
All races	66.2	70.6	73.9	69.9	94.0	–10	6	–30
Non-Hispanic white ^b	46.1	48.5	50.4	48.0	70.6	–9	5	–35
Non-Hispanic black ^b	97.5	104.6	109.3	103.0	162.2	–11	6	–40
Asian or Pacific Islander	25.8	28.4	29.9	30.1	42.2	–14	— ^c	–39
Native American ^d	90.5	96.6	101.6	87.6	134.2	–11	16	–33
Hispanic ^{b,e}	114.0	127.2	137.2	134.6	155.5	–17	2	–27

Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 OMB standards. Thirty-three states plus the District of Columbia in 2009, 30 states in 2008, 27 states in 2007, and 19 states in 2005 reported multiple-race data. Multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states. Data source: Centers for Disease Control and Prevention/NCHS, National Vital Statistics System, natality.

^a Rates per 1000 women in specified group.

^b In 1991 excludes data for New Hampshire, which did not report Hispanic origin on the birth certificate.

^c Not statistically significant

^d Includes births to Aleuts and Eskimos.

^e Includes all persons of Hispanic origin of any race.

Childbearing for Women in Their 20s and 30s

Birth rates declined for women in all 5-year age groups from 20 to 39 years. The birth rate reached a record low for women aged 20 to 24 years in 2009, falling 7% to 96.3 births per 1000 women,¹ from 103.0 in 2008. The rate for women aged 25 to 29 years also decreased in 2009 to 110.5 (a drop of 4% from 2008). The birth rate in 2009 for women aged 30 to 34 declined 2% to 97.7. For women 35 to 39 years the rate again declined by 1% in 2009, to 46.5 per 1000 women.

Childbearing for Women 40 and Over

The birth rate for women aged 40 to 44 years increased 3% from 9.8 in 2008 to 10.1 in 2009. It was the *only* age-specific rate to increase in 2009.^{1–19} The birth rate for women aged 45 to 49 years remained unchanged from 2008 at 0.7 (data not shown); this rate has trended upward since 1992.¹

Unmarried Mothers

The total number of births to unmarried women fell 2% in 2009, to 1 693 658. The birth rate for unmarried women in 2009 was 50.5 births per 1000 unmarried women aged 15 to 44 years, a decline of 4% from 2008. The proportion of all births to unmarried women increased without interruption from 1997 to 2009.¹ In 2009, 41.0% of births were to unmarried women, compared with 40.6% in 2008, 33.2% in 2000, and 18.4% in 1980.¹ The proportion of births to unmarried women increased for the 3 largest race and Hispanic-origin population groups between 2008 and 2009 (Table 4). Births to unmarried women increased from 2008 to 2009 for each age group 25 years and older, whereas they declined for women younger than age 25. In 2009, 87% of births to teenagers and 62% of births to women aged 20 to 24 were nonmarital. One in 5 births to women 30 and older were to unmarried women.¹

TABLE 4 Percentage of Births with Selected Characteristics by Race and Hispanic Origin of Mother, United States, Selected Years: 1990, 2008, and 2009

	All Races			Non-Hispanic White			Non-Hispanic Black			Hispanic ^a		
	2009	2008	1990	2009	2008	1990 ^b	2009	2008	1990 ^b	2009	2008	1990 ^b
Mother												
<20 y of age	10.0	10.4	12.8	7.3	7.5	9.6	16.4	17.1	23.2	13.8	14.1	16.8
≥40 y of age	2.8	2.7	1.2	3.0	2.9	1.2	2.2	2.1	0.8	2.3	2.2	1.2
Unmarried	41.0	40.6	28.0	29.0	28.7	16.9	72.8	72.3	66.7	53.2	52.6	36.7
Diabetes during pregnancy	4.8	4.6	2.1	4.4	4.3	2.2	4.2	4.0	1.8	5.0	4.8	2.0
Pregnancy-associated hypertension	4.1	3.9	2.7	4.6	4.4	3.0	5.0	4.8	2.8	2.9	2.8	1.8
Health care utilization												
Midwife-attended births ^c	7.6	7.5	3.9	7.5	7.3	3.2	6.9	6.9	4.4	8.1	8.2	6.2
Cesarean delivery rate	32.9	32.3	22.7	32.8	32.4	23.4	35.4	34.5	22.1	31.6	31.0	21.2
Wt gain of >40 lbs ^d	20.8	20.8	15.9	23.5	23.4	16.5	20.5	20.2	14.8	16.1	16.3	14.1
Infant												
Birth weight												
LBW ^e	8.16	8.18	7.0	7.19	7.22	5.6	13.61	13.71	13.3	6.94	6.96	6.1
VLBW ^e	1.45	1.46	1.27	1.16	1.18	0.93	3.06	3.01	2.93	1.19	1.20	1.03
Gestational age												
Preterm birth^f												
Early ^f	3.51	3.56	3.3	2.91	2.98	2.4	6.22	6.28	7.4	3.33	3.33	3.2
Late ^f	8.66	8.77	7.3	8.00	8.16	6.1	11.24	11.27	11.5	8.64	8.77	7.8
Multiple births												
Live births in twin deliveries (per 1000 live births)	33.2	32.6	22.6	37.0	36.6	22.9	38.0	36.8	26.7	22.5	22.3	18.0
Live births in higher-order multiple deliveries (per 100 000 live births)	153.5	147.6	72.8	201.4	198.1	89.8	105.6	91.3	46.2	83.5	80.1	39.4

Race and Hispanic origin are reported separately on birth certificates. Persons of Hispanic origin may be of any race. Race categories are consistent with the 1977 OMB standards. Three states and the District of Columbia in 2009 and 30 states in 2008 reported multiple-race data. Multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states. Data source: Centers for Disease Control and Prevention/NCHS, National Vital Statistics System, natality.

^a Includes all persons of Hispanic origin of any race.

^b Excludes data for New Hampshire and Oklahoma, which did not report Hispanic origin.

^c Delivered by certified nurse midwives.

^d Mother gained more than 40 pounds during pregnancy.

^e VLBW is birth weight of <1500g (3 lb, 4 oz), and LBW is birth weight of <2500g (5 lb, 8 oz).

^f Preterm indicates birth before 37 completed weeks of gestation, early preterm indicates birth before 34 completed weeks of gestation, and late preterm indicates birth between 34 and 36 completed weeks of gestation.

Cesarean Delivery

The total cesarean-delivery rate rose to 32.9% in 2009, marking the thirteenth consecutive year of increase and another record high for the nation (Table 4). The rate has climbed by nearly 60% since 1996 (20.7%); however, in the past few years, the pace has slowed.¹ From 2008 to 2009, cesarean delivery rates increased 1% to 2% for all maternal age groups over age 20. Increases were reported for all race and Hispanic-origin groups: non-Hispanic white (1%), Hispanic, American Indian or Alaska native, and Asian or Pacific Islander (2%), and non-Hispanic black (3%). Since 1994, non-Hispanic black women have had the highest cesarean delivery.¹

Multiple Births

The twin birth rate rose 2% in 2009 to 33.2 twins per 1000 total births (Table 4). However, the rise appears to have slowed to <1% per year in the period from 2005 to 2009, compared with annual increases of nearly 3% during the 1990s. The rate of twin births had increased by 76% since 1980.¹

The triplet/+ rate (the number of births in triplet and higher-order multiples per 100 000 total births) for 2009 was 153.5 per 100 000 total births, a rise of 4% from 2008 (Table 4). This was the first significant rise for this rate since 2001. The triplet/+ rate increased rapidly during the 1980s and 1990s, peaking in 1998 (193.5). The rates have since

fluctuated but have generally trended downward.¹

Babies born in twin and triplet/+ deliveries are much more likely than singletons to be born small, and accordingly, are eight times as likely to die in the first month of life.²¹ Ten percent of twins and 35% of triplets were born at very low birth weight in 2009 compared with 1% of singletons. Triplets weigh about half that of singleton infants; the average twin weighs 2 pounds less than the average singleton at birth.¹

Preterm Birth

The preterm birth rate was 12.18% in 2009, the third consecutive year of decline.¹ In 2008, the rate was 12.33. As shown in Fig 2, the preterm rate

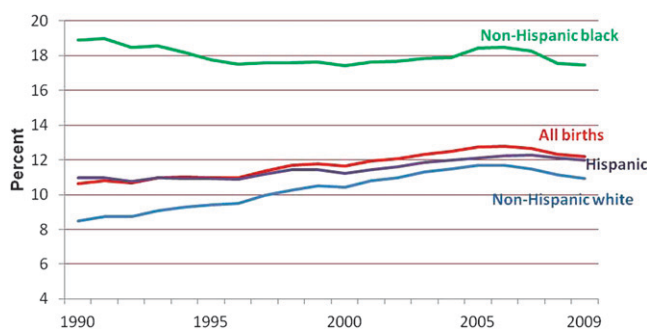


FIGURE 2

Preterm birth rates by race and Hispanic origin of mother: United States, 1990–2009. Note: Preterm birth is <37 completed weeks of gestation. Source: CDC/NCHS, National Vital Statistics System.

(infants delivered at <37 completed weeks of gestation per 100 births) rose from 1990 to 2006.¹ Declines were observed, however, from 2008 to 2009 among late-preterm infants (at 34–36 weeks), from 8.77% to 8.66% and early preterm (<34 weeks), from 3.56% to 3.51% (Table 4). The total preterm rate declined significantly among births to non-Hispanic white (from 11.14% to 10.92%), and Hispanic (from 12.10% to 11.97%) infants (Table 4).

Low Birth Weight

The low birth weight (LBW) (<2500 g) rate was 8.16% in 2009, essentially

unchanged from the 2008 rate of 8.18% (Table 4). The percentage of infants born LBW had increased fairly steadily since the mid-1980s (6.2% in 1984), but began to decline in 2006.¹ Rates of very low birth weight (<1500 g) were stable, 1.45% for 2009. The small observed changes in the LBW rates from 2008 to 2009 among the 3 largest race and Hispanic origin groups were not statistically significant (Table 4).

Over the past several decades, national LBW levels have been influenced by the rise in the rate of multiple births; more than one-half of these infants weigh

<2500 g at birth.¹ A rise in LBW was also observed between 1990 and 2006 for singleton deliveries.

The birth weight distribution has changed markedly since 1990 for all births as well as for singletons only.¹ During 1990–2009, the percentage of infants weighing <3500 g increased, whereas births at higher weights have decreased. The reasons for this shift toward lower birth weights are not fully understood, but may include obstetric intervention earlier in pregnancy, older maternal age, and increased use of infertility therapies.^{23,24}

INFANT MORTALITY

In 2009 a total of 26 531 infant deaths were reported in the United States according to preliminary data.³ The IMR was 6.42 infant deaths per 1000 live births, a figure significantly lower (by 3%) than the 2008 rate of 6.61. The NMR for 2009 was 4.19, also significantly lower than the 2008 NMR of 4.29 neonatal deaths per 1000 live births.

Data for 2007 linked birth/infant deaths show wide and persistent variation in

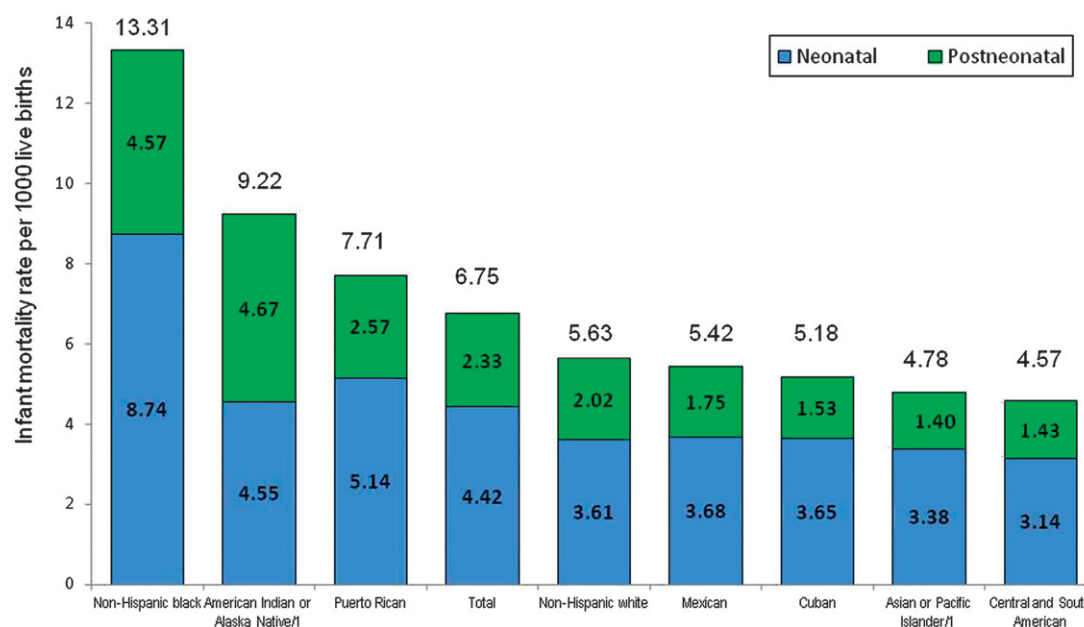


FIGURE 3

Infant, neonatal, and postneonatal mortality rates by race and Hispanic origin of mother, United States, 2007. Includes persons of Hispanic and non-Hispanic origin. Note: Neonatal is <28 days and postneonatal is 28 days to <1 year. See Mathews et al.¹⁴. Source: CDC/NCHS, National Vital Statistics System.

IMRs according to race and Hispanic origin.¹⁴ As in past years, the highest rate was among infants born to non-Hispanic black mothers,²⁵ 13.31 deaths per 1000 live births, more than double the rate of infants born to non-Hispanic white mothers (5.63) (Fig 3). Among Hispanic subgroups, rates ranged from 4.57 for Central and South Americans mothers, to 7.71 for Puerto Rican mothers. The IMRs for most Hispanic subgroups have fluctuated slightly since 2000.

Geographic Variation in Infant Outcomes

Table 5 presents 2009 information for states on the percentage of preterm birth, percentage of LBW (final data), IMRs, and NMRs (preliminary data). For 2009, Mississippi had the highest LBW (12.2%) and preterm (18.0%) rates. South Dakota had the lowest LBW (5.8%) rate, and Vermont had the lowest preterm rate (9.3%). States in the southeastern United States had the highest infant and neonatal mortality rates. In 2009, IMRs for the states ranged from 4.58 in Iowa to 10.02 in Mississippi. The IMR for the District of Columbia was 9.40. These geographic patterns have been observed for many years.

Leading Causes of Infant Death

In 2009, 55.5% of all infant deaths (Table 6) were attributable to 5 leading causes: congenital malformations, deformations, and chromosomal abnormalities (20.2%); disorders related to short gestation and LBW, not elsewhere classified (16.8%); sudden infant death syndrome (8.2%); newborn affected by maternal complications of pregnancy (6.0%); and accidents (unintentional injuries) (4.4%).³ These 5 leading causes of infant death are the same as in 2008.⁴

INTERNATIONAL COMPARISONS

Table 7 shows births for 2009/2010 and IMRs for 2007, 2008, and 2009 for the

TABLE 5 Percent Preterm and Percent LBW (Final), IMR, and NMR (Preliminary), United States and Each State: 2009

State of Residence	Preterm ^a	LBW ^b	IMR ^c	NMR ^d	State of Residence	Preterm ^a	LBW ^b	IMR ^c	NMR ^d
United States	12.2	8.2	6.42	4.19					
Alabama	15.6	10.3	8.42	5.15	Montana	10.9	7.1	5.87	3.34
Alaska	10.0	5.9	6.80	2.74	Nebraska	11.5	7.1	5.42	3.30
Arizona	12.7	7.1	5.98	3.98	Nevada	13.8	8.1	5.87	3.99
Arkansas	13.1	8.9	7.70	4.27	New Hampshire	9.9	6.9	4.86	3.36
California	10.3	6.8	4.94	3.33	New Jersey	12.0	8.3	5.12	3.63
Colorado	11.3	8.8	6.25	4.20	New Mexico	12.3	8.3	5.31	3.24
Connecticut	10.2	8.0	5.50	4.19	New York	12.2	8.2	5.32	3.65
Delaware	12.5	8.6	7.87	5.71	North Carolina	13.0	9.0	7.92	5.31
District of Columbia	14.2	10.3	9.40	6.08	North Dakota	10.6	6.4	6.11	3.33
Florida	13.5	8.7	6.88	4.48	Ohio	12.3	8.6	7.68	5.21
Georgia	13.8	9.4	8.15	5.62	Oklahoma	13.8	8.4	7.90	4.43
Hawaii	12.6	8.4	6.14	4.55	Oregon	9.8	6.3	4.81	3.33
Idaho	10.1	6.5	5.44	3.41	Pennsylvania	11.5	8.3	7.14	4.88
Illinois	12.4	8.4	6.90	4.39	Rhode Island	11.4	8.0	6.20	4.98
Indiana	11.9	8.3	7.82	4.96	South Carolina	14.5	10.0	7.41	4.49
Iowa	11.3	6.7	4.58	2.72	South Dakota	10.9	5.8	6.70	3.77
Kansas	11.2	7.3	6.98	4.25	Tennessee	13.0	9.2	8.00	4.77
Kentucky	13.6	8.9	6.79	3.49	Texas	13.1	8.5	5.99	3.78
Louisiana	14.7	10.6	8.69	5.09	Utah	11.3	7.0	5.29	3.90
Maine	9.9	6.3	5.42	3.93	Vermont	9.3	6.7	6.22	4.42
Maryland	12.7	9.1	7.27	5.18	Virginia	11.4	8.4	7.14	4.67
Massachusetts	10.9	7.8	5.03	3.85	Washington	10.3	6.3	4.91	2.84
Michigan	12.4	8.4	7.52	5.13	West Virginia	12.9	9.2	7.76	5.22
Minnesota	10.1	6.5	4.61	2.69	Wisconsin	10.9	7.1	6.08	3.98
Mississippi	18.0	12.2	10.02	6.13	Wyoming	11.2	8.4	5.96	3.55
Missouri	12.2	8.1	7.16	4.51					

Data source: Centers for Disease Control and Prevention/NCHS, National Vital Statistics System.

^a Preterm birth is <37 weeks of completed gestation.

^b LBW is <2500 g.

^c Infant deaths (< 1 year) per 1000 live births.

^d Neonatal deaths (<28 days) per 1000 live births.

TABLE 6 Deaths, Percentages of Total Deaths, and Mortality Rates for the 10 Leading Causes of Infant Death: United States, 2008 (Final) and 2009 (Preliminary)

Causes of Death and <i>International Classification of Diseases, 10th Revision Codes</i> ¹²	Rank ^a	2009			2008		
		n	%	Rate ^c	n	%	Rate ^c
All causes	— ^b	26 531	100.0	642.1	28 059	100.0	660.6
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	1	5358	20.2	129.7	5638	20.1	132.7
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	4463	16.8	108.0	4754	16.9	111.9
Sudden infant death syndrome (R95)	3	2168	8.2	52.5	2353	8.4	55.4
Newborn affected by maternal complications of pregnancy (P01)	4	1586	6.0	38.4	1765	6.3	41.6
Accidents (unintentional injuries) (V01–X59)	5	1158	4.4	28.0	1315	4.7	31.0
Newborn affected by complications of placenta, cord, and membranes (P02)	6	1022	3.9	24.7	1080	3.8	25.4
Bacterial sepsis of newborn (P36)	7	682	2.6	16.5	700	2.5	16.5
Respiratory distress of newborn (P22)	8	587	2.2	14.2	630	2.2	14.8
Diseases of the circulatory system (I00–I99)	9	565	2.1	13.7	594	2.1	14.0
Neonatal hemorrhage (P50–P52,P54)	10	537	2.0	13.0	556	2.0	13.1

Data source: Centers for Disease Control and Prevention/NCHS, National Vital Statistics System: mortality, 2009 and 2008 (www.cdc.gov/nchs/nvss/mortality_tables.htm).

^a Rank is based on 2009 data.

^b Indicates that data are not applicable.

^c IMRs are per 100 000 live births.

TABLE 7 Number of Live Births for 2009 and IMRs for 2007, 2008, and 2009 for 30 Countries

Country	No. of Births in 2009/2010 ^a	IMR		
		2009	2008	2007
Hong Kong	82 095	1.7	1.8	1.8
Japan	1 070 035	2.4	2.6	2.6
Sweden	115 641 ^a	2.5	2.5	2.5
Finland	60 980 ^a	2.6	2.6	2.7
Czech Republic	117 153 ^a	2.9	2.8	3.1
Norway	61 442 ^a	3.1	2.7	3.1
Greece	117 933	3.1	2.7	3.5
Denmark	63 411	3.1	4.0	4.0
Republic of Korea	444 849	3.2	3.5	3.6
Ireland	73 940 ^a	3.2	3.8	3.1
Spain	479 999 ^a	3.3	3.3	3.5
Belgium	127 000 ^a	3.4	3.7	4.0
Germany	681 000 ^a	3.5	3.5	3.9
Portugal	101 320	3.6	3.3	3.4
Italy	561 980 ^a	3.7	3.3	3.5
Austria	78 742 ^a	3.8	3.7	3.7
Israel	165 950 ^a	3.8	3.8	3.9
Netherlands	183 866 ^a	3.8	3.8	4.1
France	829 000 ^a	3.9	3.8	3.8
Switzerland	80 000 ^a	4.3	4.0	3.9
Australia	295 738	4.3	4.1	4.2
United Kingdom	778 823 ^a	4.7	4.6	4.8
Cuba	130 036	4.8	4.7	5.3
New Zealand	62 543	4.9	5.0	4.9
Canada	377 886	— ^b	5.1 ^c	5.1
Hungary	90 350 ^a	5.1	5.6	5.9
Croatia	44 577	5.3	4.5	5.6
Poland	413 300 ^a	5.6	5.6	6
Slovenia	60 410 ^a	5.7	5.9	6.1
United States	4 130 665	6.4 ^d	6.6	6.8

Data sources: Tables 9 and 15 in *United Nations Demographic Yearbook, 2008*.¹⁸

^a Data are for 2010.

^b Data are not available.

^c Statistics Canada, CANSIM, table 102-0504 and Catalogue no. 84F0211X.

^d Preliminary data.

United States and 29 other countries with at least 40 000 births. Data for these countries were obtained from the United Nations Demographic Yearbook,¹⁸ the United Nations demographic Web site,²⁶ and Organisation for Economic Co-operation and Development publications.²⁷ Countries are ordered from the lowest to highest IMR in 2009. Hong Kong reported an IMR <2 infant deaths per 1000 live births for all 3 years. Nine countries had an IMR half the US rate in 2009, and the rate was <5.0 infant deaths per 1000 live births for 24 countries. The potential reasons for the higher IMR in the United States are discussed elsewhere.^{4,28–31}

DEATHS

There were 2 436 682 deaths in the United States in 2009 (Table 1), 35 302 less than in 2008. Age-adjusted death rates are better indicators of the risk of mortality over time than crude death rates, because they control for changes in the age composition of the population. The age-adjusted death rate decreased by 2.6% from 7.6 deaths per 1000 US standard population in 2008, to 7.4 in 2009. This was a record low for the United States.³

The 2008 life tables show a difference in life expectancy at birth for gender, race, and Hispanic origin. Hispanic females have the highest life expectancy at birth (83.3 years), followed by non-Hispanic

white females (80.8 years), Hispanic males (78.4 years), non-Hispanic black females (76.9), non-Hispanic white males (75.9), and non-Hispanic black males (70.2).^{4,32} The estimated life expectancy at birth for a given year represents the average number of years that a group of infants would be expected to live if, throughout their lifetime, they were to experience the age-specific death rates that prevailed during the year of their birth.

Deaths Among Children

A total of 21 542 children and adolescents aged 1 to 19 years died in the United States in 2009 (Table 8).³ The death rate for children aged 1 to 19 years decreased 6.5% from 29.1 per 100 000 population in 2008 to 27.2 in 2009.

For all children aged 1 to 19 years, the leading cause of death was accidents (unintentional injuries), which accounted for 36.5% of all deaths in 2009 and 38.9% of all deaths in 2008. The second leading cause of death was homicide, accounting for 12.1% of all deaths in 2009 and 12.4% of all deaths in 2008. Between 2008 and 2009, the death rate decreased for unintentional injuries, homicide, septicemia, and cerebrovascular diseases. The preliminary death rate increased for influenza and pneumonia because of the increase in deaths from influenza A (H1N1) in 2009.³ Rates did not change significantly for the other leading causes of death among children.

The Release of Important New Health Data From the Revised Birth Certificate

The 2003 US Standard Certificate of Live Birth includes an array of new health items that can be used to describe patterns and trends in maternal and newborn risk, and the utilization and impact of health care.^{15,16} These important new items will be released by Centers of Disease Control and Prevention's National Center for Health

TABLE 8 Deaths and Death Rates for the 5 Leading Causes of Childhood Death in Specified Age Groups, United States, 2008 (Final) and 2009 (Preliminary)

Age, Causes of Death, and <i>International Classification of Diseases, Tenth Revision Codes</i> ¹²	Rank ^a	2009			2008		
		n	%	Rate ^b	n	%	Rate ^b
Total: 1–19 y							
All causes	— ^c	21 542	100.0	27.2	22 788	100.0	29.1
Accidents (unintentional injuries) (V01–X59,Y85–Y86)	1	7871	36.5	9.9	8869	38.9	11.3
Assault (homicide) (*U01–*U02,X85–Y09,Y87.1)	2	2597	12.1	3.3	2836	12.4	3.6
Intentional self-harm (suicide) (*U03,X60–X84,Y87.0)	3	1922	8.9	2.4	1826	8.0	2.3
Malignant neoplasms (C00–C97)	4	1896	8.8	2.4	1969	8.6	2.5
Congenital malformations, deformations, and chromosomal abnormalities (Q00–Q99)	5	1062	4.9	1.3	1082	4.7	1.4
Diseases of heart (I00–I09,I11,I13,I20–I51)	6	679	3.2	0.9	778	3.4	1.0
Influenza and pneumonia (J09–J18)	7	521	2.4	0.7	295	1.3	0.4
Chronic lower respiratory diseases (J40–J47)	8	260	1.2	0.3	244	1.1	0.3
Septicemia (A40–A41)	9	185	0.9	0.2	208	0.9	0.3
Cerebrovascular diseases (I60–I69)	10	174	0.8	0.2	232	1.0	0.3
1–4 y							
All causes	— ^c	4448	100.0	26.1	4730	100.0	28.3
Accidents (unintentional injuries) (V01–X59,Y85–Y86)	1	1446	32.5	8.5	1469	31.1	8.8
Congenital malformations, deformations, and chromosomal abnormalities (Q00–Q99)	2	485	10.9	2.8	521	11.0	3.1
Assault (homicide) (*U01–*U02,X85–Y09,Y87.1)	3	385	8.7	2.3	421	8.9	2.5
Malignant neoplasms (C00–C97)	4	349	7.8	2.0	394	8.3	2.4
Diseases of heart (I00–I09,I11,I13,I20–I51)	5	154	3.5	0.9	186	3.9	1.1
5–9 y							
All causes	— ^c	2508	100.0	12.2	2502	100.0	12.5
Accidents (unintentional injuries) (V01–X59,Y85–Y86)	1	776	30.9	3.8	835	33.4	4.2
Malignant neoplasms (C00–C97)	2	467	18.6	2.3	457	18.3	2.3
Congenital malformations, deformations, and chromosomal abnormalities (Q00–Q99)	3	189	7.5	0.9	170	6.8	0.8
Assault (homicide) (*U01–*U02,X85–Y09,Y87.1)	4	118	4.7	0.6	113	4.5	0.6
Influenza and pneumonia (J09–J18)	5	111	4.4	0.5	40	1.6	0.2
10–14 y							
All causes	— ^c	3121	100.0	15.6	3149	100.0	15.7
Accidents (unintentional injuries) (V01–X59,Y85–Y86)	1	891	28.5	4.5	1024	32.5	5.1
Malignant neoplasms (C00–C97)	2	426	13.6	2.1	433	13.8	2.2
Intentional self-harm (suicide) (*U03,X60–X84,Y87.0)	3	259	8.3	1.3	215	6.8	1.1
Assault (homicide) (*U01–*U02,X85–Y09,Y87.1)	4	201	6.4	1.0	207	6.6	1.0
Congenital malformations, deformations, and chromosomal abnormalities (Q00–Q99)	5	161	5.2	0.8	161	5.1	0.8
15–19 y							
All causes	— ^c	11 465	100.0	53.2	12 407	100.0	57.7
Accidents (unintentional injuries) (V01–X59,Y85–Y86)	1	4758	41.5	22.1	5541	44.7	25.8
Assault (homicide) (*U01–*U02,X85–Y09,Y87.1)	2	1893	16.5	8.8	2095	16.9	9.7
Intentional self-harm (suicide) (*U03,X60–X84,Y87.0)	3	1656	14.4	7.7	1604	12.9	7.5
Malignant neoplasms (C00–C97)	4	654	5.7	3.0	685	5.5	3.2
Diseases of heart (I00–I09,I11,I13,I20–I51)	5	325	2.8	1.5	363	2.9	1.7

Data source: Centers for Disease Control and Prevention / NCHS, National Vital Statistics System: mortality, 2009 and 2008 (www.cdc.gov/nchs/nvss/mortality_tables.htm).

^a Rank is based on 2009 data.

^b Rate per 100 000 population in specified group.

^c Indicates that data are not available.

Statistics for the first time in the near future. Newly released topics will include interval between pregnancies, smoking cessation before pregnancy, maternal BMI, the use of infertility treatment, the receipt of Supplemental Nutrition Program for Women, Infants,

and Children food, the presence of infections during pregnancy such as *Chlamydia* and hepatitis B, whether the infant was breastfed before discharge from the hospital, and the source of payment for the delivery. Information on maternal morbidities, including

whether the mother experienced a ruptured uterus or was admitted to an ICU, also will be available for the first time from the birth certificate.

These data will first be available for the 28-state 2009 revised reporting area.¹ This area includes 2.7 million births representing 66% of all US births in 2009 (see Fig 4). Although data for the 2009 revised reporting area are not generalizable to the nation, when used appropriately, this information should importantly expand our understanding of perinatal health in the United States.

Information will be available in several ways: the report “Births: Expanded data for 2009” will present brief descriptive discussions and detailed data tables by maternal age and race/ethnicity on the topics noted above plus many others. A companion report will describe the results of reviews of data quality of the new medical and health items on the birth certificate. More detailed data will be available via the interactive data access tool, VitalStats,³⁵ and also via the 2009 natality public-use microdata file.⁵ A number of special reports on specific topics such as the risk of gestational diabetes according to maternal BMI, ruptured uterus following labor and delivery, birth intervals, and differences in source of payment for delivery by maternal characteristics will be developed over the next several years.

National transition to the 2003 standard birth certificate has been delayed, but progress has been made. By the end of 2012, nearly 90% of all US births will be reported based on the revised birth certificate; the remaining jurisdictions are expected to implement the revised certificate by the end of 2013. Finally, new agreements³⁴ (Charles J. Rothwell, MS, personal communication, 2011) between NCHS and its state and jurisdictional vital statistics partners should promote improvements in the quality and the timeliness of these

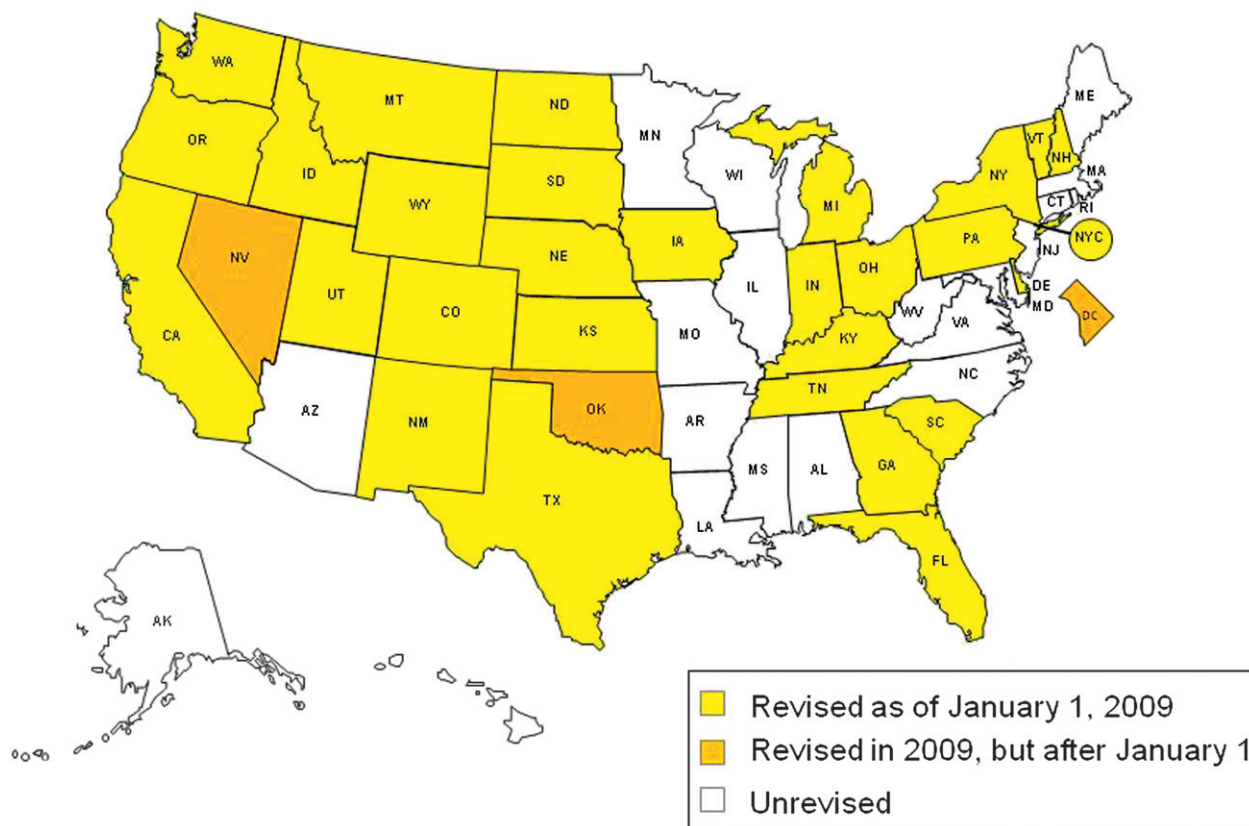


FIGURE 4

Revised Birth Certificate* Reporting Area, 2009. *2003 US Standard Certificate of Live Birth. Note: See Martin et al.¹ Source: CDC/NCHS, National Vital Statistics System.

data, making them increasingly useful to public health research.

CONCLUSIONS

Vital statistics remain a valuable tool for monitoring the health of the US population. Their value is improved

through work on the timeliness, quality, and sustainability of this decentralized system. Data collection from the 2003 revised certificates is enhanced by adopting technologically sophisticated yet cost-effective electronic systems.³⁵

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