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Births: Final Data for 2004

by Joyce A. Martin, M.P.H.; Brady E. Hamilton, Ph.D.; Paul D. Sutton, Ph.D.;
Stephanie J. Ventura, M.A.; Fay Menacker, Dr. P.H.; and Sharon Kirmeyer, Ph.D., Division of Vital Statistics

Abstract

Objectives—This report presents 2004 data on U.S. births according to a wide variety of characteristics. Data are presented for maternal demographic characteristics including age, live-birth order, race, Hispanic origin, marital status, and educational attainment; maternal lifestyle and health characteristics (medical risk factors, weight gain, and tobacco use); medical care utilization by pregnant women (prenatal care, obstetric procedures, characteristics of labor and/or delivery, attendant at birth, and method of delivery); and infant characteristics (period of gestation, birthweight, Apgar score, congenital anomalies, and multiple births). Also presented are birth and fertility rates by age, live-birth order, race, Hispanic origin, and marital status. Selected data by mother's state of residence are shown, as well as data on month and day of birth, sex ratio, and age of father. Trends in fertility patterns and maternal and infant characteristics are described and interpreted.

Methods—Descriptive tabulations of data reported on the birth certificates of the 4.1 million births that occurred in 2004 are presented.

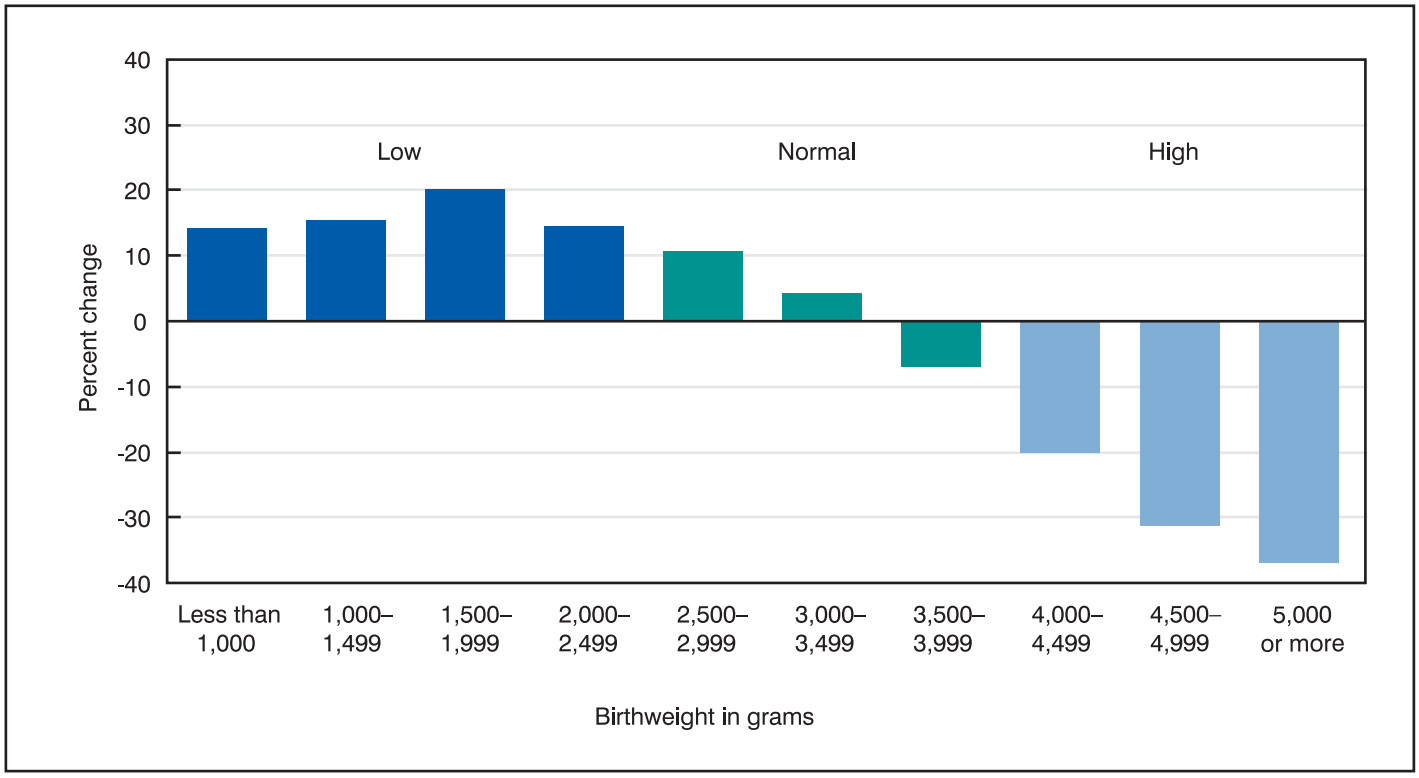

Figure 1. Percentage change in birthweight by 500 gram intervals: United States, 1990 and 2004

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Denominators for population-based rates are post-censal estimates derived from the U.S. 2000 census.

Results—In 2004, 4,112,052 births were registered in the United States, less than 1 percent more than the number in 2003. The crude birth rate declined slightly; the general fertility rate increased by less than 1 percent. Childbearing among teenagers and women aged 20–24 years declined to record lows. Rates for women aged 25–34 and 45–49 years were unchanged, whereas rates for women aged 35–44 years increased. All measures of unmarried childbearing rose in 2004. Smoking during pregnancy continued to decline. No improvement was seen in the timely initiation of prenatal care. The cesarean delivery rate jumped 6 percent to another all-time high, whereas the rate of vaginal birth after previous cesarean fell by 13 percent. Preterm and low birthweight rates continued their steady rise. The twinning rate increased, but the rate of triplet and higher order multiple births was down slightly.

Keywords: births • birth certificate • maternal and infant health • birth rates • maternal characteristics

Highlights

- In 2004, 4,112,052 births were registered in the United States, 22,102 more than in 2003. Births increased for Hispanic women, were essentially unchanged for non-Hispanic black women, and declined for non-Hispanic white women.
- The crude birth rate for the U.S. in 2004 declined slightly from 2003, to 14.0 live births per 1,000 total population. However, the general fertility rate in 2004 increased slightly from the 2003 rate, to 66.3 live births per 1,000 women aged 15–44 years. Fertility rates for non-Hispanic white and non-Hispanic black women were essentially unchanged between 2003 and 2004; the rate for Hispanic women increased by 1 percent. Fertility also increased for Asian or Pacific Islander (API) women, but was essentially unchanged for American Indian or Alaska Native (AIAN) women.
- The **birth rate for teenagers** declined 1 percent in 2004 to 41.1 births per 1,000 women aged 15–19 years. The rate has dropped one-third since its recent peak in 1991. The rates for teenage subgroups 15–17 and 18–19 years each fell 1 percent, to 22.1 and 70.0, respectively. These reductions were the smallest since the downward trend began after 1991. The rate for the youngest teenagers, 10–14 years, rose slightly from 0.6 to 0.7 per 1,000 in 2004, the first increase since 1988–89. Among population subgroups, rates fell 2 to 3 percent for non-Hispanic white and black teenagers 15–19 years. Since 1991, the rate for black teenagers has fallen almost one-half, from 118.2 to 63.1 per 1,000, whereas rates for non-Hispanic white, AIAN, and API teenagers dropped 36–38 percent. The rate for Hispanic teenagers declined 21 percent over this period, but there was very little change in the rate for 2004.
- The **birth rate for women aged 20–24 years** declined to 101.7 births per 1,000 women in 2004, marking another record low. The birth rate for **women aged 25–29 years**, 115.5 births per 1,000 women, was not significantly different from the rate in 2003. The **birth rate for women aged 30–34 years** was 95.3 births per 1,000, the highest level since 1964 but not significantly different from the rate in 2003, whereas the **birth rate for women aged 35–39 years** was up 4 percent, to 45.4 births per 1,000 women. The **birth rate for women aged 40–44 years** rose by 2 percent, to 8.9. The birth rate for women aged 45–49 years was unchanged. A total of 374 births to women aged 50–54 years were reported in 2004.
- The **first birth rate** declined slightly between 2003 and 2004, to 26.4 births per 1,000 women aged 15–44 years. First birth rates for women aged 10–14 and 45–49 years were unchanged between 2003 and 2004, whereas the rates for women in all 5-year age groups 15–34 years decreased by 1 percent. The rates for women aged 35–39 and 40–44 years increased by 3 and 5 percent, respectively.
- **The mean or average age at first birth** for the United States in 2004 was 25.2 years, unchanged from 2003. Mean age at first birth for non-Hispanic white, non-Hispanic black, and Hispanic women was unchanged between 2003 and 2004. Mean age at first birth was highest for API women, 28.4 years, and lowest for American Indian or Alaska Native women, 21.8 years.
- For the second consecutive year, all measures of **childbearing by unmarried women** rose. The **birth rate** rose 3 percent to 46.1 per 1,000 unmarried women aged 15—44 years in 2004, essentially matching the previous high point recorded in 1994. During the years 1995–2002 the rate was fairly stable. The **number of births to unmarried women** climbed 4 percent, to 1,470,189, the highest number ever recorded in the more than six decades for which comparable national statistics are available. The **proportion of all births to unmarried women** increased to 35.8 percent in 2004. Birth rates for unmarried teenagers continued to fall, though more modestly than in previous years, whereas rates for unmarried women aged 20 years and over continued to increase. Unmarried teenagers accounted for only 24 percent of all nonmarital births in 2004, whereas unmarried women in their twenties accounted for 59 percent.
- **Cigarette smoking** during pregnancy was reported in two distinct formats in 2004. For the nearly three-quarters of births in states asking about tobacco use with a simple "yes/no" question, 10.2 percent of their mothers reported smoking in 2004, down slightly compared with 2003 (10.4 percent). Among the seven

states that reported this information from a revised question asking for tobacco use in each trimester of pregnancy, 16.3 percent reported smoking at some point during pregnancy. The higher level reflects both higher smoking prevalence in those states and the more specific focus of the revised question, capturing smoking at three separate points during pregnancy. Infants born to mothers who smoke are substantially more likely than infants born to nonsmokers to be low birthweight (LBW). For the seven states collecting information using the revised question, the LBW levels were 11.9 percent for births to smokers and 7.2 percent for nonsmokers.

- **Timely initiation of prenatal care** does not appear to have improved in the United States in 2004. For the 41-state reporting area for which comparable data are available, 83.9 percent of women began care in the first trimester of pregnancy, essentially unchanged from 2003. No improvement was reported in the percentage of women with late (care beginning in the last trimester of pregnancy) or no care for 2003–2004 (3.6 percent). Prenatal care utilization had improved modestly, but fairly steadily between 1990 and 2003.
- The **rate of induction of labor** increased for 2003–2004 to 21.2 percent. This is more than twice the 1990 rate (9.5 percent).
- Between 2003 and 2004, the **rate of cesarean delivery** increased by 6 percent to 29.1 percent of all births, the highest rate ever reported in the U.S. After falling between 1989 and 1996, the cesarean rate has risen by 41 percent. The primary rate increased 8 percent, and the rate of vaginal birth after cesarean delivery (VBAC) fell by 13 percent for 2003–2004.
- The **preterm birth rate** rose 2 percent in 2004, to 12.5 percent of all births. The percentage of infants delivered preterm (less than 37 completed weeks of gestation) has climbed 18 percent since 1990. Increases for 2003–2004 were reported among both very preterm (less than 32 weeks) and moderately preterm (32–36 weeks) births. Although multiple births have contributed importantly to this recent rise, preterm rates for singletons have also increased, up 11 percent since 1990. Nearly all of the increase in the singleton preterm rate is among late preterm (34–36 week) births. All preterm infants are at heightened risk of morbidity and mortality compared with infants born at higher gestational ages.
- The **low birthweight (LBW) rate** rose to 8.1 percent in 2004, the highest level reported since 1969. The percentage of infants born at less than 2,500 grams has increased 16 percent since 1990. In contrast, large reductions in the percentage of heavier birthweight infants (3,500 grams or greater or 7 lb 12 oz or more) are seen since 1990 (**Figure 1**). Increases in LBW between 2003 and 2004 are seen for very low (less than 1,500 grams) and moderately LBW (1,500–2,499 grams) infants, and for each of the largest racial/ethnic groups. The LBW rate for infants born in single deliveries (multiple births have a large influence on overall LBW levels) also rose for 2003–2004, and is up 7 percent since 2000.
- The **twin birth rate** rose 2 percent in 2004, to 32.3 twins per 1,000 births, another record high. The twinning rate has climbed 42 percent since 1990 and 70 percent since 1980. The rate of triplet/+ births declined 6 percent for 2004, to 176.9 per 100,000 births. The triplet/+ birth rate soared 400 percent between 1980 and 1998, but has trended slightly downward since. Twins and triplets/+ are on average born much smaller than infants born in single deliveries. On average twins weigh more than 2 lb and triplets more than 3 lb less than singletons.

Introduction

This report presents detailed data on numbers and characteristics of births in 2004, birth and fertility rates, maternal lifestyle and health characteristics, medical services utilization by pregnant women, and infant health characteristics. These data provide important information on fertility patterns among American women by such characteristics as age, live-birth order, race, Hispanic origin, marital status, and educational attainment. Up-to-date information on these fertility patterns is critical to understanding population growth and change in this country and in individual states. Data on maternal characteristics such as weight gain, tobacco use, and medical risk factors are useful in accounting for differences in birth outcomes. Information on use of prenatal care, obstetric procedures, complications of labor and/or delivery, attendant at birth and place of delivery, and method of delivery by maternal demographic characteristics can also help to explain differences in birth outcomes. It is very important that data on birth outcomes, especially levels of LBW and preterm birth, be continuously monitored, because these variables are important predictors of infant mortality and morbidity.

A report of preliminary birth statistics for 2004 presented data on selected topics based on a substantial sample (99.1 percent) of the 2004 birth file (1). Findings for the selected measures (age, race, Hispanic origin, marital status of mother, live-birth order, prenatal care, maternal smoking, cesarean delivery, preterm births, and LBW) based on the preliminary data are very similar to those presented here based on final data. In addition to the tabulations included in this report, more detailed analysis is possible by using the Natality public-use file that is issued for each year. The data file has been available on tape and in CD-ROM format since 1968, and a selection of tables of detailed data are available on the National Center for Health Statistics (NCHS) website at http://www.cdc.gov/nchs/datawh/statab/unpubd/natality/natab2001.htm (2,3).

The 1989 and the 2003 Revisions of the U.S. Certificate of Live Birth

This report includes 2004 data on items that are collected on *both* the 1989 Revision of the U.S. Standard Certificate of Live Birth (unrevised) and the 2003 Revision of the U.S. Standard Certificate of Live Birth (revised). The 2003 revision is described in detail elsewhere (4–6). Pennsylvania and Washington implemented the revised certificate in 2003; five states, Idaho, Kentucky, New York (excluding New York City), South Carolina, and Tennessee implemented as of January 1, 2004. Two additional states, Florida and New Hampshire, implemented the revised birth certificate in 2004, but after January 1. The nine revised states represent 20 percent of all 2004 births; the seven revised states, for which data are available for all of 2004, represent 14 percent of all births.

Data items exclusive to either the 1989 (i.e., maternal anemia, ultrasound, and alcohol use) or the 2003 birth certificate revision (i.e., use of infertility treatment, NICU admission, and maternal morbidity) are

not shown in this report. Supplemental 2004 tables for data exclusive to the 1989 revision are available on the NCHS website (www.cdc.gov/nchs), including alcohol use during pregnancy. A forthcoming report will present selected information exclusive to the 2003 revision.

Methods

Data shown in this report are based on 100 percent of the birth certificates registered in all states and the District of Columbia. More than 99 percent of births occurring in this country are registered (7). Tables showing data by state also provide separate information for Puerto Rico, Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Marianas. However, these areas are not included in totals for the United States.

Race and Hispanic origin are reported independently on the birth certificate. In tabulations of birth data by race and Hispanic origin, data for Hispanic persons are not further classified by race because the majority of women of Hispanic origin are reported as white. Most tables in this report show data for these categories: non-Hispanic white, non-Hispanic black, and Hispanic. Data for American Indian or Alaska Native (AIAN) and Asian or Pacific Islander (API) births are not shown separately by Hispanic origin because the majority of these populations are non-Hispanic. Data are also presented in some tables for four specific Hispanic subgroups: Mexican, Puerto Rican, Cuban, and Central and South American, and for an additional subgroup referred to as "other and unknown Hispanic." Text references to black births and black mothers or white births and white mothers are used interchangeably for ease in writing.

In 1997, the Office of Management and Budget (OMB) issued "Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity" (8–10). The 1997 revised standards incorporated two major changes designed to reflect the changing racial and ethnic profile of the United States. First, the revision increased from four to five the minimum set of categories to be used by federal agencies for identification of race. The 1977 standards required federal agencies to report race-specific tabulations using a minimum set of four single-race categories: AIAN, API, black, and white. The revised standards called for reporting of Asians separately from Native Hawaiians or Other Pacific Islanders. The revised standards also require federal data collection programs to allow respondents to select *one or more race categories*.

For the 2000 decennial census, the U.S. Census Bureau collected race and ethnicity data in accordance with the 1997 revised standards. However, the National Vital Statistics System, which is based on data collected by the states, will not be fully compliant with the new standards until all of the States revise their birth certificates to reflect the new standards. Thus, beginning with the 2000 data year, the numerators (births) for birth rates are incompatible with the denominators (populations) (see "Population denominators"). In order to compute rates, it is necessary to bridge population data for multiple-race persons to single-race categories. This has been done for birth rates by race presented in this report. Once all states revise their birth registration systems to be compliant with the 1997 OMB standards, the use of bridged populations can be discontinued.

For the 2004 data year, multiple race was reported by California, Florida (for births occurring from March 1, 2004, only), Hawaii, Idaho, Kentucky, Michigan (for births at selected facilities only), Minnesota, New Hampshire (for births occurring from July 19, 2004, only), New York State (excluding New York City), Ohio, Pennsylvania, South Carolina, Tennessee, Utah, and Washington. Data from the vital records of the remaining states, the District of Columbia, and New York City followed the 1977 OMB standards in which a single race is reported (8,9). In addition, these areas also report the minimum set of four races as stipulated in the 1977 standards, compared with the minimum of five races for the 1997 standards.

To provide uniformity and comparability of the data during the transition period, before multiple-race data are available for all reporting areas, it is necessary to bridge the responses of those who reported more than one race to a single race. Multiple race is imputed to a single race (one of the following: AIAN, API, black, or white) according to the combination of races, Hispanic origin, sex, and age indicated on the birth certificate of the mother or father (10–13); see "Technical Notes." The bridging procedure imputes multiple race of mothers as reported on the birth certificate to one of the four minimum races stipulated in the 1977 OMB standards, that is, AIAN, API, black, or white. Mothers of a specified API subgroup, that is, Chinese, Japanese, Hawaiian, or Filipino, in combination with another race, that is, AIAN, black, or white, or another API subgroup cannot be imputed to a particular API subgroup. For this report, data are not shown for the specified API subgroups because of this change (4,14); see "Technical Notes." Reports on 2003 and 2004 births to multiple-race women are forthcoming.

Changes in the processing of information on Hispanic origin for the 2003 Revision of the U.S Standard Certificate of Live Birth (revised) allows for the capturing of multiple Hispanic subgroups for the nine states that implemented the revised certificate, and for Minnesota, which used the 1989 Revision of the U.S. Standard Certificate of Live Birth in 2004. Mothers reporting more than one Hispanic origin subgroup represented 1.5 percent of all 2004 births and are classified as "other and unknown" Hispanic; see "Technical Notes."

Information on educational attainment, prenatal care, and tobacco use, although collected on both the 1989 and the 2003 revisions of the U.S. Standard Certificates of Live Birth, are not considered comparable between revisions, and, accordingly, are presented separately in this report. Data on educational attainment, prenatal care, and tobacco use for the two states that revised after January 1, 2004 are excluded from all tabulations; see "Technical Notes."

Information on the measurement of marital status, gestational age, and birthweight; the computation of derived statistics and rates; population denominators; random variation and relative standard error; and the definitions of terms are presented in the "Technical Notes."

Information on births by age, race, or marital status of mother is imputed if it is not reported on the birth certificate. These items were not reported for less than 1 percent of U.S. births in 2003. (See "Technical Notes" for additional information.) All other maternal, paternal, and infant characteristics (except items on which length of gestation is calculated) are not imputed. Births for which a particular characteristic is unknown are subtracted from the figures for total births that are used as denominators before percentages, percent distributions, and medians are computed. Levels of incomplete reporting vary substantially by specific item and by state. Table I in the "Technical Notes" provides information on the percentage of records with missing information for each item by state for 2004.

Demographic Characteristics

Births and birth rates

Number of births

In 2004, a total of 4,112,052 **births** were registered in the United States, 22,102 more than in 2003. The number of births in 2004 is the highest reported since 1990 (4,158,212). After a downward trend from 1990 to 1997, the total number of births has generally increased. (**See Tables 1–15 for national and state data by age, live-birth order, race, and Hispanic origin.**)

The number of births to non-Hispanic white women declined by 1 percent in 2004; births to non-Hispanic black women were essentially unchanged (**Tables 1 and 5**). Births rose by 2 percent for American Indian or Alaska Native (AIAN) women, and 4 percent for Asian or Pacific Islander (API) and Hispanic women. Among the specified Hispanic groups, births increased by 1 percent for Cuban women, 4 percent for Mexican women, 5 percent for Puerto Rican women, and 6 percent for Central and South American women.

Crude birth rate

In 2004, the **crude birth rate** (CBR) was 14.0 live births per 1,000 women (total population), 1 percent lower than the rate for 2003 (14.1). After dropping steadily from 1990, the most recent peak (16.7), to 1997 (14.2), the CBR has fluctuated between 13.9 and 14.4 per 1,000 (**Tables 1 and 5**).

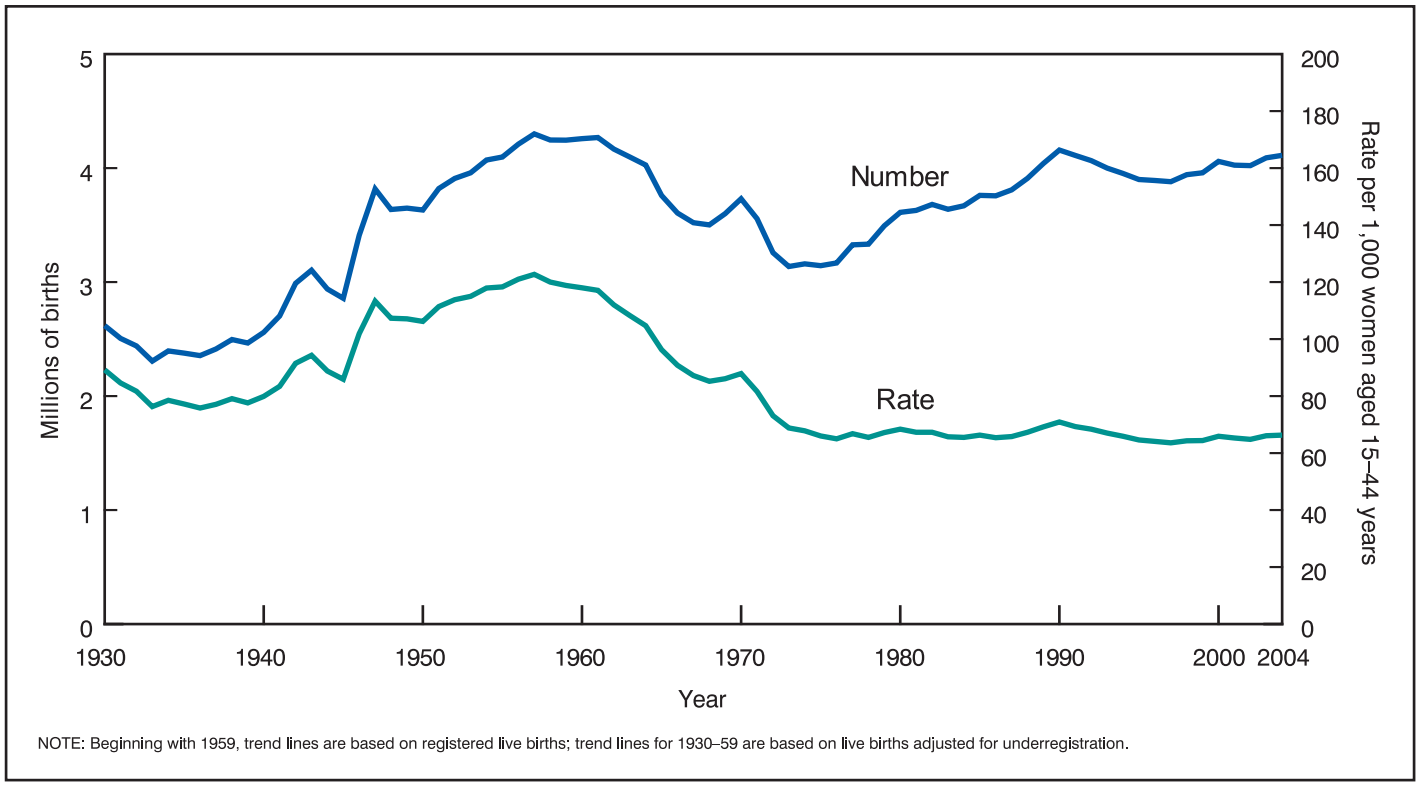
Fertility rate

The 2004 **general fertility rate** (GFR) was 66.3 live births per 1,000 women of childbearing age (15–44 years), a slight increase over the 2003 rate (66.1), and the highest rate since 1993 (67.0). After decreasing substantially from 1990 to 1997 (from 70.9 to 63.6), then increasing moderately from 1997 to 2000, the GFR has generally fluctuated (**Figure 2 and Tables 1 and 5**).

The GFRs for non-Hispanic white and non-Hispanic black women were essentially unchanged between 2003 and 2004; in contrast, the rate for Hispanic women increased by 1 percent (**Table 5**). Among the specified Hispanic origin groups, fertility levels for Mexican women were up 1 percent and fertility levels for Puerto Rican women were up 11 percent, whereas the levels for "other" Hispanic and Cuban women were down 2 and 14 percent, respectively. The 2004 fertility rates for all race and Hispanic origin groups except Cubans were below the 1990 levels. The fertility rate for API women increased by 1 percent from 2003 to 2004; the rate for AIAN women was essentially unchanged (**Table 1**).

Age of mother

Teenagers—Birth rates for adolescents aged 15–19 years declined again in 2004, but at a much slower pace than reported over the dozen years extending from 1991 to 2003. The rates for 2004 were still record lows for the United States (**Tables A, 3, 4, 8, and Figures 3 and 4**). The **birth rate for the youngest teenagers increased** to 0.7 births per 1,000 females aged 10–14 years in 2004, compared with 0.6 in 2003; nonetheless, the 2004 rate was one-half the rate reported a decade earlier (1.4 per 1,000 in 1994) (15). The



NOTE: Beginning with 1959, trend lines are based on registered live births; trend lines for 1930–59 are based on live births adjusted for underregistration.

Figure 2. Live births and fertility rates: United States, 1930–2004

Table A. Birth rates for women aged 10–19 years, by age and race and Hispanic origin of mother: United States, 1991, 2002, 2003, and 2004, and percentage change in rates, 1991–2004 and 2003–04

[Rates per 1,000 women in specified group]

Age and race and Hispanic origin of mother	2004	2003	2002	1991	Percent change, 2003–04	Percent change, 1991–2004
10–14 years						
All races and origins[1]	0.7	0.6	0.7	1.4	17	–50
Non-Hispanic white	0.2	0.2	0.2	0.5	0	–60
Non-Hispanic black	1.6	1.6	1.9	4.9	0	–67
American Indian total[2,3]	0.9	1.0	0.9	1.6	–10	–44
Asian or Pacific Islander total[3]	0.2	0.2	0.3	0.8	0	–75
Hispanic[4]	1.3	1.3	1.4	2.4	0	–46
15–19 years						
All races and origins[1]	41.1	41.6	43.0	61.8	–1	–33
Non-Hispanic white	26.7	27.4	28.5	43.4	–3	–38
Non-Hispanic black	63.1	64.7	68.3	118.2	–2	–47
American Indian total[2,3]	52.5	53.1	53.8	84.1	–1	–38
Asian or Pacific Islander total[3]	17.3	17.4	18.3	27.3	–1	–37
Hispanic[4]	82.6	82.3	83.4	104.6	0	–21
15–17 years						
All races and origins[1]	22.1	22.4	23.2	38.6	–1	–43
Non-Hispanic white	12.0	12.4	13.1	23.6	–3	–49
Non-Hispanic black	37.1	38.7	41.0	86.1	–4	–57
American Indian total[2,3]	30.0	30.6	30.7	51.9	–2	–42
Asian or Pacific Islander total[3]	8.9	8.8	9.0	16.3	1	–45
Hispanic[4]	49.7	49.7	50.7	69.2	0	–28
18–19 years						
All races and origins[1]	70.0	70.7	72.8	94.0	–1	–26
Non-Hispanic white	48.7	50.0	51.9	70.6	–3	–31
Non-Hispanic black	103.9	105.3	110.3	162.2	–1	–36
American Indian total[2,3]	87.0	87.3	89.2	134.2	0	–35
Asian or Pacific Islander total[3]	29.6	29.8	31.5	42.2	–1	–30
Hispanic[4]	133.5	132.0	133.0	155.5	1	–14

[1]Includes origin not stated.

[2]Includes births to Aleuts and Eskimos.

[3]Data for persons of Hispanic origin are included in the data for each race group according to the mother's reported race; see "Technical Notes."

[4]Includes all persons of Hispanic origin of any race; see "Technical Notes."

NOTES: 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 Office of Management and Budget (OMB) standards. Fifteen states reported multiple-race data for 2004. The multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

increase in the birth rate resulted in a 2 percent increase in the number of births in this age group, to 6,781, the first increase among the youngest teenagers since 1993–94.

The **birth rate for teenagers 15–19 years** declined 1 percent to 41.1 births per 1,000 females (**Tables A**, **4**, and **9**). The 2004 rate was 33 percent lower than the rate for the recent peak in 1991 (61.8). There was a fractional increase in the number of births to teenagers 15–19 years, entirely resulting from the 1 percent increase in the number of female teenagers (16) (2004 estimates shown in "Technical Notes" Table II). In 2004, 415,262 babies were born to adolescents 15–19 years.

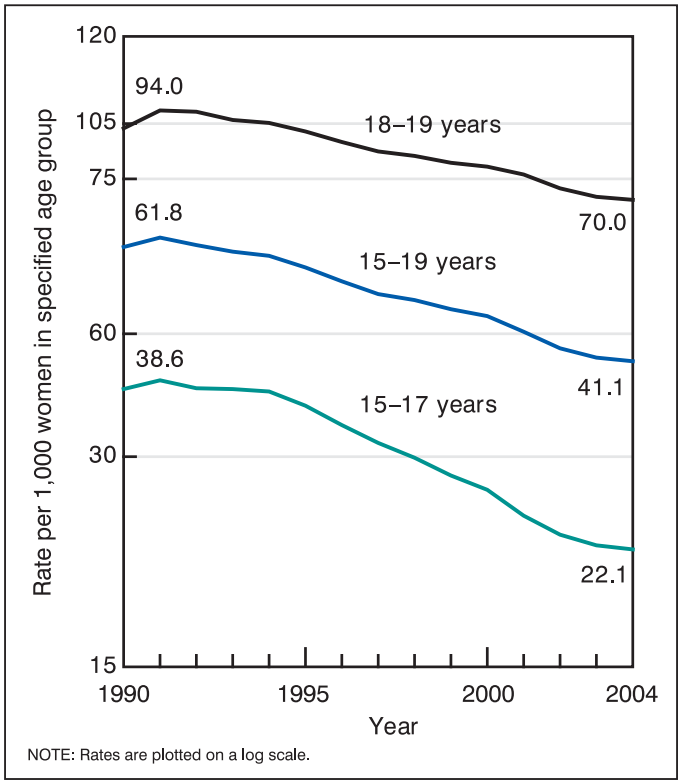


Figure 3. Birth rates for teenagers: United States, 1990–2004

Birth rates for teenagers 15–17 and 18–19 years each dropped 1 percent in 2004, to 22.1 and 70.0 per 1,000, respectively. Overall since 1991, the rate for teenagers 15–17 years fell 43 percent, whereas the rate for older teenagers declined 26 percent. Births to 15–17-year-olds fell to 133,980, the fewest in more than half a century (126,941 in 1950), whereas births to older teenagers increased slightly to 281,282.

Generally, the declines in teenage birth rates for ages 15–19 years in 2004 were strongest among non-Hispanic white and non-Hispanic black females, for whom rates fell 2 to 3 percent. The rate declined 1 percent for AIAN teenagers, increased slightly for Hispanic teenagers, and were essentially unchanged for API teenagers. Among Hispanic subgroups, rates increased for both Mexican teenagers (95.5 per 1,000 aged 15–19 years) and Puerto Rican teenagers (62.6). In 2004, the overall rate remained highest for Mexican teenagers, and lowest for API teenagers, 17.3. Rates for other population groups were 63.1 for non-Hispanic black, 52.5 for AIAN, and 26.7 for non-Hispanic white teenagers.

Throughout the period of steady decline from 1991 to 2004, the sharpest declines were for non-Hispanic black teenagers. Overall, their rate fell 47 percent during this period, but for young black teenagers 15–17 years, the rate dropped more than one-half, from 86.1 per 1,000 in 1991 to 37.1 in 2004 (**Table A**). Trends in state-specific teenage birth rates are discussed in the section "Births and birth rates by state."

Teenage pregnancy rates fell substantially from 1990 to 2000. Pregnancy rates are computed from the sums of live births, induced abortions, and fetal losses. Currently, teenage *pregnancy* rates are available through 2000, the most recent year for which detailed national abortion estimates are available (17–20). The teenage pregnancy rate in 2000 was 84.5 per 1,000 females aged 15–19 years, the lowest rate

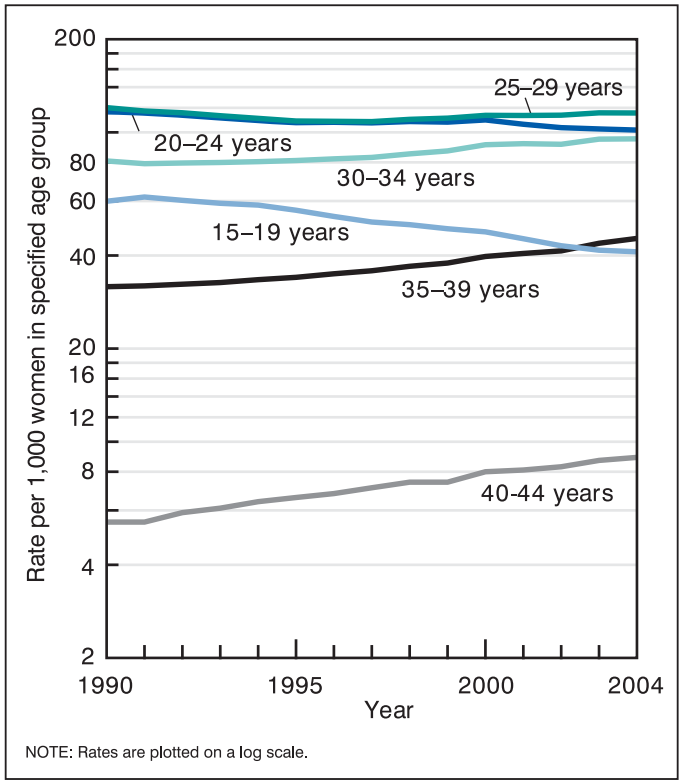


Figure 4. Birth rates by age of mother: United States, 1990–2004

reported since 1976, when the Centers for Disease Control and Prevention (CDC) NCHS series of national estimates first became available (19,20). The rate dropped 27 percent from its 1990 peak (116.3) to 2000. The decline in the pregnancy rate during 1990–2000 is reflected in declines in live birth and induced abortion rates, with larger declines reported for abortions. While national abortion data for years since 2000 are not available, information from CDC's Abortion Surveillance system for 2001 and 2002 for 46 states and the District of Columbia suggest continued declines in the numbers and rates of abortions for teenagers (21,22). These declines together with the declines in birth rates among teenagers indicate that teenage *pregnancy rates* have continued to fall. An analysis of recent trends in pregnancies is in preparation.

Analyses of the 2002 National Survey of Family Growth (NSFG) suggest a number of factors that likely account for the falling pregnancy rates (23). According to the 2002 NSFG, the proportions of young teenage males and females (ages 15–17 years) who had ever had sexual intercourse declined significantly in comparison with the 1995 NSFG and the 1995 National Survey of Adolescent Males. There were also declines for males 18–19 years. At the same time, the use of contraception increased in ways indicating more effective and consistent use. About three out of four teenagers used a method of contraception at first intercourse, and the overwhelming majority (83 percent of females and 91 percent of males) used a method at their most recent sex. The 2002 NSFG also reported that the use of highly effective hormonal methods such as Depo Provera™ and Lunelle™ increased, as did the use of dual methods, such as the condom with a hormonal method. Data for 2005 from CDC's Youth Risk Behavior Survey for school-age youth substantiate the NSFG findings for teenagers' contraceptive use at their most recent sexual intercourse (24). Since the mid-1990s, many private and public efforts have focused teenagers' attention on the importance of pregnancy prevention through abstinence and responsible behavior (25,26).

Women aged 20 years and over: Women in their twenties—The **birth rate for women aged 20–24 years** was 101.7 births per 1,000 women in 2004, down 1 percent from 2003 (102.6). This is fourth consecutive decline in this rate and marks another record low for this age group for the United States (3). Since 1990, the rate has generally declined, down 13 percent from 116.5 per 1,000 (**Figures 4, 5, and Tables 3, 4, 7, and 8**). The **rate for women aged 25–29 years** in 2004, 115.5 births per 1,000 women, was not significantly different from the rate in 2003. Between 1990 and 1997, the rate for this age group steadily declined but has generally risen since 1998. Women aged 20–29 years, the principal childbearing ages, historically account for the largest share of all births. However, the proportion of births to these women has declined over the last three decades, falling from 65 percent in 1976 to 52 percent of all births in 2004. The distinct differences in trends in birth rates by age for 1990–2004 are illustrated in **Figure 5**.

Women in their thirties—The **birth rate for women aged 30–34 years** in 2004 was 95.3 births per 1,000 women, the highest level since 1964 but not significantly different from the rate in 2003 (95.1) (**Tables 4 and 8**). Between 1991 and 2004, the rate rose by 20 percent. During that period, the *number of births* to women aged 30–34 years increased by 9 percent, entirely reflecting the increase in the birth rates; the *population* of women in this age group declined by 9 percent. The **birth rate for women aged 35–39 years** was 45.4 births per 1,000 women, up 4 percent from the rate in 2003 (43.8). The rate for this age group has increased each year since 1978 (19.0) and has risen 43 percent since only 1990 (31.7). The number of births to women aged 35–39 years reached yet another record high in 2004 (475,606) (**Tables 2 and 6**). From 1990 to 2004, the *number of births* to this age group rose by 50 percent, compared with a 5-percent increase in the *population* of women aged 35–39 years (16,27).

Women in their forties—In 2004, the **birth rate for women aged 40–44 years** rose to 8.9 births per 1,000 women from 8.7 births in 2003, an increase of 2 percent. The rate for this age group is the highest since 1968 (9.6), and more than double the 1981 rate (3.8), the lowest on record. Since 1981, the rate for this age group has generally increased and has risen 62 percent since 1990 (5.5). The number of births to women aged 40–44 years increased by 3 percent during 2003–04, from 101,005 to 103,769, more than twice the number reported for 1990 and the highest number on record for the United States; the population of women aged 40–44 years increased only slightly (by less than 1 percent from 2003 to 2004) (16,27). The **birth rate for women aged 45–49 years** was unchanged between 2003 and 2004, at 0.5 births per 1,000 women. This rate more than doubled between 1990 and 2000 but has remained stable since. The number of births to women aged 45–49 years increased 4 percent, from 5,522 to 5,748 between 2003 and 2004, more than three times the number for 1990 (1,638), and the highest reported since 1939.

Births to women aged 50 years and over—The number of births to women aged 50–54 years increased from 323 to 374 for 2003–04 (**Tables 2 and 6**). The number of births to women in this age group has increased dramatically from 144 in 1997, when data for women 50–54 years became available again. (From 1964 to 1996, age of mother was imputed if the reported age was under 10 years or aged 50 years and over; see "Technical Notes.")

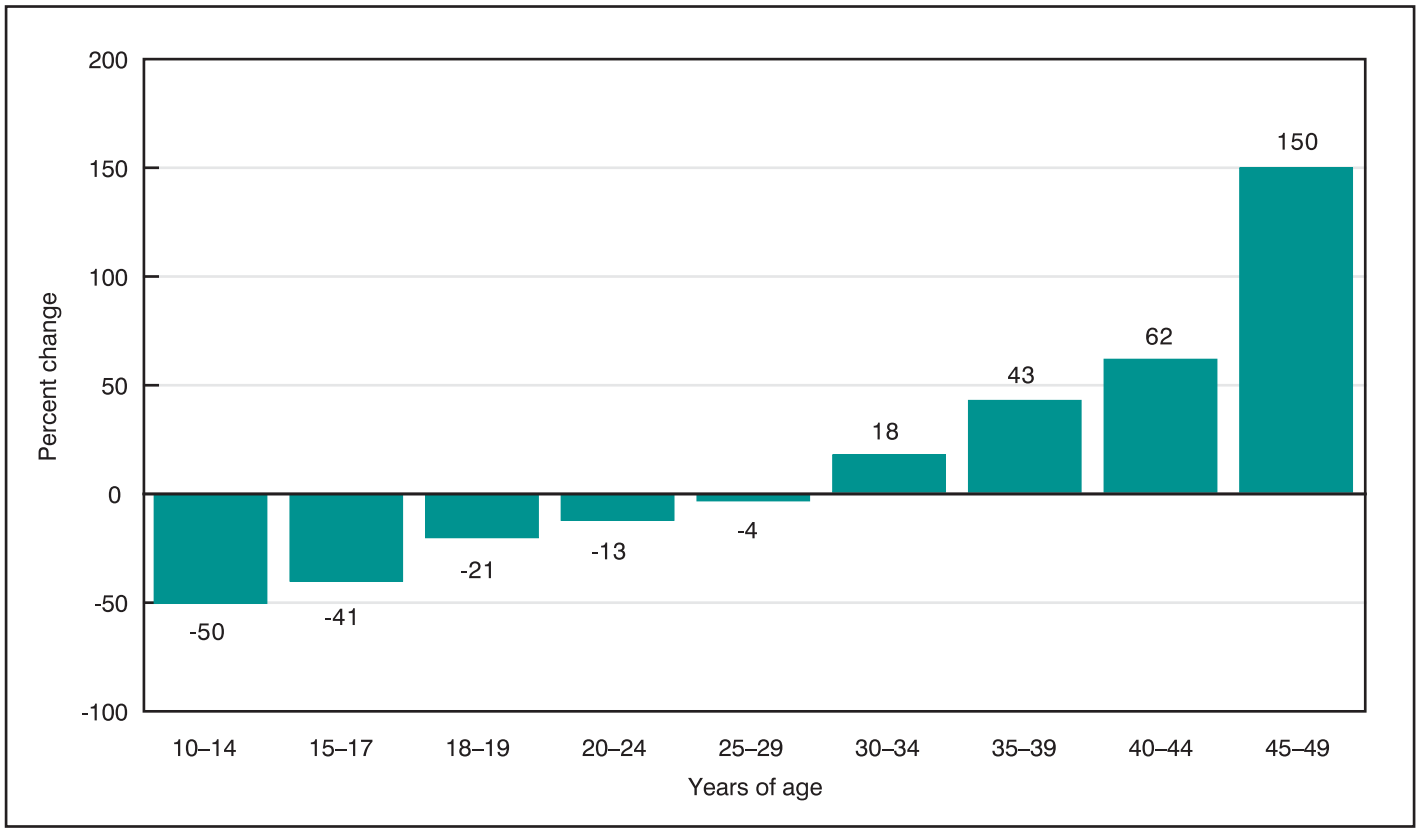


Figure 5. Percentage change in birth rates by age of mother: United States, 1990 and 2004

Because of small numbers, births to women aged 50–54 years historically have been included with births to women aged 45–49 years when computing birth rates by age of mother (the denominator for the rate is women aged 45–49 years). To estimate the incidence of births for women aged 45–49 and 50–54 years separately, we calculated rates for these age groups for 2003 and 2004. Rates are expressed *per 10,000 women* because of the small number of births to women aged 50–54 years. The birth rate for women aged 50–54 years was 0.4 births per 10,000 women in this age group in the U.S. population, significantly higher than the 0.3 births per 10,000 in 2003. Excluding births to women aged 50–54 years had essentially no impact on the birth rate for women aged 45–49 years.

The increase in birth rates for women 35 years of age and over during the last 20 years has been linked, in part, to the use of fertility-enhancing therapies (28). The proportion of childless women aged 35–44 years reporting impaired fecundity who sought fertility treatment rose considerably from 1982 to 1995, although the proportion has leveled off from 1995 to 2002 (29,30). In 2004, 1 out of 18 births to women aged 35 years and over was in a multiple delivery, an outcome associated with infertility treatment, compared with 1 out of 33 births to women under 35 years of age (see section on "Multiple births"). The incidence of multiple deliveries dramatically increases with the age of mother; for example, one out of five births to women aged 45–49 years and one out of every two births to women aged 50–54 years was a multiple birth in 2004.

Live-birth order

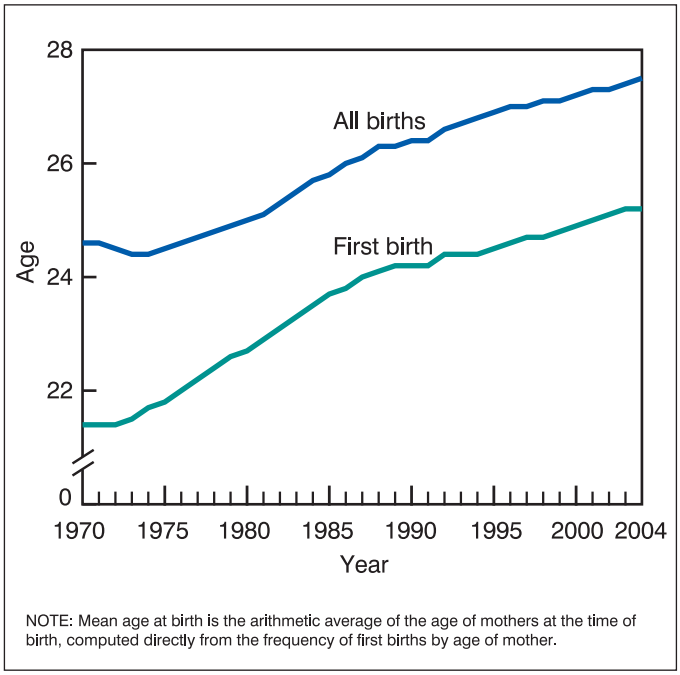
The first birth rate for women aged 15–44 years was 26.4 births per 1,000 women in 2004, a slight decline from 2003 (26.5) (**Tables 3 and 7**). The first birth rate dropped steadily between 1990 (29.0) and 1997 (25.9), and has since fluctuated moderately (**Table 9**).

First birth rates for women aged 10–14 and 45–49 years were unchanged between 2003 and 2004, whereas the rates for women in each 5-year age group 15–34 years decreased by 1 percent on average; rates for women aged 35–39 and 40–44 years increased by 3 and 5 percent, respectively.

The rates for third- and fourth-order births for women aged 15–44 years increased by 1 and 2 percent, respectively, from 2003 to 2004, whereas rates of second-, fifth-, sixth and seventh-, and eighth and higher-order births were unchanged.

Another useful measure in interpreting childbearing patterns is the **mean age at first birth**. The mean is the arithmetic average of the age of mothers at the time of birth and is computed directly from the frequency of first births by age of mother. The mean age of first-time mothers in 2004 was 25.2 years, unchanged from the record high set for the United States in 2003 (**Tables 10, 14, 15).** Since 1970, the mean age at first birth has increased 3.8 years, compared with a 2.9 year increase in the total mean age of mother at birth (**Figure 6**) (31).

Mean age at first birth was also unchanged for nearly all race and Hispanic origin groups between 2003 and 2004. The average age of first-time mothers remained at 26.2 years for non-Hispanic white, 22.7 years for non-Hispanic black, and 23.1 years for Hispanic women in 2004. Despite the stability in mean age among the three largest race and Hispanic origin groups, substantial variations nevertheless persist. In 2004, API women had the highest mean age at first birth, 28.4 years, and AIAN women had the lowest mean age at first birth, 21.8 years.



NOTE: Mean age at birth is the arithmetic average of the age of mothers at the time of birth, computed directly from the frequency of first births by age of mother.

Figure 6. Mean age of mother for all births and mean age of mother at first birth: United States, 1970–2004

Total fertility rate

The **total fertility rate** (TFR) summarizes the potential impact of current fertility patterns on completed family size. The TFR estimates the number of births that a hypothetical cohort of 1,000 women would have if they experienced throughout their childbearing years the same age-specific birth rates observed in a given year. The rate can be expressed as the average number of children that would be born per woman. Because it is computed from age-specific birth rates, the TFR is age adjusted and can be readily compared with populations across time or among geographic areas.

In 2004, the TFR was 2,045.5 (or 2.05 births per woman), slightly higher than the rate in 2003 (2,042.5) (**Tables 4, 8, 14, and 15**). After falling substantially from 1990 (2,081.0) to 1997 (1,971.0), then rising moderately from 1997 to 2000, the TFR has fluctuated. The rise in the TFR between 2003 and 2004 is the result of increases in birth rates for women aged 30–44 years, and especially those aged 35–39 years (see previous section on "Age of mother").

The TFRs for two of the three largest **race and Hispanic origin** groups declined between 2003 and 2004, falling by less than 1 percent for both non-Hispanic white and non-Hispanic black women; the rate for Hispanic women rose by 1 percent. Rates for Mexican and Puerto Rican women were up by 2 and 12 percent, respectively; the rates for "other" Hispanic and Cuban women were down by 3 and 16 percent, respectively. The rate for API women rose by 1 percent in 2004, whereas the rate for AIAN women was essentially unchanged.

Differences among these groups are even more apparent when their rates are compared with a "replacement" rate. A replacement rate is the rate at which a given generation can exactly replace itself, generally considered to be 2,100 births per 1,000 women. The U.S. TFR was below the replacement rate for the 33rd consecutive year in 2004. Whereas the TFRs for nearly all groups were below "replacement" in 2004, the rate was above replacement for Hispanic women overall (2,824.5), Mexican women (3,021.0), and "other" Hispanic women (2,648.0) (**Tables 4, 8, 14, and 15**). State-specific TFRs for 2004 are discussed in the next section.

Births and birth rates by state

Nationally, the number of births increased by less than 1 percent between 2003 and 2004. Among the states, 12 reported significant increases in their numbers of births in 2004, whereas only 4 reported significant declines. **See Tables 11–13 for 2004 data.**

In 2004, crude birth rates by state ranged from 10.6 births per 1,000 total population (Maine and Vermont) to 21.2 (Utah). Between 2003 and 2004 rates increased significantly only in the District of Columbia and Virginia and declined in 9 states (Colorado, Connecticut, Illinois, Maryland, Massachusetts, Michigan, New Jersey, New York, and Rhode Island). All other reporting areas were essentially unchanged.

Fertility rates per 1,000 women aged 15–44 years in 2004 ranged from a low of 52.1 in Vermont to a high of 92.3 in Utah (**Table 11**). Between 2003 and 2004 fertility rates increased significantly in only 4 states (California, Florida, Georgia, and Virginia) and the District of Columbia.

In 2004, TFRs, which provide a summary of lifetime fertility, increased significantly for California, Georgia, Virginia, and the District of Columbia. TFRs for all other states, like the national rate, were essentially unchanged between 2003 and 2004.

Fertility tends to be higher for states in the western half of the country. In 2004, as in previous years, the majority of western states reported TFRs significantly above the national rate, whereas the majority of eastern states reported TFRs significantly below the national rate (32). In 2004, state-specific TFRs ranged from a high of 2,544.5 (2.5 births per women) in Utah, to a low of 1,711.0 (1.7 births per women) in Rhode Island.

Birth rate for teenagers by state

Birth rates for teenagers vary considerably by state (**Tables 11 and B**). Birth rates by state for teenagers 15–19 years ranged from 18.2 per 1,000 (New Hampshire) to 62.6 (Texas) in 2004; among all reporting areas the District of Columbia reported the highest rate (66.7). Nationally, birth rates for teenagers 15–19 years fell significantly between 2003 and 2004; however, among states only New Jersey and New York reported significant declines. Birth rates were essentially unchanged for all other states and territories. Since 1991 teen birth rates have declined significantly for all reporting areas (**Table B**). Also see discussion of births to teenagers in the "Age of mother" section of this report.

Sex ratio

In 2004, there were 2,104,661 male and 2,007,391 female live births in the United States, or 1,048 males for every 1,000 female births (**Tables 14 and 15**). Similar to previous years, the sex ratio was the highest for births to API mothers (1,058), followed by births to non-Hispanic white (1,053), Hispanic (1,042), non-Hispanic black (1,038), and AIAN (1,030) mothers.

Since 1940, the overall sex ratio has ranged from 1,046 to 1,059. Annual fluctuations within this range make the identification of

Table B. Birth rates for teenagers 15–19 years by state, 1991 and 2004, and percentage change 1991–2004: United States and each state and territory

[Birth rates per 1,000 estimated female population aged 15–19 years in each area]

State	1991	2004	Percent change, 1991–2004	State	1991	2004	Percent change, 1991–2004
United States[1]	61.8	41.1	–33	Nebraska	42.4	35.9	–15
				Nevada	74.5	51.1	–31
Alabama	73.6	52.4	–29	New Hampshire	33.1	18.2	–45
Alaska	66.0	38.9	–41	New Jersey	41.3	24.1	–42
Arizona	79.7	60.1	–25	New Mexico	79.5	60.8	–24
Arkansas	79.5	60.3	–24	New York	45.5	26.9	–41
California	73.8	39.5	–46	North Carolina	70.0	48.8	–30
Colorado	58.3	43.9	–25	North Dakota	35.5	27.2	–23
Connecticut	40.1	24.4	–39	Ohio	60.5	38.5	–36
Delaware	60.4	43.5	–28	Oklahoma	72.1	55.6	–23
District of Columbia	109.6	66.7	–39	Oregon	54.8	33.3	–39
Florida	67.9	42.4	–38	Pennsylvania	46.7	30.5	–35
Georgia	76.0	53.4	–30	Rhode Island	44.7	32.9	–26
Hawaii	59.2	36.1	–39	South Carolina	72.5	52.1	–28
Idaho	53.9	38.6	–28	South Dakota	47.6	38.5	–19
Illinois	64.5	40.2	–38	Tennessee	74.8	52.1	–30
Indiana	60.4	43.5	–28	Texas	78.4	62.6	–20
Iowa	42.5	31.6	–26	Utah	48.0	34.0	–29
Kansas	55.4	40.7	–27	Vermont	39.2	20.9	–47
Kentucky	68.8	49.2	–28	Virginia	53.4	35.2	–34
Louisiana	76.0	56.2	–26	Washington	53.7	31.3	–42
Maine	43.5	24.3	–44	West Virginia	58.0	43.8	–24
Maryland	54.1	32.4	–40	Wisconsin	43.7	30.2	–31
Massachusetts	37.5	22.3	–41	Wyoming	54.3	42.7	–21
Michigan	58.9	34.1	–42				
Minnesota	37.3	26.7	–28	Puerto Rico	72.4	61.7	–15
Mississippi	85.3	61.9	–27	Virgin Islands	77.9	52.7	–32
Missouri	64.4	43.4	–33	Guam	95.7	62.6	–35
Montana	46.8	35.8	-24	American Samoa	---	45.8	---
				Northern Marianas	---	39.3	---

--- Data not available.

[1]Excludes data for the territories.

meaningful short-term trends difficult. However, a recent report identified a gradual decline in the sex ratio beginning in the early 1970s (33).

Month of birth

The monthly average number of births in 2004 was 342,671. The actual number of births per month ranged from 315,821 (February) to 359,426 (July) (**Table 16**). Historically, the number of births peaks during the summer, and is at its lowest during the winter. Following the historic pattern, observed birth rates in 2004, which take into account the different number of days in the month, were at their highest in September and lowest in December.

When compared with 2003, observed monthly birth rates in 2004 were up for only 3 months (March, June, and November), whereas observed monthly fertility rates were higher for 6 months and lower for 6 months. When seasonal variation is filtered from the monthly birth and fertility rates, an estimate of the underlying trends is obtained. In 2004, adjusted birth rates fell for all months; adjusted fertility rates fell for 4 months.

Day of the week of birth

In 2004, an average of 11,235 infants were born each day. Looking at the average number of births by specific day of the week reveals considerable differences. As in previous years, the average number of births was highest on Tuesday (13,045), and lowest on Sunday (7,501) (**Table 17**).

An index of occurrence can be used to measure the variation in the daily pattern of births. The index is defined as the ratio of the average number of births per day of the week to the average number of births per day of the year with the base set at 100. In 2004, Tuesday again had the highest index at 116.1, indicating that there were 16.1 percent more births on Tuesday than on the average day. Consistent with established patterns, infants in 2004 were much less likely to be born on weekends, with indices of occurrence of 66.8 for Sunday and 75.6 for Saturday.

Patterns in the average number of births by day of the week may be influenced by the scheduling of induction of labor and cesarean delivery. For example, the index of occurrence for vaginal births excluding inductions (spontaneous vaginal births) ranged from 86.5 on Sunday to 106.6 on Tuesday (detailed data not shown). The relatively narrow range for spontaneous vaginal births contrasts sharply with that of repeat cesarean deliveries that ranged from 32.7 on Sunday to 130.5 on Tuesday (**Table 17**). Also see section on "Method of delivery."

Births to unmarried women

All measures of childbearing by unmarried women increased substantially in 2004, the largest increases in a decade (1993–94).

The **birth rate for unmarried women** increased 3 percent in 2004, to 46.1 births per 1,000 unmarried women aged 15–44 years. The 2004 rate essentially matched the previous high point for this measure, 46.2 in 1994. The rate indicates the risk that an unmarried woman will give birth. During the years 1995–2002, the rate changed little, ranging from 42.9 to 44.3 (**Figure 7 and Tables C, 18, and 19**). Largely, as a result of the rising birth rate, the **number of births to unmarried women** climbed 4 percent in 2004, to 1,470,189, the highest number ever in the more than six decades for which national statistics are available (34). The number rose 9 percent from 2000 to 2004, following on smaller yet steady increases through the mid- to late 1990s that resulted principally from increases in the number of unmarried women in the reproductive ages (35–37). The recent increase since 2002 reflects in small part population growth (up about 2 percent), but mostly it reflects the increase in the birth rate.

In 2004, **35.8 percent of all births were to unmarried women**. This percentage has risen steadily since the late 1990s, following several years of essentially no change (**Table C**). About 43 percent of first births in 2004 were to unmarried women (tabular data not shown). Data from the 2002 National Survey of Family Growth, conducted by CDC's NCHS show that 40 percent of recent nonmarital births were to cohabiting women (29).

Since 1998, all states except Michigan and New York report mother's marital status on the birth certificate through a direct question in the birth registration process. Michigan and New York infer the mother's marital status on the basis of other information on the birth certificate; see "Technical Notes" for detailed information.

Table C. Number, rate, and percentage of births to unmarried women, and birth rate for married women: United States, 1980 and 1985–2004

Year	Births to unmarried women			Birth rate for married women[3]
	Number	Rate[1]	Percent[2]	
2004	1,470,189	46.1	35.8	87.6
2003	1,415,995	44.9	34.6	88.1
2002	1,365,966	43.7	34.0	86.3
2001	1,349,249	43.8	33.5	86.7
2000	1,347,043	44.1	33.2	87.4
1999	1,308,560	43.3	33.0	84.8
1998	1,293,567	43.3	32.8	84.2
1997	1,257,444	42.9	32.4	82.7
1996	1,260,306	43.8	32.4	82.3
1995	1,253,976	44.3	32.2	82.6
1994	1,289,592	46.2	32.6	82.9
1993	1,240,172	44.8	31.0	86.1
1992	1,224,876	44.9	30.1	88.5
1991	1,213,769	45.0	29.5	89.6
1990	1,165,384	43.8	28.0	93.2
1989	1,094,169	41.6	27.1	91.9
1988	1,005,299	38.5	25.7	90.8
1987	933,013	36.0	24.5	90.0
1986	878,477	34.2	23.4	90.7
1985	828,174	32.8	22.0	93.3
1980	665,747	29.4	18.4	97.0

[1]Births to unmarried women per 1,000 unmarried women aged 15–44 years.
[2]Percent of all births to unmarried women.
[3]Births to married women per 1,000 married women aged 15–44 years.

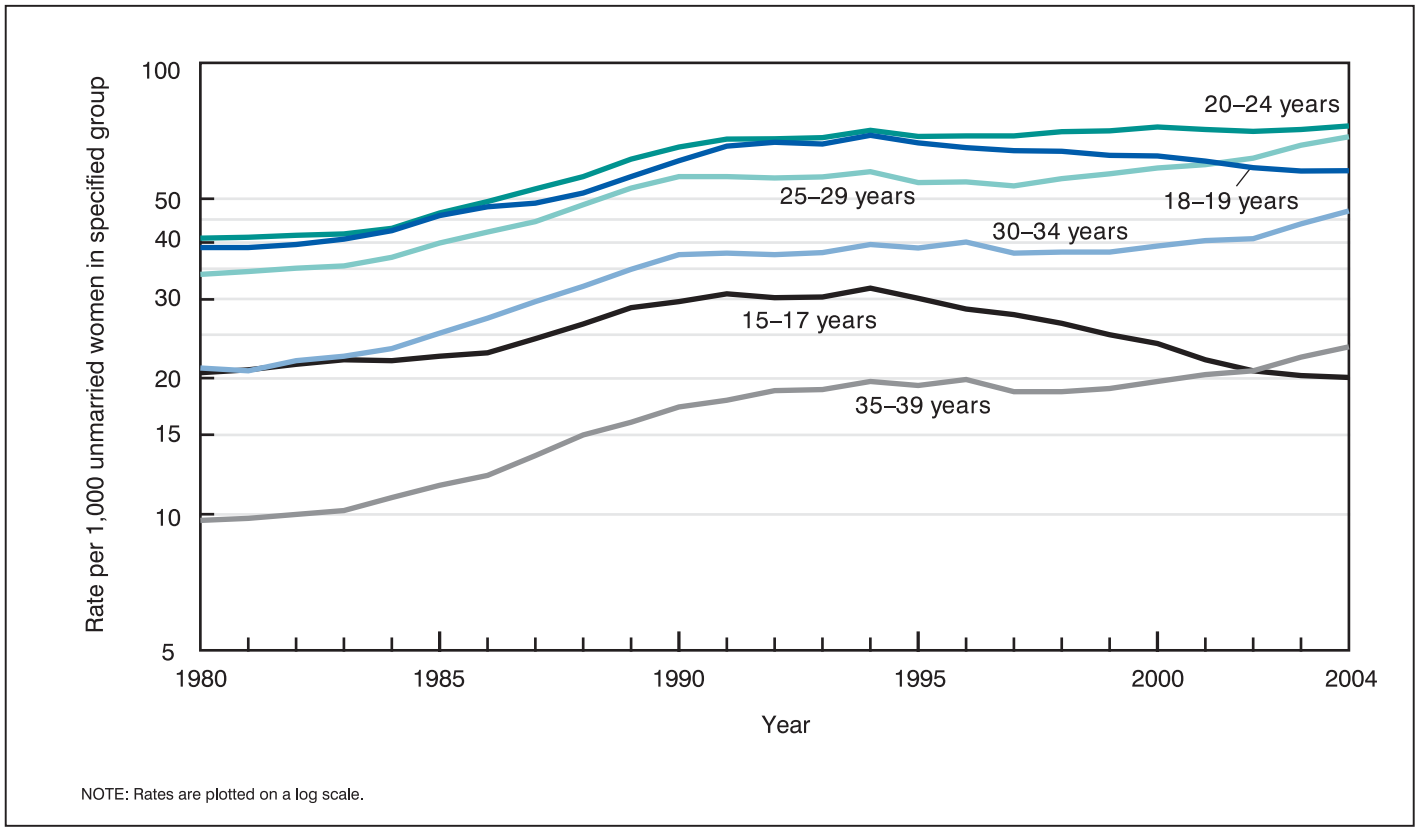


Figure 7. Birth rates for unmarried women, by age of mother: United States, 1980–2004

Birth rates for unmarried women by age continue to be highest for women in their twenties (**Tables 18 and 19**). In 2004, the rates were 72.5 per 1,000 for women aged 20–24 years and 68.6 for women aged 25–29 years. The next highest rate was for older unmarried teenagers, 18–19 years, 57.7. Rates for other age groups are considerably lower.

The overall increase in the nonmarital birth rate from 2003 to 2004 entirely reflects increases in rates for women aged 20 years and over; these increases have been ongoing since the mid-1970s. In contrast, the birth rate for unmarried teenagers 15–19 years continued to fall, albeit very slightly, in 2004. The rate for young teenagers 15–17 years declined, whereas the rate for older teenagers was essentially stable. Overall, the birth rate for unmarried teenagers has dropped 24 percent since the 1994 peak. During the decade 1994–2004, the decline in the rate for younger teenagers was more than double that for older teenagers, 37 percent compared with 16 percent. The contrasting trends between teenagers and adult women have been observed since the mid-1990s, and they have led to changes in the distribution of nonmarital births by age. Over the decade 1994–2004, the proportion of nonmarital births to teenagers dropped from 31 to 24 percent, whereas the proportion to women in their twenties rose from 53 to 59 percent (34).

Rates for unmarried women vary widely by race and ethnicity, mirroring the fertility differentials for all women described above. In 2004, the nonmarital rate for Hispanic women was highest, at 95.7 per 1,000, followed by black women, 67.2, non-Hispanic white women, 29.4, and API women, 23.6. These variations have changed little in recent years. Birth rates increased for all groups, by 1 percent for black women, 3 to 4 percent for Hispanic and non-Hispanic white women, and 6 percent for API women (**Table 19**).

Differences in nonmarital childbearing among race and ethnicity groups are reflected in contrasting patterns within groups by maternal age. Birth rates for unmarried black and Hispanic teenagers are relatively similar, but at ages 20 years and over, the rates quickly diverge. In age groups 30–34 years and over, the rates for unmarried Hispanic women are about double the rates for unmarried black women. Among age groups under 20 years, API women have the lowest rates, whereas at aged 30 years and over, rates are lowest for non-Hispanic white women.

Among teenage population subgroups, nonmarital birth rates have generally fallen since 1994, although rates for black teenagers have been declining since 1991. The rate for young black teenagers has declined more than one-half since 1991. Rates for other groups have fallen as well, but the declines slowed or reversed slightly for some groups in 2004.

The **proportion of all births that are to unmarried women** increased for all population groups in 2004. The proportions in 2004 were 15.5 percent for API women, 24.5 percent for non-Hispanic white women, 46.4 percent for Hispanic women, 62.3 percent for AIAN women, and 69.3 percent for non-Hispanic black women.

Numbers and proportions of births to unmarried women by race and Hispanic origin and by state are shown in **Table 20**. Numbers increased in every area with the exception of Wyoming and Northern Marianas; each reported very small declines. The increases amounted to 6 percent or more in 11 areas and Guam. Proportions rose in 36 states, the District of Columbia, and Puerto Rico; and were essentially unchanged in all other areas.

Age of father

The **birth rate per 1,000 men aged 15–54 years** was 48.8 in 2004, slightly lower than the rate in 2003 (48.9), but higher than the all-time low of 48.4 reported in 2002 (**Table 21**). The birth rate for males aged 15–19 years was 17.0 in 2004, essentially unchanged from the all-time low of 16.9 in 2003. Between 2003 and 2004 rates declined for men in their twenties, but increased for men aged 30–49 years. Rates for men aged 50 years and over were essentially unchanged.

Information on age of father is often missing on birth certificates of children born to women less than 25 years of age and to unmarried women. In 2004, age of father was not reported for 14 percent of all births, 24 percent of births to all women less than 25 years of age, and 36 percent of all nonmarital births. In computing birth rates by age of father, births where age of father is not stated were distributed in the same proportion as births where age of father is stated within each 5-year age interval of mother. This procedure avoids the distortion in rates that would result if the relationship between age of mother and age of father were disregarded. The procedures for computing birth rates by age of father are described in more detail in the "Technical Notes."

Educational attainment

Information on educational attainment is reported on both the 2003 Standard Certificate of Live Birth (revised) and 1989 Standard Certificate of Live Birth (unrevised). However, the format of the education item on the revised standard certificate substantively differs from that of the unrevised standard certificate (see "Technical Notes"). The 1989 certificate item asks for the highest grade completed at the time of the birth; the 2003 certificate item asks for the highest degree or level of school completed at the time of the birth (e.g., high school diploma, bachelor degree, etc.). Accordingly, education data for the states that have implemented the revised certificates are not directly comparable with the data for the states that are not yet using the revised certificate. For 2004, unrevised data are available for 41 states, New York City, and the District of Columbia (80 percent of all 2004 births). Revised data are available for all of 2004 for seven states (Idaho, Kentucky, New York (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington), representing 14 percent of all births.

For the 41-state reporting area described above, 77.8 percent of women who gave birth in 2004 completed at least 12 or more years of school, slightly lower than the percentage for these 41 states in 2003 (77.9) (**Table D**). The percentage of women who completed 16 or more years of school in 2004 was 26.9, 1 percent more that the percentage for these 41 states in 2003 (26.7). The educational attainment of women giving birth has increased substantially over the last few decades. This trend in part reflects increases in educational attainment of all women during this time (38).

For the seven revised states for which data are available for all of 2004, 81.0 percent of women who gave birth had at least a high school diploma or higher and 26.4 percent had a Bachelor's degree or higher in 2004 (**Table D**).

Table D. Years of schooling and degrees achieved, by age and race and Hispanic origin of mother: 41 states, the District of Columbia, and New York City (unrevised) and 7 states (revised), 2004

Age and race and Hispanic origin of mother	Unrevised[1]		Revised[2]	Unrevised[1]		Revised[2]
	2004[3]	2003[3]	2004[4]	2004[3]	2003[3]	2004[4]
	12 years or more years of school		High school diploma (GED) or higher	16 years or more years of school		Bachelor's degree or higher
All races and origins[5]	77.8	77.9	81.0	26.9	26.7	26.4
Under 15 years	*	*	*	*	*	*
15–19 years	41.6	40.6	40.4	*	*	*
20–24 years	72.2	72.0	73.9	6.1	5.9	4.6
25–29 years	82.7	83.0	86.7	28.8	28.6	27.9
30–34 years	88.1	88.7	92.0	46.4	46.2	45.9
35–39 years	89.0	89.2	92.8	48.8	47.8	47.8
40 years and over	87.7	87.8	90.8	46.2	45.7	43.4
Non-Hispanic white	89.0	89.0	87.0	37.0	36.4	31.0
Under 15 years	*	*	*	*	*	*
15–19 years	48.6	47.6	45.1	*	*	*
20–24 years	81.5	81.3	79.2	8.4	8.1	5.3
25–29 years	93.5	93.7	92.0	38.2	37.5	31.9
30–34 years	97.0	97.0	95.9	57.0	56.2	50.2
35–39 years	97.4	97.3	96.2	59.3	57.8	51.9
40 years and over	96.7	96.5	94.5	56.4	55.4	47.4
Non-Hispanic black	76.6	76.5	73.0	13.8	13.9	10.1
Under 15 years	*	*	*	*	*	*
15–19 years	44.2	42.8	39.2	*	*	*
20–24 years	77.2	77.0	74.4	4.6	4.6	3.3
25–29 years	85.1	85.7	83.5	17.5	17.9	13.3
30–34 years	90.1	90.3	87.4	30.0	29.9	23.1
35–39 years	90.6	90.5	88.9	32.5	31.8	26.1
40 years and over	89.9	89.6	84.9	32.2	32.0	24.4
Hispanic[6]	51.6	51.3	47.8	8.0	7.8	7.5
Under 15 years	*	*	*	*	*	*
15–19 years	31.7	30.5	24.8	*	*	*
20–24 years	52.9	52.2	46.2	2.5	2.4	1.4
25–29 years	55.2	55.2	52.1	9.5	9.4	8.2
30–34 years	57.3	58.0	56.8	15.8	15.9	16.7
35–39 years	57.7	57.8	61.3	17.3	16.8	20.4
40 years and over	53.8	53.8	56.9	16.5	16.3	18.3

* Figure does not meet standards of reliability or precision; based on fewer than 20 births in the numerator.

[1]Data are based on the 1989 Revision of the U.S. Certificate of Live Birth; these data are not comparable with those based on the 2003 Revision of the U.S. Certificate of Live Birth.

[2]Data are based on the 2003 Revision of the U.S. Certificate of Live Birth; these data are not comparable with those based on the 1989 Revision of the U.S. Certificate of Live Birth.

[3]Excludes data from Florida, Idaho, Kentucky, New Hampshire, New York state (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

[4]Includes data from Idaho, Kentucky, New York state (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

[5]Includes races other than white and black and origin not stated.

[6]Includes all persons of Hispanic origin of any race; see "Technical Notes."

NOTES: 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 Office of Management and Budget (OMB) standards. Fifteen states reported multiple-race data for 2004. The multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

For the 41-state reporting area variations in educational attainment are seen among the largest **racial and Hispanic origin groups**, for 2004 as in previous years. In 2004, 89.0 percent of non-Hispanic white and 76.6 percent of non-Hispanic black mothers completed at least 12 years of school, essentially unchanged from 2003. The percentage of Hispanic mothers who completed high school increased to 51.6 percent in 2004, but was nonetheless much lower than the percentages for non-Hispanic white and non-Hispanic black women. The levels of advanced educational attainment (at least 16 years of school) for women giving birth in 2004 were 37.0 percent for non-Hispanic white, 13.8 for non-Hispanic black, and 8.0 for Hispanic mothers. The percentages for non-Hispanic white and Hispanic mothers in 2004 were significantly higher than in 2003; the percentage for non-Hispanic black mothers was essentially unchanged.

Maternal education has long been considered an important factor in fertility and maternal and infant health. The educational attainment of women has been shown to have a profound effect on the number of births and the risk of adverse birth outcome. Women with higher educational attainment are more likely to desire and give birth to fewer children, and are less likely to engage in behaviors detrimental to health and pregnancy (29,39,40).

Maternal Lifestyle and Health Characteristics

Weight gain in pregnancy

Excessive and insufficient maternal weight gain during pregnancy can negatively influence pregnancy outcome. Inadequate weight gain has been associated with an increased risk of intrauterine growth retardation, shortened gestational age, low birthweight, and perinatal mortality (41,42). High weight gain during pregnancy has been linked with an elevated risk of a large-for-gestational-age infant, cesarean delivery, and long-term maternal weight retention (43). The body mass index (BMI) is an indirect measure of body fat (44). The Institute of Medicine (IOM) recommended the following weight gains for singleton pregnancy based on the mother's pre-pregnancy BMI (45). However, the IOM recommends that weight gain goals be tailored to the individual's needs.

Pre-pregnancy category	BMI range	Recommended gain
Low	Less than 19.8	28–40 pounds
Normal	19.8–26.0	25–35 pounds
High	26.0–29.0	15–25 pounds

Recommendations for obese women (a BMI of at least 29) are currently under discussion (43).

In 2004, 13.0 percent of women who gave birth gained less than 16 pounds, considered inadequate for most women (45); 20.0 percent had weight gains of more than 40 pounds, considered excessive for most women (**Table 22**). Thus, approximately one-third of mothers had gains outside of the guidelines (based on weight alone). Studies show that the majority of American women have pregnancy weight gains outside their BMI-based recommendations (43).

The distribution of reported weight gain has changed markedly between 1990 and 2004. For the mothers of *at least full term, singleton* births, the percentage of mothers who gained less than 16 pounds increased by 48 percent (from 8.3 to 12.2), and those who gained over 40 pounds, by 25 percent (from 16.1 to 20.1 percent) (data not shown).

Weight gained during pregnancy differs widely by racial or ethnic group. For 2004, non-Hispanic white women and Asian or Pacific Islander (API) women have relatively low proportions of women with weight gains of less than 16 pounds (10.7 and 10.1 percent, respectively), whereas non-Hispanic black women and American Indian or Alaska Native (AIAN) women have higher proportions of women with inadequate weight gains (19.0 and 17.5 percent, respectively) (**Tables 23, 24**). Non-Hispanic white women were the most likely to gain more than 40 pounds (22.2 percent), compared with the least likely, those of API origin (14.2 percent) (data not shown).

Moderate maternal weight gain (between 16 and 40 pounds) and healthy birthweight are positively correlated, as demonstrated in 2004 by a general decline in the percentage of low birthweight (LBW) infants as maternal weight gain increases (from 13.9 percent for weight gains of less than 16 pounds, to 5.8 percent for gains of 36–40 pounds) (data not shown).

Risk factors in this pregnancy

During pregnancy, medical risk factors can contribute to serious complications and maternal and infant morbidity and mortality, particularly if not treated properly (46–48). Sixteen risk factors that can affect pregnancy outcome are separately identified on the 1989 Certificate of Live Birth used by 41 states and the District of Columbia in 2004; 10 such factors are identified on the 2003 revised certificate and were reported by 7 states for 2004. Shown in **Table 25**, and discussed here, are the four risk factors comparable across revisions, and for which national data are available.

In 2004, two pregnancy risk factors, **pregnancy-associated hypertension** and **diabetes** during pregnancy, occurred among 4 percent of mothers (37.9 and 35.8 per 1,000 births, respectively) (**Table 25**). These risk factors have had the highest prevalence since these data became available from birth certificates. After steadily rising during the 1990s, the level of pregnancy-associated hypertension peaked in 2000 and since then has essentially not changed. Reported diabetes prevalence rose by more than two-thirds in the years 1990–2004 (from 21.3 to 35.8 per 1,000 live births). Pregnancy-associated hypertension and chronic hypertension are closely related hypertensive disorders, but the latter is a rarer condition. The prevalence of **chronic hypertension** has increased by almost one-half since 1990 (6.5 in 1990, 9.6 in 2004).

The risk of having a medical condition often differs by maternal age (**Table 25,**). Older mothers are much more prone to chronic conditions such as diabetes. The 2004 level was 80.9 per 1,000 for mothers 40 years of age and over, compared with 11.2 for mothers under age 20 years. The age-specific diabetes levels from birth certificate data are comparable to those obtained from recent National Health Interview Surveys (49). **Figure 8** shows sharp increases in diabetes levels for each age group between 1990 and 2004 (50).

Rates for chronic hypertension are more than seven times higher for mothers aged 40 years and over than for those under 20 years of age (26.7 compared with 3.5 per 1,000). However, rates for pregnancy-related hypertension tend to be highest for both the oldest and youngest mothers.

The risk factors during pregnancy can also vary greatly by maternal race and ethnicity (**Tables 23–25**). In 2004, diabetes rates among API women were higher than those for the other major racial or ethnic groups (5.8 compared with 3.4 percent for non-Hispanic black women).

Tobacco use during pregnancy

Information on **smoking during pregnancy** was reported according to two distinct questions in 2004. For 40 states, New York City, and the District of Columbia, smoking status was based on the 1989 U.S. Standard Certificate (unrevised), whereas data for 7 states are drawn from the 2003 revision of the birth certificate (revised). The questions on the two versions of the birth certificate are not comparable. Briefly stated, the 1989 revision asks a simple "yes/no" question on tobacco use during pregnancy. In contrast, the 2003 revision asks for tobacco use during each trimester of pregnancy (as well as the 3-month period prior to pregnancy). For the purposes of this report, data are shown separately for the areas using the unrevised certificate and for the areas using the revised certificate. For the 7 revised states, if the mother reported smoking in any of the 3 trimesters of pregnancy she was recorded as a smoker. Data are not included in this report for Florida and New Hampshire, which revised their certificates in 2004, but after January 1, or for California, which did not report tobacco use in 2004.

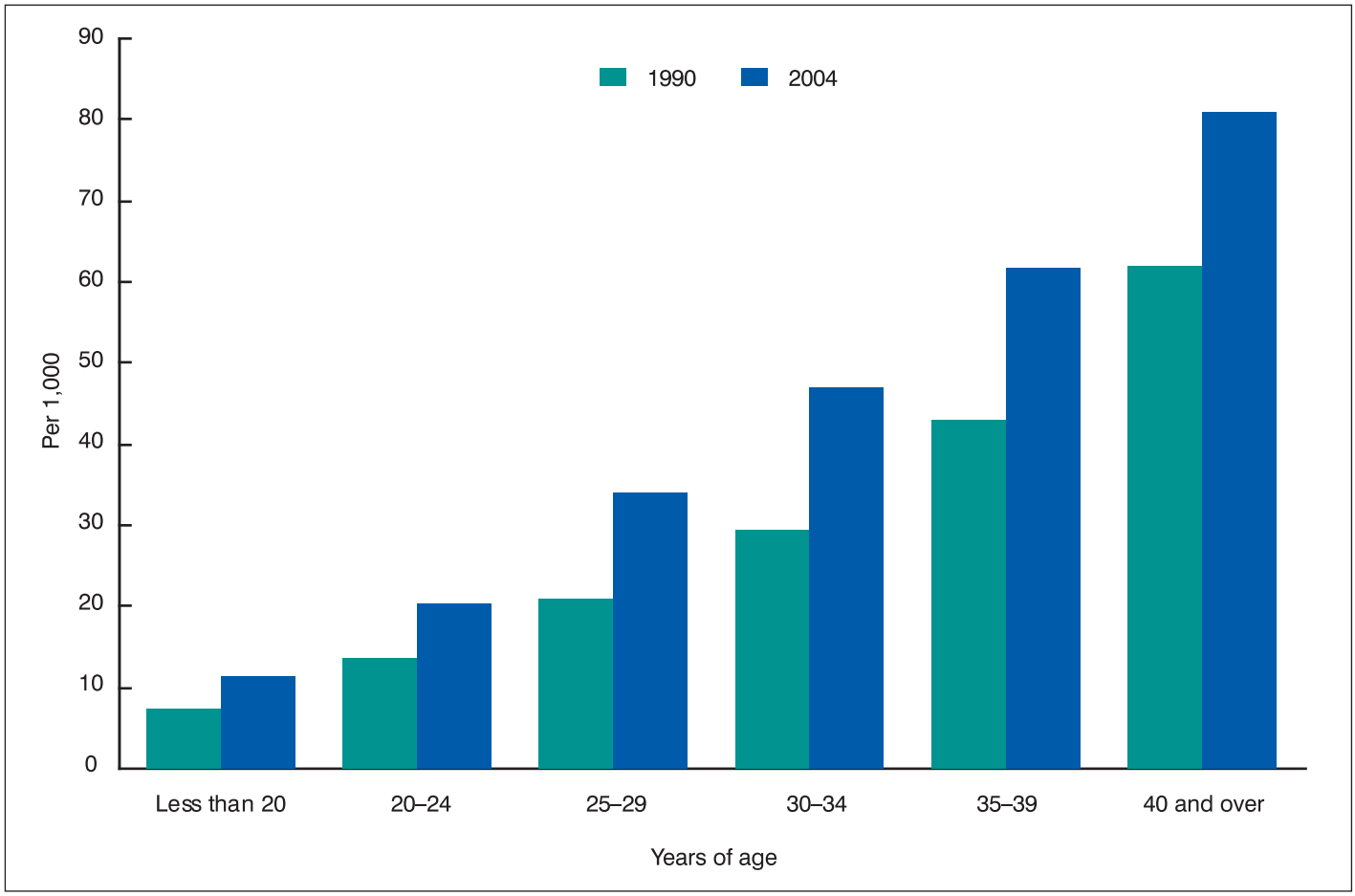


Figure 8. Diabetes rates by age of mother: United States, 1990 and 2004

Smoking during pregnancy declined slightly to 10.2 percent of women giving birth in 2004, compared with 10.4 percent for the same group of 40 reporting areas, the District of Columbia, and New York City (**Table E**). These areas accounted for 67 percent of U.S. births in 2004. Differences among population subgroups were essentially unchanged from previous years. The smoking rate was highest for AIAN women, at 18.2 percent, followed by non-Hispanic white women, 13.8 percent, and non-Hispanic black women, 8.4 percent. Rates for Hispanic (2.6 percent) and API women (2.2 percent) were substantially lower.

For the seven revised areas for which revised data on tobacco use are available for all of 2004, the overall smoking rate was 16.3 percent. As noted above, the revised question on smoking differs considerably from the question on the 1989 certificate, and it is expected that the revised question will elicit higher rates of smoking during pregnancy. Moreover, the seven revised states individually have traditionally reported higher smoking rates than other states (51). Despite these differences in smoking levels between the two sets of reporting areas, the variations among population subgroups by race and Hispanic origin persist for the revised states (**Table E**).

Studies based on the unrevised smoking question have suggested some underreporting of smoking on the birth certificate, although the trends and variations in smoking among population subgroups have been confirmed by surveillance and survey data (29,52). Some of the underreporting no doubt reflected the lack of a specific time reference, that is, when during pregnancy the mother smoked. It is believed that the new question on prenatal smoking is providing higher quality, more reliable information in part because there is a specific time reference (each trimester) and women are afforded the chance to report that their smoking behavior has changed (53–55).

Over the 15-year period for which smoking status has been reported on U.S. birth certificates, the relationship between smoking status and educational attainment has been consistent. Regardless of whether the comparisons are based on the unrevised or revised smoking question, smoking rates are highest for women who have attended but not graduated from high school and lowest for college-educated women. In 2004, based on information from the seven revised states, 33 percent of women who attended but did not complete high school were smokers compared with 2 percent of college graduates (**Table F**). Women with a grammar school education have relatively low smoking rates, about 10 percent in 2004.

The concern about smoking during pregnancy has been long-standing and is linked to adverse pregnancy outcomes, including low birthweight (LBW), intrauterine growth retardation, miscarriage, and infant mortality, as well as negative consequences for child health and development (56). These adverse consequences in turn are associated with substantial economic and social costs (57). Over the period for which the information has been reported on birth certificates and in national surveys, the negative relationship between smoking and LBW has been replicated repeatedly (58,59). Babies born to women who smoke are at substantially greater risk of LBW than babies born to nonsmokers. The revised smoking question corroborates this pattern for 2004 births. In the seven states with the revised question, 11.9

Table E. Trimester of pregnancy prenatal care began and smoking status during pregnancy, by race and Hispanic origin of mother: 41 states, the District of Columbia, and New York City (unrevised) and 7 states (revised), 2004

Characteristic and race and Hispanic origin of mother	Unrevised[1] 2004[3]	Unrevised[1] 2003[3]	Revised[2] 2004[4]
All races and origins[5]			
Prenatal care beginning in the 1st trimester	83.9	84.0	72.9
Prenatal care beginning in 3rd trimester or no care	3.6	3.6	6.2
Smoker	10.2	10.4	16.3
Non-Hispanic white			
Prenatal care beginning in the 1st trimester	88.9	89.1	78.0
Prenatal care beginning in 3rd trimester or no care	2.2	2.1	4.5
Smoker	13.8	13.8	19.0
Non-Hispanic black			
Prenatal care beginning in the 1st trimester	76.5	76.2	58.9
Prenatal care beginning in 3rd trimester or no care	5.7	5.9	11.4
Smoker	8.4	8.4	13.0
American Indian total[6,7]			
Prenatal care beginning in the 1st trimester	69.9	70.6	58.7
Prenatal care beginning in 3rd trimester or no care	7.9	7.7	11.2
Smoker	18.2	18.2	21.2
Asian or Pacific Islander total[7]			
Prenatal care beginning in the 1st trimester	85.6	85.4	69.1
Prenatal care beginning in 3rd trimester or no care	3.0	3.1	6.8
Smoker	2.2	2.2	2.9
Hispanic[8]			
Prenatal care beginning in the 1st trimester	77.5	77.3	56.5
Prenatal care beginning in 3rd trimester or no care	5.4	5.3	11.0
Smoker	2.6	2.7	5.7

[1]Data are based on the 1989 Revision of the U.S. Certificate of Live Birth; these data are not comparable with those based on the 2003 Revision of the U.S. Certificate of Live Birth.

[2]Data are based on the 2003 Revision of the U.S. Certificate of Live Birth; these data are not comparable with those based on the 1989 Revision of the U.S. Certificate of Live Birth.

[3]Excludes data from Florida, Idaho, Kentucky, New Hampshire, New York state (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington. Information on smoking status excludes data for California.

[4]Includes data from Idaho, Kentucky, New York state (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington.

[5]Includes origin not stated.

[6]Includes births to Aleuts and Eskimos.

[7]Data for persons of Hispanic origin are included in the data for each race group according to the mother's reported race; see "Technical Notes."

[8]Includes all persons of Hispanic origin of any race; see "Technical Notes."

NOTES: 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 Office of Management and Budget (OMB) standards. Fifteen states reported multiple-race data for 2004. The multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

percent of babies born to smokers were LBW compared with 7.2 percent of babies born to nonsmokers. This variation was observed for population subgroups as well (**Table F**).

Medical Services Utilization

Prenatal care

This report includes data on the timing of prenatal care based on both the 1989 (unrevised) and the 2003 Revisions to the U.S. Standard Certificate of Live Birth (revised). The 2003 revision of the birth certificate introduced substantive changes in item wording and also to the sources of prenatal information; see "Technical Notes." Accordingly, prenatal care data for the two revisions are not directly comparable, and are shown separately. For 2004, unrevised data are available for 41 states, New York City, and the District of Columbia. Revised data are available for seven states (New York state excluding New York City); **see Tables E, 26(a), and 26(b)**.

Timely initiation of prenatal care does not appear to have improved in the United States in 2004. For the 41-state reporting area for which comparable data are available, 83.9 percent of mothers were reported to have begun care within the first 3 months of pregnancy, a level not significantly different from that reported for the same reporting area for 2003 (84.0 percent); **see Table E**. No change was observed in the percentage of women receiving late (care beginning in the 3rd trimester of pregnancy) or no care for 2003–04 (3.6 percent). Prenatal care utilization had improved modestly, but quite steadily from 1990 to 2003 (4). Appropriate prenatal care, that is, care provided by a health professional to pregnant women, can enhance pregnancy outcome by assessing risk, providing health care advice, and managing chronic and pregnancy-related health conditions (60–63). Preconception care, that is, care which promotes the health of women of reproductive age *before* conception, is also recommended (64). Information on preconception care is not available from birth certificate data.

The percentage of women beginning care in the first trimester of pregnancy was essentially unchanged among the largest **racial and Hispanic origin groups** in the 41-state reporting area between 2003 and 2004; **see Table E**. Sizable gains in prenatal care utilization had been observed for 1990–2003 among non-Hispanic black, Hispanic, and AIAN women (4). These gains may be linked in part to the expansion of Medicaid for pregnant women in the late 1980s (65,66). Despite improvements in recent years among groups with lower levels of care, large disparities persist. In 2004, non-Hispanic white and API women were more than 10 percent more likely to receive timely care than non-Hispanic black and Hispanic women.

Among **the states** for which comparable data are available for 2003–04, no clear pattern was observed in changes in prenatal care utilization. **See Tables 26(a) and 26(b) for 2004 data**.

The Adequacy of Prenatal Care Utilization (APNCU) Index is an alternative measure of prenatal care timing that takes into account the number of prenatal care visits and gestational age of the newborn at delivery (67,68). **The APNCU** shows a small increase in the proportion of women receiving less than adequate care for 2003–04; **see Table G**.

For the seven revised states for which data are available for all of 2004, 72.9 percent of women were reported to have begun care in the first 3 months of pregnancy; 6.2 percent of mothers were reported to have late or no prenatal care (**Table 26(a)**). As noted above, the revised prenatal care item is substantively different from the unrevised question. As one result, levels of prenatal care utilization based on revised data are substantially lower than those based on unrevised data. For example, unrevised 2003 data for Kentucky indicate that 87.0 of residents began care in the first trimester of pregnancy in 2003. This

Table F. Smoking during pregnancy according to educational attainment of mother, and percentage low birthweight by smoking status, by race and Hispanic origin of mother: Total of 7 states (revised), 2004

[Low birthweight is defined as weight of less than 2,500 grams (5lb 8 oz)]

Education of mother	Percent smokers	Race and Hispanic origin of mother	Percent low birthweight by smoking status	
			Yes	No
Total	16.3	All races and origins[1]	11.9	7.2
Grammar school	10.4	Non-Hispanic white	11.0	6.2
Some high school	33.2	Non-Hispanic black	19.0	12.9
High school diploma, GED	24.9	American Indian total[2,3]	7.9	7.4
Some college	13.6	Asian or Pacific Islander total[3]	9.8	7.1
College graduate	2.1	Hispanic[4]	12.5	6.6

[1]Includes origin not stated.

[2]Includes births to Aleuts and Eskimos.

[3]Data for persons of Hispanic origin are included in the data for each race group according to the mother's reported race; see "Technical Notes."

[4]Includes all persons of Hispanic origin of any race; see "Technical Notes."

NOTES: Data are based on the 2003 Revision of the U.S. Certificate of Live Birth; these data are not comparable with those based on the 1989 Revision of the U.S. Certificate of Live Birth. Includes data for Idaho, Kentucky, New York state (excluding New York City), Pennsylvania, South Carolina, Tennessee, and Washington, which implemented the 2003 revision of the birth certificate. 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 Office of Management and Budget (OMB) standards. Fifteen states reported multiple-race data for 2004. The multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

Table G. Percentage of births by adequacy of prenatal care utilization index: 41 states, the District of Columbia, and New York City (unrevised), 2003 and 2004

	2004	2003
Intensive use	32.6	32.6
Adequate	42.6	42.8
Intermediate	13.7	13.6
Inadequate	11.2	11.1

NOTES: Data are based on the 1989 Revision of the U.S. Certificate of Live Birth; these data are not comparable with those based on the 2003 Revision of the U.S. Certificate of Live Birth. Excludes data for Idaho, Florida, Kentucky, New Hampshire, New York state (excluding New York City), Pennsylvania, South Carolina, Tennesee, and Washington; see "Technical Notes."

compares with a level of 74.5 percent based on 2004 revised data. Much, if not all of the difference between 2003 and 2004 for Kentucky and other revised states is related to changes in reporting and *not* to changes in prenatal care utilization.

Obstetric procedures

In this report, data are presented for the two obstetric procedures reported on both the revised and unrevised U.S. Standard Certificates of Live Birth; see "Technical Notes."

The rate of induction of labor increased for 2003–04 from 20.6 to 21.2 percent. This rate has increased more than two-fold since 1990 (9.5 percent) (**Tables 25 and H**). The rate of induction had generally risen steadily every year 1989–2000 for all gestational ages, including preterm deliveries (less than 37 completed weeks of gestation). Since 2000, rates have fluctuated somewhat for very preterm (less than 32 weeks) and moderately preterm infants (32–36 weeks); rates for 2004 were 7.5 and 15.0, respectively. Induction rates for births at 37 weeks and over generally continued to rise, reaching 22.4 percent for 2004 (**Figure 9**; data not shown).

Induction levels more than doubled for each racial and ethnic group between 1990 and 2004 (**Table 25** for 2004 data); rates among groups continue to vary widely (**Table H**). For example, the rate for non-Hispanic white women (25.4 percent) was notably higher than that for Hispanic (14.3) and API women (14.4). For Hispanic subgroups, rates ranged from 13.3 percent among Mexican, to 20.6 percent for Cuban mothers (data not shown).

It has been suggested that increasing induction rates may be related, in part, to an increase in elective inductions (inductions with no medical or obstetric indication). In a study of variation in induction rates among hospitals and clinicians, 25 percent of inductions had no apparent medical indication (69). Induction (whether for a medical indication or elective) may increase the risk of cesarean delivery in nulliparous women (70,71).

The rate for tocolysis, the use of agents that hinder or delay uterine activity for the management of preterm labor, was 2.0 percent for 2004, compared with 2.1 percent for 2001–03. The rate of tocolysis has fluctuated only slightly since 1996. Discussion is ongoing regarding the safety, efficacy, and appropriate use of these agents (72).

Characteristics of labor and delivery

The report includes national data for the three characteristics of labor and delivery that are comparable across the 1989 and 2003 revisions of the U.S. Standard Certificate of Live Birth.

Moderate or heavy **meconium** staining occurred in about 5 percent of all deliveries in 2004. The presence of meconium during labor and delivery can directly alter the amniotic fluid, reduce antibacterial activity (and subsequently increase the risk of perinatal bacterial infection), and damage the infant's lungs if inhaled (47). Depending on the severity of the condition, other complications of labor and delivery reported on the birth certificate may require medical interventions and can also affect the health of the infant. The two other complications of labor and delivery reported in common on the 1989 revision and the 2003 revision of the birth certificate occur less frequently: **breech/malpresentation** (4.2 percent of live births) and **precipitous labor** (1.9 percent) (**Table 25**).

Rates for breech/malpresentation and for precipitous labor rise steadily with age. The 2004 rate of breech/malpresentation for mothers

Table H. Rate of induction of labor by race and Hispanic origin of mother: United States, 1990, 1995, 2000, 2003, and 2004 and percentage change, 1990–2004

[Rates are number of live births with induction per 100 live births in specified group]

Race and Hispanic origin of mother	2004	2003	2000	1995	1990	Percent change, 1990–2004
All races and origins[1]	21.2	20.6	19.9	16.0	9.5	123
Non-Hispanic white	25.4	24.7	23.6	18.9	11.3	125
Non-Hispanic black	18.6	17.5	16.5	11.7	6.7	178
American Indian total[2,3]	20.1	19.9	20.1	15.6	9.4	114
Asian or Pacific Islander total[3]	14.4	14.0	13.3	10.8	5.9	144
Hispanic[4]	14.3	13.6	13.2	10.2	5.6	155

[1]Includes origin not stated.

[2]Includes births to Aleuts and Eskimos.

[3]Data for persons of Hispanic origin are included in the data for each race group according to the mother's reported race; see "Technical Notes."

[4]Includes all persons of Hispanic origin of any race; see "Technical Notes."

NOTES: 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 Office of Management and Budget (OMB) standards. Fifteen states reported multiple-race data for 2004. The multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

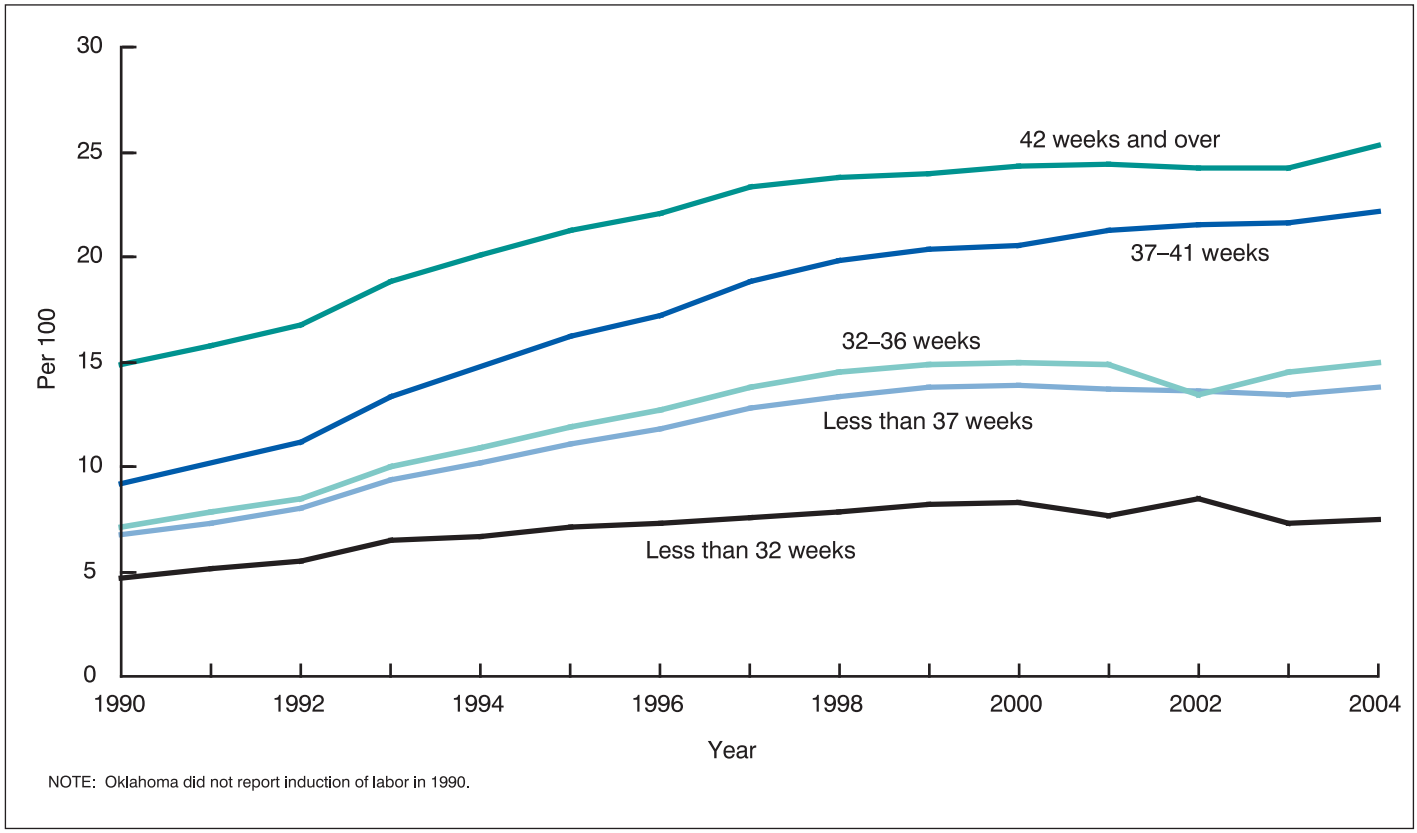


Figure 9. Rates of induction of labor by gestational age: United States, 1990–2004

aged 40 years and over (65. 3 per 1,000 live births) is more than double that for mothers under age 20 years (29.5 per 1,000). Older mothers are also much more likely to experience precipitous labor (22.0 versus 13.0 complications per 1,000 live births) (**Table 25**). Rates of labor and delivery characteristics vary also by race and ethnicity (**Table 25**). For example, non-Hispanic black mothers had the highest rate of meconium staining (63.5 per 1,000 live births), Hispanic mothers had an intermediate rate (53.0), and non-Hispanic white mothers the lowest—at 42.5 per 1,000. The rate was fairly constant across age groups for each racial and ethnic group.

Attendant at birth and place of delivery

The percentage of all births delivered by physicians in hospitals was 91.5 percent for 2004, unchanged from 2003 (**Table 27**). This level has increased only slightly from 2001–02 (91.3 percent). In 2004, as in previous years, almost all doctor-attended births were attended by doctors of medicine (M.D.s). The percentage of physician-attended births attended by doctors of osteopathy (D.O.s) was 4.9 percent, a slight increase from 2002 and 2003 (4.8). This

rate has increased fairly steadily from 2.8 percent reported in 1989 (the first year data on D.O.s were available from the birth certificate).

The percentage of *all* births attended by midwives, which had increased steadily between 1975 and 2002 (from less than 1.0 to 8.1 percent), declined slightly between 2003 (8.0 percent) and 2004 (7.9 percent). Because cesarean deliveries are almost exclusively performed by physicians, the percentage of all *vaginal* births attended by midwives was calculated. This rate has steadily increased each year since 1991 (the first year that method of delivery was reported on birth certificates by all states and the District of Columbia). In 2004, midwives attended 11.1 percent of vaginal births, almost double the 1991 rate (5.7 percent).

Most midwife-attended births are by certified nurse midwives (CNMs). For 2004, the percentage of midwife-attended births by certified nurse midwives was 94.5 percent (essentially the same as in 2002 and 2003). This rate has remained at 90 percent or more since 1989 (the first year that this information was collected on birth certificates). Most midwife-attended births occur in hospitals. Due to underreporting of midwife-attended deliveries, these data should be considered lower estimates of the actual number of midwife-attended births (7,73).

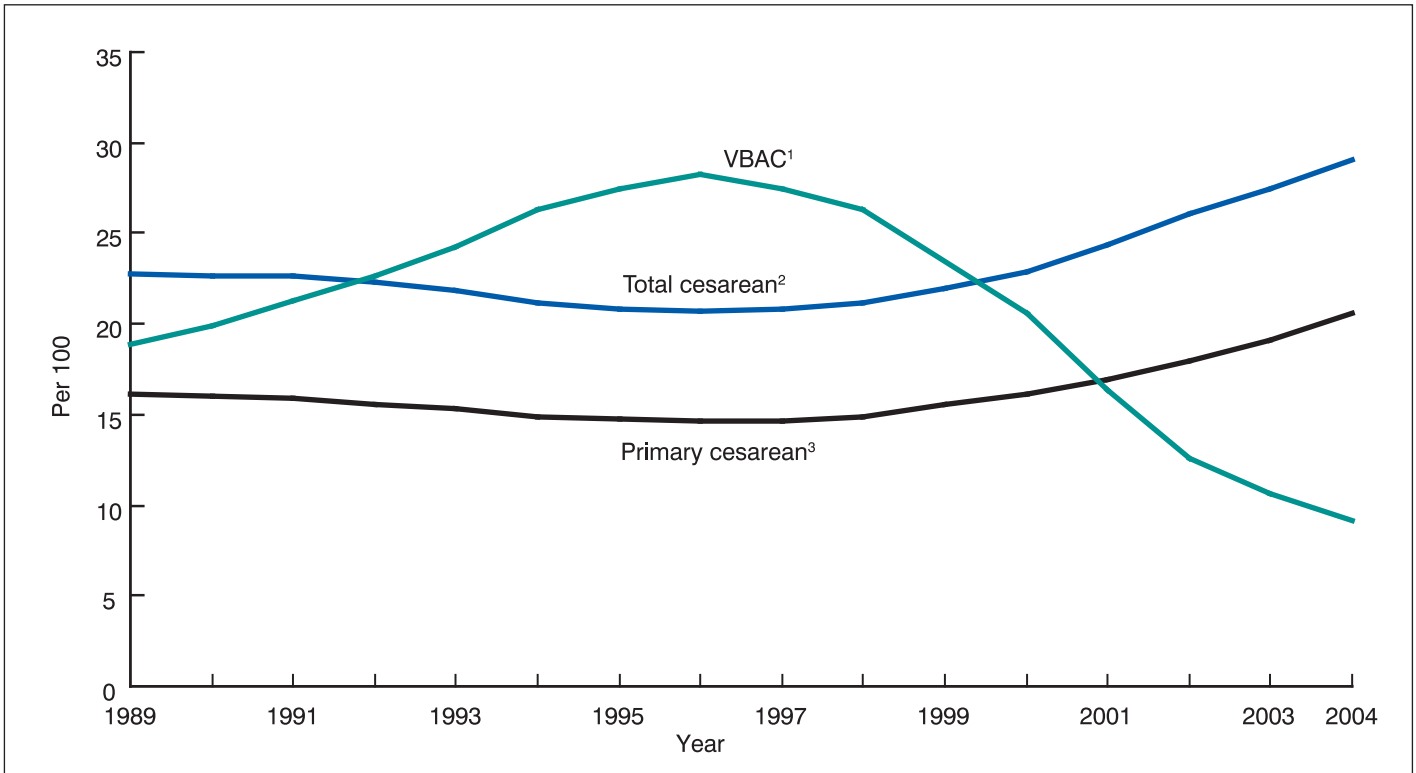
In 2004, 99 percent of all births were delivered in hospitals. This level has been stable over the past several decades. Of the 1 percent of out-of-hospital births in 2004, 65 percent were in a residence and 27 percent were in a freestanding birthing center. These levels have varied only moderately since 1989.

As in past years, about 92 percent of births to non-Hispanic white and black women were attended by a physician in a hospital, compared with 90 percent of births to Hispanic women. CNM-attended hospital births were more likely among Hispanic women (8.9 percent) than among non-Hispanic white and black women (6.6 and 6.8 percent, respectively). See **Tables 23 and 24** for CNM-attended births by race and Hispanic origin.

Method of delivery

The rate of cesarean delivery for 2004 increased to 29.1 percent, the highest rate ever reported in the United States. This rate represents a 6 percent increase from 2003 (27.5 percent). After falling between 1989 and 1996, the cesarean rate rose by 41 percent from the 1996 low of 20.7 (**Figure 10 and Table 28**). Data from the National Hospital Discharge Survey show similar trends in cesarean delivery for 1990–2004 (74,75).

The continued escalation in the total cesarean rate is being driven by both the increase in the primary cesarean rate and the decrease in the rate of vaginal birth after cesarean delivery (VBAC). The risks, benefits, and long-term consequences of cesarean delivery, especially with regard to medically indicated or cesarean delivery with no medical or obstetrical indication, and VBAC delivery are the subject of intense debate (76–78). A National Institutes of Health expert panel recently acknowledged a lack of national data or other studies on mothers' preferences and recommended against cesareans that are not medically indicated for women desiring several children, and for pregnancies of less than 39 weeks of gestation (79).



[1]Number of vaginal births after cesarean (VBAC) per 100 live births to women with a previous cesarean delivery.
[2]Percentage of all live births by cesarean delivery.
[3]Number of primary cesarean deliveries per 100 live births to women who have not had a previous cesarean.
NOTE: Due to changes in data collection from implementation of the 2003 revision of the U.S. Standard Certificate of Live Birth, there may be small discontinuities in rates of primary cesarean delivery and VBAC in 2003 and 2004. See "Technical Notes."

Figure 10. Total and primary cesarean rate and vaginal birth after cesarean rate: United States, 1989–2004

Method of delivery data based on the 1989 and the 2003 revisions of the U.S. Certificate of Live Birth are combined for all measures shown in this report. The numbers and percentages of total vaginal and total cesarean deliveries (e.g., the total cesarean delivery rate) appear to be very consistent between revisions. However, information on whether the delivery is a VBAC, primary cesarean, or repeat cesarean appears to be less comparable. In brief, data for the revised states show higher-than-expected VBAC and primary cesarean rates and lower-than-expected repeat cesarean rates. These discontinuities are likely due to wording and formatting changes to the method of delivery item on the 2003 Revision of the U.S. Standard certificate of live birth (5,6). The changes to the method of delivery item appear to have a small impact (2 to 3 percent) on the national primary and VBAC rates shown in this report. However, changes in VBAC, primary, and repeat cesarean deliveries for states that have implemented the revised certificates should be interpreted with caution; see "Technical Notes."

The primary cesarean rate for 2004 (20.6 per 100 live births to women who had no previous cesarean) was 8 percent higher than in 2003 (19.1). This rate has increased by an average of 5 percent each year during 1998–2003, and was 41 percent higher than the low reported for 1996–97 (14.6). The trends for rates for low-risk women, (i.e., women with a singleton, full-term infant in vertex presentation) are similar to those for all women (80,81). Rates for women at no indicated risk (i.e., those with singleton, full-term, vertex presentation births with no risk factors or complications of labor and delivery reported on the birth certificate) more than doubled between 1991–2003 (82) (data not shown). The increase in primary cesarean deliveries may be associated with nonclinical factors such as demographics, physician practice patterns, and maternal choice (77,83,84).

Between 2003 and 2004, the rate of VBAC fell 13 percent—from 10.6 to 9.2 per 100 women with a previous cesarean and the lowest level reported since this information has been collected on birth certificates (1989). The VBAC rate has fallen by 67 percent since 1996, after increasing by 50 percent between 1989 and 1996 (from 18.9 to 28.3 percent) (**Figure 10 and Table 28**).

Among women with a first (primary) cesarean delivery, subsequent deliveries will be either a repeat cesarean or a VBAC. This steep decline in the rate of VBAC implies a corresponding rise in the rate of repeat cesarean deliveries (the rate of cesarean delivery per 100 women with a previous cesarean). The repeat rate increased from 71.7 to 90.8 percent between 1996 and 2004; therefore, once a woman has a cesarean delivery, it is highly likely (there is more than a 90 percent chance) that subsequent deliveries will be by cesarean. The trend was essentially the same for low-risk women (**Figure 11**). The steep decline in the VBAC rate (and, accordingly, the increase in the repeat cesarean rate) may be related to reports of risks associated with VBAC, more conservative practice guidelines, legal pressures, as well as the continuing debate regarding the harms and benefits of vaginal birth compared with cesarean delivery (78,84–87).

Between 2003 and 2004, the primary rate increased and the VBAC rate decreased for almost all ages, and for all racial and ethnic groups (**Table 28** and data not shown). These rates have also changed by a similar magnitude among low-risk women of all ages and racial and ethnic groups (81) and data not shown.

The primary cesarean rate rose 7 to 9 percent between 2003 and 2004, for non-Hispanic white, non-Hispanic black, and Hispanic women. The primary rate for non-Hispanic black women (22.5) remained higher than the rates for non-Hispanic white and Hispanic women (21.1 and 18.2, respectively) (**Table 29**).

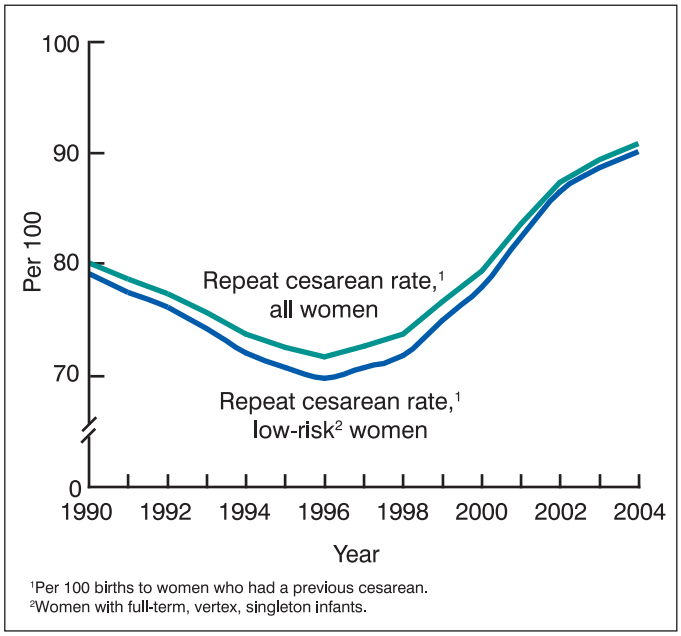


Figure 11. Repeat cesarean rates for all women, and for low-risk women: United States, 1990–2004

As in past years, primary cesarean rates rose as maternal age increased. For example, the 2004 rate for mothers aged 40–54 years (32.6) was over 75 percent higher than that for mothers under age 20 years (18.4) (**Table 29**). The higher rates for older mothers may be related to increased rates of multiple births, other biologic factors, and patient/practitioner concerns (88).

Declines in the VBAC rate were similar for the largest racial and Hispanic origin groups (11–13 percent) (**Table 29**). Until 2002, VBAC rates decreased with advancing maternal age. However, since 2002, VBAC rates have been essentially the same for all age groups.

For American Indian or Alaska Native women, the overall cesarean rate in 2004 was 25.1 percent; the rate for Asian or Pacific Islander women was 28.4 percent. Among Hispanic subgroups, the rate of cesarean delivery ranged between 27.1 for Mexican, to 43.4 for Cuban mothers (**Tables 23 and 24**).

Since 1996, as the cesarean rate has increased, the percentage of births delivered by either forceps or vacuum extraction has decreased 45 percent, from 9.4 to 5.2 percent (**Table J**). The rate of forceps delivery steadily decreased between 1989 and 2004, from 5.5 to 1.1. The rate of delivery by vacuum extraction, which had increased by 77 percent between 1989 (3.5) and 1997 (6.2 percent), has since decreased by one-third, to 4.1 percent for 2004.

Cesarean rates generally increased for all states (except Alaska) and the District of Columbia for 2003–04. As in previous years, there was considerable variation in cesarean rates by state, from under 22 percent in Alaska, Utah, and New Mexico, to over 32 percent for Kentucky, Louisiana, Mississippi, New Jersey, and West Virginia (**Table 30**). Almost one-half (47.7 percent) of births in Puerto Rico were cesarean deliveries. An analysis of cesarean delivery rates for Puerto Rican women by place of delivery (Puerto Rico compared with the U.S. mainland) found that rates in Puerto Rico were substantially higher than for Puerto Rican women who delivered on the U.S. mainland (89).

Table J. Percentage of live births delivered by forceps or vacuum extraction: United States, 1989–2004

Year	Forceps	Vacuum extraction	Forceps or Vacuum
2004	1.1	4.1	5.2
2003	1.3	4.3	5.6
2002	1.5	4.4	5.9
2001	1.8	4.5	6.3
2000	2.1	4.9	7.0
1999	2.3	5.1	7.4
1998	2.6	6.0	8.6
1997	2.8	6.2	9.0
1996	3.2	6.2	9.4
1995	3.5	5.9	9.4
1994	3.8	5.7	9.5
1993	4.1	5.3	9.4
1992	4.3	4.8	9.1
1991	4.6	4.4	9.0
1990[1]	5.1	3.9	9.0
1989[2]	5.5	3.5	9.0

[1]Exclues data for Oklahoma, which did not require reporting of method of delivery.
[2]Excludes data for Louisiana, Maryland, Nebraska, Nevada, and Oklahoma, which did not require reporting of method of delivery.

VBAC rates generally declined between 2003 and 2004 by state. In 2004, VBAC rates ranged from 4.2 in Louisiana, to 19.2 per 100 in Alaska and Utah. As noted above, increases for 2003–04 observed in VBAC rates in states that implemented the revised birth certificate likely reflect differences in wording and format between the 1989 and 2003 birth certificate revisions; see "Technical Notes."

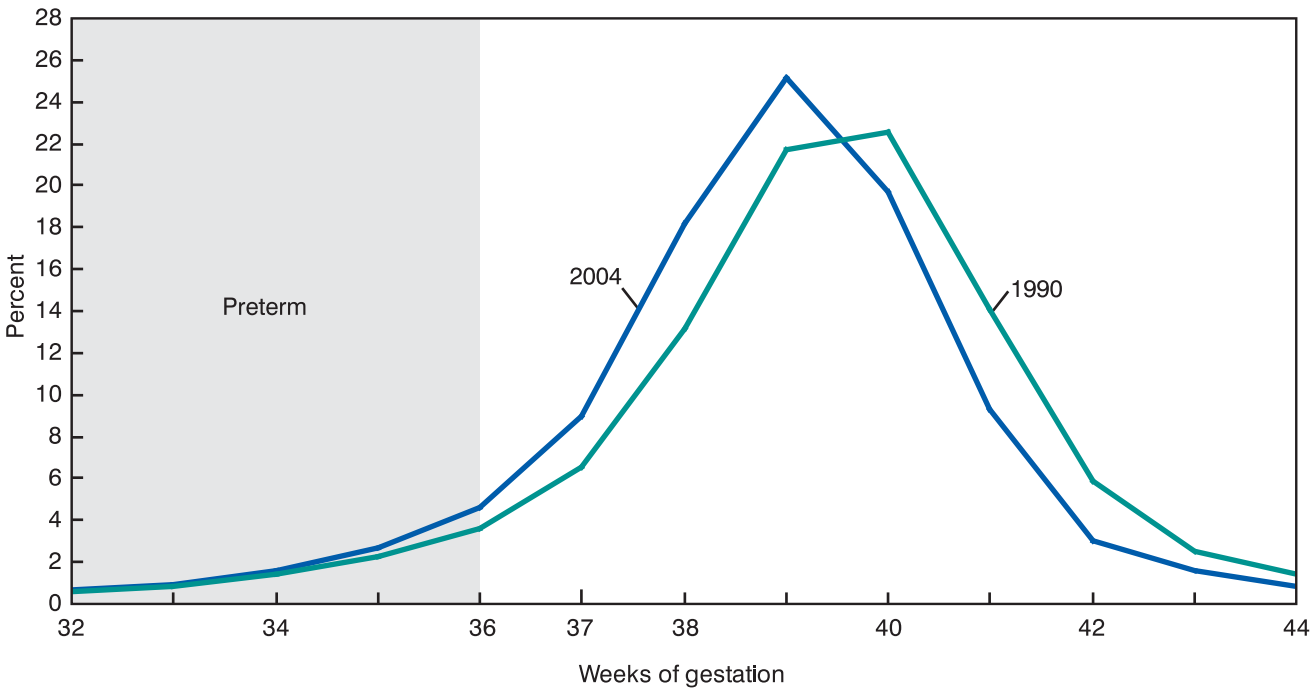
Infant Health Characteristics

Period of gestation

The **preterm birth rate** rose another 2 percent in 2004, to 12.5 percent of all births. More than one-half million (508,356) babies were born preterm (less than 37 completed weeks of gestation) in 2004, the highest number reported since comparable information on gestational age has been available from birth certificates (1981). The percentage of infants born preterm has risen 18 percent since 1990 (from 10.6 percent), and by 33 percent since 1981 (9.4 percent). Increases for 2003–04 are seen among very preterm, (less than 32 completed weeks of gestation), and moderately preterm (32–36 weeks) infants; **see Tables 23, 24, 31, and 32**. Since 1990, the percentage of very preterm births (VPT) has risen from 1.92 to 2.01 percent, and that of moderately preterm infants (MPT) from 8.7 to 10.5 percent.

Preterm birth is a leading cause of infant morbidity and mortality, accounting for nearly one-half of all congenital neurological defects such as cerebral palsy, and more than two-thirds of infant deaths (90,91). The causes and best management of preterm labor are not fully understood (91–93).

The primary measure used to determine the gestational age of the newborn is the interval between the first day of the mother's last normal menstrual period (LMP) and the infant's date of birth. The LMP-based gestational age is subject to error for several reasons; see "Technical Notes." Although these data are edited for gestational ages that are



NOTE: Percent distribution based on gestational ages of 17–47 completed weeks.

Figure 12. Percent distribution of births by gestational age (32–44 weeks): United States, 1990 and 2004

clearly inconsistent with the infant's birthweight, these edits are conservative and substantial incongruities in these data persist. Changes in reporting of this measure over time may have some effect on trends in preterm birth rates, particularly by race (94–96).

Because of their growing numbers and heightened risk of early delivery compared with singletons, multiple births have an important influence on recent trends in preterm birth rates. Accordingly, when only singleton births are examined, a slightly different trend emerges from that for all births. Among singletons only, the preterm rate rose 11 percent between 1990 and 2004 (9.7 to 10.8 percent); nearly all of the increase was among infants delivered at 34–36 weeks, or "late preterm;" **see Figure 12 and Table K**. A small decline, from 1.69 to 1.61 percent, is seen in singleton VPT births over this period. The increase in late preterm births is of concern because these babies comprise more than 70 percent of all preterm births (**Figures 12 and 13**) and, although infants born at 34–36 weeks are at lower risk of adverse outcome compared with infants born at earlier gestational ages, they are at heightened risk when compared with infants delivered at higher ages (97,98).

The trend to earlier deliveries is also seen at later gestational ages, that is, at term or later (37 and more weeks). Among singleton births, the percentage of births delivered at 40 weeks and greater declined from 36.9 to 36.2 between 2003 and 2004, and the percentage of births at 37–39 weeks increased from 52.5 to 53.0 (**Table K**). Since 1990, the percentage of births 40 weeks and greater has dropped by more than 25 percent. The marked shift in the gestational age distribution suggests increases in the use of delivery management techniques such as induction of labor and cesarean delivery (99–101). The rise in preterm births has been shown to have occurred among births with these medical interventions, and also among "spontaneous" deliveries or those for whom no intervention is reported (102–104).

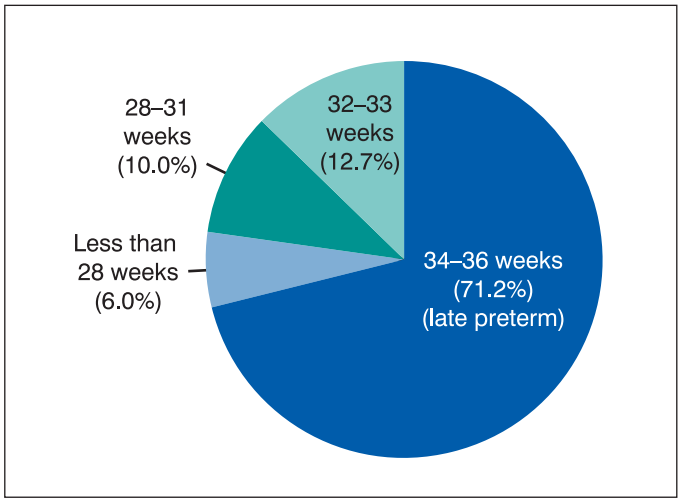


Figure 13. Percent distribution of preterm births: United States, 2004

Preterm rates rose for the current year for non-Hispanic white (11.3 to 11.5 percent), and Hispanic infants (11.9 to 12.0 percent); the change among non-Hispanic black infants was not statistically significant (17.8 to 17.9 percent) (**Table 32**). Since 1990, preterm birth rates have risen by more than one-third for non-Hispanic white births (from 8.5 percent), and 9 percent for Hispanic births (11.0 percent). Preterm rates among non-Hispanic black infants appeared to have declined during the 1990s (from 18.9 percent in 1990 to 17.4 in 2000), but have been on the rise since. The risk of preterm birth in 2004 for non-Hispanic black newborns was nearly 50 percent higher than that for non-Hispanic white and Hispanic black infants. Preterm birth rates for American Indian or

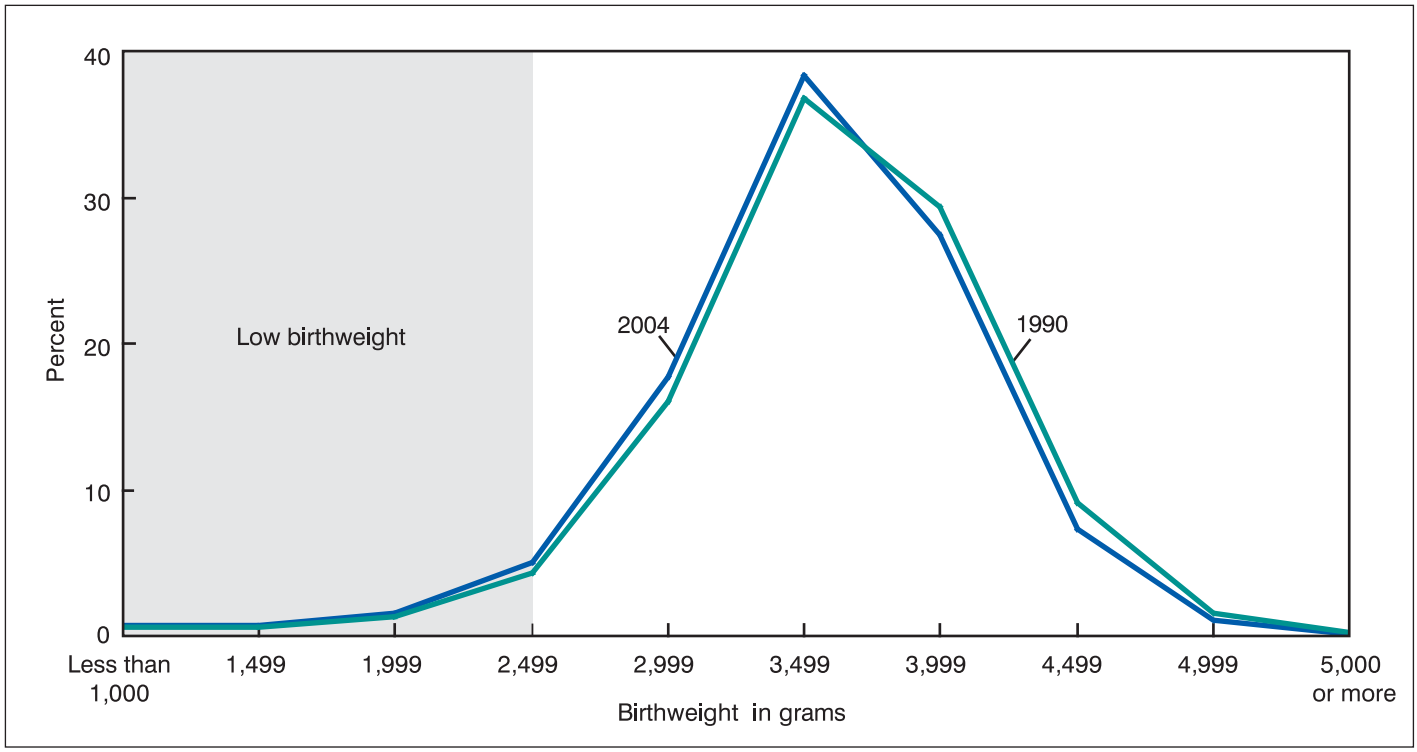


Figure 14. Percent distribution of births by birthweight: United States, 1990 and 2004

Table K. Percent distribution of gestational age of all births and for singleton births only: United States, 1990, 2003, and 2004

Gestational age	All births			Singleton births		
	2004	2003	1990	2004	2003	1990
Under 28 weeks	0.75	0.74	0.71	0.61	0.60	0.61
28–31 weeks	1.25	1.22	1.21	1.01	0.99	1.08
Total under 32 weeks	2.01	1.97	1.92	1.61	1.58	1.69
32–33 weeks	1.59	1.57	1.40	1.28	1.25	1.24
34–36 weeks	8.90	8.80	7.30	7.88	7.81	6.77
Total under 37 weeks	12.49	12.33	10.61	10.77	10.65	9.70
37–39 weeks	52.36	51.85	41.38	53.03	52.48	41.42
40 and higher weeks	35.15	35.82	48.00	36.20	36.87	48.88

Alaska Native (AIAN), Asian or Pacific Islander (API), and the Hispanic subgroups are shown in **Tables 24** and **25**.

Birthweight

The **low birthweight rate (LBW)** increased again, to 8.1 percent in 2004, from 7.9 percent in 2003, the highest level reported since 1969. The percentage of infants born at less than 2,500 grams or 5 lb 8 oz, has generally been on the rise over the last two decades; the 2004 rate is 16 percent higher than that reported for 1990 (7.0 percent), and 21 percent higher than the 1984 low (6.7 percent); (**see Figures 1, 14, and Tables 31, 32, and 34**). Increases for 2003–04 were observed for both very low (less than 1,500 grams, or less than 3 lb 4 oz), and moderately low birthweight (1,500 to 2,499 grams or 3 lb 5 oz to 5 lb 8 oz) infants. The percentage of infants born **very low birthweight (VLBW)** increased from 1.45 to 1.48, and is up from 1.27 since 1990. The percentage of infants born moderately low birthweight (MLBW) rose from 6.48 to 6.60 for 2003–04, and is up from 5.69 percent since 1990.

The weight of the newborn is an important predictor of future morbidity and mortality (90,105,106). For VLBW infants, the risk of dying in the first year of life is nearly 100 times that of normal weight infants; the risk for MLBW infants is more than five times higher than that of heavier newborns. Mortality risk is lowest for infants born at 3,500–4,500 grams (7 lb 12 oz to 9 lb 14 oz) (90).

The pronounced shift in recent years in the birthweight distribution toward smaller babies is demonstrated in **Figures 1 and 14**. Between 1990 and 2004, increases are observed for each 500 gram interval under 3,500 grams. In contrast, large declines are seen at 3,500 grams and over. Trends are similar when singleton births of 2,500 grams and higher are examined; however, increases for birthweight intervals less than 2,500 grams are substantially reduced (**see Table L** for trends in singleton birthweight). Of particular note is the large decline in the percentage of infants delivered at 4,000–4,499 grams (8 lb 14 oz–9 lb 14 oz), down 4 percent for 2003–04, and 20 percent since 1990. Infants delivered at 4,000–4,499 grams are more likely than infants delivered at all other birthweights, to survive to their first birthday (90). The percentage of all infants 4,000 grams or more dropped from 8.9 to 8.5 percent between 2003 and 2004. The proportion of higher birthweight infants has fallen from levels of over 11 percent since the 1980s. Increases in the multiple birth rate, obstetric interventions such as induction of labor and cesarean delivery, older maternal age at childbearing, and increased use of infertility therapies may have influenced the trends toward lower birthweights. See also sections on "Obstetric procedures," "Method of delivery," and "Period of gestation" (99,100,107–111).

LBW levels increased for 2003–04 among each of the largest racial and ethnic groups; non-Hispanic white (from 7.0 to 7.2 percent), non-Hispanic black (from 13.6 to 13.7 percent), and Hispanic (from 6.7 to 6.8 percent) (**Table 32**). Increases in VLBW rates were statistically significant for non-Hispanic white and Hispanic infants, but not for non-Hispanic black infants. **See Tables 23 and 24** for VLBW and LBW levels for population subgroups; AIAN, API, Mexican, Puerto Rican, Cuban, and Central and South American infants.

The rise in the rate of multiple births, which tend to be born much smaller than singletons (see section on "Multiple births") has strongly influenced the upward swing in the LBW rate; however, low birthweight among infants in single deliveries has also been on the increase. For 2004, **the LBW rate for singletons** increased to 6.3 percent, from 6.2 percent for 2003. Singleton LBW has risen 5 percent since only 2000 (6.0 percent). The VLBW rate among singletons was 1.12 for 2004, compared with 1.11 percent in 2003. In 2004, the **mean or average birthweight** for infants delivered in single deliveries was 3,316 grams (7 lb, 5 oz), down 1 percent since 1990 (**Table L**).

Singleton LBW rose between 2003 and 2004 among non-Hispanic white and Hispanic infants; the increase for non-Hispanic black infants was not statistically significant (**Table L**). Since 1990, LBW rates for singletons have risen 8 and 14 percent for Hispanic and non-Hispanic white infants, respectively, and declined 2 percent among non-Hispanic black newborns.

The **youngest and oldest mothers** are the most likely to deliver LBW infants. For 2004, the lowest LBW levels were reported for women aged 25–34 years; the highest for teenagers under 15 years and women aged 45–54 years (**Table 34**). However, much of the elevated LBW risk among older mothers is associated with their higher multiple birth rates. When only singleton births are examined for this age group for 2004, the LBW rate for the oldest mothers drops from 21 to 10 percent. (Data not shown.)

Low birthweight levels also differ widely by state or reporting area. For 2004, more than 10 percent of all infants in Alabama, Louisiana, Mississippi, South Carolina, and the District of Columbia were born LBW, compared with less than 6.5 percent of infants in Alaska, Maine, Oregon, Vermont, and Washington. Differences in demographic characteristics such as maternal age and race and ethnicity explain some of the overall differences in birth outcome among states (**Tables 35 and 36**).

Table L. Rate of very low birthweight and low birthweight, and mean birthweight among singletons by race and Hispanic origin of mother, United States: 1990, 1995, 2000, and 2004

	2004	2003	2000	1995	1990[1]
All races and origins[2]					
Percent very low birthweight	1.12	1.11	1.11	1.08	1.05
Percent low birthweight	6.31	6.20	6.00	6.05	5.90
Mean birthweight in grams (standard deviation)	3,316 (570)	3,325 (571)	3,348 (577)	3,353 (581)	3,365 (583)
Non-Hispanic white					
Percent very low birthweight	0.83	0.82	0.80	0.78	0.73
Percent low birthweight	5.22	5.11	4.88	4.87	4.56
Mean birthweight in grams (standard deviation)	3,375 (554)	3,384 (555)	3,410 (560)	3,416 (563)	3,433 (562)
Non-Hispanic black					
Percent very low birthweight	2.61	2.61	2.62	2.55	2.54
Percent low birthweight	11.70	11.58	11.28	11.66	11.92
Mean birthweight in grams (standard deviation)	3,115 (628)	3,122 (631)	3,141 (637)	3,132 (635)	3,128 (635)
Hispanic[3]					
Percent very low birthweight	0.98	0.94	0.94	0.93	0.87
Percent low birthweight	5.63	5.55	5.36	5.36	5.23
Mean birthweight in grams (standard deviation)	3,316 (548)	3,324 (548)	3,344 (552)	3,343 (553)	3,351 (552)

[1]Data for 1990 by race and Hispanic origin exclude data for New Hampshire and Oklahoma, which did not require reporting of Hispanic origin of mother.
[2]Includes races other than white and black and origin not stated.
[3]Includes all persons of Hispanic origin of any race; see "Technical Notes."

NOTES: Very low birthweight is less than 1,500 grams. Low birthweight is less than 2,500 grams. 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 Office of Management and Budget (OMB) standards. Fifteen states reported multiple-race data for 2004. The multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

Apgar score

To evaluate the general physical condition of the newborn, the Apgar score has been employed for over 50 years. Historically, the score has been a measure taken at 1 minute (no longer available from vital statistics), 5 minutes, and if desired, at additional 5-minute intervals after delivery (112). The Apgar score measures five easily identifiable characteristics of newborn infants. The total score is the sum of the scores of the five components. A score of 0 to 3 indicates an infant in need of resuscitation; a score of 4 to 6 is considered intermediate; a score of 7 or greater indicates that the neonate is in good to excellent physical condition.

The Apgar score can be a useful clinical indicator for reporting overall status of the newborn and response to resuscitation efforts, but it has limited use as a stand-alone measure to diagnose conditions such as asphyxia (113). The Apgar score at 5 minutes is a valid predictor of neonatal mortality, but less so for long-term outcome; also it correlates poorly with future neurological dysfunction (113).

In 2004, the **proportion of newborns with 5-minute Apgar scores** indicating excellent infant health status (9 or 10 points) declined to 88.8 percent (**Table M**). This decrease followed a very slow increase from 88.6 to 91.1 percent between 1978 and 2003. A small but significant increase in the proportion of 2004 births with low Apgar scores (below 7) to 1.5 percent is a departure from long-term stability in this measure. The proportion of births with low scores had declined over 30 percent from 1978 to 1993 (2.1 percent to 1.4); was unchanged at 1.4 percent through 2003. Low 5-minute Apgar scores are associated with lower birthweight and shorter gestational age (114,115).

Among racial and ethnic groups in 2004, non-Hispanic blacks had the highest percent (0.95 percent) of very low Apgar scores (0 to 3 points), which is more than twice the level of other groups (**Table M**). APIs had the lowest percent (0.33) of live births in this category.

Congenital anomalies

In this report, data are presented for the five congenital anomalies reported on both the revised and unrevised U.S. Standard Certificates of Live Birth; see "Technical Notes."

Congenital anomalies are the leading cause of infant death in the U.S. (90). They also cause metabolic disorders and disability (116). The national effort to prevent neural tube defects (NTDs), such as spina bifida and anencephalus, by encouraging increased intake of folic acid among women of childbearing age has been described elsewhere; increased folate use among women of childbearing age has been reported (117,118). It has been suggested that greater maternal weight may be a risk factor for NTDs (119), and that multivitamin supplementation may protect against defects other than NTDs (120).

The rate for the NTD **anencephalus** was 10.9 in 2004, compared with 11.4 per 100,000 births in 2003. The 2003 level was the highest rate reported since 1997. The anencephalus rate, which had declined in the early 1990s, was stable for 1994–97. Between 1998 and 2002, the rate was essentially unchanged, but generally lower than in previous years (117). The spina bifida/meningocele rate was 19.3 per 100,000 in 2004, compared with 18.7 in 2003 (**Table 25**). The spina bifida rate increased between 1992 and 1995 and declined for 1995–99 (117). The rate for this anomaly has not changed significantly in more recent years.

The congenital anomalies reported on birth certificates are rare events. Since a small change in the number of anomalies reported can result in a relatively large change in rates, caution should also be used in comparing yearly rates for a specific anomaly.

Among the most commonly reported specific anomalies, cleft lip/palate was reported at a rate of 77.7 per 100,000 births. The rate of Down's syndrome was 47.9.

Table M. Apgar score at 5 minutes, by race and Hispanic origin of mother: 48 states and the District of Columbia, 2004

5-minute Apgar score	All races and origins[1]	Non-Hispanic white	Non-Hispanic black	American Indian or Alaska Native total[2,3]	Asian or Pacific Islander total[3]	Hispanic[4]
0–3 Poor	0.5	0.4	1.0	0.4	0.3	0.4
4–6 Intermediate	1.1	1.0	1.5	1.1	0.7	0.8
7–8 Good	9.7	10.2	10.2	9.5	7.3	7.9
9–10 Excellent	88.8	88.4	87.3	89.1	91.6	90.9

[1]Includes origin not stated.

[2]Includes births to Aleuts and Eskimos.

[3]Data for persons of Hispanic origin are included in the data for each race group according to the mother's reported race; see "Technical Notes."

[4]Includes all persons of Hispanic origin of any race; see "Technical Notes."

NOTES: Excludes data for California and Texas, which did not report 5-minute Apgar score on the birth certificate. 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 Office of Management and Budget (OMB) standards. Fifteen states reported multiple-race data for 2004. The multiple-race data for these states were bridged to the single-race categories of the 1977 OMB standards for comparability with other states; see "Technical Notes."

Congenital anomalies are underreported on the birth certificate; however, birth certificate data may be a valuable resource for exploratory or confirmatory studies (121). Data from birth certificates have been used to support an association between maternal smoking and birth defects such as cleft lip/palate and clubfoot (121,122).

The most serious or apparent anomalies are more likely to be observed and documented prior to birth registration; early recognition and reporting of congenital anomalies are limited because many anomalies are not recognizable at birth (123).

Rates for certain types of anomalies differ widely with maternal age (**Table 25**). For example, in 2004 as in past years, infants of the youngest mothers have the highest rates for omphalocele/gastroschisis (a defect or abnormality of the anterior abdominal wall) (124); infants of mothers aged 35 years and over have the highest rates for Down's syndrome.

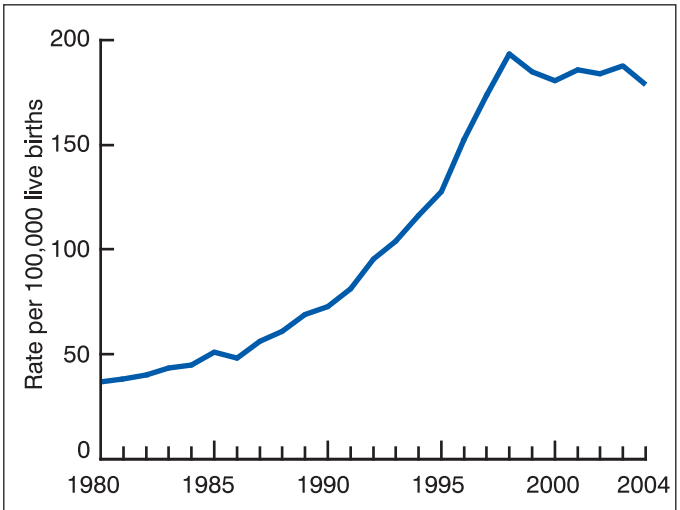
Multiple births

The twin birth rate rose 2 percent for 2004, to 32.2 twins per 1,000 total births, another record high. The twinning rate has climbed 42 percent since 1990 (from 22.6), and 70 percent since 1980 (18.9). The *number* of live births in twin deliveries rose to 132,219, nearly double the number reported for 1980 (from 68,339) (125); (**see Tables 37 and 38**).

In contrast to the continued upswing in twin births, the **rate of triplet and higher-order multiple births** (triplet/+ birth rate) declined 6 percent for 2004, to 176.9 per 100,000, from 187.4 in 2003. The triplet/+ birth rate (the number of triplets, quadruplets, quintuplets, and other higher-order multiples per 100,000 live births) soared by more than 400 percent between 1980 and 1998 (from 37.0 to 193.5 per 100,000 births) (125). Since 1999, however, this rate has been comparatively stable, trending slightly downward; the current year level is 9 percent lower than the 1998 peak; **see Figure 15**. In 2004, 7,275 triplets/+ were born, a drop of 5 percent from the previous year, and the lowest number reported since 1997. Similar trends in twinning and in triplet/+ birth rates have been observed over the last several decades in England and Wales (126).

Despite the recent small amelioration in triplet/+ birth rates, levels remain 4-fold higher than those observed prior to the introduction of fertility therapies in the early 1980s. Further, because twins make up the bulk of all multiple births (95 percent in 2004), the overall proportion of multiple births has continued to rise steadily, reaching an all-time high of 33.9 per 1,000 for 2004. The rising incidence of multiple births over the last two decades, especially that for higher-order multiples, has been associated with two related trends, the older age at childbearing (women in their thirties are more likely than younger women to conceive multiples spontaneously) and the increasing use of fertility therapies (28,127–130). These therapies include ovulation-inducing drugs, and assisted reproductive technologies (ART) in which eggs and sperm are handled in the laboratory (e.g., *in vitro* fertilization). ART is estimated to account for 44 percent of triplets and 16 percent of twins born in 2003 (131). (Note: these estimates do not take into account the impact of non-ART procedures.)

The recent interruption in the upsurge of triplet/+ births may be in part related to recommendations in the late 1990s (further refined in 2004) from the American Society of Reproductive Medicine intended to prevent higher-order multiple pregnancies by limiting the number of embryos transferred (132,133). A shift from the transfer of 3 embryos (a predictor of triplet/+ deliveries) to 2 embryos, appears to have occurred between the mid- to late 1990s and 2002 (the most recent



NOTE: Triplet/+ birth rate is the total number of live born infants in triplet and higher order multiple deliveries per 100,000 live births.

Figure 15. Triplet/+ birth rate: United States, 1980–2004

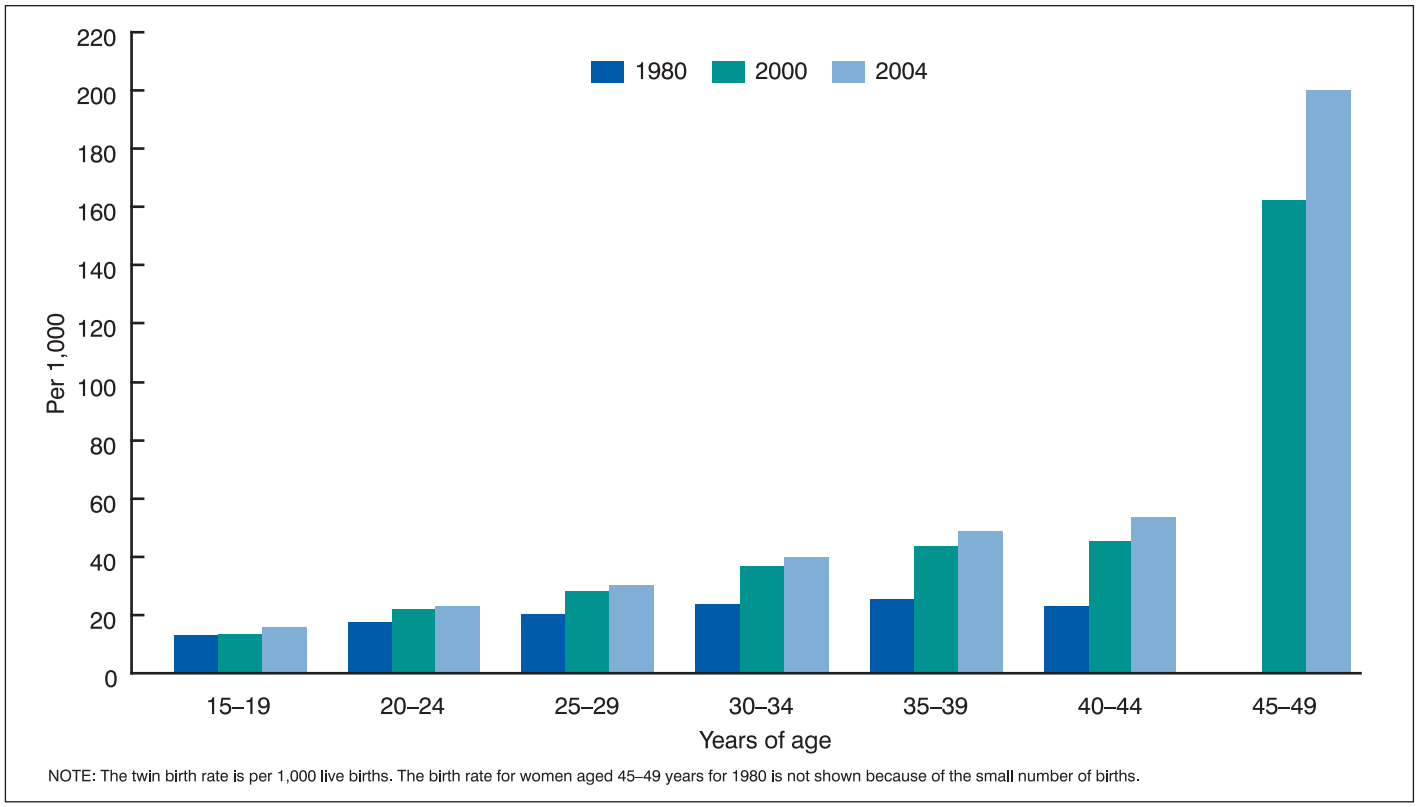
year for which data are available) (130,134). Other factors also may have influenced the recent change in triplet/+ birth rates (135,136).

Twinning rates increased between 2003 and 2004 among non-Hispanic white (36.3 in 2004), non-Hispanic black (35.6), and Hispanic women (21.5); the increase for Hispanic women was not statistically significant. Triplet/+ births declined among non-Hispanic white (243.4 per 100,000 for 2004), non-Hispanic black (99.7), and Hispanic mothers (76.4) (the decline in non-Hispanic black triplet/+ births was not significant). The fastest growth and the highest rates of twins and triplet/+ births in recent years have been observed among non-Hispanic white mothers; this group is also the most likely to receive infertility services (29). Since 1990, the twinning rate has risen 59 percent for non-Hispanic white women, compared with increases of 33 and 19 percent for non-Hispanic black and Hispanic mothers, respectively.

Multiple birth rates have risen for women of all age groups over the last several decades, but the largest growth has been among older mothers, especially those aged 35 years and over. For example, among women aged 20–24 years the twin birth rate increased 31 percent between 1980 and 2004, compared with an increase of 133 percent for women aged 40–44 years (125) **see Figure 16**.

On average, multiple births are born much earlier and smaller than singletons, and are more likely to die within the first year of life. In 2004, the average birthweight of twins was nearly 1,000 grams lower than that of singletons (2,333 grams, or 5 lb 2 oz, compared with 3,316 grams, or 7 lb 5 oz); the average triplet/+ weighed about one-half the average singleton (1,700 grams, or 3 lb 12 oz); **see Text Table N**. In 2003, the mortality rate for infants born in multiple deliveries was more than four times higher than that for singletons (90).

Twinning and triplet/+ birth rates range widely by the mother's state of residence (**Table 39**). The lowest twin birth rate reported for the combined 3-year period 2002–04 was 23.8 per 1,000 for New Mexico, compared with a high of 45.2 for Massachusetts. These states also reported among the lowest and highest triplet/+ rates for 2002–04 (69.1 per 100,000 for New Mexico and 308.0 for Massachusetts). Other states with substantially higher rates of triplet/+ birth rates were Nebraska (336.2) and New Jersey (331.4).



NOTE: The twin birth rate is per 1,000 live births. The birth rate for women aged 45–49 years for 1980 is not shown because of the small number of births.

Figure 16. Twin birth rate by age of mother: United States, 1980, 2000, and 2004

Table N. Gestational age and birthweight characteristics by plurality: United States, 2004

Gestational age	Twins	Triplets	Quadruplets	Quintuplets and higher order multiples[1]	Singletons
Number	132,219	6,750	439	86	3,972,558
Percent very preterm[2]	11.8	35.9	64.9	81.4	1.6
Percent preterm[3]	59.7	93.0	95.9	100.0	10.8
Mean gestational age in weeks (standard deviation)	35.2 (3.6)	32.1 (3.9)	29.7 (4.5)	28.4 (2.7)	38.7 (2.4)
Percent very low birthweight[4]	10.2	33.2	65.1	84.9	1.1
Percent low birthweight[5]	56.6	94.1	98.4	100.0	6.3
Mean birthweight in grams (standard deviation)	2,333 (634)	1,700 (559)	1,276 (552)	1,103 (383)	3,316 (570)

[1]Quintuplets, sextuplets, and higher order multiple births are not differentiated in the national data set.
[2]Very preterm is less than 32 completed weeks of gestation.
[3]Preterm is less than 37 completed weeks of gestation.
[4]Very low birthweight is less than 1,500 grams.
[5]Low birthweight is less than 2,500 grams.

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List of Detailed Tables