

## Characteristics of Births to Single- and Multiple-Race Women: California, Hawaii, Pennsylvania, Utah, and Washington, 2003

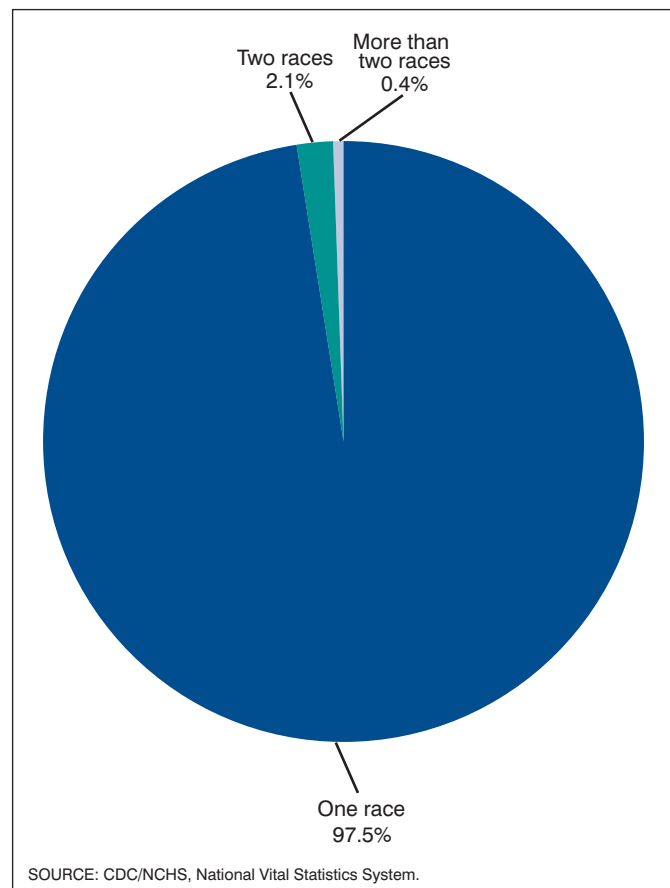
by Brady E. Hamilton, Ph.D., and Stephanie J. Ventura, M.A., Division of Vital Statistics

### Abstract

**Objectives**—In 2003, California, Hawaii, Pennsylvania, Ohio (for births occurring in December only), Utah, and Washington provided to the National Center for Health Statistics (NCHS) multiple as well as single racial entries that mothers and fathers had reported on birth certificates in accordance with the revised race and ethnicity standards issued by the Office of Management and Budget (OMB) in 1997. This report provides detailed data on women reporting single race (one race) and multiple race (two or more races) by selected demographic and health characteristics (e.g., fertility, age at first birth, Hispanic ethnicity, marital status, country of birth, preterm birth, and low birthweight) of the women and their infants. Data presented in this report are derived from birth certificates from the five states that collected, reported, and transmitted to NCHS multiple-race data as of January 1, 2003 (California, Hawaii, Pennsylvania, Utah, and Washington). Data on selected demographic and health characteristics were analyzed comparing single-race mothers to multiple-race mothers.

**Methods**—Descriptive tabulations of data reported on the birth certificates of the single- and multiple-race births that occurred in the reporting area in 2003 are presented.

**Results**—In 2003, 2.5 percent of births in California, Hawaii, Pennsylvania, Utah, and Washington were to women who reported two or more races, with levels varying from 1 (Utah) to 33 percent (Hawaii). Birth and fertility rates for single-race (one race) groups were generally lower than the rates for multiple-race groups (each race in combination with one or more other races), whereas age at first birth was generally higher for single-race women than for multiple-race women. The percentages of Hispanic births to single-race black, American Indian or Alaska Native (AIAN), Asian, and Native Hawaiian or Other Pacific Islander (NHOPi) women were lower than the percentage for women reporting those races in combination with one or more of the other races (multiple race). The percentage of births to unmarried women was higher among single-race black and AIAN women compared with



**Figure 1. Distribution of births to mothers reporting one, two, and more than two races: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

multiple-race black and AIAN women, whereas the proportions were considerably higher for multiple-race white, Asian, and NHOPi women

than for their single-race counterparts. The percentage of mothers born in the 50 states and the District of Columbia was consistently higher for multiple-race women than single-race women. In terms of infant health characteristics, infants of single-race white and Asian women had a lower preterm birth rate than infants of multiple-race white and Asian women, whereas infants of single-race black and AIAN women had higher preterm rates than infants of multiple-race black and AIAN women. The low birthweight rate was also significantly lower for single-race white, Asian, and NHOPi women than their multiple-race counterparts. In comparison, the rate for single-race black women was higher than the rate for multiple-race black women.

**Keywords:** births • birth certificate • multiple race • demographic and health characteristics

## Introduction

In 1997, OMB issued the “Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity,” which superseded the “1977 Statistical Policy Directive 15, Race and Ethnic Standards for Federal Statistics and Administrative Reporting” (1,2). These documents specify guidelines for the collection, tabulation, and presentation of race and ethnicity data within the federal statistical system. The 1997 revised standards incorporated two major changes: first, the revised standards increased the minimum set of race categories to be used by federal agencies to five (white, black or African American, American Indian or Alaska Native (AIAN), Asian, and Native Hawaiians or Other Pacific Islanders (NHOPi)); and, second and more pertinent to this report, the revised standards also require federal data collection programs to allow respondents to select *one or more race categories*. These standards were implemented in the 2003 Revision of the U.S. Standard Certificate of Live Birth, which is described in detail elsewhere (3,4). This revision is currently being implemented by the states, with full compliance not expected for the next few years (5,6).

Beginning with the 2003 data year, NCHS received multiple-race data for mothers and fathers on birth records from California, Hawaii, Ohio (starting on December 1, 2003), Pennsylvania, Utah, and Washington in accordance with the revised (1997) OMB standard. The five states that reported more than one race for all of 2003 accounted for one in five births in the United States in 2003 and reported 2.5 percent of the mothers as reporting more than one race, with levels varying from 1 percent (Utah) to 33 percent (Hawaii) (5,6).

This report provides an overview of the birth certificate data from California, Hawaii, Pennsylvania, Utah, and Washington State, which reported multiple-race data as of January 1, 2003. The objective of this research is to compare the characteristics of births to single-race mothers with the characteristics of births to multiple-race mothers. Data on selected demographic and health characteristics (e.g., births, birth and fertility rates, sex ratio at birth, age at first birth, Hispanic ethnicity, marital status, place of birth, preterm birth, and low birthweight) were analyzed comparing single-race mothers with multiple-race mothers.

## Methods

Data presented in this report are from birth certificates for 2003 for residents of California, Hawaii, Pennsylvania, Utah, and

Washington based on births that occurred in these states. Data for Ohio are excluded from this analysis because multiple-race data were not collected and reported until December 1, 2003; see “[Technical Notes](#).” The data are provided to NCHS through the Vital Statistics Cooperative Program.

The race data are based on coded and edited data from one or more racial entries on checkbox or open-ended literal responses; see “[Technical Notes](#)” for details. States differ in the number of racial entries typically reported by respondents and in the number of racial entries reported by states to NCHS (e.g., California reports to NCHS up to three racial entries per respondent, whereas Hawaii reports all racial entries provided by respondents). For purposes of this analysis, race of mother was categorized in several ways. Data are presented for 10 racial categories: 5 single-race groups (i.e., one race—white alone, black alone, AIAN alone, Asian alone, and NHOPi alone); and, 5 multiple-race groups (i.e., each of the 5 races in combination with one or more of the other races). An example of a multiple-race group in this categorization is *Asian reported in combination with one or more of the other races*. In addition, data (number of births and percent distribution) for mothers and fathers are reported for all 31 possible combinations of the minimum 5 race categories (5 single-race groups and 26 mutually exclusive multiple-race groups). Selected demographic and health characteristics of the mothers and their infants are also reported for all 10 combinations of 2 races (e.g., Asian and white or NHOPi and white). Information on the group of women reporting more than one race is also reported.

Text references to births to a single-race group are used interchangeably with references to that group alone for ease of writing. For example, *single-race Asians* are also referred to as *Asians alone*. Similarly, text references to *multiple-race Asians* are used interchangeably with *Asians in combination with one or more of the other races*. Text references to *two races in combination* hyphenate the names of the race groups in combination, again for ease of writing. For example, births to mothers who are Asian and white will be referred to as Asian-white. In this report, the two-race groups are collectively referred to as biracial to differentiate these groups from the broader categories of one race in combination with one or more other races, of which the two-race groups are a subset.

As noted, mothers who report more than one race are included in more than one group of races in combination with one or more other races. These multiple-race groups should not be compared with each other nor should these groups be compared with the biracial groups. However, the single-race groups may be compared with the one race in combination with one or more other races groups or biracial groups.

Race and Hispanic origin are reported independently on the birth certificate. In the tabulations of birth data by race, data for persons of Hispanic origin are included in the data for each group, whether single race or multiple race, according to the mother’s reported race(s). Although substantial differences exist in demographic and infant health characteristics between Hispanic and non-Hispanic women, Hispanic origin is treated in this report as one of the demographic characteristics on which single-race mothers and multiple-race mothers are compared. Data were not further classified by Hispanic origin (i.e., Mexican, Puerto Rican, Cuban, Central and South American, or other and unknown Hispanic) for this report.

This report includes 2003 data on selected items which were 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). Only comparable data items included on both the 1989 and the 2003 birth certificate revision are shown in this report (see “[Technical Notes](#)”) and revised data are combined with unrevised data. Rates and other measures by race shown in this report are not comparable with those previously published in “Births: Final Data for 2003” (5). To produce national rates and other statistics for the latter report, it was necessary to “bridge” the responses of women who reported more than one race to a single-race category. This is necessary because the majority of states do not currently report multiple race on their birth certificates. Details of the “bridging” procedures are described elsewhere (5). Additional information on sources and methods is presented in the “[Technical Notes](#).”

## Results

### Demographic characteristics of mother

#### Births and birth and fertility rates

In 2003, the number of mothers reporting more than one race giving birth in the five-state reporting area (California, Hawaii, Pennsylvania, Utah, and Washington) was 20,555, or 2.5 percent of births (see [Table 1](#) and [Figure 1](#)). The numbers and percentages differed considerably by state, with the percentage of multiple-race mothers varying from 1 percent for Utah to 33 percent for Hawaii. This variation is striking for the two-, three-, four-, and five-race combinations by state. For example, white-Asian-Native Hawaiian or Other Pacific Islander (NHOPI) mothers accounted for 11.8 percent of births in Hawaii, reflecting that state’s unique ethnic heritage, whereas the percentage of births to mothers in this multiple-race group in the other states is negligible. This variation also reflects, in large part, differences in the demographic characteristics of the states. Births to California residents account for the overwhelming share of births in the five-state reporting area, 65 percent in 2003 ([Table 2](#)). Thus much of the difference in fertility patterns in the reporting area described in this report reflects patterns in California. In addition to the state-to-state variations in levels of multiple-race births, the proportions of births to single- and multiple-race women also differ considerably across the reporting area according to the race reported by mother. Among mothers reporting white, black, or Asian either alone or in combination with one or more other races, the vast majority were single race: 97 percent of white women and 91 percent of black women reported themselves as single-race white or single-race black, and 89 percent of Asian women were single-race Asian ([Figure 2](#)). In contrast, American Indian or Alaska Native (AIAN) and NHOPI mothers were about equally likely to be single race or to report one or more other races. Among the 17,029 births to biracial women, three groups accounted for nearly three-quarters of births: Asian-white (30 percent), AIAN-white (22 percent), and black-white (20 percent) (tabular data not shown). The percentage of births to women reporting each of the five races in combination with one or more of the other races also differed according to the races reported by the mother ([Figure 3](#)).

Fertility patterns also differed for mothers reporting single race compared with mothers reporting more than one race. The crude birth rate for single-race women was highest for NHOPI, at 17.5 live births

per 1,000 people, and lowest for AIAN (8.5) ([Table 2](#)). The rates for the single-race white, AIAN, and NHOPI women were significantly lower than the rates for women reporting these races in combination with any other races. However, the rate for single-race Asian women was higher than the rate for multiple-race Asian women, whereas the rates for single-race and multiple-race black women were not significantly different.

The general fertility rate, which relates births to the number of women in the childbearing ages, was highest for single-race NHOPI women (72.3 per 1,000 women aged 15–44 years) and lowest for single-race AIAN women (35.2 per 1,000). Differences in the general fertility rate between the single-race groups and groups reporting more than one race were generally similar to those for the crude birth rate ([Figure 4](#)).

The total fertility rates (TFRs) of single-race black, AIAN, Asian, and NHOPI women were also significantly lower than the rates for multiple-race black, AIAN, Asian, and NHOPI women, with particularly large differences for AIAN and NHOPI rates ([Table 2](#) and [Figure 5](#)). However, the reverse was true for white women: The TFR for single-race white women was significantly higher than the rate for white women reporting another race. The TFR summarizes the potential impact of current fertility patterns on completed family size by estimating the average number of births that a hypothetical cohort of 1,000 women would have over their reproductive lifetime. The TFR is age adjusted and can be readily compared among populations.

To sum up, fertility patterns for those women reporting white, black, or Asian alone tended to be relatively similar to those women reporting each of these races in combination with one or more other races, whereas patterns among AIAN and NHOPI differed considerably between single-race women and women reporting those races in combination. The impact of the differences for AIAN and NHOPI groups is illustrated in [Figures 4](#) and [5](#). Rates for single-race AIAN women were substantially lower than rates for women reporting AIAN in combination with one or more of the other races. The rates for multiple-race AIAN women shown in this report for 2003 are more consistent with those previously published for “bridged-race” AIAN women than are the rates for single-race AIAN women. For example, the TFR for AIAN “bridged” women in 2003 for the United States as a whole was 1,731.5; and the rate for the five-state reporting area for multiple-race AIAN women was 1,801.5, whereas the rate for single-race AIAN women in the five states was 1,048.5.

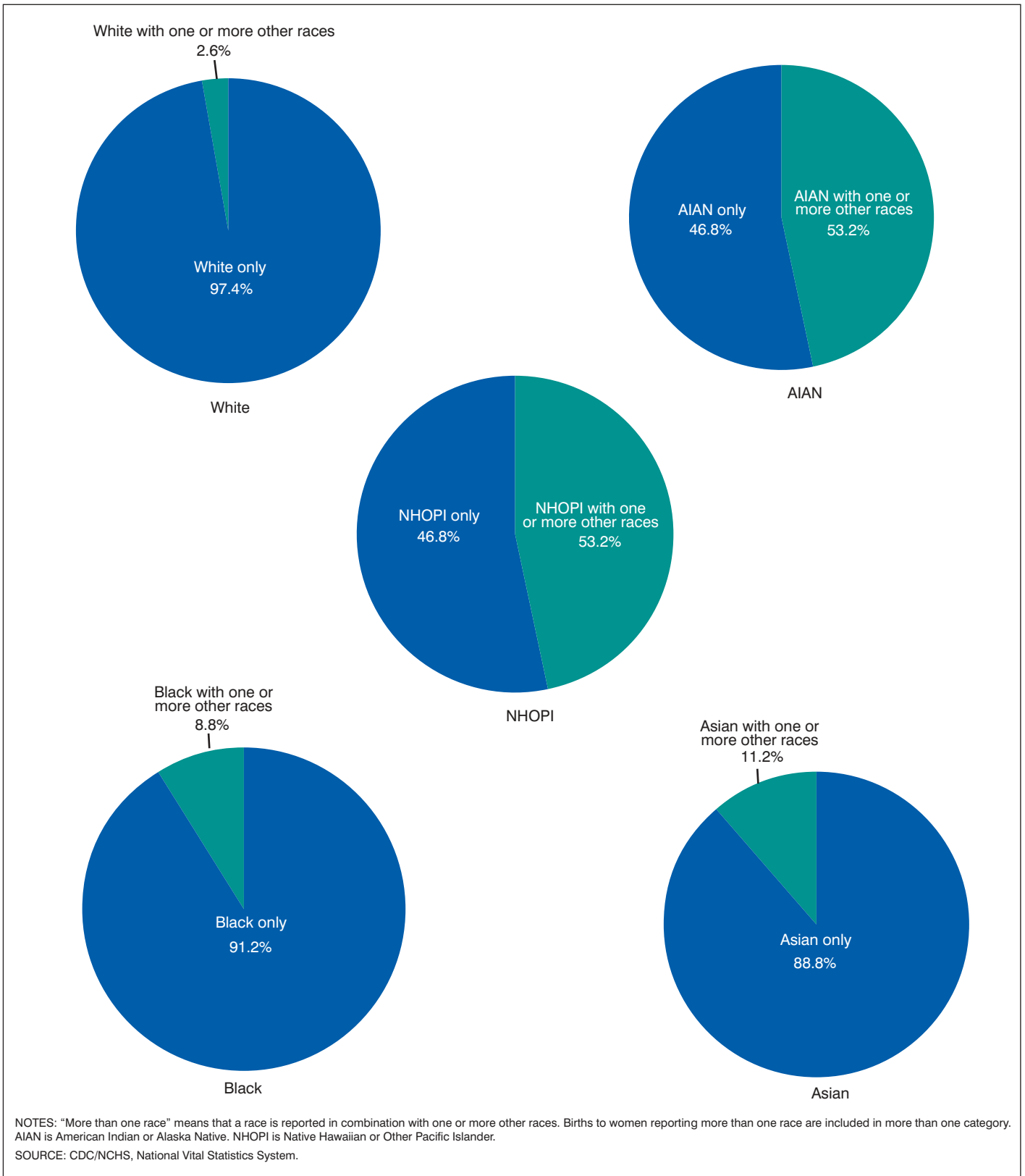
Birth and fertility rates for the biracial groups, that is, women reporting two races, cannot be computed because the necessary populations for the states reporting *one or more races* on the birth certificate are not available.

#### Sex ratio

Comparisons of sex ratio at birth among the race groupings, single race (one race), more than one race, and biracial (two races), show that although differences appear to exist, these were not statistically significant, except for births to women reporting single-race white and those women reporting multiple-race white.

#### Age of mother

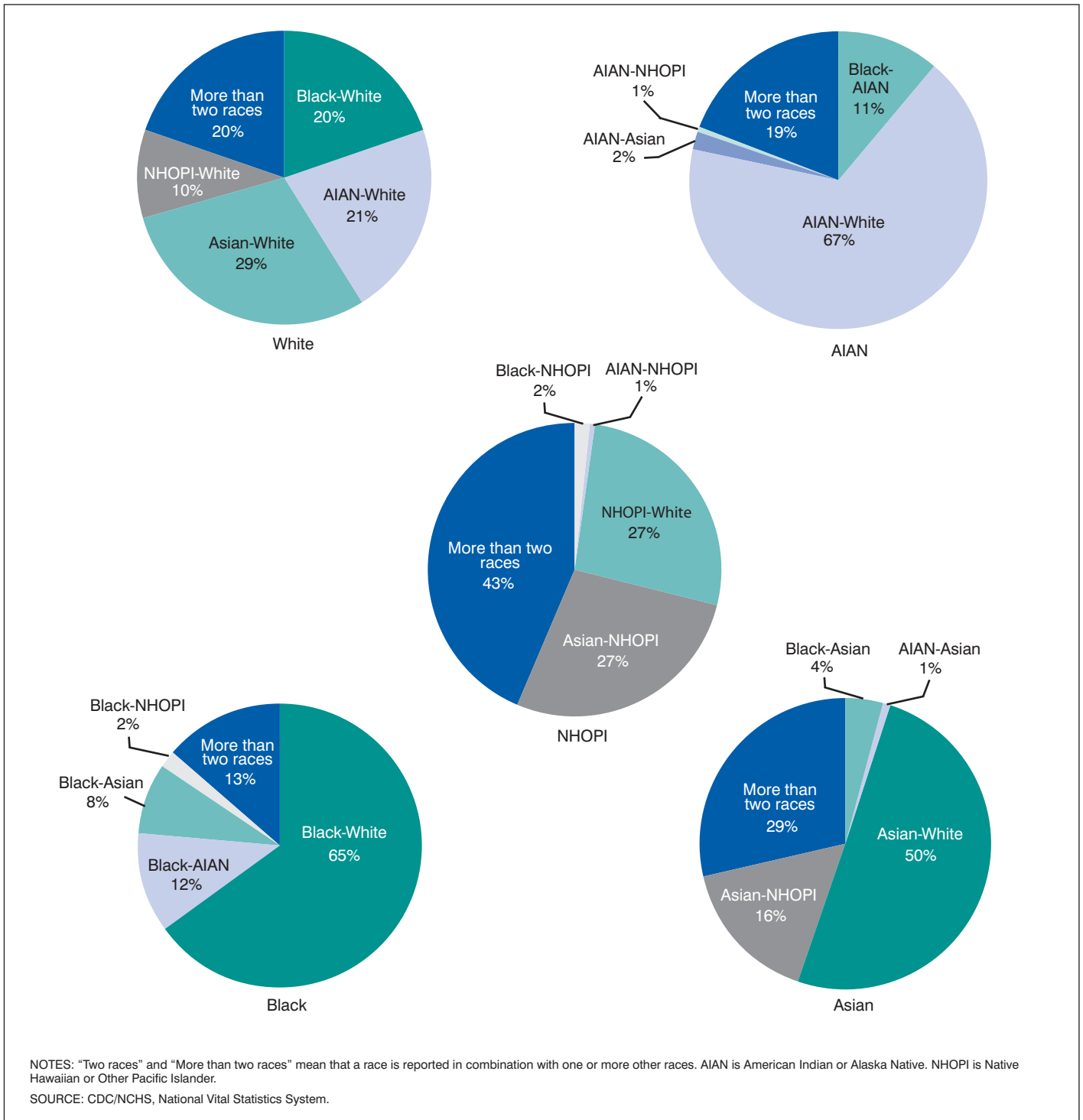
In 2003, the percentage of births to mothers under age 20 years was highest for single-race AIAN mothers (16.4) and lowest for



**Figure 2. Percentage of births to mothers reporting one race or more than one race, by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

single-race Asian mothers (3.2) (Table 2). There are no particular patterns in the levels of teenage births among multiple-race women in general, except that the proportions for black-white and black-AIAN women tended to be higher than their single-race counterparts.

A useful measure in interpreting fertility patterns by age of mother 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

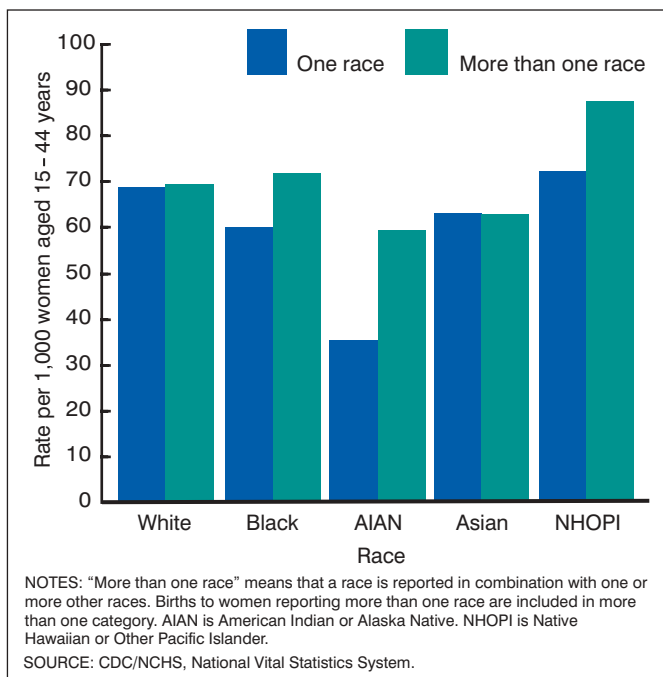


**Figure 3. Percentage of births to mothers reporting two races or more than two races, by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

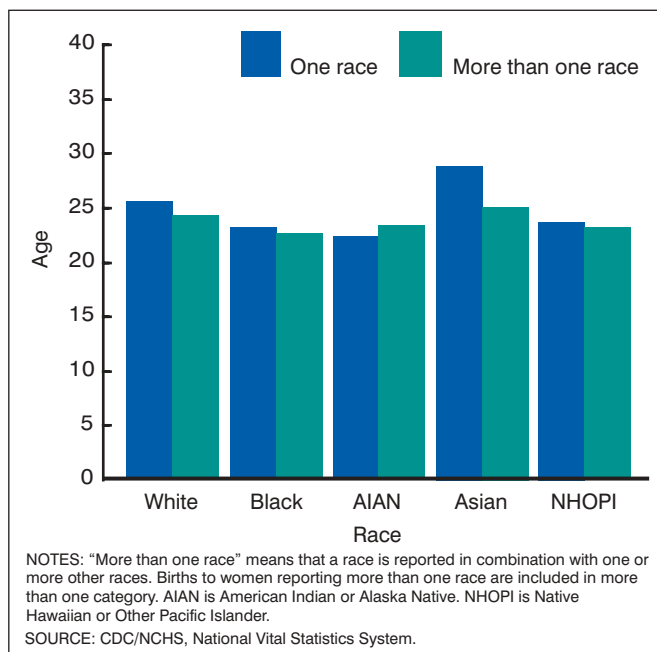
mothers in 2003 was highest for single-race Asian women (28.9) and lowest for single-race AIAN women (22.3) in the five-state reporting area (Table 2). The mean age at first birth was generally significantly higher for single-race mothers than for mothers reporting more than one race, with one exception. The mean age for single-race AIAN women was significantly lower than for women reporting multiple-race AIAN (23.3) (Figure 6). Among the biracial groups, the mean age at first birth was highest for white-Asian mothers (26.5) and lowest for black-NHOPI mothers (20.1).

### Hispanic origin of mother

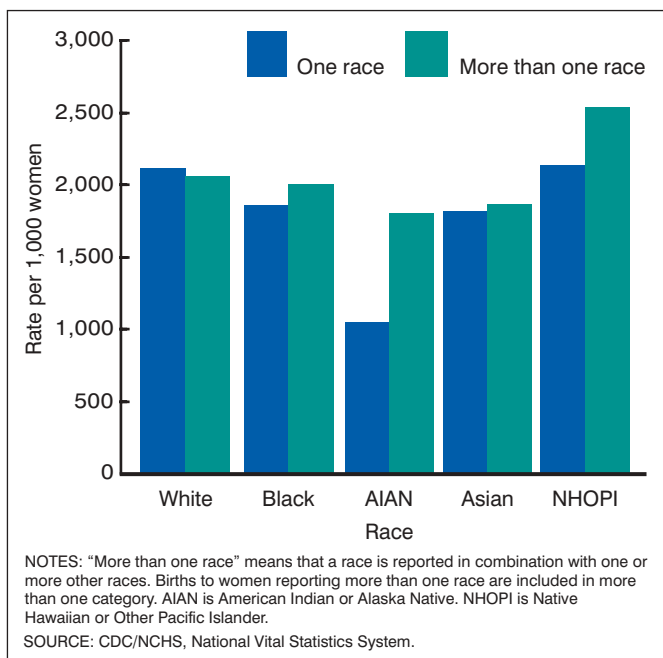
In 2003, among the single-race groups, white mothers had the highest proportion of births (44.6 percent) to Hispanic women, whereas Asian mothers had the lowest (2.7). The high proportion of Hispanic among white women largely reflects the impact of California births on the five-state reporting area. The percentage of Hispanic births was significantly higher for single-race white women than multiple-race white women (21.8). In contrast, the percentages



**Figure 4. General fertility rates for women reporting one race or more than one race, by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**



**Figure 6. Mean age at first birth for women reporting one race or more than one race, by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**



**Figure 5. Total fertility rates for women reporting one race or more than one race, by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

of Hispanic births for single-race black, AIAN, Asian, and NHOPI women were significantly lower than the percentage for multiple-race black, AIAN, Asian, and NHOPI women (Figure 7). Among the largest two-race combinations, AIAN-white mothers had the highest proportion of Hispanic births (27.3) and Asian-white women had the lowest proportion (16.0) (Table 2).

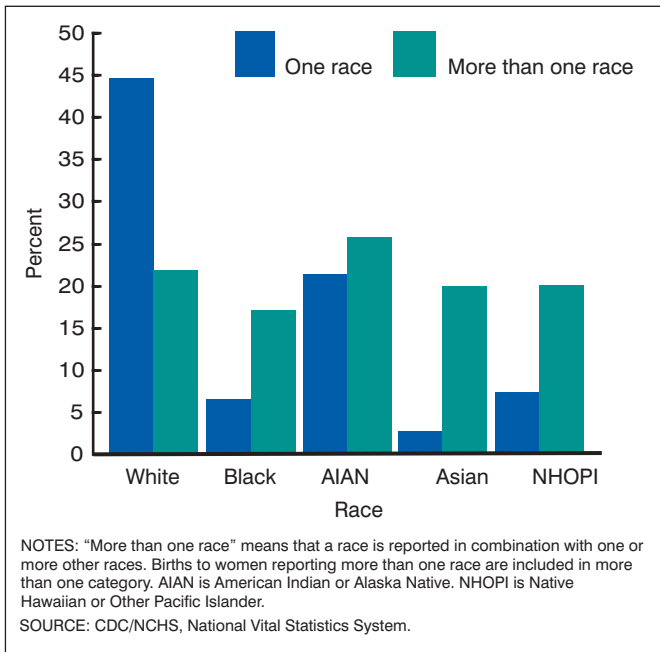
### Births to unmarried women

Nonmarital birth patterns differ considerably by race of mother. The proportions of births to unmarried, single-race women were highest for black, AIAN, and NHOPI women (ranging from 39 to 66 percent) and much lower for single-race white (31 percent) and Asian women (14 percent) (Table 2). Looking at differences between single-race women and women reporting more than one race, there is no consistent pattern (Figure 8). Differences were relatively small but significant for black and AIAN women, with a tendency for higher proportions of nonmarital births among single-race compared with multiple-race black and AIAN women. In contrast, the proportions of births to unmarried women were considerably (and significantly) higher for multiple-race white, Asian, and NHOPI women than for women reporting white, Asian, and NHOPI alone. Differences between some of the single-race and biracial groups are not statistically significant as are the differences among most of the biracial groups.

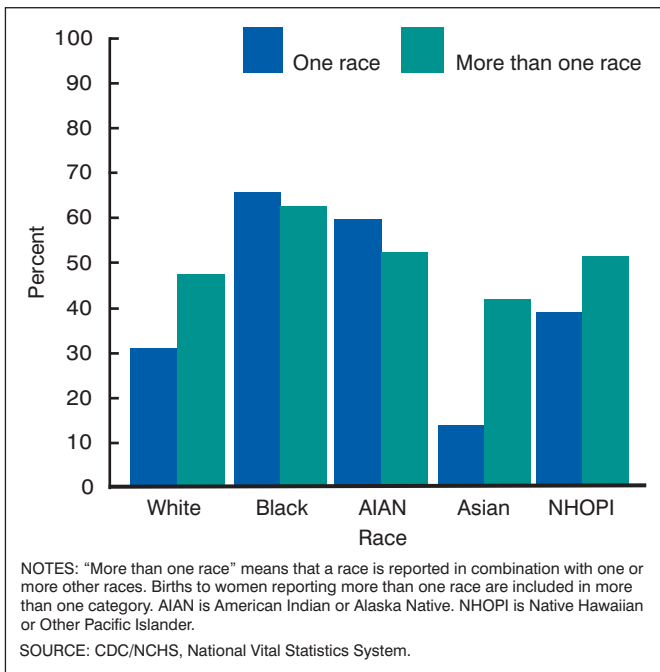
### Place of birth

In 2003, 92.5 percent of single-race AIAN mothers were native born (i.e., born in the 50 states and the District of Columbia), the highest percentage among the single-race groups in the reporting area, in contrast 16.8 percent of single-race Asian mothers were native born, the lowest percentage among the single-race groups. The proportion of mothers native born was consistently significantly higher for women reporting more than one race than single-race women, that is, mothers reporting more than one race were more likely to have been born in the United States (Table 2).

In 2003, the proportion of mothers born in the United States was highest among the biracial groups for black-AIAN mothers (98.5) and lowest for black-Asian mothers (68.5) in the five-state reporting area

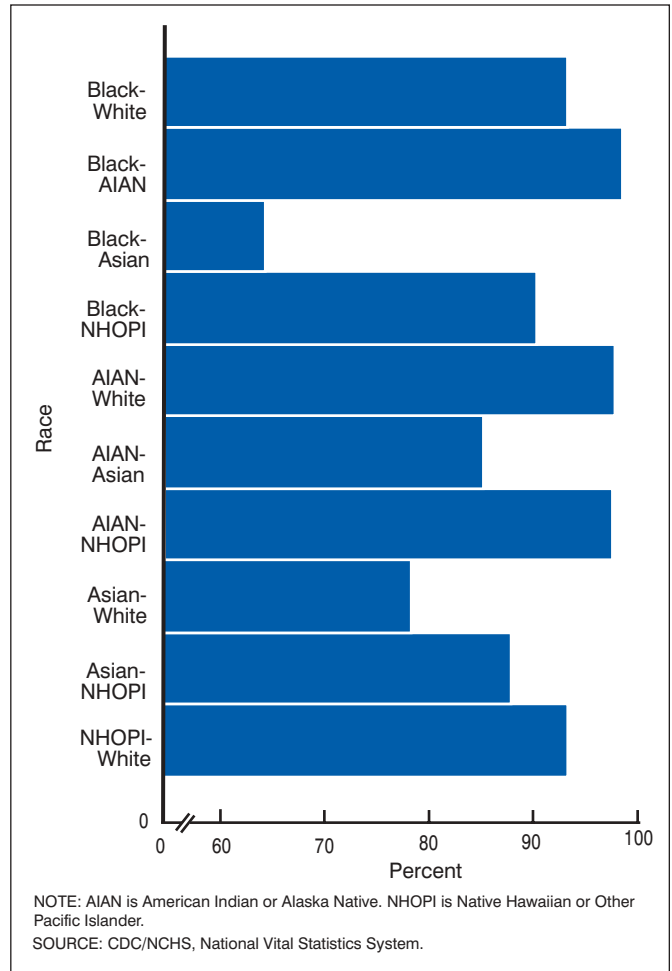


**Figure 7. Percentage of births to Hispanic women for women reporting one race or more than one race, by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**



**Figure 8. Percentage of births to unmarried women for women reporting one race or more than one race, by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

(Figure 9). Comparing the single-race groups with the biracial groups, the proportion of mothers born in the United States was generally significantly higher for most biracial groups than either of the two corresponding single-race groups reported.



**Figure 9. Percentage of mothers born in the 50 states, and the District of Columbia to women reporting two races: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

## Multiple Race of Father

### Births

The number of fathers reporting more than one race for the reporting area was 17,549 in 2003, or 2.3 percent of births, somewhat less than the percentage of mothers reporting more than one race (2.5 percent) (see Table 3). It must be noted, however, that this lower number reflects not only possible actual differences in the race patterns of the fathers but also missing information on fathers, which varies by age of mother, marital status of mother, and state (5,6). This issue notwithstanding, the percentage distributions differed considerably by state, as seen for mothers reporting more than one race, with the percentage of fathers reporting more than one race varying from 1 percent for Utah to 32 percent for Hawaii. As mentioned before, this variation reflects, in large part, differences in the demographic characteristics of the states.

## Infant Health Characteristics

### Period of gestation

Rates of preterm birth (births at less than 37 completed weeks of gestation) differed considerably for single-race women compared with multiple-race women in the five-state reporting area. In 2003, among the single-race groups, infants of black mothers had the highest (15.8) and infants of Asian mothers had the lowest (9.9) preterm rates. Infants of single-race white and Asian women had lower rates of preterm birth than infants of multiple-race white and Asian women (see [Table 2](#) and [Figure 10](#)). However, infants of single-race black and AIAN women had higher preterm rates (15.8 and 13.1, respectively) than infants of multiple-race black and AIAN women (11.9 and 11.6, respectively). The difference for NHOPI women was not significant.

Among the biracial groups, infants of Asian-NHOPI mothers had the highest preterm rate (15.6), whereas infants of NHOPI-white women had the lowest rate (10.6). Differences among most of the biracial groups are not statistically significant. Comparisons between the single-race and biracial groups revealed no consistent patterns with few of the differences between the single-race and biracial groups being statistically significant.

### Birthweight

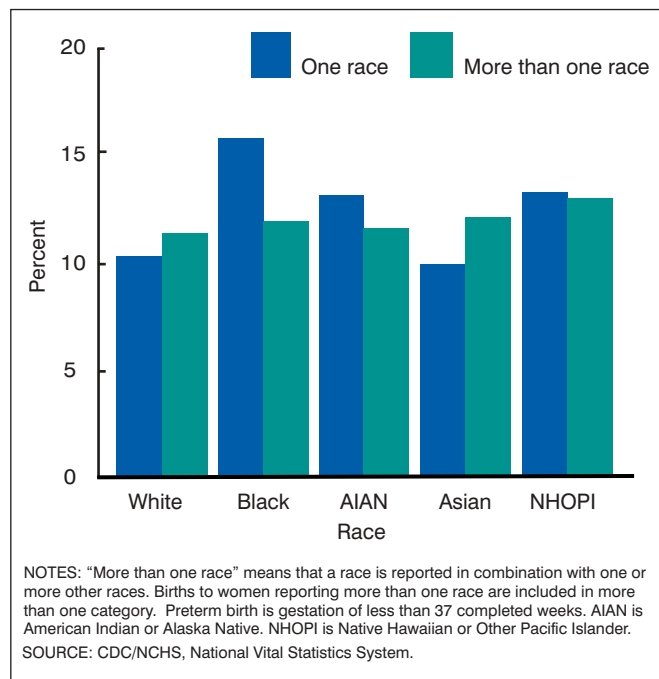
In 2003, among the single-race groups, low birthweight rates (births of less than 2,500 grams or 5 pounds 8 ounces) were highest for infants of black mothers (12.8) and lowest for infants of white mothers (6.2) ([Table 2](#) and [Figure 11](#)). Infants of single-race white, Asian, and NHOPI women had significantly lower rates than infants of multiple-race white, Asian, and NHOPI women. Infants of single-race black women had a rate (12.8) significantly higher than infants of multiple-race black women (9.8). The difference for AIAN women was not significant. Differences among many of the two-race groups were not statistically significant.

## Conclusion

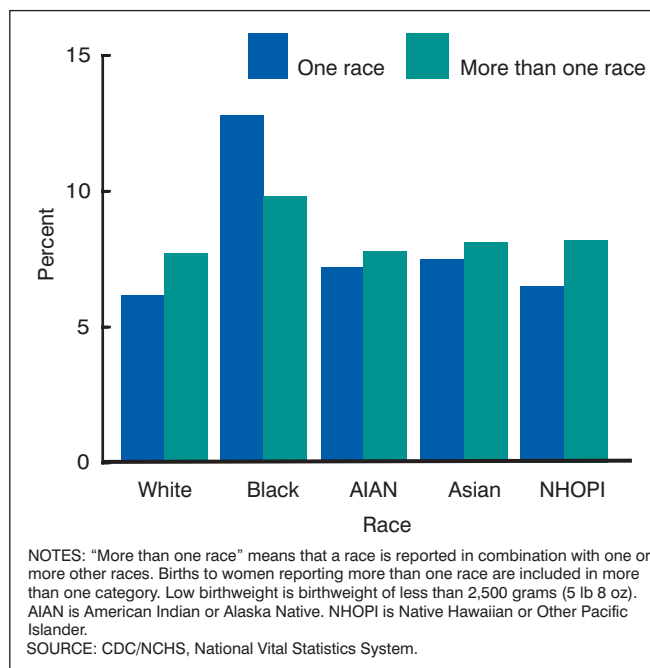
As shown in this report, differences exist between single-race and multiple-race mothers in terms of fertility, age at first birth, Hispanic ethnicity, marital status, place of birth of mother, preterm delivery, and infant birthweight. These data add to the importance of allowing mothers to report more than one race and analyzing demographic and health characteristics by reported race categories.

More detailed analysis is required, however, to better understand the confounding and contextual factors associated with the preliminary findings shown in this report. For example, some of the differences may reflect the generally younger age of multiple-race women and higher proportion of Hispanic births to women in particular single-race groups.

The findings presented here are based on data for only five states (California, Hawaii, Pennsylvania, Utah, and Washington) that reported multiple-race data on their birth certificates in 2003. These states differ markedly in terms of socioeconomic and demographic characteristics from each other and from the Nation as a whole. This study will be replicated as more states begin reporting multiple-race data, to see if the differences shown here persist or if other patterns emerge. In particular, it will be important to monitor the variations in fertility and



**Figure 10. Percentage of preterm births to women reporting one race or more than one race by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**



**Figure 11. Percentage of low birthweight births to women reporting one race or more than one race by race reported: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

maternal and infant health for the AIAN and NHOPI populations. Women reporting these races were approximately equally likely to report these races alone or to report other races as well. However, the characteristics of these births differ substantially according to whether



the mother was single race or multiple race. Thus it is important when examining characteristics of births to analyze single- and multiple-race births separately whenever possible.

## References

- Office of Management and Budget. Revisions to the standards for the classification of federal data on race and ethnicity. Federal Register 62FR58781–58790. October 30, 1997. Available from: <http://www.whitehouse.gov/omb/fedreg/ombdir15.html>.
- Office of Management and Budget. Race and ethnic standards for federal statistics and administrative reporting. Statistical Policy Directive 15. May 12, 1977.
- National Center for Health Statistics. 2003 revision of the U.S. Standard Certificate of Live Birth. 2003. Available from: [http://www.cdc.gov/nchs/vital\\_certs\\_rev.htm](http://www.cdc.gov/nchs/vital_certs_rev.htm).
- National Center for Health Statistics. Report of the Panel to Evaluate the U.S. Standard Certificates and Reports. National Center for Health Statistics. 2000. Available from: [http://www.cdc.gov/nchs/data/dvs/panelreport\\_acc.pdf](http://www.cdc.gov/nchs/data/dvs/panelreport_acc.pdf).
- Martin JA, Hamilton BE, Sutton PD, et al. Births: Final data for 2003. National vital statistics reports; vol 54 no 2. Hyattsville, MD: National Center for Health Statistics. 2005. Available from: [http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54\\_02.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr54/nvsr54_02.pdf).
- National Center for Health Statistics. Technical Appendix. Vital statistics of the United States, 2003, vol I Natality. U.S. Department of Health and Human Services. Centers for Disease Control and Prevention. National Center for Health Statistics. Hyattsville, MD. Available from: <http://www.cdc.gov/nchs/births.htm>.
- Ingram DD, Parker JD, Schenker N, et al. United States Census 2000 with bridged race categories. National Center for Health Statistics. Vital Health Stat 2(135). 2003. Available from: [http://www.cdc.gov/nchs/data/series/sr\\_02/sr02\\_135.pdf](http://www.cdc.gov/nchs/data/series/sr_02/sr02_135.pdf).
- Johnson D. Coding and editing multiple race. Presented at the 2004 Joint Meeting of NAPHIS and VSCP. Portland, OR. June 6–10, 2004. Available from: <http://www.naphis.org/events/index.asp?bid=699>.
- Weed JA. Coding and editing multiple race. Presented at the 2004 Joint Meeting of NAPHIS and VSCP. Portland, OR. June 6–10, 2004. Available from: [http://www.cdc.gov/nchs/data/dvs/Multiple\\_race\\_docu\\_5-10-04.pdf](http://www.cdc.gov/nchs/data/dvs/Multiple_race_docu_5-10-04.pdf).
- National Center for Health Statistics. Natality public-use tape and CD-ROM. Hyattsville, MD: National Center for Health Statistics. Annual products.
- Ventura SJ, Bachrach CA. Nonmarital childbearing in the United States, 1940–99. National vital statistics reports; vol 48 no 16. Hyattsville, MD: National Center for Health Statistics. 2000. Available from: [http://www.cdc.gov/nchs/data/nvsr/nvsr48/nvsr48\\_16.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr48/nvsr48_16.pdf).
- Ventura SJ. Births to unmarried mothers: United States, 1980–92. National Center for Health Statistics. Vital Health Stat 21(53). 1995.
- National Center for Health Statistics. Computer edits for natality data, effective 1993. Instruction manual, part 12. Hyattsville, MD: National Center for Health Statistics. 1995.
- Alexander GR, Allen MC. Conceptualization, measurement, and use of gestational age. I. Clinical and Public Health Practice. J Perinatal 16(1):53–9. 1996.
- Martin JA, Hamilton BE, Sutton PD, et al. Births: Final data for 2002. National vital statistics reports; vol 52 no 10. Hyattsville, MD: National Center for Health Statistics. 2003. Available from: [http://www.cdc.gov/nchs/data/nvsr/nvsr52/nvsr52\\_10.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr52/nvsr52_10.pdf).
- U.S. Census Bureau. State population estimates by age, sex, race, and Hispanic origin for 5 race groups (5 race alone or in combination groups). SC-EST2003-race5. Released September 30, 2004. Available from: [http://www.census.gov/popest/archives/2000s/vintage\\_2003/2003s.html](http://www.census.gov/popest/archives/2000s/vintage_2003/2003s.html).
- U.S. Census Bureau. State population estimates by age, sex, race, and Hispanic origin for 6 race groups (5 race alone groups and one group with two or more race groups). SC-EST2003-race6. Released September 30, 2004. Available from: [http://www.census.gov/popest/archives/2000s/vintage\\_2003/2003s.html](http://www.census.gov/popest/archives/2000s/vintage_2003/2003s.html).
- Bailer JC, Ederer F. Significance factors for the ratio of a Poisson variable to its expectations. Biometrics. 20:639–43. 1964.
- Schenker N, Gentleman JF. On judging the significance of differences by examining the overlap between confidence intervals. Amer Stat 55:182–6. 2001.
- Mathews TJ, Hamilton BE. Trend analysis of sex ratio at birth in the United States. National vital statistics reports; vol 53 no 20. Hyattsville, MD: National Center for Health Statistics. 2005. Available from: [http://www.cdc.gov/nchs/data/nvsr/nvsr53/nvsr53\\_20.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr53/nvsr53_20.pdf).
- Mathews TJ, Hamilton BE. Mean age of mother, 1970–2000. National vital statistics reports; vol 51 no 1. Hyattsville, MD: National Center for Health Statistics. 2002. Available from: [http://www.cdc.gov/nchs/data/nvsr/nvsr51/nvsr51\\_01.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr51/nvsr51_01.pdf).

## List of Detailed Tables

1. Number and percentage of live births by race of mother: California, Hawaii, Pennsylvania, Utah, and Washington, 2003 . . . . .	10
2. Total number of births, birth and fertility rates, and percentage of births with selected demographic and infant health characteristics, by race of mother: California, Hawaii, Pennsylvania, Utah, and Washington, 2003 . . . . .	11
3. Number and percentage of live births by race of father: California, Hawaii, Pennsylvania, Utah, and Washington, 2003 . . . . .	15

**Table 1. Number and percentage of live births by race of mother: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

[By place of residence]

Race	State											
	Total of reporting area		California <sup>1</sup>		Hawaii		Pennsylvania		Utah		Washington	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total <sup>2</sup>	835,405	100.0	540,997	100.0	18,100	100.0	145,959	100.0	49,860	100.0	80,489	100.0
One race	808,689	97.5	530,859	98.3	12,047	66.6	139,862	98.2	49,173	99.0	76,748	97.3
White	661,445	79.8	432,950	80.1	3,783	20.9	113,817	79.9	46,917	94.5	63,978	81.1
Black	55,506	6.7	30,232	5.6	485	2.7	20,910	14.7	323	0.7	3,556	4.5
AIAN <sup>3</sup>	4,873	0.6	2,306	0.4	62	0.3	180	0.1	506	1.0	1,819	2.3
Asian	81,413	9.8	62,867	11.6	6,106	33.8	4,874	3.4	859	1.7	6,707	8.5
NHOP <sup>4</sup>	5,452	0.7	2,504	0.5	1,611	8.9	81	0.1	568	1.1	688	0.9
More than one race	20,555	2.5	9,330	1.7	6,034	33.4	2,557	1.8	493	1.0	2,141	2.7
Two races	17,029	2.1	8,861	1.6	3,461	19.1	2,267	1.6	472	1.0	1,968	2.50.0
Black and White	3,474	0.4	2,173	0.4	24	0.1	834	0.6	75	0.2	368	0.5
Black and AIAN <sup>3</sup>	619	0.1	243	0.0	6	*	309	0.2	8	*	53	0.1
Black and Asian	433	0.1	303	0.1	22	0.1	53	0.0	4	*	51	0.1
Black and NHOP <sup>4</sup>	103	0.0	49	0.0	30	0.2	15	*	1	*	8	*
AIAN and White <sup>3</sup>	3,732	0.5	1,979	0.4	134	0.7	761	0.5	142	0.3	716	0.9
AIAN and Asian <sup>3</sup>	106	0.0	47	0.0	18	*	6	*	1	*	34	0.0
AIAN and NHOP <sup>3,4</sup>	44	0.0	15	*	15	*	1	*	3	*	10	*
Asian and White	5,163	0.6	3,255	0.6	952	5.3	258	0.2	128	0.3	570	0.7
Asian and NHOP <sup>4</sup>	1,655	0.2	316	0.1	1,248	6.9	10	*	22	0.0	59	0.1
NHOP <sup>4</sup> and White <sup>4</sup>	1,700	0.2	481	0.1	1,012	5.6	20	0.0	88	0.2	99	0.1
Three races	3,290	0.4	469	0.1	2,364	13.1	276	0.2	20	0.0	161	0.2
Black, AIAN, and White <sup>3</sup>	463	0.1	168	0.0	14	*	225	0.2	3	*	53	0.1
Black, AIAN, and Asian <sup>3</sup>	25	0.0	10	*	3	*	5	*	?	*	7	*
Black, AIAN, and NHOP <sup>3,4</sup>	9	*	7	*	1	*	1	*	?	*	?	*
Black, Asian, and White	105	0.0	65	0.0	7	*	15	*	1	*	17	*
Black, Asian, and NHOP <sup>4</sup>	16	*	4	*	10	*	?	*	?	*	2	*
Black, NHOP <sup>4</sup> , and White <sup>4</sup>	39	0.0	16	*	14	*	4	*	2	*	3	*
AIAN, Asian, and White <sup>3</sup>	219	0.0	69	0.0	102	0.6	15	*	2	*	0.0	*
AIAN, NHOP <sup>4</sup> , and White <sup>3,4</sup>	75	0.0	14	*	50	0.3	3	*	2	*	6	*
AIAN, Asian, and NHOP <sup>3,4</sup>	31	0.0	6	*	21	0.1	?	*	?	*	4	*
Asian, NHOP <sup>4</sup> , and White <sup>4</sup>	2,308	0.3	110	0.0	2,142	11.8	8	*	10	*	38	0.0
Four races	218	0.0	-	*	195	1.1	12	*	1	*	10	*
Black, AIAN, Asian, and White <sup>3</sup>	16	*	-	*	5	*	7	*	-	*	4	*
Black, AIAN, Asian, and NHOP <sup>3,4</sup>	6	*	-	*	4	*	2	*	-	*	?	*
Black, AIAN, NHOP <sup>4</sup> , and White <sup>3,4</sup>	10	*	-	*	8	*	1	*	-	*	1	*
Black, Asian, NHOP <sup>4</sup> , and White <sup>4</sup>	9	*	-	*	8	*	?	*	-	*	1	*
AIAN, Asian, NHOP <sup>4</sup> , and White <sup>3,4</sup>	177	0.0	-	*	170	0.9	2	*	1	*	4	*
Five races												
Black, AIAN, Asian, NHOP <sup>4</sup> , and White <sup>3,4</sup>	18	*	-	*	14	*	2	*	-	*	2	*

0.0 Quantity more than zero but less than 0.5.

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

- Quantity zero.

<sup>1</sup>California reported up to three racial entries to NCHS.

<sup>2</sup>Includes all births to residents of the states that reported multiple race for the entire year. Percentages are based on the number of births occurring in the states that reported multiple race for the entire year to residents of the states; see "Technical Notes." Births that occurred in states that did not report multiple race to residents of the multiple-race reporting states are not shown separately but are included in the total.

<sup>3</sup>AIAN is American Indian or Alaska Native.

<sup>4</sup>NHOP<sup>4</sup> is Native Hawaiian or Other Pacific Islander.

NOTES: Six states (California, Hawaii, Pennsylvania, Ohio, Utah, and Washington) provided multiple-race data to NCHS in 2003; see "Technical Notes." This table excludes data for Ohio, which reported multiple race in December 2003 only.

**Table 2. Total number of births, birth and fertility rates, and percentage of births with selected demographic and infant health characteristics, by race of mother: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

[By place of residence. Birth rates are live births per 1,000 population. Fertility rates are computed by relating total births, regardless of age of mother, to women aged 15–44 years. Populations estimated as of July 1; see references 16 and 17]

Race	Births	Rates			Demographic characteristics					Health characteristics		
		Crude birth rate	General fertility rate	Total fertility rate	Sex ratio <sup>1</sup>	Births to mothers under age 20 years	Mean age of mother at first birth <sup>2</sup>	Births to Hispanic mothers	Births to unmarried mothers	Mothers born in the 50 states and DC	Preterm births <sup>3</sup>	Low birthweight <sup>4</sup>
Total of reporting area <sup>5</sup>	835,405	14.5	67.6	2,074.5	1,048	9.0	25.7	36.8	32.2	64.3	10.7	6.8
Race reported alone or in combination with one or more other races <sup>6</sup>												
White	678,953	14.4	68.8	2,119.0	1,046	9.1	25.5	44.0	31.4	67.7	10.3	6.2
Black	60,851	13.9	61.0	1,866.0	1,040	16.0	23.0	7.4	65.6	88.3	15.4	12.5
AIAN <sup>7</sup>	10,423	10.7	44.9	1,347.0	1,042	16.2	22.9	23.7	55.7	95.3	12.3	7.5
Asian	91,700	15.1	63.0	1,838.5	1,072	4.1	28.5	4.7	16.9	24.6	10.1	7.6
NHOPI <sup>8</sup>	11,652	19.2	79.6	2,333.5	1,081	11.8	23.4	13.9	45.3	71.1	13.1	7.4
Race reported alone <sup>9</sup>												
White	661,445	14.4	68.8	2,120.0	1,045	8.9	25.5	44.6	30.9	67.1	10.3	6.2
Black	55,506	13.9	60.1	1,857.5	1,041	15.5	23.1	6.5	65.9	87.9	15.8	12.8
AIAN <sup>7</sup>	4,873	8.5	35.2	1,048.5	1,026	16.4	22.3	21.4	59.5	92.5	13.1	7.2
Asian	81,413	15.2	63.1	1,815.5	1,070	3.2	28.9	2.7	13.7	16.8	9.9	7.5
NHOPI <sup>8</sup>	5,452	17.5	72.3	2,134.0	1,057	8.7	23.7	7.1	38.7	44.4	13.3	6.5
Race reported in combination with one or more other races <sup>10</sup>												
White	17,508	15.0	69.5	2,061.0	1,078	14.5	24.2	21.8	47.5	91.7	11.4	7.7
Black	5,345	14.2	72.0	2,005.5	1,028	20.7	22.6	17.1	62.7	92.5	11.9	9.8
AIAN <sup>7</sup>	5,550	13.9	59.4	1,801.5	1,056	16.1	23.3	25.7	52.3	97.7	11.6	7.8
Asian	10,287	14.1	62.6	1,870.0	1,091	11.7	25.1	19.9	41.8	86.6	12.1	8.1
NHOPI <sup>8</sup>	6,200	20.9	87.3	2,538.0	1,102	14.5	23.2	19.9	51.1	94.5	13.0	8.2
Two races reported in combination												
Black and White	3,474	---	---	---	1,032	20.0	22.7	19.7	62.9	93.9	11.9	9.6
Black and AIAN <sup>7</sup>	619	---	---	---	1,016	21.0	22.2	10.1	67.7	98.5	13.4	13.5
Black and Asian	433	---	---	---	929	14.1	23.8	5.9	50.8	68.5	12.8	10.0
Black and NHOPI <sup>8</sup>	103	---	---	---	981	29.1	20.1	*	61.2	91.3	*	*
AIAN and White <sup>7</sup>	3,732	---	---	---	1,058	14.9	23.6	27.3	48.0	97.9	11.6	6.9
AIAN and Asian <sup>7</sup>	106	---	---	---	1,000	*	24.6	30.2	49.1	86.8	*	*
AIAN and NHOPI <sup>7,8</sup>	44	---	---	---	*	*	*	*	56.8	97.7	*	*
Asian and White	5,163	---	---	---	1,072	8.8	26.5	19.3	31.7	81.0	10.9	7.4
Asian and NHOPI <sup>8</sup>	1,655	---	---	---	1,026	12.6	24.0	16.0	49.2	89.4	15.6	10.8
NHOPI and White <sup>8</sup>	1,700	---	---	---	1,048	13.8	23.4	17.8	46.6	94.2	10.6	6.5
California	540,997	15.2	69.9	2,131.5	1,050	9.3	25.8	50.4	33.5	53.8	10.5	6.6
Race reported alone or in combination with one or more other races <sup>6</sup>												
White	441,280	15.6	73.7	2,253.0	1,047	9.9	25.4	61.3	34.4	56.5	10.2	6.1
Black	33,270	12.4	54.0	1,666.5	1,045	14.0	23.6	4.1	62.1	90.8	15.2	12.1
AIAN <sup>7</sup>	4,864	7.1	29.8	901.5	1,056	14.3	23.4	28.5	52.7	97.4	11.6	7.2
Asian	67,052	14.7	60.8	1,758.5	1,069	3.2	28.9	2.1	13.7	18.6	9.7	7.3
NHOPI <sup>8</sup>	3,522	14.3	56.2	1,646.5	1,080	8.3	24.6	7.7	35.0	59.9	12.8	6.6
Race reported alone <sup>9</sup>												
White	432,950	15.7	74.2	2,270.5	1,046	9.8	25.4	62.0	34.2	55.9	10.2	6.0
Black	30,232	12.4	53.2	1,658.5	1,050	13.6	23.6	2.3	62.6	90.7	15.5	12.4
AIAN <sup>7</sup>	2,306	5.6	23.0	691.0	1,030	13.6	22.9	19.9	56.5	96.7	11.5	7.0
Asian	62,867	15.2	62.3	1,785.0	1,071	2.8	29.1	0.9	12.5	14.6	9.6	7.3
NHOPI <sup>8</sup>	2,504	17.2	67.2	1,967.5	1,087	7.1	24.5	2.8	33.4	49.2	12.5	5.8
Race reported in combination with one or more other races <sup>10</sup>												
White	8,330	11.8	54.7	1,649.0	1,070	13.1	25.1	28.4	42.9	89.5	11.0	7.3
Black	3,038	12.8	62.4	1,773.5	1,000	18.4	23.3	22.2	57.1	91.9	12.0	9.3
AIAN <sup>7</sup>	2,558	9.5	40.5	1,241.5	1,080	14.9	36.2	49.3	98.0	11.7	7.4	
Asian	4,185	10.1	44.9	1,373.5	1,045	9.5	26.6	20.6	32.6	79.4	10.5	7.4
NHOPI <sup>8</sup>	1,018	10.1	40.2	1,180.5	1,065	11.3	24.8	19.8	39.0	86.1	13.5	8.4

See footnotes at end of table.

**Table 2. Total number of births, birth and fertility rates, and percentage of births with selected demographic and infant health characteristics, by race of mother: California, Hawaii, Pennsylvania, Utah, and Washington, 2003—Con.**

[By place of residence. Birth rates are live births per 1,000 population. Fertility rates are computed by relating total births, regardless of age of mother, to women aged 15–44 years. Populations estimated as of July 1; see references 16 and 17]

Race	Rates				Demographic characteristics						Health characteristics	
	Births	Crude birth rate	General fertility rate	Total fertility rate	Sex ratio <sup>1</sup>	Births to mothers under age 20 years	Mean age of mother at first birth <sup>2</sup>	Births to Hispanic mothers	Births to unmarried mothers	Mothers born in the 50 states and DC	Preterm births <sup>3</sup>	Low birthweight <sup>4</sup>
Two races reported in combination												
Black and White	2,173	---	---	---	1,014	16.0	23.6	26.0	57.2	93.4	12.0	9.5
Black and AIAN <sup>7</sup>	243	---	---	---	944	23.0	22.1	11.5	61.7	98.8	13.1	13.6
Black and Asian	303	---	---	---	836	13.2	24.1	*	49.2	70.3	11.5	7.6
Black and NHOPJ <sup>8</sup>	49	---	---	---	1,042	*	20.7	*	63.3	100.0	*	*
AIAN and White <sup>7</sup>	1,979	---	---	---	1,112	13.8	24.0	40.9	47.4	97.9	12.0	6.7
AIAN and Asian <sup>7</sup>	47	---	---	---	741	*	*	*	46.8	91.5	*	*
AIAN and NHOPJ <sup>7,8</sup>	15	---	---	---	*	*	*	*	*	*	*	*
Asian and White	3,255	---	---	---	1,075	9.1	27.0	22.4	30.1	80.1	10.0	6.8
Asian and NHOPJ <sup>8</sup>	316	---	---	---	1,013	*	27.1	7.0	29.7	66.0	17.1	13.6
NHOPJ and White <sup>8</sup>	481	---	---	---	1,091	12.9	24.0	29.1	38.3	93.8	10.7	5.0
Hawaii	18,100	14.4	72.2	2,242.5	1,097	8.4	25.9	14.5	33.5	72.6	12.6	8.6
Race reported alone or in combination with one or more other races <sup>5</sup>												
White	8,439	16.6	81.6	2,491.0	1,103	9.3	25.1	17.8	35.3	92.1	11.5	7.2
Black	655	15.1	67.6	1,920.5	1,099	8.9	23.8	17.6	28.2	86.1	12.6	11.8
AIAN <sup>7</sup>	627	25.1	107.9	3,223.5	1,042	14.7	22.8	41.8	49.4	96.7	12.1	7.0
Asian	10,832	14.9	75.5	2,372.5	1,115	9.2	26.3	15.4	35.3	69.1	13.0	9.4
NHOPJ <sup>8</sup>	6,358	22.5	100.1	2,980.5	1,122	14.2	22.6	17.9	53.4	82.1	13.8	8.3
Race reported alone <sup>9</sup>												
White	3,783	11.6	60.9	1,852.0	1,075	3.6	27.1	12.3	16.4	87.4	10.3	6.3
Black	485	16.1	67.0	1,883.0	1,073	5.8	24.4	16.5	20.2	86.6	13.8	12.4
AIAN <sup>7</sup>	62	16.1	71.2	2,236.0	1,000	*	*	46.8	33.9	88.7	*	*
Asian	6,106	11.5	61.8	1,925.0	1,106	5.2	28.4	9.5	22.8	48.2	12.6	10.1
NHOPJ <sup>8</sup>	1,611	13.9	63.5	1,941.0	1,109	10.6	22.5	9.5	50.4	37.7	15.3	7.7
Race reported in combination with one or more other races <sup>10</sup>												
White	4,656	25.5	112.9	3,367.0	1,127	14.0	23.3	22.3	50.6	95.9	12.4	8.0
Black	170	12.8	69.4	2,077.5	1,179	17.6	22.0	20.6	51.2	84.7	*	*
AIAN <sup>7</sup>	565	26.7	114.4	3,395.0	1,047	15.4	41.2	51.2	97.5	12.2	7.3	
Asian	4,726	23.7	105.9	3,140.5	1,127	14.3	23.3	23.0	51.5	96.0	13.5	8.6
NHOPJ <sup>8</sup>	4,747	28.5	124.4	3,658.0	1,127	15.4	22.7	20.8	54.4	97.2	13.2	8.5
Two races reported in combination												
Black and White	24	---	---	---	*	*	*	*	*	*	*	*
Black and AIAN <sup>7</sup>	6	---	---	---	*	*	*	*	*	*	*	*
Black and Asian	22	---	---	---	*	*	*	*	*	*	*	*
Black and NHOPJ <sup>8</sup>	30	---	---	---	*	*	*	*	*	93.3	*	*
AIAN and White <sup>7</sup>	134	---	---	---	740	*	24.1	27.6	38.8	97.8	*	*
AIAN and Asian <sup>7</sup>	18	---	---	---	*	*	*	*	*	*	*	*
AIAN and NHOPJ <sup>7,8</sup>	15	---	---	---	*	*	*	*	*	*	*	*
Asian and White	952	---	---	---	1,056	9.1	25.2	22.4	39.2	90.7	12.3	8.1
Asian and NHOPJ <sup>8</sup>	1,248	---	---	---	1,029	14.7	22.9	18.6	54.6	96.6	15.4	10.3
NHOPJ and White <sup>8</sup>	1,012	---	---	---	1,061	14.6	22.9	14.9	53.3	95.4	11.4	7.9
Pennsylvania	145,959	11.8	58.1	1,855.0	1,043	9.0	25.8	7.5	33.9	89.5	11.6	8.1
Race reported alone or in combination with one or more other races <sup>6</sup>												
White	115,972	10.8	54.3	1,751.0	1,045	7.5	26.2	7.0	27.7	93.1	10.8	7.0
Black	22,383	16.6	73.3	2,231.0	1,037	19.6	22.0	10.4	74.9	88.2	16.2	13.6
AIAN <sup>7</sup>	1,520	27.3	118.9	3,622.5	974	17.2	23.2	12.3	57.0	95.0	12.9	10.9
Asian	5,257	18.1	67.6	1,880.5	1,058	4.7	27.7	6.7	15.5	14.8	9.6	8.1
NHOPJ <sup>8</sup>	150	15.1	59.4	1,738.5	786	17.3	23.8	35.6	59.3	62.4	17.4	*

See footnotes at end of table.

**Table 2. Total number of births, birth and fertility rates, and percentage of births with selected demographic and infant health characteristics, by race of mother: California, Hawaii, Pennsylvania, Utah, and Washington, 2003—Con.**

[By place of residence. Birth rates are live births per 1,000 population. Fertility rates are computed by relating total births, regardless of age of mother, to women aged 15–44 years. Populations estimated as of July 1; see references 16 and 17]

Race	Rates				Demographic characteristics						Health characteristics	
	Births	Crude birth rate	General fertility rate	Total fertility rate	Sex ratio <sup>1</sup>	Births to mothers under age 20 years	Mean age of mother at first birth <sup>2</sup>	Births to Hispanic mothers	Births to unmarried mothers	Mothers born in the 50 states and DC	Preterm births <sup>3</sup>	Low birthweight <sup>4</sup>
Race reported alone <sup>9</sup>												
White	113,817	10.6	53.7	1,735.0	1,045	7.2	26.3	7.0	27.1	93.1	10.7	7.0
Black	20,910	16.3	71.4	2,185.0	1,034	19.3	22.0	10.5	74.9	87.7	16.5	13.8
AIAN <sup>7</sup>	180	8.4	36.6	1,119.5	856	15.6	22.9	45.3	54.4	73.6	15.6	11.2
Asian	4,874	18.5	68.2	1,880.0	1,050	4.1	27.9	6.7	13.8	10.3	9.3	7.9
NHOPI <sup>8</sup>	81	16.5	64.8	1,949.0	723	*	24.0	53.8	61.7	50.0	*	*
Race reported in combination with one or more other races <sup>10</sup>												
White	2,155	22.6	117.6	3,311.0	1,043	20.7	22.8	7.7	59.2	93.6	11.9	9.4
Black	1,473	22.5	120.6	3,213.5	1,086	25.3	21.5	8.7	75.2	95.1	12.0	11.1
AIAN <sup>7</sup>	1,340	39.1	170.3	5,203.0	991	17.5	7.8	57.4	97.9	12.5	10.8	
Asian	383	13.9	60.6	1,812.5	1,164	12.0	25.5	6.6	37.9	72.0	12.9	11.0
NHOPI <sup>8</sup>	69	13.7	54.0	1,555.5	865	*	23.5	*	56.5	76.1	*	*
Two races reported in combination												
Black and White	834	---	---	---	1,122	28.9	20.8	8.6	77.7	96.0	11.4	9.4
Black and AIAN <sup>7</sup>	309	---	---	---	1,146	18.4	22.5	8.4	73.8	98.3	13.8	15.0
Black and Asian	53	---	---	---	1,080	*	22.3	*	64.2	71.4	*	*
Black and NHOPI <sup>8</sup>	15	---	---	---	*	*	*	*	*	*	*	*
AIAN and White <sup>7</sup>	761	---	---	---	982	16.0	23.7	7.2	46.6	98.9	12.6	9.4
AIAN and Asian <sup>7</sup>	6	---	---	---	*	*	*	*	*	*	*	*
AIAN and NHOPI <sup>7,8</sup>	1	---	---	---	*	*	*	*	*	*	*	*
Asian and White	258	---	---	---	1,150	7.8	27.1	*	25.6	69.8	13.3	9.3
Asian and NHOPI <sup>8</sup>	10	---	---	---	*	*	*	*	*	*	*	*
NHOPI and White <sup>8</sup>	20	---	---	---	*	*	*	*	*	*	*	*
Utah	49,860	21.2	92.2	2,566.5	1,040	6.7	23.8	14.2	17.2	85.2	10.4	6.5
Race reported alone or in combination with one or more other races <sup>6</sup>												
White	47,371	21.2	93.0	2,586.0	1,040	6.5	23.7	14.8	16.5	87.0	10.3	6.4
Black	417	13.8	65.1	1,800.0	1,075	16.1	22.6	11.6	48.7	67.1	17.7	14.7
AIAN <sup>7</sup>	668	15.4	62.1	1,738.0	1,068	18.7	21.0	12.0	55.4	97.0	13.0	6.4
Asian	1,028	18.2	66.2	1,825.5	1,020	4.7	26.7	2.9	14.0	22.7	10.9	7.4
NHOPI <sup>8</sup>	697	29.7	123.6	3,442.0	969	9.0	22.6	*	22.5	55.3	10.0	5.7
Race reported alone <sup>9</sup>												
White	46,917	21.3	93.2	2,591.5	1,041	6.4	23.8	14.8	16.3	86.9	10.3	6.4
Black	323	14.3	61.3	1,738.0	1,057	11.1	23.8	7.5	44.6	62.2	18.6	15.5
AIAN <sup>7</sup>	506	15.2	59.6	1,679.5	1,108	17.2	21.1	4.4	58.5	97.4	12.8	6.5
Asian	859	19.3	66.6	1,802.5	1,031	3.6	27.4	*	11.4	11.2	10.6	7.6
NHOPI <sup>8</sup>	568	32.3	133.0	3,748.0	1,029	8.5	22.8	*	21.5	47.8	10.6	5.8
Race reported in combination with one or more other races <sup>10</sup>												
White	454	15.8	78.7	2,102.0	924	15.4	21.8	21.9	37.0	89.6	11.9	7.1
Black	94	12.3	82.7	1,932.0	1,136	33.0	19.8	25.5	62.8	84.0	*	*
AIAN <sup>7</sup>	162	16.2	71.4	1,951.5	952	23.5	35.8	45.7	95.7	13.6	*	*
Asian	169	14.2	64.0	1,790.0	965	*	23.4	*	27.2	81.1	12.4	*
NHOPI <sup>8</sup>	129	22.0	94.4	2,449.0	743	*	21.8	*	27.1	88.4	*	*
Two races reported in combination												
Black and White	75	---	---	---	1,027	26.7	20.3	28.0	57.3	88.0	*	*
Black and AIAN <sup>7</sup>	8	---	---	---	*	*	*	*	*	*	*	*
Black and Asian	4	---	---	---	*	*	*	*	*	*	*	*
Black and NHOPI <sup>8</sup>	1	---	---	---	*	*	*	*	*	*	*	*
AIAN and White <sup>7</sup>	142	---	---	---	945	18.3	21.1	39.4	43.0	95.0	*	*
AIAN and Asian <sup>7</sup>	1	---	---	---	*	*	*	*	*	*	*	*
AIAN and NHOPI <sup>7,8</sup>	3	---	---	---	*	*	*	*	*	*	*	*
Asian and White	128	---	---	---	1,032	*	23.7	*	25.0	82.8	*	*
Asian and NHOPI <sup>8</sup>	22	---	---	---	*	*	*	*	*	*	*	*
NHOPI and White <sup>8</sup>	88	---	---	---	760	*	21.4	*	25.0	92.0	*	*

See footnotes at end of table.

**Table 2. Total number of births, birth and fertility rates, and percentage of births with selected demographic and infant health characteristics, by race of mother: California, Hawaii, Pennsylvania, Utah, and Washington, 2003—Con.**

[By place of residence. Birth rates are live births per 1,000 population. Fertility rates are computed by relating total births, regardless of age of mother, to women aged 15–44 years. Populations estimated as of July 1; see references 16 and 17]

Race	Births	Rates			Demographic characteristics					Health characteristics		
		Crude birth rate	General fertility rate	Total fertility rate	Sex ratio <sup>1</sup>	Births to mothers under age 20 years	Mean age of mother at first birth <sup>2</sup>	Births to Hispanic mothers	Births to unmarried mothers	Mothers born in the 50 states and DC	Preterm births <sup>3</sup>	Low birthweight <sup>4</sup>
Washington . . . . .	80,489	13.1	61.2	1,899.5	1,039	8.5	25.9	17.0	28.8	75.6	10.3	6.0
Race reported alone or in combination with one or more other races <sup>6</sup>												
White . . . . .	65,891	12.2	58.3	1,824.0	1,043	8.5	25.9	17.5	27.7	82.1	9.6	5.5
Black . . . . .	4,126	15.4	68.5	2,037.5	1,001	13.1	23.8	16.7	52.0	70.1	13.8	9.9
AIAN <sup>7</sup> . . . . .	2,744	16.7	69.8	2,077.5	1,049	18.8	22.2	19.9	61.7	91.0	12.9	6.7
Asian . . . . .	7,531	17.0	65.2	1,889.5	1,058	4.2	28.0	11.3	19.7	21.0	10.0	7.1
NHOP <sup>8</sup> . . . . .	925	20.1	76.1	2,165.5	956	10.3	23.9	15.5	43.7	51.4	11.7	5.2
Race reported alone <sup>9</sup>												
White . . . . .	63,978	12.2	58.3	1,829.5	1,042	8.3	26.0	17.8	27.1	81.8	9.6	5.5
Black . . . . .	3,556	16.5	70.3	2,127.0	1,005	12.1	24.2	18.2	50.1	66.4	14.2	10.1
AIAN <sup>7</sup> . . . . .	1,819	18.1	75.3	2,251.0	1,019	20.0	21.8	24.8	64.9	87.7	14.7	7.5
Asian . . . . .	6,707	18.2	68.5	1,960.5	1,050	3.7	28.3	11.8	17.5	14.1	9.8	7.0
NHOP <sup>8</sup> . . . . .	688	25.3	94.7	2,703.5	911	10.0	23.5	17.1	42.3	39.7	12.8	6.1
Race reported in combination with one or more other races <sup>10</sup>												
White . . . . .	1,913	12.2	56.0	1,636.5	1,075	14.5	23.9	7.4	49.3	89.7	10.0	6.7
Black . . . . .	570	11.1	58.9	1,620.5	979	19.5	21.9	7.7	63.5	93.2	11.6	8.1
AIAN <sup>7</sup> . . . . .	925	14.4	61.0	1,814.0	1,112	16.5	10.4	55.4	97.3	9.4	5.1	
Asian . . . . .	824	11.1	47.0	1,415.5	1,124	8.3	25.7	7.1	37.6	77.0	11.2	7.9
NHOP <sup>8</sup> . . . . .	237	12.6	48.5	1,385.5	1,097	11.0	24.8	10.8	47.7	85.2	8.4	*
Two races reported in combination												
Black and White . . . . .	368	---	---	---	927	22.0	21.7	5.6	64.9	95.4	12.3	9.0
Black and AIAN <sup>7</sup> . . . . .	53	---	---	---	767	*	*	*	60.4	98.1	*	*
Black and Asian . . . . .	51	---	---	---	1,217	*	22.9	*	49.0	66.7	*	*
Black and NHOP <sup>8</sup> . . . . .	8	---	---	---	*	*	*	*	*	*	*	*
AIAN and White <sup>7</sup> . . . . .	716	---	---	---	1,094	17.0	23.0	8.4	53.9	97.6	9.1	5.2
AIAN and Asian <sup>7</sup> . . . . .	34	---	---	---	*	*	*	*	*	85.3	*	*
AIAN and NHOP <sup>7,8</sup> . . . . .	10	---	---	---	*	*	*	*	*	*	*	*
Asian and White . . . . .	570	---	---	---	1,058	7.5	26.4	4.8	32.6	74.7	11.4	9.0
Asian and NHOP <sup>8</sup> . . . . .	59	---	---	---	903	*	25.7	*	49.2	71.2	*	*
NHOP <sup>8</sup> and White <sup>8</sup> . . . . .	99	---	---	---	1,063	*	26.3	*	39.4	87.9	*	*

--- Data not available.

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

<sup>1</sup>Male live births per 1,000 female live births.

<sup>2</sup>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.

<sup>3</sup>Births of less than 37 completed weeks of gestation.

<sup>4</sup>Low birthweight births are less than 2,500 grams (5 lb 8 oz).

<sup>5</sup>Includes all births to residents of the state(s) that reported multiple race for the entire year.

<sup>6</sup>“Race reported alone or in combination with one or more other races” means that either only one race is reported or more than one race is reported (in combination with the reported race). Figures based on number of births occurring in the states that reported multiple race for the entire year to residents of the states; see “Technical Notes.” Figures add to more than the total for reporting area because some births are included in more than one category.

<sup>7</sup>AIAN is American Indian or Alaska Native.

<sup>8</sup>NHOP<sup>8</sup> is Native Hawaiian or Other Pacific Islander.

<sup>9</sup>“Race reported alone” means that only one race is reported.

<sup>10</sup>“Race reported in combination with one or more other races” means that more than one race is reported (in combination with the reported race).

NOTES: Six states (California, Hawaii, Pennsylvania, Ohio, Utah, and Washington) provided multiple-race data to NCHS in 2003; see “Technical Notes.” This table excludes data for Ohio, which reported multiple race in December 2003 only. California reported up to three racial entries to NCHS.

**Table 3. Number and percentage of live births by race of father: California, Hawaii, Pennsylvania, Utah, and Washington, 2003**

[By place of residence]

Race	State											
	Total of reporting area		California <sup>1</sup>		Hawaii		Pennsylvania		Utah		Washington	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total <sup>2</sup> . . . . .	835,405	100.0	540,997	100.0	18,100	100.0	145,959	100.0	49,860	100.0	80,489	100.0
One race . . . . .	731,694	97.7	491,456	98.4	10,698	67.6	126,642	98.2	44,188	99.1	58,710	97.4
White . . . . .	598,669	79.9	401,512	80.4	3,842	24.3	102,217	79.3	42,197	94.7	48,901	81.1
Black . . . . .	56,629	7.6	32,065	6.4	650	4.1	20,103	15.6	421	0.9	3,390	5.6
AIAN <sup>3</sup> . . . . .	3,458	0.5	1,864	0.4	52	0.3	185	0.1	306	0.7	1,051	1.7
Asian . . . . .	67,834	9.1	53,575	10.7	4,714	29.8	4,057	3.1	654	1.5	4,834	8.0
NHOP <sup>4</sup> . . . . .	5,104	0.7	2,440	0.5	1,440	9.1	80	0.1	610	1.4	534	0.9
More than one race . . . . .	17,549	2.3	8,159	1.6	5,132	32.4	2,285	1.8	383	0.9	1,590	2.6
Two races . . . . .	14,844	2.0	7,784	1.6	3,119	19.7	2,095	1.6	362	0.8	1,484	2.5
Black and White . . . . .	2,957	0.4	1,949	0.4	47	0.3	663	0.5	69	0.2	229	0.4
Black and AIAN <sup>3</sup> . . . . .	789	0.1	274	0.1	21	0.1	412	0.3	7	*	75	0.1
Black and Asian . . . . .	391	0.1	283	0.1	19	*	44	0.0	3	*	42	0.1
Black and NHOP <sup>4</sup> . . . . .	116	0.0	58	0.0	31	0.2	15	*	1	*	11	*
AIAN and White <sup>3</sup> . . . . .	3,235	0.4	1,723	0.3	149	0.9	734	0.6	97	0.2	532	0.9
AIAN and Asian <sup>3</sup> . . . . .	92	0.0	46	0.0	21	0.1	7	*	1	*	17	*
AIAN and NHOP <sup>3,4</sup> . . . . .	30	0.0	6	*	11	*	-	*	7	*	6	*
Asian and White . . . . .	4,229	0.6	2,741	0.5	767	4.8	196	0.2	104	0.2	421	0.7
Asian and NHOP <sup>4</sup> . . . . .	1,584	0.2	297	0.1	1,201	7.6	8	*	8	*	70	0.1
NHOP and White <sup>4</sup> . . . . .	1,421	0.2	407	0.1	852	5.4	16	*	65	0.1	81	0.1
Three races . . . . .	2,551	0.3	375	0.1	1,880	11.9	176	0.1	21	0.0	99	0.2
Black, AIAN, and White <sup>3</sup> . . . . .	367	0.0	151	0.0	26	0.2	143	0.1	3	*	44	0.1
Black AIAN, and Asian <sup>3</sup> . . . . .	26	0.0	11	*	5	*	5	*	-	*	5	*
Black, AIAN, and NHOP <sup>3,4</sup> . . . . .	4	*	2	*	2	*	-	*	-	*	-	*
Black, Asian, and White . . . . .	64	0.0	46	0.0	3	*	10	*	1	*	4	*
Black, Asian, and NHOP <sup>4</sup> . . . . .	19	*	6	*	8	*	3	*	-	*	2	*
Black, NHOP, and White <sup>4</sup> . . . . .	24	0.0	11	*	13	*	-	*	-	*	-	*
AIAN, Asian, and White <sup>3</sup> . . . . .	136	0.0	45	0.0	67	0.4	6	*	-	*	18	*
AIAN, NHOP, and White <sup>3,4</sup> . . . . .	73	0.0	15	*	50	0.3	3	*	2	*	3	*
AIAN, Asian, and NHOP <sup>3,4</sup> . . . . .	29	0.0	-	*	26	0.2	-	*	-	*	3	*
Asian, NHOP, and White <sup>4</sup> . . . . .	1,809	0.2	88	0.0	1,680	10.6	6	*	15	*	20	0.0
Four races . . . . .	145	0.0	-	*	127	0.8	11	*	-	*	7	*
Black, AIAN, Asian, and White <sup>3</sup> . . . . .	12	*	-	*	3	*	5	*	-	*	4	*
Black, AIAN, Asian, and NHOP <sup>3,4</sup> . . . . .	4	*	-	*	4	*	?	*	-	*	-	*
Black, AIAN, NHOP, and White <sup>3,4</sup> . . . . .	8	*	-	*	3	*	3	*	-	*	2	*
Black, Asian, NHOP, and White <sup>4</sup> . . . . .	12	*	-	*	10	*	1	*	-	*	1	*
AIAN, Asian, NHOP, and White <sup>3,4</sup> . . . . .	109	0.0	-	*	107	0.7	2	*	-	*	-	*
Five races . . . . .												
Black, AIAN, Asian, NHOP, and White <sup>3,4</sup> . . . . .	9	*	-	*	6	*	3	*	-	*	-	*
Race unknown or not stated . . . . .	80,001	...	40,574	...	2,251	...	13,492	...	5,095	...	18,589	...

0.0 Quantity more than zero but less than 0.5.

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

- Quantity zero.

... Category not applicable.

<sup>1</sup>California reported up to three racial entries to NCHS.<sup>2</sup>Includes all births to residents of the states that reported multiple race for the entire year. Also includes data for births with race of father unknown or not stated, shown separately. Percentages are based on the number of births occurring in the states that reported multiple race for the entire year to residents of the states; see "Technical Notes." Births that occurred in states that did not report multiple race to residents of the multiple-race reporting states are not shown separately but are included in the total.<sup>3</sup>AIAN is American Indian or Alaska Native.<sup>4</sup>NHOP is Native Hawaiian or Other Pacific Islander.

NOTES: Six states (California, Hawaii, Pennsylvania, Ohio, Utah, and Washington) provided multiple-race data to NCHS in 2003; see "Technical Notes." This table excludes data for Ohio, which reported multiple race in December 2003 only.

## Technical Notes

### Source of data

Data shown in this report are based on 100 percent of the birth certificates filed in 2003 for California, Hawaii, Pennsylvania, Utah, and Washington, which provided multiple-race data for mothers and fathers to NCHS as of January 1, 2003. Data for Ohio, which did not provide multiple-race data for mothers and fathers until December 1, 2003, are excluded from all tabulations. The data are provided to NCHS through the Vital Statistics Cooperative Program.

This report includes 2003 data on selected items that were 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 (3,4). Three states, California, Hawaii, and Utah, collected data based on the 1989 (unrevised) birth certificate. The two remaining states, Pennsylvania and Washington, implemented the revised birth certificate in 2003. Only comparable data items included on both the 1989 and the 2003 birth certificate revision are shown in this report. Revised data from Pennsylvania and Washington are combined with unrevised data from California, Hawaii, and Utah.

### Race of mother and father

In 1997, the Office of Management and Budget (OMB) issued "Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity," which revised the "1977 Statistical Policy Directive 15, Race and Ethnic Standards for Federal Statistics and Administrative Reporting" (1,2,7). These documents specify guidelines for collection, tabulation, and presentation of race and ethnicity data within the federal statistical system. 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: American Indian or Alaska Native (AIAN), Asian or Pacific Islander (API), black, and white. The five categories for race specified in the 1997 standards are: American Indian or Alaska Native (AIAN), Asian, black or African American, Native Hawaiian or Other Pacific Islander (NHOP), and white. The revised standards called for reporting of Asians separately from Native Hawaiians or Other Pacific Islanders. Collection of additional detail on race and ethnicity is permitted, as before, so long as the additional categories can be aggregated into the minimum categories. The revised standards also require federal data collection programs to allow respondents to select *one or more race categories*.

Beginning with the 2003 data year, NCHS accepted multiple-race data for mothers and fathers on birth records from Pennsylvania and Washington, using the 2003 revision of the U.S. Standard Certificate of Live Birth, and California, Hawaii, Ohio (starting on December 1, 2003), and Utah, using the 1989 revision of the U.S. Standard Certificate of Live Birth, in accordance with the revised (1997) OMB standard (discussed above). The five states that reported more than one race for all of 2003 accounted for 20.4 percent of births in the U.S. in 2003 and reported 2.5 percent of the mothers as multiracial, with

levels varying from 1.0 percent (Utah) to 33.4 percent (Hawaii) (5,6). Data from the vital records of the remaining 44 states and the District of Columbia followed the 1977 OMB standards in which a single race is reported to NCHS (2,5,6). 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.

Race of mother presented in this report is based on the minimum five categories stipulated in the OMB standard—American Indian or Alaska Native (AIAN), Asian, black or African American, Native Hawaiian or Other Pacific Islander (NHOP), and white—categorized in several ways. Data are presented for 10 racial categories: five one-race groups (i.e., each of the five races reported alone, as a single race); and five more than one-race groups (i.e., each of the five races reported in combination with one or more of the other races). In addition, data (number of births and percent distribution) for mothers and fathers are reported for all 31 combinations of the minimum five race categories (five single-race groups and 26 mutually exclusive multiple-race groups). Selected demographic and health characteristics of the mothers and their infants are also reported for all 10 combinations of two specific races (e.g., Asian and white or NHOP and white).

The race data are based on coded and edited data from one or more racial entries on checkbox or open-ended literal responses (8,9). States differ in the number of racial entries typically reported by respondents and in the number of racial entries reported by states to NCHS. For example, California reports to NCHS up to three racial entries per respondent, whereas Hawaii reports all racial entries provided by respondents.

Detailed data on race as reported by the multiple-race reporting states are available on the 2003 natality public-use file (10).

### Hispanic origin

Race and Hispanic origin are reported separately on the birth certificate. In this report, Hispanic origin is treated as one of the demographic characteristics on which single-race mothers and multiple-race mothers are compared. Data in the tabulations shown in this report were not further classified by Hispanic origin (i.e., Mexican, Puerto Rican, Cuban, Central and South American, or other and unknown Hispanic).

### Age of mother

Age of mother is computed in most cases from the mother's and infant's dates of birth as reported on the birth certificate. Age of mother is imputed for ages nine years or under and 55 years and over. A review and verification of unedited birth data for 1996 showed that the vast majority of births reported as occurring to women aged 50 years and over were to women aged 50–54 years.

### Marital status

Marital status of women giving birth in California is determined by a direct question in the birth registration process. Birth certificates for the other four states (Hawaii, Pennsylvania, Utah, and Washington) included a question about the mother's marital status. Details of the reporting procedures are described in previous reports (11,12).

Where the mother's marital status was not reported, marital status was imputed as "married" for these records, if the father's age was reported. If the father's age was unknown, the mother was considered "unmarried."



## Gestation

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 date of birth. It is subject to error for several reasons, including imperfect maternal recall or misidentification of the LMP because of post-conception bleeding, delayed ovulation, or intervening early miscarriage. These data are edited for LMP-based gestational ages that are clearly inconsistent with the infant's plurality and birthweight, but reporting problems for this item persist and may occur more frequently among some subpopulations and among births with shorter gestations (6,13–15).

## Computations of percentages and percent distributions

Births for which a particular characteristic is unknown were subtracted from the figures for total births that were used as denominators before percentages and percent distributions were computed. An asterisk (\*) is shown in place of any derived statistic (rate or percentage) based on fewer than 20 births in the numerator.

## Computation of means

An asterisk (\*) is shown in place of any derived mean based on fewer than a frequency of 20 births. Means based on births below these minimum levels lack sufficient reliability for analytic purposes.

## Population denominators

Fertility rates by state shown in this report are based on populations estimated as of July 1, 2003. These populations are available from the U.S. Census Bureau (16,17) and are based on the 2000 census counts by state, age, sex, Hispanic origin, and race in two separate files: five-race groups (five race alone or in combination groups) (e.g., AIAN alone or in combination), and six-race groups (five race alone groups and one group with two or more race groups) (e.g., AIAN alone). Population estimates for race in combination are derived by subtracting race alone from race alone or in combination (e.g., AIAN alone or in combination—AIAN alone).

## Random variation and significance testing for natality data

The number of births reported for an area is essentially a complete count, because more than 99 percent of all births are registered. Although this number is not subject to sampling error, it may be affected by nonsampling errors in the registration process such as mistakes in recording the mother's residence or age during the registration process.

When the number of births is used for analytic purposes (i.e., the comparison of numbers, rates, and percentages over time, for different areas, or between different groups), the number of events that *actually* occurred can be thought of as one outcome in a large series of possible results that *could have* occurred under the same (or similar) circumstances. When considered in this way, the number of births is subject to random variation and a probable range of values can be estimated from the actual figures, according to certain statistical assumptions.

The confidence interval is the range of values for the number of births, birth rates, or percentage of births that you could expect in 95

out of 100 cases. The confidence limits are the end points of this range of values (the highest and lowest values). Confidence limits tell you how much the number of events or rates could vary under the same (or similar) circumstances.

Confidence limits for numbers, rates, and percentages can be estimated from the actual number of vital events. Procedures differ for rates and percentages and also differ depending on the number of births on which these statistics are based. Below are detailed procedures and examples for each type of case.

When the number of vital events is large, the distribution is assumed to follow a normal distribution (where the relative standard error is small). When the number of events is small and the probability of the event is small, the distribution is assumed to follow a Poisson probability distribution. Considerable caution should be observed in interpreting the occurrence of infrequent events.

## 95 percent confidence limits for numbers less than 100

When the number of births is less than 100 and the rate is small, the data are assumed to follow a Poisson probability distribution (18). Confidence limits are estimated using the following formulas:

$$\text{Lower limit} = B \times L$$

$$\text{Upper limit} = B \times U$$

where

$B$  = number of births

$L$  = the value in Table IV in "Births: Final Data for 2003" (5) that corresponds to the number  $B$

$U$  = the value in Table IV "Births: Final Data for 2003" (5) that corresponds to the number  $B$

## Example

Suppose that the number of births to women who are American Indian or Alaska Native and Native Hawaiian or Other Pacific Islander (AIAN-NHOPI) was 47. The confidence limits for this number would be:

$$\begin{aligned} \text{Lower limit} &= 47 \times 0.73476 \\ &= 35 \end{aligned}$$

$$\begin{aligned} \text{Upper limit} &= 47 \times 1.32979 \\ &= 63 \end{aligned}$$

This means that the chances are 95 out of 100 that the actual number of births to these women would lie between 35 and 63.

## 95 percent confidence limits for numbers 100 or more

When the number of events is greater than 100, the data are assumed to approximate a normal distribution. Formulas for 95 percent confidence limits are:

$$\text{Lower limit} = B - (1.96 \times \sqrt{B})$$

$$\text{Upper limit} = B + (1.96 \times \sqrt{B})$$

where

$B$  = number of births

### Example

Suppose that the number of births to multiple-race white (white reported in combination with one or more of the other races) women was 14,108. The 95 percent confidence limits for this number would be:

$$\begin{aligned}\text{Lower limit} &= 14,108 - (1.96 \times \sqrt{14,108}) \\ &= 14,108 - 233 \\ &= 13,875\end{aligned}$$

$$\begin{aligned}\text{Upper limit} &= 14,108 + (1.96 \times \sqrt{14,108}) \\ &= 14,108 + 233 \\ &= 14,341\end{aligned}$$

This means that the chances are 95 out of 100 that the actual number of births to these women would lie between 13,875 and 14,341.

### Computing confidence intervals for rates

The same statistical assumptions can be used to estimate the variability in birth rates. Again, one formula is used for rates based on numbers of events fewer than 100, and another formula for rates based on numbers of 100 or greater. For our purposes, assume that the denominators of these rates (the population estimates) have no error. Although this assumption is technically correct *only* for denominators based on the census that occurs every 10 years, the error in intercensal population estimates is usually small, difficult to measure, and therefore not considered.

### 95 percent confidence limits for rates based on fewer than 100 events

When the number of events in the numerator is fewer than 100 (but greater than 20), the confidence interval for a rate can be estimated using the two formulas which follow and the values in Table IV in "Births: Final Data for 2003" (5):

$$\text{Lower limit} = R \times L$$

$$\text{Upper limit} = R \times U$$

where

$R$  = birth rate

$L$  = the value in Table IV in "Births: Final Data for 2003" (5) that corresponds to the number of events  $B$

$U$  = the value in Table IV in "Births: Final Data for 2003" (5) that corresponds to the number of events  $B$

### Example

Suppose that the general fertility rate for single-race NHOPI women in Pennsylvania was 65.7 per 1,000 women 15–44 years of age, based on 87 births in the numerator. Using Table IV:

$$\text{Lower limit} = 65.7 \times 0.80096 = 52.6$$

$$\text{Upper limit} = 65.7 \times 1.23350 = 81.0$$

This means that the chances are 95 out of 100 that the actual general fertility rate for single-race NHOPI women in Pennsylvania lies between 52.6 and 81.0.

### 95 percent confidence limits for rates when the numerator is 100 or more

In this case, use the following formula for the birth rate  $R$  based on the number of births  $B$ :

$$\text{Lower limit} = R - [1.96 \times (R / \sqrt{B})]$$

$$\text{Upper limit} = R + [1.96 \times (R / \sqrt{B})]$$

where

$R$  = birth rate

$B$  = number of births

### Example

Suppose that the general fertility rate for single-race Asian (Asian alone) women is 62.9 births per 1,000 women age 15–44 years, based on 80,747 births in the numerator. Therefore, the 95 percent confidence interval would be:

$$\begin{aligned}\text{Lower limit} &= 62.9 - [1.96 \times (62.9 / \sqrt{80,747})] \\ &= 62.9 - 0.433 \\ &= 62.5\end{aligned}$$

$$\begin{aligned}\text{Upper limit} &= 62.9 + [1.96 \times (62.9 / \sqrt{80,747})] \\ &= 62.9 + 0.433 \\ &= 63.3\end{aligned}$$

This means that the chances are 95 out of 100 that the actual general fertility rate for single-race Asian women lies between 62.5 and 63.3.

### Computing 95 percent confidence intervals for percentages

In many instances we need to compute the confidence intervals for percentages. Percentages derive from a binomial distribution. As with birth rates, an asterisk (\*) will be shown for any percentage that is based on fewer than 20 births in the numerator. We easily compute a 95 percent confidence interval for a percentage when the following conditions are met:

$$B \times p \geq 5 \text{ and } B \times q \geq 5$$

where

$B$  = number of births in the denominator

$p$  = percent divided by 100

$q = 1 - p$

For natality data, these conditions will be met except for very rare events in small subgroups. If the conditions are not met, the variation in the percentage will be so large as to render the confidence intervals meaningless. When these conditions are met the 95 percent confidence interval can be computed using the normal approximation of the binomial. The 95 percent confidence intervals are computed by the following formulas:

$$\text{Lower limit} = p - [1.96 \times (\sqrt{p \times q / B})]$$

$$\text{Upper limit} = p + [1.96 \times (\sqrt{p \times q / B})]$$

where

$p$  = percent divided by 100

$q = 1 - p$

$B$  = number of births in the denominator

### Example

Suppose that the percentage of births to single-race NHOPI women that were non marital was 49.7 percent. This was based on 14,751 births in the numerator and 29,682 births in the denominator. First we test to make sure we can use the normal approximation of the binomial:

$$29,682 \times 0.497 = 14,752$$

$$29,682 \times (1 - 0.497) = 29,682 \times 0.503 = 14,930$$

Both 14,752 and 14,930 are greater than 5 so we can proceed. The 95 percent confidence interval would be:

$$\begin{aligned} \text{Lower limit} &= 0.497 - [1.96 \times (\sqrt{0.497 \times 0.503 / 29,682})] \\ &= 0.497 - 0.006 \\ &= 0.491 \text{ or } 49.1 \text{ percent} \end{aligned}$$

$$\begin{aligned} \text{Upper limit} &= 0.497 + [1.96 \times (\sqrt{0.497 \times 0.503 / 29,682})] \\ &= 0.497 + 0.006 \\ &= 0.503 \text{ or } 50.3 \text{ percent} \end{aligned}$$

This means that the chances are 95 out of 100 that the actual percentage of births to unmarried single-race NHOPI women lies between 49.1 and 50.3 percent.

### Significance testing

#### One or both of the rates is based on fewer than 100 cases

To compare two rates, when one or both of those rates are based on fewer than 100 cases, you first compute the confidence intervals for both rates. Then you check to see if those intervals overlap. If they **do** overlap, the difference is not statistically significant at the 95 percent level. If they **do not** overlap, the difference is indeed statistically significant.

### Example

Suppose that the general fertility rate for single-race NHOPI women in Pennsylvania was 65.7 per 1,000 women 15–44 years of age and 57.2 for multiple-race NHOPI women in Pennsylvania. Is the rate for single-race NHOPI women significantly higher than the rate for multiple-race NHOPI women? The two rates are based on 87 events for the single race and 77 events for the multiple race. Both rates are based on fewer than 100 events; therefore, the first step is to compute the confidence intervals for both rates.

These two confidence intervals overlap. Therefore, the general fertility rate for single-race NHOPI women in Pennsylvania is not

	Lower Limit	Upper Limit
Single-race NHOPI . . . . .	52.6	81.0
Multiple-race NHOPI . . . . .	45.1	71.5

significantly higher (at the 95 percent confidence level) than the rate for multiple-race NHOPI women in Pennsylvania.

This method of comparing confidence intervals is a conservative test for statistical significance. That is, the difference between two rates may, in fact, be statistically significant even though confidence intervals for the two rates overlap (19). Thus, caution should be observed when interpreting a nonsignificant difference between two rates, especially when the lower and upper limits being compared overlap only slightly.

### Both rates are based on 100 or more events

When both rates are based on 100 or more events, the difference between the two rates, irrespective of sign (+/-), is considered statistically significant if it exceeds the statistic in the formula below. This statistic equals 1.96 times the standard error for the difference between two rates.

$$1.96 \times \sqrt{\frac{R_1^2}{N_1} + \frac{R_2^2}{N_2}}$$

where

$R_1$  = first rate

$R_2$  = second rate

$N_1$  = first number of births

$N_2$  = second number of births

If the difference is **greater** than this statistic, then the difference would occur by chance fewer than five times out of 100. If the difference is **less than or equal** to this statistic, the difference might occur by chance more than five times out of 100. We say that the difference is not statistically significant at the 95 percent confidence level.

### Example

Is the general fertility rate for single-race Asian women (62.9 births per 1,000 women aged 15–44 years) significantly higher than the comparable rate for multiple-race Asian women (62.7)? Both rates are based on more than 100 births (80,747 for single-race Asian women and 11,478 for multiple-race Asian women). The difference between the rates is  $62.9 - 62.7 = 0.2$ . The statistic is then calculated as follows:

$$\begin{aligned} &1.96 \times \sqrt{\frac{62.9^2}{80,747} + \frac{62.7^2}{11,478}} \\ &= 1.96 \times \sqrt{[(3,956.4/80,747) + (3,931.3/11,478)]} \\ &= 1.96 \times \sqrt{0.049 + 0.343} \\ &= 1.96 \times \sqrt{0.392} \\ &= 1.96 \times 0.626 \\ &= 1.23 \end{aligned}$$

The difference between the rates (0.2) is not greater than this statistic (1.23). Therefore, the difference is not statistically significant at the 95 percent confidence level.

### Testing differences between two percentages

When testing the difference between two percentages, both percentages must meet the following conditions:

$$B \times p \geq 5 \text{ and } B \times q \geq 5$$

where

$B$  = number of births in the denominator

$p$  = percentage divided by 100

$q = 1 - p$

When both percentages meet these conditions, then the difference between the two percentages is considered statistically significant if it is greater than the statistic in the formula below. This statistic equals 1.96 times the standard error for the difference between two percentages.

$$1.96 \times \sqrt{p \times (1 - p) \times \left( \frac{1}{B_1} + \frac{1}{B_2} \right)}$$

where

$B_1$  = number of births in the denominator of the first percentage

$B_2$  = number of births in the denominator of the second percentage

$$p = \frac{B_1 \times p_1 + B_2 \times p_2}{B_1 + B_2}$$

$p_1$  = the first percentage divided by 100

$p_2$  = the second percentage divided by 100

### Example

Is the percentage of births to unmarried women higher for single-race black women (50.2) than multiple-race black women (49.7)? Suppose that the number in the denominator was 13,714 for single-race black women and 29,682 for multiple-race black women. The necessary conditions are met for both percentages (calculations not shown). The difference between the two percentages is  $0.502 - 0.497 = 0.005$ . The statistic is then calculated as follows:

$$\begin{aligned} 1.96 \times \sqrt{0.499 \times (0.501) \times (0.000106609)} &= 1.96 \times \sqrt{0.000026652} \\ &= 1.96 \times 0.005162563 \\ &= 0.010 \end{aligned}$$

The difference between the percentages (0.005) is less than this statistic (0.010). Therefore, the difference is not statistically significant at the 95 percent confidence level.

### Testing differences between two ratios

A previous report details the formula and procedure in testing differences between two sex ratios when the number of male or female births is based on 100 or more cases (20). When one or both ratios are based on fewer than 100 cases, confidence intervals are computed for both ratios and compared. (The lower and upper confidence limits are computed from the sex ratio and the values in Table IV in "Births: Final Data for 2003" (5) that correspond to the adjusted number of births,  $B_{adj} = (B_M \times B_F) / (B_M + B_F)$ , where  $B_M$  is the number of male births and  $B_F$  is the number of female births). If the confidence intervals overlap, the difference is not statistically significant given the width of the confidence interval (i.e., 95 percent level). If they do not overlap, the difference is statistically significant.

### Testing differences between two means

Another report details the formula and procedure in testing differences between two means in which both means are based on 100 or more cases (21). When one or both means are based on fewer than 100 cases, confidence intervals are computed for both means based on the mean and number of births. Again, if the confidence intervals overlap, the difference is not statistically significant given the width of the confidence interval (i.e., 95 percent level). If they do not overlap, the difference is statistically significant.

---

## Contents

Abstract	1
Introduction	2
Methods	2
Results	3
Demographic characteristics of mother	3
Sex ratio	3
Age of mother	3
Hispanic origin of mother	5
Births to unmarried women	6
Place of birth	6
Multiple Race of Father	7
Births	7
Infant Health Characteristics	8
Period of gestation	8
Birthweight	8
Conclusion	8
References	9
List of Detailed Tables	9
Technical Notes	16

---

## Acknowledgments

This report was prepared under the general direction of Charles J. Rothwell, Director of the Division of Vital Statistics (DVS), James A. Weed, Deputy Director of DVS, and Stephanie J. Ventura, Chief of the Reproductive Statistics Branch (RSB). David P. Johnson of the Systems, Programming, and Statistical Resources Branch (SPSRB) provided computer programming support and review. The authors gratefully acknowledge the contribution of James A. Weed (DVS) and David P. Johnson of SPSRB who were instrumental in creating and developing the procedure for collecting and analyzing multiple race. James A. Weed (DVS) served as peer reviewer. Thomas D. Dunn of SPSRB and Joyce A. Martin and Yashodhara Patel of RSB provided content review. This report was edited by Demarius V. Miller, CDC/CCHIS/NCHM/Division of Creative Services, Writer Editor Services Branch; typeset by Jacqueline M. Davis, CoCHIS/NCHM/Division of Creative Services; and graphics were produced by Jarmila G. Ogburn, CoCHIS/NCHM/Division of Creative Services.

---

## Copyright information

All material appearing in this report is in the public domain and may be reproduced or copied without permission; citation as to source, however, is appreciated.

---

## Suggested citation

Hamilton BE, Ventura SJ. Characteristics of births to single- and multiple-race women: California, Hawaii, Pennsylvania, Utah, and Washington, 2003. National vital statistics reports; vol 55 no 15. Hyattsville, MD: National Center for Health Statistics. 2007.

---

## National Center for Health Statistics

Director  
Edward J. Sondik, Ph.D.

Acting Co-Deputy Directors  
Jennifer H. Madans, Ph.D.  
Michael H. Sadagursky

## Division of Vital Statistics

Director, Charles J. Rothwell

---

## U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES

Centers for Disease Control and Prevention  
National Center for Health Statistics  
3311 Toledo Road  
Hyattsville, MD 20782

---

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE, \$300

---

To receive this publication regularly, contact  
the National Center for Health Statistics by  
calling 1-800-232-4636  
E-mail: [nchsquery@cdc.gov](mailto:nchsquery@cdc.gov)  
Internet: [www.cdc.gov/nchs](http://www.cdc.gov/nchs)

---

CS109414 (5/2007)  
T28116  
DHHS Publication No. (PHS) 2007-1120

FIRST CLASS MAIL POSTAGE & FEES PAID CDC/NCHS PERMIT NO. G-284
---