

## Trends and Variations in Reproduction and Intrinsic Rates: United States, 1990–2014

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### Abstract

**Objective**—This report presents trends in reproduction and intrinsic rates from 1990 through 2014. In addition, total fertility and gross reproduction rates by race and Hispanic-origin group are presented from 1990 through 2014, and net reproduction and intrinsic rates for selected race and Hispanic-origin group are presented from 2006 through 2014.

**Methods**—Tabular and graphic data on the trends in the reproduction and intrinsic rates for the United States, by race and Hispanic origin of mother, are presented and described.

**Results**—Rates of reproduction (total fertility, gross reproduction, and net reproduction), the intrinsic rate of natural increase, and the intrinsic birth rate were lower in 2014 than

1990. After a steady decline from 1990 through 1997, all rates increased from 1997 through 2007 but declined again from 2007 through 2013. The rates increased between 2013 and 2014. Among the race and Hispanic subgroups examined, the total fertility and gross reproduction rates were lower for all groups in 2014 compared with 1990. The net reproduction rate, intrinsic rate of natural increase, and intrinsic birth rate for the selected groups non-Hispanic white, non-Hispanic black, and Hispanic declined from 2006 through 2014.

**Keywords:** birth certificate • total fertility rate • gross reproduction rate • net reproduction rate • intrinsic rate of natural increase • intrinsic birth rate

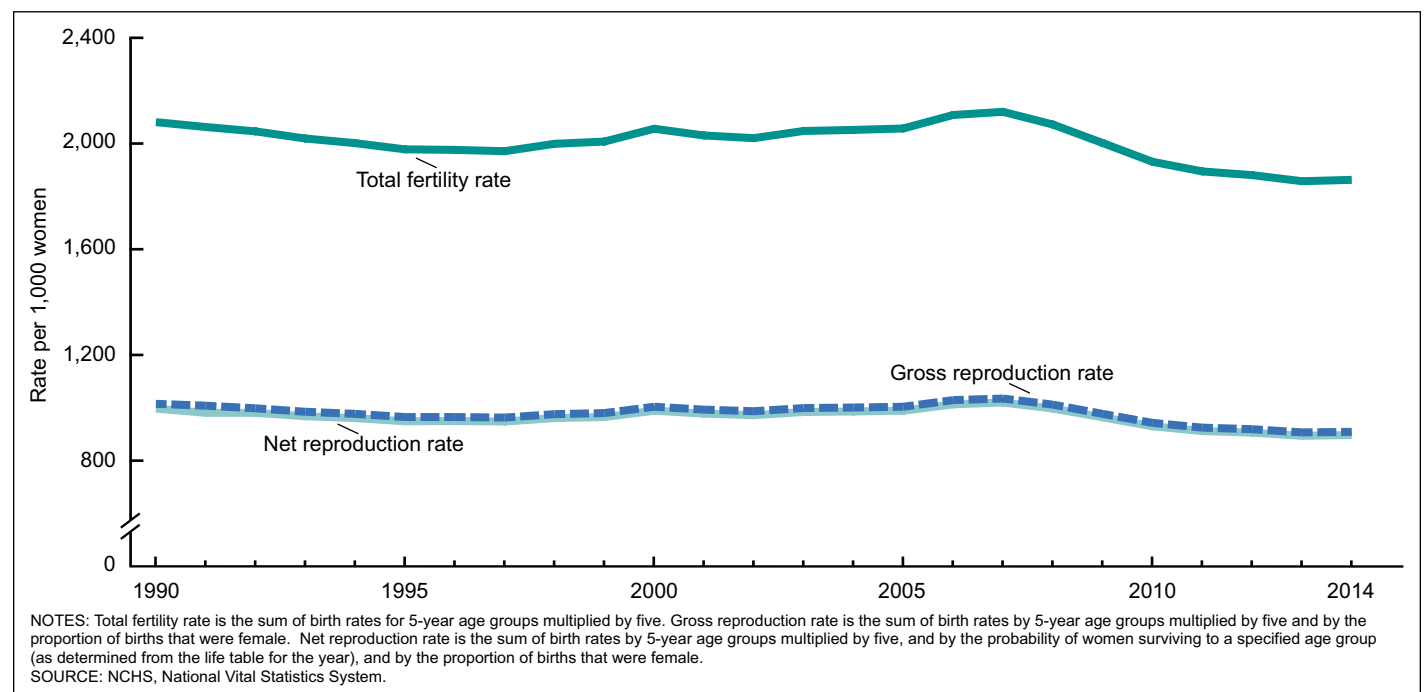


Figure 1. Total fertility, gross reproduction, and net reproduction rates: United States, 1990–2014

## Dedication

This report is dedicated to Sharon E. Kirmeyer, Ph.D.  
May 22, 1949–September 24, 2016



Sharon Kirmeyer was an integral member of the Division of Vital Statistics' Reproductive Statistics Branch for more than 12 years and contributed to research on interpregnancy birth interval, prepregnancy body mass index, cohort fertility, and childlessness. Her insight and generosity will be greatly missed by her colleagues and friends at the National Center for Health Statistics.

## Introduction

This report provides detailed information on fertility patterns for 1990–2014, focusing on the more recent period 2000 through 2014. An earlier report described fertility patterns for 1990 through 2002 (1). These measures are important for understanding population growth and change in the United States (1). Reproduction and intrinsic rates are useful additions to the birth and fertility rates published annually by the National Center for Health Statistics (NCHS). Whereas birth and fertility rates measure the fertility of women in a given year, the rates of reproduction summarize the fertility of women over a generation, that is, the total or average number of births expected for a group of women during their lifetime given particular fertility and mortality rates. The cumulative birth rate from the cohort fertility tables measures the actual number of births for a group or cohort of women, but it requires that the women have completed their lifetime childbearing (1). The intrinsic rates summarize the birth, death, and rate of change of a population, which would be expected to prevail given particular fertility and mortality rates. (Life expectancy at birth is based on the same principle.) Because the reproduction and intrinsic rates are based on age-specific birth and mortality rates, these measures are not affected by changes over time in the age composition of a population and can be used to compare populations over time or among different groups. The intrinsic rates reflect the change, fertility, and mortality of a population apart from the effect of the age structure (and excluding migration). These rates are annual measures similar to the crude rate of natural increase, crude birth rate, and crude death rate.

This report updates an earlier report and presents new gross reproduction rates for 2003–2014 and new net reproduction and intrinsic rates for 1991–1999 and 2002–2014 (1). This report also presents revised gross reproduction rates for 2001 and 2002 and revised net reproduction and intrinsic rates for 2001 (for more information, see reference 1). All rates in this report are based on the latest available total fertility and age-specific birth rates for 1999–2014, which are based on population estimates (revised) consistent with the 1990, 2000, and 2010 censuses (2). (The above-mentioned total fertility rates are also shown in this report.) Consequently, the revised rates may differ from those previously published based on earlier population estimates (unrevised) (1). The reproduction and intrinsic rates are presented by race and Hispanic origin of mother. To place the new and revised reproduction and intrinsic rates in context, and to provide an overall indication of the trends, the rates are shown since 1990 (except for the net reproduction and intrinsic rates for non-Hispanic white, non-Hispanic black, and Hispanic population groups that are available in this report for the first time from 2006 to the present).

## Methods

This report presents new reproduction and intrinsic rates for 2002–2014 and revised rates for 1991–1999 and 2001.

The reproduction and intrinsic rates shown in this report are based on the total fertility and age-specific birth rates published in “Births: Final Data for 2014” ([2], see Tables 4 and 8), and the probability of survival from published and unpublished life tables of mortality reports (3–24). The fertility rates shown in this report are based on data from 100% of the birth certificates registered in all states and the District of Columbia (D.C.). Similarly, the survival probabilities are based on data from 100% of the death certificates registered in the states and D.C. The birth (and death) data are provided to NCHS through the Vital Statistics Cooperative Program.

Race and Hispanic origin are reported separately on the birth certificate. In tabulations of birth data by race and Hispanic origin of mother, data for Hispanic persons are not further classified by race because the majority of women of Hispanic origin report themselves as white. This report shows reproduction and intrinsic rates for the three largest population groups: non-Hispanic white, non-Hispanic black, and Hispanic. In addition, total fertility and net reproduction rates are shown for the following population groups: total white, total black, total American Indian or Alaska Native (AIAN), total Asian or Pacific Islander (API), and specified Hispanic groups (Mexican, Puerto Rican, Cuban, and Other Hispanic).

The total fertility and age-specific birth rates used to calculate the reproduction and intrinsic rates, as well as the probability of survival, estimated from the life tables and used to calculate the net reproduction and intrinsic rates, are based on intercensal and postcensal population estimates consistent with the latest census, with the exception of the life tables for 1991–1999 for the United States. These life tables have not been revised to incorporate population estimates based on the 2000 census.

Net reproduction rates, intrinsic rates of natural increase, intrinsic birth rates, and intrinsic death rates for non-Hispanic white, non-Hispanic black, and Hispanic population groups are shown for the first time in this report, and are based on life tables for these groups available only since 2010 (starting with the data year 2006) (3–24). Net reproduction rates, intrinsic rates of natural increase, intrinsic birth rates, and intrinsic death rates for the AIAN and API race groups and specified Hispanic-origin groups cannot be computed and shown because life tables are not available for these groups (3–24). (While life tables are available for white total and black total population groups, this report shows net reproduction and intrinsic rates and trends for non-Hispanic white and non-Hispanic black population groups to allow comparison with the Hispanic population group.) The total fertility and gross reproduction rates are available for all race and Hispanic-origin groups from 1990 through 2014 and are presented and discussed in the report. For net reproduction rates, intrinsic rates of natural increase, intrinsic birth rates, and intrinsic death rates, trends are presented only for the three largest population groups, non-Hispanic white, non-Hispanic black, and Hispanic, because (as indicated above) life tables are not available for all race groups.

The differences in rates have been tested for statistical significance. A statement that a given rate is higher or lower than another rate indicates that the rates are statistically different at the significance level of 0.05. Trends in the rates were evaluated using the Joinpoint Regression Program (25). For information on the method used to test for statistical significance, see [Technical Notes](#).

## Results

### Rates of reproduction

*Total fertility rate*—The total fertility rate (TFR) shows the potential impact of current fertility patterns on reproduction, that is, completed family size. The rate indicates the average number of births to a hypothetical cohort of 1,000 women, if they experienced throughout their childbearing years the age-specific birth rates observed in a given year.

The TFR generally declined from 1990 through 2014, dropping to 1,862.5 births per 1,000 women from 2,081.0 ([Table 1](#) and [Figure 1](#)). From 1990 through 1997, the rate declined steadily, falling 5% (to 1,971.0 in 1997). The TFR generally increased from 1997 through 2007 (rising 8% to 2,120.0), but it declined 12% from 2007 through 2013, with the pace of decline slowing or moderating after 2011. The rate increased less than 1% from 2013 through 2014.

From 1990 through 2014, the TFR was below “replacement,” the level at which a given generation can exactly replace itself (generally considered to be 2,100 births per 1,000 women), for each year except for 2006 and 2007. Before 2006, the rate was last above replacement in 1972 (2).

The TFR declined for all race and Hispanic-origin groups, except for Cuban women, from 1990 through 2014. Nevertheless, rates differed substantially by race and Hispanic origin. Rates for Hispanic women exceeded replacement for every year from

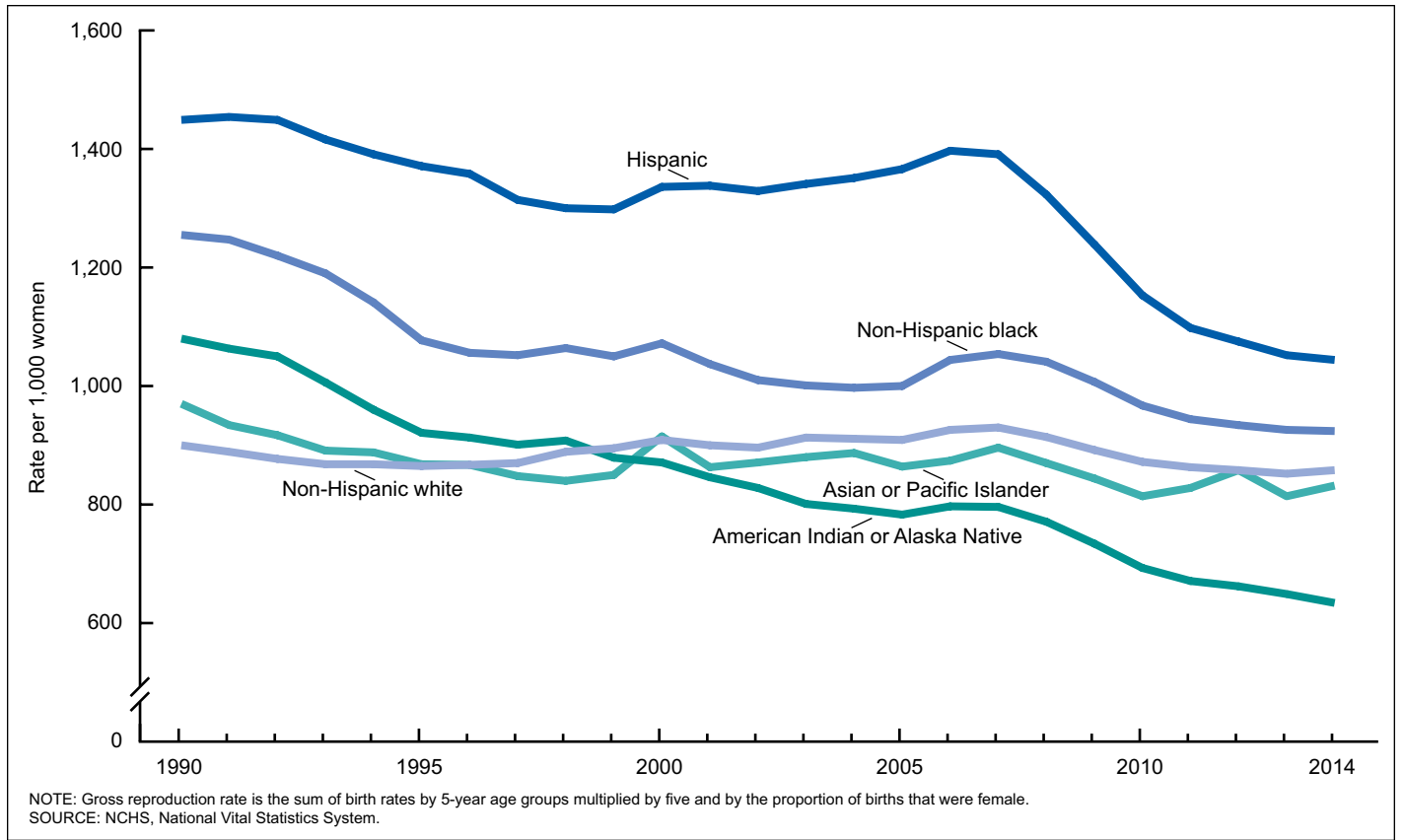
1990 through 2014, whereas the rates for non-Hispanic white and API women were consistently below replacement during that time ([Tables 2](#) and [3](#)). The rate for AIAN women was above replacement from 1990 through 1992, but it has been below since 1993 and has been the lowest among the race groups since 2000. The decline in and low rate for AIAN women reflect the relatively low number and small increase in births to women in this race group compared with the large increase in the population size of AIAN women. The increase in the AIAN population, which was comparatively greater than other race and Hispanic-origin groups, was driven, in part, by a large increase in the Hispanic AIAN population. Among the specified Hispanic groups, rates differed substantially, with the rate for Mexican women exceeding replacement for all but the last 3 years from 1990 through 2014, whereas the rates for Cuban women were consistently below replacement and lowest among the Hispanic groups.

*Gross reproduction rate*—The gross reproduction rate (GRR) is another measure used to summarize reproduction. The GRR represents the average number of daughters born to a hypothetical cohort of 1,000 women if they experienced the age-specific birth rates observed in a given year throughout their childbearing years, and if none of the cohort were to die during their childbearing years. The GRR is similar to the TFR except that it measures only female births, since reproduction is largely dependent on the number of females in a given population.

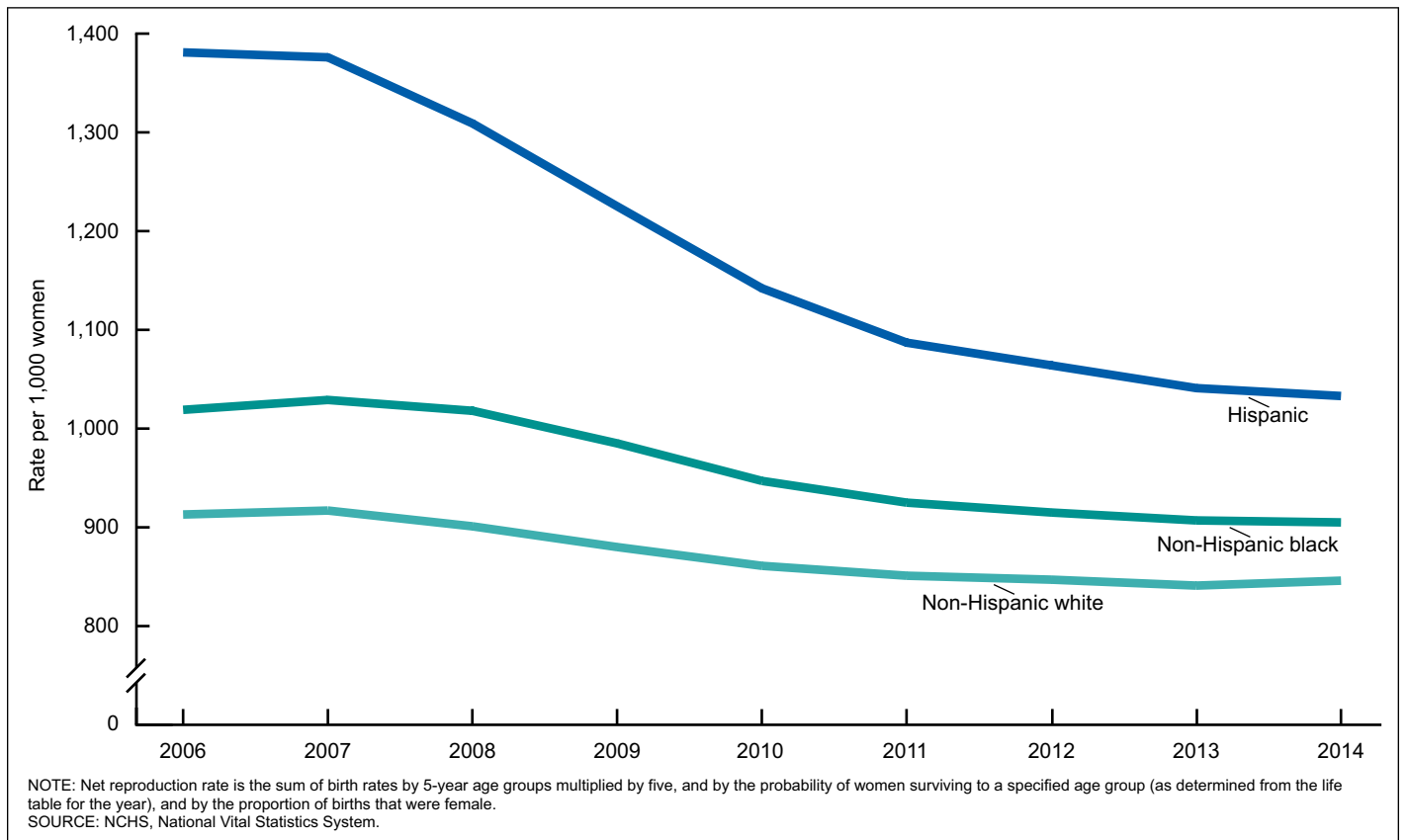
In 2014, the **GRR** was 909 female births per 1,000 women ([Table 1](#)), down 10% from the rate in 1990 (1,015). The rate generally declined from 1990 through 1997 (963), generally rose from 1997 through 2007 (to 1,035), and then declined through 2013, with the rate of the decline lessening after 2011 ([Figure 1](#)). The rate increased less than 1% from 2013 through 2014. Due to the narrow variability of the number of female births relative to male births, the GRR has closely paralleled the TFR.

GRRs also varied considerably by race and Hispanic origin ([Tables 2](#) and [3](#) and [Figure 2](#)). In 2014, the rates for the three largest race and Hispanic-origin groups were 858 for non-Hispanic white women, 924 for non-Hispanic black women, and 1,044 for Hispanic women. The 2014 rates for AIAN and API women were 634 and 832, respectively. The rate for AIAN women has been the lowest among the race groups since 2000. The rates for all groups in 2014 were lower than in 1990, with the exception of Cuban women, for whom the rate rose from 703 to 767. The largest declines were for AIAN, Hispanic, and non-Hispanic black women (down 41%, 28%, and 26%, respectively) (see note about decline of TFR for AIAN women above). Rates were down by 14% for API women and 5% for non-Hispanic white women from 1990 through 2014.

*Net reproduction rate*—The net reproduction rate (NRR) is closely related to the GRR. The NRR, however, unlike the GRR, incorporates the effects of mortality. The NRR represents the average number of daughters who would be born to a hypothetical cohort of 1,000 women, if they passed through their childbearing years conforming to the age-specific fertility and mortality rates of a given year. In comparison, the GRR assumes that all of the women in the cohort survive through their childbearing years.



**Figure 2. Gross reproduction rate, by race and Hispanic origin: United States, 1990–2014**



**Figure 3. Net reproduction rate, by race and Hispanic origin of mother: United States, 2006–2014**

The NRR for the United States was 897 births per 1,000 women in 2014, down from 997 in 1990. From 1990 through 1997, the rate declined steadily, dropping 5%, and then generally rose from 1997 (948) through 2007 (1,020) (Table 1 and Figure 1). The rate declined overall between 2007 and 2013, down 12%, with the rate of the decline lessening since 2011. The rate increased (less than 1%) from 2013 through 2014.

For the three largest race and Hispanic-origin groups the NRR varied. In 2014, the rate was 846 births per 1,000 for non-Hispanic white, 905 for non-Hispanic black, and 1,033 for Hispanic women. From 2006 through 2014, rates declined 7% for non-Hispanic white, 11% for non-Hispanic black, and 25% for Hispanic women (Table 3 and Figure 3).

The NRR can also be used to measure replacement; a rate of 1,000 means that a cohort of 1,000 women is having enough daughters to exactly replace itself in the population. In general, the overall rate has been below replacement, except for 2006 and 2007, mirroring the TFR (Figure 1) (1). The NRR was above replacement for Hispanic women from 2006 through 2014, changed from above to below replacement for non-Hispanic black women during these years, and was below replacement for non-Hispanic white women over this period.

The difference between the GRR and the NRR has diminished considerably over the last several decades, reflecting the decline in the age-specific mortality rates of women in their childbearing years.

## Intrinsic rates

The **intrinsic rate of natural increase (IRNI)** measures the rate of change of population size that would eventually result from the continuance of the age-specific birth and mortality rates of a given year over time, assuming no migration. A rate that is less than zero (negative) signifies a population decline, whereas a rate greater than zero (positive) denotes population growth.

The intrinsic rate of natural increase for the United States in 2014 was  $-3.7$  per 1,000 population. The rate was negative, indicating a population decrease for all years from 1990 through 2014, except for 2006 and 2007. The IRNI was down in 2014 from 1990 (Table 1 and Figure 4). From 1990 through 1997, the rate declined steadily, falling from  $-0.1$  to  $-2.0$ , then increased generally from 1997 through 2007 (rising to  $0.7$ ). The rate has generally declined since 2007, with the rate of the decline lessening since 2011. The trend of the IRNI has generally paralleled that of the NRR since 1990 (Figure 4).

Among the three largest race and Hispanic-origin groups, IRNIs differ considerably. In 2014, the rates for non-Hispanic white and non-Hispanic black population groups were both negative, at  $-5.7$  and  $-3.6$ , respectively, whereas the rate for the Hispanic population group was positive, at  $1.1$ . From 2006 through 2014, the rate for the non-Hispanic white population group declined 78% from  $-3.2$  in 2006, whereas the rate for the non-Hispanic black population group declined from  $0.7$  in 2006, shifting from an increasing population (2006–2008) to decreasing population (2009–2014) (Table 3 and Figure 5). The

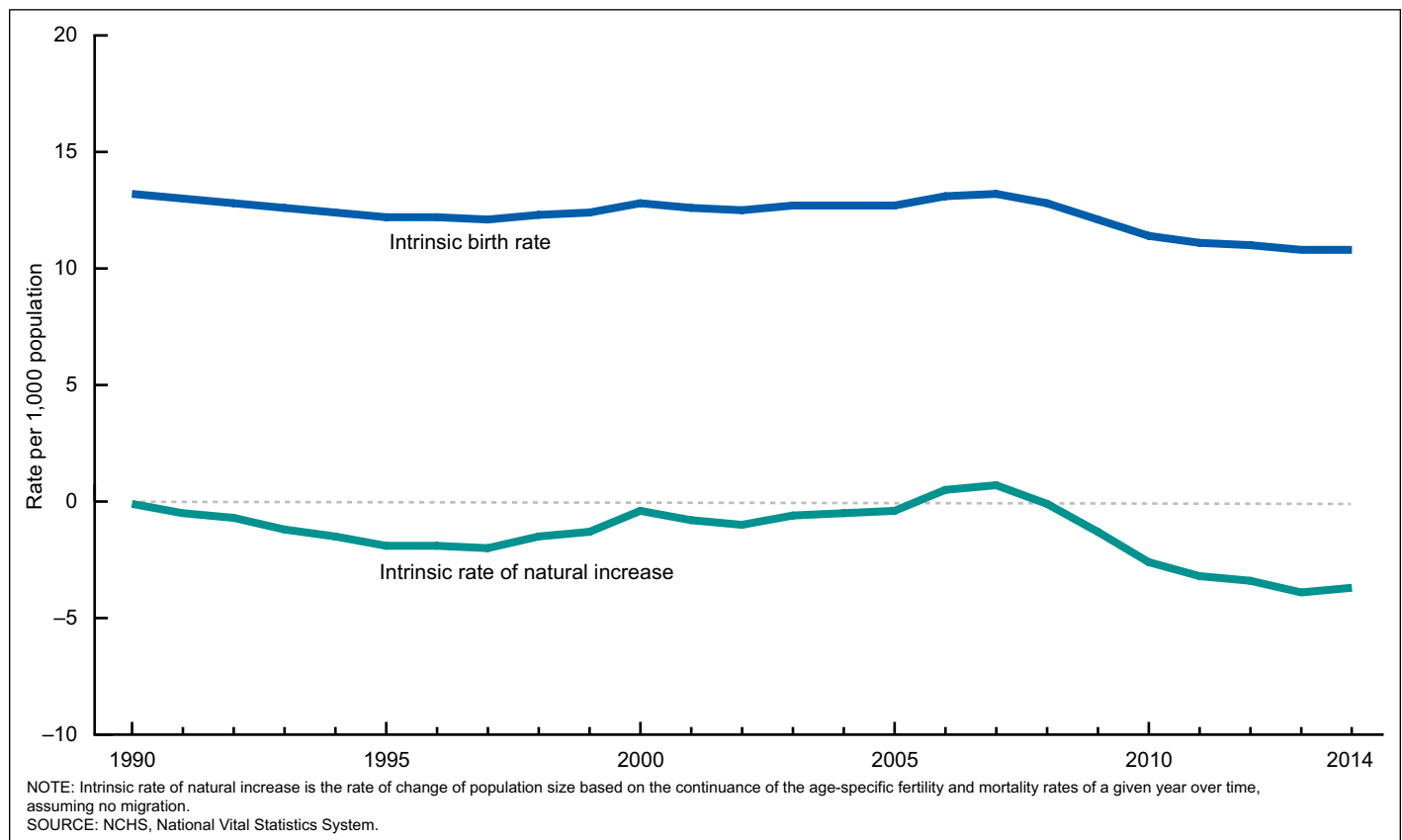
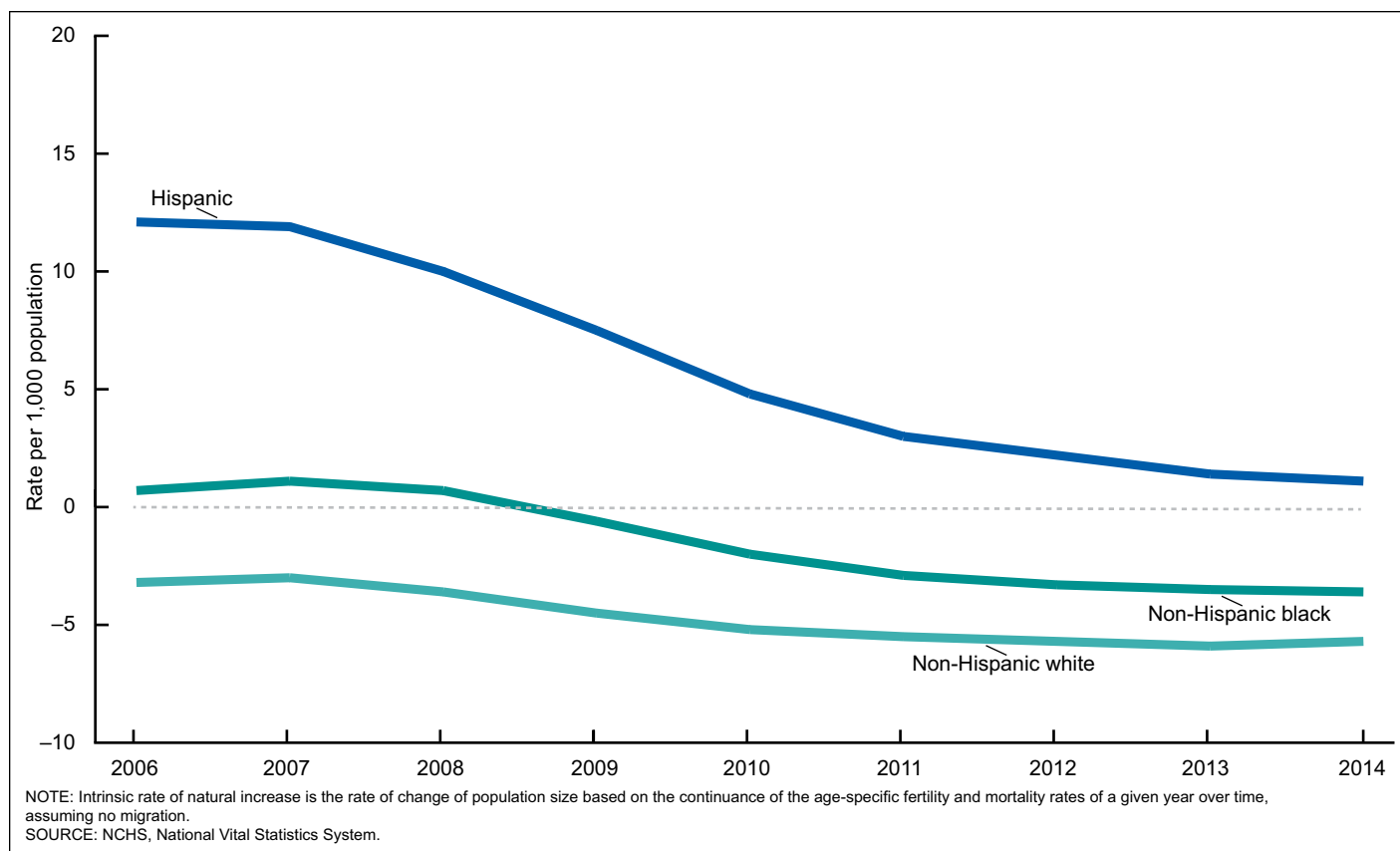


Figure 4. Intrinsic rate of natural increase and intrinsic birth rate: United States, 1990–2014



**Figure 5. Intrinsic rate of natural increase, by race and Hispanic origin of mother: United States, 2006–2014**

intrinsic rate for the Hispanic population group declined steadily from 2006 through 2014, down 91% from 12.1, but it remained positive throughout this period.

The **intrinsic birth rate (IBR)** is the birth rate of a stable population, that is, a hypothetical population that would eventually prevail if the age-specific birth and mortality rates of a given year continued over time, assuming no migration. This population is stable in terms of its unchanging age structure. The other component of the rate of increase is the intrinsic death rate (IDR). The intrinsic death rate is the mortality rate of the stable population.

From 1990 through 2014, the IBR declined 18% to 10.8 births per 1,000 population from 13.2 (Table 1 and Figure 4). The IBR declined from 1990 through 1997 (12.1), rose from 1997 through 2007 (13.2), and then declined from 2007 through 2014, with the rate of the decline lessening since 2011. During this time, the trend for the IDR was the reverse of the trend for the IBR (Table 1). That is, it rose from 1990 through 1997, declined from 1997 through 2007, and then rose again from 2007 through 2014.

Based on the ratio of the percent change in the IBR to the percent change in the IDR, the overall decline in the IRNI from 1990 through 2014 reflected a decrease in the IBR, but there were exceptions. From 1990 through 1997, the fall in the IRNI was due mostly to the decrease in the IBR, compared with the increase in the IDR. From 1997 through 2007, however, the fall in the IRNI was due mostly to the increase in the IDR, compared with the decrease in the IBR. Finally, from 2007 through 2014,

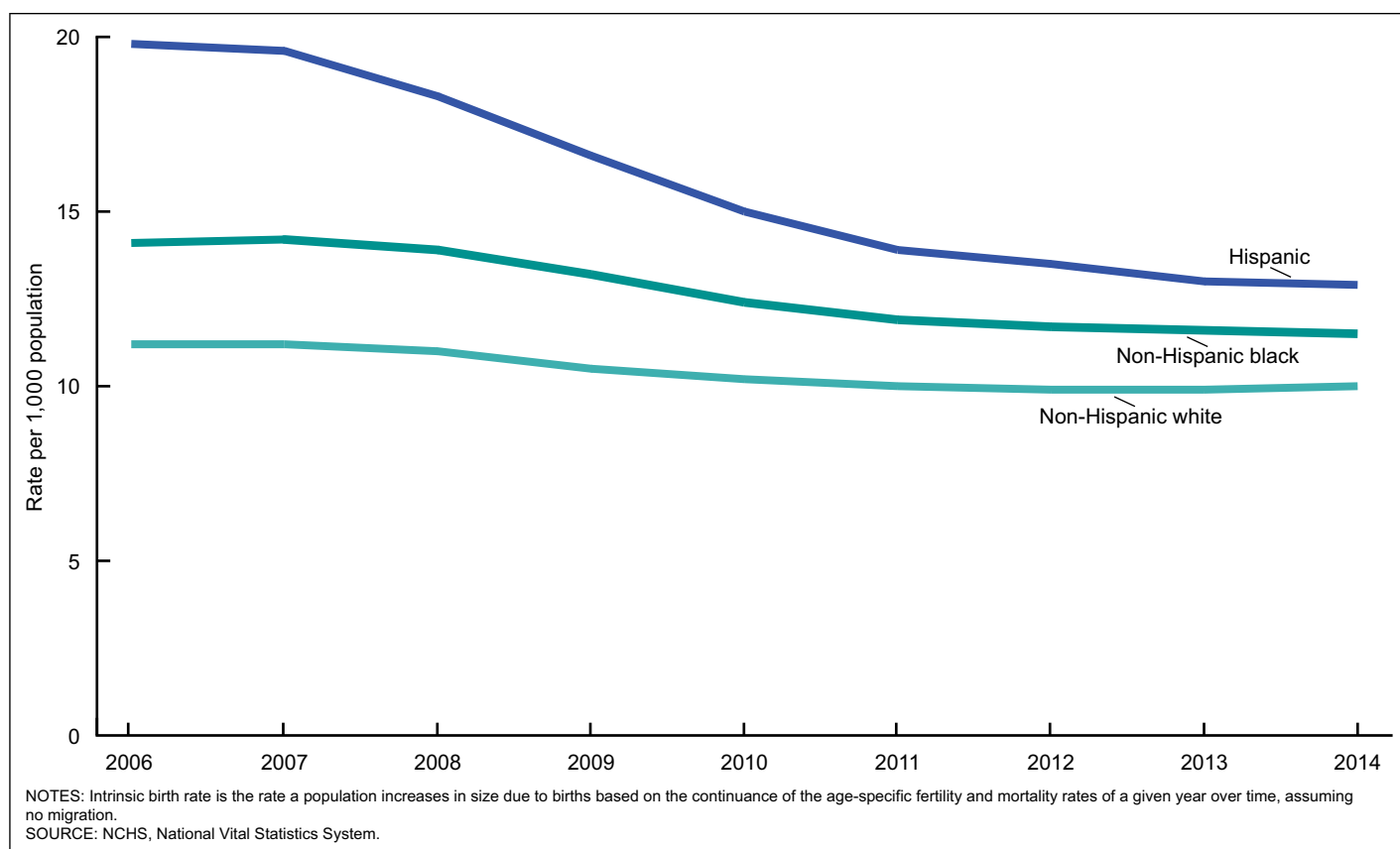
the decline in the IRNI was again due mostly to the decrease in the IBR, compared with the increase in the IDR.

In 2014, the IBR was 10.0 for non-Hispanic white, 11.5 for non-Hispanic black, and 12.9 for Hispanic population groups, down for each group from 11.2, 14.1, and 19.8 in 2006, respectively (Table 3 and Figure 6). However, the IDR rose during this period for non-Hispanic white (from 14.4 to 15.7), non-Hispanic black (from 13.4 to 15.1), and Hispanic (from 7.7 to 11.8) population groups. Based on the ratio of the percent change in the IBR to the percent change in the IDR, the decline in the IRNI for Hispanic and non-Hispanic black population groups was due mostly to the decline in the IBR, while the decline in the IRNI for the non-Hispanic white group was due more to the rise in the IDR.

## Conclusion

Reproductive and intrinsic rates provide important measures for understanding population growth and change in the United States. Whereas birth and fertility rates measure the fertility of women in a given year, the rates of reproduction estimate the total or average number of births expected for a group of women during their lifetime given particular fertility and mortality rates. Similarly, the intrinsic rates summarize the expected fertility, mortality, and change of a population given particular fertility and mortality rates and, unlike the crude birth rate, crude death rate, and crude rate of natural increase, they are not affected





**Figure 6. Intrinsic birth rate, by race and Hispanic origin of mother: United States, 2006–2014**

by changes over time in the age composition of a population. Accordingly, the intrinsic rates, as well as the reproductive rates, can be used to compare populations over time or among different groups.

This report presented new and revised reproduction and intrinsic rates, including: new gross reproduction rates for 2003–2014, new net reproduction and intrinsic rates for 1991–1999 and 2002–2014, revised gross reproduction rates for 2001 and 2002, and revised net reproduction and intrinsic rates for 2001 (1). In addition, this report also presented, for the first time, the reproduction and intrinsic rates by race and Hispanic origin of mother for the three largest groups: non-Hispanic white, non-Hispanic black, and Hispanic.

In general, the rates of reproduction declined from 1990 through 2014, down 10% each for the total fertility, gross reproduction, and net reproduction rates. Moreover, each of these rates have been below replacement, the level at which a given group can replace itself, for most years from 1990 through 2014. The IRNI and IBR also declined from 1990 through 2014, down 36-fold and 18%, respectively, whereas the IDR rose by 9%. (As noted, the intrinsic rates reflect the change, fertility, and mortality of a population apart from the effect of the age structure and excluding migration, which when taken into account, would affect the rates.)

For the selected race and Hispanic-origin groups, the rates of reproduction (TFR, GRR, and NRR) declined from 2006 through 2014 for non-Hispanic white, non-Hispanic black, and Hispanic women. The intrinsic rates (IRNI and IBR) declined as

well from 2006 through 2014 for the three population groups. For one group, non-Hispanic black, the IRNI reversed from positive to negative during this period. Despite these declines, however, differences in the reproductive and intrinsic rates for the groups persist.

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## List of Detailed Tables

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**Table 1. Total fertility rates, gross reproduction rates, net reproduction rates, intrinsic rates of natural increase, intrinsic birth rates, and intrinsic death rates: United States, 1990–2014**

[Total fertility rate is the sum of birth rates for 5-year age groups multiplied by five. Gross reproduction rate is the sum of birth rates by 5-year age groups multiplied by five and by the proportion of births that were female. Net reproduction rate is the sum of birth rates by 5-year age groups multiplied by five, and by the probability of women surviving to a specified age group (as determined from the life table for the year), and by the proportion of births that were female. Intrinsic rate of natural increase is the rate of change of population size based on the continuance of the age-specific fertility and mortality rates of a given year over time, assuming no migration. Intrinsic birth rate is the rate a population increases in size due to births based on the continuance of the age-specific fertility and mortality rates of a given year over time, assuming no migration. Intrinsic death rate is the rate a population decreases in size due to deaths based on the continuance of the age-specific fertility and mortality rates of a given year over time, assuming no migration. For method of computation, see Technical Notes of "Reproduction Rates for 1990–2002 and Intrinsic Rates for 2000–2001: United States." Population enumerated as of April 1 for census years, and estimated as of July 1 for all other years]

Year	Total fertility rate	Gross reproduction rate	Net reproduction rate	Intrinsic rate of natural increase	Intrinsic birth rate	Intrinsic death rate
2014	1,862.5	909	897	-3.7	10.8	14.5
2013	1,857.5	907	894	-3.9	10.8	14.7
2012	1,880.5	919	906	-3.4	11.0	14.4
2011	1,894.5	925	912	-3.2	11.1	14.3
2010	1,931.0	943	930	-2.6	11.4	14.0
2009	2,002.0	977	964	-1.3	12.1	13.4
2008	2,072.0	1,012	997	-0.1	12.8	12.9
2007	2,120.0	1,035	1,020	0.7	13.2	12.5
2006	2,108.0	1,029	1,013	0.5	13.1	12.6
2005	2,057.0	1,004	989	-0.4	12.7	13.1
2004	2,051.5	1,001	986	-0.5	12.7	13.2
2003	2,047.5	999	984	-0.6	12.7	13.3
2002	2,020.5	987	972	-1.0	12.5	13.5
2001	2,030.5	993	978	-0.8	12.6	13.4
2000	2,056.0	1,004	989	-0.4	12.8	13.2
1999	2,007.5	980	965	-1.3	12.4	13.7
1998	1,999.0	976	961	-1.5	12.3	13.8
1997	1,971.0	963	948	-2.0	12.1	14.1
1996	1,976.0	965	950	-1.9	12.2	14.1
1995	1,978.0	965	949	-1.9	12.2	14.1
1994	2,001.5	977	961	-1.5	12.4	13.9
1993	2,019.5	985	968	-1.2	12.6	13.8
1992	2,046.0	998	981	-0.7	12.8	13.5
1991	2,062.5	1,008	987	-0.5	13.0	13.5
1990	2,081.0	1,015	997	-0.1	13.2	13.3

NOTE: Net reproduction and intrinsic rates for 1991–1999 are computed based on unrevised life tables for 1991–1999; see Technical Notes.

**Table 2. Total fertility and gross reproduction rates, by race and Hispanic origin of mother: United States, 1990–2014**

[Total fertility rate is the sum of birth rates for 5-year age groups multiplied by five. Gross reproduction rate is the sum of birth rates by 5-year age groups multiplied by five and by the proportion of births that were female. For method of computation see Technical Notes of “Reproduction Rates for 1990–2002 and Intrinsic Rates for 2000–2001: United States.” Populations estimated as of April 1 for census years and estimated as of July 1 for all other years. Populations for specified Hispanic groups are based on American Community Survey estimates as of July 1 for 2010–2014; prior to 2010, populations for specified Hispanic groups were based on Current Population Survey estimates as of April 1 for census years and estimated as of July 1 for all other years]

Year	All races and origins <sup>1</sup>	White <sup>2</sup>	Black <sup>2</sup>	American		Hispanic <sup>3</sup>					Non-Hispanic		
				Indian or Alaska Native <sup>2</sup>	Asian or Pacific Islander <sup>2</sup>	Total	Mexican	Puerto Rican	Cuban	Other Hispanic	Total <sup>4</sup>	White <sup>2</sup>	Black <sup>2</sup>
<b>Total fertility rate</b>													
2014	1,862.5	1,875.5	1,872.0	1,288.5	1,715.5	2,130.5	1,983.5	1,681.0	1,570.5	2,805.5	1,793.0	1,762.5	1,873.5
2013	1,857.5	1,868.0	1,882.5	1,334.5	1,681.0	2,149.0	2,018.5	1,684.0	1,449.0	2,799.5	1,784.0	1,751.0	1,881.5
2012	1,880.5	1,885.5	1,899.5	1,350.0	1,769.5	2,189.5	2,082.5	1,688.5	1,370.5	2,812.5	1,803.0	1,761.5	1,898.5
2011	1,894.5	1,905.0	1,920.0	1,373.5	1,706.5	2,240.0	2,143.0	1,747.5	1,433.5	2,847.5	1,810.5	1,773.5	1,919.5
2010	1,931.0	1,947.5	1,957.0	1,404.0	1,689.0	2,350.0	2,276.5	1,747.5	1,452.5	2,870.0	1,831.0	1,791.0	1,971.5
2009	2,002.0	2,016.5	2,036.0	1,494.0	1,743.0	2,531.5	2,442.0	1,922.5	1,352.0	3,248.5	1,877.5	1,830.0	2,046.5
2008	2,072.0	2,087.0	2,102.5	1,569.0	1,797.5	2,706.0	2,663.5	2,004.0	1,536.5	3,278.0	1,926.0	1,874.5	2,115.5
2007	2,120.0	2,137.0	2,145.5	1,621.5	1,850.5	2,840.0	2,944.5	2,101.0	1,542.5	2,995.0	1,959.5	1,908.0	2,142.0
2006	2,108.0	2,125.0	2,143.0	1,625.0	1,803.0	2,856.0	2,997.0	2,088.5	1,556.5	2,918.0	1,946.0	1,900.5	2,128.5
2005	2,057.0	2,078.5	2,062.0	1,584.0	1,784.5	2,792.0	2,954.5	2,065.5	1,540.5	2,737.0	1,902.0	1,869.0	2,030.5
2004	2,051.5	2,074.5	2,026.0	1,610.5	1,825.0	2,759.0	2,948.5	2,005.0	1,699.5	2,594.0	1,906.0	1,871.0	2,030.5
2003	2,047.5	2,075.0	1,994.5	1,639.5	1,819.0	2,736.0	2,903.0	1,805.0	2,032.5	2,690.0	1,909.0	1,874.5	2,037.5
2002	2,020.5	2,041.5	1,990.0	1,675.5	1,798.5	2,711.0	2,869.0	1,937.0	1,958.5	2,612.0	1,885.0	1,840.0	2,053.0
2001	2,030.5	2,042.5	2,049.5	1,712.5	1,785.0	2,726.0	2,905.0	2,144.5	1,786.0	2,503.5	1,898.0	1,846.0	2,107.0
2000	2,056.0	2,051.0	2,129.0	1,772.5	1,892.0	2,730.0	2,906.5	2,178.5	1,528.0	2,563.5	1,931.5	1,866.0	2,178.5
1999	2,007.5	2,007.5	2,082.5	1,783.5	1,754.5	2,649.0	2,823.0	2,104.5	1,388.5	2,517.0	1,894.0	1,838.5	2,134.0
1998	1,999.0	1,991.0	2,111.5	1,851.0	1,731.5	2,652.5	2,878.0	2,043.5	1,402.5	2,448.5	1,887.5	1,825.0	2,164.0
1997	1,971.0	1,955.0	2,091.5	1,834.5	1,757.5	2,680.5	2,957.0	1,931.5	1,619.5	2,376.5	1,853.0	1,785.5	2,137.5
1996	1,976.0	1,960.5	2,088.5	1,855.0	1,787.0	2,772.0	3,052.0	1,965.0	1,617.0	2,516.5	1,852.0	1,781.0	2,140.0
1995	1,978.0	1,954.5	2,127.5	1,878.5	1,795.5	2,798.5	3,033.5	2,078.0	1,584.0	2,629.5	1,856.5	1,777.5	2,186.5
1994	2,001.5	1,957.5	2,258.5	1,950.0	1,834.0	2,839.0	3,024.0	2,341.5	1,587.0	2,693.0	1,883.5	1,782.5	2,314.5
1993	2,019.5	1,961.5	2,351.0	2,048.5	1,841.5	2,894.5	3,041.5	2,416.0	1,570.0	2,914.5	1,901.5	1,786.0	2,412.5
1992 <sup>5</sup>	2,046.0	1,978.0	2,416.0	2,135.5	1,894.5	2,957.5	3,107.0	2,568.5	1,453.5	2,989.0	1,929.0	1,803.5	2,482.5
1991 <sup>5</sup>	2,062.5	1,988.0	2,462.0	2,142.5	1,928.0	2,963.5	3,103.5	2,573.5	1,352.5	3,064.5	1,953.0	1,822.5	2,532.0
1990 <sup>6</sup>	2,081.0	2,003.0	2,480.0	2,184.5	2,002.5	2,959.5	3,214.0	2,301.0	1,459.5	2,877.0	1,979.5	1,850.5	2,547.5
<b>Gross reproduction rate</b>													
2014	909	914	923	634	832	1,044	971	821	767	1,377	875	858	924
2013	907	911	926	649	814	1,052	987	826	701	1,373	870	852	926
2012	919	921	934	662	858	1,075	1,024	829	675	1,379	880	858	934
2011	925	929	944	671	828	1,098	1,049	854	698	1,402	882	863	944
2010	943	950	961	693	814	1,153	1,117	856	710	1,410	892	872	967
2009	977	984	1,001	734	844	1,239	1,196	936	663	1,588	916	892	1,007
2008	1,012	1,018	1,034	771	870	1,323	1,304	975	742	1,601	940	914	1,041
2007	1,035	1,043	1,055	796	896	1,391	1,442	1,031	745	1,469	956	930	1,054
2006	1,029	1,036	1,050	797	874	1,397	1,467	1,019	761	1,425	949	926	1,044
2005	1,004	1,013	1,016	783	864	1,366	1,445	1,016	744	1,338	927	909	1,000
2004	1,001	1,012	994	793	887	1,351	1,446	975	816	1,268	930	911	997
2003	999	1,012	980	801	880	1,341	1,423	883	999	1,318	931	913	1,001
2002	987	996	979	828	871	1,329	1,408	940	953	1,280	919	896	1,010
2001	993	998	1,009	846	863	1,338	1,426	1,045	879	1,228	927	900	1,037
2000	1,004	1,000	1,048	871	915	1,336	1,423	1,062	745	1,254	943	909	1,072
1999	980	979	1,025	879	850	1,298	1,384	1,036	681	1,229	924	895	1,050
1998	976	972	1,038	908	840	1,300	1,413	1,000	666	1,198	921	889	1,064
1997	963	954	1,030	901	848	1,314	1,451	943	793	1,164	904	870	1,052
1996	965	956	1,030	913	867	1,358	1,497	965	791	1,228	904	867	1,056
1995	965	953	1,048	921	868	1,371	1,487	1,011	772	1,290	905	865	1,077
1994	977	954	1,114	960	888	1,391	1,482	1,147	785	1,319	919	868	1,141
1993	985	955	1,159	1,006	891	1,416	1,489	1,176	761	1,427	927	868	1,190
1992 <sup>5</sup>	998	964	1,187	1,050	917	1,449	1,523	1,249	699	1,468	940	877	1,220
1991 <sup>5</sup>	1,008	970	1,212	1,063	934	1,454	1,521	1,275	653	1,504	954	889	1,247
1990 <sup>6</sup>	1,015	975	1,222	1,080	970	1,449	1,574	1,126	703	1,407	965	900	1,255

<sup>1</sup>Includes births to race and origin groups not shown separately, such as white-Hispanic and black-Hispanic women, and births with origin not stated.  
<sup>2</sup>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. Forty-nine states and the District of Columbia reported multiple-race data in 2014. 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 reference 2 in this report. Multiple-race reporting areas vary for 2003–2014; see reference 2 in this report.  
<sup>3</sup>Includes all persons of Hispanic origin of any race; see reference 2 in this report.  
<sup>4</sup>Includes races other than white and black.  
<sup>5</sup>Excludes data for New Hampshire, which did not report Hispanic origin.  
<sup>6</sup>Excludes data for New Hampshire and Oklahoma, which did not report Hispanic origin.

**Table 3. Total fertility rates, gross reproduction rates, net reproduction rates, intrinsic rates of natural increase, intrinsic birth rates, and intrinsic death rates, by race and Hispanic origin of mother: United States, 2006–2014**

[Total fertility rate is the sum of birth rates for 5-year age groups multiplied by five. Gross reproduction rate is the sum of birth rates by 5-year age groups multiplied by five and by the proportion of births that were female. Net reproduction rate is the sum of birth rates by 5-year age groups multiplied by five, and by the probability of women surviving to a specified age group (as determined from the life table for the year), and by the proportion of births that were female. Intrinsic rate of natural increase is the rate of change of population size based on the continuance of the age-specific fertility and mortality rates of a given year over time, assuming no migration. Intrinsic birth rate is the rate a population increases in size due to births based on the continuance of the age-specific fertility and mortality rates of a given year over time, assuming no migration. Intrinsic death rate is the rate a population decreases in size due to deaths based on the continuance of the age-specific fertility and mortality rates of a given year over time, assuming no migration. For method of computation, see Technical Notes of "Reproduction Rates for 1990–2002 and Intrinsic Rates for 2000–2001: United States." Population enumerated as of April 1 for 2010 and estimated as of July 1 for all other years]

Year	Total fertility rate	Gross reproduction rate	Net reproduction rate	Intrinsic rate of natural increase	Intrinsic birth rate	Intrinsic death rate
<b>All races and origins<sup>1</sup></b>						
2014	1,862.5	909	897	-3.7	10.8	14.5
2013	1,857.5	907	894	-3.9	10.8	14.7
2012	1,880.5	919	906	-3.4	11.0	14.4
2011	1,894.5	925	912	-3.2	11.1	14.3
2010	1,931.0	943	930	-2.6	11.4	14.0
2009	2,002.0	977	964	-1.3	12.1	13.4
2008	2,072.0	1,012	997	-0.1	12.8	12.9
2007	2,120.0	1,035	1,020	0.7	13.2	12.5
2006	2,108.0	1,029	1,013	0.5	13.1	12.6
<b>Non-Hispanic white<sup>2</sup></b>						
2014	1,762.5	858	846	-5.7	10.0	15.7
2013	1,751.0	852	841	-5.9	9.9	15.8
2012	1,761.5	858	847	-5.7	9.9	16.6
2011	1,773.5	863	851	-5.5	10.0	15.5
2010	1,791.0	872	861	-5.2	10.2	15.4
2009	1,830.0	892	880	-4.5	10.5	15.0
2008	1,874.5	914	901	-3.6	11.0	14.6
2007	1,908.0	930	917	-3.0	11.2	14.2
2006	1,900.5	926	913	-3.2	11.2	14.4
<b>Non-Hispanic black<sup>2</sup></b>						
2014	1,873.5	924	905	-3.6	11.5	15.1
2013	1,881.5	926	907	-3.5	11.6	15.1
2012	1,898.5	934	915	-3.2	11.7	14.9
2011	1,919.5	944	925	-2.9	11.9	14.8
2010	1,971.5	967	947	-2.0	12.4	14.4
2009	2,046.5	1,007	985	-0.6	13.2	13.8
2008	2,115.5	1,041	1,018	0.7	13.9	13.2
2007	2,142.0	1,054	1,029	1.1	14.2	13.1
2006	2,128.5	1,044	1,019	0.7	14.1	13.4
<b>Hispanic<sup>3</sup></b>						
2014	2,130.5	1,044	1,033	1.1	12.9	11.8
2013	2,149.0	1,052	1,041	1.4	13.0	11.6
2012	2,189.5	1,075	1,064	2.2	13.4	11.2
2011	2,240.0	1,098	1,087	3.0	13.9	10.9
2010	2,350.0	1,153	1,142	4.8	15.0	10.2
2009	2,531.5	1,239	1,225	7.5	16.6	9.1
2008	2,706.0	1,323	1,309	10.0	18.3	8.3
2007	2,840.0	1,391	1,376	11.9	19.6	7.7
2006	2,856.0	1,397	1,381	12.1	19.8	7.7

<sup>1</sup>Includes births to race and origin groups not shown separately, such as white-Hispanic and black-Hispanic women, and births with origin not stated.

<sup>2</sup>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. Forty-nine states and the District of Columbia reported multiple-race data in 2014. 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 reference 2 in this report. Multiple-race reporting areas vary for 2006–2014; see reference 2 in this report.

<sup>3</sup>Includes all persons of Hispanic origin of any race; see reference 2 in this report.

## Technical Notes

### Source of data

The natality data presented in this report are based 100% of the birth certificates filed in the United States, that is, in all states and the District of Columbia (D.C.). Detailed methodological information on the collection and reporting of birth certificate data is presented elsewhere (26). The mortality data for the life tables used to compute the rates in this report are based on information from all death certificates filed in the United States. Detailed methodological information on the collection and reporting of death certificate data is presented elsewhere (27). Both natality and mortality data are provided to the National Center for Health Statistics (NCHS) through the Vital Statistics Cooperative Program. In this report, the rates are based only on events occurring within the 50 states and D.C.; births and deaths that occur within the territories are not included.

The new and revised reproduction and intrinsic rates shown in this report are derived from the total fertility and age-specific birth rates published in “Births: Final Data for 2014” (2) and from the probability of survival, which is determined from published and unpublished life tables in the life tables and final mortality reports (3–24).

These rates and probabilities for the years before 2010 have been revised based on the intercensal population estimates consistent with the latest census, with the exception of the probabilities for 1991 through 1999. The life tables for 1991 through 1999 are based on postcensal population estimates consistent with the 1990 census, that is, these tables have not been revised using intercensal population estimates consistent with the 2000 census. There are currently no plans to revise the life tables for these years.

### The 1989 and 2003 U.S. Standard Certificates of live birth and death

This report is based on data 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) (28), and on both the 1989 and 2003 revisions of the U.S. Standard Certificate of Death (29). Data for years prior to 1989 are based on information collected in the previous revisions of the U.S. Standard Certificates of live birth and death (30). Detailed information on the 2003 revision is presented elsewhere (31).

### Race and Hispanic origin of mother

#### Hispanic origin

Hispanic origin and race are reported separately on the birth and death certificates. Data shown by race (i.e., American Indian or Alaska Native [AIAN] and Asian or Pacific Islander [API]) include persons of Hispanic or non-Hispanic origin, and data for Hispanic origin include all persons of Hispanic origin of any race. Rates for non-Hispanic persons are shown separately for white and black mothers, given the substantial differences

between Hispanic and non-Hispanic white women and Hispanic and non-Hispanic black women. Items asking for the Hispanic origin of the mother have been included on the birth certificates of all states and D.C. since 1993 and on the death certificate for all states and D.C. since 1997. From 1990 through 1992, New Hampshire did not report Hispanic origin on the birth certificate; Oklahoma did not report Hispanic origin on the birth certificate in 1990.

#### Single, multiple, and “bridged” race

The 2003 revisions of the U.S. Standard Certificates of live birth and death allow the reporting of more than one race (multiple races) for each parent or decedent (28,29) in accordance with the revised standards issued by the Office of Management and Budget (OMB) in 1997 (32,33). Information on this change is presented elsewhere (26,27,34–36).

In 2014, 49 states and D.C. reported multiple races on their birth certificates, which accounted for 99% of U.S. births, while in 2014, 46 states and D.C. reported multiple races on their death certificates, which accounted for 93% of U.S. deaths (26,27).

In 2014, more than one race was reported for slightly more than 2% of mother’s records in the 49 multiple-race reporting states and D.C., whereas 0.4% of the death records in the 46 states and D.C. in 2014 reported multiple race (26,27). From 2003 through 2014, the multiple-race reporting states varied, starting with six states for births and seven states for deaths in 2003.

Data from the vital records of the remaining states are based on the 1989 revisions of the U.S. Standard Certificates of live birth and death that follow the 1977 OMB standard, allowing only a single race to be reported (30,31,33).

To provide uniformity and comparability of the data during the period before all of the data are available in the new multiple-race format, it was necessary to “bridge” the responses of those who reported more than one race (multiple races) to one, single race. Information detailing the bridging procedure, as well as the processing and tabulation of data by race, is presented elsewhere (26,27).

#### Computation of rates

For information and discussion on the computation of rates, see “Reproduction Rates for 1990–2002 and Intrinsic Rates for 2000–2001: United States” (1).

The rates shown in this report are based on revised fertility rates and probabilities consistent with the latest census, with the exception of the probabilities for 1991 through 1999. At the time this report was prepared, revised life tables for 1991 through 1999 were not available. The reproduction and intrinsic rates for 1991 through 1999 were computed based on unrevised life tables for 1991 through 1999. There are currently no plans to revise the life tables for these years.

A comparison of reproduction and intrinsic rates for 2001 through 2009 based on revised total fertility and age-specific birth rates and revised survival probabilities, with rates based on revised total fertility and age-specific birth rates and unrevised probabilities for those years showed that the differences between the rates were negligible.

It is important to note that the intrinsic rate of natural increase, intrinsic birth rate, and intrinsic death rate are not equivalent to the corresponding rate of natural increase, crude birth rate, and crude death rate (1). The distinction between the two categories of rates is in the age structure of the respective populations used to calculate the rates. The intrinsic rate is based on a stable population, that is, a hypothetical population with an *unchanging* age structure (and no migration) over time (1).

## Significance testing

Data presented in this report are not subject to sampling error. However, data, even based on complete counts, may be affected by random variation. That is, the number of events that *actually* occurred may be considered one outcome in a large series of possible results that *could have* occurred under the same circumstances. When the number of births is used for analytic purposes and considered in this way, the comparison of rates over time or between groups can be tested, according to certain statistical assumptions.

Random variability in the denominators of the rates (the population estimates) is not considered in the calculation of standard errors because its contribution to the overall variability of the rates is negligible compared with the variability in the numerators.

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.

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

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 5 times out of 100. If the difference is *less than or equal to* this statistic, the difference might occur by chance more than 5 times out of 100. Accordingly, the difference is not considered statistically significant at the 95% confidence level.



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