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## Effect on Mortality Rates of the 1989 Change in Tabulating Race

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No. 25

The report discusses the effect of the change in tabulation from race of child to race of mother on mortality rates. Infant, fetal, perinatal, and maternal mortality rates are shown by race of child and race of mother for 1970–89.

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# Effect on Mortality Rates of the 1989 Change in Tabulating Race

by Donna L. Hoyert, Ph.D., Division of Vital Statistics

## Highlights

Effective with vital statistics data for 1989, the National Center for Health Statistics (NCHS) made the following change in most of its tabulations of race for live births and fetal deaths: race for live births and fetal deaths are shown by race of mother rather than by race of child. As a result of the change in the tabulation by race of live births and fetal deaths, infant, fetal, perinatal, and maternal mortality rates by race in NCHS tabulations for 1989 are not comparable with those of previous years.

To facilitate comparison with previous years' data and analysis of current patterns, key tabulations and text analysis in reports from NCHS for 1989 and 1990 data (1-3) show infant, fetal, perinatal, and maternal mortality data computed on the basis of live births and fetal deaths tabulated by both race of mother and race of child. This makes it possible to distinguish the effects of this change in tabulation from real changes in the data. Beginning with data for 1991, NCHS publications show most tabulations by race of mother only.

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NOTE: This report was prepared in the Division of Vital Statistics. Manju Sharma and Joseph Farrell of the Systems and Programming Branch provided programming support for the report. Betty L. Smith of the Statistical Resources Branch provided content review. The Registration Methods Branch and the Technical Services Branch provided consultation to State vital statistics offices regarding collection of the vital statistics data on which this report is based. This report was edited by Gail V. Johnson and typeset by Zung T. N. Le of the Publications Branch, Division of Data Services.

This report documents the effect of the change in tabulation and presents mortality rates based on race of mother for years prior to when the change in tabulation was introduced, thereby providing a continuous time series (1970-89) for the affected rates. This permits an assessment of the change on trends in rates and on mortality race ratios.

The effect of the change in tabulating race is small for all but certain small minority groups. The impact of the change is greater for the black population than for the white population. For example, for 1989 the effect of the change to race of mother on infant mortality rates is not significantly different for the white population but is a 5-percent increase for the black population. In the case of smaller minority groups, the change to race of mother had a much greater effect. For example, rates for Hawaiians (1987-89) are 44 percent larger by race of mother than by race of child. Another consequence of the change is that the mortality race ratio somewhat increased for rates based on race of mother compared with rates based on race of child.

For fetal mortality, rates in 1989 for the white population are the same, and for the black population the difference in the rates is not statistically significant. Among perinatal deaths (for example, Perinatal Definition I), rates in 1989 for the white population do not differ significantly, but for the black population rates are 4 percent greater based on race of mother compared with rates based on race of child. For maternal mortality, the effect of the change in tabulating race is not statistically significant.

# Introduction

## Race of child

Prior to 1989, NCHS tabulations of race for live births and fetal deaths were by race of child. Because race of child is not reported directly on the birth certificate or fetal death report, it was determined for statistical purposes by an algorithm based on the race of mother and father, which are each reported directly on the birth certificate and fetal death report.

The algorithm used information reported for the race of the mother and father to assign the race of the child for live births or fetal deaths. When both parents were of the same race, the race of the live birth or fetal death was assigned the parents' race. In cases of mixed parentage where only one parent was white, the child was assigned the race of the other parent. When neither parent was white, the child was assigned the race of the father with one exception; if either parent was Hawaiian, the child was assigned to Hawaiian. If race was not reported for one parent, the child was assigned the race of the parent for whom race was given (4).

## Rationale for the change

The principal reason for making the change in tabulating live births and fetal deaths from race of child to race of mother in 1989 was to coincide with the implementation of the regular decennial revision of the standard certificates and reports (3,4). While many of the items on the certificates and reports prior to 1989 pertained to the mother, the revised birth certificate and fetal death report of 1989 added many new ones. It is more appropriate to tabulate maternal items such as alcohol and tobacco use, weight gain during pregnancy, medical risk factors, obstetric procedures, complications of labor and/or delivery, and method of delivery by the race of the mother than by the race of the child. While the change does create some disjuncture in showing trends over time, making the change in the tabulation of race in conjunction with tabulating the new items avoids this problem for the new variables.

In addition, there has been an increase in the percent of births and fetal deaths with mixed racial parentage (3,4). For

example, 1 percent of births in 1968 were of mixed racial parentage compared with 3 percent in 1989 (4). For 1989, the corresponding percent of fetal deaths of mixed racial parentage was also 3 percent (5). An increase in mixed racial parentage results in an increasing proportion of births and fetal deaths for which the arbitrary rules of the algorithm assign the race of the child or fetus. The majority of these births and fetal deaths involve one white and one minority parent; the algorithm for race of child assigns all of these children to minority races (3,4).

Another change over the past 20 years has been the increase in the percent of births and fetal deaths with race of father not stated (3,4). As a consequence, race of child for an increasing number of these births and fetal deaths are assigned the race of the mother on a *de facto* basis. The percent of live births with race of father not stated increased from 7 percent in 1968 to 15 percent in 1989 (4). The corresponding percent for fetal deaths with race of father not stated is much higher, 28 percent in 1989 (5). The increase in records with race of father not stated reflects an increase in the proportion of births and fetal deaths to unmarried women. Information on father's race is missing, in part, because information on the father is less likely to be reported for unmarried mothers. The extent of the problem of missing information on paternal race for live births and fetal deaths differs by race group (4).

The change to race of mother in tabulating live births results in mortality rates by race that are considered more realistic than those based on race of child. Additional improvements in infant mortality rates specific for race and Hispanic origin can be made by using rates based on cohorts of events (cohort rates) rather than using traditional synthetic measures (period rates) that are routinely presented in national and State vital statistics reports including this report.

Infant mortality rates based on birth cohorts differ from period rates, by a small amount for white and black infants, but by a substantial amount for the smaller minority groups (6). These differences persist even after changing from tabulating by race of child to race of mother. Future NCHS reports will present cohort rates by race of mother.

# Purpose

This report has several purposes:

- it provides previously unavailable infant, fetal, perinatal, and maternal mortality rates tabulated by race of mother for the period 1970–89
- it shows the impact of the changes in tabulating race for live births and fetal deaths on time series data on infant, maternal, fetal, and perinatal mortality for this period
- it describes the effect of the changes by selected characteristics of the mother

Mortality data by race are usually presented on an annual basis for the two major race categories “white” and “black.”

When presenting race data for more detailed groups, several years of data can be combined to increase the number of deaths observed in the categories, thereby improving the statistical stability of the rates. Accordingly, mortality rates for smaller race groups are presented for the period 1987–89 combined in a separate section of this report.

Mortality data on Hispanic origin has been presented in NCHS publications since 1984. The effect of the change of tabulation to race of mother on Hispanic data is described in another section of this report.

# Effect on mortality

## Infant mortality

For infant mortality rates (the number of infant deaths per 1,000 live births), the change in tabulation of live births to race of mother affects only the denominator. The numerator, infant deaths, continues to be reported and tabulated by the race of the decedent. In fact, there are no items on the race of the mother or father of an infant on the death certificate. The effect of the change in tabulating race of live births is an increase in births identified as white and a decrease in births identified as black (table 1) (4).

The effect of the change on infant mortality rates is to slightly reduce the rate for white infants and to increase it for black infants. For example, in 1989, rates for white infants were not significantly different when based on race of mother (ratio of 0.99 with the rate using race of child as the

denominator), while rates for black infants were 5 percent larger (ratio of 1.05) (figure 1, table A, and table 2). Over time, ratios of rates computed by the two methods have diverged slightly. The ratio for white infants was 0.99 in both 1970 and 1989, while the ratio for black infants was 1.02 in 1970 compared with 1.05 in 1989. The effect of the change is the same for neonatal and postneonatal mortality rates as for infant mortality rates.

### Trend, 1970–89

The decline in infant mortality rates between 1970 and 1989 was virtually the same by race of mother and by race of child (table A and table 2). For the white population, rates tabulated by both race of child and race of mother declined by 54 percent, from 17.8 to 8.2 per 1,000 live births and from

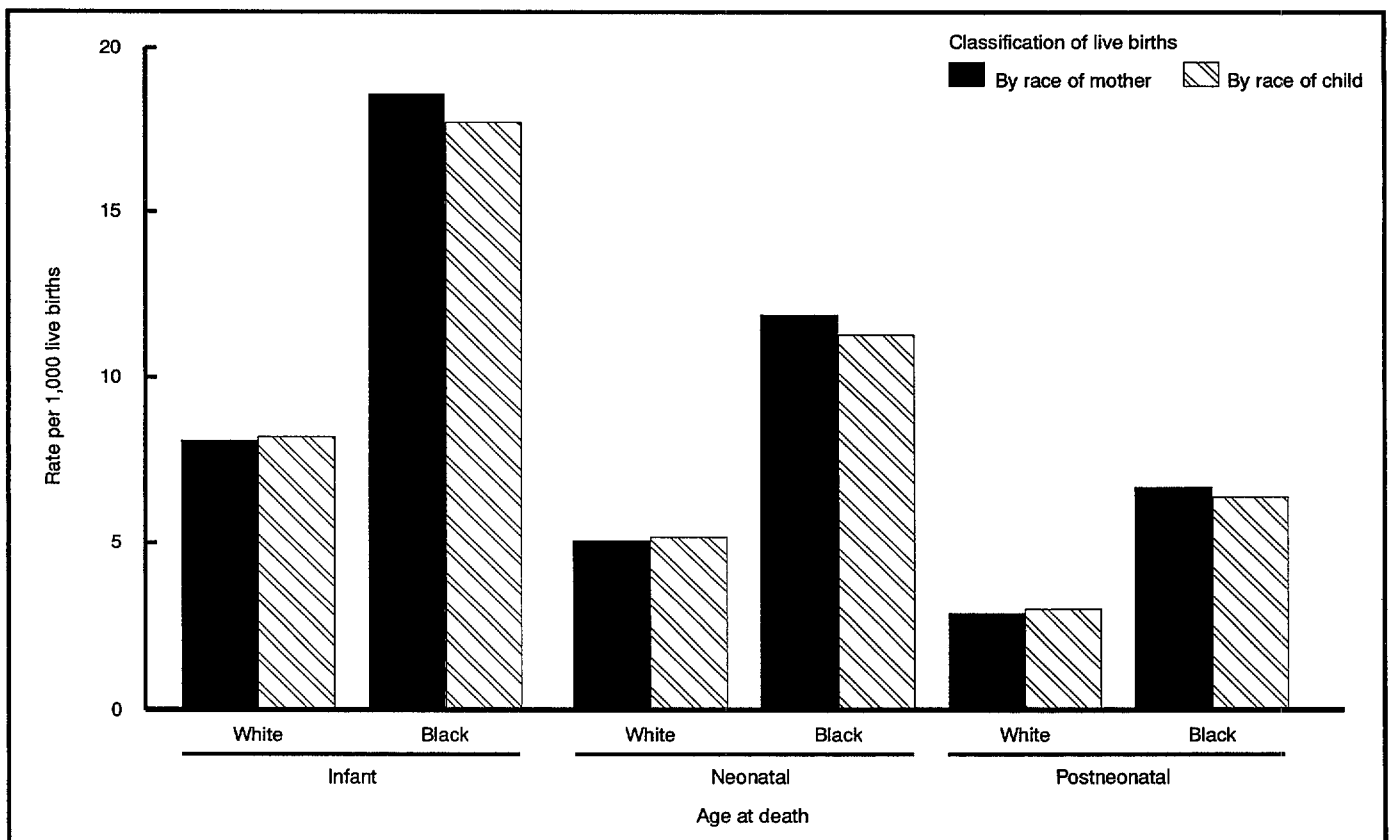


Figure 1. Infant mortality rates by race: United States, 1989



**Table A. Infant mortality rates by race and the ratio of the rates: United States, selected years, 1970–89**

[Rates are infant (under 1 year) deaths per 1,000 live births in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Year	White			All other			Black		
	Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio
1989	8.1	8.2	0.99	16.3	15.2	1.07	18.6	17.7	1.05
1985	9.2	9.3	0.99	16.8	15.8	1.06	19.0	18.2	1.04
1980	10.9	11.0	0.99	20.2	19.1	1.06	22.2	21.4	1.04
1975	14.0	14.2	0.99	25.3	24.2	1.05	27.0	26.2	1.03
1970	17.6	17.8	0.99	31.8	30.9	1.03	33.3	32.6	1.02

17.6 to 8.1, respectively. For the black population, rates tabulated by race of child declined by 46 percent, from 32.6 to 17.7 per 1,000 live births compared with a 44 percent decline by race of mother from 33.3 to 18.6.

### Maternal mortality

Maternal deaths are deaths assigned to Complications of pregnancy, childbirth, and the puerperium (ICD–9 Nos. 630–676) (3). Maternal mortality rates, like infant mortality rates, are affected by the change in tabulating race of live births because live births comprise the denominator of the rates, while maternal deaths comprise the numerator. The numerator, maternal deaths, continues to be tabulated by race of decedent. Thus, the change in tabulation of maternal mortality rates by race affects only the denominator.

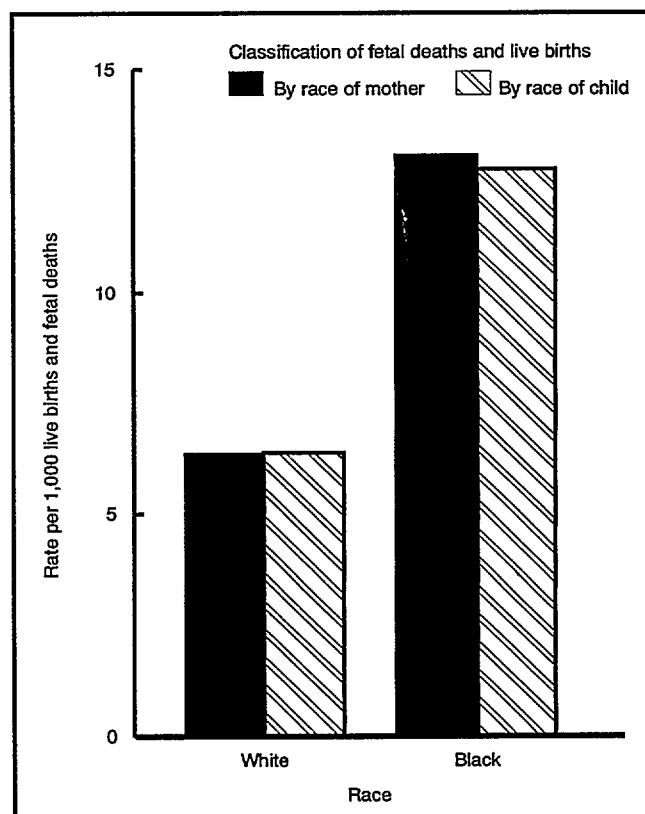
The apparent effect of the change in tabulation was to decrease the maternal mortality rate for white mothers and to increase the maternal mortality rate for black mothers; however, the effect was not statistically significant (table 3). The ratio for white mothers was 0.99 in 1970 compared with 0.98 in 1989, while the ratio for black mothers for these years was 1.02 and 1.05, respectively.

### Trend, 1970–89

Maternal mortality rates, 1970–89, based on live births tabulated by race of child and by race of mother are shown in table 3, along with ratios of the rates (rate using race of child as the denominator). The trend is essentially unaffected by the change in tabulation from race of child to race of mother. For white mothers, rates tabulated by race of child declined by 60 percent, from 14.4 to 5.7 per 100,000 live births, while rates tabulated by race of mother declined by 61 percent, from 14.3 to 5.6. For black mothers, rates tabulated by race of child declined by 71 percent, from 59.8 to 17.5; by race of mother, rates declined from 60.9 to 18.4 (70 percent).

### Fetal mortality

Fetal mortality rates are the number of fetal deaths per 1,000 live births and fetal deaths. In the case of fetal mortality, the change in tabulation affects both the numerator and denominator of the rate, because effective in 1989, both tabulation of live births and fetal deaths changed from race of child to race of mother. The change to both the numerator,

**Figure 2. Fetal mortality rates by race: United States, 1989**

fetal deaths, and the denominator, live births and fetal deaths combined, results in an increase in the number of white events and a decrease in the number of black events.

There is no effect of the change to race of mother for fetal mortality among the white population. While the effect of the change among the black population is an increase in the rates, the difference is not statistically significant (figure 2 and table 4). In both 1970 and 1989, fetal mortality rates tabulated by race of mother and by race of child were not significantly different for either the white or black population.

### Trend, 1970–89

Fetal mortality rates by race of child and by race of mother decreased by virtually identical amounts between 1970 and 1989 (table 4). For the white population, rates tabulated

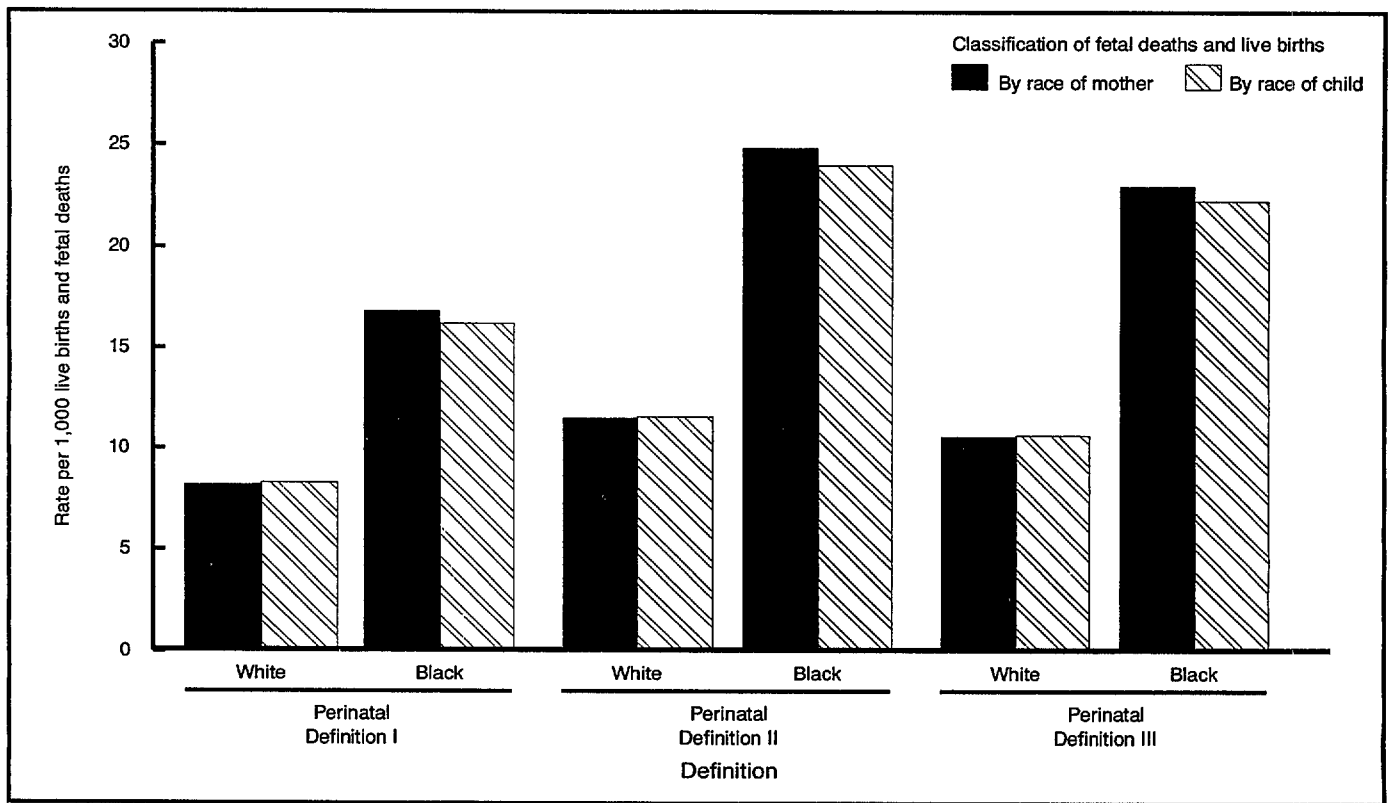


Figure 3. Perinatal mortality rates by race: United States, 1989

by race of child and by race of mother declined by 48 percent, from 12.3 to 6.4 per 1,000 live births and fetal deaths. For the black population, rates tabulated by race of child declined by 45 percent, from 23.2 to 12.8 per 1,000 live births and fetal deaths; this compares with 44 percent for rates tabulated by race of mother, a decline from 23.4 to 13.1.

### Age of mother

The effect of the change in tabulation varies by age. For the white population, the apparent effect of the change in tabulation is a slight increase in the rate for mothers under 15 years of age and a slight decrease in the rate for mothers 45–49 years of age; however, this effect is not statistically significant (table 5). For white fetal deaths, rates are the same by race of mother and by race of child for the age group 15–19 through the age group 40–44 years of age. For black fetal deaths, the change in tabulation results in a slight, but not statistically significant, decrease in the rate for mothers under 15 years of age and a slight, but not significant, increase in the rate for mothers of all other ages.

Fetal mortality rates are high for very young mothers, under 15 years of age, and older mothers, 40–44 and 45–49 years of age (table 5). For example, among white mothers (by race of mother), the fetal mortality rate is 12.4 per 1,000 live births and fetal deaths for mothers under 15 years, 6.2 for mothers 20–24 years, 12.0 for mothers 40–44 years, and 24.8 for mothers 45–49 years of age.

### Mother's marital status

The change in tabulation has essentially no effect on fetal mortality by marital status. By race of mother and by race of child, the rates are virtually identical (table 6). For the white population, the rates tabulated by race of mother and by race of child for married mothers are both 5.9 per 1,000 live births and fetal deaths and 8.7 for unmarried mothers. For the black population, the rate by race of child is 11.3 per 1,000 live births and fetal deaths compared with 11.6 by race of mother for married mothers and 14.1 by race of child compared with 14.2 by race of mother for unmarried mothers.

### Perinatal mortality

Three definitions of perinatal mortality are used by NCHS to show mortality among fetal deaths and infant deaths: the distinction between the three is in which fetal deaths and infant deaths are included in the measures. For each definition, perinatal mortality rates are comprised of fetal deaths and infant deaths per 1,000 fetal deaths and live births. Accordingly, the fetal death component of the numerator of the rate is affected by the change in tabulating race; and both components of the denominator, live births and fetal deaths, are affected. The change in tabulation to race of mother results in a larger number of perinatal deaths identified as white and a smaller number identified as black (table 7).

The effect of the change on perinatal mortality, in general, is negligible for the white population and small for the black population (table 7 and figure 3). For example, for Perinatal Definition I (fetal deaths of 28 weeks or more gestation and infant deaths under 7 days of age), for the white population, the ratio of the rates computed by the two methods was 1.00 in 1970; in 1989 it was 0.99. The difference between the rates was not significantly different in 1989. For the black population, the ratio was 1.01 in 1970 compared with 1.04 in 1989. The ratios are essentially the same for Perinatal Definition II (fetal deaths of 20 weeks or more gestation and infant deaths under 28 days of age) and Perinatal Definition III (fetal deaths of 20 weeks or more gestation and infant deaths under 7 days of age).

### **Trend, 1970–89**

Perinatal mortality rates (Perinatal Definition I) tabulated by race of child and by race of mother decreased by virtually the same amount between 1970 and 1989. For the white population, rates tabulated by race of child declined by 60 percent, from 21.0 to 8.3 per 1,000 live births and fetal deaths, and by race of mother from 20.9 to 8.2 (61 percent). For the black population, rates tabulated by race of child declined by 53 percent, from 34.5 to 16.2 per 1,000 live births and fetal deaths, and by race of mother from 34.9 to 16.8 (52 percent).

# Effect on mortality race ratio

The mortality race ratio is the rate for the black population divided by the rate for the white population. The change in the basis of tabulating race affected this ratio, which is slightly greater by race of mother than by race of child (figure 4). This was true for infant and maternal rates in 1970 and 1989 and perinatal mortality rates (Perinatal Definition I) in 1970.

For infant mortality, the mortality race ratio by race of mother in 1989 was 2.3 in contrast to 2.2 by race of child; in

1970 it was 1.9 and 1.8, respectively. The maternal mortality race ratio was 3.3 by race of mother in 1989 compared with 3.1 by race of child; the ratio was 4.3 and 4.2, respectively, in 1970. For fetal mortality, the 1989 ratio by race of mother and by race of child was 2.0; in 1970 the ratio was 1.9 for both race of mother and race of child. The perinatal mortality race ratio (Perinatal Definition I) was 2.0 by race of mother and by race of child in 1989; in 1970 the ratio was 1.7 and 1.6, respectively.

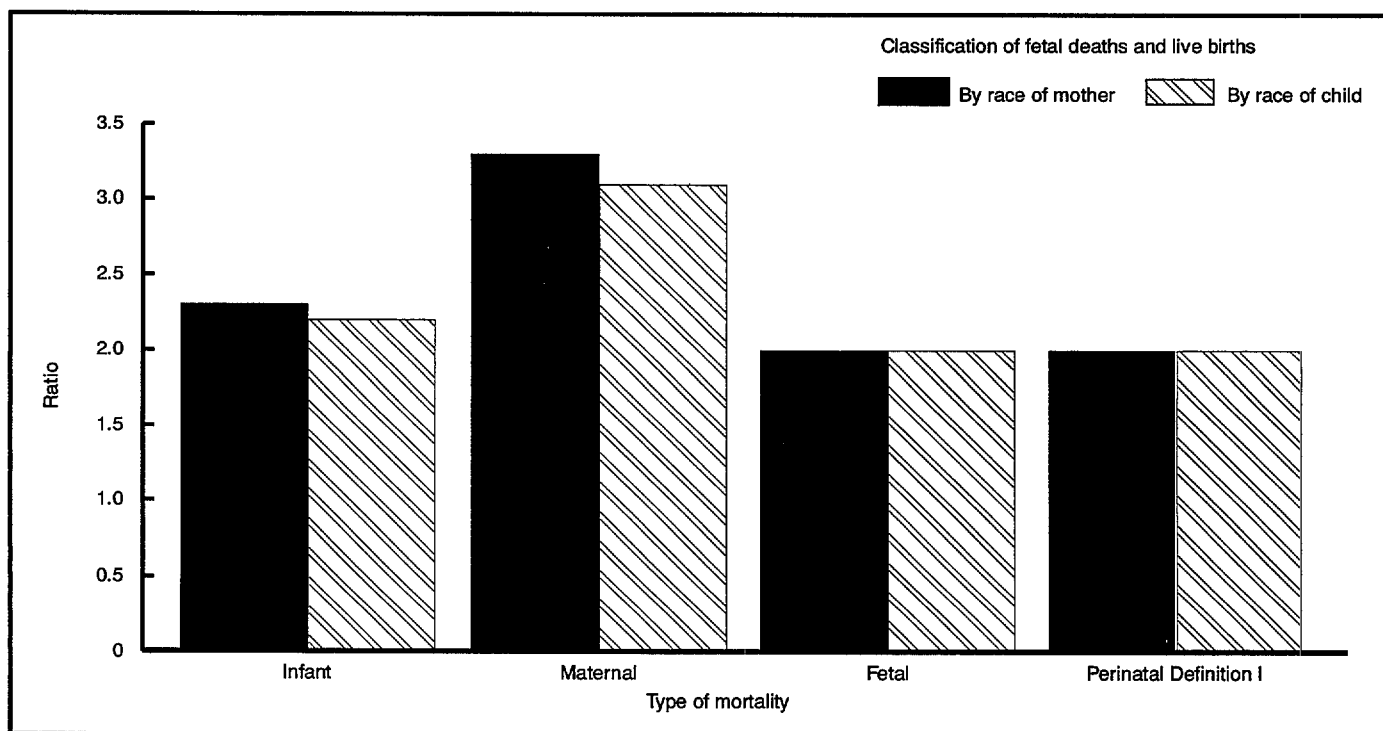


Figure 4. Mortality race ratios: United States, 1989

## Hispanic origin, 1989

In contrast to tabulations by race of live births and fetal deaths, tabulations by Hispanic origin of live births and fetal deaths have always been tabulated by origin of mother by NCHS. Thus, the change in tabulating race of live births and fetal deaths does not affect infant, fetal, perinatal, and maternal mortality rates by Hispanic origin; however, rates for comparison groups, those of non-Hispanic origin, which were tabulated by race of child, are affected by the change. As was reported in previous sections of this report, the effect of the change in tabulation of race is small (tables 1-7).

Infant mortality rates are not significantly different for the white population of non-Hispanic origin by race of mother than by race of child. Infant mortality rates are greater for the non-Hispanic black population by race of mother than by race of child (ratio of 1.05) (table 8). The impact on the comparison

groups of changing the tabulation from race of child to race of mother is the same for neonatal and postneonatal rates.

For the non-Hispanic white population, fetal mortality rates are the same by race of mother and child (6.1) (table 9). For the non-Hispanic black population, the rate by race of mother is 12.3 compared with 12.2 by race of child.

For the white non-Hispanic population, perinatal mortality rates (Perinatal Definition I) by race of mother and by race of child are 7.9 and 8.0, respectively. For the black non-Hispanic population, rates are somewhat larger by race of mother than by race of child (16.0 and 15.6, respectively) (table 10). The difference between the rates is not statistically significant for either the non-Hispanic white or the non-Hispanic black population. This pattern holds for Perinatal Definitions II and III, as well as for Perinatal Definition I.

# More detailed race groups, 1987–89 combined

Table B, figure 5, and table 11 show the effect of the change in tabulating live births by race on infant mortality rates for smaller race groups for the years 1987–89 combined. The effect is considerable for the smaller minority groups. For example, by race of mother, the rate for Hawaiian infants is

44 percent greater (a ratio of 1.44); for American Indians, the rate is 24 percent greater (1.24); for Other Asian or Pacific Islanders, the rate is 9 percent greater (1.09). The effect of the change on neonatal and postneonatal mortality is the same as the effect on infant mortality.

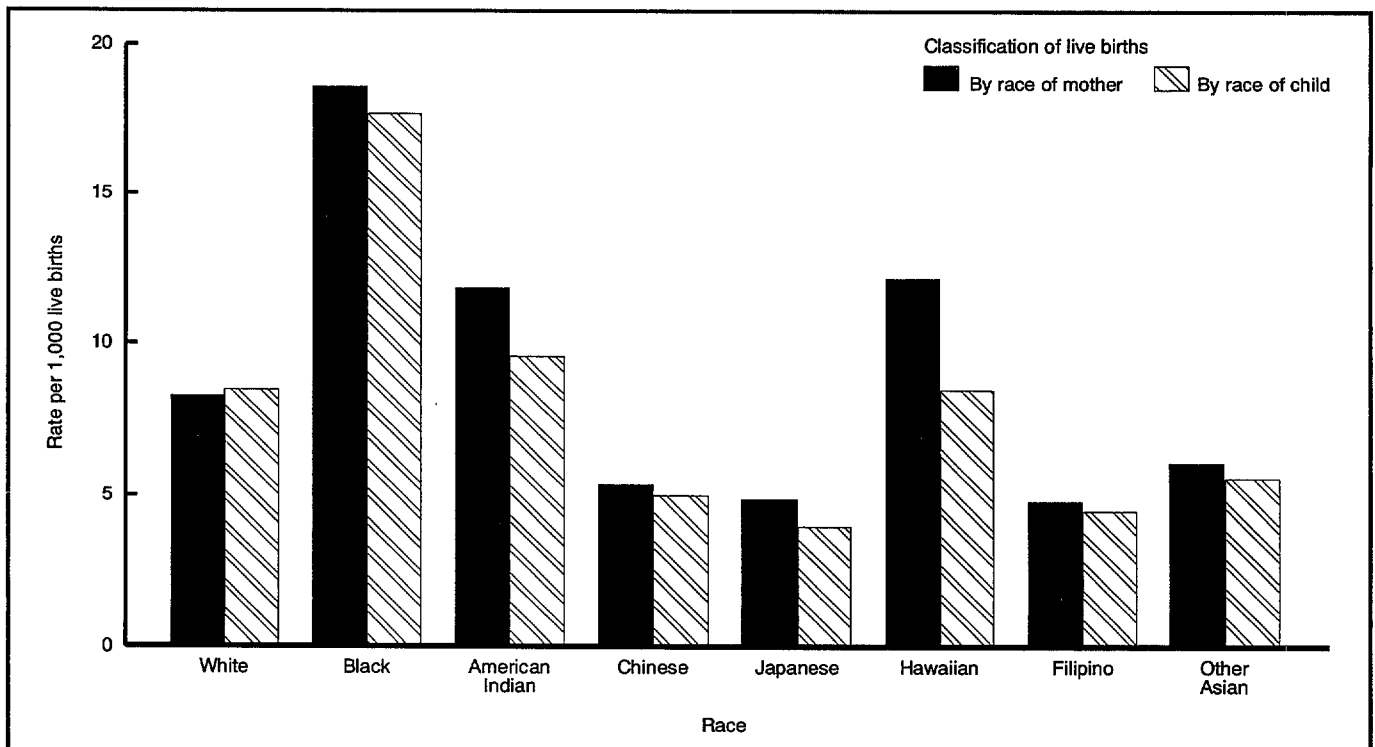
**Table B. Infant mortality rates by specified race and the ratio of the rates: United States, 1987–89 combined**

[Rates are infant (under 1 year) deaths per 1,000 live births in specified group. Ratio is the rate using race of mother divided by the rate using race of child. The number of infant deaths and infant mortality rates for specified races other than white and black should be interpreted with caution because of inconsistencies in reporting race on birth and death certificates; see Technical notes]

Race	Race of mother	Race of child	Ratio
White	8.3	8.5	0.98
Black	18.6	17.7	1.05
American Indian <sup>1</sup>	11.9	9.6	1.24
Chinese	5.4	5.0	1.08
Japanese	4.9	4.0	1.23
Hawaiian <sup>2</sup>	12.2	8.5	1.44
Filipino	4.8	4.5	1.07
Other Asian or Pacific Islander	6.1	5.6	1.09
Other	5.4	4.5	1.20

<sup>1</sup>Includes deaths among Aleuts and Eskimos.

<sup>2</sup>Includes deaths to part-Hawaiians.



**Figure 5. Infant mortality rates by race: United States, 1987–89**

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## Symbols

---	Data not available
...	Category not applicable
–	Quantity zero
0.0	Quantity more than zero but less than 0.05
Z	Quantity more than zero but less than 500 where numbers are rounded to thousands
*	Figure does not meet standard of reliability or precision (estimate is based on fewer than 20 deaths in numerator or denominator)

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**Table 1. Live births by race of mother and race of child: United States, 1970–89**

Year	All races	Race of mother			Race of child		
		White	All other	Black	White	All other	Black
1989	4,040,958	3,192,355	848,603	673,124	3,131,991	908,967	709,395
1988	3,909,510	3,102,083	807,427	638,562	3,046,162	863,348	671,976
1987	3,809,394	3,043,828	765,566	611,173	2,992,488	816,906	641,567
1986	3,756,547	3,019,175	737,372	592,910	2,970,439	786,108	621,221
1985	3,760,561	3,037,913	722,648	581,824	2,991,373	769,188	608,193
1984 <sup>1</sup>	3,669,141	2,967,100	702,041	568,138	2,923,502	745,639	592,745
1983 <sup>1</sup>	3,638,933	2,946,468	692,465	562,624	2,904,250	734,683	586,027
1982 <sup>1</sup>	3,680,537	2,984,817	695,720	568,506	2,942,054	738,483	592,641
1981 <sup>1</sup>	3,629,238	2,947,679	681,559	564,955	2,908,669	720,569	587,797
1980 <sup>1</sup>	3,612,258	2,936,351	675,907	568,080	2,898,732	713,526	589,616
1979 <sup>1</sup>	3,494,398	2,842,867	651,531	557,684	2,808,420	685,978	577,855
1978 <sup>1</sup>	3,333,279	2,713,108	620,171	532,825	2,681,116	652,163	551,540
1977 <sup>1</sup>	3,326,632	2,720,183	606,449	526,667	2,691,070	635,562	544,221
1976 <sup>1</sup>	3,167,788	2,593,957	573,831	498,506	2,567,614	600,174	514,479
1975 <sup>1</sup>	3,144,198	2,576,818	567,380	496,829	2,551,996	592,202	511,581
1974 <sup>1</sup>	3,159,958	2,598,222	561,736	494,005	2,575,792	584,166	507,162
1973 <sup>1</sup>	3,136,965	2,571,660	565,305	500,505	2,551,030	585,935	512,597
1972 <sup>1</sup>	3,258,411	2,675,535	582,876	519,824	2,655,558	602,853	531,329
1971 <sup>2</sup>	3,555,970	2,939,568	616,402	553,750	2,919,746	636,224	564,960
1970 <sup>2</sup>	3,731,386	3,109,956	621,430	561,992	3,091,264	640,122	572,362

<sup>1</sup>Based on 100 percent of births in selected States and on a 50-percent sample of births in all other States.

<sup>2</sup>Based on a 50-percent sample of births.

**Table 2. Infant, neonatal, and postneonatal mortality rates by race of mother and race of child and the ratio of the rates: United States, 1970–89**

[Rates are infant (under 1 year), neonatal (under 28 days), and postneonatal (28 days–11 months) deaths per 1,000 live births in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Year	All races	White			All other			Black		
		Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio
Infant										
1989	9.8	8.1	8.2	0.99	16.3	15.2	1.07	18.6	17.7	1.05
1988	10.0	8.4	8.5	0.99	16.1	15.0	1.07	18.5	17.6	1.05
1987	10.1	8.5	8.6	0.99	16.5	15.4	1.07	18.8	17.9	1.05
1986	10.4	8.8	8.9	0.99	16.7	15.7	1.06	18.9	18.0	1.05
1985	10.6	9.2	9.3	0.99	16.8	15.8	1.06	19.0	18.2	1.04
1984	10.8	9.3	9.4	0.99	17.1	16.1	1.06	19.2	18.4	1.04
1983	11.2	9.6	9.7	0.99	17.8	16.8	1.06	20.0	19.2	1.04
1982	11.5	9.9	10.1	0.98	18.3	17.3	1.06	20.5	19.6	1.05
1981	11.9	10.3	10.5	0.98	18.8	17.8	1.06	20.8	20.0	1.04
1980	12.6	10.9	11.0	0.99	20.2	19.1	1.06	22.2	21.4	1.04
1979	13.1	11.3	11.4	0.99	20.9	19.8	1.06	22.6	21.8	1.04
1978	13.8	11.9	12.0	0.99	22.1	21.1	1.05	23.9	23.1	1.03
1977	14.1	12.2	12.3	0.99	22.7	21.7	1.05	24.4	23.6	1.03
1976	15.2	13.2	13.3	0.99	24.6	23.5	1.05	26.4	25.5	1.04
1975	16.1	14.0	14.2	0.99	25.3	24.2	1.05	27.0	26.2	1.03
1974	16.7	14.7	14.8	0.99	25.9	24.9	1.04	27.5	26.8	1.03
1973	17.7	15.6	15.8	0.99	27.1	26.2	1.03	28.8	28.1	1.02
1972 <sup>1</sup>	18.5	16.2	16.4	0.99	28.7	27.7	1.04	30.3	29.6	1.02
1971	19.1	17.0	17.1	0.99	29.4	28.5	1.03	30.9	30.3	1.02
1970	20.0	17.6	17.8	0.99	31.8	30.9	1.03	33.3	32.6	1.02

**Table 2. Infant, neonatal, and postneonatal mortality rates by race of mother and race of child and the ratio of the rates: United States, 1970–89—Con.**

[Rates are infant (under 1 year), neonatal (under 28 days), and postneonatal (28 days–11 months) deaths per 1,000 live births in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Year	All races	White			All other			Black		
		Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio
Neonatal										
1989	6.2	5.1	5.2	0.98	10.3	9.6	1.07	11.9	11.3	1.05
1988	6.3	5.3	5.4	0.98	10.3	9.7	1.06	12.1	11.5	1.05
1987	6.5	5.4	5.5	0.98	10.7	10.0	1.07	12.3	11.7	1.05
1986	6.7	5.7	5.8	0.98	10.8	10.1	1.07	12.3	11.7	1.05
1985	7.0	6.0	6.1	0.98	11.0	10.3	1.07	12.6	12.1	1.04
1984	7.0	6.1	6.2	0.98	10.9	10.2	1.07	12.3	11.8	1.04
1983	7.3	6.3	6.4	0.98	11.4	10.8	1.06	12.9	12.4	1.04
1982	7.7	6.7	6.8	0.99	12.0	11.3	1.06	13.6	13.1	1.04
1981	8.0	7.0	7.1	0.99	12.5	11.8	1.06	14.0	13.4	1.04
1980	8.5	7.4	7.5	0.99	13.2	12.5	1.06	14.6	14.1	1.04
1979	8.9	7.8	7.9	0.99	13.6	12.9	1.05	14.8	14.3	1.03
1978	9.5	8.3	8.4	0.99	14.7	14.0	1.05	16.0	15.5	1.03
1977	9.9	8.7	8.7	1.00	15.4	14.7	1.05	16.6	16.1	1.03
1976	10.9	9.6	9.7	0.99	17.1	16.3	1.05	18.5	17.9	1.03
1975	11.6	10.3	10.4	0.99	17.5	16.8	1.04	18.9	18.3	1.03
1974	12.3	11.0	11.1	0.99	17.9	17.2	1.04	19.2	18.7	1.03
1973	13.0	11.7	11.8	0.99	18.5	17.9	1.03	19.8	19.3	1.03
1972 <sup>1</sup>	13.6	12.3	12.4	0.99	19.9	19.2	1.04	21.1	20.7	1.02
1971	14.2	12.9	13.0	0.99	20.2	19.6	1.03	21.4	21.0	1.02
1970	15.1	13.7	13.8	0.99	22.1	21.4	1.03	23.2	22.8	1.02
Postneonatal										
1989	3.6	2.9	3.0	0.97	6.0	5.6	1.07	6.7	6.4	1.05
1988	3.6	3.1	3.1	1.00	5.7	5.4	1.06	6.5	6.2	1.05
1987	3.6	3.1	3.1	1.00	5.8	5.4	1.07	6.4	6.1	1.05
1986	3.6	3.1	3.1	1.00	5.9	5.6	1.05	6.6	6.3	1.05
1985	3.7	3.2	3.2	1.00	5.8	5.5	1.05	6.4	6.1	1.05
1984	3.8	3.2	3.3	0.97	6.2	5.8	1.07	6.8	6.5	1.05
1983	3.9	3.3	3.3	1.00	6.4	6.0	1.07	7.0	6.8	1.03
1982	3.8	3.2	3.3	0.97	6.3	5.9	1.07	6.9	6.6	1.05
1981	3.9	3.4	3.4	1.00	6.3	6.0	1.05	6.8	6.6	1.03
1980	4.1	3.5	3.5	1.00	7.0	6.6	1.06	7.6	7.3	1.04
1979	4.2	3.5	3.5	1.00	7.3	6.9	1.06	7.7	7.5	1.03
1978	4.3	3.6	3.6	1.00	7.4	7.0	1.06	7.9	7.6	1.04
1977	4.2	3.6	3.6	1.00	7.3	7.0	1.04	7.8	7.6	1.03
1976	4.3	3.6	3.6	1.00	7.5	7.2	1.04	7.9	7.6	1.04
1975	4.5	3.8	3.8	1.00	7.8	7.5	1.04	8.1	7.9	1.03
1974	4.4	3.7	3.7	1.00	8.0	7.7	1.04	8.3	8.1	1.02
1973	4.8	3.9	3.9	1.00	8.6	8.3	1.04	9.0	8.8	1.02
1972 <sup>1</sup>	4.8	4.0	4.0	1.00	8.8	8.5	1.04	9.1	8.9	1.02
1971	4.9	4.0	4.0	1.00	9.2	8.9	1.03	9.5	9.4	1.01
1970	4.9	4.0	4.0	1.00	9.8	9.5	1.03	10.1	9.9	1.02

<sup>1</sup>Deaths based on a 50-percent sample.

**Table 3. Maternal mortality rates by race of mother and race of child and the ratio of the rates: United States, 1970–89**

[Maternal deaths, 1970–78, are those assigned to complications of pregnancy, childbirth, and the puerperium, category numbers 630–678 of the Eighth Revision International Classification of Diseases, Adapted, 1965. Maternal deaths, 1979–1989, are those assigned to complications of pregnancy, childbirth, and the puerperium, category numbers 630–676 of the Ninth Revision International Classification of Diseases, 1975. Rates per 100,000 live births in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Year	White				All other			Black		
	All races	Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio	Race of mother	Race of child	Ratio
1989	7.9	5.6	5.7	0.98	16.5	15.4	1.07	18.4	17.5	1.05
1988	8.4	5.8	5.9	0.98	18.6	17.4	1.07	20.5	19.5	1.05
1987	6.6	5.0	5.1	0.98	12.8	12.0	1.07	14.9	14.2	1.05
1986	7.2	4.8	4.9	0.98	17.1	16.0	1.07	19.7	18.8	1.05
1985	7.8	5.1	5.2	0.98	19.2	18.1	1.06	21.3	20.4	1.04
1984	7.8	5.4	5.4	1.00	17.9	16.9	1.06	20.6	19.7	1.05
1983	8.0	5.8	5.9	0.98	17.3	16.3	1.06	19.0	18.3	1.04
1982	7.9	5.7	5.8	0.98	17.4	16.4	1.06	19.0	18.2	1.04
1981	8.5	6.2	6.3	0.98	18.3	17.3	1.06	21.2	20.4	1.04
1980	9.2	6.6	6.7	0.99	20.9	19.8	1.06	22.4	21.5	1.04
1979	9.6	6.3	6.4	0.98	23.9	22.7	1.05	26.0	25.1	1.04
1978	9.6	6.3	6.4	0.98	24.2	23.0	1.05	25.9	25.0	1.04
1977	11.2	7.6	7.7	0.99	27.2	26.0	1.05	30.2	29.2	1.03
1976	12.3	8.9	9.0	0.99	27.7	26.5	1.05	30.5	29.5	1.03
1975	12.8	9.0	9.1	0.99	30.3	29.0	1.04	32.2	31.3	1.03
1974	14.6	9.9	10.0	0.99	36.5	35.1	1.04	39.3	38.3	1.03
1973	15.2	10.7	10.7	1.00	35.9	34.6	1.04	39.4	38.4	1.03
1972 <sup>1</sup>	18.8	14.2	14.3	0.99	39.8	38.5	1.03	41.6	40.7	1.02
1971	18.8	12.9	13.0	0.99	46.7	45.3	1.03	49.3	48.3	1.02
1970	21.5	14.3	14.4	0.99	57.6	55.9	1.03	60.9	59.8	1.02

<sup>1</sup>Deaths based on a 50-percent sample.

**Table 4. Fetal deaths and fetal mortality rates by race of mother and race of child and the ratio of the rates: United States, 1970–89**

[Fetal deaths include only those with stated or presumed period of gestation of 20 weeks or more; see Technical notes. Rates per 1,000 live births and fetal deaths in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Race and year	Race of mother		Race of child		Ratio
	Number	Rate	Number	Rate	
<b>All races:</b>					
1989	30,469	7.5	30,469	7.5	1.00
1988	29,442	7.5	29,442	7.5	1.00
1987	29,349	7.6	29,349	7.6	1.00
1986	28,972	7.7	28,972	7.7	1.00
1985	29,661	7.8	29,661	7.8	1.00
1984	30,099	8.1	30,099	8.1	1.00
1983	30,752	8.4	30,752	8.4	1.00
1982	32,694	8.8	32,694	8.8	1.00
1981	32,596	8.9	32,596	8.9	1.00
1980	33,353	9.1	33,353	9.1	1.00
1979	32,969	9.3	32,969	9.3	1.00
1978	32,301	9.6	32,301	9.6	1.00
1977	33,053	9.8	33,053	9.8	1.00
1976	33,111	10.3	33,111	10.3	1.00
1975	33,796	10.6	33,796	10.6	1.00
1974	36,281	11.4	36,281	11.4	1.00
1973	38,309	12.1	38,309	12.1	1.00
1972	41,380	12.5	41,380	12.5	1.00
1971	47,818	13.3	47,818	13.3	1.00
1970	52,961	14.0	52,961	14.0	1.00
<b>White:</b>					
1989	20,520	6.4	20,132	6.4	1.00
1988	19,982	6.4	19,626	6.4	1.00
1987	20,315	6.6	19,972	6.6	1.00
1986	20,442	6.7	20,146	6.7	1.00

**Table 4. Fetal deaths and fetal mortality rates by race of mother and race of child and the ratio of the rates: United States, 1970–89—Con.**

[Fetal deaths include only those with stated or presumed period of gestation of 20 weeks or more; see Technical notes. Rates per 1,000 live births and fetal deaths in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Race and year	Race of mother		Race of child		Ratio
	Number	Rate	Number	Rate	
White:—Con.					
1985	21,228	6.9	20,954	7.0	0.99
1984	21,807	7.3	21,497	7.3	1.00
1983	21,945	7.4	21,650	7.4	1.00
1982	23,608	7.8	23,316	7.9	0.99
1981	23,670	8.0	23,364	8.0	1.00
1980	24,014	8.1	23,766	8.1	1.00
1979	23,672	8.3	23,489	8.3	1.00
1978	22,932	8.4	22,696	8.4	1.00
1977	23,863	8.7	23,628	8.7	1.00
1976	24,184	9.2	23,987	9.3	0.99
1975	24,500	9.4	24,309	9.4	1.00
1974	26,580	10.1	26,365	10.1	1.00
1973	27,641	10.6	27,433	10.6	1.00
1972	29,780	11.0	29,611	11.0	1.00
1971	34,539	11.6	34,308	11.6	1.00
1970	38,731	12.3	38,481	12.3	1.00
All other:					
1989	9,949	11.6	10,337	11.2	1.04
1988	9,460	11.6	9,816	11.2	1.04
1987	9,034	11.7	9,377	11.3	1.04
1986	8,530	11.4	8,826	11.1	1.03
1985	8,433	11.5	8,707	11.2	1.03
1984	8,292	11.7	8,602	11.4	1.03
1983	8,807	12.6	9,102	12.2	1.03
1982	9,086	12.9	9,378	12.5	1.03
1981	8,926	12.9	9,232	12.7	1.02
1980	9,339	13.6	9,587	13.3	1.02
1979	9,297	14.1	9,480	13.6	1.04
1978	9,369	14.9	9,605	14.5	1.03
1977	9,190	14.9	9,425	14.6	1.02
1976	8,927	15.3	9,124	15.0	1.02
1975	9,296	16.1	9,487	15.8	1.02
1974	9,701	17.0	9,916	16.7	1.02
1973	10,668	18.5	10,876	18.2	1.02
1972	11,600	19.5	11,769	19.1	1.02
1971	13,279	21.1	13,510	20.8	1.01
1970	14,230	22.4	14,480	22.1	1.01
Black: <sup>1</sup>					
1989	8,938	13.1	9,215	12.8	1.02
1988	8,435	13.0	8,675	12.7	1.02
1987	8,104	13.1	8,337	12.8	1.02
1986	7,649	12.7	7,856	12.5	1.02
1985	7,559	12.8	7,738	12.6	1.02
1984	7,446	12.9	7,653	12.7	1.02
1983	7,832	13.7	8,001	13.5	1.01
1982	8,085	14.0	8,274	13.8	1.01
1981	8,014	14.0	8,225	13.8	1.01
1980	8,480	14.7	8,640	14.4	1.02
1979	8,547	15.1	8,683	14.8	1.02
1978	8,588	15.9	8,734	15.6	1.02
1977	8,467	15.8	8,643	15.6	1.01
1976	8,222	16.2	8,363	16.0	1.01
1975	8,601	17.0	8,721	16.8	1.01
1974	8,975	17.8	9,125	17.7	1.01
1973	9,957	19.5	10,101	19.3	1.01
1972	10,815	20.4	10,915	20.1	1.01
1971	12,472	22.0	12,626	21.9	1.00
1970	13,446	23.4	13,594	23.2	1.01

<sup>1</sup>Included in "All other."

**Table 5. Fetal deaths and fetal mortality rates by age of mother, race of mother and race of child, and the ratio of the rates: United States, 1989**

[Fetal deaths include only those with stated or presumed period of gestation of 20 weeks or more; see Technical notes. Ratio is the rate using race of mother divided by the rate using race of child. Rates per 1,000 live births and fetal deaths in specified group]

Age of mother and race	Race of mother		Race of child		Ratio
	Number	Rate	Number	Rate	
<b>White:</b>					
Less than 15	58	12.4	54	11.8	1.05
15-19	2,526	7.4	2,456	7.4	1.00
20-24	5,157	6.2	5,036	6.2	1.00
25-29	5,950	5.7	5,858	5.7	1.00
30-34	4,308	6.1	4,252	6.1	1.00
35-39	2,057	8.4	2,021	8.4	1.00
40-44	434	12.0	425	12.0	1.00
45-49	30	24.8	30	25.4	0.98
<b>All other:</b>					
Less than 15	110	15.8	114	16.1	0.98
15-19	1,862	11.1	1,932	10.9	1.02
20-24	2,850	11.1	2,971	10.8	1.03
25-29	2,493	11.1	2,585	10.7	1.04
30-34	1,715	12.2	1,771	11.6	1.05
35-39	737	14.1	773	13.7	1.03
40-44	173	19.7	182	19.2	1.03
45-49	9	*	9	*	*
<b>Black:<sup>1</sup></b>					
Less than 15	109	16.3	113	16.7	0.98
15-19	1,769	11.6	1,820	11.5	1.01
20-24	2,622	12.0	2,711	11.8	1.02
25-29	2,219	13.1	2,278	12.7	1.03
30-34	1,488	15.5	1,528	14.9	1.04
35-39	591	17.7	618	17.3	1.02
40-44	134	25.0	141	24.4	1.02
45-49	6	*	6	*	*

<sup>1</sup>Included in "All other."

**Table 6. Fetal deaths and fetal mortality rates by maternal marital status by race of mother and race of child and the ratio of the rates: Total of 42 States and the District of Columbia, 1989**

[Fetal deaths include only those with stated or presumed period of gestation of 20 weeks or more; see Technical notes. Ratio is the rate using race of mother divided by the rate using race of child. Rates per 1,000 live births and fetal deaths in specified group]

Maternal marital status and race	Race of mother		Race of child		Ratio
	Number	Rate <sup>1</sup>	Number	Rate <sup>1</sup>	
<b>White<sup>2</sup></b>					
Married	8,709	5.9	8,596	5.9	1.00
Unmarried	2,752	8.7	2,657	8.7	1.00
<b>All other<sup>2</sup></b>					
Married	1,903	9.8	2,016	9.4	1.04
Unmarried	4,084	13.6	4,179	13.5	1.01
<b>Black<sup>2,3</sup></b>					
Married	1,565	11.6	1,632	11.3	1.03
Unmarried	3,899	14.2	3,982	14.1	1.01

<sup>1</sup>Not-stated values are proportionally distributed.

<sup>2</sup>Number includes not-stated marital status.

<sup>3</sup>Included in "All other."



**Table 7. Perinatal deaths and perinatal mortality rates by race of mother and race of child and the ratio of the rates: United States, 1970–89—Con.**

[Perinatal Definition I includes infant deaths of less than 7 days and fetal deaths with stated or presumed period of gestation of 28 weeks or more; Perinatal Definition II includes infant deaths of less than 28 days and fetal deaths with stated or presumed period of gestation of 20 weeks or more; Perinatal Definition III includes infant deaths of less than 7 days and fetal deaths with stated or presumed period of gestation of 20 weeks or more. Rates per 1,000 live births and fetal deaths in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Race and year	Perinatal Definition I <sup>1</sup>					Perinatal Definition II					Perinatal Definition III				
	Race of mother		Race of child			Race of mother		Race of child			Race of mother		Race of child		
	Number	Rate	Number	Rate	Ratio	Number	Rate	Number	Rate	Ratio	Number	Rate	Number	Rate	Ratio
<b>All other:—Con.</b>															
1974 . . . . .	15,182	26.7	15,331	26.0	1.03	19,747	34.6	19,962	33.6	1.03	18,368	32.1	18,583	31.3	1.03
1973 . . . . .	16,213	28.3	16,364	27.6	1.03	21,131	36.7	21,339	35.8	1.03	19,824	34.4	20,032	33.6	1.02
1972 . . . . .	17,984	30.4	18,103	29.6	1.03	23,188	39.0	23,357	38.0	1.03	21,758	36.6	21,927	35.7	1.03
1971 . . . . .	19,298	30.9	19,464	30.2	1.02	25,750	40.9	25,981	40.0	1.02	24,384	38.7	24,615	37.9	1.02
1970 . . . . .	21,056	33.4	21,226	32.7	1.02	27,946	44.0	28,196	43.1	1.02	26,463	41.6	26,713	40.8	1.02
<b>Black:</b>															
1989 . . . . .	11,419	16.8	11,597	16.2	1.04	16,959	24.9	17,236	24.0	1.04	15,716	23.0	15,993	22.3	1.03
1988 . . . . .	11,016	17.1	11,176	16.5	1.04	16,130	24.9	16,370	24.1	1.03	15,003	23.2	15,243	22.4	1.04
1987 . . . . .	10,773	17.5	10,922	16.9	1.04	15,624	25.2	15,857	24.4	1.03	14,514	23.4	14,747	22.7	1.03
1986 . . . . .	10,496	17.6	10,635	17.0	1.04	14,946	24.9	15,153	24.1	1.03	13,922	23.2	14,129	22.5	1.03
1985 . . . . .	10,506	17.9	10,628	17.4	1.03	14,899	25.3	15,078	24.5	1.03	13,824	23.5	14,003	22.7	1.04
1984 . . . . .	10,250	17.9	10,389	17.4	1.03	14,448	25.1	14,655	24.4	1.03	13,493	23.4	13,700	22.8	1.03
1983 . . . . .	10,621	18.7	10,750	18.2	1.03	15,109	26.5	15,278	25.7	1.03	14,058	24.6	14,227	24.0	1.03
1982 . . . . .	11,314	19.7	11,431	19.1	1.03	15,829	27.5	16,018	26.7	1.03	14,654	25.4	14,843	24.7	1.03
1981 . . . . .	11,397	20.0	11,524	19.4	1.03	15,914	27.8	16,125	27.1	1.03	14,688	25.6	14,899	25.0	1.02
1980 . . . . .	12,198	21.3	12,322	20.7	1.03	16,783	29.1	16,943	28.3	1.03	15,478	26.8	15,638	26.1	1.03
1979 . . . . .	12,194	21.7	12,279	21.1	1.03	16,817	29.7	16,953	28.9	1.03	15,566	27.5	15,702	26.8	1.03
1978 . . . . .	12,549	23.3	12,653	22.7	1.03	17,122	31.6	17,268	30.8	1.03	15,866	29.3	16,012	28.6	1.02
1977 . . . . .	12,774	24.0	12,901	23.5	1.02	17,216	32.2	17,392	31.5	1.02	15,790	29.5	15,966	28.9	1.02
1976 . . . . .	13,332	26.5	13,432	25.8	1.03	17,439	34.4	17,580	33.6	1.02	16,081	31.7	16,222	31.0	1.02
1975 . . . . .	13,854	27.6	13,940	26.9	1.03	17,972	35.6	18,092	34.8	1.02	16,624	32.9	16,744	32.2	1.02
1974 . . . . .	14,174	28.3	14,278	27.8	1.02	18,450	36.7	18,600	36.0	1.02	17,157	34.1	17,307	33.5	1.02
1973 . . . . .	15,232	30.0	15,337	29.5	1.02	19,855	38.9	19,999	38.3	1.02	18,614	36.5	18,758	35.9	1.02
1972 . . . . .	16,897	32.1	16,971	31.5	1.02	21,799	41.1	21,899	40.4	1.02	20,425	38.5	20,525	37.9	1.02
1971 . . . . .	18,231	32.5	18,328	32.0	1.02	24,320	43.0	24,474	42.4	1.01	23,041	40.7	23,195	40.2	1.01
1970 . . . . .	19,914	34.9	20,021	34.5	1.01	26,474	46.0	26,622	45.4	1.01	25,062	43.6	25,210	43.0	1.01

<sup>1</sup>Figures for gestational age not stated are distributed for fetal deaths. The numbers for Definition I differ from those published in *Vital Statistics of the United States*; see Technical notes for details.

**Table 8. Infant, neonatal, and postneonatal mortality rates by specified Hispanic origin and race for non-Hispanic origin, by race of mother and race of child and the ratio of the rates: 43 States and the District of Columbia, 1989**

[Rates are infant (under 1 year), neonatal (under 28 days), and postneonatal (28 days–11 months) deaths per 1,000 live births in specified group. Ratio is the rate using race of mother divided by the rate using race of child. For a listing of reporting States, see Technical notes]

<i>Origin and/or race of mother</i>	<i>Race of mother</i>	<i>Race of child</i>	<i>Ratio of rate using race of mother to rate using race of child</i>
<b>Infant</b>			
Hispanic . . . . .	8.5	...	...
Mexican . . . . .	7.9	...	...
Puerto Rican . . . . .	9.6	...	...
Cuban . . . . .	7.4	...	...
Central and South American . . . . .	4.3	...	...
Other and unknown Hispanic . . . . .	15.2	...	...
Non-Hispanic <sup>1</sup> . . . . .	9.8	9.8	1.00
White . . . . .	7.9	8.1	0.98
Black . . . . .	18.5	17.7	1.05
<b>Neonatal</b>			
Hispanic . . . . .	5.4	...	...
Mexican . . . . .	5.0	...	...
Puerto Rican . . . . .	5.9	...	...
Cuban . . . . .	5.3	...	...
Central and South American . . . . .	2.6	...	...
Other and unknown Hispanic . . . . .	9.9	...	...
Non-Hispanic <sup>1</sup> . . . . .	6.2	6.2	1.00
White . . . . .	5.0	5.1	0.98
Black . . . . .	11.6	11.2	1.04
<b>Postneonatal</b>			
Hispanic . . . . .	3.1	...	...
Mexican . . . . .	2.9	...	...
Puerto Rican . . . . .	3.7	...	...
Cuban . . . . .	2.1	...	...
Central and South American . . . . .	1.7	...	...
Other and unknown Hispanic . . . . .	5.2	...	...
Non-Hispanic <sup>1</sup> . . . . .	3.7	3.7	1.00
White . . . . .	2.9	3.0	0.97
Black . . . . .	6.8	6.5	1.05

<sup>1</sup>Includes races other than white or black.



**Table 9. Fetal deaths and fetal mortality rates by specified Hispanic origin and race for non-Hispanic origin, by race of mother and race of child and the ratio of the rates: 31 States, 1989**

[Fetal deaths for 1989 include only those with stated or presumed period of gestation of 20 weeks or more; see Technical notes. Rates per 1,000 live births and fetal deaths in specified group. Ratio is the rate using race of mother divided by the rate using race of child. For a listing of reporting States, see Technical notes]

<i>Origin and/or race</i>	<i>Race of mother</i>		<i>Race of child</i>		<i>Ratio</i>
	<i>Number</i>	<i>Rate</i>	<i>Number</i>	<i>Rate</i>	
Hispanic . . . . .	2,922	6.9	...	...	...
Mexican . . . . .	2,010	6.4	...	...	...
Puerto Rican . . . . .	111	6.6	...	...	...
Cuban . . . . .	77	8.6	...	...	...
Central and South American . . . . .	257	6.3	...	...	...
Other and unknown Hispanic . . . . .	467	10.7	...	...	...
Non-Hispanic <sup>1</sup> . . . . .	16,802	7.2	16,802	7.2	1.00
White . . . . .	10,825	6.1	10,605	6.1	1.00
Black . . . . .	5,311	12.3	5,474	12.2	1.01

<sup>1</sup>Includes races other than white or black.

**Table 10. Perinatal deaths and mortality rates by specified Hispanic origin and race for non-Hispanic origin, by race of mother and race of child and the ratio of the rates: 31 States, 1989**

[Perinatal Definition I includes infant deaths of less than 7 days and fetal deaths with stated or presumed period of gestation of 28 weeks or more; Perinatal Definition II includes infant deaths of less than 28 days and fetal deaths with stated or presumed period of gestation of 20 weeks or more; Perinatal Definition III includes infant deaths of less than 7 days and fetal deaths with stated or presumed period of gestation of 20 weeks or more. Rates per 1,000 live births and fetal deaths in specified group. Ratio is the rate using race of mother divided by the rate using race of child]

Origin and/or race	Race of mother		Race of child		Ratio
	Number	Rate	Number	Rate	
Perinatal Definition I <sup>1</sup>					
Hispanic . . . . .	3,828	9.0	...	...	...
Mexican . . . . .	2,683	8.5	...	...	...
Puerto Rican . . . . .	171	10.1	...	...	...
Cuban . . . . .	90	10.1	...	...	...
Central and South American . . . . .	283	7.0	...	...	...
Other and unknown Hispanic . . . . .	604	13.9	...	...	...
Non-Hispanic <sup>2</sup> . . . . .	21,673	9.3	21,673	9.3	1.00
White . . . . .	14,011	7.9	13,873	8.0	0.99
Black . . . . .	6,852	16.0	6,957	15.6	1.03
Not stated . . . . .	704	...	704	...	...
Perinatal Definition II					
Hispanic . . . . .	5,158	12.1	...	...	...
Mexican . . . . .	3,574	11.3	...	...	...
Puerto Rican . . . . .	235	13.9	...	...	...
Cuban . . . . .	125	14.0	...	...	...
Central and South American . . . . .	392	9.7	...	...	...
Other and unknown Hispanic . . . . .	832	19.0	...	...	...
Non-Hispanic <sup>2</sup> . . . . .	30,902	13.3	30,902	13.3	1.00
White . . . . .	19,689	11.1	19,469	11.1	1.00
Black . . . . .	10,074	23.4	10,237	22.8	1.03
Not stated . . . . .	1,104	...	1,104	...	...
Perinatal Definition III					
Hispanic . . . . .	4,763	11.2	...	...	...
Mexican . . . . .	3,296	10.5	...	...	...
Puerto Rican . . . . .	222	13.1	...	...	...
Cuban . . . . .	118	13.2	...	...	...
Central and South American . . . . .	357	8.8	...	...	...
Other and unknown Hispanic . . . . .	770	17.6	...	...	...
Non-Hispanic <sup>2</sup> . . . . .	28,328	12.2	28,328	12.2	1.00
White . . . . .	18,006	10.1	17,786	10.2	0.99
Black . . . . .	9,296	21.6	9,459	21.0	1.03
Not stated . . . . .	1,060	...	1,060	...	...

<sup>1</sup>Figures for gestational age not stated are distributed for fetal deaths. The numbers for Definition I differ from those published in *Vital Statistics of the United States*; see Technical notes for details.

<sup>2</sup>Includes races other than white and black.

**Table 11. Infant, neonatal, and postneonatal mortality rates by specified race of mother and of child and the ratio of the rates: United States, 1987–89**

[Rates are infant (under 1 year), neonatal (under 28 days), and postneonatal (28 days–11 months) deaths per 1,000 live births in specified group. The number of infant deaths and infant mortality rates for specified races other than white and black should be interpreted with caution because of inconsistencies in reporting race on birth and death certificates; see Technical notes. Ratio is the rate using race of mother divided by the rate using race of child]

<i>Race</i>	<i>Race of mother</i>	<i>Race of child</i>	<i>Ratio</i>
		Infant	
All races . . . . .	9.9	9.9	1.00
White . . . . .	8.3	8.5	0.98
Black . . . . .	18.6	17.7	1.05
American Indian <sup>1</sup> . . . . .	11.9	9.6	1.24
Chinese . . . . .	5.4	5.0	1.08
Japanese . . . . .	4.9	4.0	1.23
Hawaiian <sup>2</sup> . . . . .	12.2	8.5	1.44
Filipino . . . . .	4.8	4.5	1.07
Other Asian or Pacific Islander . . . . .	6.1	5.6	1.09
Other . . . . .	5.4	4.5	1.20
		Neonatal	
All races . . . . .	6.3	6.3	1.00
White . . . . .	5.3	5.4	0.98
Black . . . . .	12.1	11.5	1.05
American Indian <sup>1</sup> . . . . .	5.6	4.5	1.24
Chinese . . . . .	3.0	2.8	1.07
Japanese . . . . .	3.2	2.7	1.19
Hawaiian <sup>2</sup> . . . . .	7.6	5.2	1.46
Filipino . . . . .	3.2	3.0	1.07
Other Asian or Pacific Islander . . . . .	3.7	3.4	1.09
Other . . . . .	3.4	2.9	1.17
		Postneonatal	
All races . . . . .	3.6	3.6	1.00
White . . . . .	3.0	3.1	0.97
Black . . . . .	6.5	6.2	1.05
American Indian <sup>1</sup> . . . . .	6.3	5.1	1.24
Chinese . . . . .	2.4	2.2	1.09
Japanese . . . . .	1.7	1.4	1.21
Hawaiian <sup>2</sup> . . . . .	4.7	3.2	1.47
Filipino . . . . .	1.6	1.5	1.07
Other Asian or Pacific Islander . . . . .	2.4	2.2	1.09
Other . . . . .	2.0	1.6	1.25

<sup>1</sup>Includes deaths among Aleuts and Eskimos.

<sup>2</sup>Includes deaths to part-Hawaiians.

# Appendix

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# Technical notes

## Nature and sources of data

Mortality and natality statistics shown in this report are based on information from records of deaths and live births filed in the 50 States and the District of Columbia. The U.S. Standard Certificate of Live Birth, the U.S. Standard Certificate of Death, and the U.S. Standard Report of Fetal Death were revised in 1989; for additional details see the 1989 revision of the U.S. standard certificates and reports and Technical appendixes of *Vital Statistics of the United States* (3,4,7).

Mortality statistics are based on information coded by the National Center for Health Statistics (NCHS) from copies of the original certificates received from the State registration offices and on State-coded data provided to NCHS through the Vital Statistics Cooperative Program (VSCP).

Natality statistics are based on information coded by the State registration offices from copies of the original certificates. The data are provided to NCHS through the VSCP. In 1984 and earlier years, the VSCP included varying numbers of States that provided data based on 100 percent of their birth certificates. Data for States not in the VSCP were based on a 50-percent sample of birth certificates filed in those States (for additional detail, see Technical appendix of *Vital Statistics of the United States* (4).

Data for the United States as a whole refer to events occurring within the United States. Data shown for geographic areas are by place of residence. Mortality and natality statistics exclude events to nonresidents of the United States.

## Race classification

For vital statistics in the United States, deaths are classified by race—white, black, American Indian, Chinese, Hawaiian, Japanese, Filipino, Other Asian or Pacific Islander, and other. Mortality data for Filipino and Other Asian or Pacific Islander were shown for the first time in 1979. Most of the tables in this report show data for white, all other (including black), and black.

The white category includes, in addition to persons reported as white, those reported as Mexican, Puerto Rican, Cuban, and all other Caucasians. The American Indian category includes American, Alaskan, Canadian, Eskimo, and Aleut. If the racial entry on the death certificate indicates a mixture of Hawaiian and any other race, the entry is coded to Hawaiian. If the race is given as a mixture of white and any other race, the entry is

coded to the appropriate other race. If a mixture of races other than white is given (except Hawaiian), the entry is coded to the first race listed.

Records with missing information for race are treated differently for decedents, parents of live births and fetal deaths, and live births and fetal deaths. Maternal and infant death records with race entry not stated are assigned to a racial designation as follows: If the preceding record is coded white, the code assignment is made to white; if the code is other than white, the assignment is made to black.

Live birth and fetal death records do not include an item to identify the race of these vital events, but rather collect information on the race of the mother and the race of the father, by which race of the vital event is classified. Beginning in 1989, if the race of the mother is not defined or not identifiable with one of the categories used in the classification and the father's race is known, the race of the father is assigned as the mother's race. Where information for both parents is missing (0.3 percent of live births in 1989), race of mother is allocated electronically according to the specific race of the mother on the preceding record with a known race of mother (4). For this report, these procedures were also used for the years 1970–88 as well as for 1989 for analysis of the change.

Prior to 1989, for live birth and fetal death records, the race of the child was constructed using an algorithm. If, according to the algorithm, the race of the child was not defined or not identifiable with one of the categories used in the classification of race, then the race of the child was allocated electronically according to the specific race of the child on the preceding record (8). For analytical purposes, this procedure was also applied to 1989 events in this report.

## Hispanic origin

For 1989 mortality data for the Hispanic-origin population are based on deaths to residents of States whose data were at least 90 percent complete on a place-of-occurrence basis and were considered to be sufficiently comparable to be used for analysis. Infant mortality rates for the Hispanic-origin population are based on numbers of resident infant deaths reported to be of Hispanic origin and numbers of resident live births by Hispanic origin of mother for 43 States and the District of Columbia. The 43 States are Alabama, Alaska, Arizona, Arkansas, California, Colorado, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Massachusetts, Michigan, Minnesota, Missis-

sippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, West Virginia, Wisconsin, and Wyoming. The other seven States are Connecticut, Louisiana, Maryland, New Hampshire, Oklahoma, Rhode Island, and Virginia.

In computing infant mortality rates, deaths and live births of unknown origin are not distributed among the specified Hispanic and non-Hispanic groups. Because the percent of infant deaths of unknown origin was 2.6 percent, and the percent of live births of unknown origin was 1.1 percent in the reporting area for 1989, infant mortality rates by specified Hispanic origin and race for non-Hispanic origin may be somewhat underestimated. Small numbers of infant deaths for specific Hispanic-origin groups can result in infant mortality rates subject to relatively large random variation (see section, "Random variation").

In 1980 the 43 States and the District of Columbia accounted for about 97 percent of the Hispanic population in the United States, including about 99 percent of the Mexican population, 94 percent of the Puerto Rican population, 97 percent of the Cuban population, and 94 percent of the "Other Hispanic" population (9).

## Maternal deaths

Maternal deaths are those for which the certifying physician has designated a maternal condition as the underlying cause of death. Maternal conditions are those assigned to Complications of pregnancy, childbirth, and the puerperium (ICD-9 Nos. 630-676). For details on classification of causes of death, see the Technical appendix of *Vital Statistics of the United States* (3). The World Health Organization (WHO) (10) definition of a maternal death follows:

A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Under the Eighth Revision, maternal deaths were assigned to Complications of pregnancy, childbirth, and the puerperium (ICDA-8 Nos. 630-678). See the Technical appendix of *Vital Statistics of the United States* for further details (3).

Maternal mortality rates are computed on the basis of the number of live births. The maternal mortality rate indicates the likelihood that a pregnant woman will die from maternal causes. The number of live births used in the denominator is an approximation of the population of pregnant women who are at risk of a maternal death.

## Infant deaths

An infant death is defined as a death under 1 year of age. The term excludes fetal deaths. Infant deaths are usually divided into two categories according to age, neonatal and

postneonatal. Neonatal deaths are those that occur during the first 27 days of life, and postneonatal deaths are those that occur between 28 days and 1 year of age. It has generally been believed that different factors influencing the child's survival predominate in these two periods.

Infant mortality rates are calculated by dividing the number of infant deaths in a calendar year by the number of live births registered for the same period and are presented as rates per 1,000 or per 100,000 live births. Infant mortality rates use the number of live births in the denominator to approximate the population at risk of dying before the first birthday.

This measure is an approximation of the risk of dying in infancy because some of the live births will not have been exposed to a full year's risk of dying and some of the infants that die during a year will have been born in the previous year. The error introduced into the infant mortality rate by this inexactness is usually small, especially when the birth rate is relatively constant from year to year (11,12). Other sources of error in the infant mortality rate have been attributed to differences in applying the definitions for infant death and fetal death when registering the event (13,14).

Infant mortality rates for specified races other than white or black may be underestimated, based on results of studies in which race on the birth and death certificates for the same infant were compared (15). The figures should be interpreted with caution because of inconsistencies in reporting of race between the numerator and denominator of the rates, see the Technical appendix of *Vital Statistics of the United States*, volume II (3). This reflects differences in the nature of reporting and processing race on these two vital records. On the birth certificate, race of parents is reported by the mother at the time of delivery. On the death certificate, race of the deceased infant is reported by the funeral director based on observation or on information supplied by an informant, such as a parent. Because of these differences in race-specific infant mortality rates, one should use, if possible, data from the national linked birth and infant death data set to measure infant mortality for smaller race groups.

## Fetal deaths

NCHS adopted the WHO's 1950 recommendation for the following definition of fetal death shortly after its recommendation:

Death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation, the fetus does not breathe or show any other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles (16).

The term "fetal death" was defined on an all-inclusive basis to end confusion arising from the use of such terms as stillbirth, spontaneous abortion, and miscarriage. All registration areas included in this report have definitions similar to the standard definition (17).

The 1977 revision of the *Model State Vital Statistics Act and Model State Vital Statistics Regulations* (18) recommended the reporting of spontaneous fetal deaths at a gestation of 20 weeks or more or a weight of 350 grams or more and all induced terminations of pregnancy regardless of gestational age and further that fetal deaths and induced terminations of pregnancy be reported on separate forms.

Beginning with fetal deaths reported in 1970, procedures were implemented that attempted to separate reports of spontaneous fetal deaths from those of induced terminations of pregnancy. These procedures were implemented because the health implications are different for spontaneous fetal deaths than for induced terminations of pregnancy. These procedures are still in use.

### **Comparability and completeness of data**

Registration area requirements for reporting fetal deaths vary. Most of these areas require reporting of fetal death at gestations of 20 weeks or more. There is substantial evidence that not all fetal deaths for which reporting is required are reported (19).

Underreporting of fetal deaths is most likely to occur in the earlier part of the required reporting period for each State. Thus, for States requiring reporting of all periods of gestation, fetal deaths occurring at younger gestational ages are less completely reported. The reporting of fetal deaths at 20–23 weeks of gestation may be more complete for those States that report fetal deaths at all periods of gestation than for others.

The tables are based on fetal deaths occurring at gestations of 20 weeks or more. The tables also include fetal deaths for which gestation is not stated for those States requiring reporting at 20 weeks or more gestation only. Beginning with 1969, fetal deaths of not stated gestation were excluded for States requiring reporting of all products of conception except for those with a stated birth weight of 500 grams or more. In 1989 this rule was applied to the following States: Georgia, Hawaii, New York (including New York City), Rhode Island, and Virginia. Each year there are exceptions to this procedure; for additional details see the Technical appendix of *Vital Statistics of the United States*, volume II (3).

Reporting of race on the fetal death report may occur in one of two ways. On some fetal death reports, race of parents is reported by medical personnel at the time of delivery using information supplied by the mother. On other fetal death reports, race of the parents is reported by the funeral director based on observation or on information supplied by an informant, such as a parent.

Tabulation of items on the fetal death report excludes those States whose fetal death reports do not include an item or whose reporting is incomplete. For fetal deaths prior to data year 1991, tables exclude data for States with no response for a data item on more than 80 percent of the records (6).

### **Period of gestation**

The period of gestation is the number of completed weeks elapsed between the first day of the last normal menstrual period (LMP) and the date of delivery. If data to calculate

period of gestation is not on the record or if the calculated gestation falls beyond a duration considered biologically plausible, the “Physician’s estimate of gestation” is used (for additional details see the Technical appendix of *Vital Statistics of the United States*, volume I (4)). All areas included in this report reported LMP in 1989, and all areas reported physician’s estimate of gestation except California, the District of Columbia, Louisiana, Maryland, and Oklahoma.

### **Hispanic origin of mother**

For 1989, mortality data for the Hispanic-origin population are based on deaths in States whose data were at least 90 percent complete on a place-of-occurrence basis and considered to be sufficiently comparable to be used for analysis. Fetal and perinatal mortality rates are based on numbers of resident fetal and perinatal deaths and live births by Hispanic origin of mother for 31 States. The 31 States include Alabama, Arizona, Arkansas, California, Colorado, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Minnesota, Mississippi, Missouri, Nebraska, Nevada, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, West Virginia, Wisconsin, and Wyoming. The 31 States exclude Alaska, Connecticut, Delaware, the District of Columbia, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, Montana, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Rhode Island, Virginia, and Washington.

The 31 States for which fetal and perinatal data by Hispanic origin are shown accounted for about 75 percent of the Hispanic population in 1980—including 92 percent of the Mexican population, 27 percent of the Puerto Rican population, 75 percent of the Cuban population, and 57 percent of the “Other Hispanic” population (9). Accordingly, caution should be exercised in generalizing mortality patterns from the reporting area to the Hispanic-origin population (especially Puerto Ricans) of the entire United States. (See also section on Hispanic origin under Nature and sources of data).

### **Marital status**

Table 6 shows fetal deaths and fetal mortality rates by mother’s marital status. The following States were excluded from this table because their report of fetal death did not include an item on marital status: California, Connecticut, Maryland, Michigan, Nevada, New York (including New York City), Ohio, and Texas. Because live births comprise the denominator of the rate, marital status must be reported for mothers of live births also. Marital status of the mother of the live birth is inferred for States that did not report it on the birth certificate.

Beginning with data for 1989, fetal deaths with marital status not stated are shown as not stated in frequencies, but are proportionally distributed for rate computations into either the married or unmarried categories according to the percent of fetal deaths with stated marital status that fall into each category (for additional details, see the Technical appendix of *Vital Statistics of the United States*, volume II (3)). In the live birth records, not stated marital status is coded married. The

differences in treating not stated values in the two files result in overestimating rates for unmarried mothers.

### Age of mother

Beginning with data for 1989, the U.S. Standard Report of Fetal Death asks for the mother's date of birth. Age of mother is computed from the mother's date of birth and the date of the termination of the pregnancy. For those States whose certificates do not contain an item for the mother's date of birth, reported age of the mother (in years) is used. The age of the mother is edited by NCHS for upper and lower limits. When mothers are reported to be under 10 years of age or 50 years of age and over, the age of the mother is considered not stated and is assigned as follows: Age on all fetal death records and live birth records with age of mother not stated is assigned according to the age appearing on the record previously processed for a mother of identical race and having the same total-birth order (total of live births and other terminations).

### Perinatal deaths

WHO recommends, in ICD-9, that "national perinatal statistics should include all fetuses and infants delivered weighing at least 500 grams (or when birth weight is unavailable, the corresponding gestational age (22 weeks) or body length (25 centimeters crown-heel)), whether alive or dead. . ." It further recommends, "countries should present, solely for international comparisons, 'standard perinatal statistics' in which both the numerator and denominator of all rates are restricted to fetuses and infants weighing 1,000 grams or more (or, where birth weight is unavailable, the corresponding gestational age (28 weeks) or body length (35 centimeters crown-heel))." Because birth weight and gestational age are not reported on the death certificate in the United States, NCHS was unable to adopt these definitions. Three definitions of perinatal mortality are used by NCHS: Perinatal Definition I, generally used for international comparisons, which includes fetal deaths of 28 weeks' gestation or more and infant deaths of less than 7 days; Perinatal Definition II, which includes fetal deaths of 20 weeks' gestation or more and infant deaths of less than 28 days; and Perinatal Definition III, which includes fetal deaths of 20 weeks' gestation or more and infant deaths of less than 7 days.

Variations in fetal death reporting requirements and practices have implications for perinatal rates. Because reporting is generally poorer near the lower limit of the reporting requirement, States that require reporting of all products of pregnancy regardless of gestation are likely to have more complete reporting of fetal deaths at 20 weeks or more than those States that do not.

Fetal deaths with gestational age not stated are presumed to be of 20 weeks' gestation or more if the State requires reporting of all fetal deaths at a gestational age of 20 weeks or more or the fetus weighed 500 grams or more in those States requiring reporting of all fetal deaths regardless of gestational age. For Definition I, fetal deaths at a gestation not stated but presumed to have been of 20 weeks or more are allocated to

the category 28 weeks or more, according to the proportion of fetal deaths with stated gestational age that falls into that category. For Definitions II and III, fetal deaths at a presumed gestation of 20 weeks or more are included with those at a stated gestation of 20 weeks or more.

For Perinatal Definition I, the number of perinatal deaths in tables 7 and 10 are not identical to those published in the *Vital Statistics of the United States* because of differences in distributing not-stated gestational age. The rates are consistent. The difference in numbers in this report and the *Vital Statistics of the United States* arises because the allocation of not-stated gestational age for fetal deaths is done slightly differently for the perinatal tables shown in this report and those shown in the *Vital Statistics of the United States*. For this report, the allocation is made separately for race groups by race of child and summed to calculate the total number of perinatal deaths for the United States. Likewise, the allocation is made separately for race groups by race of mother. For information on Hispanic origin among perinatal deaths, see section on "Hispanic origin of mother" under Fetal deaths.

### Random variation

Although the mortality data in this report (except data for 1972) are not subject to sampling error, they may be affected by random variation in the number of deaths involved. When the number of events is small (perhaps less than 100) and the probability of such an event is small, considerable caution must be observed in interpreting the data. Such infrequent events may be assumed to follow a Poisson probability distribution. For this distribution, a simple approximation may be used to estimate the confidence interval as follows:

If  $N$  is the number of registered deaths in the population and  $R$  is the corresponding rate, the chances are 19 in 20 (approximate 95-percent confidence interval) that

$$1. \quad N-2\sqrt{N} \quad \text{and} \quad N+2\sqrt{N}$$

covers the "true" number of events.

$$2. \quad R-2\frac{R}{\sqrt{N}} \quad \text{and} \quad R+2\frac{R}{\sqrt{N}}$$

covers the "true" rate.

If the rate  $R_1$  corresponding to  $N_1$  events is compared with the rate  $R_2$  corresponding to  $N_2$  events, the difference between the two rates may be regarded as statistically significant if it exceeds

$$3. \quad 2\sqrt{\frac{R_1^2}{N_1} + \frac{R_2^2}{N_2}}$$

Additional information on random variation may be found in the Technical appendix of *Vital Statistics of the United States*, volume II (3).

### Rates and ratios

An asterisk is shown in place of a rate based on 20 or fewer deaths. These rates have a relative standard error of 23 percent or more and are, therefore, considered statistically unreliable.



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For answers to questions about this report or for a list of reports published in these series, contact:

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