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Infant Mortality Statistics from the 2000 Period Linked Birth/Infant Death Data Set

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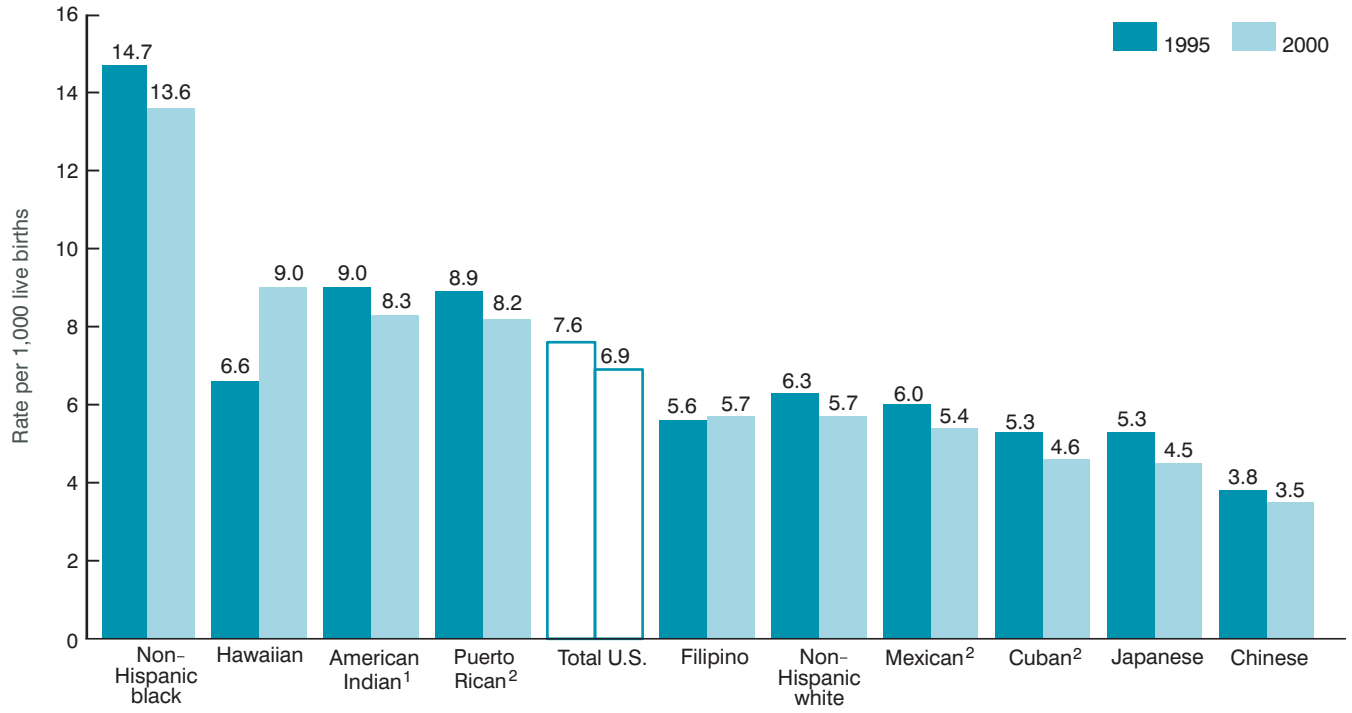
Abstract

Objectives—This report presents the 2000 period infant mortality statistics from the linked birth/infant death data set (linked file) by a variety of maternal and infant characteristics.

Methods—Descriptive tabulations of data are presented and interpreted.

Results—Infant mortality rates ranged from 3.5 per 1,000 live births for Chinese mothers to 13.5 for black mothers. Among Hispanics, rates ranged from 4.5 for Cuban mothers to 8.2 for Puerto Rican mothers. Infant mortality rates were higher for those infants whose mothers had no prenatal care, were teenagers, had 9–11 years of education, were unmarried, or smoked during pregnancy. Infant mortality was also higher for male infants, multiple births, and infants born preterm or at low birthweight. The three leading causes of infant death—Congenital malformations, low birthweight, and Sudden infant death syndrome (SIDS)—taken together accounted for 45 percent of all infant deaths in the United States in 2000. Cause-specific mortality rates varied considerably by race and Hispanic origin. For infants of black mothers, the infant mortality rate for low birthweight was nearly



[1]Includes Aleuts and Eskimos.
[2]Persons of Hispanic origin may be of any race.
NOTE: Differences are significant for total U.S., non-Hispanic white, non-Hispanic black, and Mexican mothers.

Figure 1. Infant mortality rates by race and ethnicity, 1995 and 2000

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four times that for white mothers. For infants of black and American Indian mothers, the SIDS rates were 2.4 and 2.3 times that for non-Hispanic white mothers.

Keywords: infant mortality • infant health • birthweight • maternal characteristics

Introduction

This report presents infant mortality data from the 2000 period linked file. In the linked file, the information from the death certificate is linked to information from the birth certificate for each infant under 1 year of age who died in the 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, or Guam during 2000. Linked birth/infant death data are not available for American Samoa and the Commonwealth of the Northern Marianas. The purpose of the linkage is to use the many additional variables available from the birth certificate to conduct more detailed analyses of infant mortality patterns. This report presents infant mortality data by race and Hispanic origin of the mother, birthweight, period of gestation, sex of infant, plurality, trimester of pregnancy prenatal care began, maternal age, maternal educational attainment, live-birth order, mother's marital status, mother's place of birth, maternal smoking during pregnancy, age at death, and underlying cause of death (tables 1 through 7). Other variables that are available in the linked file data set (1), but are not discussed in this report include: father's age, race, and Hispanic origin; birth attendant; place of delivery; mother's weight gain during pregnancy; and many medical and health measurements. Another report, based on data from the vital statistics mortality file, provides more detailed information on trends in infant mortality and on causes of infant death (2). Some rates calculated from the mortality file differ from those published using the linked birth/infant death file (see Technical notes).

Methods

Data shown in this report are based on birth and infant death certificates registered in all States, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam. As part of the Vital Statistics Cooperative Program (VSCP), each State provided to the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS) matching birth and death certificate numbers for each infant under 1 year of age who died in the State during 2000. When the birth and death occurred in different States, the State of death was responsible for contacting the State of birth identified on the death certificate to obtain the original birth certificate number. NCHS used the matching birth and death certificate numbers provided by the States to extract final edited data from the NCHS natality and mortality statistical files. These data were linked to form a single statistical record, thereby establishing a national linked record file.

After the initial linkage, NCHS returned computer lists of unlinked infant death records and records with inconsistent data between the birth and death certificates to each State. State additions and corrections were incorporated, and a final national linked file was produced. In 2000, 98.6 percent of all infant death records were successfully matched to their corresponding birth records. This is higher than in 1999 (97.7). Some of the improvement in matching for 2000 was due to the acceptance of late filed birth certificate records used exclusively for the creation of the linked file. A record weight was added to the linked file in 2000 to compensate for the 1.4 percent of infant death records that were not linked to their corresponding birth certificates. See the Technical notes for more information on the weighting of the linked file.

Information on births by age, race, or marital status of mother is imputed if it is not reported on the birth certificate. These items were not reported for less than 1 percent of U.S. births in 2000.

Race and Hispanic origin are reported independently on the birth certificate. In tabulations of birth data by race and Hispanic origin, data for Hispanic persons are not further classified by race because the vast majority of women of Hispanic origin are reported as white. Data for American Indian and Asian or Pacific Islander (API) births are not shown separately by Hispanic origin because the vast majority of these populations are non-Hispanic.

Cause-of-death statistics in this publication are classified in accordance with the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* (ICD–10) (3). Previous issues of this report included causes of death classified according to the *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, Ninth Revision* (ICD–9) (4).

Data by maternal and infant characteristics

This report presents descriptive tabulations of infant mortality data by a variety of maternal and infant characteristics. These tabulations are useful for understanding the basic relationships between risk factors and infant mortality, *unadjusted for the possible effects of other variables*. In reality, women with one risk factor often have other risk factors as well. For example, teenage mothers are more likely to also be unmarried and of a low-income status, and mothers who do not receive prenatal care are more likely to be of a low-income status and uninsured. The preferred method for disentangling the multiple interrelationships among risk factors is multivariate analysis; however, an understanding of the basic relationships between risk factors and infant mortality is a necessary precursor to more sophisticated types of analyses and is the aim of this publication.

Race and Hispanic origin data—Infant mortality rates are presented for both detailed race of mother and Hispanic origin of mother. The linked file is particularly useful for computing accurate infant mortality rates for this purpose because the race of the mother from the birth certificate is used in both the numerator and denominator of the infant mortality rate. In contrast, for the vital statistics mortality data—the more "traditional" source of infant mortality data—race information for the denominator is the race of the mother as reported on the birth certificate, whereas the race information for the numerator is the race of the decedent as reported on the death certificate (1,5). Another source of error is misreported race on the death certificate where race of the deceased infant is reported by the funeral director based on information provided by an informant or on observation. These different reporting methods can lead to differences in race-specific infant mortality rates between the two data sources with a larger impact on rates for races other than white and black (5,6).

Rates for total Asian or Pacific Islander (API) and for Chinese, Japanese, Filipino, and other API mothers are reported for all 50 States and the District of Columbia. In addition, infant mortality rates for five other detailed API groups, including Vietnamese, Asian Indian, Korean,

Samoan, and Guamanian mothers are presented for an 11-State reporting area: California, Hawaii, Illinois, Minnesota, Missouri, New Jersey, New York, Texas, Virginia, Washington, and West Virginia.

Race and Hispanic origin of mother are reported as separate items on the birth certificate; thus, a mother of Hispanic origin may be of any race. Although the overwhelming majority of Hispanic-origin births are to white women (7), there are notable differences in infant mortality trends between Hispanic and non-Hispanic white women. Therefore, race-specific data for non-Hispanic mothers are presented for comparison in tables showing data for Hispanic mothers. Race and ethnic differentials in infant mortality rates may reflect differences in income, educational levels, access to health care, health insurance, and other factors.

Statistical significance—Text statements have been tested for statistical significance, and a statement that a given infant mortality rate is higher or lower than another rate indicates that the rates are significantly different. Information on the methods used to test for statistical significance, as well as information on differences between period and cohort data, the weighting of the linked file, and a comparison of infant mortality data between the linked file and the vital statistics mortality file are presented in the Technical notes. Additional information on marital status, period of gestation, birthweight, and cause-of-death classification is also presented in the Technical notes.

Results and Discussion

Infant mortality by race and Hispanic origin of mother

The overall 2000 infant mortality rate from the linked file was 6.9 infant deaths per 1,000 live births, similar to the rate in 1999 (7.0) and lower than the 1998 level (7.2) (8). The rate has declined 9 percent since 1995 (7.6). There was wide variation in infant mortality rates by race of mother with the highest rate, 13.5 for infants of black mothers, nearly four times greater than the lowest rate of 3.5 for infants of Chinese mothers. Rates were intermediate for infants of non-Hispanic white and Filipino mothers (both 5.7), but higher for Hawaiian (9.0) and American Indian mothers (8.3) (tables A and B).

The neonatal mortality rate (less than 28 days) for infants of black mothers (9.1) was significantly higher than for all other racial groups. Infants of black and American Indian mothers had the highest postneonatal rates (28 days to under 1 year) of any group, 4.3 and 3.9, respectively. In general, the neonatal mortality rates were about twice the postneonatal rates for nearly all groups in which both rates could be reliably computed. The exception was infants of American Indian mothers whose neonatal mortality rate was not significantly different from the postneonatal rate (4.4 versus 3.9).

In the 11-State reporting area for the expanded API subgroups, infant mortality rates were 4.5 for both Korean and Asian Indians and 4.4 for infants of Vietnamese mothers (table C).

There was wide variation in infant mortality rates for Hispanic subgroups with the rates high for infants of Puerto Rican mothers (8.2) and low for Cuban as well as Central and South American mothers (4.6). Rates were intermediate for infants of Mexican mothers (5.4) (table B). Among Hispanics, only Mexican mothers showed a significant decline from 1995 to 2000 (figure 1). The rates for non-Hispanic black and non-Hispanic white mothers also declined from 1995 to 2000. Although not significant, rates for Hawaiian mothers increased from 6.6 in 1995 to 9.0 in 2000.

Infant mortality by State

Infant mortality rates for 1998–2000 varied by State and within States by race and Hispanic origin of mother (table 1). Three years of data were combined to obtain statistically reliable rates. Rates were generally highest for States in the South and lowest for States in the West and Northeast (figure 2). Infant mortality rates ranged from 10.3 for Mississippi (unchanged from 1997–99) to 5.0 for Massachusetts. The highest rate (13.5) was noted for the District of Columbia; however, this rate is more appropriately compared with rates for other large U.S. cities, because of the high concentrations of high-risk women in these areas.

Mortality rates for infants of non-Hispanic black mothers ranged from 17.3 in Iowa to 8.5 in Oregon. Oklahoma had the highest infant mortality rate for infants of non-Hispanic white mothers (8.2), and Massachusetts had the lowest rate (4.2).

Mortality rates for infants of American Indian and API mothers could be reliably computed for only 14 and 25 States, respectively.

Table A. Infant, neonatal, and postneonatal deaths and mortality rates by specified race or national origin of mother: United States, 2000 linked file

Race of mother	Live births	Number of deaths			Mortality rate per 1,000 live births		
		Infant	Neonatal	Postneonatal	Infant	Neonatal	Postneonatal
All races	4,058,882	27,960	18,733	9,227	6.9	4.6	2.3
White	3,194,049	18,246	12,179	6,067	5.7	3.8	1.9
Black	622,621	8,391	5,684	2,707	13.5	9.1	4.3
American Indian[1]	41,668	346	183	164	8.3	4.4	3.9
Asian or Pacific Islander	200,544	977	688	289	4.9	3.4	1.4
Chinese	34,271	121	87	33	3.5	2.5	1.0
Japanese	8,969	41	24	17	4.5	2.6	*
Hawaiian	6,608	60	41	18	9.0	6.2	*
Filipino	32,108	182	131	51	5.7	4.1	1.6
Other Asian or Pacific Islander	118,588	574	405	170	4.8	3.4	1.4

* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
1 Includes Aleuts and Eskimos.

NOTE: Neonatal is less than 28 days and postneonatal is 28 days to under 1 year.

Table B. Infant, neonatal, and postneonatal deaths and mortality rates by Hispanic origin of mother and by race of mother for mothers of non-Hispanic origin: United States, 2000 linked file

Hispanic origin and race of mother	Live births	Number of deaths			Mortality rate per 1,000 live births		
		Infant	Neonatal	Postneonatal	Infant	Neonatal	Postneonatal
All origins[1]	4,058,882	27,960	18,733	9,227	6.9	4.6	2.3
Total Hispanic	815,883	4,564	3,078	1,486	5.6	3.8	1.8
Mexican	581,924	3,162	2,103	1,059	5.4	3.6	1.8
Puerto Rican	58,126	477	337	140	8.2	5.8	2.4
Cuban	13,429	61	43	18	4.6	3.2	*
Central and South American	113,346	526	370	156	4.6	3.3	1.4
Other and unknown Hispanic	49,058	338	225	113	6.9	4.6	2.3
Non-Hispanic total[2]	3,200,030	22,916	15,287	7,629	7.2	4.8	2.4
Non-Hispanic white	2,362,982	13,461	8,924	4,537	5.7	3.8	1.9
Non-Hispanic black	604,367	8,212	5,552	2,660	13.6	9.2	4.4
Not stated	42,969	480	368	112	...	...	...

* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
... Category not applicable.
1 Origin of mother not stated included in "All origins" but not distributed among origins.
2 Includes races other than white or black.

NOTE: Neonatal is less than 28 days and postneonatal is 28 days to under 1 year.

Table C. Infant, neonatal, and postneonatal deaths and mortality rates by race or national origin of mother: Total of 11 States, 2000 linked file

Race of mother	Live births	Number of Deaths			Mortality rate per 1,000 live births		
		Infant	Neonatal	Postneonatal	Infant	Neonatal	Postneonatal
All races	1,817,264	11,197	7,447	3,750	6.2	4.1	2.1
Total Asian or Pacific Islander	142,986	699	500	199	4.9	3.5	1.4
Chinese	27,526	93	70	23	3.4	2.5	0.8
Japanese	7,093	33	19	13	4.6	*	*
Filipino	26,495	149	106	42	5.6	4.0	1.6
Vietnamese	16,315	72	48	24	4.4	2.9	1.5
Asian Indian	24,485	109	86	23	4.5	3.5	0.9
Korean	10,274	46	29	17	4.5	2.8	*
Hawaiian	5,970	50	35	15	8.4	5.9	*
Samoan	1,705	11	8	3	*	*	*
Guamanian	556	2	2	-	*	*	*
Remaining Asian or Pacific Islander	22,567	133	96	37	5.9	4.3	1.7
White	1,435,567	7,615	5,032	2,583	5.3	3.5	1.8
Black	229,829	2,821	1,886	936	12.3	8.2	4.1
American Indian[1]	8,882	62	29	32	7.0	3.3	3.6

* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
- Quantity zero.
1 Includes Aleuts and Eskimos.

NOTE: States included are California, Hawaii, Illinois, Minnesota, Missouri, New Jersey, New York, Texas, Virginia, Washington, and West Virginia. Neonatal is less than 28 days and postneonatal is 28 days to under 1 year.

Mortality rates for infants of American Indian mothers ranged from 15.4 in Nebraska to 7.6 in New Mexico. Overall, infant mortality rates for infants of API mothers were the lowest, ranging from 3.8 in Pennsylvania to 7.6 in Hawaii.

Sex of infant

In 2000 the overall infant mortality rate for male infants was 7.5 per 1,000, 21 percent higher than the rate for female infants (6.2) (tables 2 and 3). Infant mortality rates were higher for male than female infants in each racial and Hispanic origin group. Differences were not statistically significant for infants of Puerto Rican and Central and South American mothers. A similar comparison could not be made for infants of Cuban mothers due to a small number of female infant deaths.

Multiple births

For plural births, the infant mortality rate was 31.1, more than five times the rate of 6.1 for single births (table 2). Infant mortality rates that could be reliably calculated for plural births were higher than rates for single births for all race and Hispanic-origin groups.

The risk of infant death increases with the increasing number of infants in the pregnancy (9). In 2000 the infant mortality rates for quadruplets (95.5) and triplets (63.2) were more than three times and

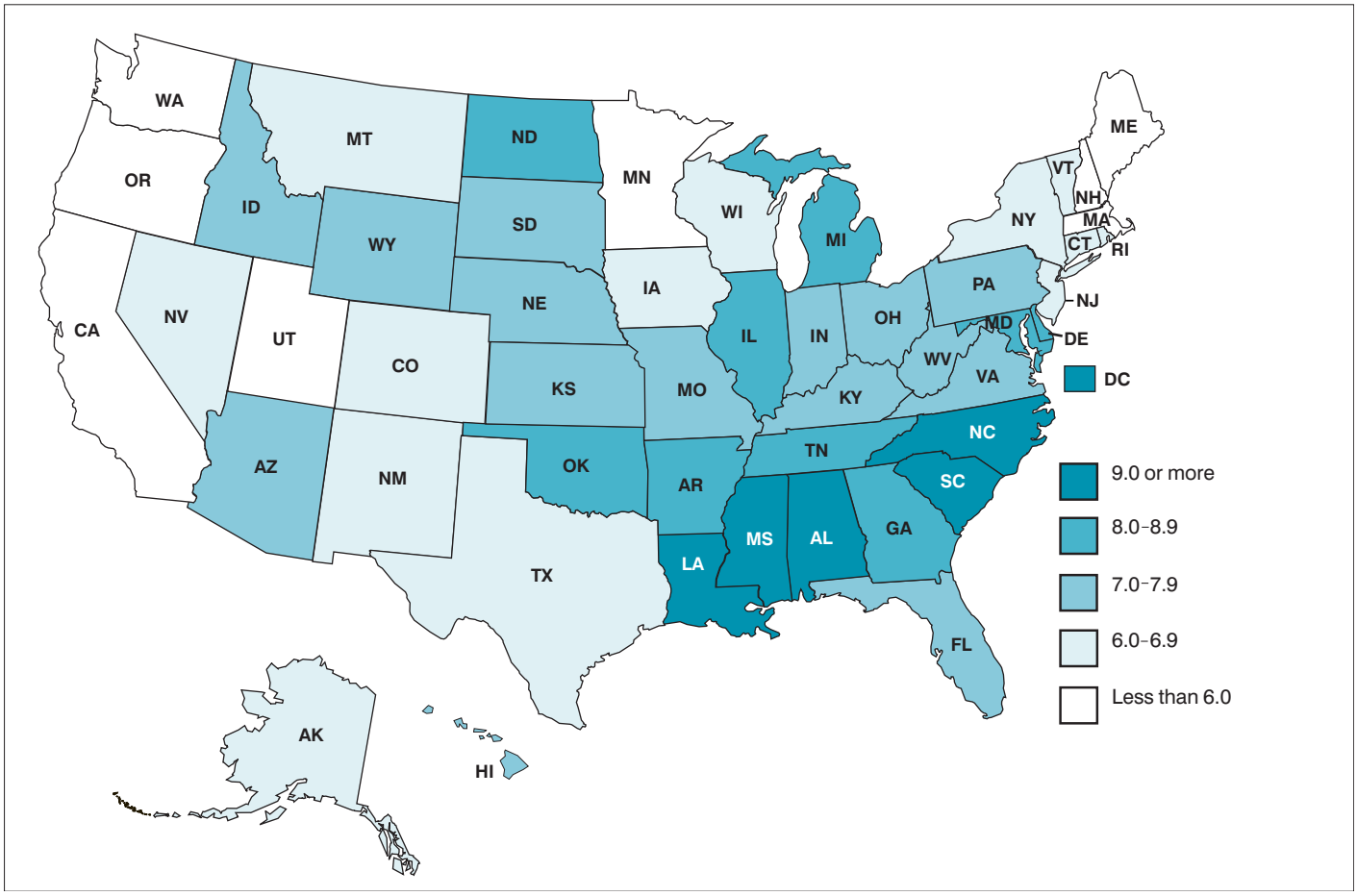

Figure 2. Infant mortality rates by State, 1998–2000

two times, respectively, the rate for twin births (28.9). Rates for quadruplets and triplets were more than 15 and 10 times respectively, the rate for single births (6.1) (tabular data not shown).

Birthweight and period of gestation

Birthweight and period of gestation are the two most important predictors of an infant's subsequent health and survival. Infants born too small or too soon have a much greater risk of death and both short-term and long-term disability than those born at term (37–41 weeks of gestation) or with birthweights of 2,500 grams or more (10–12). The percent of infants born at low birthweight ranged from 5.1 percent for births to Chinese mothers to 13.0 percent for births to black mothers (tables 4 and 5). The percent of preterm births (those born before 37 completed weeks of gestation) ranged from 7.3 percent for births to Chinese mothers to 17.3 percent for births to black mothers.

Infant mortality rates were much higher for low-birthweight infants than for infants with birthweights of 2,500 grams or more for all race and ethnic groups studied. Overall, the infant mortality rate for very low birthweight infants (those with birthweights of less than 1,500 grams) was 244.3, almost 100 times the rate for infants with birthweights of 2,500 grams or more (2.5).

Similarly, the infant mortality rate for very preterm infants (those born at less than 32 weeks of gestation) was 180.9, nearly 70 times the rate for infants born at term (2.6) (37–41 weeks of gestation) (tables 2 and 3).

Infant mortality rates for more detailed birthweight categories are presented in table 6. Eighty-five percent of infants with birthweights of less than 500 grams died within the first year of life—most within the first few days of life. An infant's chances of survival increase rapidly with increasing birthweight. At birthweights of 1,250–1,499 grams, about 95 out of 100 infants survive the first year of life. Infant mortality rates are lowest at birthweights of 3,500–4,999 grams.

From 1995 to 2000, infants weighing 3,000 to 3,499 grams had the largest decline, 17 percent, in the infant mortality rate by specified birthweight (from 2.9 to 2.4). The only nonsignificant changes were for infants weighing 4,500–4,999, and 5,000 grams or more. For infants of white mothers, the largest significant decline was for infants weighing 1,250 to 1,499 grams (20 percent). The largest decline by specified birthweight for infants of black mothers was for those 4,000 to 4,499 grams (44 percent).

Prenatal care

Prenatal care includes patient education, early recognition of symptoms and risk factors that require monitoring, and timely access to care. Therefore, prenatal care has frequently been the focus of efforts to reduce infant mortality, especially among women with medical and demographic risk factors for adverse outcomes (13–16). In 2000 infants of mothers who began prenatal care after the first trimester of pregnancy or not at all had an infant mortality rate of 8.8 per 1,000, which was 44 percent higher than the rate for those whose care began in the first trimester (6.1). For each race and Hispanic

origin group where rates could be reliably calculated, infant mortality rates were higher for mothers who began prenatal care after the first trimester or received no care than for those who received early care (tables 2 and 3). These differences were significant for all but infants of American Indian, Mexican, and Central and South American mothers.

Overall, the infant mortality rate for infants whose mothers began care in the third trimester (6.1) was lower than for those who began care in the second trimester, (7.2). This is because women who began prenatal care in the third trimester had to have a gestation period of at least 7 months, thus reducing the probability that the infant would be born preterm or of low birthweight. The relationship between month of initiation of prenatal care and length of gestation is complex. Therefore, prenatal care data are often grouped into two categories: mothers who began care in the first trimester and those who began care after the first trimester or not at all (17).

Maternal age

Infant mortality rates are highest for infants of teenage mothers, lowest for mothers in their late twenties and early thirties, and again higher for mothers in their forties and over (tables 2 and 3). Among teen births, rates were higher for the younger teenagers. In 2000 the mortality rate for infants of mothers aged 15–17 years was 10.5, compared with a rate of 9.4 for mothers aged 18–19 years (tabular data not shown). The infant mortality rate for infants of mothers less than 15 years of age was 17.7.

For all infants and for infants of non-Hispanic white mothers, mortality rates were higher for teenage mothers than for mothers 40–54 years of age. For infants of Mexican mothers, mortality rates were higher for infants of mothers 40–54 years of age than for teenagers.

Studies suggest that the higher mortality risk for infants of younger mothers may be related to the preponderance of teenage mothers who are from disadvantaged backgrounds, while for older mothers, both biological and sociological factors may play a role (18–22).

Maternal education

Infant mortality rates generally decreased with increasing educational level (tables 2 and 3). This pattern may reflect the effects of more education as well as socioeconomic differences; women with more education tend to have higher family income levels (23). In addition, most mothers with 0–8 years of education were born outside of the 50 States and the District of Columbia (24). Only nonsignificant differences between education levels are observed by race and Hispanic origin of mothers.

Live-birth order

Infant mortality rates were generally higher for first births than for second births, and then increased as birth order increased (tables 2 and 3). Overall, the infant mortality rate for first births (6.8) was 13 percent higher than for second births (6.0). The rate for fifth and higher order births (10.8) was 80 percent higher than the rate for second births. The higher parities and therefore the highest order births (fifth child and above) are more likely to be associated with older maternal age and lower socioeconomic status (25).

Marital status

Infants of mothers who are not married have been shown to be at higher risk for poor outcomes (26–28). The infant mortality rate for infants of unmarried mothers (9.9) was more than 83 percent higher than the rate for infants of married mothers (5.4) (tables 2 and 3). Infant mortality rates were higher for infants of unmarried mothers in each race and Hispanic origin group and these differences were significant.

Nativity

In 2000 the infant mortality rate for mothers born in the 50 States and the District of Columbia (7.2) was 41 percent higher than the rate for mothers born outside of the 50 States and the District of Columbia (5.1) (tables 2 and 3). This relationship was observed for most race and Hispanic origin groups.

A variety of different hypotheses have been advanced to account for the lower infant mortality rate among infants of mothers born outside the 50 States and the District of Columbia, including possible differences in the level of familial integration and social support for new mothers (29–32). Also, women born outside the 50 States and the District of Columbia have been shown to have different characteristics than their U.S.– born counterparts with regard to socioeconomic and educational status, and risk behaviors such as smoking and alcohol use (32,33).

Maternal smoking

Tobacco use during pregnancy causes the passage of substances such as nicotine, hydrogen cyanide, and carbon monoxide from the placenta into the fetal blood supply. These substances restrict the growing infant's access to oxygen and can lead to adverse pregnancy and birth outcomes such as low birthweight, preterm delivery, intrauterine growth retardation, and infant mortality (34–37).

The infant mortality rate for infants of smokers was 10.7 in 2000, 65 percent higher than the rate of 6.5 for nonsmokers. For each race and Hispanic-origin group for which these rates could be computed, the infant mortality rate for smokers was higher than for nonsmokers (tables 2 and 3).

Leading causes of infant death

Infant mortality rates for the five leading causes of infant death are presented in table 7 by race and Hispanic origin of mother. For 1999 and 2000 data, cause-of-death data in the United States are coded according to the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* (ICD–10) (3). From 1979–98 causes were classified according to the ninth revision (ICD–9) (4).

The leading cause of infant death in the United States in 2000 was Congenital malformations, deformations and chromosomal abnormalities (congenital malformations), accounting for 21 percent of all infant deaths. Disorders related to short gestation and low birthweight, not elsewhere classified (low birthweight) was second, accounting for 16 percent of all infant deaths, followed by Sudden infant death syndrome (SIDS) accounting for 9 percent of infant deaths. The fourth and fifth leading causes—Newborn affected by maternal complications of

pregnancy (maternal complications), and Newborn affected by complications of placenta, cord and membranes (cord and placental complications), accounted for 5 and 4 percent, respectively, of all infant deaths in 2000. Together the five leading causes accounted for 54 percent of all infant deaths in the United States in 2000.

The first four leading causes of death were the same in 2000 as in the previous year. However, the fifth leading cause changed between 1999 and 2000. In 1999 the fifth leading cause was Respiratory distress of newborn. Respiratory distress of newborn has continued its rapid decline (it declined by 13 percent from 1999 to 2000), and has now dropped out of the five leading causes of infant death (it is now sixth). Cord and placental complications, sixth in 1999, is the fifth leading cause of infant death in 2000.

The rank order of leading causes of infant death varied substantially by race and Hispanic origin of the mother. Congenital malformations was the leading cause of infant death for all groups except for black and Puerto Rican mothers, for whom low birthweight was the leading cause.

When changes in cause-specific infant mortality rates from 1999 to 2000 were examined, SIDS rates declined by 7 percent for the total population, and also for white mothers, continuing the rapid decline in SIDS during the 1990s. From 1999 to 2000, infant mortality rates from cord and placental complications increased by 12 percent for white mothers, but declined by 20 percent for black mothers. However, 1999 represented a low point in the long-term trend for white mothers, and a high point in the long-term trend for black mothers, so these changes should be interpreted with caution. Other changes in cause-specific infant mortality rates by race and/or ethnicity from 1999 to 2000 were not statistically significant.

When differences between cause-specific infant mortality rates by race and/or ethnicity were examined, infant mortality rates for congenital malformations were 21 percent higher for black than for white mothers. Rates were 10 percent higher for Mexican than for non-Hispanic white mothers. Differences in infant mortality rates for Congenital malformations between American Indian and white mothers were not statistically significant. Infant mortality rates from congenital malformations were 17 percent lower for API than for white mothers.

Infants of black mothers had the highest infant mortality rates from low birthweight; the rate for black mothers was nearly four times the rate for white mothers. The rate for Puerto Rican mothers was two times the rate for non-Hispanic white mothers. Rates were about 1.5 times higher for American Indian than for white mothers.

For SIDS, infant mortality rates were highest among black and American Indian mothers. SIDS rates for black mothers were 2.4 times, and for American Indian mothers 2.3 times those for white mothers. As most SIDS deaths occur during the postneonatal period, the high SIDS rates for infants of black and American Indian mothers account for much of their elevated risk of postneonatal mortality. For infants of API mothers, the SIDS rate of 29.4 was 43 percent lower than the white rate of 51.8. For Mexican mothers, the SIDS rate of 31.8 was 46 percent lower than the rate of 57.7 for non-Hispanic white mothers.

For maternal complications and cord and placental complications, infants of black mothers had the highest mortality rates. Black infant mortality rates were three times those for white mothers for maternal complications, and two times for cord and placental complications. The infant mortality rate for cord and placental complications was 71 percent higher for Puerto Rican mothers than for non-Hispanic white mothers.

In 2000, 98 percent of infant deaths from maternal complications and 90 percent of infant deaths from cord and placental complications occurred to low-birthweight infants. The higher percent of black and Puerto Rican infants born low birthweight may help to explain their higher infant mortality rates from these causes. In contrast, the infant mortality rate from maternal complications was 31 percent lower for Mexican than for non-Hispanic white mothers, and the infant mortality rate from cord and placental complications was 28 percent lower for Mexican than for non-Hispanic white mothers.

An examination of cause-specific differences in infant mortality rates between race and Hispanic origin groups can help the researcher to understand overall differences between these groups. For example, 28 percent of the elevated infant mortality rates for black mothers, when compared with white mothers, can be accounted for by their higher infant mortality rates due to low birthweight, 9 percent can be accounted for by differences in SIDS, and 7 percent by differences in maternal complications. In other words, if black infant mortality rates for these three causes could be reduced to white levels, the difference in the infant mortality rate between black and white mothers would be reduced by 44 percent.

For American Indian mothers, more than one-fourth (26 percent) of their elevated infant mortality rate, when compared with white mothers, can be accounted for by their higher SIDS rates, and 14 percent by higher rates for low birthweight. If American Indian infant mortality for SIDS and low birthweight could be reduced to white levels, the difference in the infant mortality rate between American Indian and white mothers would be reduced by 40 percent.

Similarly, 29 percent of the difference between Puerto Rican and non-Hispanic white infant mortality rates can be accounted for by differences in low birthweight, and a further 7 percent by cord and placental complications. If Puerto Rican infant mortality for these two causes could be reduced to non-Hispanic white levels, the difference in the infant mortality rate between Puerto Rican and non-Hispanic white infants would be reduced by 36 percent. In addition to helping to explain differences in infant mortality rates between various groups, comparisons such as these can be helpful in targeting prevention efforts.

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Table 1. Infant mortality rates by race and Hispanic origin of mother: United States and each State, Puerto Rico, Virgin Islands, and Guam, 1998-2000 linked files

[By place of residence]

State	Total	Race and Hispanic origin of mother						
		Race				Hispanic origin		
		White	Black	American Indian[1]	Asian/Pacific Islander	Hispanic	Non-Hispanic White	Non-Hispanic Black
		Infant mortality rates per 1,000 live births in specified group						
United States [2]	7.0	5.8	13.8	9.0	5.1	5.7	5.8	13.9
Alabama	9.8	7.1	15.4	*	*	7.3	7.1	15.4
Alaska	6.3	5.1	*	9.7	*	*	5.0	*
Arizona	7.0	6.6	15.2	8.7	5.1	6.7	6.6	15.0
Arkansas	8.4	7.3	12.7	*	*	5.7	7.4	12.6
California	5.5	5.1	11.9	9.3	4.8	5.2	4.8	12.0
Colorado	6.5	6.1	14.7	*	4.9	6.5	5.9	14.8
Connecticut	6.5	5.6	13.6	*	*	8.6	4.7	13.5
Delaware	8.8	6.6	15.6	*	*	*	6.5	15.8
District of Columbia	13.5	5.7	16.9	*	*	9.1	*	16.8
Florida	7.2	5.6	12.5	*	5.2	4.9	5.8	12.6
Georgia	8.3	5.9	13.4	*	4.5	5.1	5.9	13.5
Hawaii	7.4	6.7	*	*	7.6	7.5	6.4	*
Idaho	7.2	7.0	*	*	*	8.7	6.8	*
Illinois	8.5	6.4	17.1	*	6.7	7.2	6.2	17.1
Indiana	7.8	6.9	15.4	*	6.6	6.8	6.9	15.4
Iowa	6.2	5.8	17.2	*	*	6.1	5.8	17.3
Kansas	7.0	6.8	10.5	*	*	5.2	7.1	10.5
Kentucky	7.4	6.8	12.6	*	*	*	6.9	12.7
Louisiana	9.1	6.1	13.5	*	*	4.9	6.2	13.5
Maine	5.4	5.5	*	*	*	*	5.4	*
Maryland	8.1	5.3	13.9	*	4.8	5.8	5.2	13.9
Massachusetts	5.0	4.5	9.9	*	3.9	5.5	4.2	11.2
Michigan	8.1	6.3	16.4	*	6.7	6.6	6.0	16.4
Minnesota	5.9	5.3	13.1	10.4	6.8	6.9	5.2	13.0
Mississippi	10.3	6.6	14.7	*	*	*	6.6	14.7
Missouri	7.5	6.1	16.0	*	*	6.5	6.1	16.0
Montana	6.8	6.2	*	11.3	*	*	6.0	*
Nebraska	7.0	6.3	16.0	15.4	*	7.8	6.2	16.2
Nevada	6.7	6.2	12.5	*	6.0	6.0	6.1	12.1
New Hampshire	5.4	5.3	*	*	*	*	4.7	*
New Jersey	6.4	4.9	13.3	*	4.6	6.2	4.4	13.8
New Mexico	6.9	6.7	*	7.6	*	6.6	7.0	*
New York	6.3	5.1	11.3	*	4.0	5.9	4.7	11.8
North Carolina	9.0	6.7	15.7	11.7	6.2	6.2	6.7	15.7
North Dakota	8.0	7.2	*	15.1	*	*	7.0	*
Ohio	7.9	6.8	14.5	*	4.3	8.7	6.7	14.4
Oklahoma	8.5	8.0	13.3	8.2	*	5.4	8.2	13.5
Oregon	5.6	5.5	8.7	10.6	4.2	6.4	5.3	8.5
Pennsylvania	7.2	5.9	15.5	*	3.8	8.5	5.6	15.4
Rhode Island	6.4	5.5	14.8	*	*	6.4	4.9	13.5
South Carolina	9.5	6.3	15.6	*	*	5.9	6.3	15.5
South Dakota	7.8	6.7	*	13.3	*	*	6.7	*
Tennessee	8.4	6.4	15.6	*	5.9	5.4	6.4	15.6
Texas	6.0	5.4	11.0	*	4.2	5.2	5.5	11.0
Utah	5.3	5.2	*	*	6.2	5.7	5.2	*
Vermont	6.3	6.2	*	*	*	*	6.2	*
Virginia	7.2	5.6	12.8	*	5.4	4.7	5.6	12.8
Washington	5.3	4.9	11.0	9.2	5.3	5.0	4.8	10.1
West Virginia	7.6	7.6	9.7	*	*	*	7.6	9.8
Wisconsin	6.9	5.8	16.7	8.3	5.8	7.4	5.7	16.6
Wyoming	7.0	6.9	*	*	*	*	6.8	*
Puerto Rico	10.2	10.2	9.8	---	---	---	---	---
Virgin Islands	9.9	*	11.6	*	*	*	*	11.2
Guam	7.6	*	*	*	8.1	*	*	*

* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
--- Data not available.
1 Includes Aleuts and Eskimos.
2 Excludes data for Puerto Rico, Virgin Islands, and Guam.

Table 2. Infant mortality rates, live births, and infant deaths by selected characteristics and specified race of mother: United States, 2000 linked file

Characteristics	All races	Race of mother			
		White	Black	American Indian[1]	Asian/ Pacific Islander
	Infant mortality rates per 1,000 live births in specified group				
Total	6.9	5.7	13.5	8.3	4.9
Age at death:					
Total neonatal	4.6	3.8	9.1	4.4	3.4
Early neonatal (< 7 days)	3.7	3.0	7.4	3.4	2.8
Late neonatal (7-27 days)	0.9	0.8	1.8	1.0	0.7
Postneonatal	2.3	1.9	4.3	3.9	1.4
Sex:					
Male	7.5	6.2	14.8	9.9	5.3
Female	6.2	5.1	12.1	6.7	4.4
Plurality:					
Single births	6.1	5.0	12.1	7.9	4.4
Plural births	31.1	26.7	52.7	27.2	26.2
Birthweight:					
Less than 2,500 grams	59.4	54.1	75.8	62.7	44.4
Less than 1,500 grams	244.3	232.7	266.9	265.7	234.4
1,500-2,499 grams	15.8	16.0	15.8	19.7	12.3
2,500 grams or more	2.5	2.2	3.9	4.3	1.6
Period of gestation:					
Less than 32 weeks	180.9	170.2	203.7	163.4	170.5
32-36 weeks	9.4	8.9	11.2	11.6	8.5
37-41 weeks	2.6	2.4	4.1	4.1	1.7
42 weeks or more	2.9	2.5	4.8	5.8	2.2
Trimester of pregnancy prenatal care began:					
First trimester	6.1	5.1	12.2	7.4	4.4
After first trimester or no care	8.8	7.2	14.3	9.1	5.6
Second trimester	7.2	6.2	11.0	7.5	4.6
Third trimester	6.1	5.4	8.3	7.9	3.8
No prenatal care	33.8	25.7	50.0	29.9	32.7
Age of mother:					
Under 20 years	9.9	8.5	13.8	9.1	10.4
20-24 years	7.6	6.2	13.1	7.0	5.4
25-29 years	6.1	5.1	13.1	9.1	4.1
30-34 years	5.6	4.7	13.8	9.7	4.4
35-39 years	6.4	5.4	14.5	7.0	4.8
40-54 years	7.9	7.0	15.1	*	7.4
Educational attainment of mother:					
0-8 years	6.8	6.3	13.4	*	6.5
9-11 years	9.5	8.0	14.6	9.9	6.9
12 years	7.5	6.1	13.2	7.5	5.4
13-15 years	5.9	4.8	11.7	8.1	4.5
16 years and over	4.3	3.8	10.6	*	3.7
Live-birth order:					
1	6.8	5.8	13.3	7.6	4.5
2	6.0	5.1	11.9	7.2	4.6
3	6.9	5.6	13.2	7.9	5.0
4	8.4	6.6	15.2	9.6	6.4
5 or more	10.8	8.3	17.8	12.8	10.5
Marital status:					
Married	5.4	4.9	11.5	6.3	4.5
Unmarried	9.9	7.8	14.4	9.8	7.2
Mother's place of birth:					
Born in the 50 States and D.C.	7.2	5.8	13.5	8.4	6.4
Born elsewhere	5.1	4.8	9.6	*	4.5
Maternal smoking during pregnancy:[2]					
Smoker	10.7	9.4	19.8	12.2	8.6
Nonsmoker	6.5	5.2	12.7	6.8	4.8

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths by selected characteristics and specified race of mother: United States, 2000 linked file--Con.

Characteristics	All races	Race of mother			
		White	Black	American Indian[1]	Asian/ Pacific Islander
			Live births		
Total	4,058,882	3,194,049	622,621	41,668	200,544
Sex:					
Male	2,076,998	1,636,101	316,123	21,193	103,581
Female	1,981,884	1,557,948	306,498	20,475	96,963
Plurality:					
Single births	3,932,630	3,094,255	601,471	40,750	196,154
Plural births	126,252	99,794	21,150	918	4,390
Birthweight:					
Less than 2,500 grams	308,074	209,477	81,116	2,825	14,656
Less than 1,500 grams	58,810	36,828	19,369	493	2,120
1,500-2,499 grams	249,264	172,649	61,747	2,332	12,536
2,500 grams or more	3,748,046	2,982,366	541,244	38,813	185,623
Not stated	2,762	2,206	261	30	265
Period of gestation:					
Less than 32 weeks	77,558	49,050	24,991	808	2,709
32-36 weeks	389,686	286,787	81,704	4,403	16,792
37-41 weeks	3,256,070	2,591,605	466,915	32,297	165,253
42 weeks or more	292,209	232,591	44,121	3,630	11,867
Not stated	43,359	34,016	4,890	530	3,923
Trimester of pregnancy prenatal care began:					
First trimester	3,284,281	2,649,248	444,515	27,961	162,557
After first trimester or no care	665,447	468,195	154,014	12,368	30,870
Second trimester	512,735	365,191	114,193	8,914	24,437
Third trimester	108,073	74,936	25,275	2,652	5,210
No prenatal care	44,639	28,068	14,546	802	1,223
Not stated	109,154	76,606	24,092	1,339	7,117
Age of mother:					
Under 20 years	477,520	337,462	122,763	8,215	9,080
20-24 years	1,017,815	772,818	202,598	13,633	28,766
25-29 years	1,087,563	874,190	141,974	10,053	61,346
30-34 years	929,299	764,721	94,815	6,097	63,666
35-39 years	452,064	368,714	49,299	2,983	31,068
40-54 years	94,621	76,144	11,172	687	6,618
Educational attainment of mother:					
0-8 years	234,099	208,604	15,560	1,790	8,145
9-11 years	631,992	466,162	140,204	11,124	14,502
12 years	1,273,074	965,245	243,337	16,234	48,258
13-15 years	872,288	681,775	140,829	8,534	41,150
16 years and over	986,525	828,252	71,404	3,177	83,692
Not stated	60,904	44,011	11,287	809	4,797
Live-birth order:					
1	1,622,429	1,282,509	232,361	14,551	93,008
2	1,312,692	1,048,898	184,065	11,660	68,069
3	676,606	533,632	110,864	7,370	24,740
4	259,976	197,007	51,002	3,949	8,018
5 or more	169,589	117,785	42,022	3,979	5,803
Not stated	17,590	14,218	2,307	159	906
Marital status:					
Married	2,711,813	2,327,678	195,962	17,315	170,858
Unmarried	1,347,069	866,371	426,659	24,353	29,686
Mother's place of birth:					
Born in the 50 States and D.C.	3,180,551	2,563,153	545,286	39,421	32,691
Born elsewhere	866,215	623,419	74,038	2,126	166,632
Not stated	12,116	7,477	3,297	121	1,221
Maternal smoking during pregnancy:[2]					
Smoker	425,107	360,981	52,852	7,553	3,721
Nonsmoker	3,063,543	2,372,979	529,582	30,187	130,795
Not stated	38,261	30,443	5,137	896	1,785

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths by selected characteristics and specified race of mother: United States, 2000 linked file--Con.

Characteristics	All races	Race of mother			
		White	Black	American Indian[1]	Asian/ Pacific Islander
		Infant deaths			
Total	27,960	18,246	8,391	346	977
Age at death:					
Total neonatal	18,733	12,179	5,684	183	688
Early neonatal (< 7 days)	14,893	9,614	4,582	143	553
Late neonatal (7-27 days)	3,841	2,565	1,102	40	135
Postneonatal	9,227	6,067	2,707	164	289
Sex:					
Male	15,664	10,223	4,683	210	548
Female	12,297	8,023	3,708	137	429
Plurality:					
Single births	24,037	15,578	7,276	321	862
Plural births	3,924	2,668	1,115	25	115
Birthweight:					
Less than 2,500 grams	18,299	11,326	6,145	177	651
Less than 1,500 grams	14,366	8,569	5,169	131	497
1,500-2,499 grams	3,933	2,757	976	46	154
2,500 grams or more	9,259	6,672	2,116	166	305
Not stated	403	248	129	4	21
Period of gestation:					
Less than 32 weeks	14,033	8,348	5,091	132	462
32-36 weeks	3,663	2,557	913	51	142
37-41 weeks	8,418	6,092	1,909	131	285
42 weeks or more	851	592	212	21	26
Not stated	995	657	266	11	61
Trimester of pregnancy prenatal care:					
First trimester	19,966	13,618	5,418	207	723
After first trimester or no care	5,858	3,374	2,200	112	172
Second trimester	3,687	2,247	1,261	67	112
Third trimester	660	407	211	21	20
No prenatal care	1,511	720	727	24	40
Not stated	2,136	1,254	773	27	82
Age of mother:					
Under 20 years	4,744	2,883	1,692	75	94
20-24 years	7,724	4,825	2,648	96	155
25-29 years	6,631	4,429	1,858	91	252
30-34 years	5,238	3,589	1,311	59	280
35-39 years	2,872	1,990	713	21	148
40-54 years	751	530	169	4	49
Educational attainment of mother:					
0-8 years	1,583	1,305	208	16	53
9-11 years	5,977	3,721	2,045	110	100
12 years	9,511	5,928	3,201	121	261
13-15 years	5,172	3,270	1,648	69	185
16 years and over	4,224	3,146	759	11	308
Not stated	1,495	876	530	19	70
Live-birth order:					
1	11,034	7,404	3,098	111	420
2	7,912	5,317	2,198	84	313
3	4,656	3,008	1,466	58	123
4	2,172	1,308	776	38	51
5 or more	1,834	973	750	51	61
Not stated	353	236	102	5	9
Marital status:					
Married	14,643	11,518	2,253	109	764
Unmarried	13,318	6,728	6,138	238	214

See footnotes at end of table.

Table 2. Infant mortality rates, live births, and infant deaths by selected characteristics and specified race of mother: United States, 2000 linked file--Con.

Characteristics	All races	Race of mother			
		White	Black	American Indian[1]	Asian/ Pacific Islander
		Infant deaths			
Mother's place of birth:					
Born in the 50 States and D.C.	22,795	14,870	7,385	331	209
Born elsewhere	4,446	2,974	713	10	749
Not stated	720	402	293	5	19
Maternal smoking during pregnancy:[2]					
Smoker	4,556	3,384	1,048	92	32
Nonsmoker	19,793	12,222	6,746	204	622
Not stated	729	483	190	29	27

* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
1 Includes Aleuts and Eskimos.
2 Excludes data for California , which do not report tobacco use on the birth certificate.

NOTE: Infant deaths are weighted so numbers may not exactly add to totals due to rounding. Not stated responses were included in totals but not distributed among groups for rate computations.

Table 3. Infant mortality rates, live births, and infant deaths by selected characteristics and Hispanic origin of mother and by race of mother for mothers of non-Hispanic origin: United States, 2000 linked file

Characteristics	All origins[1]	Hispanic						Non-Hispanic		
		Total	Mexican	Puerto Rican	Cuban	Central and South American	Other and unknown Hispanic	Total[2]	White	Black
	Infant mortality rates per 1,000 live births in specified group									
Total	6.9	5.6	5.4	8.2	4.5	4.6	6.9	7.2	5.7	13.6
Age at death:										
Total neonatal	4.6	3.8	3.6	5.8	3.2	3.3	4.6	4.8	3.8	9.2
Early neonatal (< 7 days)	3.7	2.9	2.8	4.4	2.4	2.5	3.8	3.8	3.0	7.4
Late neonatal (7-27 days)	0.9	0.8	0.8	1.4	*	0.8	0.8	1.0	0.8	1.8
Postneonatal	2.3	1.8	1.8	2.4	*	1.4	2.3	2.4	1.9	4.4
Sex:										
Male	7.5	6.0	5.8	8.8	6.1	5.0	7.1	7.9	6.3	14.9
Female	6.2	5.2	5.1	7.5	*	4.3	6.6	6.4	5.1	12.3
Plurality:										
Single births	6.1	5.1	5.0	7.4	3.8	4.1	6.4	6.3	5.0	12.2
Plural births	31.1	28.6	27.3	37.2	*	30.2	26.5	31.1	26.0	52.7
Birthweight:										
Less than 2,500 grams	59.4	56.1	56.4	64.4	44.7	49.9	56.6	59.6	52.8	75.6
Less than 1,500 grams	244.3	235.5	241.4	249.1	196.3	202.2	236.5	244.0	229.5	265.7
1,500-2,499 grams	15.8	22.8	17.4	78.4	*	13.9	15.9	15.6	15.6	15.9
2,500 grams or more	2.5	2.1	2.1	2.3	1.7	1.5	2.6	2.6	2.3	3.9
Period of gestation:										
Less than 32 weeks	180.9	156.0	153.0	195.1	133.3	139.5	163.1	184.5	173.4	203.0
32-36 weeks	9.4	7.8	8.3	7.7	*	5.9	7.1	9.8	9.3	11.2
37-41 weeks	2.6	2.2	2.3	2.7	1.8	1.7	2.8	2.7	2.4	4.1
42 weeks or more	2.9	2.3	2.3	*	*	*	*	3.1	2.6	4.9
Trimester of pregnancy prenatal care began:										
First trimester	6.1	5.2	5.1	7.0	4.4	4.4	6.1	6.3	5.1	12.3
After first trimester or no care	8.8	5.8	5.5	10.8	*	4.6	7.1	10.1	8.1	14.5
Second trimester	7.2	5.0	4.8	8.6	*	4.1	5.9	8.1	6.9	11.1
Third trimester	6.1	3.9	3.8	*	*	*	*	7.2	6.6	8.6
No prenatal care	33.8	20.9	18.5	48.5	*	17.3	35.9	39.3	29.7	50.2
Age of mother:										
Under 20 years	9.9	7.4	7.1	9.7	*	5.8	9.4	10.9	9.3	13.8
20-24 years	7.6	5.2	4.8	7.5	*	4.7	7.4	8.3	6.7	13.1
25-29 years	6.1	5.0	5.0	7.1	*	4.0	5.0	6.3	5.0	13.3
30-34 years	5.6	5.0	5.0	7.1	*	4.5	5.8	5.7	4.6	14.0
35-39 years	6.4	6.2	6.1	10.8	*	5.1	5.5	6.3	5.2	14.6
40-54 years	7.9	9.6	9.7	*	*	*	*	7.6	6.3	15.2
Educational attainment of mother:										
0-8 years	6.8	5.4	5.2	10.2	*	5.1	9.1	10.4	9.9	14.0
9-11 years	9.5	6.2	5.8	10.3	*	5.0	7.8	11.2	9.6	14.7
12 years	7.5	5.2	5.2	7.0	*	4.3	6.0	8.0	6.4	13.3
13-15 years	5.9	4.9	4.8	7.0	*	3.9	5.5	6.1	4.8	11.8
16 years and over	4.3	4.0	4.1	5.6	*	3.5	*	4.3	3.8	10.7
Live-birth order:										
1	6.8	6.0	5.7	9.4	5.0	4.8	7.3	7.0	5.7	13.5
2	6.0	4.9	4.9	6.3	*	4.0	6.0	6.2	5.1	12.0
3	6.9	4.9	4.8	6.4	*	4.3	5.4	7.4	5.9	13.3
4	8.4	5.9	5.4	10.7	*	5.8	8.2	9.1	6.9	15.3
5 or more	10.8	7.8	7.2	11.5	*	7.9	12.3	11.9	8.5	17.9
Marital status:										
Married	5.4	4.9	4.9	7.3	3.7	4.2	5.8	5.4	4.9	11.6
Unmarried	9.9	6.5	6.3	8.8	6.8	5.2	8.2	11.0	8.5	14.5
Mother's place of birth:										
Born in the 50 States and D.C.	7.2	6.4	6.3	7.9	5.1	5.4	6.5	7.2	5.7	13.6
Born elsewhere	5.1	5.0	4.9	8.6	4.1	4.5	5.5	5.3	3.9	10.4
Maternal smoking during pregnancy:[3]										
Smoker	10.7	10.9	11.0	12.6	*	*	8.0	10.7	9.3	19.8
Nonsmoker	6.5	5.5	5.3	7.7	4.3	4.5	6.6	6.6	5.0	12.9

See footnotes at end of table.

Table 3. Infant mortality rates, live births, and infant deaths by selected characteristics and Hispanic origin of mother and by race of mother for mothers of non-Hispanic origin: United States, 2000 linked file--Con.

Characteristics	All origins[1]	Hispanic						Non-Hispanic			Not stated
		Total	Mexican	Puerto Rican	Cuban	Central and South American	Other and unknown Hispanic	Total[2]	White	Black	
						Live births					
Total	4,058,882	815,883	581,924	58,126	13,429	113,346	49,058	3,200,030	2,362,982	604,367	42,969
Sex:											
Male	2,076,998	416,528	296,925	29,780	6,880	57,951	24,992	1,638,514	1,211,757	306,836	21,956
Female	1,981,884	399,355	284,999	28,346	6,549	55,395	24,066	1,561,516	1,151,225	297,531	21,013
Plurality:											
Single births	3,932,630	798,750	570,402	56,592	13,043	110,862	47,851	3,092,408	2,281,139	583,685	41,472
Plural births	126,252	17,133	11,522	1,534	386	2,484	1,207	107,622	81,843	20,682	1,497
Birthweight:											
Less than 2,500 grams	308,074	52,407	35,050	5,420	873	7,210	3,854	252,479	156,130	79,574	3,188
Less than 1,500 grams	58,810	9,474	6,089	1,136	163	1,380	706	48,638	27,151	19,017	698
1,500-2,499 grams	249,264	42,933	28,961	4,284	710	5,830	3,148	203,841	128,979	60,557	2,490
2,500 grams or more	3,748,046	763,302	546,775	52,681	12,555	106,112	45,179	2,945,268	2,205,071	524,556	39,476
Not stated	2,762	174	99	25	1	24	25	2,283	1,781	237	305
Period of gestation:											
Less than 32 weeks	77,558	13,531	8,927	1,456	240	1,921	987	63,201	35,364	24,518	826
32-36 weeks	389,686	76,175	53,350	6,363	1,184	10,342	4,936	309,719	209,579	79,876	3,792
37-41 weeks	3,256,070	645,011	458,961	45,437	11,032	90,961	38,620	2,577,308	1,934,500	452,617	33,751
42 weeks or more	292,209	63,102	45,225	4,603	922	8,524	3,828	226,231	168,723	42,684	2,876
Not stated	43,359	18,064	15,461	267	51	1,598	687	23,571	14,816	4,672	1,724
Trimester of pregnancy prenatal care began:											
First trimester	3,284,281	587,305	411,141	43,695	12,166	84,646	35,657	2,664,514	2,049,299	431,666	32,462
After first trimester or no care	665,447	201,946	153,062	12,000	1,108	24,388	11,388	457,011	266,172	149,634	6,490
Second trimester	512,735	151,858	114,300	9,468	922	18,544	8,624	356,020	213,187	110,934	4,857
Third trimester	108,073	36,898	28,197	1,810	135	4,688	2,068	70,154	38,355	24,377	1,021
No prenatal care	44,639	13,190	10,565	722	51	1,156	696	30,837	14,630	14,323	612
Not stated	109,154	26,632	17,721	2,431	155	4,312	2,013	78,505	47,511	23,067	4,017
Age of mother:											
Under 20 years	477,520	132,111	99,078	11,611	1,012	11,168	9,242	341,384	205,898	119,755	4,025
20-24 years	1,017,815	247,554	182,869	19,093	2,318	28,527	14,747	760,940	523,975	197,192	9,321
25-29 years	1,087,563	218,168	157,439	13,500	3,918	31,332	11,979	858,059	651,448	137,550	11,336
30-34 years	929,299	141,500	94,702	9,059	3,676	25,769	8,294	776,797	617,373	91,484	11,002
35-39 years	452,064	62,993	39,392	4,066	2,141	13,428	3,966	383,261	302,579	47,581	5,810
40-54 years	94,621	13,557	8,444	797	364	3,122	830	79,589	61,709	10,805	1,475
Educational attainment of mother:											
0-8 years	234,099	170,367	142,631	2,736	192	21,405	3,403	62,748	39,368	14,179	984
9-11 years	631,992	219,645	170,670	16,364	1,402	19,738	11,471	407,752	247,550	136,225	4,595
12 years	1,273,074	239,518	163,677	19,541	4,496	34,719	17,085	1,022,292	724,148	236,824	11,264
13-15 years	872,288	107,987	63,556	12,603	3,117	19,277	9,434	756,434	571,292	137,230	7,867
16 years and over	986,525	60,676	29,101	5,922	4,137	15,582	5,934	915,463	760,316	69,593	10,386
Not stated	60,904	17,690	12,289	960	85	2,625	1,731	35,341	20,308	10,316	7,873
Live-birth order:											
1	1,622,429	302,805	209,908	22,503	5,957	44,861	19,576	1,303,380	974,649	225,050	16,244
2	1,312,692	247,474	173,538	17,880	4,847	35,893	15,316	1,051,903	796,441	178,534	13,315
3	676,606	152,301	111,357	10,262	1,871	20,167	8,644	517,545	379,236	107,685	6,760
4	259,976	65,599	50,093	4,120	489	7,624	3,273	191,714	130,612	49,772	2,663
5 or more	169,589	43,476	33,798	2,881	239	4,532	2,026	123,983	73,491	41,230	2,130
Not stated	17,590	4,228	3,230	480	26	269	223	11,505	8,553	2,096	1,857
Marital status:											
Married	2,711,813	467,707	345,365	23,504	9,759	62,701	26,378	2,213,322	1,841,290	189,207	30,784
Unmarried	1,347,069	348,176	236,559	34,622	3,670	50,645	22,680	986,708	521,692	415,160	12,185
Mother's place of birth:											
Born in the 50 States and D.C.	3,180,551	309,350	216,952	37,420	5,678	12,494	36,806	2,834,321	2,230,808	537,528	36,880
Born elsewhere	866,215	504,587	364,074	20,511	7,743	100,616	11,643	356,610	127,302	63,807	5,018
Not stated	12,116	1,946	898	195	8	236	609	9,099	4,872	3,032	1,071
Maternal smoking during pregnancy:[3]											
Smoker	425,107	19,232	8,552	5,724	418	1,291	3,247	400,073	337,618	51,924	5,802
Nonsmoker	3,063,543	533,420	344,151	49,728	12,241	86,417	40,883	2,499,027	1,830,715	513,763	31,096
Not stated	38,261	5,118	3,582	604	35	500	397	30,335	23,097	4,841	2,808

See footnotes at end of table.

Table 3. Infant mortality rates, live births, and infant deaths by selected characteristics and Hispanic origin of mother and by race of mother for mothers of non-Hispanic origin: United States, 2000 linked file--Con.

Characteristics	All origins[1]	Hispanic						Non-Hispanic			Not stated
		Total	Mexican	Puerto Rican	Cuban	Central and South American	Other and unknown Hispanic	Total[2]	White	Black	
	Infant deaths										
Total	27,960	4,564	3,162	477	61	526	338	22,916	13,461	8,212	480
Age at death:											
Total neonatal	18,733	3,078	2,103	337	43	370	225	15,288	8,924	5,552	368
Early neonatal (< 7 days)	14,893	2,399	1,641	257	32	281	188	12,166	7,039	4,479	326
Late neonatal (7-27 days)	3,841	679	462	80	11	89	37	3,121	1,885	1,072	42
Postneonatal	9,227	1,486	1,059	140	18	156	113	7,628	4,537	2,660	112
Sex:											
Male	15,664	2,493	1,721	263	42	290	177	12,892	7,621	4,564	279
Female	12,297	2,069	1,441	213	19	236	160	10,025	5,841	3,648	202
Plurality:											
Single births	24,037	4,073	2,847	419	50	451	306	19,569	11,330	7,123	394
Plural births	3,924	490	315	57	11	75	32	3,348	2,132	1,089	86
Birthweight:											
Less than 2,500 grams	18,299	2,942	1,976	349	39	360	218	15,039	8,249	6,015	318
Less than 1,500 grams	14,366	2,231	1,470	283	32	279	167	11,869	6,232	5,053	265
1,500-2,499 grams	3,933	979	505	336	7	81	50	3,170	2,016	962	54
2,500 grams or more	9,259	1,583	1,162	122	21	160	118	7,564	5,050	2,071	112
Not stated	403	40	25	6	1	6	2	314	163	126	50
Period of gestation:											
Less than 32 weeks	14,033	2,111	1,366	284	32	268	161	11,658	6,131	4,976	264
32-36 weeks	3,663	595	443	49	7	61	35	3,032	1,948	898	36
37-41 weeks	8,418	1,440	1,033	123	20	155	109	6,881	4,618	1,871	98
42 weeks or more	851	146	105	10	*	19	12	693	441	208	11
Not stated	995	272	215	10	2	24	21	652	323	259	71
Trimester of pregnancy prenatal care:											
First trimester	19,966	3,053	2,105	308	54	369	217	16,673	10,475	5,320	239
After first trimester or no care	5,858	1,176	847	129	6	113	81	4,593	2,166	2,163	88
Second trimester	3,687	758	545	81	5	76	51	2,879	1,476	1,234	49
Third trimester	660	143	108	13	*	17	5	502	255	209	15
No prenatal care	1,511	276	195	35	1	20	25	1,212	435	719	23
Not stated	2,136	334	210	39	1	44	40	1,649	820	728	153
Age of mother:											
Under 20 years	4,744	973	700	113	8	65	87	3,712	1,907	1,654	61
20-24 years	7,724	1,279	884	144	9	133	109	6,331	3,506	2,593	116
25-29 years	6,631	1,084	784	96	18	126	60	5,425	3,273	1,824	122
30-34 years	5,238	709	470	64	11	116	48	4,421	2,815	1,284	109
35-39 years	2,872	389	242	44	13	68	22	2,429	1,572	693	54
40-54 years	751	130	82	16	2	19	11	601	390	164	19
Educational attainment of mother:											
0-8 years	1,583	916	748	28	*	109	31	652	389	199	14
9-11 years	5,977	1,356	991	169	9	98	89	4,577	2,381	2,001	43
12 years	9,511	1,247	845	136	15	149	102	8,156	4,635	3,160	107
13-15 years	5,172	534	302	88	17	75	52	4,595	2,730	1,623	42
16 years and over	4,224	242	120	33	18	55	16	3,932	2,875	743	50
Not stated	1,495	266	155	22	2	40	47	1,006	452	486	224
Live-birth order:											
1	11,034	1,805	1,206	211	30	215	143	9,066	5,525	3,040	163
2	7,912	1,220	855	113	17	143	92	6,565	4,040	2,150	126
3	4,656	748	540	66	8	87	47	3,854	2,250	1,435	54
4	2,172	390	270	44	5	44	27	1,750	906	761	32
5 or more	1,834	340	245	33	1	36	25	1,471	626	740	25
Not stated	353	61	46	9	*	2	4	211	115	86	80
Marital status:											
Married	14,643	2,301	1,679	172	36	261	153	12,054	9,032	2,193	289
Unmarried	13,318	2,263	1,483	305	25	265	185	10,863	4,429	6,019	191

See footnotes at end of table.

Table 3. Infant mortality rates, live births, and infant deaths by selected characteristics and Hispanic origin of mother and by race of mother for mothers of non-Hispanic origin: United States, 2000 linked file--Con.

Characteristics	All origins[1]	Hispanic						Non-Hispanic			Not stated
		Total	Mexican	Puerto Rican	Cuban	Central and South American	Other and unknown Hispanic	Total[2]	White	Black	
	Infant deaths										
Mother's place of birth:											
Born in the 50 States and D.C.	22,795	1,987	1,356	296	29	68	238	20,512	12,736	7,288	296
Born elsewhere	4,446	2,503	1,775	176	32	456	64	1,899	495	664	45
Not stated	720	74	31	5	-	2	36	505	230	260	140
Maternal smoking during pregnancy:[3]											
Smoker	4,556	209	94	72	3	14	26	4,278	3,133	1,030	70
Nonsmoker	19,793	2,932	1,834	382	53	393	270	16,608	9,205	6,620	253
Not stated	729	76	52	10	-	6	8	544	334	166	108

* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
\- Quantity zero.
1 Includes origin not stated.
2 Includes races other than black or white.
3 Excludes data for California , which does not report tobacco use on the birth certificate.

NOTE: Infant deaths are weighted so numbers may not exactly add to totals due to rounding. Not stated responses were included in totals but not distributed among groups for rate computations.

Table 4. Percent of live births with selected maternal and infant characteristics by specified race of mother: United States, 2000 linked file

Characteristic	All races	White	Black	American Indian[1]	Asian or Pacific Islander					
					Total	Chinese	Japanese	Hawaiian	Filipino	Other
Birthweight:										
Less than 1,500 grams	1.4	1.2	3.1	1.2	1.1	0.8	0.8	1.4	1.4	1.1
Less than 2,500 grams	7.6	6.6	13.0	6.8	7.3	5.1	7.1	6.8	8.5	7.7
Preterm births[2]	11.6	10.6	17.3	12.7	9.9	7.3	8.3	11.7	12.2	10.1
Prenatal care beginning in the first trimester	83.2	85.0	74.3	69.3	84.0	87.6	91.0	79.9	84.9	82.5
Births to mothers under 20 years	11.8	10.6	19.7	19.7	4.5	0.9	1.9	17.4	5.3	4.8
Fourth and higher order births	10.6	9.9	15.0	19.1	6.9	2.2	3.6	15.5	7.4	7.9
Births to unmarried mothers	33.2	27.1	68.5	58.4	14.8	7.6	9.5	50.0	20.3	13.8
Mothers completing 12 or more years of school	78.3	78.6	74.5	68.4	88.4	88.3	97.9	83.3	93.8	86.5
Mothers born in the 50 States and D.C.	78.6	80.4	88.0	94.9	16.4	9.5	41.1	97.6	20.5	10.9
Mother smoked during pregnancy[3]	12.2	13.2	9.1	20.0	2.8	0.6	4.2	14.4	3.2	2.3

1 Includes births to Aleuts and Eskimos.
2 Born prior to 37 completed weeks of gestation.
3 Excludes data for California which does not report tobacco use on the birth certificate.

Table 5. Percent of live births with selected maternal and infant characteristics by Hispanic origin of mother and race of mother for mothers of non-Hispanic origin: United States, 2000 linked file

Characteristic	All origins[1]	Hispanic						Non-Hispanic		
		Total	Mexican	Puerto Rican	Cuban	Central and South American	Other and unknown Hispanic	Total[2]	White	Black
Birthweight:										
Less than 1,500 grams	1.4	1.2	1.0	2.0	1.2	1.2	1.4	1.5	1.1	3.1
Less than 2,500 grams	7.6	6.4	6.0	9.3	6.5	6.4	7.9	7.9	6.6	13.2
Preterm births[3]	11.6	11.2	11.0	13.5	10.6	11.0	12.2	11.7	10.4	17.4
Prenatal care beginning in the first trimester	83.2	74.4	72.9	78.5	91.7	77.6	75.8	85.4	88.5	74.3
Births to mothers under 20 years	11.8	16.2	17.0	20.0	7.5	9.9	18.8	10.7	8.7	19.8
Fourth and higher order births	10.6	13.4	14.5	12.1	5.4	10.8	10.9	9.9	8.7	15.1
Births to unmarried mothers	33.2	42.7	40.7	59.6	27.3	44.7	46.2	30.8	22.1	68.7
Mothers completing 12 or more years of school	78.3	51.1	45.0	66.6	88.1	62.8	68.6	85.1	87.8	74.7
Mothers born in the 50 States and D.C.	78.6	38.0	37.3	64.6	42.3	11.0	76.0	88.8	94.6	89.4
Mother smoked during pregnancy[4]	12.2	3.5	2.4	10.3	3.3	1.5	7.4	13.8	15.6	9.2

1 Includes origin not stated.
2 Includes races other than black or white.
3 Born prior to 37 completed weeks of gestation.
4 Excludes data for California which does not report tobacco use on the birth certificate.

Table 6. Live births, infant, neonatal, and postneonatal deaths and mortality rates by race of mother and birthweight: United States, 2000 linked file, and percent change in birthweight-specific infant mortality, 1995-2000 linked file

Race and birthweight	Number in 2000				Mortality rate per 1,000 live births in 2000			Percent change in infant mortality rate 1995-2000
	Live births	Infant deaths	Neonatal deaths	Postneonatal deaths	Infant	Neonatal	Postneonatal	
All races[1]	4,058,882	27,960	18,733	9,227	6.9	4.6	2.3	-9.2
Less than 2,500 grams	308,074	18,299	14,929	3,370	59.4	48.5	10.9	-8.0
Less than 1,500 grams	58,810	14,366	12,615	1,750	244.3	214.5	29.8	-9.0
Less than 500 grams	6,406	5,420	5,306	114	846.1	828.3	17.8	-6.4
500-749 grams	11,181	5,325	4,648	678	476.3	415.7	60.6	-9.8
750-999 grams	11,942	1,861	1,413	448	155.8	118.3	37.5	-14.4
1,000-1,249 grams	13,355	1,033	722	311	77.3	54.1	23.3	-9.6
1,250-1,499 grams	15,926	726	526	200	45.6	33.0	12.6	-16.5
1,500-1,999 grams	60,864	1,721	1,125	596	28.3	18.5	9.8	-14.8
2,000-2,499 grams	188,400	2,212	1,189	1,023	11.7	6.3	5.4	-13.3
2,500 grams or more	3,748,046	9,259	3,427	5,832	2.5	0.9	1.6	-16.7
2,500-2,999 grams	671,080	3,064	1,274	1,790	4.6	1.9	2.7	-14.8
3,000-3,499 grams	1,510,754	3,600	1,237	2,363	2.4	0.8	1.6	-17.2
3,500-3,999 grams	1,164,773	1,943	648	1,295	1.7	0.6	1.1	-15.0
4,000-4,499 grams	340,467	502	187	315	1.5	0.5	0.9	-16.7
4,500-4,999 grams	54,764	112	55	57	2.0	1.0	1.0	-9.1**
5,000 grams or more	6,208	38	26	11	6.1	4.2	*	-27.4**
Not stated	2,762	403	378	25	...	...	...	...
White	3,194,049	18,246	12,179	6,067	5.7	3.8	1.9	-9.5
Less than 2,500 grams	209,477	11,326	9,348	1,979	54.1	44.6	9.4	-9.4
Less than 1,500 grams	36,828	8,569	7,622	947	232.7	207.0	25.7	-10.7
Less than 500 grams	3,523	2,998	2,939	58	851.0	834.2	16.5	-6.6**
500-749 grams	6,590	3,222	2,877	345	488.9	436.6	52.4	-10.5
750-999 grams	7,326	1,179	934	245	160.9	127.5	33.4	-16.5
1,000-1,249 grams	8,678	695	514	181	80.1	59.2	20.9	-11.9
1,250-1,499 grams	10,711	475	357	118	44.3	33.3	11.0	-20.2
1,500-1,999 grams	41,894	1,191	827	364	28.4	19.7	8.7	-14.5
2,000-2,499 grams	130,755	1,567	899	667	12.0	6.9	5.1	-12.4
2,500 grams or more	2,982,366	6,672	2,602	4,069	2.2	0.9	1.4	-18.5
2,500-2,999 grams	479,038	2,105	948	1,158	4.4	2.0	2.4	-17.0
3,000-3,499 grams	1,174,842	2,571	924	1,647	2.2	0.8	1.4	-18.5
3,500-3,999 grams	977,221	1,479	514	965	1.5	0.5	1.0	-16.7
4,000-4,499 grams	297,564	401	153	248	1.3	0.5	0.8	-18.8
4,500-4,999 grams	48,344	86	44	42	1.8	0.9	0.9	-10.0**
5,000 grams or more	5,357	29	20	9	5.4	3.7	*	-29.9**
Not stated	2,206	248	229	19	...	...	...	...
Black	622,621	8,391	5,684	2,707	13.5	9.1	4.3	-7.5
Less than 2,500 grams	81,116	6,145	4,898	1,248	75.8	60.4	15.4	-4.3
Less than 1,500 grams	19,369	5,169	4,428	741	266.9	228.6	38.3	-6.5
Less than 500 grams	2,624	2,196	2,145	51	836.9	817.5	19.4	-6.5**
500-749 grams	4,158	1,906	1,592	314	458.4	382.9	75.5	-8.2
750-999 grams	4,067	576	391	185	141.6	96.1	45.5	-13.1
1,000-1,249 grams	4,060	291	171	120	71.7	42.1	29.6	-3.8**
1,250-1,499 grams	4,460	200	130	71	44.8	29.1	15.9	-7.8**
1,500-1,999 grams	15,762	439	238	202	27.9	15.1	12.8	-13.9
2,000-2,499 grams	45,985	536	231	305	11.7	5.0	6.6	-13.3
2,500 grams or more	541,244	2,116	661	1,455	3.9	1.2	2.7	-13.3
2,500-2,999 grams	142,917	806	265	541	5.6	1.9	3.8	-9.7
3,000-3,499 grams	236,517	855	249	606	3.6	1.1	2.6	-12.2
3,500-3,999 grams	128,202	363	106	257	2.8	0.8	2.0	-20.0
4,000-4,499 grams	28,757	69	27	41	2.4	0.9	1.4	-44.2
4,500-4,999 grams	4,308	18	9	9	*	*	*	*
5,000 grams or more	543	5	4	1	*	*	*	*
Not stated	261	129	125	4	...	...	...	...

* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
** Not significant at p<.05.
... Category not apllicable.
[1] Includes races other than white or black.

NOTE: Infant deaths are weighted so numbers may not exactly add to totals due to rounding. Neonatal is less than 28 days and postneonatal is 28 days to under 1 year

Table 7. Infant deaths and mortality rates for the five leading causes of infant death by race and Hispanic origin of mother: United States, 2000 linked file

[Rates per 100,000 live births in specified group]

Cause of death (Based on the Tenth Revision, International Classification of Diseases, 1992)	All races			White			Black[1]			American Indian[2,3]			Asian and Pacific Islander[4]		
	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate
All causes	...	27,960	688.9	...	18,246	571.2	...	8,391	1347.7	...	346	830.4	...	977	487.2
Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	1	5,756	141.8	1	4,425	138.5	2	1,040	167.0	1	61	146.4	1	231	115.2
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	4,401	108.4	2	2,386	74.7	1	1,828	293.6	3	46	110.4	2	141	70.3
Sudden infant death syndrome (R95)	3	2,522	62.1	3	1,653	51.8	3	760	122.1	2	50	120.0	3	59	29.4
Newborn affected by maternal complications of pregnancy (P01)	4	1,391	34.3	4	834	26.1	4	501	80.5	11	6	*	4	50	24.9
Newborn affected by complications of placenta, cord and membranes (P02)	5	1,042	25.7	5	712	22.3	6	284	45.6	5	12	*	6	34	17.0

Cause of death (Based on the Tenth Revision International Classification of Diseases, 1992)	Total Hispanic[5, 6]			Mexican[7]			Puerto Rican[8]			Central and South American[9]			Non-Hispanic White		
	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate	Rank	Number	Rate
All causes	...	4,564	559.4	...	3,162	543.4	...	477	820.6	...	526	464.1	...	13,461	569.7
Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	1	1,180	144.6	1	865	148.6	2	77	132.5	1	132	116.5	1	3,189	135.0
Disorders related to short gestation and low birth weight, not elsewhere classified (P07)	2	659	80.8	2	425	73.0	1	84	144.5	2	88	77.6	2	1,682	71.2
Sudden infant death syndrome (R95)	3	280	34.3	3	185	31.8	3	37	63.7	3	30	26.5	3	1,364	57.7
Newborn affected by maternal complications of pregnancy (P01)	4	164	20.1	5	110	18.9	6	17	*	4	21	18.5	4	647	27.4
Newborn affected by complications of placenta, cord and membranes (P02)	6	148	18.1	6	97	16.7	4	23	39.6	7	18	*	5	547	23.1

... Category not applicable.
* Figure does not meet standard of reliability or precision; based on fewer than 20 deaths in the numerator.
1 For blacks, Respiratory distress of newborn was the fifth leading cause of death with 342 deaths and a rate of 55.0.
2 Includes Aleuts and Eskimos.
3 For American Indians, Accidents (unintentional injuries) was the fourth leading cause of death with 24 deaths and a rate of 58.6.
4 For Asian and Pacific Islanders, Diseases of circulatory system was the fifth leading cause of death with 38 deaths and a rate of 18.7.
5 Includes Cuban and other and unknown Hispanic.
6 For Total Hispanic, Respiratory distress of newborn was tied for the fourth leading cause of death with 164 deaths and a rate of 20.1.
7 For Mexicans, Respiratory distress of newborn was the fourth leading cause of death with 114 deaths and a rate of 19.6.
8 For Puerto Ricans, Bacterial sepsis of newborn was the fifth leading cause of death; however with only 18 deaths a reliable infant mortality rate could not be computed.
9 For Central and South Americans, Diseases of the circulatory system and Respiratory distress of newborn were tied for the fifth leading cause of death; however with only 19 deaths each, reliable infant mortality rates could not be computed.

NOTE: Reliable cause-specific infant mortality rates cannot be computed for Cubans because of the small number of infant deaths (61).

Technical Notes

Differences between period and cohort data

From 1983–91, NCHS produced linked files in a birth cohort format (38). Beginning with 1995 data, linked files are produced first using a period format and then subsequently using a birth cohort format. Thus, the 2000 period linked file contains a numerator file that consists of all infant deaths occurring in 2000 that have been linked to their corresponding birth certificates, whether the birth occurred in 2000 or in 1999. In contrast, the 2000 birth cohort linked file will contain a numerator file that consists of all infant deaths to babies born in 2000 whether the death occurred in 2000 or 2001. In practice, there is very little difference in rates between the period and the cohort files.

For the 2000 file, NCHS accepted birth records that could be linked to infant deaths even if registered after the closure of the 2000 birth file (less than 100 cases). This improved the infant birth/death linkage and made the denominator file distinctly different from the official 2000 birth file.

The release of linked file data in two different formats allows NCHS to meet demands for more timely linked files while still meeting the needs of data users who prefer the birth cohort format. While the birth cohort format has methodological advantages, it creates substantial delays in data availability, since it is necessary to wait until the close of the following data year to include all infant deaths in the birth cohort. Beginning with 1995 data, the period linked file is the basis for all official NCHS linked file statistics (except for special cohort studies).

Weighting

A record weight is added to the linked file to compensate for the 1.4 percent (in 2000) of infant death records that could not be linked to their corresponding birth certificates. This procedure was initiated in 1995. Records for Puerto Rico, the Virgin Islands, and Guam are not weighted. The percent of records linked varied by registration area (from 91.9–100.0 percent with all but nine areas—the District of Columbia, Hawaii, Kansas, Maine, New Jersey, New Mexico, Ohio, Oklahoma, and Texas at—97 percent or higher) (table I). The number of infant deaths in the linked file for the 50 States and the District of Columbia was weighted to equal the sum of the linked plus unlinked infant deaths by State of residence at birth and age at death (less than 1 day, 1–27 days, and 28 days to under 1 year). The addition of the weight greatly reduced the potential for bias in comparing infant mortality rates by characteristics.

The 2000 linked file started with 28,006 infant death records. Of these 28,006 records, 27,622 were linked; 384 were unlinked because corresponding birth certificates could not be identified. The 28,006 linked and unlinked records contained 46 records of infants whose mothers' usual place of residence is outside of the United States. These 46 records were excluded to derive a weighted total of 27,960 infant deaths. Thus, all total calculations for 2000 in this report used a weighted total of 27,960 infant deaths (tables A, B, 2, 3, 6, and 7).

Table I. Percent of infant death records which were linked to their corresponding birth records: United States and each State, Puerto Rico, Virgin Islands, and Guam, 2000 linked file

State	Percent linked by State of occurrence of death
United States [1]	98.6
Alabama	100.0
Alaska	100.0
Arizona	99.3
Arkansas	100.0
California	98.0
Colorado	100.0
Connecticut	100.0
Delaware	97.8
District of Columbia	96.5
Florida	99.9
Georgia	100.0
Hawaii	96.4
Idaho	100.0
Illinois	99.3
Indiana	98.2
Iowa	100.0
Kansas	96.2
Kentucky	99.2
Louisiana	97.3
Maine	95.6
Maryland	99.6
Massachusetts	98.7
Michigan	99.8
Minnesota	99.7
Mississippi	99.8
Missouri	99.7
Montana	100.0
Nebraska	100.0
Nevada	98.9
New Hampshire	100.0
New Jersey	95.6
New Mexico	93.2
New York	99.1
North Carolina	99.5
North Dakota	100.0
Ohio	95.2
Oklahoma	91.9
Oregon	100.0
Pennsylvania	99.9
Rhode Island	98.9
South Carolina	100.0
South Dakota	100.0
Tennessee	100.0
Texas	96.7
Utah	97.5
Vermont	100.0
Virginia	98.9
Washington	99.8
West Virginia	99.4
Wisconsin	100.0
Wyoming	100.0
Puerto Rico	98.8
Virgin Islands	100.0
Guam	100.0

[1] Excludes data for Puerto Rico, Virgin Islands, and Guam.

Comparison of infant mortality data between the linked file and the vital statistics mortality file

The overall infant mortality rate from the 2000 period linked file of 6.9 is the same as the 2000 vital statistics mortality file (2). The number of infant deaths differs slightly (2). Differences in numbers of infant deaths between the two data sources can be traced to three different causes:

1. geographic coverage differences
2. additional quality control
3. weighting

Differences in geographic coverage are due to the fact that for the vital statistics mortality file all deaths occurring in the 50 States

and the District of Columbia are included regardless of the place of birth of the infant. In contrast, to be included in the linked file, both the birth and death must occur in the 50 States and the District of Columbia. Also, the linkage process subjects infant death records to an additional round of quality control review. Every year, a few records are voided from the file at this stage because they are found to be fetal deaths, deaths at ages over 1 year, or duplicate death certificates. Finally, although every effort has been made to design weights that will accurately reflect the distribution of deaths by characteristics, weighting may contribute to small differences in numbers and rates by specific variables between these two data sets.

Marital status

National estimates of births to unmarried women are based on two methods of determining marital status. In 2000 marital status was based on a direct question in 48 states and the District of Columbia. In the two States (Michigan and New York), which used inferential procedures to compile birth statistics by marital status in 2000, a birth is inferred as nonmarital if either of these factors, listed in priority-of-use order, is present: a paternity acknowledgment was received or the father's name is missing. For more information on the inferential procedures and on the changes in reporting; see Technical notes in *Births: Final Data for 2000* (7).

Period of gestation and birthweight

The primary measure used to determine the gestational age of the newborn is the interval between the first day of the mother's last normal menstrual period (LMP) and the date of birth. It is subject to error for several reasons, including imperfect maternal recall or misidentification of the LMP because of postconception bleeding, delayed ovulation, or intervening early miscarriage. These data are edited for LMP-based gestational ages that are clearly inconsistent with the infant's plurality and birthweight (see below), but reporting problems for this item persist and many occur more frequently among some subpopulations and among births with shorter gestations (39,40).

The U.S. Standard Certificate of Live Birth contains an item, "clinical estimate of gestation," which is compared with length of gestation computed from the date the LMP began when the latter appears to be inconsistent with birthweight. This is done for normal weight births of apparently short gestations and very low birthweight births reported to be full term. The clinical estimate was also used if the LMP date was not reported. The period of gestation for 5.0 percent of the births in 2000 was based on the clinical estimate of gestation. For 97 percent of these records, the clinical estimate was used because the LMP date was not reported. For the remaining 3 percent, the clinical estimate was used because it was consistent with the reported birthweight, whereas the LMP-based gestation was not. In cases where the reported birthweight was inconsistent with both the LMP-computed gestation and the clinical estimate of gestation, the LMP-computed gestation was used and birthweight was reclassified as "not stated." This was necessary for about 420 births or less than 0.01 percent of all birth records in 2000 (7).

For the linked file, not stated birthweight was imputed for 2,119 records or 0.05 percent of the birth records in 2000 when birthweight was not stated but the period of gestation was known. In this case, birthweight was assigned the value from the previous record with the same period of gestation, maternal race, sex, and plurality. If birthweight and period of gestation were both unknown (2,762 records in 2000) the not stated value for birthweight was retained. This imputation was done to improve the accuracy of birthweight-specific infant mortality rates, since the percent of records with not stated birthweight was higher for infant deaths (3.84 percent before imputation) than for live births (0.12 percent before imputation). The imputation reduced the percent of not stated records to 1.43 percent for infant deaths, and 0.05 percent for births. The not stated birthweight cases in the natality/birth file, as distinct from the linked file, are not imputed (7).

Cause-of-death classification

The mortality statistics presented in this report were compiled in accordance with the World Health Organization (WHO) regulations, which specify that member nations classify and code causes of death in accordance with the current *revision* of the *International Statistical Classification of Diseases and Related Health Problems*. The ICD provides the basic guidance used in virtually all countries to code and classify causes of death. The ICD not only details disease classification but also provides definitions, tabulation lists, the format of the death certificate, and the rules for coding cause of death. Cause-of-death data presented in this report were coded by procedures outlined in annual issues of the *NCHS Instruction Manual* (41,42).

In this report, tabulations of cause-of-death statistics are based solely on the underlying cause of death. The underlying cause is defined by WHO as "the disease or injury which initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury" (3). It is selected from the conditions entered by the physician in the cause-of-death section of the death certificate. When more than one cause or condition is entered by the physician, the underlying cause is determined by the sequence of conditions on the certificate, provisions of the ICD, and associated selection rules and modifications. Generally, more medical information is reported on death certificates than is directly reflected in the underlying cause of death. This is captured in NCHS multiple cause-of-death statistics (43,44).

Changes in cause-of-death classification

About every 10 to 20 years, the *International Classification of Diseases* is revised to take into account advances in medical knowledge. Effective with deaths occurring in 1999, the United States began using the *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* (ICD–10) (3); during the period 1979–98, causes were coded and classified according to the Ninth Revision (ICD–9) (4).

The ICD–10 has many changes from the ICD–9, including considerably greater detail, shifts in inclusion terms and titles from one category, section, or chapter to another; regroupings of diseases; new titles and sections; and modifications in coding rules (3). As a result, serious breaks occur in comparability for a number of causes of death. Measures of this discontinuity are essential to the interpretation of mortality trends, and are discussed in detail in other NCHS publications (2,45).

Tabulation lists and cause-of-death ranking

The cause-of-death rankings for ICD–10 are based on the List of 130 Selected Causes of Infant Death. The tabulation lists and rules for ranking leading causes of death are published in the NCHS Instruction Manual, Part 9, ICD–10 Cause-of-Death Lists for Tabulating Mortality Statistics, Effective 1999 (46). Briefly, category titles that begin with the words "Other" and "All other" are not ranked to determine the leading causes of death. When one of the titles that represents a subtotal is ranked (for example, Influenza and pneumonia (J10–J18)), its component parts are not ranked (in this case, Influenza (J10–J11) and Pneumonia (J12–18)).

Computation of rates

Infant mortality rates are the most commonly used index for measuring the risk of dying during the first year of life. For the linked birth/infant death data set they 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. Both the mortality file and the linked birth/infant death file use this computation method but due to unique numbers of infant deaths, as explained in the section above on the comparison of these two files, the rates will often differ for specific variables (particularly for race and ethnicity). Infant mortality rates use the number of live births in the denominator to approximate the population at risk of dying before the first birthday. In contrast to the infant mortality rates based on live births, infant death rates, used only in age-specific death rates with the mortality file, use the estimated population of persons under 1 year of age as the denominator. For all variables, not stated responses were shown in tables of frequencies, but were dropped before rates were computed.

As stated previously, infant death records for the 50 States and the District of Columbia in the linked file are weighted so that the infant mortality rates are not underestimated for those areas that did not successfully link all records.

Random variation in infant mortality rates

The number of infant deaths and live births reported for an area represent complete counts of such events. As such, they are not subject to sampling error, although they are subject to nonsampling error in the registration process. However, when the figures are used for analytic purposes, such as the comparison of rates over time, for different areas, or among different subgroups, the number of events that actually occurred may be considered as one of a large series of possible results that could have arisen under the same circumstances (47). As a result, numbers of births, deaths, and infant mortality rates are subject to random variation. The probable range of values may be estimated from the actual figures according to certain statistical assumptions.

In general, distributions of vital events may be assumed to follow the binomial distribution. When the number of events is large, the relative standard error is usually small. 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. Estimates of relative standard errors (RSEs) and 95-percent confidence intervals are shown below.

The formula for the RSE of infant deaths and live births is:

$$\mathrm{RSE}(D) = 100 \bullet \sqrt{\frac{1}{D}}$$

where D is the number of deaths and

$$\mathrm{RSE}\ (B) = 100 \bullet \sqrt{\frac{1}{B}}$$

where B is the number of births.

For example, let us say that for group A the number of infant deaths was 104 while the number of live births was 27,380 yielding an infant mortality rate of 3.8 infant deaths per 1,000 live births.

$$\text{The RSE of the deaths} = 100 \bullet \sqrt{\frac{1}{104}} = 9.81,$$

$$\text{while the RSE of the births} = 100 \bullet \sqrt{\frac{1}{27{,}830}} = 0.60$$

The formula for the RSE of the infant mortality rate (IMR) is:

$$\mathrm{RSE(IMR)} = 100 \bullet \sqrt{\frac{1}{D} + \frac{1}{B}}$$

$$\text{The RSE of the IMR} = 100 \bullet \sqrt{\frac{1}{104} + \frac{1}{27{,}380}} = 9.82$$

Binomial distribution—When the number of events is greater than 100, the binomial distribution is used to estimate the 95-percent confidence intervals as follows:

$$\text{Lower: } R_1 - 1.96 \bullet R_1 \bullet \frac{\mathrm{RSE}(R_1)}{100}$$

$$\text{Upper: } R_1 + 1.96 \bullet R_1 \bullet \frac{\mathrm{RSE}(R_1)}{100}$$

Thus, for Group A:

$$\text{Lower: } 3.8 - \left(1.96 \bullet 3.8 \bullet \frac{9.82}{100}\right) = 3.1$$

$$\text{Upper: } 3.8 + \left(1.96 \bullet 3.8 \bullet \frac{9.82}{100}\right) = 4.5$$

Thus the chances are 95 out of 100 that the true infant mortality rate for Group A lies somewhere in the 3.1–4.5 interval.

Poisson distribution—When the number of events in the numerator is less than 100 the confidence interval for the rate can be estimated based on the Poisson distribution using the values in table II.

$$\text{Lower: IMR} \bullet L\ (.95,\ D_{adj})$$

$$\text{Upper: IMR} \bullet U\ (.95,\ D_{adj})$$

where D_{adj} is the adjusted number of infant deaths (rounded to the nearest integer) used to take into account the RSE of the number of infant deaths and live births, and is computed as follows:

$$D_{adj} = \frac{D \bullet B}{D + B}$$

Table II. Values of *L* and *U* for calculating 95-percent confidence limits for numbers of events and rates when the number of events is less than 100

N	*L*	*U*	*N*	*L*	*U*
1	0.02532	5.57164	51	0.74457	1.31482
2	0.12110	3.61234	52	0.74685	1.31137
3	0.20622	2.92242	53	0.74907	1.30802
4	0.27247	2.56040	54	0.75123	1.30478
5	0.32470	2.33367	55	0.75334	1.30164
6	0.36698	2.17658	56	0.75539	1.29858
7	0.40205	2.06038	57	0.75739	1.29562
8	0.43173	1.97040	58	0.75934	1.29273
9	0.45726	1.89831	59	0.76125	1.28993
10	0.47954	1.83904	60	0.76311	1.28720
11	0.49920	1.78928	61	0.76492	1.28454
12	0.51671	1.74680	62	0.76669	1.28195
13	0.53246	1.71003	63	0.76843	1.27943
14	0.54671	1.67783	64	0.77012	1.27698
15	0.55969	1.64935	65	0.77178	1.27458
16	0.57159	1.62394	66	0.77340	1.27225
17	0.58254	1.60110	67	0.77499	1.26996
18	0.59266	1.58043	68	0.77654	1.26774
19	0.60207	1.56162	69	0.77806	1.26556
20	0.61083	1.54442	70	0.77955	1.26344
21	0.61902	1.52861	71	0.78101	1.26136
22	0.62669	1.51401	72	0.78244	1.25933
23	0.63391	1.50049	73	0.78384	1.25735
24	0.64072	1.48792	74	0.78522	1.25541
25	0.64715	1.47620	75	0.78656	1.25351
26	0.65323	1.46523	76	0.78789	1.25165
27	0.65901	1.45495	77	0.78918	1.24983
28	0.66449	1.44528	78	0.79046	1.24805
29	0.66972	1.43617	79	0.79171	1.24630
30	0.67470	1.42756	80	0.79294	1.24459
31	0.67945	1.41942	81	0.79414	1.24291
32	0.68400	1.41170	82	0.79533	1.24126
33	0.68835	1.40437	83	0.79649	1.23965
34	0.69253	1.39740	84	0.79764	1.23807
35	0.69654	1.39076	85	0.79876	1.23652
36	0.70039	1.38442	86	0.79987	1.23499
37	0.70409	1.37837	87	0.80096	1.23350
38	0.70766	1.37258	88	0.80203	1.23203
39	0.71110	1.36703	89	0.80308	1.23059
40	0.71441	1.36172	90	0.80412	1.22917
41	0.71762	1.35661	91	0.80514	1.22778
42	0.72071	1.35171	92	0.80614	1.22641
43	0.72370	1.34699	93	0.80713	1.22507
44	0.72660	1.34245	94	0.80810	1.22375
45	0.72941	1.33808	95	0.80906	1.22245
46	0.73213	1.33386	96	0.81000	1.22117
47	0.73476	1.32979	97	0.81093	1.21992
48	0.73732	1.32585	98	0.81185	1.21868
49	0.73981	1.32205	99	0.81275	1.21746
50	0.74222	1.31838			

L (.95, D_{adj}) and U (.95, D_{adj}) refer to the values in table II corresponding to the value of D_{adj}.

For example, let us say that for Group B the number of infant deaths was 47, the number of live births was 8,901, and the infant mortality rate was 5.3.

$$D_{adj} = \frac{(47 \bullet 8{,}901)}{(47 + 8{,}901)} = 47$$

Therefore the 95-percent confidence interval (using the formula for 1–99 infant deaths) =

Lower: 5.3 • 0.73476 = 3.9

Upper: 5.3 • 1.32979 = 7.0

Comparison of two infant mortality rates—If either of the two rates to be compared is based on less than 100 deaths, compute the confidence intervals for both rates and check to see if they overlap. If so, the difference is not statistically significant at the 95-percent level. If they do not overlap, the difference is statistically significant. If both of the two rates (R_1 and R_2) to be compared are based on 100 or more deaths, the following z-test may be used to define a significance test statistic:

$$z = \frac{R_1 - R_2}{\sqrt{R_1^2\left(\frac{\mathrm{RSE}(R_1)}{100}\right)^2 + R_2^2\left(\frac{\mathrm{RSE}(R_2)}{100}\right)^2}}$$

If $|z| \geq 1.96$, then the difference is statistically significant at the 0.05 level and if $|z| < 1.96$, the difference is not significant.

Availability of linked file data

Linked file data are available on CD-ROM from the National Technical Information Service (NTIS) and the Government Printing Office (GPO). Data are also available in selected issues of the *Vital*

and Health Statistics, Series 20 reports and the *National Vital Statistics Reports* (formerly the *Monthly Vital Statistics Report*) through NCHS. Additional unpublished tabulations are available from NCHS through the Internet site at http://www.cdc.gov/nchs. Selected variables from the linked file are also available for tabulation on CDC WONDER at http://wonder.cdc.gov/lbdj.shtml.

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