



## Trends in Racial and Ethnic-Specific Rates for the Health Status Indicators: United States, 1990–98

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### Abstract

The Health Status Indicators (HSIs) were developed as part of the Healthy People 2000 process to facilitate the comparison of health status measures at national, State, and local levels (1). In this report national trends in racial and ethnic-specific rates for 17 HSIs are examined for the period from 1990–98. One of three overarching goals of Healthy People 2000 was to reduce health disparities (2). Examination of trends in the HSIs indicates that rates for most racial/ethnic groups improved. Rates for American Indian or Alaska Natives did not improve for six of the HSIs. An index of disparity, a summary measure of disparity among race/ethnic-specific rates, was used to measure changes in disparity between 1990 and 1998. The index of disparity decreased for 12 of the HSIs. Based on this index, racial/ethnic disparity in the percent of low birthweight infants declined by 19 percent, disparity in the percent of children under 18 years of age in poverty and in the syphilis case rate declined by 13 percent, and disparity in the stroke death rate declined by 11 percent. The index declined by less than 10 percent for eight other indicators. The index of disparity increased between 1990 and 1998 for the other five HSIs examined here. The index of disparity increased by more than 10 percent for work-related injury death rates, motor vehicle crash death rates, and suicide death rates. While rates for the HSIs have improved, not all groups have benefited equally and substantial differences among racial/ethnic groups persist.

### Introduction

*Healthy People 2000 National Health Promotion and Disease Prevention Objectives*, Objective 22.1 called for the development of a set of Health Status Indicators (HSIs) appropriate for use by Federal, State, and local health agencies (2). Under the auspices of the Centers for Disease Control and Prevention, a group of public health professionals, known as Committee 22.1, was convened to identify a set of HSIs. Through a rigorous consensus process, a list of 18 HSIs was developed and published in 1991 (1). Originally Committee 22.1 recommended that only one indicator, infant mortality, be examined by race and Hispanic origin. However, experience with the indicators soon revealed that it was essential to account for differences in the racial and ethnic composition of geographic areas when making comparisons. Committee 22.1 subsequently recommended that whenever data were available to provide reliable estimates, the HSIs be examined for specific groups (3). The first report on racial differentials in the HSIs at the national level was published in 1995 (4) and subsequent national data on the HSIs have been published in each *Healthy People 2000 Review* (5).

This report examines trends in the rates for 17 indicators associated with the original list of 18 HSIs. The original HSI for cardiovascular disease deaths was subdivided into two indicators, one for heart disease deaths and one for stroke deaths. Reported cases of Acquired Immunodeficiency Syndrome (AIDS) were excluded from this report because the case definition of AIDS changed in 1993 and because the transition from HIV infection to AIDS has been altered

substantially, making AIDS cases an inappropriate indicator of HIV infection. Reported cases of measles were excluded from this report because race was poorly reported during the earlier part of the period and the number of cases is now too small to make it practical to calculate rates by race/ethnicity. Rates or percents are shown for five racial/ethnic groups (white non-Hispanic, black non-Hispanic, Hispanic, American Indian or Alaska Native, and Asian or Pacific Islander) from 1990 to 1998. Where appropriate, the data for the HSIs are age adjusted to control for differences in age composition among the racial/ethnic groups. Differences in race/ethnic-specific rates are affected by the quality of race and ethnic information reported in vital registration and case reporting systems as well as in the census. The quality of racial and ethnic data is known to vary (6), however, the effect on the findings presented here cannot be specified.

When the HSIs were developed, no target rates or percents were specified for the year 2000. However, many of the HSIs correspond to Healthy People 2000 objectives for which targets for the year 2000 were set. These targets were set to encourage significant improvement in rates for the total population by the year 2000. For some objectives, targets were also set for special population subgroups when it was known that these groups had higher rates than the total population. These targets called for a greater percent change for the minority population, with the aim of reducing the relative difference between rates for these racial/ethnic groups and the rate for the total population. Special population targets were established for Healthy People 2000 objectives that correspond closely to 10 of the HSIs, including the following:

- Stroke death rates among blacks
- Lung cancer death rates among black males
- Breast cancer death rates among black females
- Suicide death rates among American Indian or Alaska Native males and for white males 65 years of age and over
- Homicide death rates among black males 15–34 years of age, among Hispanic males 15–34, among black females 15–34, and among American Indian or Alaska Natives of all ages
- Tuberculosis case rates among blacks, Hispanics, American Indian or Alaska Natives, and Asian or Pacific Islanders
- Syphilis case rates among blacks
- Infant mortality rates among black, American Indian or Alaska Native, and Puerto Rican women
- Percent of low birthweight infants among black and Puerto Rican women
- Percent of women not beginning prenatal care in the first trimester among black, American Indian or Alaska Native, and Hispanic women

There were no corresponding special population targets for the following HSIs: Total death rates, heart disease death rates, motor vehicle crash death rates, work-related injury death rates, live birth rates for women age 15–17 years,

percent of children under age 18 years living in poverty, and the percent of persons in counties with poor air quality.

The figures showing trends in the HSIs in this report are based on annual rates or percents for each of the five racial/ethnic groups. The vertical axis for the rate or percent in each figure is shown on a log scale. The log scale makes it possible to determine visually whether the rates are changing proportionally (parallel lines) or disproportionately over time. The trends in race/ethnic-specific rates are also discussed in terms of the relative change in rates from the beginning to the end of the period. The percent change in the rate for each specific group is calculated by subtracting the rate in 1998 from the rate in 1990, dividing by the rate in 1990 and expressing the result as a percent. Changes from 1990 to 1998 for the five racial/ethnic groups were compared in this way. These comparisons indicate whether the five groups are changing in the same direction and to the same extent. The ratios of highest to lowest race/ethnic-specific rates at the beginning and end of the period are also compared. These ratio comparisons indicate whether the proportional difference between the highest and lowest rates in 1998 was smaller or larger than the difference in 1990.

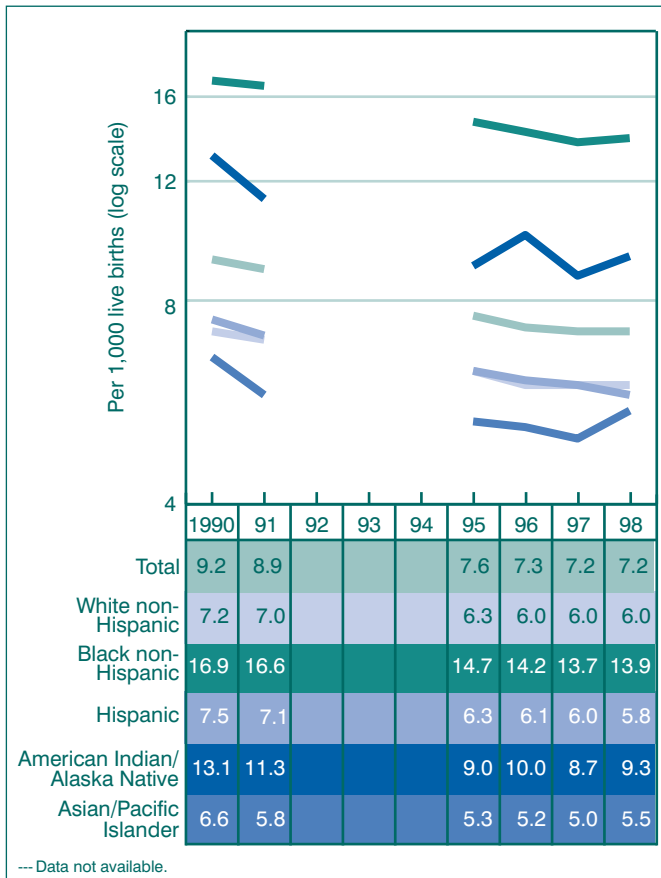
The special population targets were set to achieve relatively greater reductions in rates for specific populations compared to the total population. In order to determine whether or not greater reductions had occurred, the percent change from 1990 to 1998 for the special population (or a group representing the special population) was compared with the change for the total population. In order to be consistent with the intent of the special population target, the change in the special population should be greater than the change for the total population.

Finally, the index of disparity was employed as a summary measure of racial and ethnic disparity for each HSI in 1990 and 1998. The index of disparity was used to compare the degree of disparity in each indicator in 1990 with the degree of disparity in 1998. The index of disparity was also employed to compare the degree of disparity among HSIs in 1998. For additional information about the HSIs and the techniques employed in this report see the section on “Methods.”

## Findings

### Infant mortality rate

Infant mortality rates from the linked files of live births and infant deaths are shown in [figure 1](#). These rates are based on the race and origin of the mother recorded on the birth certificate. Linked files were not created for the years 1992–94. Infants of Asian or Pacific Islander women had the lowest infant mortality rates and infants of black non-Hispanic women had the highest infant mortality rates for the years shown. Between 1990 and 1998 the infant mortality rate for infants of American Indian or Alaska Native women declined by 29 percent, for infants of Hispanic women by 23 percent, for infants of black non-Hispanic women by 18 percent, and for infants of white



**Figure 1. Infant mortality rates by race and Hispanic origin of mother: United States, 1990–91 and 1995–98**

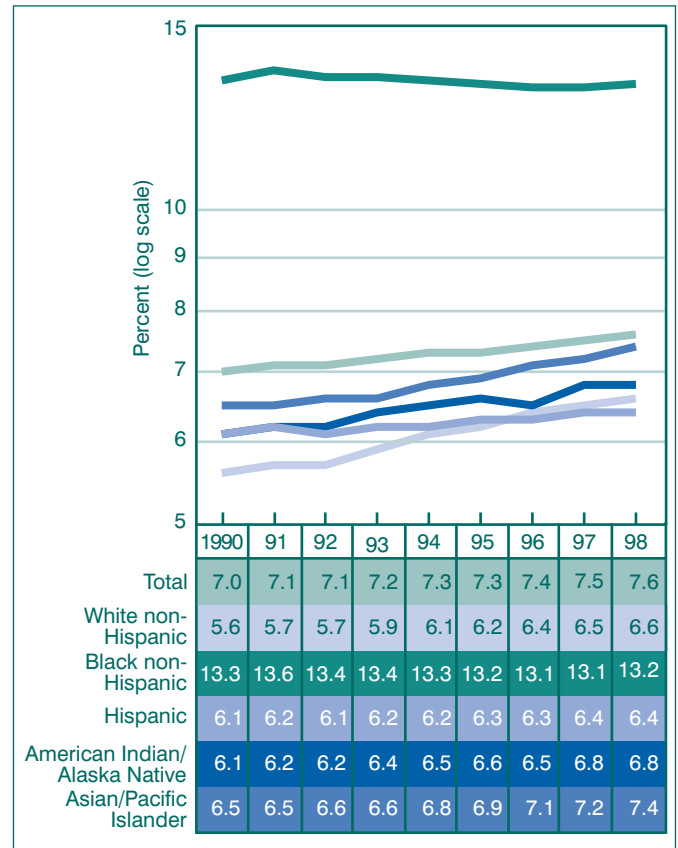
non-Hispanic and Asian or Pacific Islander women by 17 percent.

In 1990 the infant mortality rate for infants of black non-Hispanic women was 2.6 times the rate for infants of Asian or Pacific Islanders. In 1998 the rate for infants of black non-Hispanic women was 2.5 times the rate for infants of Asian or Pacific Islanders.

The infant mortality rate for the total population declined by 22 percent from 9.2 per 1,000 live births in 1990 to 7.2 in 1998. Greater declines among infants of American Indian or Alaska Native women and among infants of Hispanic women compared with the total population were consistent with the special population target for Objective 14.1 for infants of American Indian or Alaska Native women and for infants of Puerto Rican women. A smaller decline of 18 percent for infants of black non-Hispanic women was inconsistent with the intent of the special population target for infants of black women.

### Percent low birthweight

The percent of low birthweight infants among black non-Hispanic women was 13.3 in 1990 and 13.2 in 1998 (figure 2). The rates for the other four racial/ethnic groups increased, by 18 percent for white non-Hispanics, by 5 percent for Hispanics, by 11 percent for American Indian or Alaska Natives, and by 14 percent for Asian or Pacific



**Figure 2. Percent low birthweight by race and Hispanic origin of mother: United States, 1990–98**

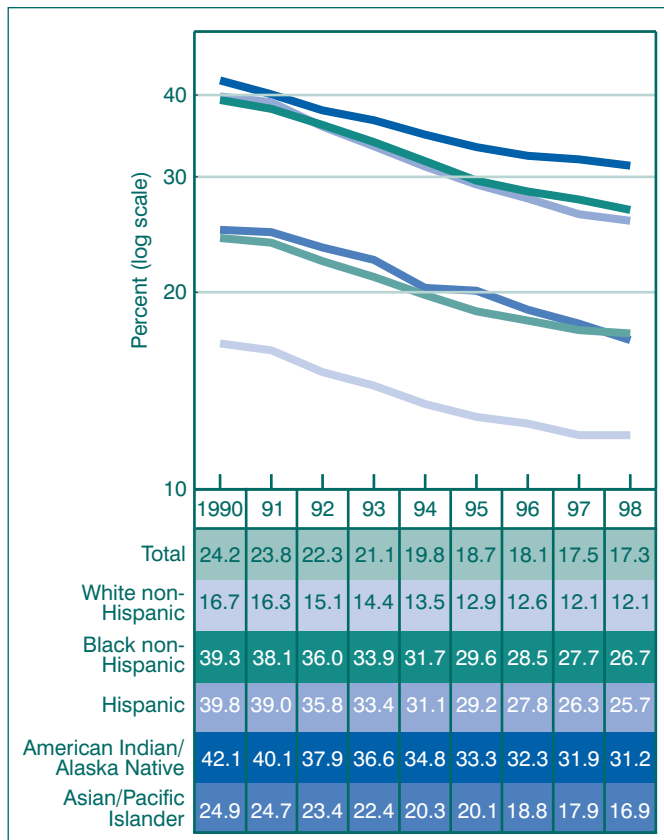
Islanders. The differences between the black non-Hispanic group and the other groups decreased due to increases in rates for the other groups. In this instance, a reduction in racial/ethnic differences occurred despite the fact that the indicator was not declining to meet the Healthy People 2000 target for Objective 14.5 of 5 percent.

The ratio of the percent low birthweight for the highest group in 1990 (13.3 percent) to the percent for the lowest group (5.6 percent) was 2.4. In 1998 the ratio was 2.1. The relative difference between the highest and lowest rates was, therefore, reduced during the period.

The fact that the percent of low birthweight infants did not decline for Hispanic women and declined by less than 1 percent for black non-Hispanic women is not consistent with special population targets for Puerto Rican and black women.

### Women with no prenatal care in the first trimester

In 1990 the proportion of women with no prenatal care in the first trimester ranged from 16.7 percent for white non-Hispanic women to 42.1 percent for American Indian or Alaska Native women (figure 3). In 1998 the range was from 12.1 percent for white non-Hispanic women to 31.2 percent for American Indian or Alaska Native women. The percent of women with no prenatal care in the first trimester decreased for all five groups from 26 to 35 percent



**Figure 3. Percent of women with no prenatal care in the first trimester by race and Hispanic origin of mother: United States, 1990–98**

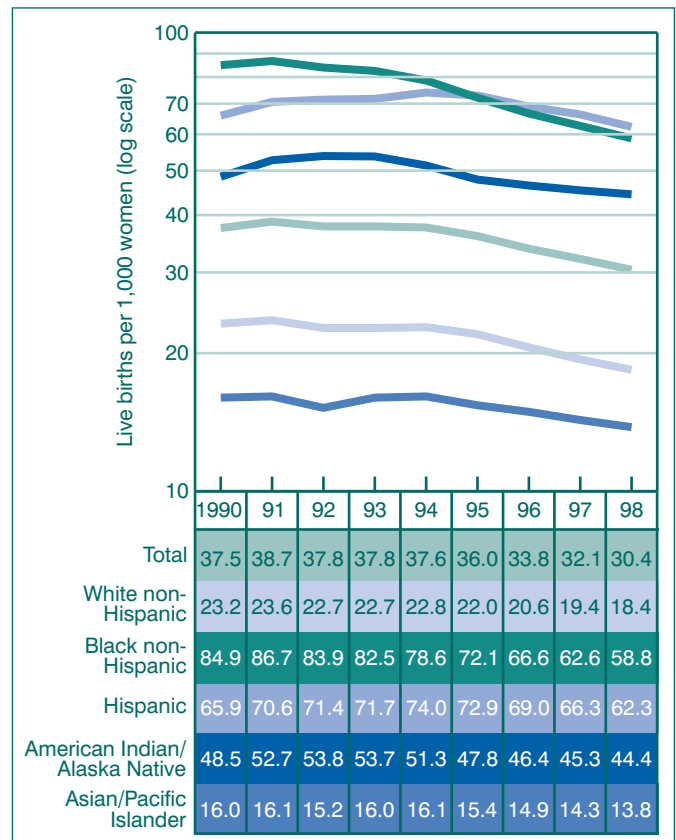
during the period. American Indian or Alaska Native women, the group with the highest percent of women with no care in the first trimester, had the least decline (26 percent). Little convergence in rates is evident in [figure 3](#).

The percent of women without prenatal care in the first trimester for American Indian or Alaska Natives was 2.5 times the percent for white non-Hispanics in 1990. In 1998 the percent for American Indian or Alaska Native women was 2.6 times the rate for white non-Hispanics. The relative difference between the groups with the highest and lowest percents was essentially unchanged.

The percent of women with no prenatal care in the first trimester for the total population decreased by 29 percent from 24.2 percent in 1990 to 17.2 percent in 1998. The rates for black non-Hispanics, Hispanics, and Asian or Pacific Islanders declined by greater margins (32 percent, 35 percent, and 32 percent, respectively). These declines are consistent with special population targets for blacks and Hispanics in Objective 14.11. The percent of women not beginning prenatal care in the first trimester declined by 26 percent for American Indian or Alaska Native women, which was inconsistent with the intent of the special population target for this group.

### Live birth rates for females age 15–17 years

The live birth rate for females age 15–17 years is based on the number of live births to females age 15–17 in the



**Figure 4. Live birth rates for women age 15–17 years by race and Hispanic origin of mother: United States, 1990–98**

numerator and the estimated number of females age 15–17 in the denominator based on the 1990 census and intercensal estimates. The fact that the numerator and denominator of the rate are based on different data systems increases the potential effect of errors in racial and ethnic classification. There are no routine estimates of the net effect of these errors for this population (see the section on Race and Hispanic origin under “Methods”).

Among black non-Hispanic women 15–17 years of age, a decline in live birth rates began after 1991 ([figure 4](#)). Among American Indian or Alaska Natives, declines in live birth rates began after 1992. Among white non-Hispanics, Hispanics, and Asian or Pacific Islanders, declines in live birth rates for females age 15–17 years began after 1994. As a result of the delay in the start of the decline for young Hispanic women, their live birth rates surpassed those of black non-Hispanic women after 1994. Between 1990 and 1998, live birth rates for females age 15–17 years declined by 31 percent for black non-Hispanics, by 21 percent for white non-Hispanics, by 14 percent for Asian or Pacific Islanders, by 8 percent for American Indian or Alaska Natives, and by 5 percent for Hispanics.

The highest race/ethnic-specific group rate in 1990 was 5.3 times the lowest group rate, whereas the highest group rate in 1998 was 4.5 times the lowest rate. Some convergence in rates is evident in [figure 4](#).

## Total death rate

The HSI's include the age-adjusted total death rate and age-adjusted death rates for seven specific causes of death. Race/ethnic-specific death rates are subject to misclassification of race and ethnicity among deaths and misclassification of individuals in the census and consequent errors in intercensal estimates. Estimates of the approximate effect of the combined bias due to race misclassification on death certificates and under enumeration on the 1990 census are as follows: white, -1.0 percent; black, -5.0 percent; American Indian, +20.6 percent; and Asian or Pacific Islander, +10.7 percent. The findings presented here should be interpreted with the limitations of the data in mind. For additional discussion of classification issues see the section on Race and Hispanic origin under "Methods" below.

Age-adjusted death rates for the HSI's are shown in table 1 for 1990 and for 1998. The percent change in each race/ethnic-specific rate between 1990 and 1998 is shown along with the ratio of the highest race/ethnic-specific rate to the lowest race/ethnic-specific rate for each year. In 1990 Asian or Pacific Islanders had the lowest total age-adjusted death rate, 295.5 deaths per 100,000 population. The rates for Hispanics, American Indian or Alaska Natives, and white non-Hispanics ranged from 395.2 to 483.7 per 100,000. Non-Hispanic blacks had the highest rate (785.2 per 100,000). The rates for all groups except American Indian or Alaska Natives were lower in 1998 than they were in 1990. The two groups with the lowest rates declined by the greatest proportions; the rates for Asian or Pacific Islanders declined by 10 percent and the rates for Hispanics declined by 13 percent. During the same period, the groups with the

**Table 1. Age-adjusted death rates for selected causes of death by race and Hispanic origin, 1990, 1998, and percent change from 1990 to 1998: United States**

	Total	Non-Hispanic			American Indian or Alaska Native	Asian or Pacific Islander	Ratio highest/lowest <sup>2</sup>
		White	Black	Hispanic			
<b>Total deaths</b>							
1990 <sup>1</sup>	518.0	483.7	785.2	395.2	441.7	295.5	2.7
1998	471.7	452.7	710.7	342.8	458.1	264.6	2.7
Percent change, 1990-98	-8.9	-6.4	-9.5	-13.3	3.7	-10.5	
<b>Heart disease</b>							
1990 <sup>1</sup>	151.3	145.3	211.8	101.5	106.0	78.0	2.7
1998	126.6	123.6	188.0	84.2	97.1	67.4	2.8
Percent change, 1990-98	-16.3	-14.9	-11.2	-17.0	-8.4	-13.6	
<b>Stroke</b>							
1990 <sup>1</sup>	27.5	25.1	47.8	20.7	19.1	24.7	2.5
1998	25.1	23.3	42.5	19.0	19.6	22.7	2.2
Percent change, 1990-98	-9.0	-7.2	-11.1	-8.2	2.6	-8.1	
<b>Lung cancer</b>							
1990 <sup>1</sup>	39.8	39.8	50.9	15.7	19.6	17.6	3.2
1998	37.0	38.3	46.0	13.6	25.1	17.2	3.4
Percent change, 1990-98	-7.0	-3.8	-9.6	-13.4	28.1	-2.3	
<b>Female breast cancer</b>							
1990 <sup>1</sup>	23.0	23.0	27.3	14.0	9.9	9.9	2.8
1998	18.8	18.7	26.1	12.1	10.3	9.8	2.7
Percent change, 1990-98	-18.3	-18.7	-4.4	-13.6	4.0	-1.0	
<b>Motor vehicle crash</b>							
1990 <sup>1</sup>	18.4	18.1	18.3	19.2	33.0	12.5	2.6
1998	15.6	15.7	17.2	14.9	31.8	8.6	3.7
Percent change, 1990-98	-15.2	-13.3	-6.0	-22.4	-3.6	-31.2	
<b>Suicide</b>							
1990 <sup>1</sup>	11.5	12.5	7.0	7.2	12.4	6.0	2.1
1998	10.4	11.8	6.1	6.0	13.4	5.9	2.3
Percent change, 1990-98	-9.6	-5.6	-12.9	-16.7	8.1	-1.7	
<b>Homicide</b>							
1990 <sup>1</sup>	10.2	4.1	39.6	17.5	11.1	5.2	9.7
1998	7.3	3.2	26.1	9.9	9.9	3.7	8.2
Percent change, 1990-98	-28.4	-22.0	-34.1	-43.4	-10.8	-28.8	

<sup>1</sup> Age-adjusted death rates for 1990 were calculated based on population estimates for July 1, 1990. Rates published elsewhere for 1990 are based on the enumerated population on April 1, 1990, for the year in which the decennial census was taken. Rates for noncensus years are based on July 1 (midyear) populations. In order to measure changes over time, rates based on the July 1 populations are used.

<sup>2</sup> Ratio of the highest race/ethnic-specific rate to the lowest race/ethnic-specific rate for each year.

highest rates (white non-Hispanics and black non-Hispanics) declined by 6 percent and 9 percent, respectively. The rates for American Indian or Alaska Natives increased by 4 percent from 1990 to 1998.

In 1990 the highest group rate (black non-Hispanic, 785.2 per 100,000) was 2.7 times the lowest group rate (Asian or Pacific Islander, 295.5 per 100,000) and in 1998 the highest group rate (black non-Hispanic, 710.7 per 100,000) was again 2.7 times the lowest group rate (Asian or Pacific Islander, 264.6 per 100,000). Although the absolute difference between the highest and lowest group rates in 1998 was smaller than the difference in 1990 (446.1 versus 489.7), the proportional difference between the highest and lowest rates was unchanged.

### Heart disease death rate

Between 1990 and 1998 all five racial/ethnic groups experienced declines in age-adjusted heart disease death rates (table 1). Rates declined by 17 percent for Hispanics, by 15 percent for white non-Hispanics, by 14 percent for Asian or Pacific Islanders, by 11 percent for black non-Hispanics, and by 8 percent for American Indian or Alaska Natives.

In 1990 the age-adjusted heart disease death rate for black non-Hispanics (211.8 per 100,000) was 2.7 times the rate for Asian or Pacific Islanders (78.0 per 100,000). In 1998 the rate for black non-Hispanics (188.0 per 100,000) was 2.8 times the rate for Asian or Pacific Islanders (67.4 per 100,000). The ratios of heart disease death rates for the groups with the highest and lowest rates at the beginning and end of the period were essentially the same. All five groups experienced reductions in heart disease death rates ranging from 8 to 17 percent. Therefore, there was little reduction in the relative differences among racial/ethnic groups.

### Stroke death rate

The age-adjusted stroke death rate was substantially higher for black non-Hispanics compared with the other racial/ethnic groups (table 1). Between 1990 and 1998 the rate for American Indian or Alaska Natives increased by 3 percent; however, this difference was not statistically significant. The rates for the other four racial/ethnic groups declined by 7 to 11 percent.

In 1990 American Indian or Alaska Natives had the lowest age-adjusted death rate due to stroke (19.1 per 100,000) while the rate for black non-Hispanics was 2.5 times as high (47.8 per 100,000). In 1998 Hispanics had the lowest age-adjusted death rate due to stroke (19.0 per 100,000). In 1998 the rate for black non-Hispanics was 2.2 times the rate for Hispanics. The relative difference between the highest and lowest rates had, therefore, decreased.

The Healthy People 2000 target for Objective 15.2 called for a 34 percent reduction in the age-adjusted stroke death rate for the total population and a 49 percent reduction in the rate for blacks from the baseline in 1987 to the year

2000 target. Between 1990 and 1998 the stroke death rates for black non-Hispanics decreased by 11 percent. During the same period the age-adjusted stroke death rate for the total population decreased by 9 percent from 27.5 to 25.1 per 100,000. The actual reduction for blacks was slightly greater than that for the total population.

### Lung cancer death rate

Hispanics had the lowest age-adjusted death rate due to lung cancer in 1990 (table 1). Asian or Pacific Islanders, American Indian or Alaska Natives, white non-Hispanics, and black non-Hispanics had successively higher rates. The same rank order was evident in 1998. The rate for American Indian or Alaska Natives increased by 28 percent from 19.6 to 25.1 per 100,000. The lung cancer death rate for Hispanics declined by 13 percent, the rate for black non-Hispanics declined by 10 percent, the rate for white non-Hispanics declined by 4 percent, and the rate for Asian or Pacific Islanders declined by 2 percent. The decline for Asian or Pacific Islanders was not statistically significant.

In 1990 the highest rate (50.9 per 100,000 for black non-Hispanics) was 3.2 times the lowest rate (15.7 per 100,000 for Hispanics). In 1998 the highest rate (46 per 100,000 for black non-Hispanics) was 3.4 times the lowest rate (13.6 per 100,000 for Hispanics). The relative difference between highest and lowest rates had increased slightly.

From 1990 to 1998 the age-adjusted lung cancer death rate for the total population declined by 7 percent from 39.8 to 37.0 per 100,000. The lung cancer death rate for black non-Hispanics declined by 10 percent, which is consistent with the aim of the special population target for black males in Objective 3.2.

### Female breast cancer death rate

Between 1990 and 1998, the age-adjusted female breast cancer death rate for white non-Hispanics declined by 19 percent, the rate for Hispanics declined by 14 percent, and the rate for black non-Hispanics declined by 4 percent (table 1). Despite intervening fluctuations, the rate for Asian or Pacific Islanders was nearly unchanged and the rate for American Indian or Alaska Natives increased by 4 percent. Neither of these changes was statistically significant.

The age-adjusted female breast cancer death rate for black non-Hispanics was 2.8 times the rate for Asian or Pacific Islanders in 1990. The rate for black non-Hispanics declined by 4 percent and the rate for Asian or Pacific Islanders declined by 1 percent. In 1998 the ratio of the rates for these two groups was 2.7.

Despite the fact that there was a special population target for breast cancer death rates among black females, the rate for non-Hispanic black females declined by only 4 percent while the rate for the total population declined by 18 percent from 23.0 per 100,000 in 1990 to 18.8 per 100,000 in 1998.

## Motor vehicle crash death rate

The age-adjusted motor vehicle crash death rate for Asian or Pacific Islanders declined by 31 percent from 1990 to 1998, the rates for Hispanics declined by 22 percent, and the rates for white non-Hispanics declined by 13 percent (table 1). The rates for black non-Hispanics declined by 6 percent and the rates for American Indian or Alaska Natives declined by 4 percent; the latter decline was not statistically significant. The group with the highest rate in 1990 (American Indian or Alaska Native) declined the least; the group with the lowest rate in 1990 (Asian or Pacific Islander) declined the most.

In 1990 the ratio of the rate for the highest group (American Indian or Alaska Native) to the rate for the lowest group (Asian or Pacific Islander) was 2.6. In 1998 the ratio of the rate for the highest group to the lowest group was 3.7. The relative difference between the highest and lowest groups increased during this period.

## Suicide death rate

During the first half of the decade there were increases in age-adjusted suicide death rates for all groups except for white non-Hispanics (data not shown). Comparing rates in 1990 with those in 1998, rates declined by 17 percent for Hispanics, by 13 percent for black non-Hispanics, by 6 percent for white non-Hispanics, and by 2 percent for Asian or Pacific Islanders (table 1). The decline in suicide rates for Asian or Pacific Islanders was not statistically significant. The age-adjusted suicide death rate for American Indian or Alaska Natives increased by 8 percent from 1990 to 1998; however, this increase was not statistically significant. While black non-Hispanics, Hispanics, and Asian or Pacific Islanders had nearly the same rate in 1998, substantial differences in rates remain between these groups and the white non-Hispanic and American Indian or Alaska Native groups.

In 1990 white non-Hispanics had the highest age-adjusted suicide death rate, which was 2.1 times the lowest rate. In 1998 American Indian or Alaska Natives had the highest rate, which was 2.3 times the lowest rate.

Despite the fact that there was a special population target for American Indian or Alaska Native males, the age-adjusted suicide death rate for American Indian or Alaska Natives increased by 8 percent while the rate for the total population decreased by 10 percent.

## Homicide death rate

During the period from 1990 to 1998 the age-adjusted homicide death rate declined by 43 percent for Hispanics, by 34 percent for black non-Hispanics, by 29 percent for Asian or Pacific Islanders, by 22 percent for white non-Hispanics, and by 11 percent for American Indian or Alaska Natives (table 1). The decline for American Indian or Alaska Natives was not statistically significant.

In 1990 the age-adjusted homicide death rate for black non-Hispanics was 9.7 times the rate for white non-

Hispanics. In 1998 the rate for black non-Hispanics was 8.2 times the rate for white non-Hispanics.

The homicide death rate for the total population declined by 28 percent from 10.2 per 100,000 in 1990 to 7.3 per 100,000 in 1998. Greater percent declines for Hispanics and for black non-Hispanics are consistent with special population targets for these groups; however, the smaller decline in rates for American Indian or Alaska Natives was contrary to the intent of the special population target for this group in Objective 7.1.

## Work-related injury death rate

Work-related injury deaths are relatively rare events, occurring on the order of about 3 per 100,000 persons 16 years of age and over. The rates by race/ethnicity are shown in figure 5. In these data whites and blacks include persons of Hispanic origin. In 1992, the first year for which data from the Census of Fatal Occupational Injuries (CFOI) is available, rates ranged from 2.7 for blacks and Asian or Pacific Islanders to 3.1 for whites and Hispanics. Data for American Indians or Alaska Natives are not available for 1992. Between 1993 and 1998, rates declined by 47 percent for American Indian or Alaska Natives, by 34 percent for Asian or Pacific Islanders, by 17 percent for blacks, by

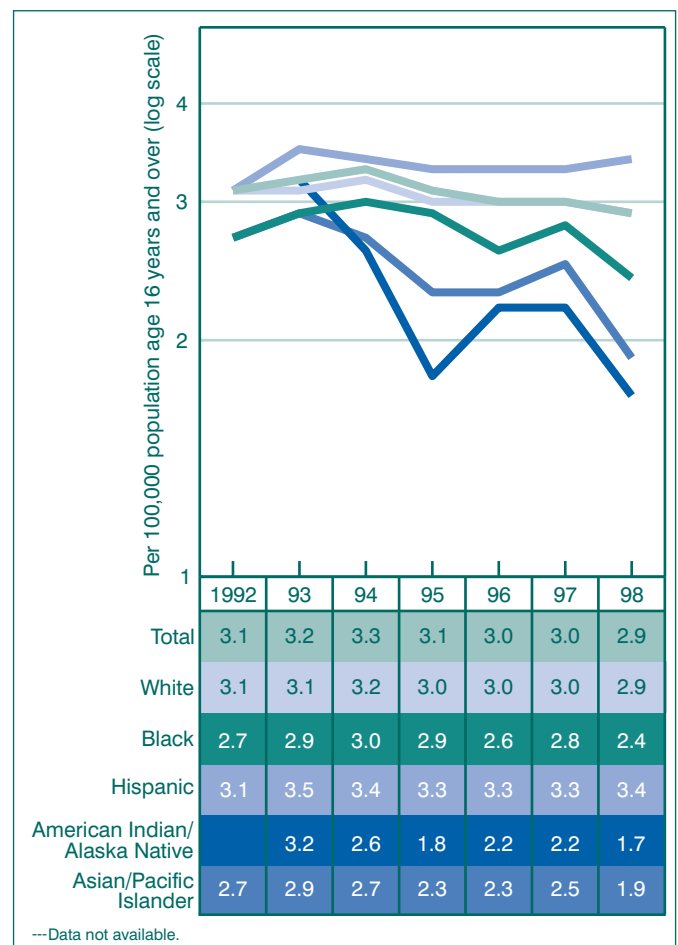


Figure 5. Work-related injury death rates by race and Hispanic origin: United States, 1992–98

6 percent for whites, and by 3 percent for Hispanics. The statistical significance of changes in work-related injury death rates was not assessed.

The ratio of the highest race/ethnic-specific rate to the lowest race/ethnic-specific rate was 1.1 in 1992 and 2 in 1998. A distinct divergence in rates is evident in figure 5.

### Tuberculosis case rate

Tuberculosis case rates for Asian or Pacific Islanders declined more slowly than case rates for the other groups as indicated by the slope of the lines in figure 6. The tuberculosis case rate for Asian or Pacific Islanders declined by 15 percent from 1990 to 1998. The rate for white non-Hispanics, the group with the lowest rate in 1990, declined by 45 percent. The rates for black non-Hispanics declined by 46 percent; and the rates for Hispanics and for American Indian or Alaska Natives declined by 37 percent. The statistical significance of changes in tuberculosis case rates was not assessed.

The tuberculosis case rate for Asian or Pacific Islanders in 1990 was more than 10 times the rate for white non-Hispanics. In 1998 the rate for Asian or Pacific Islanders was more than 15 times the rate for white non-Hispanics. A widening of the gap between the highest and lowest rates is evident in figure 6.

The tuberculosis case rate for the total population declined by 34 percent from 10.3 to 6.8 per 100,000. The tuberculosis case rates for black non-Hispanics, American

Indian or Alaska Natives, and for Hispanics declined by greater percents (46 percent, 37 percent, and 37 percent, respectively) consistent with special population targets for these groups. The tuberculosis case rate for Asian or Pacific Islanders, the group with the highest rates, declined the least (15 percent). This decline was inconsistent with the intent of the special population target for Asian or Pacific Islanders in Objective 20.4.

### Primary and secondary syphilis case rate

The two groups with the highest rates of syphilis in 1990, black non-Hispanics and Hispanics, had the greatest declines (88 percent and 90 percent, respectively) (figure 7). The two groups with the lowest rates of syphilis in 1990, white non-Hispanics and Asian or Pacific Islanders, declined by smaller proportions (81 percent and 73 percent, respectively). The syphilis case rates declined the least for American Indian or Alaska Natives (49 percent). The statistical significance of changes in primary and secondary syphilis case rates was not assessed.

In 1990 the primary and secondary syphilis case rate for black non-Hispanics (141.9 per 100,000) was 95 times the rate for Asian or Pacific Islanders (1.5). In 1998 the rate for black non-Hispanics (16.9) was 42 times the rate for Asian or Pacific Islanders (0.4).

The Healthy People 2000 target for Objective 19.3 for the total population (4.0 per 100,000) was attained in 1997 (3.2 per 100,000) and the special population target for blacks (30.0 per 100,000) was attained in 1996. Between 1990 and

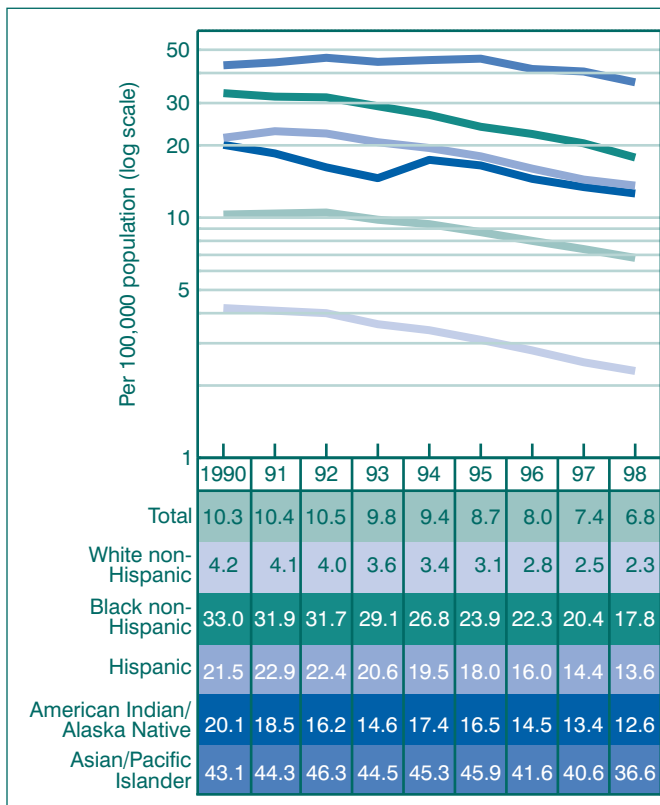


Figure 6. Tuberculosis case rates by race and Hispanic origin: United States, 1990–98

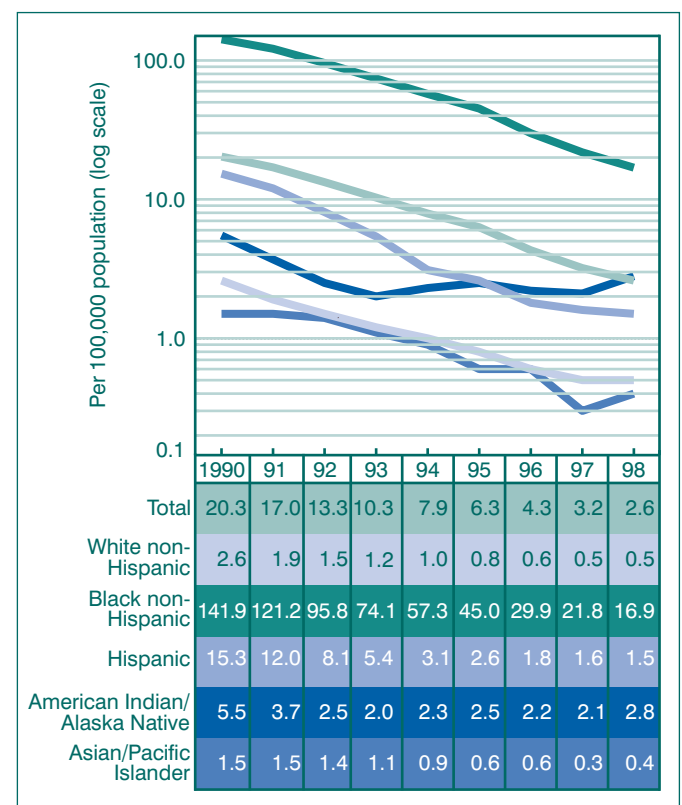
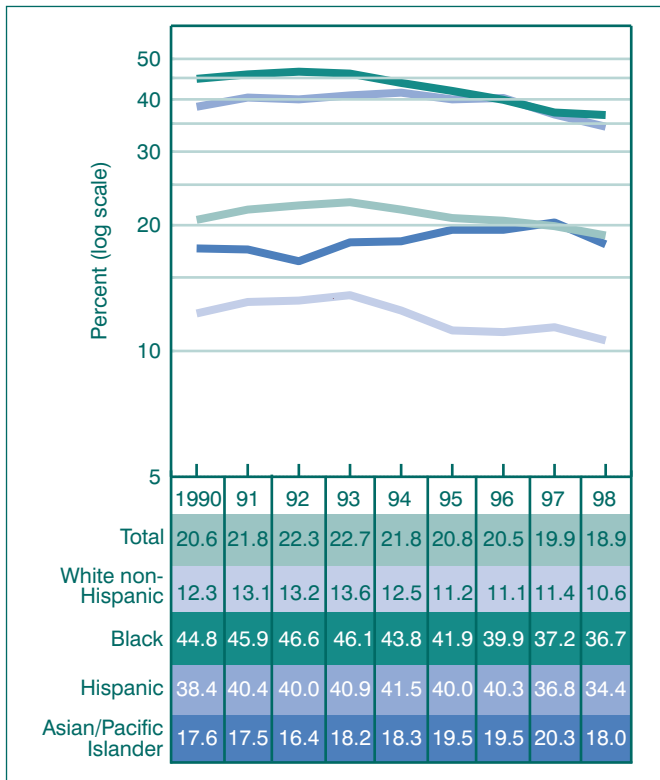


Figure 7. Primary and secondary syphilis case rates by race and Hispanic origin: United States, 1990–98





**Figure 8. Percent of children under 18 years old in poverty by race and Hispanic origin: United States, 1990–98**

1998 the primary and secondary syphilis case rate declined by 87 percent for the total population, from 20.3 per 100,000 in 1990 to 2.6 per 100,000 in 1998, while the rate for black non-Hispanics declined by 88 percent. The percent change for the special population was, therefore, greater than the percent change for the total population.

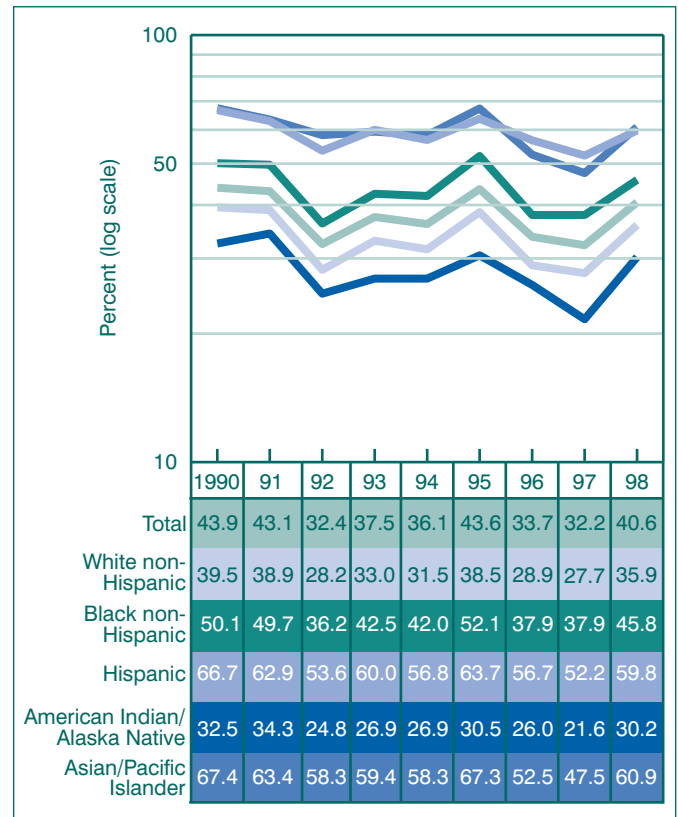
### Percent of children under 18 years old in poverty

After 1990 the percent of children under age 18 years living in poverty increased among white non-Hispanics until 1993, among blacks until 1992, among Hispanics until 1994 and among Asian or Pacific Islanders until 1997 (figure 8). Subsequent declines were evident for all racial/ethnic groups. Between 1990 and 1998 the percent of children under 18 in poverty declined by 18 percent for blacks, by 14 percent for white non-Hispanics, and by 10 percent for Hispanics. Between 1990 and 1998 the percent of children under age 18 years in poverty increased by 2 percent for Asian or Pacific Islanders. The increase for Asian or Pacific Islanders was not statistically significant.

In 1990 the poverty rate for black children under 18 years of age, the highest group, was 3.6 times the rate for white non-Hispanic children. In 1998 the rate for black children was 3.5 times the rate for white non-Hispanic children.

### Percent of persons in counties exceeding EPA air quality standards

Weather patterns have a substantial impact on air quality and the cyclical nature of these patterns is evident in



**Figure 9. Percent of persons in counties exceeding EPA standards for air quality by race and Hispanic origin: United States, 1990–98**

figure 9 (7). The percent of persons in counties exceeding EPA standards for air quality declined for all racial/ethnic groups from 1990 to 1992, then increased for all groups from 1992 to 1995. The percent of persons in counties exceeding EPA air quality standards declined again from 1995 to 1997, and increased again between 1997 and 1998. Either Hispanics or Asian or Pacific Islanders had the highest percent of persons in counties exceeding EPA air quality standards each year between 1990 and 1998. The other three racial/ethnic groups maintained their same relative positions throughout the period. American Indian or Alaska Natives had the lowest percent of persons in counties exceeding EPA air quality standards, followed by white non-Hispanics and black non-Hispanics. Given the cyclic nature of this indicator, comparisons between 1990 and 1998 are not very meaningful.

The ratio between the group with the highest percent of persons in counties exceeding EPA air quality standards and the group with the lowest percent of persons in such counties was 2.1 in 1990, 1.8 in 1991, 2.4 in 1992 and 1997, 2.2 in 1993–96, and 2.0 in 1998. The relative difference between the group with the highest percent and the group with the lowest percent was rather consistent during this period.

### Comparing a summary measure of disparity for 1990 and 1998

The index of disparity summarizes the differences among group rates. This statistic provides a basis for

**Table 2. Index of disparity among five racial/ethnic groups for the Health Status Indicators: United States, 1990, 1998, and percent change**

	Index of disparity		Percent change 1990–98	
	1990	1998	Decrease	Increase
Infant mortality rates . . . . .	38.9	36.4	-6.4	
Low birthweight (percent) . . . . .	28.4	23.0	-19.0**	
No prenatal care in first trimester (percent). . . . .	46.9	43.5	-7.2**	
Live birth rates for women age 15–17 years . . . . .	65.4	67.7		3.5**
Total death rates . . . . .	27.9	25.8	-7.5**	
Heart disease death rates . . . . .	31.1	30.9	-0.6	
Stroke death rates . . . . .	29.6	26.4	-10.8**	
Lung cancer death rates . . . . .	39.0	35.4	-9.2**	
Female breast cancer death rates . . . . .	34.3	33.6	-2.0	
Motor vehicle crash death rates . . . . .	23.6	32.8		39.0**
Suicide death rates . . . . .	28.2	33.8		19.9**
Homicide death rates . . . . .	95.5	86.8	-9.1**	
Work-related injury death rates (1993–98) <sup>1</sup> . . . . .	6.3	22.1		250.8 <sup>a</sup>
Tuberculosis case rates . . . . .	160.4	170.3		6.2 <sup>a</sup>
Primary and secondary syphilis case rates . . . . .	175.3	153.1	-12.7 <sup>a</sup>	
Children under age 18 years in poverty (percent) <sup>2</sup> . . . . .	64.7	56.2	-13.1	
Percent with poor air quality (1992–1998) . . . . .	31.1	29.5	-5.1 <sup>a</sup>	

\*\*The difference in the index of disparity is statistically significant at the 0.05 level.

<sup>a</sup>The statistical significance of the difference in the index of disparity was not tested. Methods for assessing the reliability of the underlying rates are not available.

<sup>1</sup>The index of disparity for work-related injury deaths is not strictly comparable with the index of disparity for the other indicators because the data are available for the following groups: white, black, Hispanic, American Indian, Aleut and Eskimo, and Asian or Pacific Islanders. Persons of Hispanic origin may be of any race.

<sup>2</sup>The index of disparity for the percent of children in poverty is not strictly comparable with the index of disparity for the other indicators because the data are available for the following groups: white non-Hispanic, black, Hispanic, and Asian or Pacific Islander.

comparing the degree of difference (disparity) in race/ethnic specific rates in 1990 with the disparity in race/ethnic rates in 1998. The index of disparity was calculated for each of the HSIs in 1990 and in 1998 and the percent change in the index of disparity between 1990 and 1998 was calculated (table 2). The index of disparity for infant mortality rates by race and Hispanic origin was 38.9 percent in 1990. This statistic indicates that the disparity among racial/ethnic groups was equal to 38.9 percent of the total infant mortality rate. In 1998 the disparity among racial/ethnic groups was equal to 36.4 percent. A decline in the index of disparity indicates that the disparity in race/ethnic specific rates declined relative to the total rate. The index of disparity for the infant mortality rate declined by 6.4 percent between 1990 and 1998; this difference was not statistically significant.

The index of disparity declined for 12 of the 17 HSIs. Declines in the index of disparity were statistically significant for six of the HSIs: Percent of low birthweight infants (-19 percent), percent of women with no prenatal care in the first trimester (-7.2 percent), total death rate (-7.5 percent), stroke death rate (-10.8 percent), lung cancer death rate (-9.2 percent), and the homicide death rate (-9.1 percent). Declines in the index of disparity were not statistically significant for the infant mortality rate, heart disease death rate, female breast cancer death rate, and percent of children under age 18 in poverty. The significance of changes in the index of disparity for the syphilis case rate and for the percent of persons with poor air quality could not be assessed.

The index of disparity increased for the other five HSIs. Increases in the index of disparity were statistically significant for three HSIs: The live birth rate for women age

15–17 years (+3.5 percent), motor vehicle crash death rate (+39.0 percent), and the suicide death rate (+19.9 percent). The statistical significance of increases in the index of disparity for the work-related injury death rate (+250.8) and the tuberculosis case rate (+6.2) could not be assessed. An increase in the index of disparity can be interpreted as an increase in the racial/ethnic disparity among rates.

### Comparing racial and ethnic disparity among the HSIs

The index of disparity also provides a basis for comparing the degree of racial/ethnic disparity among indicators (table 3). Tuberculosis case rates had the highest index of disparity in 1998 (170.3 percent). Primary and secondary syphilis case rates had the second highest index of disparity (153.1 percent) followed by homicide death rates (86.8 percent), and live birth rates to women age 15–17 years (67.7 percent). These four indicators also had the greatest ratios of highest to lowest race/ethnic-specific rates in 1998 (42 for syphilis, 16 for tuberculosis, 8 for homicide, and 4.5 for live birth rates to women age 15–17). The magnitude of the index value for primary and secondary syphilis case rates is primarily a function of the extraordinarily high rate for black non-Hispanics (figure 7). The magnitude of the index values for tuberculosis case rates, homicide death rates, and live birth rates for women age 15–17 are a function of substantial differences between the overall population rate (dominated by the white non-Hispanic group) and the other four racial/ethnic groups (figure 6, table 1, and figure 4, respectively).

**Table 3. Index of disparity among five racial/ethnic groups for the Health Status Indicators: United States, 1998**

	Index of disparity 1998
Tuberculosis case rates . . . . .	170.3
Primary and secondary syphilis case rates. . . . .	153.1
Homicide death rates . . . . .	86.8
Live birth rates for women age 15–17 years. . . . .	67.7
Children under age 18 years in poverty (percent) <sup>1</sup> . . . . .	56.2
No prenatal care in first trimester (percent) . . . . .	43.5
Infant mortality rates . . . . .	36.4
Lung cancer death rates . . . . .	35.4
Suicide death rates . . . . .	33.8
Female breast cancer death rates . . . . .	33.6
Motor vehicle crash death rates . . . . .	32.8
Heart disease death rates . . . . .	30.9
Percent with poor air quality (1992–98). . . . .	29.5
Stroke death rates. . . . .	26.4
Total death rates. . . . .	25.8
Low birthweight (percent) . . . . .	23.0
Work-related injury death rates (1993–98) <sup>2</sup> . . . . .	22.1

<sup>1</sup>The index of disparity for the percent of children in poverty is not strictly comparable with the index of disparity for the other indicators because the data are available for the following groups: white non-Hispanic, black, Hispanic, and Asian or Pacific Islander.  
<sup>2</sup>The index of disparity for work-related injury deaths is not strictly comparable with the index of disparity for the other indicators because the data are available for the following groups: white, black, Hispanic, American Indian, Aleut and Eskimo, and Asian or Pacific Islanders. Persons of Hispanic origin may be of any race.

Despite the fact that the index of disparity for work-related injury deaths increased by 250.8 percent between 1990 and 1998, work-related injury deaths had the smallest index of disparity in 1998 (22.1 percent). While differences in work-related injury death rates have increased since the data first became available, the relative size of differences remains small. The ratio of highest to lowest race/ethnic-specific work-related injury death rates was 2 in 1998. The remaining indicators had indexes of disparity ranging from 23 to 56 percent.

## Conclusions

### Trends in the HSIs

An earlier report noted that substantial improvements were made in the HSIs for the total population (8). National targets for the Healthy People 2000 objectives that correspond to the HSIs have been attained for six of the indicators and the United States had significantly improving trends for 14 indicators. No significant improvement was evident for lung cancer deaths, work-related injury deaths, and homicide deaths; and the percent of low birthweight infants was increasing significantly instead of decreasing.

Trends in race/ethnic-specific rates were examined in this report for 17 HSIs. All five racial/ethnic groups experienced at least nominal reductions in rates for 10 of the HSIs between 1990 and 1998: heart disease death rates, motor vehicle crash death rates, work-related injury death rates (between 1993 and 1998), homicide death rates, tuberculosis case rates, primary and secondary syphilis case rates, infant mortality rates, percent of women with no prenatal care in the first trimester, live birth rates for women

age 15–17 years, and percent of persons in counties exceeding EPA air quality standards.

For four additional HSIs, there was at least nominal improvement between 1990 and 1998 in rates for all groups except American Indian or Alaska Natives: total death rates, stroke death rates, lung cancer death rates, and suicide death rates. Female breast cancer death rates declined at least nominally for white non-Hispanics, black non-Hispanics, and Hispanics; increased for American Indian or Alaska Natives; and were unchanged for Asian or Pacific Islanders. The percent of low birthweight increased for all racial/ethnic groups except for black non-Hispanics. The percent of children under 18 years old in poverty increased only for Asian or Pacific Islanders.

The findings concerning American Indian and Alaska Natives stood out for six of the HSIs. Between 1990 and 1998, the lung cancer death rate for American Indian or Alaska Natives increased by 28 percent, the percent of low birthweight infants increased by 11 percent, the suicide death rate increased by 8 percent, the total death rate and the breast cancer death rate each increased by 4 percent, and the stroke death rate increased by 3 percent. While the changes in the suicide, breast cancer, and stroke death rates were not statistically significant, American Indian or Alaska Natives do not appear to have experienced the same improvements in these indicators as the other racial/ethnic groups experienced. While there may be alternative explanations for these findings, such as improvement in the identification of native peoples during this period, further investigation is needed.

### Special population targets

Ten of the HSIs correspond to Healthy People 2000 objectives with special population targets intended to reduce differences in rates between a specific racial/ethnic group and the total population. The special population target for syphilis case rates among blacks was attained. Declines in stroke death rates, lung cancer death rates, homicide death rates, tuberculosis case rates, and in the percent of women with no prenatal care during the first trimester were greater for black non-Hispanics than they were for the total population. These reductions were consistent with the goal of reducing disparities. Declines for black non-Hispanics were not greater than declines for the total population in female breast cancer death rates or in infant mortality rates despite special population targets. There was no decline in the percent of low birthweight infants for black non-Hispanics despite a special population target for blacks.

Compared with changes for the total population, Hispanics experienced greater declines in homicide death rates and tuberculosis case rates. These changes were consistent with special population targets intended to produce greater improvements for Hispanics.

Among American Indian or Alaska Natives, changes in suicide and homicide death rates were in the opposite direction of that intended by special population targets for Objectives 6.1 and 7.1. On the other hand, tuberculosis case

rates and infant mortality rates declined by greater percents for American Indian or Alaska Natives compared with the total population. These changes were consistent with the intent of special population targets for these objectives.

The tuberculosis case rate for Asian and Pacific Islanders was the highest of the five racial/ethnic groups and declined the least, despite the fact that there was a special population target for tuberculosis case rates for this group (Objective 20.4).

## The index of disparity

Examination of the race/ethnic-specific rates for the HSIs indicates that substantial disparities in rates persist. The comparison of percent changes in rates over time provides a good indication of which groups are not improving and which groups are improving by greater margins. The ratio comparisons are indicative of relative changes between groups with the highest and lowest rates but they do not provide information about how the rates for the groups in between are changing. These comparisons do not lend themselves to a summary conclusion about how differences among all five groups are changing for a particular indicator. In order to draw such conclusions, an index of disparity was employed as a summary measure of differences in race/ethnic specific rates. The index of disparity is employed to measure changes in disparity over time and to compare the degree of disparity among indicators.

The index of disparity provides a measure of variability in race/ethnic specific rates relative to the rate for the total population. The index of disparity decreased for 12 HSIs. The index of disparity for the percent of low birthweight infants decreased by 19 percent; however, this decrease was the result of increases in rates for the four racial/ethnic groups with the lowest rates at the beginning of the period. The index of disparity decreased by less than 10 percent for nine of the HSIs.

Increases in the index of disparity for motor vehicle crash death rates, work-related injury death rates, suicide death rates, and tuberculosis case rates were due to the divergence in racial/ethnic rates. In each of these instances, the racial/ethnic group with the highest rate in 1990 had little or no decline from 1990 to 1998 (see [table 1](#) and [figures 5](#) and [6](#)).

The index of disparity also provides a basis for comparing the disparity in rates among indicators. The HSIs with the highest index values are tuberculosis case rates, syphilis case rates, homicide death rates, live birth rates for women age 15–17 years, and percent of children under age 18 in poverty.

## Implications of this study

While the validity of the findings presented here depends upon the accuracy of the reporting of race and ethnicity, it is not likely that all of the differences observed here are the result of errors in reporting or changes in reporting of race and ethnicity over time.

One of the overarching goals of Healthy People 2000 was to reduce—and finally eliminate—disparities among population groups of Americans (2). In pursuit of this goal special population targets were established where specific sex, race, ethnic, age, income, or education groups were known to have less favorable rates. In Healthy People 2010 the overarching goal is to “eliminate health disparities among different segments of the population”(9). These include differences that occur by gender, race or ethnicity, education or income, disability, living in rural localities, or sexual orientation. In Healthy People 2010, the objectives will be monitored for as many of these characteristics as possible. Based on this analysis relatively little progress was made toward the goal of eliminating racial/ethnic disparities among the HSIs during the last 10 years. Progress toward the goal of eliminating health disparities will require more concerted efforts during the next 10 years.

## Methods

### The Health Status Indicators (HSIs)

Committee 22.1 designated 18 HSIs (1). The HSIs are based on established data collection systems with standardized definitions and collection procedures (10). The indicator for cardiovascular disease deaths included two subcategories, heart disease and stroke. Because the trends in these subcategories are distinguishable, the findings are presented for the two subcategories. Reported cases of AIDS were included as one of the original HSIs. Since the case definition for AIDS changed in 1993 and because the transition from HIV infection to AIDS has been altered substantially by the introduction of drug therapies, the original measure is not a reliable indicator of trends during the 1990s or a valid indicator of HIV infection. Therefore, reported cases of AIDS are not examined here. Reported cases of measles were also one of the original HSIs. Until recently the proportion of measles cases with race “not stated” was too large to permit valid calculation of race-specific case rates and the number of measles cases is now small enough to make the calculation of race/ethnic specific rates impractical. As a result, reported cases of measles are also not examined in this report.

The proportion of live births to adolescents (ages 10–17) was one of the original HSIs. This indicator is easily measured from birth certificate data; however, the proportion of births to adolescents is not an adequate basis for comparing teenage fertility among different populations. The proportion of all births to adolescents is also a function of the fertility of older women. The live birth rate for teenagers 15–17 years is a much better measure of teenage fertility for comparative purposes. The birth rate is calculated by dividing the number of live births to women age 15–17 years in a calendar year by the population of females age 15–17 at the midpoint of that calendar year. The result is multiplied by 1,000 and the result is expressed as a birth rate per 1,000 females age 15–17 years of age. Omitting AIDS

and measles and subdividing cardiovascular disease into two indicators, this report presents findings for 17 indicators.

## Race and Hispanic origin

The HSIs are based on a variety of data collection systems with different data collection procedures. Generally these data systems record the subject's race in terms of white, black, American Indian or Alaska Native, and Asian or Pacific Islander; and the subject's origin in terms of Hispanic or non-Hispanic. These two measures of race and ethnicity are combined to form five groups (white non-Hispanic, black non-Hispanic, Hispanic, American Indian or Alaska Native, and Asian or Pacific Islander). Persons of Hispanic origin can be of any race. While the categories white non-Hispanic and black non-Hispanic exclude persons reported as Hispanic, small numbers of Hispanics are included among the American Indian or Alaska Native and Asian or Pacific Islander groups. Whenever possible, the rates and percents for the HSIs were calculated for each of these five groups. Work-related injury deaths are tabulated according to white, black, Hispanic, American Indian or Alaska Native, and Asian or Pacific Islander (11). Since Hispanics may be of any race, they are also included among the other four groups. The percent of children under 18 years old in poverty is tabulated for the following four categories: white non-Hispanic, black, Hispanic, and Asian or Pacific Islander. Hispanics are included among the black and Asian or Pacific Islander groups.

The validity of the findings in this report depends upon the accuracy of race and ethnic data. A number of studies have been conducted on the reliability of race reported on the death certificate by comparing race on the death certificate with that reported on another data collection instrument, such as the census or a survey. Differences may arise because of differences in who provides race information on the compared records. Race information on the death certificate is reported by the funeral director as provided by an informant or, in the absence of an informant, on the basis of observation. In contrast, race on the census is obtained while the individual is alive and is self-reported or reported by another member of the household. Studies (12, 13) show that a person self-reported as American Indian or Asian on census or survey records was sometimes reported as white on the death certificate. The net effect of misclassification is an underestimation of deaths and death rates for races other than white and black. In addition, undercoverage of minority groups in the census and resultant population estimates introduces biases into death rates by race (6). Estimates of the approximate effect of the combined bias due to race misclassification on death certificates and under enumeration on the 1990 census are as follows: white, -1.0 percent; black, -5.0 percent; American Indian, +20.6 percent; and Asian or Pacific Islander, +10.7 percent. Death rates for the Hispanic population are also affected by undercoverage of this population group in the census and resultant population estimates; the estimated

net correction, taking into account both sources of bias is +1.6 percent. The extent to which racial and ethnic misclassification may have changed from 1990 to 1998 is unknown.

Misclassification is less of a problem for information from birth certificates to the extent that information is supplied by an informant and proportions or rates are calculated based solely on information from the birth certificate. In the linked birth-infant death file, the mother's race on the birth certificate is used for purposes of computing infant mortality rates. The effects of misclassification on the comparisons made here cannot be estimated.

## Rates and percents

The HSIs are based on rates or percents that permit comparisons among populations or geographic areas with populations of different size. The death rates are age adjusted to the 1940 standard population to eliminate the effects of differences in age composition from comparisons among populations (14). These rates represent the number of deaths that would occur per 100,000 persons if the standard population had the age-specific death rates of the population of interest. It should be remembered that these age-adjusted rates are appropriate for comparison purposes and that they have no inherent meaning for most other purposes.

Age-specific population data for the calculation of rates by race and ethnicity were extracted from Census Bureau estimates for the year 1998 along with corresponding adjustments in estimates going back to 1990: U.S. Census Bureau; [http://www.census.gov/population/www/estimates/expectancyst\\_sasrh.html](http://www.census.gov/population/www/estimates/expectancyst_sasrh.html) (revised September 15, 1999).

The trends in race/ethnic-specific rates and percents for each HSI are shown in tables and graphs. When graphs are shown, the vertical axis for the rates and percents is shown on a log scale. The log scale provides for a visual comparison of the proportional change in rates over time. In this case the change for each of the five racial/ethnic groups can be compared directly. The log scale compensates for differences in the level of an indicator among groups. On the normal scale, a change from 50 percent to 45 percent (a reduction of 10 percent) appears to be as great as a change from 10 percent to 5 percent (a reduction of 50 percent). On the log scale a change from 50 percent to 25 percent (a 50 percent reduction) would appear as great as a change from 10 percent to 5 percent. When rates of change for two groups are compared on the log scale, proportional changes are indicated by parallel lines. Disproportional change between two groups is evident when the slopes of their trend lines are different. More steeply sloping lines are indicative of greater proportional changes.

The percent change in rates from the beginning of the period (usually 1990) to the end of the period (1998) are compared for the five race/ethnic specific groups. Unless otherwise noted, changes between 1990 and 1998 are statistically significant at the 0.05 level. Tests of significance were not conducted for tuberculosis case rates, syphilis case

rates, work-related injury death rates, and the percent of persons in counties exceeding EPA standards for air quality. The reporting of notifiable diseases, work-related injuries, and air quality are subject to errors in coverage that cannot be estimated routinely. The focus of the analysis is on the relative degree of change over time rather than on the statistical significance of the difference between initial and final rates. When the rates for two groups change by similar percents, there is no reduction in the relative difference between the rates for the two groups. When the rates for two groups change by different percents, the relative difference between the rates for the two groups is either increasing or decreasing.

## The index of disparity

The discussion of differences in rates among groups becomes complicated when there are more than two groups. The index of disparity was developed as a summary measure of the differences between rates for subgroups in a population. The numerator of the index, the mean deviation, is obtained by first calculating the difference between each group rate and the rate for the total population. The absolute values of these differences are added and the sum is divided by the number of groups. The subgroup rates are not weighted according to the number of individuals in each group. The mean deviation would be suitable for comparisons among different sets of subgroups within a single population or between different populations with the same overall rate. The mean deviation is indicative of the degree of difference from the overall rate. It would not be appropriate to compare the mean deviation for a single indicator at two points in time when rates are changing or to compare the mean deviation between two indicators with different overall rates.

In order to make additional comparisons, the mean deviation is divided by the rate for the total population and multiplied by 100. Dividing by the total population rate standardizes the index. The degree of difference in the subgroup rates is expressed relative to the rate in the total population. Multiplying by 100 converts the ratio to a percent for convenience in making comparisons. The differences between the rates for the subgroups are, therefore, expressed as a percent of the total population rate. The resulting index of disparity can be used to compare differences in rates over time even if the overall rate in the population is changing. It can also be used to make comparisons among indicators with different means and to make comparisons among indicators with different metrics (i.e., percent; per 1,000; per 100,000, etc.).

The index of disparity also has certain limitations. It is a statistic that summarizes the differences between subgroup rates and the rate for the total population. It does not specify which group has the highest or lowest rate. It does not indicate how many groups are different from the total population or whether the differences in rates are statistically significant. Similar index values could be obtained when the rate for one group is very different from the total or when

the rates for two groups are only moderately different from the total. When used to monitor changes in disparity over time, it does not tell us whether the overall rate in the population is increasing or decreasing. A decrease in the statistic does not necessarily indicate that the rate in the population is improving; it simply means that there is proportionally less difference in subgroup rates relative to the overall rate in the population. The index of disparity should be interpreted in conjunction with the race/ethnic-specific rates on which it is based.

A bootstrap procedure was employed to estimate a standard error for the index of disparity based on the underlying rates and their standard errors. The standard errors for the rates based on vital statistics data are estimates of nonsampling error since no sampling is involved in the collection of the data. The standard errors for the percents of children under 18 years old in poverty include both sampling and nonsampling error since they are estimates based on the Current Population Survey. The bootstrap procedure uses the rate and standard error for each group to produce 25,000 random numbers assuming a normal distribution. An estimate of the index of disparity is calculated from the generated rates. The distribution of the simulated index of disparity is used to derive an estimate of the standard error for the index. A z-test for the difference between two rates was used to determine whether changes in the index of disparity between 1990 and 1998 were statistically significant at the 0.05 level (15). A description of the methodology for calculating confidence limits for the index of disparity is available from the authors.

## Sources of Data

### Death rates (except work-related injury)

Numbers of deaths by race, Hispanic origin, cause of death, age, and in the case of breast cancer—for females only—were extracted from annual mortality files from the National Vital Statistics System. The cause-of-death categories were based on the following *International Classification of Diseases Ninth Revision* codes: total deaths (ICD-9 codes, all causes of death combined); heart disease deaths (ICD-9 codes 390–398, 402, and 404–429); stroke deaths (ICD-9 codes 430–438); lung cancer deaths (ICD-9 code 162.0); female breast cancer deaths (ICD-9 code 174); motor vehicle crash deaths (ICD-9 codes E810–E825); suicide deaths (ICD-9 codes E950–E959); and homicide deaths (ICD-9 codes E960–E978). In 1990, data for Louisiana, New Hampshire, and Oklahoma were excluded from this analysis of race/ethnic specific trends because Hispanic origin was not reported on the death certificate. Data for New Hampshire and Oklahoma were excluded in 1991 and 1992, and data for Oklahoma were excluded in 1993–96. In 1997 all States and the District of Columbia reported Hispanic origin on the death certificate. The data for each racial/ethnic group were extracted for 11 age groups so that age-adjusted rates could be computed. Age and race/ethnic-specific population denominator data were

extracted from Census Bureau estimates for the year 1998 along with corresponding adjustments in estimates going back to 1990: U.S. Census Bureau; [http://www.census.gov/population/www/estimates/st\\_sasrh.html](http://www.census.gov/population/www/estimates/st_sasrh.html) (revised September 15, 1999).

### **Work-related injury death rates**

Data on injury-related deaths to workers 16 years of age and over for the years 1992–98 were drawn from the Census of Fatal Occupational Injuries (CFOI) database maintained by the Bureau of Labor Statistics. These data are reported for the following racial/ethnic categories: white, black, Hispanic, American Indian or Alaska Native, and Asian or Pacific Islander. The sources of annual population data cited previously were also employed as denominators here. The denominator was limited to the population 16 years of age and over.

### **Tuberculosis case rates**

Tuberculosis case rates per 100,000 population by race/ethnicity from 1990 to 1998 were extracted from the following publications: Centers for Disease Control and Prevention, Reported Tuberculosis in the United States, 1998 (July 1999), 1997 (July 1998), 1996 (July 1997), 1995 (July 1996), 1994 (July 1995), 1993 (July 1994); and Tuberculosis Statistics in the United States 1990–92 (1994).

### **Syphilis case rates**

Syphilis case rates per 100,000 population by race/ethnicity from 1990 to 1998 were provided by Emmett Swint, Centers for Disease Control and Prevention, National Center for HIV, STD, and TB Prevention.

### **Infant mortality rates**

Numbers of live births and infant deaths according to the mother's race/ethnicity on the birth certificate were drawn from the annual linked birth/infant death data sets for the years 1990–92 and 1995–98. National linked files were not created for the years 1992–94.

### **Low birthweight and prenatal care**

The percent of low birthweight infants was based on the number of live-born infants weighing less than 2,500 grams, divided by the total number of live-born infants according to the mother's race/ethnicity. Infants with no birthweight recorded were excluded from both the numerator and the denominator. The percent of women who did not begin prenatal care in the first trimester was based on the number of live births where the woman did not begin prenatal care during the first 3 months of pregnancy—including women who did not have any prenatal care. Live births for which the month care began was not stated were excluded from both the numerator and denominator. These frequencies were extracted from the annual natality files from the National Vital Statistics System.

### **Live birth rates for females age 15–17 years**

These rates were based on the numbers of live births to women 15–17 years old by race/ethnicity extracted from the annual natality files from the National Vital Statistics System. The numbers of females 15–17 years old by State were supplied by Stephanie Ventura, Division of Vital Statistics, National Center for Health Statistics, based on previously published reports on birth rates for teenagers (16).

### **Percent of children under 18 years old in poverty**

Data on the percent of children under 18 years old living in poverty by race/ethnicity were extracted from the following publication: U.S. Census Bureau, Poverty in the United States, 1998; Current Population Reports P60–207, September 1999. These data are reported for the following racial/ethnic categories: white non-Hispanic, black, Hispanic, and Asian and Pacific Islander.

### **Percent of persons in counties exceeding EPA standards for air quality**

The Environmental Protection Agency (EPA) monitors the occurrence of air pollutants (carbon monoxide, nitrogen dioxide, ozone, lead, particulate matter, and sulfur dioxide) during the previous 12 months. Counties that did not meet EPA National Ambient Air Quality Standards (NAAQS) are identified in a database maintained by the Office of Air Quality Planning & Standards, Information Transfer & Program Integration Division, which can be found at: <http://www.epa.gov/aqspubl1/select.html>.

Counties where one or more of the six criteria pollutants exceeded NAAQS were tabulated by State and year. So-called “secondary exceedences” were used such that a county had to have at least two recorded values in excess of the NAAQS to be in exceedence. Any county with one or more secondary exceedences was considered in exceedence of the standards. Annual population estimates (as described above) for the counties that exceeded any standard were used to calculate the percent of persons living in counties exceeding EPA air quality standards for each racial/ethnic group. These methods differ from those used to monitor Healthy People 2000 Objective 11.5 and generally produce estimates of the percent of persons in counties exceeding EPA air quality standards higher than those for Objective 11.5.

When interpreting the results it is important to remember that the national network of air quality monitors is not uniformly distributed among counties and that many counties have no monitors at all. Also not accounted for in the data are effects of weather and climate on the concentration and distribution of pollutants in counties where monitors are located or adjacent counties which have no monitors.

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