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CDC Health Disparities and Inequalities Report — United States, 2013

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Foreword

Thomas R. Frieden, MD, MPH
Director, CDC

CDC works 24 hours a day, seven days a week protecting people in the United States from health threats in order to save lives, promote health, and reduce costs. Achieving health equity, eliminating health disparities, and improving health in the United States are overarching goals to improve and protect our nation's health.

Over the past 50 years, the United States has made significant progress toward these important goals. Life expectancy increased from just under 70 years in 1960 to approximately 79 years in 2011 (*1,2*). People are living longer, healthier, and more productive lives. However, this upward trend is neither as rapid as it should be — we lag behind dozens of other nations (*3*) – nor is it uniformly experienced by people in the United States.

In fact, these two shortcomings of our health system are distinct but related. Our overall health status does not achieve our potential. An important part of this — even though preventable illness, injury, disability, and death affect all segments of society — is that life expectancy and other key health outcomes vary greatly by race, sex, socioeconomic status, and geographic location. In the United States, whites have a longer healthy life expectancy than blacks, and women live longer than men (*4*). There are also marked regional differences, with much lower life expectancy among both white and black Americans who live in the Southeast (*4*).

CDC Health Disparities and Inequalities Report — United States, 2013 is the second agency report examining some of the key factors that affect health and lead to health disparities in the United States. Four findings bring home the enormous personal tragedy of health disparities:

- Cardiovascular disease is the leading cause of death in the United States. Non-Hispanic black adults are at least 50% more likely to die of heart disease or stroke prematurely (i.e., before age 75 years) than their non-Hispanic white counterparts (*5*).
- The prevalence of adult diabetes is higher among Hispanics, non-Hispanic blacks, and those of other or mixed races than among Asians and non-Hispanic whites. Prevalence is also higher among adults without college degrees and those with lower household incomes (*6*).
- The infant mortality rate for non-Hispanic blacks is more than double the rate for non-Hispanic whites. Rates also vary geographically, with higher rates in the South and Midwest than in other parts of the country (*7*).
- Men are far more likely to commit suicide than women, regardless of age or race/ethnicity, with overall rates nearly four times those of women. For both men and women, suicide rates are highest among American Indians/Alaska Natives and non-Hispanic whites (*8*).

CDC and its partners work to identify and address the factors that lead to health disparities among racial, ethnic, geographic, socioeconomic, and other groups so that barriers to health equity can be removed. The first step in this process is to shine a bright light on the problem to be solved. Providing accurate, useful data on the leading causes of illness and death in the United States and across the world is a foundation of CDC's mission and work.

In 1966, Martin Luther King said that "Of all the forms of inequality, injustice in health care is the most shocking and inhumane" (*9*). Nearly a half century after Reverend King made this observation, we have made some but not nearly enough progress in reducing the barriers to equitable health care and to health equity. We should work with what he called "the fierce urgency of now" to eliminate this form of inequality wherever and whoever it affects.

As Secretary of Health and Human Services Kathleen G. Sebelius has said, "Health equity benefits everyone" (*10*). Every person who dies young, is avoidably disabled, or is unable to function at their optimal level represents not only a personal and family tragedy but also impoverishes our communities and our country. We are all deprived of the creativity, contributions, and participation that result from disparities in health status.

Eliminating the burden of racial and ethnic health disparities is not easy, but it can be done. For example, 20 years ago the Vaccines for Children (VFC) program was created to provide vaccines at no cost to eligible children. It is now one of our country's most successful public health initiatives (*11*). By removing cost barriers associated with vaccines, the VFC program has protected millions of children from diseases — both those who participated directly in the program and others — and has helped to virtually eliminate disparities in childhood vaccination rates. More recently, the Affordable Care Act (*12*), with its provisions to require insurer coverage of preventive services without cost to patients and to increase health insurance access for millions of previously uninsured Americans (*13,14*), provides a powerful opportunity to further reduce health disparities.

Achieving health equity requires the hard work of many people and organizations. CDC's many partners can use the information in this report to stimulate action to further reduce health disparities. The future health of our nation will be determined, to a large extent, by how effectively federal, state, and local agencies and private organizations work with communities to eliminate health disparities among populations that continue to experience a disproportionate burden of disease, disability, injury, and death.

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Introduction: CDC Health Disparities and Inequalities Report — United States, 2013

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Summary

This supplement is the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access (CDC. CDC Health Disparities and Inequalities Report—United States, 2011. MMWR 2011;60[Suppl; January 14, 2011]). *The 2013 CHDIR provides new data for 19 of the topics published in 2011 and 10 new topics. When data were available and suitable analyses were possible for the topic area, disparities were examined for population characteristics that included race and ethnicity, sex, sexual orientation, age, disability, socioeconomic status, and geographic location. The purpose of this supplement is to raise awareness of differences among groups regarding selected health outcomes and health determinants and to prompt actions to reduce disparities. The findings in this supplement can be used by practitioners in public health, academia and clinical medicine; the media; the general public; policymakers; program managers; and researchers to address disparities and help all persons in the United States live longer, healthier, and more productive lives.*

Disparities in Health Outcomes and Health Determinants

Health is influenced by many factors. Poor health status, disease risk factors, and limited access to health care are often interrelated and have been reported among persons with social, economic, and environmental disadvantages. The conditions and social context in which persons live can explain, in part, why certain populations in the United States are healthier than others and why some are not as healthy as they could be (*1*). The World Health Organization (WHO) defines the social determinants of health as the conditions in which persons are born, grow, live, work, and age, including the health-care system (*2*). According to WHO, "the social determinants of health are mostly responsible for health inequities—the unfair and avoidable differences in health status seen within and between countries" (*2*). The social determinants of health as well as race and ethnicity, sex, sexual orientation, age, and disability all influence health. Identification and awareness of the differences among populations regarding health outcomes and health determinants are essential steps towards reducing disparities in communities at greatest risk.

Disparities exist when differences in health outcomes or health determinants are observed between populations. The terms health disparities and health inequalities are often used interchangeably. This supplement uses the terms health disparities and inequalities to refer to gaps in health between segments of the population.

Public Health Importance of Health Disparities

The burden of illness, premature death, and disability disproportionately affects certain populations. During the past decade, documented disparities have persisted for approximately 80% of the *Healthy People 2010 objectives* and have increased for an additional 13% of the objectives (*3*). Data from the REACH U.S. Risk Factor Survey of approximately 30 communities in the United States indicate that residents in mostly minority communities continue to have lower socioeconomic status, greater barriers to health-care access, and greater risks for, and burden of, disease compared with the general population living in the same county or state (*4*). Both the 2012 National Healthcare Disparities Report *(5)* and the 2012 National Healthcare Quality Report (*6*) found that almost none of the disparities in access to care are improving. In addition, quality of care varies not only across types of care but also across parts of the country (*5,6*). Disparities in health care access and quality can result in unnecessary direct and indirect costs. According to a 2009 study by the Joint Center for Political and Economic Studies, eliminating health disparities for minorities would have reduced direct medical care expenditures by $229.4 billion and reduced indirect costs associated with illness and premature death by approximately $1 trillion during 2003–2006 (*7*).

About This Report

This supplement is the second in a series of reports that address health disparities. The 2011 CHDIR was the first CDC report to assess health disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access (*8*). The 2013 CHDIR includes more current data for 19 of the topics published in 2011. Two 2011 topics, housing and air quality, are not included in 2013 because there were no new data to report. There are 10 new topics. The new topics include: access to healthier food retailers, unemployment, nonfatal work-related injuries and illnesses, fatal work-related injuries, residential proximity to major highways, activity limitations due to chronic diseases, asthma attacks, health-related quality of life, periodontitis in adults, and tuberculosis. In the 2011 CHDIR, the prevalence of asthma (i.e., the percentage of persons who have ever been diagnosed with asthma and still have asthma) was reported, whereas in this report, the characteristics of persons who experienced an asthma attack during the preceding 12 months are discussed. Although the focus of these reports is on the measurement of health disparities, most also mentioned existing evidence-based interventions or strategies.

Criteria for Topic Selection

Selection of new topics for this supplement was done in consultation with CDC's Associate Directors for Science. The primary prerequisites for selection of topics were that data be of high quality and appropriate for developing national estimates. In addition, the topic had to meet one or more of the following criteria: 1) leading cause of premature death, higher disease burden, or lower life expectancy at birth for certain segments of the U.S. population as defined by sex, race/ethnicity, income or education, geography, sexual orientation, and disability status; 2) known determinant of health (e.g., social, demographic, and environmental) where disparities have been identified; and 3) health outcome for which effective and feasible interventions exist where disparities have been identified.

Analysis

Most of the analyses in this supplement are descriptive and did not control for potential confounders or adjust for age; therefore, caution should be used in comparing these findings to findings from studies with different analytical approaches. When data were available and suitable for analysis, disparities were examined for characteristics that included race and ethnicity, sex, age, household income, educational attainment, and geographic location. Other characteristics that were analyzed included place of birth, language spoken at home, disability status, and sexual orientation. Consistent definitions were used as a guide to promote standardization of analyses across the reports. However, readers should be attentive to the definitions used in each report. There are some similarities and some differences in definitions across reports because there are multiple ways to categorize these variables. For certain variables, the most appropriate categorization depends on the topic being studied (e.g., age groups). For other variables, the Office of Management and Budget (OMB) and the U.S. Department of Health and Human Services have set rules that are to be used in federal surveys (i.e., race, ethnicity). To the extent possible, OMB standards were used in the analyses. However, some data sources did not collect or report information with the granularity recommended by OMB because the numbers of some racial and ethnic groups were small and their estimates would not be meaningful. Subject matter experts across CDC participated in identifying appropriate definitions.

Analyses focused on the estimated prevalence of a risk factor or health outcome or on the estimated rate of a health outcome in the population. Also, in certain reports, change in the estimated prevalence or rate over time in recent years was calculated. Analytic methods used in the reports varied; therefore, it is important to read the methods description for each report. Most authors calculated absolute or relative difference in prevalence or rate, or both, between segments of the U.S. population. The absolute difference is the arithmetic difference between two groups. For example, if the prevalence of a certain condition is 1% among women and 5% among men, the absolute difference is 4 percentage points. The relative difference is the absolute difference divided by the value for the referent group; the result is multiplied by 100% to create a percentage. In the above example, the relative difference for men compared with women is 400% ([4%/1%]*100%). In other words, men have an excess prevalence that is four times the prevalence of what occurs among women. This example illustrates that the relative difference can be far larger than the absolute difference, especially when the overall prevalence of the condition is low. Conversely, the relative difference can be smaller when the overall prevalence is high. For example, if the prevalence is 91% among women and 95% among men, the absolute difference is still 4 percentage points but the relative difference is only 4%. To gain a more complete understanding of the population's health status and the impact of disparities, it is instructive to look at both measures.

In most analyses, the statistical significance of observed differences was assessed using formal significance testing with alpha=0.05. If statistical testing was not done, differences were

assessed by calculating and comparing 95% confidence intervals (CIs) around the estimated prevalence or rate. In this approach, CIs were used as a measure of variability, and nonoverlapping CIs were considered statistically different. While using CIs in this way is a conservative evaluation of significance differences, infrequently this approach might lead to a conclusion that estimates are similar when the point estimates do differ. Because of analytical constraints, neither statistical significance nor 95% CIs were calculated for three reports (*9–11*).

Use of This Report

The findings and conclusions in this supplement are intended for practitioners in public health, academia and clinical medicine; the media; general public; policymakers; program managers; and researchers to address disparities and help all persons in the United States live longer, healthier, and more productive lives. The information on disparities can be used to help select interventions for specific subgroups or populations and support community actions to address disparities.

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Social Determinants of Health

Education and Income — United States, 2009 and 2011

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Introduction

The factors that influence the socioeconomic position of individuals and groups within industrial societies also influence their health (*1*,*2*). Socioeconomic position has continuous and graded effects on health that are cumulative over a lifetime. The socioeconomic conditions of the places where persons live and work have an even more substantial influence on health than personal socioeconomic position (*3*,*4*). In the United States, educational attainment and income are the indicators that are most commonly used to measure the effect of socioeconomic position on health. Research indicates that substantial educational and income disparities exist across many measures of health (*1*,*5*–*8*). A previous report described the magnitude and patterns of absolute and relative measures of disparity in noncompletion of high school and poverty in 2005 and 2009 (*9*). Notable disparities defined by race/ethnicity, socioeconomic factors, disability status, and geographic location were identified for 2005 and 2009, with no evidence of a temporal decrease in racial/ethnic disparities, whereas socioeconomic and disability disparities increased from 2005 to 2009.

The analysis and discussion of educational attainment and income that follow are part of the second CDC Health Disparities and Inequalities Report (CHDIR) and update information on disparities in the prevalence of noncompletion of high school and poverty presented in the first CHDIR (*8*). The 2011 CHDIR (*9*) was the first CDC report to describe disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*10*). The purposes of this analysis are to discuss and raise awareness about group differences in levels of noncompletion of high school and poverty and to motivate actions to reduce these disparities.

Methods

To monitor progress toward eliminating health disparities in the prevalence of noncompletion of high school and poverty, CDC analyzed 2009 and 2011 data from the Current Population Survey (CPS), using methods described previously (*8*). The CPS is a cross-sectional monthly household survey of a representative sample of the civilian, noninstitutionalized U.S. household population that is conducted jointly by the U.S. Census Bureau and the Bureau of Labor Statistics (*11*). Data on the continuous income-to-poverty ratio (IPR) in the 2009 and 2011 National Bureau of Economic Research (NBER) data sets based on the March CPS were merged with the March supplement files from the 2009 and 2011 Integrated Public Use Microdata Series — Current Population Surveys (IPUMS-CPS) (*12*,*13*).

Self-reported data were collected on various characteristics, including demographic, socioeconomic, and geographic characteristics and place of birth. Group disparities in age-standardized prevalence of noncompletion of high school and poverty were assessed according to sex, race/ethnicity, age, educational attainment, poverty status, disability status, place of birth, world region (country) of birth, U.S. census region of residence, and metropolitan area of residence.

Race/ethnicity categories included non-Hispanic white, non-Hispanic black, American Indian/ Alaska Native, Asian/Pacific Islander, Hispanic, and multiple races. Age groups included 25–44, 45–64, 65–79, and ≥80 years. Educational attainment categories included less than high school, high school graduate or equivalent, some college, and college graduate. Poverty status was derived from the IPR, which is based on family income relative to federally established poverty thresholds that are revised annually to reflect changes in the cost of living as measured by the Consumer Price Index (*14*).

Disability status was defined by the national data collection standards released by the U.S. Department of Health and Human Services (HHS) in 2011 (*15*). World region of birth was aggregated to approximate the regions of the world from which the foreign born now originate (*16*). Absolute and relative disparities in noncompletion of high school were assessed separately for adults aged ≥25 years and 18–24 years; for poverty, disparities were assessed for the total population aged ≥18 years.

Disparities between groups were measured as deviations from a referent category rate. Referent categories were usually those

that had the most favorable group estimates for most variables; for racial/ethnic comparisons, white males and females were selected because they were the largest group (*17*,*18*). Absolute difference was measured as the simple difference between a group estimate and the estimate for its respective reference category, or referent group. Relative difference, a percentage, was obtained by dividing the absolute difference by the value in the referent category and multiplying by 100. To evaluate changes in disparity over time, relative differences for the groups in 2009 were subtracted from relative differences in 2011 (*17*,*18*). The z statistic and a two-tailed test at $p<0.05$ with Bonferroni correction for multiple comparisons were used to test for the statistical significance of the observed absolute and relative differences and for changes over time. To calculate the standard errors for testing the change over time, a previously described method was used (*19*), modified to account for the parameter being compared (i.e., relative difference). Statistically significant increases and decreases in relative differences from 2009 to 2011 were interpreted as increases and decreases in disparity, respectively. CDC used statistical software to account for the complex sample design of the CPS and to produce point estimates, standard errors, and 95% confidence intervals. Estimates were age standardized by the direct method to the year 2000 age distribution of the U.S. population (*20*). Estimates with relative standard error ≥30% were not reported.

Results

In the 2011 population aged ≥25 years, statistically significant absolute disparities in noncompletion of high school were identified for all the characteristics studied (Table 1). Noncompletion of high school increased with age; the absolute differences between the age-specific percentages in the referent group (45–64 years) and the age groups 65–79 years and ≥80 years were 6.6 and 14.8 percentage points, respectively. The absolute racial/ethnic difference between non-Hispanic whites and each of the other racial ethnic groups was highest for Hispanics (30.4 percentage points), lowest for the multiple races group (4.0 percentage points), and intermediate for non-Hispanic American Indian/Alaska Natives (11.6 percentage points), and non-Hispanic blacks (8.8 percentage points). This pattern was similar in both sexes, except that among women, the absolute difference for the multiple races group (3.1 percentage points) was not statistically significant. Absolute differences between the age-standardized percentages of adults who had not completed high school in each poverty status group and the referent group (high income, IPR ≥4) were statistically significant overall and in both men and women. Noncompletion of high school increased with increasing poverty; the absolute difference for the poorest group was approximately three times the absolute difference for the middle-income group (6.4 versus 1.7 percentage points). Significant absolute differences between adults with and without a disability in noncompletion of high school also were found (total: 9.8 percentage points; men: 9.5 percentage points; women: 10.1 percentage points).

Among adults aged ≥25 years in 2011, noncompletion of high school was generally more common among foreign-born than U.S.-born adults (Table 1). Significant absolute differences from the U.S. born were observed in the total population (24.9 percentage points), among non-Hispanic whites (3.1 percentage points), A/PIs (9.0 percentage points), and Hispanics (27.7 percentage points). Disparities in noncompletion of high school also were found according to world region (countries) of birth. In 2011, significant absolute differences were found between persons born in the United States (referent group) and those born in Latin American and Caribbean countries (46.1 percentage points) or in countries in Asia and the Pacific (6.1 percentage points). In 2011, significant absolute differences were also found between residents of the U.S. census regions of the Midwest, South, or West and the referent group (the Northeast). The absolute difference in age-standardized noncompletion of high school between residents who lived inside metropolitan areas and those who lived outside metropolitan areas (referent group) also was significant. In 2009 and 2011, the magnitude and pattern of age, poverty status, and disability differences were similar in men and women. No significant differences were identified in the relative differences of any these characteristics from 2009 to 2011.

Among younger adults aged 18–24 years in 2011, significant disparities in place of birth and in demographic, socioeconomic, disability, and geographic characteristics were found in the age-standardized percentages of adults who did not complete high school (Table 2). Unlike adults aged ≥25 years, the absolute difference between the percentages of young adults who did not complete high school in the younger age group (18–19 years) and older referent group (20–24 years) was significant (33.1 percentage points). The relative difference between persons aged 18–19 years and the referent group increased significantly by 61.6 percentage points from 2009 to 2011, whereas no change occurred from 2009 to 2011 in age-specific disparities in the older population (≥25 years) (Table 1). Among racial/ethnic groups, absolute differences from non-Hispanic whites were only significant among non-Hispanic blacks (7.2 percentage points) and Hispanics (12.4 percentage points), with the magnitude and pattern

TABLE 1. Age-standardized* percentage of adults aged ≥25 years who did not complete high school, by selected characteristics — Integrated Public Use Microdata Series, Current Population Survey, United States, 2009 and 2011

Characteristic	2009				2011				Change in relative difference from 2009 to 2011 (percentage points)
	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	
Sex									
Male	14.1	(0.2)	1.4†	11.0	13.2	(0.2)	1.4†	11.9	0.9
Female	12.7	(0.2)	Ref.	Ref.	11.8	(0.2)	Ref.	Ref.	Ref.
Age group (yrs)§									
Both sexes									
25–44	11.7	(0.2)	0.7	6.2	11.0	(0.2)	0.4	4.1	-2.1
45–64	11.0	(0.2)	Ref.	Ref.	10.5	(0.2)	Ref.	Ref.	Ref.
65–79	19.5	(0.4)	8.5†	77.3	17.2	(0.4)	6.6†	63.1	-14.2
≥80	27.6	(0.8)	16.6†	150.7	25.3	(0.7)	14.8†	140.6	-10.0
Male									
25–44	13.0	(0.3)	1.3†	11.5	12.1	(0.2)	1.0†	9.0	-2.5
45–64	11.7	(0.3)	Ref.	Ref.	11.1	(0.3)	Ref.	Ref.	Ref.
65–79	18.5	(0.6)	6.8†	58.0	16.6	(0.5)	5.4†	48.7	-9.4
≥80	27.2	(1.1)	15.5†	132.1	26.0	(1.1)	14.9†	133.5	1.4
Female									
25–44	10.3	(0.2)	0	-0.3	9.8	(0.2)	-0.2	-1.7	-1.4
45–64	10.4	(0.2)	Ref.	Ref.	9.9	(0.2)	Ref.	Ref.	Ref.
65–79	20.4	(0.5)	10.0†	96.7	17.7	(0.5)	7.7†	77.8	19.0
≥80	27.9	(0.9)	17.5†	169.0	24.9	(0.8)	15.0†	150.6	-18.4
Race/Ethnicity									
Both sexes									
White, non-Hispanic	8.0	(0.1)	Ref.	Ref.	7.3	(0.1)	Ref.	Ref.	Ref.
Black, non-Hispanic	17.0	(0.4)	9.0†	112.6	16.1	(0.4)	8.8†	121.2	8.9
Asian/Pacific Islander	12.7	(0.7)	4.7†	59.1	12.1	(0.6)	4.9†	66.8	7.7
American Indian/Alaska Native	20.0	(1.8)	12.0†	149.8	18.8	(1.9)	11.5†	158.5	8.8
Multiple races	13.4	(1.0)	5.4†	67.8	11.3	(1.0)	4.0†	55.4	-12.4
Hispanic¶	40.1	(0.6)	32.1†	400.8	37.7	(0.5)	30.4†	419.3	18.5
Male									
White, non-Hispanic	8.6	(0.2)	Ref.	Ref.	7.9	(0.2)	Ref.	Ref.	Ref.
Black, non-Hispanic	17.6	(0.6)	9.1†	106.0	17.3	(0.6)	9.4†	120.1	14.1
Asian/Pacific Islander	10.3	(0.8)	1.8	20.9	10.2	(0.7)	2.3†	29.5	8.6
American Indian/Alaska Native	21.0	(2.2)	12.4†	145.0	20.8	(2.4)	13.0†	165.1	20.1
Multiple races	13.3	(1.4)	4.7†	55.1	12.7	(1.5)	4.8†	61.6	6.5
Hispanic	41.1	(0.7)	32.5†	380.4	38.4	(0.7)	30.5†	388.2	7.8
Female									
White, non-Hispanic	7.4	(0.2)	Ref.	Ref.	6.7	(0.2)	Ref.	Ref.	Ref.
Black, non-Hispanic	16.6	(0.5)	9.2†	123.3	15.2	(0.5)	8.5†	127.1	3.8
Asian/Pacific Islander	14.6	(0.8)	7.2†	96.1	13.6	(0.7)	7.0†	104.2	8.1
American Indian/Alaska Native	19.6	(2.1)	12.2†	163.8	16.9	(2.1)	10.2†	152.8	-11.0
Multiple races	13.1	(1.2)	5.7†	76.3	9.8	(1.2)	3.1	46.3	-30.1
Hispanic	38.7	(0.6)	31.3†	420.0	36.8	(0.6)	30.1†	450.9	30.9
Income-to-poverty ratio**									
Both sexes									
Poor, <1.00	18.4	(0.5)	7.4†	66.6	16.6	(0.4)	6.4†	61.9	-4.7
Near poor, 1.00–1.9	15.6	(0.3)	4.6†	41.7	14.7	(0.3)	4.4†	42.9	1.2
Middle income, 2.00–3.9	13.2	(0.2)	2.1†	19.4	12.0	(0.2)	1.7†	16.9	-2.5
High income, ≥4.0	11.0	(0.2)	Ref.	Ref.	10.3	(0.2)	Ref.	Ref.	Ref.
Male									
Poor, <1.00	18.9	(0.6)	7.5†	66.5	17.3	(0.6)	6.5†	60.1	-6.4
Near poor, 1.00–1.9	17.0	(0.5)	5.7†	50.2	16.0	(0.5)	5.2†	48.1	-2.1
Middle income, 2.00–3.9	14.1	(0.3)	2.8†	24.3	12.7	(0.3)	1.9†	17.6	-6.7
High income, ≥4.0	11.3	(0.3)	Ref.	Ref.	10.8	(0.3)	Ref.	Ref.	Ref.
Female									
Poor, <1.00	17.9	(0.5)	7.2†	67.1	15.9	(0.5)	6.2†	63.0	-4.1
Near poor, 1.00–1.9	14.3	(0.3)	3.6†	34.1	13.5	(0.4)	3.7†	37.9	3.8
Middle income, 2.00–3.9	12.3	(0.3)	1.6†	14.9	11.3	(0.3)	1.5†	15.8	0.9
High income, ≥4.0	10.7	(0.2)	Ref.	Ref.	9.8	(0.2)	Ref.	Ref.	Ref.

See table footnotes on the next page.

TABLE 1. (*Continued*) Age-standardized* percentage of adults aged ≥25 years who did not complete high school, by selected characteristics — Integrated Public Use Microdata Series, Current Population Survey, United States, 2009 and 2011

Characteristic	2009				2011				Change in relative difference from 2009 to 2011 (percentage points)
	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	
Disability status									
Both sexes									
Disability	23.3	(0.5)	11.4†	95.5	21.1	(0.5)	9.8†	87.3	-8.3
No disability	11.9	(0.2)	Ref.	Ref.	11.2	(0.1)	Ref.	Ref.	Ref.
Male									
Disability	23.3	(0.8)	10.4†	80.8	21.5	(0.7)	9.5†	78.9	-1.9
No disability	12.9	(0.2)	Ref.	Ref.	12.0	(0.2)	Ref.	Ref.	Ref.
Female									
Disability	23.2	(0.6)	12.2†	111.2	20.6	(0.7)	10.1†	96.3	-14.9
No disability	11.0	(0.2)	Ref.	Ref.	10.5	(0.2)	Ref.	Ref.	Ref.
Place of birth									
All racial/ethnic groups									
United States or U.S. territory	9.6	(0.2)	Ref.	Ref.	8.7	(0.1)	Ref.	Ref.	Ref.
Foreign country	35.6	(0.6)	26.0†	270.0	33.7	(0.6)	24.9†	286.0	16.0
White, non-Hispanic									
United States or U.S. territory	8.0	(0.2)	Ref.	Ref.	7.2	(0.1)	Ref.	Ref.	Ref.
Foreign country	10.6	(0.7)	2.6†	33.1	10.3	(0.7)	3.1†	43.3	10.3
Black, non-Hispanic									
United States or U.S. territory	17.3	(0.5)	Ref.	Ref.	16.1	(0.4)	Ref.	Ref.	Ref.
Foreign country	15.7	(1.3)	-1.6	-9.2	16.3	(1.4)	0.2	1.1	10.3
Asian/Pacific Islander									
United States or U.S. territory	4.7	(1.1)	Ref.	Ref.	4.7	(1.0)	Ref.	Ref.	Ref.
Foreign country	14.2	(0.8)	9.5†	199.8	13.7	(0.7)	9.0†	191.3	-8.5
American Indian/Alaska Native									
United States or U.S. territory	20.1	(1.8)	Ref.	Ref.	19.0	(2.0)	Ref.	Ref.	Ref.
Foreign country	—††	—	NA	NA	20.0	(5.7)	1.0	5.2	NA
Multiple races									
United States or U.S. territory	14.4	(1.2)	Ref.	Ref.	12.3	(1.2)	Ref.	Ref.	Ref.
Foreign country	—	—	NA	NA	—	—	NA	NA	NA
Hispanic									
United States or U.S. territory	22.3	(1.0)	Ref.	Ref.	20.5	(0.9)	Ref.	Ref.	Ref.
Foreign country	50.5	(0.7)	28.1†	125.9	48.2	(0.7)	27.7†	135.3	9.3
World region (country) of birth									
United States	9.8	(0.2)	Ref.	Ref.	8.8	(0.1)	Ref.	Ref.	Ref.
Canada, Europe, Australia, or New Zealand	5.3	(1.0)	-4.5†	-45.9	6.0	(1.3)	-2.8	-32.2	13.7
Mexico, South America, Central America, or Caribbean	57.2	(0.9)	47.4†	485.8	54.9	(0.9)	46.1†	522.9	37.1
Africa or the Middle East	11.6	(2.3)	1.8	18.5	9.1	(2.3)	0.3	2.9	-15.6
Asia or the Pacific Islands	17.3	(1.7)	7.5†	77.3	14.9	(1.6)	6.1†	69.3	-8.0
U.S. census region§§									
Northeast	9.4	(0.4)	Ref.	Ref.	8.7	(0.4)	Ref.	Ref.	Ref.
Midwest	10.7	(0.4)	1.3	13.9	10.2	(0.4)	1.5†	17.4	3.5
South	12.2	(0.4)	2.8†	30.4	11.3	(0.3)	2.6†	29.5	-0.8
West	12.6	(0.6)	3.3†	34.8	11.0	(0.5)	2.3†	26.8	-8.0
Area of residence									
Inside metropolitan area	16.4	(0.4)	1.4†	9.1	15.7	(0.4)	1.4†	9.5	0.4
Outside metropolitan area	15.0	(0.5)	Ref.	Ref.	14.3	(0.5)	Ref.	Ref.	Ref.

Abbreviations: FPL = federal poverty level; NA = not applicable; Ref. = referent; SE = standard error.

* Age standardized to the 2000 U.S. standard population.

† Difference between a group estimate and the estimate for its respective referent group is significant (p<0.05, two-tailed z test with Bonferroni correction for multiple comparisons).

§ Age-specific estimates are not age standardized.

¶ Persons of Hispanic ethnicity might be of any race or combination of races.

** On the basis of the U.S. FPL. FPL was based on U.S. Census Bureau poverty thresholds (available at http://www.census.gov/hhes/www/poverty.html).

†† Estimate is statistically unreliable because relative SE ≥30%.

§§ *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

TABLE 2. Age-standardized* percentage of adults aged 18–24 years who did not complete high school, by selected characteristics — Integrated Public Use Microdata Series, Current Population Survey, United States, 2009 and 2011

Characteristic	2009				2011				Change in relative difference from 2009 to 2011 (percentage points)
	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	
Sex									
Male	22.4	(0.5)	4.6†	25.8	22.4	(0.5)	3.6†	18.9	-6.9
Female	17.8	(0.4)	Ref.	Ref.	18.8	(0.5)	Ref.	Ref.	Ref.
Age group (yrs)§									
Both sexes									
18–19	40.1	(0.7)	28.7†	252.8	43.6	(0.8)	33.1†	314.4	61.6§§
20–24	11.4	(0.4)	Ref.	Ref.	10.5	(0.4)	Ref.	Ref.	Ref.
Male									
18–19	43.9	(1.0)	30.9†	238.9	47.0	(1.1)	35.4†	305.2	66.3
20–24	13.0	(0.5)	Ref.	Ref.	11.6	(0.5)	Ref.	Ref.	Ref.
Female									
18–19	36.2	(1.0)	26.4†	271.3	40.2	(1.1)	30.8†	327.1	55.8
20–24	9.7	(0.4)	Ref.	Ref.	9.4	(0.4)	Ref.	Ref.	Ref.
Race/Ethnicity									
Both sexes									
White, non-Hispanic	16.3	(0.4)	Ref.	Ref.	17.2	(0.5)	Ref.	Ref.	Ref.
Black, non-Hispanic	24.4	(1.1)	8.2†	50.2	24.3	(1.0)	7.2†	41.7	-8.5
Asian/Pacific Islander	13.8	(1.3)	-2.5	-15.3	16.2	(2.0)	-1.0	-5.9	9.4
American Indian/Alaska Native	25.1	(3.2)	8.9	54.4	26.0	(3.7)	8.9	51.7	-2.7
Multiple races	19.9	(2.2)	3.6	22.2	18.8	(2.2)	1.6	9.4	-12.8
Hispanic¶	31.5	(1.0)	15.2†	93.7	29.5	(0.9)	12.4†	72.0	-21.7
Male									
White, non-Hispanic	18.2	(0.6)	Ref.	Ref.	18.4	(0.6)	Ref.	Ref.	Ref.
Black, non-Hispanic	26.7	(1.8)	8.6†	47.2	26.7	(1.5)	8.3†	45.0	-2.2
Asian/Pacific Islander	14.6	(1.8)	-3.6	-19.7	17.1	(2.5)	-1.3	-7.2	12.5
American Indian/Alaska Native	28.6	(4.7)	10.4	57.4	31.0	(5.9)	12.6	68.4	11.0
Multiple races	22.5	(3.1)	4.3	23.6	16.0	(2.5)	-2.4	-13.0	-36.6
Hispanic	35.1	(1.4)	17.0†	93.3	32.0	(1.2)	13.6†	73.8	-19.5
Female									
White, non-Hispanic	14.3	(0.5)	Ref.	Ref.	15.9	(0.6)	Ref.	Ref.	Ref.
Black, non-Hispanic	22.2	(1.3)	7.9†	55.4	22.0	(1.5)	6.1	38.5	-16.9
Asian/Pacific Islander	12.7	(1.6)	-1.6	-11.3	15.2	(2.3)	-0.7	-4.5	6.9
American Indian/Alaska Native	21.9	(4.1)	7.6	53.4	23.2	(5.0)	7.4	46.3	-7.0
Multiple races	17.0	(2.8)	2.7	18.9	21.3	(3.4)	5.4	34.1	15.2
Hispanic	27.6	(1.2)	13.3†	92.8	26.6	(1.1	10.7†	67.4	-25.4
Income-to-poverty ratio**									
Both sexes									
Poor, <1.00	23.7	(1.1)	5.9†	32.9	23.5	(0.9)	4.7†	25.1	-7.8
Near poor, 1.00–1.9	22.8	(0.8)	5.0†	27.8	22.3	(0.9)	3.6†	19.0	-8.7
Middle income, 2.00–3.9	19.8	(0.6)	1.9	10.8	20.4	(0.6)	1.6	8.5	-2.3
High income, ≥4.0	17.9	(0.5)	Ref.	Ref.	18.8	(0.5)	Ref.	Ref.	Ref.
Male									
Poor, <1.00	25.0	(1.4)	5.4†	27.4	24.9	(1.3)	4.4	21.3	-6.1
Near poor, 1.00–1.9	26.0	(1.2)	6.3†	32.0	24.6	(1.3)	4.1†	19.9	-12.1
Middle income, 2.00–3.9	22.5	(0.9)	2.9	14.6	22.0	(0.9)	1.5	7.2	-7.4
High income, ≥4.0	19.7	(0.8)	Ref.	Ref.	20.5	(0.7)	Ref.	Ref.	Ref.
Female									
Poor, <1.00	22.5	(1.4)	6.5†	40.6	22.0	(1.1)	5.0†	29.6	-11.0
Near poor, 1.00–1.9	19.5	(1.0)	3.5†	21.6	20.0	(1.1)	3.0	17.9	-3.7
Middle income, 2.00–3.9	17.0	(0.7)	1.0	6.3	18.6	(0.8)	1.6	9.2	3.0
High income, ≥4.0	16.0	(0.7)	Ref.	Ref.	17.0	(0.7)	Ref.	Ref.	Ref.
Disability status									
Both sexes									
Disability	32.4	(2.0)	12.7†	64.5	35.5	(2.3)	15.4†	76.3	11.8
No disability	19.7	(0.4)	Ref.	Ref.	20.1	(0.4)	Ref.	Ref.	Ref.

See table footnotes on the next page.

TABLE 2. (*Continued*) Age-standardized* percentage of adults aged 18–24 years who did not complete high school, by selected characteristics — Integrated Public Use Microdata Series — Current Population Survey, United States, 2009 and 2011

Characteristic	2009				2011				Change in relative difference from 2009 to 2011 (percentage points)
	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	% who did not complete high school	(SE)	Absolute difference (percentage points)	Relative difference (%)	
Male									
Disability	29.5	(2.4)	7.3†	32.7	38.0	(2.8)	16.1†	73.8	41.1§§
No disability	22.2	(0.5)	Ref.	Ref.	21.8	(0.5)	Ref.	Ref.	Ref.
Female									
Disability	36.0	(3.4)	18.8†	109.4	32.0	(3.3)	13.6†	73.7	-35.7
No disability	17.2	(0.4)	Ref.	Ref.	18.4	(0.5)	Ref.	Ref.	Ref.
Place of birth									
All racial/ethnic groups									
United States or U.S. territory	18.5	(0.4)	Ref.	Ref.	19.1	(0.4)	Ref.	Ref.	Ref.
Foreign country	32.7	(1.4)	14.2†	77.1	31.4	(1.4)	12.0†	63.0	-14.1
White, non-Hispanic									
United States or U.S. territory	16.5	(0.4)	Ref.	Ref.	17.3	(0.5)	Ref.	Ref.	Ref.
Foreign country	13.2	(2.3)	-3.4	-20.3	16.6	(3.2)	-0.7	-4.1	16.2
Black, non-Hispanic									
United States or U.S. territory	24.9	(1.2)	Ref.	Ref.	24.7	(1.1)	Ref.	Ref.	Ref.
Foreign country	22.1	(4.1)	-2.8	-11.4	23.3	(4.4)	-1.4	-5.6	5.7
Asian/Pacific Islander									
United States or U.S. territory	—††	—	Ref.	Ref.	—	—	Ref.	Ref.	Ref.
Foreign country	18.1	(2.3)	NA	NA	22.1	(3.6)	NA	NA	NA
American Indian/Alaska Native									
United States or U.S. territory	24.7	(3.2)	Ref.	Ref.	26.8	(3.9)	Ref.	Ref.	Ref.
Foreign country	0	(0)	-24.7	-100.0	—	—	NA	NA	NA
Multiple races									
United States or U.S. territory	21.1	(2.7)	Ref.	Ref.	20.4	(2.6)	Ref.	Ref.	Ref.
Foreign country	—	—	NA	NA	—	—	NA	NA	NA
Hispanic									
United States or U.S. territory	24.6	(1.5)	Ref.	Ref.	24.5	(1.4)	Ref.	Ref.	Ref.
Foreign country	44.9	(1.9)	20.4†	82.9	40.6	(1.8)	16.0†	65.4	-17.4
World region (country) of birth									
United States	18.4	(0.3)	Ref.	Ref.	19.2	(0.4)	Ref.	Ref.	Ref.
Canada, Europe, Australia, or New Zealand	—	—	NA	NA	—	—	NA	NA	NA
Mexico, South America, Central America, or the Caribbean	46.5	(2.1)	28.1†	153.1	42.5	(2.1)	23.4†	121.9	-31.3
Africa or the Middle East	—	—	NA	NA	30.5	(0)	11.3	58.9	NA
Asia or the Pacific Islands	20.1	(4.0)	1.7	9.3	24.8	(3.8)	5.6	29.2	19.9
U.S. census region¶¶									
Northeast	15.5	(1.1)	Ref.	Ref.	18.0	(1.2)	Ref.	Ref.	Ref.
Midwest	18.6	(0.9)	3.1	20.0	19.2	(0.8)	1.2	6.8	-13.2
South	20.8	(0.9)	5.3†	34.1	21.1	(0.9)	3.1	17.3	-16.8
West	22.6	(1.2)	7.1†	46.0	20.4	(1.0)	2.4	13.4	-32.6
Residence in metropolitan area									
Inside metropolitan area	21.3	(0.8)	0.1	0.3	22.1	(0.7)	-1.3	-5.3	-5.6
Outside metropolitan area	21.3	(1.0)	Ref.	Ref.	23.4	(1.0)	Ref.	Ref.	Ref.

Abbreviations: FPL = federal poverty level; NA = not applicable; Ref. = referent; SE = standard error.

* Age standardized to the 2000 U.S. standard population.

† Difference between a group estimate and the estimate for its respective referent group is significant (p<0.05, two-tailed z test with Bonferroni correction for multiple comparisons).

§ Age-specific estimates are not age standardized.

¶ Persons of Hispanic ethnicity might be of any race or combination of races.

** On the basis of the U.S. FPL. FPL was based on U.S. Census Bureau poverty thresholds (available at http://www.census.gov/hhes/www/poverty.html).

†† Estimate is statistically unreliable because relative SE ≥30%.

§§ Difference between the relative differences in 2011 and 2009 is significant (p<0.05, two-tailed z test with Bonferroni correction for multiple comparisons).

¶¶ *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

similar in men and women. Overall, absolute differences in noncompletion of high school between the referent group (high income) and those who lived in poor (4.7 percentage points) or near-poor families (3.6 percentage points) were significant; however, absolute differences were only significant for men in middle-income families and women in poor families. Significant absolute differences in noncompletion of high school also were found among young adults with a disability (15.4 percentage points); however, unlike men aged ≥25 years, the disparity among younger adult men worsened from 2009 to 2011 by 41.1 percentage points. No temporal change in disability disparity was observed among young adult females (Table 2). In 2011, absolute differences in the age-standardized percentage of persons who did not complete high school among those who were foreign born and U.S. born (referent group) were significant in the total population (12.0 percentage points) and among Hispanics (16.0 percentage points). In addition, absolute differences were only significant between U.S.-born young adults and young adults born in Latin American and Caribbean countries (23.4 percentage points). No significant differences were found by U.S. census region or metropolitan area. No significant changes in the U.S. census region disparities occurred from 2009 to 2011.

In 2011, overall and for men and women, significant absolute differences in the age-standardized percentages of adults in poor families (IPR <1.00) were found among the youngest adults, non-Hispanic blacks, and Hispanics; all groups that had not completed college; and adults with disabilities (Table 3). In 2009 and 2011, disparities in poverty increased with decreasing level of educational attainment, with the greatest disparity experienced by the group with the lowest level of educational attainment. Significant absolute differences in the age-standardized percentages in poor families were found between persons of either sex with a disability and those with no disability (referent group) (men: 3.2 percentage points; women 3.5 percentage points). In 2009 and 2011, the absolute differences between persons who were foreign born and U.S. born (referent group) in age-standardized percentages of adults in poor families were significant in the total population (1.7 and 1.6 percentage points, respectively) but not by race/ethnicity. In addition, significant absolute differences also were found between adults born in Latin American and Caribbean countries and those born in the United States. In 2009 and 2011, significant absolute differences in the percentages of adults who lived in poverty were found between residents of the U.S. census regions of the West, South, or Midwest and the referent group (Northeast region) but not between residents who lived inside compared with outside metropolitan areas. From 2009 to 2011, no statistically significant changes in the relative differences in poverty by any characteristic were found (Table 3).

Discussion

The findings in this report indicate that racial/ethnic, socioeconomic, and geographic disparities in noncompletion of high school and poverty persist in the U.S. adult population; little evidence of improvement from 2009 to 2011 was identified. Within each year studied to date, significant absolute and relative differences were found; however, between years, these differences were not statistically different. The pattern of disparities is consistent with sociodemographic and geographic differences reported by several national surveys (*6–8,16,21–25*). The findings also reveal that young racial/ethnic, foreign-born, and poor adults might be especially vulnerable to early onset and progression of poor health as evidenced by marked disparities in noncompletion of high school among these subgroups.

Educational attainment and income provide psychosocial and material resources that protect against exposure to health risks in early and adult life (*1–3*). Persons with low levels of education and income generally experience increased rates of mortality, morbidity, and risk-taking behaviors and decreased access to and quality of health care (*1,6–8*). This report confirms that the lowest levels of education and income are most common and persistent among subgroups that systematically exhibit the poorest health. For example, two out of five Hispanics and nearly one out of five non-Hispanic blacks or American Indian/Alaska Natives had not completed high school, and at least one out of 10 of these racial/ethnic groups had incomes less than the official poverty threshold. However, substantial empirical evidence from the United States and elsewhere consistently shows no thresholds in the relationships between education or income and health. Among children and adults in the overall population and within racial/ethnic groups, rates of mortality, morbidity, and poor health behaviors decrease in a continuous and graded manner with increasing levels of education and income (*6,7,23–25*).

Health-promotion efforts have emphasized racial/ethnic disparities in health as part of an approach to risk reduction that focuses on groups at high risk, with little or no improvement in disparities (*24,26*). The patterns described in this report suggest that interventions and policies that are also designed to take account of the influence of educational attainment, family income, and other socioeconomic conditions on health risks in the entire population might prove to be more effective in reducing health disparities (*27,28*).

TABLE 3. Age-standardized* percentage of adults aged ≥18 years with incomes less than the federal poverty level, by selected characteristics — Integrated Public Use Microdata Series — Current Population Survey, United States, 2009 and 2011

	2009				2011				
Characteristic	% with IPR <1.00	(SE)	Absolute difference (percentage points)	Relative difference (%)	Percentage with IPR <1.00	(SE)	Absolute difference (percentage points)	Relative difference (%)	Change in relative difference from 2009 to 2011 (percentage points)
Sex									
Male	11.4	(0.2)	Ref.	Ref.	13.2	(0.2)	Ref.	Ref.	Ref.
Female	11.9	(0.1)	0.5†	4.0	13.5	(0.2)	0.4	2.9	-1.1
Age group (yrs)§									
Both sexes									
18–24	12.8	(0.3)	1.9†	17.1	15.1	(0.4)	2.4†	18.6	1.5
25–44	11.9	(0.2)	0.9	8.5	13.5	(0.2)	0.8	6.2	-2.3
45–64	11.0	(0.2)	Ref.	Ref.	12.8	(0.2)	Ref.	Ref.	—
65–79	11.1	(0.3)	0.1	1.1	12.5	(0.3)	-0.2	-1.6	-2.7
≥80	12.1	(0.6)	1.1	10.0	12.8	(0.5)	0	0	-10
Male									
18–24	12.3	(0.4)	1.7†	15.8	14.8	(0.5)	2.1†	16.2	0.4
25–44	11.7	(0.2)	1.1†	10.2	13.5	(0.3)	0.8	6.1	-4.1
45–64	10.6	(0.3)	Ref.	Ref.	12.7	(0.3)	Ref.	Ref.	Ref.
65–79	11.1	(0.5)	0.4	4.2	11.6	(0.4)	-1.1	-8.7	-12.9
≥80	11.4	(0.9)	0.8	7.5	13.0	(0.9)	0.3	2.1	-5.4
Female									
18–24	13.3	(0.4)	2.1†	18.6	15.5	(0.5)	2.7†	21	2.4
25–44	12.0	(0.2)	0.8	6.9	13.6	(0.2)	0.8	6.3	-0.6
45–64	11.2	(0.2)	Ref.	Ref.	12.8	(0.3)	Ref.	Ref.	Ref.
65–79	11.1	(0.4)	-0.2	-1.7	13.3	(0.4)	0.5	4.0	5.7
≥80	12.4	(0.6)	1.2	10.4	12.6	(0.7)	-0.2	-1.5	-11.9
Race/Ethnicity									
Both sexes									
White, non-Hispanic	10.7	(0.2)	Ref.	Ref.	12.4	(0.2)	Ref.	Ref.	Ref.
Black, non-Hispanic	14.4	(0.4)	3.7†	34.8	16.4	(0.4)	4.1†	32.8	-2.0
Asian/Pacific Islander	10.7	(0.5)	0	0.1	11.5	(0.5)	-0.8	-6.8	-6.9
American Indian/Alaska Native	15.3	(1.9)	4.7	43.6	18.9	(3.5)	6.6	53.4	9.7
Multiple races	11.2	(0.9)	0.5	4.6	12.4	(1.0)	0	0.2	-4.4
Hispanic¶	14.5	(0.4)	3.9†	36.3	16.0	(0.4)	3.7†	29.7	-6.6
Male									
White, non-Hispanic	10.5	(0.2)	Ref.	Ref.	12.2	(0.2)	Ref.	Ref.	Ref.
Black, non-Hispanic	14.0	(0.5)	3.5†	33.4	15.6	(0.5)	3.4†	28.1	-5.3
Asian/Pacific Islander	10.8	(0.6)	0.3	3.0	12.0	(0.7)	-0.2	-1.6	-4.6
American Indian/Alaska Native	12.9	(1.9)	2.4	22.5	18.6	(3.1)	6.4	52.1	29.6
Multiple races	9.4	(1.2)	-1.1	-10.3	12.6	(1.4)	0.4	3.3	13.6
Hispanic	14.3	(0.5)	3.8†	36.2	15.8	(0.5)	3.5†	29.0	-7.2
Female									
White, non-Hispanic	10.8	(0.2)	Ref.	Ref.	12.5	(0.2)	Ref.	Ref.	Ref.
Black, non-Hispanic	14.7	(0.5)	3.9†	35.6	17.0	(0.6)	4.5†	36.1	0.5
Asian/Pacific Islander	10.5	(0.6)	-0.3	-3.0	11.1	(0.5)	-1.4	-11.1	-8.1
American Indian/Alaska Native	17.7	(2.4)	6.9	63.8	19.3	(4.3)	6.8	54.2	-9.5
Multiple races	12.6	(1.2)	1.8	16.9	12.1	(1.2)	-0.4	-3.4	-20.4
Hispanic	14.9	(0.4)	4.1†	37.6	16.2	(0.4)	3.8†	30.1	-7.5
Educational attainment									
Both sexes									
Less than high school	15.8	(0.4)	5.6†	55.0	17.6	(0.4)	6.1†	53.1	-1.8
High school graduate or equivalent	11.8	(0.2)	1.7†	16.2	13.8	(0.3)	2.3†	20.3	4.2
Some college	10.9	(0.2)	0.7	6.8	12.9	(0.3)	1.4†	12.5	5.8
College graduate	10.2	(0.2)	Ref.	Ref.	11.5	(0.3)	Ref.	Ref.	Ref.
Male									
Less than high school	15.1	(0.5)	4.6†	43.5	17.1	(0.5)	5.6†	48.4	4.9
High school graduate or equivalent	11.2	(0.3)	0.7	7.1	13.2	(0.3)	1.6†	14.1	7.1
Some college	10.8	(0.3)	0.3	2.5	12.8	(0.3)	1.3†	11.5	9.0
College graduate	10.5	(0.3)	Ref.	Ref.	11.5	(0.4)	Ref.	Ref.	Ref.
Female									
Less than high school	16.6	(0.5)	6.7†	66.9	18.0	(0.5)	6.7†	58.4	-8.5
High school graduate or equivalent	12.5	(0.3)	2.6†	26.0	14.6	(0.3)	3.2†	27.6	1.6
Some college	11	(0.2)	1.0†	10.5	13.0	(0.3)	1.6†	13.7	3.3
College graduate	10	(0.3)	Ref.	Ref.	11.5	(0.3)	Ref.	Ref.	Ref.

See table footnotes on the next page.

TABLE 3. (*Continued*) Age-standardized* percentage of adults aged ≥18 years with incomes less than the federal poverty level, by selected characteristics — Integrated Public Use Microdata Series — Current Population Survey, United States, 2009 and 2011

	2009				2011				
Characteristic	% with IPR <1.00	(SE)	Absolute difference (percentage points)	Relative difference (%)	Percentage with IPR <1.00	(SE)	Absolute difference (percentage points)	Relative difference (%)	Change in relative difference from 2009 to 2011 (percentage points)
Disability status									
Both sexes									
Disability	14.7	(0.5)	3.4†	29.8	16.4	(0.6)	3.4†	25.8	-4.0
No disability	11.4	(0.1)	Ref.	Ref.	13.0	(0.2)	Ref.	Ref.	Ref.
Male									
Disability	14.1	(0.7)	2.9†	26.0	16.1	(0.7)	3.2†	24.9	-1.1
No disability	11.2	(0.2)	Ref.	Ref.	12.9	(0.2)	Ref.	Ref.	Ref.
Female									
Disability	15.4	(0.7)	3.8†	33.2	16.7	(0.8)	3.5†	26.8	-6.4
No disability	11.5	(0.2)	Ref.	Ref.	13.2	(0.2)	Ref.	Ref.	Ref.
Place of birth									
All racial/ethnic groups									
United States or U.S. territory	11.4	(0.2)	Ref.	Ref.	13.1	(0.2)	Ref.	Ref.	Ref.
Foreign country	13	(0.3)	1.7†	15.1	14.6	(0.3)	1.6†	12.4	-2.7
White, non-Hispanic									
United States or U.S. territory	10.6	(0.2)	Ref.	Ref.	12.3	(0.2)	Ref.	Ref.	Ref.
Foreign country	11.1	(0.6)	0.5	4.7	13.4	(0.7)	1.1	8.7	3.8
Black, non-Hispanic									
United States or U.S. territory	14.4	(0.4)	Ref.	Ref.	16.5	(0.5)	Ref.	Ref.	Ref.
Foreign country	13.3	(1.0)	-1.1	-7.8	16.8	(1.3)	0.3	1.5	9.3
Asian/Pacific Islander									
United States or U.S. territory	10.2	(1.4)	Ref.	Ref.	12.6	(1.8)	Ref.	Ref.	Ref.
Foreign country	10.8	(0.6)	0.7	6.7	12.0	(0.6)	-0.6	-4.8	-11.5
American Indian/Alaska Native									
United States or U.S. territory	15.4	(1.9)	Ref.	Ref.	19.7	(3.7)	Ref.	Ref.	Ref.
Foreign country	—**	—	NA	NA	—	—	NA	NA	NA
Multiple races									
United States or U.S. territory	11.8	(1.0)	Ref.	Ref.	12.9	(1.1)	Ref.	Ref.	Ref.
Foreign country	—	—	NA	NA	—	—	NA	NA	NA
Hispanic									
United States or U.S. territory	13.7	(0.7)	Ref.	Ref.	16.0	(0.8)	Ref.	Ref.	Ref.
Foreign country	14.8	(0.5)	1.1	7.8	16.3	(0.5)	0.2	1.5	-6.3
World region (country) of birth									
United States	11.4	(0.1)	Ref.	Ref.	13.1	(0.2)	Ref.	Ref.	Ref.
Canada, Europe, Australia, or New Zealand	12.2	(1.8)	0.8	7.0	11.7	(1.7)	-1.4	-10.6	-17.6
Mexico, South America, Central America, or the Caribbean	15.6	(0.6)	4.2†	37.0	16.5	(0.6)	3.4†	26.0	-11.0
Africa or the Middle East	7.1	(1.2)	-4.3	-37.5	14.0	(3.1)	0.9	6.6	44.1
Asia or the Pacific Islands	8.9	(1.1)	-2.4	-21.4	12.6	(1.3)	-0.5	-4.1	17.3
U.S. census region††									
Northeast	9.4	(0.5)	Ref.	Ref.	9.8	(0.5)	Ref.	Ref.	Ref.
Midwest	11.1	(0.4)	1.7†	18.2	12.7	(0.4)	2.9†	29.1	10.9
South	11.3	(0.3)	1.9†	20.3	13.8	(0.4)	4.0†	40.8	20.5
West	11.7	(0.5)	2.3†	24.5	12.9	(0.6)	3.1†	31.6	7.1
Residence in metropolitan area									
Inside metropolitan area	12.7	(0.3)	0.2	1.2	14.4	(0.3)	0.4	2.5	1.3
Outside metropolitan area	12.6	(0.4)	Ref.	Ref.	14.1	(0.4)	Ref.	Ref.	Ref.

Abbreviations: IPR = income-to-poverty ratio; NA = not applicable; Ref. = referent; SE = standard error.

* Age standardized to the 2000 U.S. standard population.

† Difference between a group estimate and the estimate for its respective referent group is significant.

§ Age-specific estimates are not age standardized.

¶ Persons of Hispanic ethnicity might be of any race or combination of races.

** Estimate is statistically unreliable because relative SE ≥30%.

†† *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Limitations

The findings in this report are subject to at least two limitations. First, all data were self-reported and therefore are subject to recall and social desirability bias. Second, CDC used cross-sectional data for the analyses; therefore, no causal inferences can be drawn from the findings. The limited findings for disparities in place of birth among racial/ethnic groups might reflect small sample sizes in single years of data, as suggested by unstable estimates in the foreign-born strata of several racial/ethnic groups.

Conclusion

The U.S. Department of Education's Institute of Education Sciences recommends effective evidence-based interventions to prevent or reduce the dropout rates among middle school and high school students (*29*). The U.S. Task Force on Community Preventive Services recommends interventions that promote healthy social environments for low-income children and families and to reduce risk-taking behaviors among adolescents (*30)*. Since 2011, HHS has released several complementary initiatives to eliminate health disparities (*26*,*31*). The 2011 HHS action plan focuses specifically on reduction of racial/ethnic disparities but includes education and social and economic conditions among its major strategic areas (*26*). The 2012 National Prevention Council action plan will implement strategies of the National Prevention Strategy by targeting communities at greatest risk for health disparities, disparities in access to care, and the capacity of the prevention workforce; research to identify effective strategies; and standardization and collection of data to better identify and address disparities. CDC proposes increasing its efforts to eliminate health disparities by focusing on surveillance, analysis, and reporting of disparities and identifying and applying evidence-based strategies to achieve health equity (*31)*. Integration of these efforts across federal departments; among federal, state, and local levels of government; and with nongovernment organizations could increase understanding of how socioeconomic disparities in health arise and persist and provide information on how best to design effective interventions for populationwide and targeted approaches.

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Access to Healthier Food Retailers — United States, 2011

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Introduction

According to the *Dietary Guidelines for Americans,* persons in the United States aged ≥2 years should increase their intake of certain nutrient-rich foods, including fruits and vegetables (*1*). Fruits and vegetables contribute important nutrients that are underconsumed in the United States (*1*). Higher intake of fruits and vegetables might reduce the risk for many chronic diseases including heart disease (*2*), stroke (*3*), diabetes (*4*), and some types of cancer (*5*). In addition, replacing high-calorie foods with fruits and vegetables can aid in weight management (*1*,*6*,*7*). However, most persons in the United States do not consume the recommended amounts of fruits and vegetables and other healthier food groups (e.g., whole grains or fat-free or low-fat dairy foods) (*1*,*8*).

Persons who live in neighborhoods with better access to retailers such as supermarkets and large grocery stores that typically offer fruits and vegetables and other healthy foods might have healthier diets (*9*,*10*). However, in 2009, the U.S. Department of Agriculture estimated that 40% of all U.S. households do not have easy access (i.e., access within 1 mile of residence) to supermarkets and large grocery stores (*11*). Although few national studies examining disparities in access exist (*11*–*13*), research suggests that access is often lower among residents of rural, lower-income, and predominantly minority communities than among residents of other communities (*9*,*12*). Because of positive associations between the retail environment and diet (*9*,*10*), a *Healthy People 2020* developmental objective (*14*) is to increase the percentage of persons in the United States who have access to a retailer that sells the various foods recommended in the *Dietary Guidelines for Americans*, including fruits and vegetables, whole-grain foods, and low-fat milk, which are referred to as healthier foods in this report. Improving access to healthier food retailers has also been adopted as a promising strategy to improve dietary quality by philanthropic and governmental entities (*11*,*15*,*16*).

Access to healthier foods includes not only proximity to retail locations that offer these types of foods but also the variety, cost, and quality of foods (*17*). However, in this report and in most other studies, access refers to the proximity of food retailers because of the inherent challenges and resource needs in measuring variety, cost and quality of food. Access to supermarkets, supercenters, and large grocery stores is frequently measured because these types of stores tend to offer a wider selection and larger quantity of fruits and vegetables and other healthy foods at affordable prices than other retailers, such as convenience stores and small grocery stores (*18*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*19*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*20*). This report provides information concerning disparities in access to healthier food retailers, a topic that was not discussed in the 2011 CHDIR (*19*). The purposes of this report on access to healthier food retailers are to discuss and raise awareness of differences in the characteristics of areas with access to healthier food retailers across census tracts and to prompt actions to reduce disparities.

Methods

To estimate access to healthier food retailers across the United States and regionally (i.e., places persons live and might shop), CDC analyzed 2011 data from various sources using census tracts as the unit of analysis. In this report, the term access refers to potential access to healthier food retailers, which is where consumers can shop, rather than actual access, which is where consumers actually do shop. Access to healthier food retailers by area demographics of the census tracts also was compared. Access to a retailer was estimated by calculating the percentage of census tracts that did not have at least one healthier food retailer located within the tract or within ½ mile of the tract boundary (*21*). Census tracts are small, relatively permanent subdivisions of counties designed to be similar in population characteristics, economic status, and living conditions. The median tract area size and population was 1.9 square miles and 4,022 people.

A list of 54,666 healthier food retailers was developed from two national directories of retail food stores. One directory was purchased in June 2011 from the commercial data provider InfoUSA (available at http://www.infousa.com).

The other directory was from a list of authorized stores that accept Supplemental Nutrition Assistance Program (SNAP) benefits as of January 2012 (available at http://www.snapretailerlocator.com). Two independent data sources were used to reduce inaccuracies in store operational status and store misclassification (*22*–*28*). Evidence suggests that secondary data might only capture 55%–68% of food outlets that truly exist in an area (*24*,*26*,*27*), and store misclassification is common (*24*).

Healthier food retailers are defined as supermarkets, large grocery stores, supercenters and warehouse clubs, and fruit and vegetable specialty stores (*21*). These retailers were identified from the InfoUSA directory by using several criteria, including 2007 North American Industry Classification System (NAICS) codes (available at http://www.census.gov/eos/www/naics/), annual sales volume, annual employees on payroll, and chain store name lists. Large grocery stores and supermarkets were defined as retailers with the appropriate NAICS code (NAICS 445110: grocery stores/supermarkets) with either ≥10 annual payroll employees or ≥$2 million in annual sales or whose company name matches a chain name list (*21*). This list of 228 national and regional supermarket, supercenter, and warehouse club chain stores was developed from 2000 and 2005 data from the commercial data provider Nielsen TDLinx (*29*) and 2011 InfoUSA data and includes stores that have at least eight to 10 locations nationwide and were verified as having a full line of groceries. Supercenters and warehouse clubs were defined as retailers with the appropriate NAICS codes (NAICS 445, 452112, 452910: supercenters and warehouse clubs) or included if their company name matched the national chain name list. Fruit and vegetable specialty food stores were defined as retailers with the appropriate NAICS codes (NAICS 445230: fruit and vegetable specialty food stores).

The second directory of stores included retailers who had actively processed SNAP benefits as recently as January 3, 2012, and had store classifications through the SNAP application process consistent with the definition of healthier food retailers as described in this report (*30*). The healthier food retailers included from SNAP were those categorized as supermarkets, supercenters/warehouse clubs, large grocery stores, or fruit and vegetable specialty stores (*30*).

To estimate national and regional percentages of census tracts that had at least one healthier food retailer, stores from the two directories were assigned to one or more tracts if they were located within the tract's boundaries or within ½ mile of the boundary using geocodes provided by InfoUSA or SNAP and ArcGIS 10 (available at http://www.esri.com/software/arcgis/index.html). Boundaries for the 72,531 census tracts in the 50 U.S. states and the District of Columbia (DC) with a population of >0 were obtained from 2010 U.S. census TIGER/Line shapefiles (available at http://www.census.gov/geo/maps-data/data/tiger-line.html). Sixty-three percent (n = 22,359) of the healthier food retailers identified in InfoUSA were also in SNAP. Name, address, location, and store classification type matched in these two sources for this subset of stores (referred to as verified retailers). The remaining 32,307 stores appeared only in one data source (7,549 InfoUSA stores and 19,418 SNAP stores) or appeared in both but store classification types were inconsistent (n = 5,340). Previous evidence indicates that if a store is open, the probability that a secondary data source lists it as operational ranges from 55% to 89% (*24*,*27*,*31*,*32*). The use of secondary data to accurately classify store type (e.g., grocery store, supermarket, or supercenter) has been estimated to be 49%–85% (*24*). One study estimates that if a store is in the InfoUSA list, the likelihood that the store is operational and correctly classified as a supermarket, grocery store, or specialty store is 34.4%–44.5% (*32*). Because the operational status, store presence, and store type of the retailers that only appeared in one directory could not be verified by a second data source, tracts that only contained two or more of these stores were counted as having a healthier food retailer. If a tract has two or more unverified stores, evidence indicates that it is reasonable to assume that at least one is operational and appropriately classified (*24*,*27*). Nine percent of tracts (n = 6,563) were counted as having a healthier food retailer because two or more unverified stores were present. Twelve percent of tracts (n = 8,343) had only one unverified store from either source and therefore were counted as not having any verifiable healthier food retailers. Nineteen percent of tracts did not have stores from either directory present (n = 13,761 tracts).

To estimate percentages of access to healthier food retailers by area demographics, CDC obtained demographic information on educational attainment and per capita income at the census tract level from the 2006–2010 American Community Survey. Information on age and race/ethnicity were obtained from the 2010 U.S. census. Tracts were categorized into two groups (low and high) for each demographic characteristic by dichotomizing at the mean of the distribution. A census tract was considered urban if the geographic centroid of that tract was located in an area designated by the 2010 U.S. census as an urbanized area or urban cluster (available at http://www.census.gov/geo/www/ua/2010urbanruralclass.html). All other tracts were classified as rural. Median tract size and population density for urban tracts was 1 square mile and 3,852 persons per square mile versus 42 square miles and 100 persons per square mile in rural tracts.

Comparisons of percentages by demographics among national and U.S. Census regions (available at http://www.census.gov/geo/maps-data/maps/pdfs/reference/us_regdiv.pdf) were assessed using chi-square tests, with significance set at $p<0.05$.

Odds ratios and 95% confidence intervals (CIs) were estimated using logistic regression to characterize national and region-specific odds of not having access to a healthier food retailer by each demographic characteristic separately. Significant differences in access to healthier food retailers described in this report are those in which the 95% CIs do not include 1.0; thus, the odds of access are significantly higher or lower. Tracts that had either no sample observations or too few sample observations for computing demographic estimates were excluded (n = 404; 0.6%).

Disparities were measured as the deviations from a referent category rate or prevalence. Referent groups in all analyses were as follows: tracts with a low proportion of youths (≤23.4% of the population aged ≤18 years), a low proportion of seniors (≤13.6% of the population aged ≥65 years), a high per capita income (>$27,269 per capita income adjusted to 2010 dollars), a high proportion of non-Hispanic whites (>63.9% non-Hispanic white population), and a high proportion of college-educated persons (>27.0% of the population with a college degree or higher). Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group.

Results

In 2011, 30.3% of census tracts did not have at least one healthier food retailer within the tract or within ½ mile of tract boundaries. This represents 83.6 million persons, representing approximately 27% of the 2010 continental U.S. population. The percentage of census tracts without at least one healthier food retailer ranged from 24.1% in the West to 36.6% in the Midwest. Overall, access to healthier food retailers varied by each of the demographic characteristics examined, although these disparities were not always consistent by region (Tables 1, 2, and 3). Persons in rural census tracts were approximately 4 times as likely to lack access to a healthier food retailer than persons in urban tracts. This pattern was consistent across regions. Sensitivity analyses using national models stratified by urban status found similar relationships only for race/ethnicity. Other associations were mixed. For example, persons in urban areas with a youth population of >23.4% had a higher odds of lacking access than those in rural areas with the same proportion of youth. Education was significantly associated with access in rural areas but not in urban areas.

Overall, tracts where seniors comprised >13.6% of the population were 1.3 times as likely not to have a healthier food retailer than tracts with a lower proportion of seniors, a pattern that was similar across regions. Nationwide, tracts with <64% of non-Hispanic whites were about half as likely to lack access to a healthier food retailer than tracts with a higher percentage of non-Hispanic whites. This pattern was also similar across regions, with up to an approximately 75% reduction in the odds of no access among tracts in the Northeast with a low versus high percentage of non-Hispanic whites.

Other associations were not as consistent across regions. Nationwide, persons in tracts with an income of ≤$27,269 were 1.2 times as likely to lack access to a healthier food retailer than tracts with higher income. This association differed by region, with no association in the Midwest and a stronger association in the South. However, in the Northeast and West, persons in low-income tracts had a lower odds of lacking access to a healthier food retailer (OR: 0.91 [95% CI: 0.85–0.98]) and 0.88 [95% CI: 0.82–0.94], respectively). Similarly, nationwide, persons in tracts where ≤27.0% had a college education were significantly more likely to lack access to a healthier food retailer than persons in a tract with a higher proportion of college-educated persons; the association was not significant in the Northeast and West.

Nationwide, persons living in tracts where youths comprised >23.4% of the population had slightly higher odds of lacking access to a healthier food retailer than persons living in tracts with low proportions of youths (OR: 1.06 [95% CI: 1.03–1.09]). Regionally, persons living in tracts in the Midwest with a higher proportion of youths were 1.2 times as likely to lack access as persons in tracts with a low proportion of youths, with no additional associations by region.

TABLE 1. Percentage of census tracts* without at least one healthier food retailer within the tract or within ½ mile of the tract, by geographic region† — United States, 2011

	United States	Northeast	Midwest	South	West
Total no. of tracts	**72,127**	**13,333**	**16,924**	**25,948**	**15,922**
Tracts without at least one healthier food retailer (%)	30.3	27.3	36.6	31.6	24.1

* N = 72,531 census tracts in the 50 U.S. states and the District of Columbia per the 2010 U.S. census. A total of 404 (0.6%) census tracts were excluded because either no sample observations or too few sample observations were available to calculate demographic estimates.

† *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Discussion

The analyses in this report reveal that persons in 30.3% of census tracts in the U.S. do not have access to at least one healthier food retailer. The most substantial disparities were associated with urbanization; persons in rural tracts were four times as likely to lack access than persons in more urban tracts. Persons living in tracts with a high percentage of non-Hispanic whites and those with a high percentage of seniors also had consistently worse access across regions. Access to healthier food retailers among youths and by income and education varied by region. Some of the findings in this study are similar to those of other national studies, including those that assess urban and rural areas, whereas other findings, such as those that assess access to food retailers according to income, are not consistent with previous studies (*11*,*12*). However, findings related to race/ethnicity and access vary substantially among studies. One national study found no differential access to healthy food retailers among racial/ethnic groups (*11*), whereas another national study found a lack of access in minority neighborhoods (*12*). After controlling for demographic characteristics, one study found fewer chain supermarkets in non-Hispanic black neighborhoods than in non-Hispanic white neighborhoods and fewer chain supermarkets in Hispanic neighborhoods than in non-Hispanic white neighborhoods. However, non-Hispanic black neighborhoods were found to have more nonchain supermarkets and grocery stores than white neighborhoods (*12*). The definition of healthier food retailers in this particular study was chain vs. nonchain supermarkets. This distinction was used because chain supermarkets tend to have more healthy, affordable foods than nonchain supermarkets. CDC conducted a sensitivity analysis of the data in this report to explore access to chain supermarkets only among tracts with predominantly (>50%) non-Hispanic black residents compared with predominantly non-Hispanic white residents, adjusting for region and urbanization. This sensitivity analysis revealed that access to chain supermarkets was lower in census tracts with predominantly non-Hispanic black residents than in tracts with predominantly non-Hispanic white residents, results that are similar to those of another study (*12*).

TABLE 2. Percentage of census tracts* without at least one healthier food retailer within the tract or within ½ mile of the tract, by census tract demographic characteristics — United States, 2011

Demographic characteristics†	%	Absolute difference (percentage points)	OR§	(95% CI)§
Urbanization				
Rural	51.5	30.9	4.10	(3.96–4.24)
Urban¶	20.6	Ref.	—	—
Youths aged ≤18 yrs (%)				
High: >23.4% of population	30.9	1.2	1.06	(1.03–1.09)
Low: ≤23.4% of population	29.7	Ref.	—	—
Adults aged ≥65 yrs (%)				
High: >13.6% of population	33.6	6.0	1.33	(1.29–1.37)
Low: ≤13.6% of population	27.6	Ref.	—	—
Whites, non-Hispanic (%)				
Low: ≤63.9% of population	21.2	15.0	0.48	(0.46–0.49)
High: >63.9% of population	36.2	Ref.	—	—
Per capita income in 2010 dollars (%)				
Low: ≤$27,269	31.4	2.9	1.15	(1.11–1.18)
High: >$27,269	28.5	Ref.	—	—
Persons with college degree (%)				
Low: ≤27.0% of population	33.3	7.5	1.43	(1.38–1.48)
High: >27.0% of population	25.8	Ref.	—	—

Abbreviations: 95% CI = 95% confidence interval; OR = odds ratio; Ref. = referent.

* N = 72,531 census tracts in the 50 U.S. states and the District of Columbia per the 2010 U.S. census. A total of 404 (0.6%) were excluded because either no or too few sample observations were available to calculate demographic estimates.

† Tracts were categorized into low and high groups for each demographic characteristic by dichotomizing at the mean of the distribution.

§ ORs and 95% CIs were estimated using logistic regression.

¶ A census tract was considered urban if the centroid of that tract was located in a 2010 U.S. census–designated urbanized area or urban cluster. All other tracts were considered rural.

Limitations

The findings in this report are subject to at least four limitations. First, the estimates of access to food retailers reflect potential access, which indicates retailers where consumers are able to shop, but do not reflect actual access, which is where consumers actually decide to shop, or other aspects of access, such as affordability, selection, and quality of foods within stores or modes of transportation to stores. Neighborhoods identified as not having at least one healthier food retailer might still have access to healthier foods if their local convenience stores and corner stores provide a wide selection and adequate quantity of affordable produce and other items. Although some studies have shown these types of retailers typically do not stock healthier foods (*9*,*18*), others have reported improved food selection because of recent changes implemented in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) that require that healthy foods be stocked at stores that accept vouchers (*33*). However, because no systematic way exists at a national level to identify small retailers offering healthier foods, they are not counted as a healthier food retailer. In addition, although residents might have additional access to produce in their neighborhoods through farmers markets and farm stands, these venues are not included in this analysis. Second, only

TABLE 3. Percentage of census tracts* without at least one healthier food retailer within the tract or within ½ mile of the tract, by census tract demographic characteristics and region†— United States, 2011

Demographic characteristics§	No. of tracts	Northeast %	Northeast Absolute difference (percentage points)	Northeast OR¶	Northeast (95% CI)¶	Midwest %	Midwest Absolute difference (percentage points)	Midwest OR	Midwest (95% CI)	South %	South Absolute difference (percentage points)	South OR	South (95% CI)	West %	West Absolute difference (percentage points)	West OR	West (95% CI)
Urbanization																	
Rural	11,675	52.1	32.2	4.37	(4.01–4.76)	53.4	26.4	3.10	(2.90–3.31)	50.6	30.5	4.06	(3.84–4.29)	50.3	34.1	5.26	(4.85–5.70)
Urban**,††	10,186	19.9	Ref.	—	—	27.0	Ref.	—	—	20.1	Ref.	—	—	16.2	Ref.	—	—
Youths aged ≤18 yrs (%)																	
High: >23.4% of population	11,535	26.7	0.9	0.95	(0.88–1.03)	38.4	3.9	1.18	(1.11–1.26)	31.8	0.4	1.02	(0.97–1.07)	24.1	0.1	1.00	(0.93–1.08)
Low: ≤23.4% of population††	10,326	27.6	Ref.	—	—	34.5	Ref.	—	—	31.4	Ref.	—	—	24	Ref.	—	—
Adults aged ≥65 yrs (%)																	
High: <13.6% of population	10,879	30.8	7.2	1.44	(1.33–1.56)	38.2	3.2	1.15	(1.08–1.22)	34.4	5.1	1.27	(1.20–1.34)	28.5	6.8	1.44	(1.33–1.55)
Low: ≤13.6% of population††	10,982	23.6	Ref.	—	—	35..0	Ref.	—	—	29.3	Ref.	—	—	21.7	Ref.	—	—
Whites, non-Hispanic (%)																	
Low: ≤63.9% of population	6,029	11.3	23.6	0.24	(0.22–0.26)	27.7	11.4	0.60	(0.55–0.65)	25.2	11.7	0.58	(0.55–0.61)	18.0	13.2	0.48	(0.45–0.52)
High: >63.9% of population††	15,832	34.9	Ref.	—	—	39.1	Ref.	—	—	36.9	Ref.	—	—	31.2	Ref.	—	—
Per capita income in 2010 dollars (%)																	
Low: ≤$27,269 of population	13,990	26.4	1.8	0.91	(0.85–0.98)	37.5	2.7	1.13	(1.05–1.20)	33.6	6.2	1.34	(1.27–1.42)	23.0	2.4	0.88	(0.82–0.94)
High: >$27,269 of population††	7,871	28.2	Ref.	—	—	34.8	Ref.	—	—	27.4	Ref.	—	—	25.4	Ref.	—	—
Persons with college degree (%)																	
Low: ≤27.0% of population	14,471	27.8	1.1	1.05	(0.98–1.14)	40.0	9.9	1.55	(1.45–1.66)	35.5	11.2	1.72	(1.62–1.82)	24.5	0.9	1.05	(0.98–1.13)
High: >27.0% of population††	7390	26.7	Ref.	—	—	30.1	Ref.	—	—	24.3	Ref.	—	—	23.6	Ref.	—	—

Abbreviations: 95% CI = 95% confidence interval; OR= odds ratio; Ref. = referent.

* N = 72,531 census tracts in the 50 U.S. states and the District of Columbia per the 2010 U.S. census. A total of 404 (0.6%) were excluded because either no or too few sample observations were available to calculate demographic estimates.

† *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

§ Tracts were categorized into low and high groups for each demographic characteristic by dichotomizing at the mean of the distribution.

¶ ORs and 95% CIs were estimated using logistic regression.

** A census tract was considered urban if the centroid of that tract was located in a 2010 U.S. census designated urbanized area or urban cluster. All other tracts were considered rural.

†† Significant difference in percentage across regions using chi-square tests (p<0.001)

tracts that had at least one store that was verified by two independent data sources (60% tracts) or at least two stores that appeared in either directory of stores (9% of tracts) were counted as having a healthier food retailer. Not including tracts with only a single store listed in only one source might have overestimated lack of access if that one store was operational and appropriately classified. A sensitivity analysis showed that demographic estimates using stores identified in either source (not just those that were verified by two sources and those where two or more unverified stores were present) were similar to results shown in this report, with the exception of urbanization. In general, odds ratios were attenuated, although the direction of the associations remained unchanged. Third, only secondary data were available for this national and regional analysis. Secondary data sources have been show to misclassify store type and operational status and both undercount and overcount stores in comparison with direct field assessments (*22–28*). However, the analyses in this report included two sources of secondary data to reduce these inaccuracies. Finally, a national and regional analysis might mask various local and state disparities in access.

Conclusion

This report describes one of the few national studies assessing disparities in access to healthier food retailers by demographic characteristics nationwide and by region. Because the data cannot fully account for the heterogeneity of the U.S. food environment, a more in-depth evaluation is required to determine whether interventions are needed in specific neighborhoods.

Several strategies might improve community access to retailers that sell healthier foods. Such strategies include incentives to bring healthier food retailers into underserved areas, transportation improvements so that residents in underserved areas can reach the food retailers, and upgrading facilities to enable stocking of all forms of fruits and vegetables and to increase shelf space dedicated to fruits and vegetables, ultimately increasing the availability of high-quality, affordable fruits and vegetables in existing venues (*15*).

An example of efforts at the national level to bring healthier food retailers into underserved areas is a collaboration among the U.S. Department of Agriculture (USDA), U.S. Department of Health and Human Services (HHS), and the U.S. Department of Treasury to support projects that increase access to healthier, affordable food and encourage the purchase and consumption of healthier food (available at http://apps.ams.usda.gov/fooddeserts). The state-level pioneer effort called the Pennsylvania Fresh Food Financing Initiative has provided funding for 88 fresh-food retail projects in 34 Pennsylvania counties and improved access to healthier food for approximately 500,000 persons (*34*). Similar efforts have been expanding rapidly across states.

Changes in WIC-authorized stores improve access to healthy food in existing stores. Stores authorized to accept WIC benefits must maintain on their shelves at all times a minimum variety of healthy foods, including fruits, vegetables, and whole grains that align with the 2005 *Dietary Guidelines for Americans* and the American Academy of Pediatrics infant feeding practice guidelines (*35*). Studies have demonstrated that WIC-authorized stores are providing more healthy foods than stores that are not WIC authorized (*33*,*35*,*36*). Additional ways to bring healthier foods to persons living in underserved areas without changing existing retailers include establishing farmers markets, farm stands, and green carts (*15*). For example, in New York, the New York City Green Cart Initiative provides fruits and vegetables to underserved neighborhoods (information available at http://www.nyc.gov/html/doh/html/diseases/green-carts.shtml), and the Veggie Mobile delivers fruits and vegetables to low-income seniors in upstate New York (information available at http://www.cdcg.org/programs/veggie/veggie). Fruits and vegetables also can be delivered through drop-off boxes to churches, community centers, and other central locations (*15*).

Although the precise number of healthy food retailers that need to be in a particular area to allow adequate access to fruits and vegetables and other healthy foods is not known, ensuring that all persons in the United States have access to at least one retail venue that offers healthier foods is an important step toward supporting healthy choices and diets in communities. Improving access to healthy food retailers is important but unlikely to be sufficient to improve overall diet quality. Even in communities that have sufficient access, strategies such as store promotions and shelf labeling that help consumers identify healthy options, education on health benefits of particular foods, and information about preparation, storage, and cooking skills can encourage persons to purchase healthy foods in retail venues and might improve diet quality. The combined efforts of interventions that improve knowledge and skills, as well as increase the affordability, selection, and quality of foods in many settings are needed to encourage healthier choices among persons in the United States.

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Unemployment — United States, 2006 and 2010

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Introduction

The association between unemployment and poor physical and mental health is well established (*1*–*7*). Unemployed persons tend to have higher annual illness rates, lack health insurance and access to health care, and have an increased risk for death (*1*,*2*,*8*,*9*). Several studies indicate that employment status influences a person's health; however, poor health also affects a person's ability to obtain and retain employment (*10*). Poor health predisposes persons to a more uncertain position in the labor market and increases the risk for unemployment (*5*,*6*).

According to the Bureau of Labor Statistics (BLS), the unemployment prevalence in the United States increased from 4.7% in 2006 to 9.4% in 2010, yielding an estimated 14.5 million unemployed persons (*11*). Both the prevalence of unemployment and the health status of populations vary widely among and within communities by age, sex, and race/ethnicity. In 2010, the unemployment prevalence both for males and females was twice as high in the black and Hispanic populations as in the white population (*11*). The disparities in unemployment prevalence extend across the country and have increased from January 2008 to December 2010 (*12*). Because unemployment has historically been substantially higher in black and Hispanic populations during past decades and because unemployment has increased substantially from the start of the recession in December 2007 (*13*,*14*), associations between unemployment and health and between unemployment and minority status need to be further studied.

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*15*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*16*). This report is the first assessment of unemployment and health status in a CHDIR. The purposes of this unemployment and health analysis are to discuss and raise awareness of differences in the characteristics of persons who are unemployed and differences in health status by employment status and to prompt actions to reduce these disparities.

Methods

To assess changes in unemployment rates by several population characteristics, CDC analyzed 2006 and 2010 data from the Behavioral Risk Factor Surveillance System (BRFSS). The association between unemployment and self-reported health status, physical health, and mental health in 2010 also was examined. The 2010 state-specific unemployment prevalences were calculated and shown on a U.S. map using statistical software; prevalences were shown for men and women, non-Hispanic blacks, and non-Hispanic whites (*17*). All analyses were limited to persons aged 18–64 years.

BRFSS is a state population-based, telephone survey of noninstitutionalized U.S. adults aged ≥18 years collected in all states and selected territories. The BRFSS median response rate* for 2006 was 51.4% and for 2010 was 54.6%; the median cooperation rate† for 2006 was 74.5% and for 2010 was 76.9% (*18*,*19*). The same question from the BRFSS survey was used to assess employment status and unemployment status by asking participants whether they are currently 1) employed for wages; 2) self-employed; 3) out of work for >1 year; 4) out of work for <1 year; 5) a homemaker; 6) a student; 7) retired; or 8) unable to work. Persons who did not respond to this question were excluded from the analysis. The employment question responses were recategorized into the following groups: 1) employed (including employed for wages and self-employed), 2) unemployed (out of work for <1 year and out of work for >1 year), and 3) other (homemaker, student, retired, or unable to work).

Data were analyzed to assess disparities in unemployment prevalence for 2006 and 2010. To examine the association between unemployment and health status, data for the following three health outcomes were collected from the 2010 BRFSS data set: 1) health status, 2) number of physically unhealthy days, and 3) number of mentally unhealthy days.

* The perentage who completed interviews among all eligible persons, including those who were not contacted successfully.

† The perentage who completed interviews among all eligible persons who were contacted.

The related BRFSS questions were as follows: 1) "Would you say that in general your health is excellent, very good, good, fair, or poor?" 2) "Thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?" and 3) "Thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" In this analysis, responses to the BRFSS health status question were recategorized into the following groups: excellent/very good, good, and fair/poor. Participants with the responses "do not know/not sure" or "refused to respond" to both the physical health and mental health questions were categorized as having missing values and were excluded from the analysis. Physically unhealthy days and mentally unhealthy days were categorized separately as 0 days, 1–15 days, and 16–30 days.

Disparities were measured as the deviations from a referent group, which was the group that had the most favorable estimate for the variables used to assess disparities during the time reported. Absolute difference was calculated by subtracting the unemployment prevalence for the group of interest from the referent group. The relative difference, a percentage, was calculated by dividing the absolute difference by the value in the referent category and multiplying by 100. All state and national estimates were weighted by BRFSS sample weights using statistical software to account for the complex design. For unemployment prevalence and health status prevalence, 95% confidence intervals (CIs) were calculated for the point estimates. CIs were used as measure of variability, and nonoverlapping CIs were considered statistically different. Using CIs in this way is a conservative evaluation of significance differences; infrequently, this might lead to a conclusion that estimates are similar when the point estimates do differ. All reported differences in this report are significant based on the CI comparison.

Results

Unemployment prevalence increased from 2006 to 2010 for all adults aged 18–64 years, particularly among adults aged 25–44 years (Table 1). In general, unemployment prevalence increased among both males and females (referent group); however, males reported higher unemployment prevalence than females in both 2006 and 2010, and this difference gradually increased to 2010. The highest unemployment prevalence among racial/ethnic groups was among non-Hispanic blacks (10.4% in 2006 and 16.5% in 2010), which was almost twofold that of non-Hispanic whites (4.7% in 2006 and 8.3% in 2010). The unemployment prevalence for American Indians/Alaska Natives increased substantially from 8.8% in 2006 to 15.8% in 2010. In both years, the unemployment prevalence among persons with no health insurance was approximately 4 times higher than that for persons with health insurance. The unemployment prevalence decreased as levels of education and income increased in both 2006 and 2010. The greatest change in unemployment prevalence for education and income from 2006 to 2010 occurred among those who did not graduate from high school and in households with an annual income of <$25,000 per year. In 2006 and 2010, persons with a disability had an unemployment prevalence (60%) that was higher than that of persons without a disability (40%).

In 2010, the highest prevalence of unemployment among men was in the Northeast and West (Figure 1) and among women was in the South and West (Figure 2). The Midwest region had the lowest unemployment prevalence for both sexes. The West region (e.g., Nevada, California, and Oregon) had the highest prevalence of unemployment both among non-Hispanic blacks and non-Hispanic whites (Figures 3, and 4), and the Midwest region (e.g., North Dakota and South Dakota) had the lowest prevalence of unemployment for both these groups.

In 2010, unemployed persons were less likely than employed persons to report their health as excellent or very good (Table 2). A higher percentage of employed persons reported that they were in excellent or very good health (62.7%) than did persons who were unemployed for <1 year (49.2%) or unemployed for >1 year (39.7%). Persons who were employed were more likely to report no physically unhealthy days (70.3%) and no mentally unhealthy days (67.3%) in the past 30 days than were persons who were unemployed for <1 year (no physically unhealthy days: 63.1%; no mentally unhealthy days: 54.2%). Persons who were unemployed for >1 year were even less likely to report having had no physically or mentally unhealthy days in the past 30 days.

Discussion

BRFSS defines unemployment differently from BLS, the agency that monitors unemployment in the United States. BLS defines an unemployed person as someone who does not have a job, has been actively looking for work in the past 4 weeks, and is currently available for work (*12*,*20*). This might contribute to the slight difference in unemployment estimates between BLS and BRFSS. BRFSS was selected for this analysis because the data set includes variables of interest that enable health status assessment and report on the disparities by employment.

TABLE 1. Unemployment* prevalence among adults aged 18–64 years, by selected demographic characteristics — Behavioral Risk Factor Surveillance System, United States, 2006 and 2010

	2006				2010			
Characteristic	%	(95% CI)	Absolute difference	Relative difference (%)	%	(95% CI)	Absolute difference	Relative difference (%)
Age group (yrs)								
18–24	10.5	(9.6–11.6)	6.5	162.5	14.4	(13.5–15.5)	6.7	87.0
25–34	5.8	(5.3–6.3)	1.8	45.0	11.4	(10.8–12.1)	3.7	48.1
35–44	4.7	(4.4–5.1)	0.7	17.5	9.5	(9.0–10.0)	1.8	23.4
45–54	5.2	(4.8–5.5)	1.2	30.0	9.2	(8.8–9.5)	1.5	19.5
55–64	4.0	(3.7–4.3)	Ref.	Ref.	7.7	(7.4–8.0)	Ref.	Ref.
Sex†								
Male	5.9	(5.5–6.2)	0.1	1.7	11.3	(10.9–11.6)	2.5	28.4
Female	5.8	(5.5–6.1)	Ref.	Ref.	8.8	(8.6–9.1)	Ref.	Ref.
Race/Ethnicity§								
White, non-Hispanic	4.7	(4.5–4.9)	Ref.	Ref.	8.3	(8.1–8.6)	Ref.	Ref.
Black, non-Hispanic	10.4	(9.5–11.3)	5.7	121.3	16.5	(15.6–17.4)	8.2	98.8
Hispanic	7.2	(6.4–8.1)	2.5	53.2	12.4	(11.7–13.3)	4.1	49.4
Asian American/Pacific Islander	6.2	(4.8–8.1)	1.5	31.9	9.7	(8.5–11.1)	1.4	16.9
American Indian/Alaska Native	8.8	(6.9–11.2)	4.1	87.2	15.8	(13.2–18.9)	7.5	90.4
Health insurance¶								
Yes	4.0	(3.8–4.2)	Ref.	Ref.	6.7	(6.5–6.9)	Ref.	Ref.
No	13.8	(13.0–14.7)	9.8	245.0	25.1	(24.3–26.0)	18.4	274.6
Educational attainment								
Some high school	9.7	(8.8–10.6)	6.4	193.9	16.9	(15.9–18.0)	11.0	186.4
High school graduate or equivalent	8.0	(7.5–8.5)	4.7	142.4	13.7	(13.2–14.3)	7.8	132.2
Some college	5.2	(4.8–5.7)	1.9	57.6	9.8	(9.4–10.2)	3.9	66.1
College graduate	3.3	(3.0–3.6)	Ref.	Ref.	5.9	(5.6–6.2)	Ref.	Ref.
Income**								
<$25,000	12.7	(12.0–13.4)	10.9	605.6	21.6	(20.9–22.3)	18.3	554.5
$25,000–$50,000	5.0	(4.6–5.5)	3.2	177.8	9.8	(9.3–10.3)	6.5	197.0
$50,000–$75,000	2.8	(2.4–3.2)	1.0	55.6	5.7	(5.3–6.2)	2.4	72.7
>$75,000	1.8	(1.6–2.1)	Ref.	Ref.	3.3	(3.0–3.5)	Ref.	Ref.
Disability††								
Yes	8.4	(7.9–9.0)	3.2	61.5	12.8	(12.3–13.3)	3.5	37.6
No	5.2	(5.0–5.5)	Ref.	Ref.	9.3	(9.1–9.6)	Ref.	Ref.

Abbreviations: 95% CI = 95% confidence interval.

* Includes persons unemployed for <1 year and unemployed for >1 year.

† Sex is assessed by the interviewer, and the question is only asked if necessary

§ Race and ethnicity are two separate questions, and the data from both was merged. Persons of Hispanic ethnicity might be of any race or combination of races.

¶ Health insurance includes health insurance plans, prepaid plans such as health maintenance organizations, or government plans such as Medicare or Indian Health Services.

** Income is annual household income from all sources at intervals of $25,000.

†† Respondents were asked if they were limited in any activities because of physical, mental, or emotional problems and if they had any health problems that require use of special equipment, such as a cane, a wheelchair, a special bed, or a special telephone. If they answered "no" to one question and either said "don't know" or didn't repond to the other question, their disability status was coded as missing.

The analysis in this report found an association between unemployment and overall health status and between unemployment and number of physically and mentally unhealthy days and also found that disparities by employment increased from 2006 to 2010 for certain population groups, including persons with less than a high school education, household income <$25,000, and no health insurance coverage, as well as for American Indians/Alaska Natives. The disparities in unemployment among demographic groups reported in this study are consistent with findings from several other national surveys (*11*,*14*,*21*,*22*).

Limitations

The findings in this report are subject to at least six limitations. First, the 2006 and 2010 surveys excluded certain populations, such as persons without landlines, persons in institutions, and homeless persons; therefore, the results of this study might not be generalizable to the entire U.S. adult population. Second, the low BRFSS median state response rates for 2006 and 2010 (*18*,*19*) increase the possibility of nonresponse bias in the results. Third, BRFSS health status data are self-reported and are therefore subject to recall bias and measurement error (*23*,*24*). Fourth, BRFSS is cross-sectional, and the timeframe

FIGURE 1. Unemployment prevalence among men aged 18–64 years, by state — Behavioral Risk Factor Surveillance System, United States, 2010

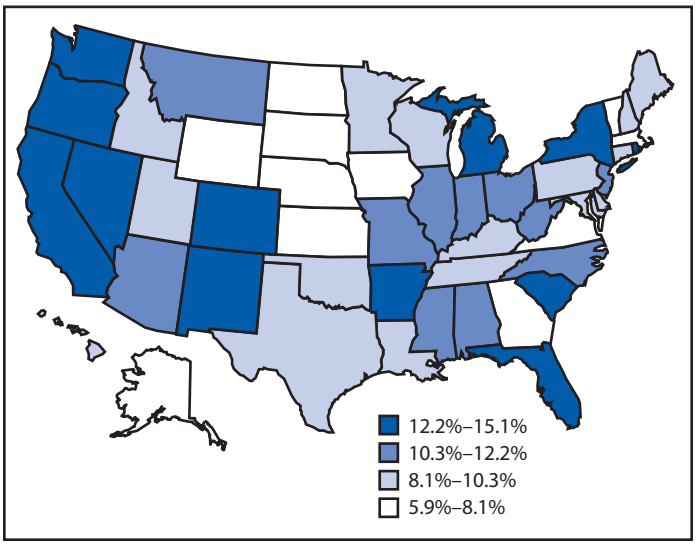


FIGURE 2. Unemployment prevalence among women aged 18–64 years, by state — Behavioral Risk Factor Surveillance System, United States, 2010

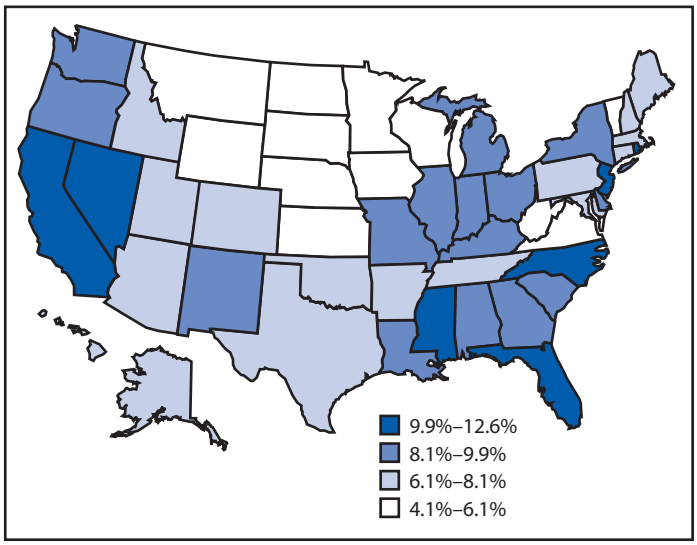


FIGURE 3. Unemployment prevalence among non-Hispanic white adults aged 18–64 years, by state — Behavioral Risk Factor Surveillance System, United States, 2010

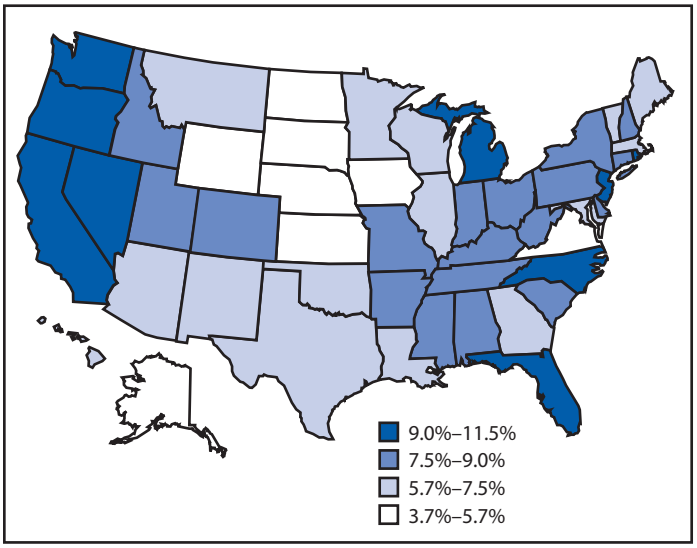
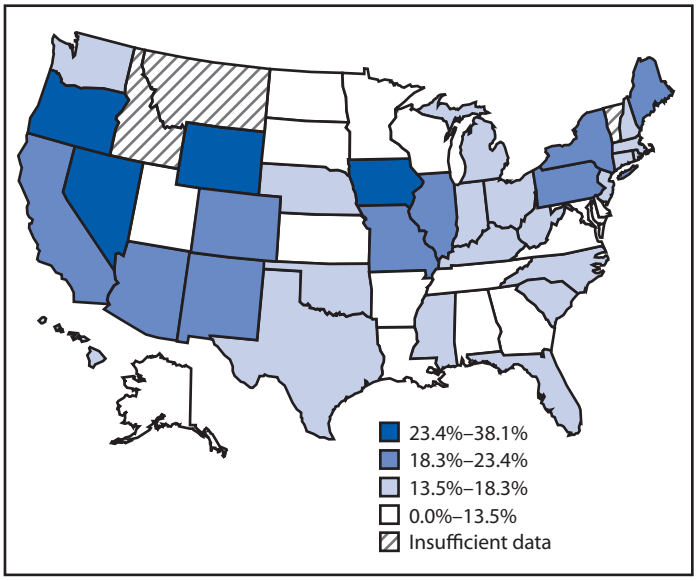


FIGURE 4. Unemployment prevalence among non-Hispanic black adults aged 18–64 years, by state — Behavioral Risk Factor Surveillance System, United States, 2010



used to define unemployment is limited to two categories (<1 year and >1 year); therefore, the directionality of the relations between short-term unemployment, longer-term unemployment, and health outcomes cannot be assessed. Fifth, the categorization of the BRFSS health status, physical health, and mental health responses is subjective. Finally, this analysis could neither address the reason that unemployment and health status are related nor determine whether these pathways altered substantially between 2006 and 2010.

Conclusion

This study supports existing findings on unemployment and health status (*1–7*). The relation between unemployment and health status is multifactorial and complex. Studies of health and unemployment disparities have identified associated intermediary factors, including health insurance coverage and access to health care (*14,25–27*). Similarly, the National Prevention Strategy notes that health disparities are often

TABLE 2. Overall health status and number of physically and mentally unhealthy days in past 30 days among adults aged 18–64 years, by employment status — Behavioral Risk Factor Surveillance System, United States, 2010

	Unemployed					
	>1 year		<1 year		Employed*	
Health status	%	(95% CI)	%	(95% CI)	%	(95% CI)
Overall health status						
Excellent or very good†	39.7	(38.1–41.4)	49.2	(47.7–51.2)	62.7	(62.2–63.1)
Good†	35.1	(33.5–36.7)	33.9	(32.3–35.6)	29.1	(28.7–29.5)
Fair or poor†	25.2	(23.8–26.7	16.6	(15.4–18.0)	8.2	(8.0–8.5)
No. of physically unhealthy days in past 30 days						
0†	55.9	(54.2–57.5)	63.1	(61.4–64.9)	70.3	(69.9–70.7)
1–15†	31.4	(29.8–33.0)	28.6	(27.0–30.2)	26.1	(25.7–26.5)
16–30†	12.8	(11.7–13.9)	8.3	(7.3–9.4)	3.6	(3.5–3.8)
No. of mentally unhealthy days in past 30 days						
0†	50.6	(48.9–52.3)	54.2	(52.4–56.0)	67.3	(66.9–67.8)
1–15†	32.6	(31.0–34.3)	32.9	(31.2–34.6)	27.3	(26.8–27.7)
16–30†	16.8	(15.6–18.1)	12.9	(11.9–14.1)	5.4	(5.2–5.6)

Abbreviation: 95% CI = 95% confidence interval.
* Employed for wages or self-employed.
† Statistically significant (p<0.05).

linked to social, economic, and environmental disadvantages (*28*). The federal government is implementing the Affordable Care Act and, beginning in 2014, the law will expand access to health insurance coverage for millions of previously uninsured persons in the United States (*29*).

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Environmental Hazards

Nonfatal Work-Related Injuries and Illnesses — United States, 2010

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Introduction

In 2012, the U.S. civilian labor force comprised an estimated 155 million workers (*1*). Although employment can contribute positively to a worker's physical and psychological health, each year, many U.S. workers experience a work-related injury or illness. In 2011, approximately 3 million workers in private industry and 821,000 workers in state and local government experienced a nonfatal occupational injury or illness (*2*). Nonfatal workplace injuries and illnesses are estimated to cost the U.S. economy approximately $200 billion annually (*3*). Identifying disparities in work-related injury and illness rates can help public health authorities focus prevention efforts. Because work-related health disparities also are associated with social disadvantage, a comprehensive program to improve health equity can include improving workplace safety and health.

This report and a similar study (*4*) are part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*5*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*6*). This report provides information concerning disparities in nonfatal work-related injury and illness, a topic that was not discussed in the 2011 CHDIR. A separate report providing information on disparities in fatal work-related injuries and homicides across industry and occupation categories also is included in this second CHDIR (*4*). The purposes of this report are to discuss and raise awareness of differences in the characteristics of workers employed in high-risk occupations and to prompt actions to reduce these disparities.

Methods

To examine disparities in nonfatal work-related injury and illness by selected characteristics, CDC used two sources of data. Health outcomes were identified by using the Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII) (available at http://www.bls.gov/iif). Data on selected worker characteristics (i.e., race/ethnicity, place of birth, sex, age, educational attainment, income level, and geographic region of residence) were derived from the 2010 Current Population Survey (CPS) microdata files (available at http://thedataweb.rm.census.gov/ftp/cps_ftp.html). CPS (available at http://www.census.gov/cps) is the primary source of U.S. workforce statistics and is based on monthly household surveys conducted by the U.S. Census Bureau.

Race and ethnicity were combined into seven groups: Hispanic, non-Hispanic white, non-Hispanic black, American Indian/Alaska Native, Asian, Hawaiian or Pacific Islander, or multiple races. Persons of Hispanic ethnicity can be of any race or combination of races. Educational attainment was defined as either 1) no education beyond high school, including those with less than a first-grade education to those who received a high school diploma or its equivalent or 2) education beyond high school, including enrollment in an occupational/vocational program, completion of some college, or receipt of a college degree or an advanced degree. Place of birth was defined as the United States, a U.S. territory, or a foreign country. Persons born in a foreign country include U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens. Income level was defined as low wage or nonlow wage; a low wage was defined as an income of ≤$435 per week (which is equivalent to the wage earned by a person working 40 hours a week at or less than 1.5 times the minimum wage of $7.25 per hour). Geographic region of residence was defined using the four U.S. Census Bureau regions: Northeast, Midwest, South and West.

SOII is a collaborative federal/state survey program administered by BLS that includes reports from a nationally representative sample of approximately 220,000 private-sector employers. The survey excludes workers on farms with <11 employees, private household workers, self-employed persons, and federal government workers. Data for employees covered by certain specific federal safety and health legislation are provided to BLS to be included in SOII by the Mine Safety and Health Administration of the U.S. Department of Labor and the Federal Railroad Administration of the U.S. Department of Transportation. Employers are required to report workplace injuries and illnesses that meet recordkeeping

requirements established by the Occupational Safety and Health Administration (OSHA), including those that result in loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment other than first aid. Information about the survey methodology is available at http://www.bls.gov/opub/hom/pdf/homch9.pdf. In 2008, BLS began including state and local government employees, with that portion of the survey conducted separately from the private-sector survey. SOII data presented in this report are limited to private-sector workers.

In SOII, for those persons whose cases result in ≥1 day away from work (DAFW), employers provide additional information, including the affected worker's occupation coded according to the Standard Occupational Classification Manual (SOC) (*7*). For each of approximately 800 occupations, BLS then estimates the rate of DAFW cases per 10,000 full-time equivalents (FTEs) using the formula one FTE = 2,000 hours worked per year. BLS derives occupation-specific denominator data from the Occupational Employment Statistics program, which produces employment and wage estimates for approximately 800 occupations at the state and national level (available at http://www.bls.gov/oes). In addition to detailed SOC occupation rates, BLS also provides injury and illness rates for all higher-level SOC categories (i.e., injury and illness rates at the two- through six-digit level of SOC).

CDC used the SOII occupation-specific DAFW injury and illness rates from 2008 to categorize all private-sector occupations into two groups: high-risk occupations and all other occupations. The list of high-risk occupations was obtained from the Council of State and Territorial Epidemiologists (CSTE) Occupational Health Indicator activity, indicator no. 15, workers employed in occupations with a high risk for occupational morbidity (*8*). A high-risk occupation was defined as one with a DAFW rate of at least twice the national DAFW rate of 113.3 cases of injury and illness per 10,000 FTEs. The CSTE Occupational Health Indicator activity used Census Bureau occupation codes, which are a condensed version of the SOC code set that includes approximately 500 occupation codes (*9*). Injury and illness rates for Census Bureau occupation codes were determined by matching to the corresponding hierarchical SOC occupation code injury and illness rates released by BLS in SOII. Of all Census Bureau occupation codes, 61 were classified as high risk (i.e., having at least twice the national average DAFW injury and illness rate). Employment estimates and demographic characteristics were obtained from the 2010 CPS for private-sector wage and salary workers aged ≥16 years who were employed in the group of 61 high-risk occupations and for all occupations.

Disparities within high-risk occupations presented in this report were measured as the absolute differences from a referent prevalence within each demographic category examined. The relative difference was calculated by dividing the absolute difference by the value of the referent category and multiplying by 100. Statistical significance was assessed based on whether the 95% confidence intervals (CIs) for each absolute or relative measure overlapped with the comparison value selected for each demographic variable. Of the 61 high-risk occupations, six occupations in which more than 1 million workers were employed (health aides; janitors and cleaners; maids and housekeepers; miscellaneous production workers; drivers: sales and trucks; and hand laborers: freight, stock, material movers) were examined more closely. Demographic characteristics were calculated for each specific occupation. Differences were assessed by calculating and comparing 95% CIs around the percentage of workers experiencing a nonfatal work-related injury or illness. In this approach, CIs were used as a measure of variability and nonoverlapping CIs were considered statistically different. Using CIs in this way is a conservative way to evaluate significance differences; infrequently this might lead to a conclusion that estimates are similar when the point estimates do differ.

Results

In 2010, approximately 16,679,000 wage and salary workers, or 16% of all private-sector workers in the United States, were employed in high-risk occupations. The proportion of workers employed in high-risk occupations differed significantly by demographic category, with 21% of males, 24% of Hispanics, 21% of non-Hispanic blacks, 20% of American Indians/Alaska Natives, 22% of foreign-born workers, and 26% of workers with no more than a high school education employed in high-risk occupations, compared with 9% of women, 9% of Asians, 13% of non-Hispanic whites, and 14% of persons born in the United States. A higher percentage of workers receiving low wages worked in high-risk occupations compared with those receiving higher wages (18% vs. 14%), and the proportion of workers employed in high-risk occupations was higher in the Midwest and the South than in the West (16% versus 14%) (Table 1).

In 2010, the six high-risk occupations in which more than 1 million workers were employed (in each occupation) accounted for 61% of private-sector wage and salary workers employed in a high-risk job (Table 2). When the demographic profiles of each of these six occupations were compared with those of all U.S. private-sector wage and salary workers, two demographic characteristics were found consistently to be statistically elevated in all six occupations: the proportion of non-Hispanic black workers and that of workers with a high school education or less. More than half of the workers in four

TABLE 1. Estimated number and percentage of workers employed in high-risk* occupations, by selected characteristics — United States, 2010

Characteristic	Workers employed in high-risk occupations			Absolute difference		Relative difference†
	No.	%	(95% CI)	Percentage points	(95% CI)	%
Sex						
Male	12,240,312	21.1	(20.7–21.5)	12.2§	(11.7–12.7)	137.1§
Female	4,438,820	8.9	(8.6–9.2)	Ref.	—¶	Ref.
Race/Ethnicity						
Hispanic**	4,009,024	24.4	(23.6–25.2)	15.2§	(14.1–16.3)	165.2§
White, non-Hispanic	9,584,598	13.0	(12.7–13.3)	3.8§	(3.0–4.6)	41.3§
Black, non-Hispanic	2,277,643	20.8	(19.9–21.7)	11.6§	(10.4–12.8)	126.1§
American Indian/Alaska Native	97,197	20.2	(15.9–24.5)	11.0§	(6.7–15.3)	119.6§
Asian	494,505	9.2	(8.4–10.0)	Ref.	—	Ref.
Hawaiian or Pacific Islander	47,318	17.8	(13.0–22.6)	8.6§	(3.8–13.4)	93.5§
Multiple races	168,847	15.1	(12.7–17.5)	6.0§	(3.4–8.6)	64.1§
Educational attainment						
No education beyond high school††	11,095,990	25.6	(25.2–26.0)	16.9§	(16.4–17.4)	197.7§
Education beyond high school§§	5,583,142	8.6	(8.4–8.8)	Ref.	—	Ref.
Place of birth						
United States	12,253,418	13.9	(13.6–14.2)	Ref.	—	Ref.
U.S. territory	110,365	19.9	(16.1–23.7)	6.1§	(2.3–9.9)	43.2§
Foreign country¶¶	4,315,349	22.1	(21.4–22.8)	8.2§	(7.5–8.9)	59.0§
Income level						
Low-wage earner ***	7,275,060	18.3	(17.7–18.9)	4.5§	(3.7–5.3)	32.6§
Nonlow-wage earner	9,421,506	13.8	(13.4–14.2)	Ref.	—	Ref.
Geographic region†††						
Northeast	3,034,789	14.8	(14.2–15.4)	0.6	(-0.2–1.4)	4.1
Midwest	3,941,498	15.8	(15.3–16.3)	1.6§	(0.9–2.3)	11.2§
South	6,272,961	16.2	(15.8–16.6)	2.0§	(1.3–2.7)	14.3§
West	3,429,884	14.2	(13.7–14.7)	Ref.	—	Ref.

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey microdata files (available at http://thedataweb.rm.census.gov/ftp/cps_ftp.html).

* Occupations for which having a "days away from work" nonfatal injury and illness rate of ≥226.6 cases per 10,000 full-time equivalents based on U.S. Department of Labor, Bureau of Labor Statistics 2008 Survey of Occupational Injuries and Illnesses (available at http://www.cste.org/resource/resmgr/OccupationalHealth/OHIGuidanceMarch2013.pdf?hhSearchTerms=%22Occupational+and+Health+and+Indicator%22).

† Compared with the lowest category.

§ Significantly different when assessed by comparison of nonoverlapping 95% CIs.

¶ Confidence intervals are not provided for the reference category.

** Persons of Hispanic ethnicity might be of any race or combination of races.

†† Includes those with less than a first-grade education to those who received a high school diploma or its equivalent.

§§ Includes enrollment in an occupational/vocational program, completion of some college, or receipt of a college degree or an advanced degree.

¶¶ Includes U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens.

*** Worker whose wage is ≤$435 per week.

††† *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

of the six occupations earned low wages, a proportion that exceeded the national average: health aides (64%), janitors and cleaners (64%), maids and housekeepers (78%), and hand laborers (58%) (Table 2).

Whereas overall almost three quarters of those employed in any high-risk occupation were males, two of the six largest high-risk occupations employed predominately females: maids and housekeepers (89%) and health aides (88%). Maids and housekeepers had the highest proportion of Hispanics (42%) among the six high-risk occupations but a much lower proportion of non-Hispanic black workers (16%). A reverse pattern is apparent among health aides, who had the highest percentage of non-Hispanic black workers (34%) and the lowest percentage of Hispanics (15%). Foreign-born workers make up a significantly higher proportion of the workforce compared with all private-sector workers in four of the six high-risk occupations: maids and housekeepers (52%), janitors and cleaners (36%), miscellaneous production workers (25%), and health aides (25%). With the exception of miscellaneous production workers, these occupations also had the highest proportions of low-wage workers found among the six high-risk/high employment occupations. Compared with all private sector workers, a higher proportion of maids and housekeepers (40%) and drivers (40%) were employed in the South, and a higher proportion of health aides (26%), miscellaneous

TABLE 2. Estimated percentage of private sector wage and salary workers employed in six high-risk* injury and illness occupations† (each with >1 million workers), by selected characteristics— United States, 2010

	All occupations (N = 108,216,000; rate§: 113.3)		Health aides (n = 1,656,000; rate: 320.7)		Janitors and cleaners (n = 1,561,000; rate: 243.0)		Maids and housekeepers (n = 1,198,000; rate: 277.7)		Misc. production workers (n = 1,047,000; rate: 462.4)		Drivers: sales and trucks (n = 2,721,000; rate: 329.4)		Hand laborers: freight, stock, and material movers (n = 1,616,000 rate: 440.3)	
Characteristic	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**
Sex														
Male	**53.7**	**(53.4–54.0)**	11.7¶	(9.9–13.5)	67.5¶	(64.8–70.2)	11.1¶	(9.1–13.1)	72.9¶	(69.8–76.0)	95.6¶	(94.7–96.5)	82.5¶	(80.4–84.6)
Female	**46.3**	**(46.0–46.6)**	88.3¶	(86.6–90.0)	32.5¶	(29.9–35.1)	88.9¶	(86.9–90.9)	27.1¶	(24.1–30.1)	4.4¶	(3.5–5.3)	17.6¶	(15.5–19.7)
Race/Ethnicity														
Hispanic**	**15.2**	**(14.9–15.5)**	14.8	(12.8–16.8)	34.0¶	(31.2–36.8)	41.7¶	(38.4–45.0)	23.7¶	(20.6–26.8)	17.8¶	(16.1–19.5)	21.2¶	(18.8–23.6)
White, non-Hispanic	**68.0**	**(67.7–68.3)**	45.4¶	(42.7–48.1)	46.2¶	(43.4–49.0)	35.4¶	(32.3–38.5)	56.7¶	(53.3–60.1)	66.4	(64.4–68.4)	57.6¶	(54.8–60.4)
Black, non-Hispanic	**10.1**	**(9.9–10.3)**	33.5¶	(30.7–36.3)	14.9¶	(12.7–17.1)	16.3¶	(13.7–18.9)	14.0¶	(11.4–16.6)	12.6¶	(11.1–14.1)	16.3¶	(14.1–18.5)
American Indian/Alaska Native	**0.4**	**(0.4–0.4)**	1.0	(0.4–1.6)	0.7	(0.2–1.2)	0.5	(0.0–1.0)	0.6	(0.0–1.2)	0.4	(0.1–0.7)	0.6	(0.1–1.1)
Asian	**5.0**	**(4.9–5.1)**	4.0	(3.0–5.0)	3.4¶	(2.5–4.3)	5.2	(3.9–6.5)	3.9	(2.7–5.1)	1.5¶	(1.0–2.0)	2.8¶	(2.0–3.6)
Hawaiian or other Pacific Islander	**0.3**	**(0.3–0.3)**	0.3	(0.0–0.6)	0.2	(0.0–0.4)	0.1	(-0.1–0.3)	0.4	(0.0–0.8)	0.2	(0.0–0.4)	0.4	(0.1–0.7)
Multiple races	**1.0**	**(0.9–1.1)**	1.1	(0.5–1.7)	0.7	(0.2–1.2)	0.9	(0.3–1.5)	0.9	(0.2–1.6)	1.1	(0.6–1.6)	1.1	(0.5–1.7)
Educational attainment														
No education beyond high school††	**40.1**	**(39.8–40.4)**	53.8¶	(51.3–56.3)	75.4¶	(73.2–77.6)	81.4¶	(79.1–83.7)	72.2¶	(69.4–75.0)	68.9¶	(67.1–70.7)	69.3¶	(67.0–71.6)
Education beyond high school§§	**59.9**	**(59.6–60.2)**	46.2¶	(43.7–48.7)	24.6¶	(22.4–26.8)	18.6¶	(16.5–20.7)	27.8¶	(25.0–30.6)	31.1¶	(29.3–32.9)	30.7¶	(28.4–33.0)
Place of birth														
United States	**81.5**	**(81.2–81.8)**	74.4¶	(72.0–76.8)	62.7¶	(59.9–65.5)	47.6¶	(44.3–50.9)	74.3¶	(71.2–77.4)	82.9	(81.3–84.5)	81.3	(79.1–83.5)
U.S. territory	**0.5**	**(0.5–0.5)**	0.8	(0.3–1.3)	1.7¶	(1.0–2.4)	0.6	(0.1–1.1)	0.8	(0.2–1.4)	0.5	(0.2–0.8)	0.6	(0.2–1.0)
Foreign country¶¶	**18.0**	**(17.7–18.3)**	24.8¶	(22.4–27.2)	35.6¶	(32.8–38.4)	51.8¶	(48.5–55.1)	24.9¶	(21.9–27.9)	16.6	(15.0–18.2)	18.1	(15.9–20.3)
Income level														
Low-wage earner***	**36.8**	**(36.3–37.3)**	63.7¶	(59.9–67.5)	64.1¶	(60.2–68.0)	78.0¶	(74.1–81.9)	34.7	(30.0–39.4)	28.5¶	(25.7–31.3)	57.5¶	(53.5–61.5)
Nonlow-wage earner	**63.2**	**(62.7–63.7)**	36.4¶	(32.6–40.2)	35.9¶	(32.0–39.8)	22.0¶	(18.1–25.9)	65.3	(60.6–70.0)	71.5¶	(68.7–74.3)	42.5¶	(38.5–46.5)
Geographic region†††														
Northeast	**19.0**	**(18.7–19.3)**	25.1¶	(22.7–27.5)	19.5	(17.2–21.8)	16.8	(14.3–19.3)	16.2	(13.6–18.8)	15.2¶	(13.6–16.8)	16.6	(14.5–18.7)
Midwest	**23.1**	**(22.8–23.4)**	26.2¶	(23.7–28.7)	23.8	(21.3–26.3)	17.6¶	(15.1–20.1)	31.2¶	(27.9–34.5)	24.7	(22.8–26.6)	27.9¶	(25.4–30.4)
South	**34.7**	**(34.4–35.0)**	34.7	(32.0–37.4)	34.0	(31.3–36.7)	40.2¶	(37.0–43.4)	35.7	(32.3–39.1)	40.4¶	(38.3–42.5)	35.7	(33.0–38.4)
West	**22.3**	**(22.0–22.6)**	14.0¶	(12.1–15.9)	22.7	(20.3–25.1)	25.4	(22.5–28.3)	17.0¶	(14.4–19.6)	19.7¶	(18.0–21.4)	19.8	(17.5–22.1)

Abbreviation: 95% CI = 95% confidence interval.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Current Population Survey microdata files (available at http://thedataweb.rm.census.gov/ftp/cps_ftp.html).

* Occupations for which having a "days away for work" nonfatal injury and illness rate of 226.6 cases per 10,000 full time equivalents or greater based on U.S. Department of Labor, Bureau of Labor Statistics 2008 Survey of Occupational Injuries and Illnesses (available at http://www.cste.org/resource/resmgr/OccupationalHealth/OHIGuidanceMarch2013.pdf?hhSearchTerms=%22Occupational+and+Health+and+Indicator%22).

† 2002 Census Occupation codes are as follows: health aides (3600); janitors and cleaners (4220); maids and housekeepers (4230); miscellaneous production workers (8850–8960); drivers: sales and trucks (9130); and hand laborers: freight, stock, and material movers (9620).

§ Injury and illness rate/10,000 full-time equivalents.

¶ Significantly different than all occupations percentage when assessed by comparison of nonoverlapping 95% CIs.

** Persons of Hispanic ethnicity can be of any race or combination of races.

†† Includes those with less than a first-grade education to those who received a high school diploma or its equivalent.

§§ Includes enrollment in an occupational/vocational program, completion of some college, or receipt of a college degree or an advanced degree.

¶¶ Includes U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens.

*** Worker whose wage is ≤$435 per week.

††† *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

production workers (31%), and hand laborers (28%) were employed in the Midwest.

Discussion

Work-related injuries and illnesses are common and preventable. On average each year, one of every 100 workers suffers a work-related injury or illness that is severe enough to result in a missed day of work. These injuries and illnesses are costly to workers, their families, and society at large. Compared with U.S.-born white non-Hispanic workers, in 2010, a higher percentage of workers of all other races, ethnicities, and places of birth (other than Asian workers) worked in a job that had at least twice the national average DAFW injury and illness rate. Overall, a higher percentage of males worked in a high-risk occupation, but in certain high-risk and high-employment occupations, workers are predominately female. A higher percentage of workers who had no more than a high school education or who earned a weekly wage of ≤$435 worked in a higher-risk job compared with workers who had a higher education level or who earned more. The burden of a work-related injury or illness for these workers might be compounded further by other sources of health inequalities. For example, in 2010, among working-age adults with an income of 100%–200% of the federal poverty level, 43% did not have access to health insurance for at least part of the previous year (*10*). In addition, because a greater proportion of workers in high-risk occupations are foreign-born and have lower levels of educational attainment than other workers, as one element of a comprehensive workplace safety and health program, training and education materials are needed that focus on addressing the needs of persons with low English proficiency and literacy levels (*11*). Intervention priorities can be informed by employment patterns (i.e., geographic concentration of workers employed in high-risk occupations) such as programs to promote better workplace safety for maids and housekeepers employed in the southern states.

Limitations

The findings in this report are subject to at least three limitations. First, the private-sector SOII data exclude workers on farms with <11 employees, private household workers, and persons who are self-employed (*12*). If these excluded workers have higher or lower injury and illness rates than other private-sector wage and salary workers employed in the same occupation, then the workplace injury and illness rates for that occupation might be under- or overestimated. Second, inclusion of cases in SOII is dependent on identifying cases as work-related; such determinations can be difficult for certain types of incidents for which the work relationship might not be clear or recordkeeping requirements are misinterpreted (*13*). Also, the work relationship might be underreported by some workers, especially those who perceive their jobs as being insecure, which might affect minority and lower-income workers differentially (*14*). Finally, underreporting of work-related illnesses is especially problematic because many work-related illnesses (e.g., cancer and chronic obstructive lung diseases) take years to develop and might be difficult to attribute to the workplace (*15*).

Conclusion

The findings provided in this report highlight the importance of preventing work-related injuries and illnesses. The Occupational Safety and Health Act affords equal protection to all workers, regardless of race, ethnicity, or immigrant status. Furthering a culture in which occupational safety and health is recognized and valued as a fundamental component of economic growth and prosperity can play an important role in promoting health equity. Identifying disparities in work-related injury and illness rates can help public health authorities focus prevention efforts. Because work-related health disparities also are associated with social disadvantage (i.e., workers with low socioeconomic status are those workers who had no more than a high school education or who earned a weekly wage of ≤$435), a comprehensive program to improve health equity should include improving workplace safety and health. The data presented in this report can be used to help focus prevention efforts on those workers in the highest-risk jobs. This information can be used to improve intervention efforts by developing programs that better meet the needs of the increasing diversity of the U.S. workforce. The National Institute for Occupational Safety and Health's Occupational Health Disparities program has prioritized research projects to improve outreach to eliminate health disparities. Prevention recommendations and publications that discuss common injury and illness concerns for these workers are available in English and Spanish; topics include safe patient lifting, chemical use, eye protection, motor vehicle safety, and manual materials handling (available at http://www.cdc.gov/NIOSH).

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Fatal Work-Related Injuries — United States, 2005–2009

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Introduction

In 2012, the U.S. civilian labor force comprised an estimated 155 million workers (*1*). Although employment can contribute positively to a worker's physical and psychological health, each year, many U.S. workers are fatally injured at work. In 2011, a total of 4,700 U.S. workers died from occupational injuries (*2*). Workplace deaths are estimated to cost the U.S. economy approximately $6 billion annually (*3*). Identifying disparities in work-related fatality rates can help public health authorities focus prevention efforts. Because work-related health disparities also are associated with social disadvantage, a comprehensive program to improve health equity should include improving workplace safety and health.

This report and a similar study (*4*) are part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*5*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*6*). This report provides information on disparities in work-related death and homicide rates across industry and occupation categories, a topic that was not discussed in the 2011 CHDIR. A separate report providing information on disparities in nonfatal work-related injuries and illnesses also is included in this second CHDIR (*4*). The purposes of this report are to discuss and raise awareness of differences in the characteristics of work-related fatal injuries and to prompt actions to reduce these disparities.

Methods

To characterize work-related death and homicide rates by selected characteristics, CDC used two sources of data. Fatalities were identified by using the Census of Fatal Occupational Injuries (CFOI),* and employment data were derived from the Current Population Survey (CPS) microdata files.

For CFOI, BLS collects data on occupational injury deaths from multiple federal, state, and local sources, including death certificates, police reports, and workers' compensation reports. To be included in CFOI, the decedent must have been employed at the time of the incident, working as a volunteer in the same functions as a paid employee, or present at a site as a job requirement (*7*). Public- and private-sector civilian workers are included. CFOI excludes deaths that occurred during a worker's normal commute to and from work and deaths related to occupational illnesses (e.g., lung disease or cancer). CFOI uses its fatality source documents to extract and code demographic information and place of birth as well as information related to the event or exposure that directly caused the death and the occupation and industrial sector in which the decedent was employed.

Race and ethnicity were combined into four broad groups: non-Hispanic white, non-Hispanic black, American Indian/Alaska Native/Asian/Pacific Islander (AI/AN/A/PI), and Hispanic. Persons of Hispanic ethnicity might be of any race or combination of races. Place of birth was defined as either the United States or its territories (including Puerto Rico, Guam, and the U.S. Virgin Islands) or a foreign country. Persons born in a foreign country include U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens. Legal immigrants, legal nonimmigrants, and undocumented workers were included in the foreign-born population if their deaths were confirmed as work-related. Information on educational attainment was not available from the CFOI data. Information on geographic region, while available in the data, were not included in the analysis.

To calculate injury-related fatality rates, CDC derived labor force denominator estimates from the CPS microdata files (*8*). CPS is the primary source of U.S. labor force statistics and is based on monthly household surveys conducted by the U.S. Census Bureau. Demographic and employment characteristics in CPS were grouped to match categories in CFOI. CPS uses the Census Bureau definition of "foreign-born," which is slightly different than the definition used by CFOI. Along with including persons who were born in the United States and its territories, CPS, unlike CFOI, also identifies persons born

* Analysis was conducted using restricted CFOI data that the National Institute for Occupational Safety and Health receives through a Memorandum of Understanding. Results might differ from those released by the Bureau of Labor Statistics.

abroad to a U.S. citizen as "native-born." Rates were calculated per 100,000 workers aged ≥15 years.

Poisson regression was used to estimate injury-fatality rates and 95% confidence intervals (CIs) for selected categorical groups (sex, age group, selected events, industry division, and occupation) stratified by demographic variables (race/ethnicity and place of birth). The injury-fatality category rate was considered elevated if it was >1.5 times the U.S. rate (3.7 per 100,000 workers for all fatalities and 0.4 per 100,000 workers for homicides) and also was considered significantly different if it did not contain the U.S. rate (3.7 for all fatalities and 0.4 for homicides). The injury-fatality rate for each category was further stratified by certain demographic variables (race/ethnicity and place of birth). The demographic-specific rate was considered elevated if it also was >1.5 times the corresponding U.S. rate for that particular category (i.e., sex, age group, selected events, industry division, and occupation) and also was considered significantly different if its confidence interval did not contain the overall category rate. No statistical testing was done for this analysis.

Results

During 2005–2009, U.S. workers died from an injury while at work at a rate of 3.7 per 100,000 workers. Hispanics and foreign-born workers had the highest work-related fatal injury rates (4.4 and 4.0 per 100,000 workers, respectively) (Table 1). For all races, ethnicities, and places of birth, males had work-related fatality rates that were 9 to 14 times higher than the rates for females. Fatal injury rates increased with age for all races, ethnicities, and nativities, with non-Hispanic whites, non-Hispanic blacks, and workers born in the United States or its territories having the most dramatic increases. Hispanics of all age groups <65 years had the highest fatality rates, particularly Hispanics aged 15–24 years. Similarly, foreign-born workers of all age groups <65 years had higher fatality rates than workers who were born in the United States or its territories.

The greatest differences in work-related injury fatality rates were across industry sectors, with the rates in agriculture, mining, construction, and transportation/warehousing/utilities being three to almost eight times higher than the overall U.S. rate (Table 1). Although fatality rates by industry sector were similar across most races/ethnicities, non-Hispanic blacks had either the highest or second highest fatality rate for every industry sector, and in agriculture, forestry, and fishing, their rate was just over 1.5 times the U.S. rate for that industry. AI/AN/A/PI and foreign-born workers in the trade sector had rates that were 1.5 to 2.0 times the U.S. rate.

Transportation incidents at work resulted in the highest work-related fatality rates for workers of all races, ethnicities, and nativities (Table 1). Rates for assaults and violent acts, particularly homicides, showed the greatest disparity across race, ethnicity, and place of birth and were highest among non-Hispanic blacks, AI/AN/A/PIs, and foreign-born workers.

During 2005–2009, a total of 2,803 workers were homicide victims (rate: 0.4 per 100,000 workers) (Table 2). Homicide rates for non-Hispanic black and AI/AN/A/PI workers were three times those of non-Hispanic white workers. The homicide rate for foreign-born workers was more than twice that of all other workers. The majority of workplace homicide victims among non-Hispanic blacks were not foreign-born (83%), whereas the majority of such victims among Hispanic workers (61%) and AI/AN/A/PI workers (89%) were foreign-born.

Male workers experienced at least triple the homicide rate that women experienced regardless of race/ethnicity or place of birth (Table 2). Most notably, non-Hispanic black, AI/AN/A/PI, and foreign-born men experienced the highest homicide rates. Hispanic women had the highest rate among women. Overall, workers aged 15–19 years experienced the lowest rates, and workers aged ≥65 years experienced the highest rates. Non-Hispanic black and AI/AN/A/PI workers experienced significantly higher rates for every age group.

Sales and related occupations (e.g., store managers, clerks, and cashiers) and transport and material moving occupations (e.g., taxi drivers and truck drivers) had the highest work-related homicide rates (Table 2). AI/AN/A/PI workers in sales and transportation occupations experienced the highest homicide-related fatality rates. Non-Hispanic blacks consistently had at least double the work-related homicide rates compared with non-Hispanic whites for every industry and occupation group.

To further understand the circumstances of these workplace homicides, CDC explored specific characteristics of the victims (data not presented). Among the 1,483 (55%) homicides for which the type of perpetrator was specified, 1,039 (70%) were committed by suspected robbers, 292 (20%) by a coworker or former coworker, 109 (7%) by a relative of the homicide victim, and 43 (3%) by miscellaneous "others." Men and women were generally victims of different types of workplace violence. Of those homicides that occurred during a suspected robbery or that were perpetrated by a coworker/former coworker, 1,119 (84%) victims were men, whereas of the 109 homicides perpetrated by a relative of the victim, 84 (77%) victims were women.

TABLE 1. Number and rate* of fatal occupational injuries — Census of Fatal Occupational Injuries, United States, 2005–2009

			Race/Ethnicity								Place of birth†			
	Total		White, non-Hispanic		Black, non-Hispanic		AI/AN/A/PI		Hispanic§		Foreign born		U.S. or U.S. territories	
Characteristic	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total¶	**26,996**	**3.7**	**18,682**	**3.7**	**2,707**	**3.5**	**982**	**2.6**	**4,367**	**4.4**	**4,665**	**4.0**	**22,331**	**3.6**
Sex														
Male	**24,995**	**6.4****	17,227	6.4	2,485	7.0	893	4.4	4,151	6.9	4,416	6.3	20,579	6.4
Female	**2,001**	**0.6**	1,455	0.6	222	0.5	89	0.5	216	0.5	249	0.5	1,752	0.6
Age group (yrs)														
15–19	**572**	**1.8**	342	1.5	45	1.5	20	2.3	163	3.6††	141	6.1††	431	1.4
20–24	**1,845**	**2.6**	1,049	2.2	183	2.3	69	2.2	524	4.3††	445	4.8††	1,400	2.2
25–34	**4,603**	**2.9**	2,744	2.8	493	2.7	153	1.6	1,162	3.9	1,054	3.4	3,549	2.8
35–44	**5,720**	**3.4**	3,660	3.3	689	3.6	212	2.0	1,089	4.2	1,179	3.5	4,541	3.3
45–54	**6,696**	**3.9**	4,802	3.8	722	4.1	284	3.4	836	4.8	1,034	4.0	5,662	3.9
55–64	**4,603**	**4.6**	3,569	4.5	395	4.7	182	4.0	430	5.7	610	4.8	3,993	4.6
≥65	**2,882**	**10.0****	2,472	10.5	179	8.8	56	5.0	159	8.4	198	5.8	2,684	10.6
Selected events§§														
Contact with object and equipment¶¶	**4,596**	**0.6**	3,210	0.6	375	0.5	108	0.3	881	0.9††	809	0.7	3,787	0.6
Falls	**3,789**	**0.5**	2,561	0.5	219	0.3	107	0.3	877	0.9††	879	0.7	2,910	0.5
Fall to lower level***	**3,279**	**0.5**	2,175	0.4	172	0.2	85	0.2	826	0.8††	817	0.7	2,462	0.4
Exposure to harmful substances/ environs†††	**2,388**	**0.3**	1,593	0.3	220	0.3	56	0.1	495	0.5††	446	0.4	1,942	0.3
Transportation incidents	**11,228**	**1.5**	8,263	1.6	1,134	1.5	309	0.8	1,394	1.4	1,358	1.1	9,870	1.6
Highway incident	**6,407**	**0.9**	4,669	0.9	728	1.0	176	0.5	780	0.8	730	0.6	5,677	0.9
Fires and explosions	**800**	**0.1**	588	0.1	79	0.1	12	<0.1	118	0.1	104	0.1	696	0.1
Assaults and violent acts	**4,097**	**0.6**	2,403	0.5	666	0.9††	390	1.0††	582	0.6	1,052	0.9††	3,045	0.5
Assaults and violent acts by person	**2,803**	**0.4**	1,354	0.3	605	0.8††	334	0.9††	459	0.5	876	0.7††	1,927	0.3
Industry division§§§														
Agriculture/Forestry/Fishing	**3,236**	**29.2****	2,576	31.0	130	46.9††	64	31.4	426	19.7	399	18.7	2,837	31.7
Mining	**810**	**22.6****	612	22.1	38	22.3	16	16.8	140	27.1	57	19.1	753	23.0
Construction	**5,674**	**10.2****	3,661	9.8	390	13.6	117	9.9	1,473	10.9	1,338	10.1	4,336	10.2
Manufacturing	**1,984**	**2.5**	1,373	2.5	214	2.9	65	1.4	327	2.8	321	2.1	1,663	2.6
Trade	**2,725**	**2.6**	1,813	2.4	275	2.8	260	5.0††	346	2.5	644	4.3††	2,081	2.3
Transportation/Warehousing/Utilities	**4,484**	**11.9****	3,125	12.8	679	11.5	151	9.0	469	9.2	663	11.6	3,821	12.0
Services, excluding health care	**7,388**	**2.1**	4,995	2.0	889	2.5	283	1.4	1,141	2.6	1,189	2.2	6,199	2.1
Health care and social services	**664**	**0.7**	509	0.9	90	0.6	23	0.4	39	0.4	49	0.4	615	0.8
Occupation group¶¶¶														
Management, business, and finance	**2,896**	**2.7**	2,614	3.1	84	1.1	81	1.4	106	1.4	192	1.5	2,704	2.9
Professional and related	**1,274**	**0.8**	1,031	0.9	93	0.7	57	0.5	75	0.7	144	0.7	1,130	0.9
Service	**3,456**	**2.8**	2,153	3.0	504	2.8	104	1.6	673	2.8	607	2.3	2,849	3.0
Sales and related	**1,532**	**1.9**	982	1.6	154	2.1	214	5.0	158	1.7	448	4.1††	1,084	1.5
Office and administrative support	**516**	**0.5**	359	0.5	66	0.5	20	0.5	63	0.5	71	0.7	445	0.5
Farming, fishing, and forestry	**1,405**	**27.5****	844	31.0	98	43.6	54	44.0	376	19.3	351	18.6	1,054	32.9
Construction and extraction	**5,445**	**12.3****	3,412	12.4	380	14.2	113	12.7	1,502	11.7	1,338	11.0	4,107	12.8
Installation, maintenance, and repair	**1,896**	**7.2**	1,466	7.6	145	7.2	39	4.1	234	6.4	198	5.5	1,698	7.5
Production	**1,289**	**2.9**	824	3.0	143	2.7	51	2.0	265	2.8	260	2.4	1,029	3.0
Transport and material moving	**7,057**	**16.0****	4,837	18.0	1,020	14.8	238	17.2	889	10.6	1,039	12.6	6,018	16.8

Abbreviation: AI/AN/A/PI = American Indian/Alaska Native/Asian/Pacific Islander.

* Per 100,000 workers aged ≥15 years. Rates were calculated by CDC based on the number of fatalities from restricted data from the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries during 2005–2009 and might differ from estimates published by the BLS; the estimated number of employed workers was obtained from the BLS Current Population Survey, 2005–2009. Per BLS publication requirements, numbers of deaths are reported for workers of all ages whereas rates are for workers aged ≥15 years.

† For CFOI, persons born in a foreign country include U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens. For CPS, persons born in the U.S. or its territories include U.S. citizens born abroad (one or both of whose parents were U.S. citizens).

§ Persons of Hispanic ethnicity might be of any race or combination of races.

¶ Totals include workers of other/unknown race and ethnicity.

** Indicates that the overall rate for the certain categories (sex, age, selected events, industry division, and occupation group) is >1.5 times the U.S. injury-fatality rate of 3.7 per 100,000 workers. Also indicates that the overall category rate is significantly different from the U.S. rate because the confidence interval for the category rate does not contain 3.7 (the U.S. rate).

†† Indicates that demographic-specific (race/ethnicity and place of birth) rate is considered elevated because it is >1.5 times the corresponding U.S. rate for that particular category (i.e., sex, age group, selected events, industry division and occupation) rate. Also indicates that this demographic-specific rate is considered significantly different because its confidence interval does not contain the corresponding overall category rate.

§§ Event or exposure according to the BLS Occupational Injury and Illness Classification System (available at http://www.bls.gov/iif/oiics_manual_2007.pdf). Totals for major events or exposures include subcategories not shown separately.

¶¶ Examples include being struck by a falling object such as a tree, being crushed during a cave-in while digging ditches, or getting caught in running machinery.

*** Examples include falling from a ladder, roof, or scaffold; falling down stairs or steps; or falling through a floor or roof.

††† Examples include heat stroke or hypothermia, poisoning through inhalation or ingestion of harmful substances, insect stings and animal bites, and non-transportation-related drownings.

§§§ Industry in which the decedent worked was coded according to the 2002 North American Industry Classification System (NAICS) (available at http://www.census.gov/eos/www/naics). The detailed codes from the 20 NAICS sectors were combined into eight industry sectors according to the similarity of their occupational safety and health risks.

¶¶¶ Occupation in which the decedent worked was coded according to the 2000 Standard Occupational Classification Manual (SOC) (available at http://www.bls.gov/soc). The detailed codes from the 22 civilian SOC groups were combined into ten occupation groups according to the similarity of their work and their occupational safety and health risks.

TABLE 2. Number and rate* of homicide deaths — Census of Fatal Occupational Injuries, United States, 2005–2009

			Race/Ethnicity								Place of birth†			
	Total		White, non-Hispanic		Black, non-Hispanic		AI/AN/A/PI		Hispanic§		Foreign born		U.S. or U.S. territories	
Characteristic	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total¶	**2,803**	**0.4**	**1,354**	**0.3**	**605**	**0.8****	**334**	**0.9****	**459**	**0.5**	**876**	**0.74****	**1,927**	**0.3**
Sex														
Male	2,291	0.6††	1,054	0.4	523	1.5**	299	1.5**	368	0.6	772	1.1**	1,519	0.5
Female	512	0.2	300	0.1	82	0.2	35	0.2	91	0.2**	104	0.2	408	0.1
Age group (yrs)														
15–19	62	0.2	23	0.1	14	0.5**	8	0.9**	17	0.4**	23	1.0**	39	0.1
20–24	207	0.3	81	0.2	51	0.7**	23	0.8**	50	0.4	60	0.6**	147	0.2
25–34	589	0.4	247	0.3	163	0.9**	44	0.5	123	0.4	157	0.5	432	0.4
35–44	714	0.4	324	0.3	155	0.8**	80	0.8**	136	0.5	251	0.8**	463	0.3
45–54	633	0.4	326	0.3	125	0.7**	89	1.1**	82	0.5	209	0.8**	424	0.3
55–64	415	0.4	243	0.3	60	0.7**	72	1.6**	34	0.5	137	1.1**	278	0.3
≥65	178	0.6††	110	0.5	36	1.8**	16	1.4**	16	0.9	38	1.1**	140	0.6
Industry division§§														
Agriculture/Forestry/Fishing	40	0.4	24	0.3	—¶¶	—	—	—	13	0.6**	15	0.7**	25	0.3
Mining	5	0.1	—	—	—	—	—	—	—	—	—	—	—	—
Construction	99	0.2	51	0.1	13	0.5**	—	—	28	0.2	26	0.2	73	0.2
Manufacturing	80	0.1	—	—	—	—	—	—	23	0.2**	24	0.2**	56	0.1
Trade	790	0.8††	342	0.5	141	1.5**	190	3.7**	98	0.7	389	2.6**	401	0.5
Transportation/Warehousing/ Utilities	267	0.7††	99	0.4	96	1.6**	18	1.0	39	0.8	91	1.6**	176	0.6
Services, excluding health care	1,412	0.4	731	0.3	312	0.9**	107	0.6	247	0.6**	314	0.6	1,098	0.4
Health care and social services	109	0.1	58	0.1	32	0.2**	9	0.2	—	—	16	0.1	93	0.1
Occupation group***														
Management, business, and finance	267	0.3	154	0.2	42	0.6**	39	0.7**	31	0.4**	73	0.6**	194	0.2
Professional and related	162	0.1	111	0.1	29	0.2**	11	0.1	8	0.1	29	0.1	133	0.1
Service	841	0.7††	419	0.6	216	1.2**	37	0.6	161	0.7	157	0.6	684	0.7
Sales and related	773	0.9††	344	0.6	129	1.7**	179	4.2**	103	1.1	373	3.4**	400	0.6
Office and administrative support	133	0.1	74	0.1	26	0.2**	—	—	21	0.2	27	0.3**	106	0.1
Farming, fishing, and forestry	26	0.5	10	0.4	—	—	—	—	12	0.6	13	0.7	13	0.4
Construction and extraction	82	0.2	36	0.1	—	—	—	—	31	0.2	23	0.2	59	0.2
Installation, maintenance, and repair	74	0.3	37	0.2	19	0.9**	5	0.5**	13	0.4	19	0.5**	55	0.3
Production	66	0.2	26	0.1	12	0.2**	—	—	23	0.3**	26	0.2**	40	0.1
Transport and material moving	365	0.8††	135	0.5	120	1.7**	40	2.9**	54	0.6	134	1.6**	231	0.7

Abbreviation: AI/AN/A/PI = American Indian/Alaska Native/Asian/Pacific Islander.

* Per 100,000 workers aged ≥15 years. Rates were calculated by CDC based on the number of fatalities from restricted data from the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries during 2005–2009 and might differ from estimates published by the BLS; the number of employed workers from the BLS Current Population Survey, 2005–2009. Per BLS publication requirements, numbers of deaths are reported for workers of all ages whereas rates are for workers aged ≥15 years.

† For CFOI, persons born in a foreign country include U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens. For CPS, persons born in the U.S. or its territories include U.S. citizens born abroad (one or both of whose parents were U.S. citizens).Persons of Hispanic ethnicity might be of any race or combination of races.

§ Persons of Hispanic ethnicity might be of any race or combination of races.

¶ Totals include workers of other/unknown race and ethnicity.

** Indicates that demographic-specific (race/ethnicity and place of birth) rate is considered elevated because it is >1.5 times the corresponding U.S. rate for that particular category (i.e., sex, age group, industry division and occupation) rate. Also indicates that this demographic-specific rate is considered significantly different because its confidence interval does not contain the corresponding overall category rate.

†† Indicates that the overall rate for the certain categories (sex, age, industry division, and occupation group) is >1.5 times the U.S. injury-fatality homicide rate of 0.4 per 100,000 workers. Also indicates that the overall category rate is significantly different from the U.S. rate because the confidence interval for the category rate does not contain 0.4 (the U.S. rate).

§§ Industry in which the decedent worked was coded according to the 2002 North American Industry Classification System (NAICS) (available at http://www.census.gov/eos/www/naics/). The detailed codes from the 20 NAICS sectors were combined into eight industry sectors according to the similarity of their occupational safety and health risks.

¶¶ Data do not meet confidential BLS publication criteria.

*** Occupation in which the decedent worked was coded according to the 2000 Standard Occupational Classification Manual (SOC) (available at http://www.bls.gov/soc/). The detailed codes from the 22 civilian SOC groups were combined into ten occupation groups according to the similarity of their work and their occupational safety and health risks.

Discussion

On average, each day, 12–13 workers in the United States die from injuries sustained at work. Hispanic and foreign-born workers are at higher risk compared with other workers, primarily because of the type of work that they do. Workers of all races, ethnicities, and places of birth working in construction, agriculture, mining, and transportation face a similar and higher risk for a work-related fatal injury than workers in other industries. Approximately 10% of injury-related fatalities at work are homicides, which occur most frequently during a robbery. Customer service workers who handle money and who often work alone (e.g., cashiers and taxi drivers) are at highest risk. AI/AN/A/PI workers in transportation and sales occupations were at especially high risk. However for every type of occupation, black non-Hispanic workers were twice as likely as white non-Hispanic workers to be a homicide victim. Efforts to prevent robbery-related homicides include establishing workplace policies and procedures that engage management and employees; providing appropriate worksite

analysis and safety and health training; ensuring that minimal cash is kept on hand; and enhancing and securing the physical environment with alarm systems, surveillance cameras, mirrors, and adequate lighting and barriers (*9*).

Women were more likely to be the victim of a homicide perpetrated by a relative. In these instances, the violence not only affects the worker but may also affect co-workers and/or customers who may be present during the incident. Multidisciplinary workplace violence prevention programs that incorporate training and perpetrator-specific prevention strategies should be made available and implemented widely (*10*).

Limitations

The findings in this report are subject to at least four limitations. First, inclusion of cases in CFOI is dependent upon identifying work-relatedness. This determination can be difficult for certain types of incidents for which the work relationship might not be clear. Second, work-related deaths enumerated in CFOI are limited to fatal injuries and do not include work-related deaths attributable to chronic illnesses such as cancer or lung disease. It is estimated that approximately 49,000 deaths each year can be attributed to work-related illnesses (*11*). Third, CFOI includes fatalities to volunteers. However, volunteers are not included in the CPS denominator, potentially resulting in an overestimation of fatality rates presented in this report by CDC. Finally, CFOI and CPS use different approaches to defining place of birth, which might result in an underestimate of injury rates for some categories.

Conclusion

These findings highlight the importance of preventing work-related deaths. All workers, regardless of their race, ethnicity, or immigrant status are afforded equal protection under the Occupational Safety and Health Act. Furthering a culture in which occupational safety and health is recognized and valued as a fundamental component of economic growth and prosperity can play an important role in promoting health equity. The fatality data presented in this report provide important information to focus prevention efforts. These findings highlight priority industries and occupations of workers in the highest risk jobs for all occupational fatalities and for homicides specifically. This information can be used to improve intervention efforts by developing programs that better meet the needs of the increasing diversity of the U.S. workforce. NIOSH's Occupational Health Disparities program has prioritized research projects to improve outreach to eliminate health disparities and NIOSH's National Occupational Research Agenda addresses high priority needs in individual industry sectors through research and partnerships. Prevention recommendations and publications that focus on the most serious concerns for these workers are available in English and Spanish; topics include workplace violence prevention, motor vehicle safety, and machine safety (available at http://www.cdc.gov/NIOSH/injury).

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Residential Proximity to Major Highways — United States, 2010

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Introduction

Traffic-related air pollution is a main contributor to unhealthy ambient air quality, particularly in urban areas with high traffic volume. Within urban areas, traffic is a major source of local variability in air pollution levels, with the highest concentrations and risk of exposure occurring near roads. Motor vehicle emissions represent a complex mixture of criteria air pollutants, including carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter (PM), as well as hydrocarbons that react with NO_x and sunlight to form ground-level ozone. Individually, each of these pollutants is a known or suspected cause of adverse health effects (*1–4*). Taking into consideration the entire body of evidence on primary traffic emissions, a recent review determined that there is sufficient evidence of a causal association between exposure to traffic-related air pollution and asthma exacerbation and suggestive evidence of a causal association for onset of childhood asthma, nonasthma respiratory symptoms, impaired lung function, all-cause mortality, cardiovascular mortality, and cardiovascular morbidity (*5*).

The mixture of traffic-related air pollutants can be difficult to measure and model. For this reason, many epidemiologic studies rely on measures of traffic (e.g., proximity to major roads, traffic density on nearest road, and cumulative traffic density within a buffer) as surrogates of exposure (*6–8*). These traffic measures typically account for both traffic volume (i.e., number of vehicles per day), which is a marker of the type and concentration of vehicle emissions, and distance, which addresses air pollution gradients near roads. Traffic emissions are highest at the point of release and typically diminish to near background levels within 150 to 300 meters of the roadway (*7,9,10*); however, the potential exposure zone around roads can vary considerably depending on the pollutant, traffic volume, ambient pollution concentrations, meteorologic conditions, topography, and land use (*5*). Traffic exposure metrics in the published literature have used a variety of different density and distance cut-points (*6*). Nevertheless, numerous epidemiologic studies have consistently demonstrated that living close to major roads or in areas of high traffic density is associated with adverse health effects, including asthma, chronic obstructive pulmonary disease, and other respiratory symptoms (*11–15*); cardiovascular disease risk and outcomes (*16–20*); adverse reproductive outcomes (*21,22*); and mortality (*23–25*). Some studies have observed a dose-response gradient such that living closer to major roads is associated with increased risk (*13,14,16–18*). In terms of traffic density, several studies have reported adverse health effects associated with residential proximity to roads with average daily traffic volume as low as 10,000 vehicles per day (*6,11,15–17*).

In the United States, it is widely accepted that economically disadvantaged and minority populations share a disproportionate burden of air pollution exposure and risk (*26,27*). A growing body of evidence demonstrates that minority populations and persons of lower socioeconomic status experience higher residential exposure to traffic and traffic-related air pollution than nonminorities and persons of higher socioeconomic status (*5,28–31*). Two recent studies have confirmed that these racial/ethnic and socioeconomic disparities also exist on a national scale (*32,33*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*34*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*35*). This report provides descriptive data on residential proximity to major highways, a topic that was not discussed in the 2011 CHDIR. The purposes of this report are to discuss and raise awareness of the characteristics of persons exposed to traffic-related air pollution and to prompt actions to reduce disparities.

Methods

To characterize the U.S. population living close to major highways, CDC examined data from several sources using Geographical Information Systems (GIS). Three data sources were used for this assessment: 1) the 2010 U.S. census (available at http://www.census.gov/2010census),

2) 2006–2010 American Community Survey (ACS) 5-year estimates (available at http://www.census.gov/acs), and 3) 2010 (Quarter 3) road network data from NAVTEQ, a commercial data source that provides comprehensive road information for the United States (available at http://www.navteq.com). Seven sociodemographic variables were examined. Data on age, sex, and race/ethnicity were obtained from the 2010 census; data on nativity, language spoken at home, educational attainment, and poverty status were obtained from the ACS.

The U.S. Census Bureau collects data on race and ethnicity (i.e., Hispanic origin) as two separate questions. For this analysis, persons of non-Hispanic ethnicity were classified as white, black, Asian/Pacific Islander, American Indian/Alaska Native, other race, and multiple races. Persons of Hispanic ethnicity, who might be of any race or combination of races, were grouped together as a single category. Educational attainment was defined as less than high school, high school graduate or equivalent, some college, or college graduate. For the variable nativity, "native born" includes U.S. citizens born abroad (one or both of whose parents were citizens at the time of birth) and anyone born in the United States or a U.S. territory; "foreign-born" denotes persons who were not U.S. citizens at birth. Poverty status was categorized by using the ratio of income to the federal poverty level (FPL), in which "poor" is <1.0 times FPL, "near poor" is 1.0–2.9 times FPL, and "nonpoor" is ≥3.0 times FPL.

Major highways were defined as interstates (Class 1) or as other freeways and expressways (Class 2) based on the Federal Highway Administration (FHWA) Functional Classification system. These road types represent the most heavily-trafficked, controlled-access highways in the United States. Although traffic volume is not factored directly into the Functional Classification system, FHWA statistics indicate that the majority of major highways have average daily traffic volumes exceeding 10,000 vehicles per day (i.e., 77% of rural interstates have >10,000 vehicles per day and >72% of urban interstates and other freeways and expressways have >30,000 vehicles per day) (*36*).

The census tract is the smallest geographic unit of analysis available for the variables of interest in the ACS data. ESRI ArcGIS v10 GIS software was used to create circular buffers of 150 meters around all major highways, and the proportion of each census tract included within the buffer area was calculated. This area proportion was then applied to the census tract-level data from the 2010 census and ACS to estimate the number of persons living within 150 meters of a major highway for the total population and by sociodemographic characteristics. Census tract count estimates were summed to obtain state and national estimates. The proportion of the population living within 150 meters of a major highway was calculated for each category of the seven sociodemographic variables, using category-specific denominators derived from the 2010 census and ACS. No sampling error is associated with the 100% population counts obtained from the 2010 census. Standard errors were not calculated for the estimated population counts derived from the ACS because of the complexity of the GIS analysis used to generate these data. Therefore, for this descriptive analysis, no statistical testing or calculation of 95% confidence intervals was conducted, and it was not possible to determine if the observed differences across population subgroups are statistically significant.

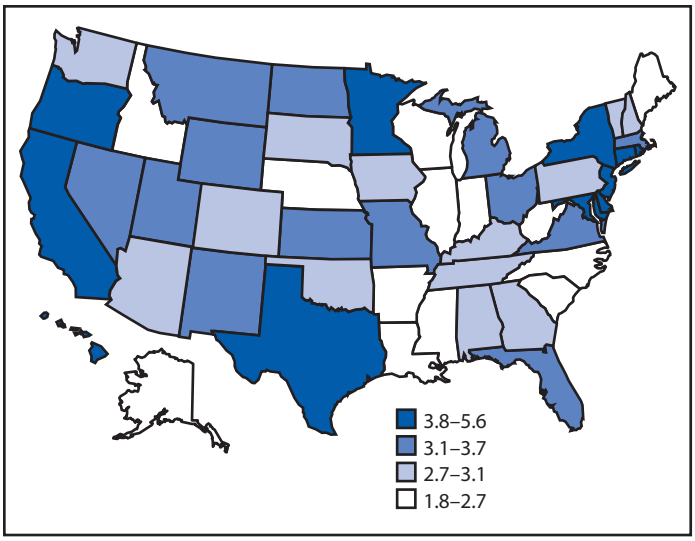
Results

Approximately 11.3 million persons (or 3.7% of the 308.7 million U.S. population) live within 150 meters of a major highway. State-level estimates ranged from 1.8% in Maine to 5.6% in New York (Figure). Regional patterns, based on U.S. Census Bureau groupings, indicate that the estimated proportion of the population living within 150 meters of a major highway ranged from 3.1% in the Midwest and 3.3% in the South to 4.3% in the Northeast and 4.4% in the West. The proportion of the population living near a major highway did not differ by sex (Table). By age group, the estimated proportion of persons living close to a major highway varied from 3.4% among those aged 45–79 years to ≥4.0% among those aged 18–34 years.

The greatest disparities were observed for race/ethnicity, nativity, and language spoken at home; the populations with the highest estimated percentage living within 150 meters of a major highway included members of racial and ethnic minority communities, foreign-born persons, and persons who speak a language other than English at home (Table). The estimated percentage of the population living within 150 meters of a major highway ranged from a low of 2.6% for American Indians/Alaska Natives and 3.1% for non-Hispanic whites to a high of 5.0% for Hispanics and 5.4% for Asians/Pacific Islanders. Likewise, the estimated proportion of the population living near a major highway was 5.1% for foreign-born persons, 5.1% for persons who speak Spanish at home, and 4.9% for persons who speak another non-English language at home.

Disparities by educational attainment and poverty status were less pronounced (Table). The estimated percentage of the population living near a major highway varied from 3.4% for high school graduates to 4.1% for those with less than a high school diploma. A more consistent pattern was observed for poverty status; the estimated proportion of the population living near a major highway was 4.2% for those in the poor category, 3.7% for those in the near-poor category, and 3.5% for those in the nonpoor category.

FIGURE. Percentage* of population living within 150 meters of a major highway, by state — United States, 2010



* Calculated by dividing the population within 150 meters of a major highway by the total population per state and multiplying by 100. The percentages are displayed using quartiles.

Discussion

Overall, approximately 4% of the total U.S. population lives within 150 meters of a major highway, suggesting increased exposure to traffic-related air pollution and elevated risk for adverse health outcomes. Estimates of residential proximity to major roads are influenced by the number and type of roads and the distance or buffer size used. In terms of quantifying the total U.S. population exposed to traffic-related air pollution, the estimate of 11.3 million people derived from this analysis should be considered conservative because only interstates, freeways, and expressways were included and a relatively small buffer distance of 150 meters was used. These conditions were selected to capture persons who are at the highest risk for exposure to traffic-related air pollution. In addition, this estimate is based on distance to a single road and does not account for cumulative exposure to traffic from multiple roads.

The percentage of the population exposed to traffic-related air pollution is expected to be larger in urban areas because of higher population density, more roads, and higher traffic volume. A case study of two North American cities (Los Angeles County and Toronto, Canada) estimated that 30%–45% of the population in these urban areas lives within 500 meters of a highway or 50–100 meters of a major road (*5*). Although this report does not address urban/rural differences directly, an additional state-level analysis of these data indicated that the percentage of the population living within 150 meters of a major highway was correlated positively (R = 0.65) with the percentage of the population living in urban areas. Additional studies are needed to understand potential sociodemographic disparities among populations living near major highways across levels of urbanization.

This analysis suggests that social and demographic disparities exist with respect to residential proximity to major highways. Larger disparities were observed for indicators of minority

TABLE. Number and percentage of population living within 150 meters of a major highway, by selected characteristics — United States, 2010

Characteristic	No.	(%)*
Total†	**11,337,933**	**(3.7)**
Sex†		
Male	5,547,223	(3.7)
Female	5,790,844	(3.7)
Age group (yrs)†		
0–4	766,603	(3.8)
5–9	727,279	(3.6)
10–17	1,168,995	(3.5)
18–24	1,219,887	(4.0)
25–34	1,714,903	(4.2)
35–44	1,523,607	(3.7)
45–64	2,808,121	(3.4)
65–79	977,948	(3.4)
≥80	412,215	(3.7)
Race/Ethnicity†		
Non-Hispanic		
White	6,030,811	(3.1)
Black	1,676,225	(4.4)
Asian/Pacific Islander	800,723	(5.4)
American Indian/Alaska Native	59,378	(2.6)
Other	27,239	(4.5)
Multiple race	235,995	(4.0)
Hispanic§	2,502,616	(5.0)
Nativity¶		
Native born**	9,172,481	(3.5)
Foreign born††	1,966,763	(5.1)
Language spoken at home (≥5 yrs)¶		
English only	7,513,304	(3.3)
Spanish	1,805,261	(5.1)
Other	1,059,572	(4.9)
Educational attainment (≥25 years)¶		
Less than high school	1,225,735	(4.1)
High school graduate or equivalent	1,988,228	(3.4)
Some college	1,977,261	(3.5)
College graduate	2,092,232	(3.8)
Poverty status¶,§§		
Poor (<1.0 times FPL)	1,733,031	(4.2)
Near-poor (1.0–2.9 times FPL)	3,882,694	(3.7)
Nonpoor (≥3.0 times FPL)	5,227,274	(3.5)

Abbreviation: FPL = federal poverty level.

* Denominator for overall population is 308,745,348. Percentages for all other rows were calculated by using category-specific denominators.

† **Source:** U.S. Census Bureau, 2010 census (available at http://www.census.gov/2010census).

§ Persons of Hispanic ethnicity might be of any race or combination of races.

¶ **Source:** U.S. Census Bureau, 2006–2010 American Community Survey (available at http://www.census.gov/acs).

** Includes U.S. citizens born abroad (one or both of whose parents were citizens at the time of birth) and anyone born in the United States or a U.S. territory.

†† Persons who were not U.S. citizens at birth.

§§ Additional information is available at http://aspe.hhs.gov/poverty/figures-fed-reg.cfm.

status (i.e., race/ethnicity, nativity, and language spoken at home) than for traditional indicators of socioeconomic status (i.e., poverty and educational attainment). Two other national studies have reported similar findings using alternative approaches. A study that examined the distribution of sociodemographic variables across various traffic exposure metrics assessed at the residential address found that race, ethnicity, poverty status, and education all were associated with one or more traffic exposure metrics (*32*). Another study demonstrated that the correlation between traffic exposure metrics and sociodemographic variables across all U.S. census tracts was stronger for race and ethnicity than it was for poverty, income, and education and that the magnitude of the correlations varied spatially by region and state (*33*).

The environmental justice literature suggests that socially disadvantaged groups might experience a phenomenon known as "triple jeopardy" (*37*). First, poor and minority groups are known to suffer negative health effects from social and behavioral determinants of health (e.g., psychosocial stress, poor nutrition, and inadequate access to health care). Second, as suggested in this analysis, certain populations (e.g., members of minority communities, foreign-born persons, and persons who speak a non-English language at home) might be at higher risk for exposure to traffic-related air pollution as a result of residential proximity to major highways. Third, there is evidence suggesting a multiplicative interaction between the first two factors, such that socially disadvantaged groups experience disproportionately larger adverse health effects from exposure to air pollution (*37–39*).

Limitations

The findings in this report are subject to at least three limitations. First, the area-proportion technique used assumes a homogeneous population density and population distribution by sociodemographic characteristics within each census tract, which might result in erroneous count estimates. The direction of the bias (overestimate or underestimate) could differ across population subgroups. For example, if socioeconomic disparities associated with residential proximity to major highways exist within census tracts, then the calculated percentages for minority subgroups might be underestimated and those for nonminority subgroups might be overestimated. Second, living within 150 meters of a major highway is only a surrogate for exposure to traffic-related air pollution. This study did not address the following factors that could affect exposure to traffic-related air pollution: number and type of vehicles traveling on major highways, cumulative effect of living near multiple roads, individual time-activity patterns (e.g., time spent at home vs. away, time spent inside vs. outside), meteorologic conditions, topography, and land-use patterns. Finally, it was not possible to perform testing to determine if the differences in the estimated percentages across population subgroups were statistically significant. However, the findings are consistent with other published research (*32,33*).

Conclusion

Primary prevention strategies to reduce traffic emissions include improving access to alternative transportation options (e.g., transit, rideshare programs, walking, and cycling), financial incentives to reduce vehicle miles traveled and congestion, diesel retrofitting, and promoting the use of electric and low emission vehicles. In addition, secondary prevention strategies to reduce exposure to traffic emissions include mitigation techniques for existing homes and buildings (e.g., roadside barriers and improved ventilation systems) and land-use policies that limit new development close to heavily-trafficked roads. For example, a recent study of roadside barriers suggests that solid barriers (i.e., noise barriers) might be more effective at mitigating traffic-related air pollution than vegetative barriers (i.e., tree stands) (*41*). In California, public health law has been used to restrict siting of new schools near major highways and busy traffic corridors (California Education Code §7213.c.2.C). Implementation of these strategies can help reduce exposures to traffic-related air pollution and health risks associated with these exposures.

Focusing prevention and mitigation interventions in urban areas, where there is a higher concentration of traffic-related air pollution and a greater proportion of the population residing near major roads, and in areas with the most socially disadvantaged populations will likely result in larger health benefits (*37*). Future and ongoing efforts to address disparities in residential proximity to major highways and traffic-related air pollution exposures will require an interdisciplinary collaboration between transportation, urban planning, and public health specialists.

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Health-Care Access and Preventive Services

Colorectal Cancer Incidence and Screening — United States, 2008 and 2010

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Introduction

Colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States among cancers that affect both men and women (*1*). Screening for CRC reduces incidence and mortality (*2*). In 2008, the U.S. Preventive Services Task Force (USPSTF) recommended that persons aged 50–75 years at average risk for CRC be screened for the disease by using one or more of the following methods: fecal occult blood testing (FOBT) every year, sigmoidoscopy every 5 years (with high-sensitivity FOBT every 3 years), or colonoscopy every 10 years (*2*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*3*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*4*). This report updates information regarding CRC screening provided in the 2011 CHDIR (*5*). The purposes of this report are to discuss and raise awareness of differences in colorectal cancer incidence, mortality, and screening and to prompt actions to reduce these disparities.

Methods

To characterize disparities for CRC incidence, CRC death rates, and CRC screening test use by test type, CDC analyzed data from multiple sources and years. Different analytic approaches were used to characterize disparities depending on the data source (i.e., deviation from referent group or comparison of weighted estimates and confidence intervals [CIs]).

To describe CRC incidence and death rates, CDC analyzed 2008 CRC incidence and mortality data from U.S. Cancer Statistics (USCS) (*1*). Demographic characteristics analyzed included sex, age, race and ethnicity. Data on household income and educational attainment are not collected by cancer registries. Race was classified as non-Hispanic white, non-Hispanic black, Asian/Pacific Islander, or American Indian/Alaska Native. Ethnicity was classified as Hispanic or non-Hispanic; persons of Hispanic ethnicity might be of any race or combination of races. Incidence data were drawn from CDC's National Program of Cancer Registries (NPCR) and the National Cancer Institute's Surveillance, Epidemiology, and End Results Program (SEER) registries that met U.S. Cancer Statistics publication criteria for the diagnosis year 2008, and mortality data were derived from the National Vital Statistics System. In 2008, all 50 states and the District of Columbia had high-quality incidence and mortality data available, and thus 100% of the U.S. population is represented for both. Incident CRCs were coded* according to the International Classification of Diseases for Oncology, Third Edition (ICD-O-3). All death certificates with CRC identified as the underlying cause of death according to the International Classification of Diseases, Tenth Revision (ICD-10) during 2008 were included in this analysis. Incidence and death rates were calculated for all age groups using SEER*Stat software (version 7.04); rates were reported per 100,000 population. Data were age-adjusted to the 2000 U.S. standard population by the direct method; corresponding 95% CIs were calculated as modified gamma intervals (*6*).

Disparities were measured as the deviations from a "referent" category rate. Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The relative difference, a percentage, was calculated by dividing the difference by the value in the referent category and multiplying by 100.

To assess disparities in CRC screening test use by test type, CDC analyzed 2010 survey data from the Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is a state-based, random digit-dialed telephone survey of the noninstitutionalized, U.S. civilian population aged ≥18 years (*7*). Survey data were available for all 50 states and the District

* Malignant behavior, ICDO3 site codes 18.0–18.9, 19.9, 20.9, and 26.0; excludes histology codes for lymphomas, mesothelioma, and Kaposi Sarcoma (9050–9055, 9140, and 9590–9989).

of Columbia. In 2010, the median response rate was 54.6%, and the median cooperation rate was 76.9% (*7*). Respondents who refused to answer, had a missing answer, or did not know the answer to a question were excluded from analysis of that specific question. Of the 226,205 persons aged 50–75 years who responded in 2010, approximately 4.2% were excluded from the analyses.

Demographic characteristics from BRFSS that were analyzed included sex, age, race, ethnicity, educational attainment, income level, disability status, health insurance status, and geographic location. Race was classified as non-Hispanic white, non-Hispanic black, Asian/Pacific Islander, American Indian/Alaska Native, or other non-Hispanic. Ethnicity was classified as Hispanic or non-Hispanic; persons of Hispanic ethnicity might be of any race or combination of races. Educational attainment was classified as less than high school, some high school, high school graduate or equivalent, some college/technical school, or college graduate. Income level was classified as <$15,000, $15,000–$34,999, $35,000–$49,999, $50,000–$74,999, and ≥$75,000.The median response rate[†] and the median cooperation rate[§] are based on Council of American Survey and Research Organizations guidelines (available at http://www.cdc.gov/brfss/annual_data/annual_2010.htm).

BRFSS respondents aged 50–75 years, the age group for which USPSTF recommends CRC screening, were asked if they had ever used a "special kit at home to determine whether the stool contains blood (FOBT)," whether they had ever had "a tube inserted into the rectum to view the colon for signs of cancer or other health problems (sigmoidoscopy or colonoscopy)," and when these tests were last performed. To allow assessment of up-to-date screening according to current USPSTF guidelines, the measure of overall screening prevalence used in the 2011 CHDIR (*5*) was modified. Percentages were estimated for persons aged 50–75 years who reported receiving an FOBT within 1 year, a sigmoidoscopy within 5 years with FOBT within 3 years, or a colonoscopy within 10 years preceding the survey. Data for the three recommended test options were combined to estimate overall prevalence of up-to-date CRC screening. States were categorized into four poverty quartiles by using data from the 2010 Current Population Survey (available at http://cps.ipums.org/cps), and composite screening rates per quartile were calculated. Composite percentages and 95% CIs were calculated by selected characteristics. Data were weighted according to the sex, racial/ethnic, and age distribution of the adult population of each state by using intercensal estimates and were age standardized to the 2010 BRFSS population aged 50–75 years.

[†] The percentage of persons who completed interviews among all eligible persons, including those who were not contacted successfully.

[§] The percentage of persons who completed interviews among all eligible persons who were contacted.

Results

Compared with women, men had higher CRC incidence rates (51.6 versus 38.7 per 100,000 population) and death rates (19.7 vs. 13.8 per 100,000 population) in 2008 (Table 1). CRC incidence and mortality increased with advancing age (Figure). Incidence and death rates were highest among persons aged ≥75 years. Non-Hispanic blacks had higher CRC incidence and death rates than non-Hispanic whites, Asians/Pacific Islanders, and American Indians/Alaska Natives. Incidence and death rates were higher among non-Hispanics than among Hispanics.

In 2010, among respondents aged 50–75 years, 64.5% reported being up-to-date with CRC screening (Table 2). The proportion of respondents who reported having had any of the test options was greater among persons aged 65–75 years compared with those aged 50–64 years, among non-Hispanics compared with Hispanics, among persons with a disability compared with those with no disability, and among persons with health insurance compared with those with no health insurance. This disparity in reported test use by health insurance status was evident for all three test types (FOBT, sigmoidoscopy with FOBT, and colonoscopy). The proportions for colonoscopy use and for overall CRC screening were slightly greater among women than among men. Reported rates of test use increased with increasing education level and household income, with the greatest increases occurring among those who reported having had a colonoscopy within 10 years preceding the survey. The prevalence of respondents who were up-to-date with CRC screening was highest among non-Hispanic whites (66.4%), followed closely by non-Hispanic blacks (64.8%). Non-Hispanic whites had the greatest proportion of respondents reporting having had a colonoscopy within 10 years preceding the survey compared with all other races; non-Hispanic blacks had the greatest proportion of respondents reporting having had FOBT within the year preceding the survey.

By composite state poverty quartiles, the relationship between reported screening rates and poverty varied by test type. No consistent relationship was observed between poverty and reported use of FOBT; however, the number of respondents who reported use of FOBT testing was small (Table 3). An inverse relationship was observed for reported use of colonoscopy and poverty, with reported colonoscopy use generally decreasing with increasing levels of poverty (Table 3).

TABLE 1. Colorectal cancer incidence and death rates,* by selected demographic characteristics — United States, 2008†

Characteristic	Incidence		Absolute difference (Rate)	Relative difference (%)	Death		Absolute difference (Rate)	Relative difference (%)
	Rate	(95% CI)			Rate	(95% CI)		
Sex								
Male	51.6	(51.2–52.0)	12.9	33.3	19.7	(19.4–19.9)	5.9	42.8
Female	38.7	(38.4–39.0)	Ref.	Ref.	13.8	(13.6–14.0)	Ref.	Ref.
Age group (yrs)								
<50	6.7	(6.6–6.8)	Ref.	Ref.	1.7	(1.7–1.8)	Ref.	Ref.
50–54	55.7	(54.7–56.7)	49.0	731.3	13.4	(12.9–13.9)	11.7	688.2
55–59	72.7	(71.5–73.9)	66.0	985.1	21.6	(20.9–22.3)	19.9	1,170.6
60–64	101.2	(99.6–102.9)	94.5	1,410.4	32.7	(31.8–33.6)	31.0	1,823.5
65–69	152.2	(149.9–154.5)	145.5	2,171.6	48.7	(47.4–50.0)	47.0	2,764.7
70–74	199.0	(196.0–201.9)	192.3	2,870.1	70.1	(68.3–71.8)	68.4	4,023.5
≥75	283.5	(281.1–285.9)	276.8	4,131.3	134.0	(132.4–135.7)	132.3	7,782.4
Race								
White, non-Hispanic	43.8	(43.6–44.1)	Ref.	Ref.	16.1	(15.9–16.2)	Ref.	Ref.
Black, non-Hispanic	53.9	(53.0–54.7)	10.1	23.1	23.5	(22.9–24.1)	7.4	46.0
Asian/Pacific Islander	34.5	(31.8–37.3)	-9.3	-21.2	15.9	(14.1–17.9)	-0.2	-1.2
American Indian/Alaska Native	35.1	(34.1–36.2)	-8.7	-19.9	11.5	(10.9–12.1)	-4.6	-28.6
Ethnicity								
Hispanic§	37.8	(37.0–38.6)	Ref.	Ref.	12.1	(11.7–12.6)	Ref.	Ref.
Non-Hispanic	45.0	(44.8–45.2)	7.2	19.0	16.7	(16.5–16.8)	4.6	38.0

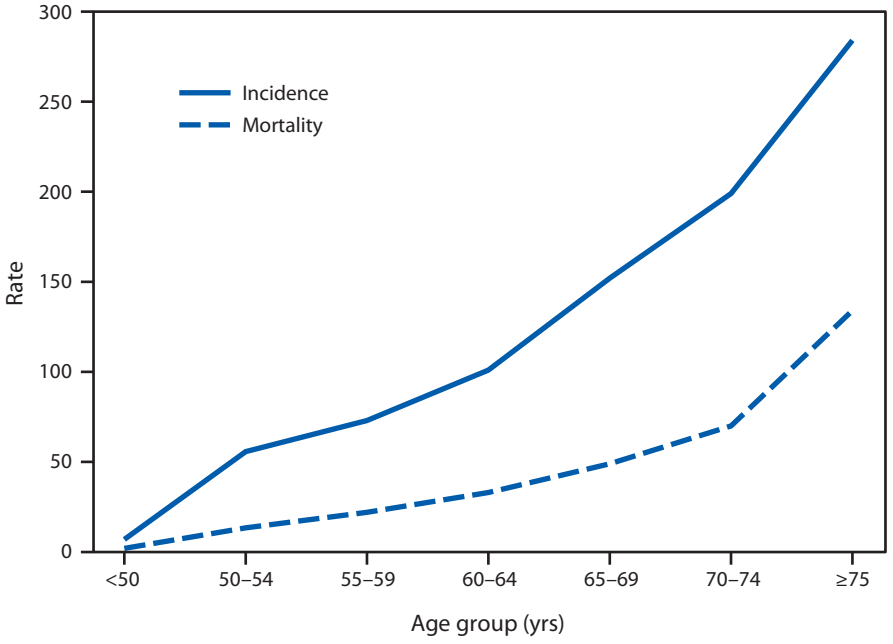
Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.

* Per 100,000 population

† Rates are age-adjusted to the U.S. Census Bureau's 2000 US Standard Population for 19 age groups (available at http//seer.cancer.gov/stdpopulations/stdpop.19ages.html). Incidence data come from CDC's National Program of Cancer Registries (NPCR) and the National Cancer Institute's Surveillance, Epidemiology, and End Results Program (SEER) registries that met U.S. Cancer Statistics publication criteria for diagnosis year 2008 and cover 100% of the U.S. population. Underlying mortality data are provided by the National Vital Statistics System and cover 100% of the U.S. population.

§ Persons of Hispanic ethnicity might be of any race or combination of races.

FIGURE. Colorectal cancer incidence and mortality rates per 100,000 population, by age group — United States, 2008*



* Rates are age-adjusted to the 2000 U.S.Census Bureau Standard Population for 19 age groups (available at http://seer.cancer.gov/stdpopulations/stdpop.19ages.html). Incidence data come from from CDC's National Program of Cancer Registries (NPCR) and the National Cancer Institute's Surveillance, Epidemiology, and End Results Program (SEER) registries that met U.S. Cancer Statistics publication criteria for diagnosis year 2008 and cover 100% of the U.S. population. Underlying mortality data are provided by the National Vital Statistics System and cover 100% of the U.S. population.

Discussion

CRC incidence and death rates were higher among older, male, and non-Hispanic populations. CRC incidence and death rates for many of these groups exceeded *Healthy People 2020* targets of 38.6 new CRC cases per 100,000 population and 14.5 CRC deaths per 100,000 population (*8*). Progress in reducing deaths from CRC has been achieved through a combination of primary prevention, early detection, and treatment (*9*). In 2010, approximately two thirds of the U.S. population aged 50–75 years met USPSTF criteria for up-to-date CRC screening. The proportion screened in a timely manner varied by race and other demographic characteristics.

Although estimates of the overall prevalence of up-to-date CRC screening in this report and in the 2011 report were computed differently, certain patterns were similar. The 2011 report analyzed BRFSS data for 2002–2008. During that time period, non-Hispanic whites had the highest overall prevalence of CRC screening, followed closely by non-Hispanic blacks (*3*). The same finding

TABLE 2. Percentage* of respondents aged 50–75 years who reported being up-to-date with colorectal cancer screening, by selected characteristics and test type — Behavioral Risk Factor Surveillance System, United States, 2010

	FOBT within 1 yr		Flexible sigmoidoscopy within 5 yrs with FOBT within 3 years		Colonoscopy within 10 yrs		Total CRC screening†	
Characteristic	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**
Sex								
Male	12.4	(12.0–12.8)	1.4	(1.3–1.5)	59.6	(59.0–60.2)	**64.0**	**(63.4–64.6)**
Female	11.1	(10.9–11.4)	1.2	(1.1–1.3)	60.9	(60.4–61.3)	**64.9**	**(64.5–65.4)**
Age group (yrs)								
50–64	10.3	(10.1–10.6)	1.0	(0.9–1.1)	55.4	(55.0–55.9)	**59.7**	**(59.2–60.1)**
65–75	15.1	(14.7–15.6)	1.9	(1.8–2.1)	71.9	(71.3–72.4)	**76.1**	**(75.6–76.7)**
Race								
White, non-Hispanic	11.3	(11.1–11.6)	1.2	(1.2–1.4)	62.5	(62.1–62.9)	**66.4**	**(66.0–66.8)**
Black, non-Hispanic	15.1	(14.2–16.1)	1.4	(1.1–1.7)	59.8	(58.5–61.1)	**64.8**	**(63.6–66.1)**
Asian/Pacific Islander	12.5	(10.5–14.7)	1.6	(0.9–2.7)	49.3	(45.9–52.6)	**54.4**	**(51.0–57.8)**
American Indian/Alaska Native	14.6	(12.1–17.6)	0.9	(0.5–1.9)	48.9	(45.0–52.8)	**55.2**	**(51.3–59.1)**
Other, non-Hispanic	13.5	(11.9–15.4)	2.1	(1.5–3.0)	55.1	(52.4–57.7)	**61.3**	**(58.7–63.8)**
Ethnicity								
Non-Hispanic	11.8	(11.6–12.1)	1.3	(1.2–1.4)	61.6	(61.2–61.9)	**65.7**	**(65.3–66.1)**
Hispanic§	10.7	(9.6–11.8)	1.2	(0.9–1.7)	45.4	(43.6–47.3)	**51.0**	**(49.1–52.9)**
Educational attainment								
Less than high school	8.3	(7.1–9.7)	0.7	(0.4–1.2)	34.6	(32.2–37.0)	**39.2**	**(36.7–41.7)**
Some high school	10.4	(9.5–11.5)	0.9	(0.6–1.3)	44.3	(42.7–46.0)	**49.4**	**(47.7–51.1)**
High school graduate or equivalent	11.0	(10.6–11.5)	0.9	(0.8–1.1)	54.9	(54.2–55.6)	**59.3**	**(58.6–60.0)**
Some college/technical school	12.3	(11.9–12.8)	1.4	(1.3–1.6)	61.2	(60.5–61.9)	**65.7**	**(65.0–66.3)**
College graduate	12.5	(12.1–12.9)	1.7	(1.5–1.8)	68.3	(67.7–68.9)	**72.0**	**(71.4–72.6)**
Income level								
<$15,000	11.2	(10.4–12.0)	0.9	(0.7–1.2)	42.3	(41.0–43.6)	**47.7**	**(46.4–49.0)**
$15,000–$34,999	11.6	(11.1–12.1)	1.1	(1.0–1.3)	50.9	(50.2–51.7)	**56.0**	**(55.2–56.8)**
$35,000–$49,999	12.0	(11.4–12.7)	1.5	(1.3–1.8)	60.5	(59.5–61.5)	**65.0**	**(64.0–65.9)**
$50,000–$74,999	12.0	(11.4–12.6)	1.3	(1.1–1.6)	65.1	(64.2–66.0)	**68.9**	**(68.0–69.7)**
≥$75,000	12.1	(11.7–12.6)	1.7	(1.5–1.9)	69.9	(69.2–70.7)	**73.4**	**(72.7–74.1)**
Disability status								
Has a disability	12.5	(12.1–12.9)	1.4	(1.2–1.6)	61.7	(61.1–62.4)	**66.3**	**(65.7–67.0)**
Does not have a disability	11.5	(11.2–11.7)	1.2	(1.2–1.4)	59.7	(59.2–60.2)	**63.8**	**(63.3–64.3)**
Health insurance status								
Has health insurance	12.2	(11.9–12.4)	1.4	(1.3–1.5)	63.3	(62.9–63.7)	**67.5**	**(67.2–67.9)**
Does not have health insurance	7.9	(6.8–9.1)	0.4	(0.3–0.6)	31.6	(29.7–33.5)	**35.4**	**(33.5–37.5)**
Total	**11.7**	**(11.5–12.0)**	**1.3**	**(1.2–1.4)**	**60.2**	**(59.9–60.6)**	**64.5**	**(64.1–64.8)**

Abbreviations: 95% CI = 95% confidence interval; CRC = colorectal cancer; FOBT = fecal occult blood testing.
* Percentages standardized to age distribution in the 2010 Behavioral Risk Factor Surveillance System.
† Home FOBT within the past year, flexible sigmoidoscopy within the past 5 years with FOBT within the past 3 years, or colonoscopy within the past 10 years.
§ Persons of Hispanic ethnicity might be of any race or combination of races.

was observed in 2010. American Indians/Alaska Natives and Hispanics had lower CRC screening rates in 2002–2008 than non-Hispanic blacks. This disparity persisted in 2010. The pattern was less consistent for the Asian/Pacific Islander population; in 2002 and 2004, their overall prevalence of up-to-date CRC screening was substantially lower than the prevalence for non-Hispanic whites. The gap narrowed in 2006 and 2008 but widened in 2010.

In 2010, CRC screening test use increased with age, educational level, and household income level. The demographic disparities were greater for colonoscopy than for sigmoidoscopy and FOBT. Similar findings were reported in the 2011 report (*3*) and in other previous studies (*10–12*). Having health insurance is also a strong predictor of screening for colorectal cancer (*11,13,14*). Disparities in the overall prevalence of up-to-date CRC screening by health insurance status were observed in 2008 (*5*) and 2010. Screening rates among insured respondents were 66.6 in 2008 and 67.5 in 2010. Rates among uninsured respondents were 37.5 in 2008 and 35.4 in 2010. Medicare has covered CRC screening for enrollees since 2001. Although this expansion of cancer screening coverage has increased CRC screening among older persons, persistent racial/ethnic, socioeconomic, and geographic disparities in test use have been reported among persons aged ≥65 years (*15–17*). Among younger adults, those with lower incomes and less than a high school education are less likely to have health-care insurance than those with higher incomes and at least some college education (*18*). For many patients, implementation of

TABLE 3. Percentage of persons reporting having had colorectal cancer screening, by state poverty-level quartiles* — Behavioral Risk Factor Surveillance System, United States, 2010

State/Area	Population in poverty (%)	FOBT within past 1 yr		Colonoscopy within past 10 yrs		Overall CRC screening†	
		%	(95% CI)	%	(95% CI)	%	(95% CI)
Quartile 1							
New Hampshire	8.2	10.2	(9.1–11.5)	72.2	(70.3–74.1)	**75.1**	**(73.2–76.9)**
Connecticut	9.1	11.5	(10.1–13.0)	72.5	(70.3–74.5)	**74.8**	**(72.8–76.8)**
Maryland	9.2	14.7	(13.3–16.1)	68.5	(66.6–70.4)	**72.2**	**(70.3–73.9)**
Wyoming	9.4	8.3	(7.3–9.4)	52.9	(50.9–54.9)	**56.4**	**(54.4–58.4)**
Vermont	9.8	8.3	(7.4–9.3)	68.8	(67.1–70.5)	**71.6**	**(69.9–73.2)**
New Jersey	10.1	11.6	(10.5–12.9)	60.4	(58.6–62.2)	**64.6**	**(62.8–66.3)**
Nebraska	10.4	8.8	(7.9–9.8)	56.4	(54.6–58.2)	**60.0**	**(58.2–61.7)**
Virginia	11.0	12.7	(10.9–14.6)	63.2	(60.5–65.8)	**67.1**	**(64.4–69.6)**
Utah	11.2	4.6	(3.9–5.4)	65.6	(63.9–67.3)	**67.0**	**(65.3–68.7)**
Pennsylvania	11.2	8.9	(8.0–9.8)	63.2	(61.4–64.9)	**66.3**	**(64.6–68.0)**
Iowa	11.3	10.8	(9.6–12.2)	60.3	(58.3–62.3)	**63.3**	**(61.3–65.3)**
Wisconsin	11.4	8.7	(7.4–10.1)	64.3	(61.8–66.7)	**68.1**	**(65.6–70.5)**
Massachusetts	11.6	11.9	(10.9–12.9)	72.3	(70.7–73.8)	**75.1**	**(73.6–76.6)**
Composite§	**10.3**	**10.7**	**(10.3–11.1)**	**64.8**	**(64.1–65.5)**	**68.2**	**(67.5–68.8)**
Quartile 2							
North Dakota	11.7	11.1	(9.9–12.6)	51.8	(49.6–54.1)	**56.7**	**(54.4–58.9)**
Minnesota	11.9	6.3	(5.4–7.4)	67.5	(65.4–69.5)	**69.3**	**(67.3–71.3)**
Maine	12.2	11.6	(10.6–12.7)	70.7	(69.0–72.2)	**73.7**	**(72.1–75.2)**
Hawaii	12.4	16.5	(14.8–18.2)	51.1	(48.8–53.4)	**60.4**	**(58.1–62.6)**
Washington	12.4	13.9	(13.1–14.7)	66.7	(65.5–67.9)	**70.9**	**(69.7–72.0)**
Alaska	12.5	8.1	(5.6–11.5)	57.4	(52.6–62.1)	**58.8**	**(54.0–63.4)**
Delaware	13.2	8.7	(7.4–10.2)	68.7	(66.2–71.2)	**70.6**	**(68.1–73.0)**
Colorado	13.3	12.0	(11.0–13.0)	59.4	(57.8–61.0)	**65.1**	**(63.6–66.7)**
Oklahoma	13.7	9.3	(8.3–10.4)	50.8	(49.0–52.7)	**54.4**	**(52.6–56.3)**
Ohio	13.7	11.7	(10.7–12.9)	58.0	(56.2–59.7)	**62.6**	**(60.9–64.4)**
Kansas	13.8	11.3	(10.4–12.4)	58.9	(57.2–60.5)	**63.0**	**(61.4–64.6)**
Louisiana	14.0	12.6	(11.4–14.0)	55.0	(53.1–56.9)	**59.9**	**(58.0–61.8)**
Illinois	14.0	7.3	(6.1–8.6)	55.9	(53.3–58.4)	**58.3**	**(55.7–60.8)**
Composite	**13.0**	**10.4**	**(10.0–10.8)**	**59.1**	**(58.3–59.9)**	**63.0**	**(62.2–63.8)**

See table footnotes on the next page.

the Affordable Care Act has removed financial barriers to CRC screening by mandating that nongovernmental health plans cover certain preventive health services without cost-sharing requirements (*19*).

FOBT and sigmoidoscopy screening rates were low in 2010. Previous studies have noted a continued decline in use of these tests (*12,20–22*), despite the fact that screening with each has been reported to be associated with reduced mortality from CRC (*23,24*). Some primary care physicians perceive FOBT and sigmoidoscopy to be less effective in reducing CRC mortality than colonoscopy, which might influence which tests they recommend to their patients (*25–27*). Studies indicate that some patients prefer FOBT, and discordance between physician and patient preferences might affect uptake of CRC screening (*28–30*). Discussing multiple options for CRC screening with patients and acknowledging their preferences when recommendations are made could contribute to improved completion of testing.

State-level poverty percentages were less clearly associated with use of FOBT compared with colonoscopy. During 2002–2008, screening with annual FOBT or lower endoscopy within 10 years was related to both income and state poverty levels (*3*). In previous studies of trends in CRC screening, changes in FOBT and colonoscopy use varied substantially by income level, health insurance status, race/ethnicity, and other demographic characteristics (*31,32*). Additional studies are needed to investigate the effects of poverty and sociocultural indicators on test use, independent of insurance status.

CDC has funded activities to improve CRC screening rates, including efforts to increase access to screening for underserved populations. The Colorectal Cancer Control Program (CRCCP) was established in 2009 following the successful implementation of a CRC screening demonstration program in five sites across the country (*33*). CRCCP funds 25 states and four tribes, with the goal of increasing screening rates among those aged 50–75 years to 80% in funded states (http://www.cdc.gov/cancer/colorectal). Approximately one third of funds are used to provide direct screening services and follow-up care to low-income men and women aged 50–64 years who are underinsured or uninsured. The majority of funds are used to promote and implement evidence-based strategies recommended by the Task Force on Community

TABLE 3. (*Continued*) Percentage of persons reporting having had colorectal cancer screening, by state poverty-level quartiles* — Behavioral Risk Factor Surveillance System, United States, 2010

State/Area	Population in poverty (%)	FOBT within past 1 yr		Colonoscopy within past 10 yrs		Overall CRC screening†	
		%	(95% CI)	%	(95% CI)	%	(95% CI)
Quartile 3							
Nevada	14.6	10.0	(8.1–12.2)	53.3	(49.8–56.7)	**57.5**	**(54.1–60.9)**
Oregon	14.6	11.5	(10.2–12.9)	57.9	(55.7–60.1)	**63.8**	**(61.6–65.9)**
Michigan	14.6	11.5	(10.5–12.7)	65.8	(64.0–67.4)	**69.3**	**(67.6–70.9)**
Florida	14.7	13.5	(12.5–14.7)	61.3	(59.6–63.1)	**65.7**	**(63.9–67.4)**
South Carolina	14.8	9.3	(8.2–10.6)	61.7	(59.5–63.8)	**64.9**	**(62.7–67.0)**
Rhode Island	15.1	9.6	(8.4–10.9)	71.7	(69.7–73.6)	**74.1**	**(72.2–76.0)**
Idaho	15.2	8.1	(7.2–9.2)	52.5	(50.4–54.5)	**55.9**	**(53.9–57.9)**
Montana	15.3	8.8	(7.8–10.0)	53.8	(51.8–55.8)	**57.9**	**(55.8–59.9)**
South Dakota	15.5	10.1	(8.9–11.4)	60.9	(58.8–63.0)	**63.9**	**(61.8–66.0)**
California	15.9	19.3	(18.3–20.4)	52.6	(51.1–54.1)	**62.1**	**(60.7–63.6)**
Missouri	16.3	8.5	(7.0–10.2)	60.1	(57.4–62.7)	**63.4**	**(60.7–65.9)**
Tennessee	16.8	12.8	(11.3–14.4)	56.7	(54.2–59.1)	**61.0**	**(58.6–63.4)**
New York	17.0	9.8	(8.8–10.9)	66.7	(64.9–68.4)	**69.2**	**(67.4–70.8)**
Composite	**15.6**	**13.5**	**(13.1–14.0)**	**59.6**	**(58.9–60.3)**	**64.8**	**(64.1–65.5)**
Quartile 4							
Indiana	17.3	10.0	(8.9–11.1)	57.6	(55.8–59.4)	**61.2**	**(59.4–63.0)**
West Virginia	17.4	12.9	(11.4–14.5)	49.9	(47.6–52.2)	**54.7**	**(52.4–57.0)**
District of Columbia	17.5	16.5	(14.6–18.6)	65.9	(63.2–68.5)	**71.1**	**(68.5–73.5)**
North Carolina	17.6	14.1	(12.9–15.3)	65.0	(63.2–66.7)	**68.7**	**(66.9–70.4)**
Kentucky	17.7	8.6	(7.5–9.9)	59.2	(57.0–61.4)	**61.7**	**(59.5–63.9)**
Alabama	17.8	10.2	(9.0–11.5)	58.2	(56.0–60.3)	**62.4**	**(60.2–64.5)**
Texas	18.4	8.7	(7.8–9.8)	55.1	(53.1–57.2)	**58.7**	**(56.7–60.8)**
Georgia	19.0	14.1	(12.6–15.7)	62.5	(60.2–64.7)	**66.3**	**(64.1–68.5)**
Arkansas	19.2	10.2	(8.8–11.9)	54.6	(51.9–57.2)	**58.9**	**(56.2–61.5)**
New Mexico	19.7	9.9	(8.7–11.2)	55.2	(53.1–57.2)	**59.2**	**(57.2–61.2)**
Arizona	22.5	11.7	(10.1–13.6)	60.3	(57.3–63.3)	**64.1**	**(61.1–67.0)**
Mississippi	23.4	11.0	(9.9–12.2)	52.8	(50.8–54.7)	**57.1**	**(55.1–59.0)**
Composite	**18.7**	**11.0**	**(10.6–11.5)**	**58.4**	**(57.6–59.2)**	**62.6**	**(61.3–63.0)**

Abbreviations: 95% CI = 95% confidence interval; CRC = colorectal cancer; FOBT = fecal occult blood testing.

* Quartiles were determined by calculating the state-level percent of residents living at or below the poverty level, and the range (low to high); the range was divided evenly into three groups by ranking the states from lowest to highest for the percentage living in poverty. **Source:** Current Population Survey 2010 file (available at http://www.census.gov/hhes/www/poverty/data).

† Home FOBT within the past year, flexible sigmoidoscopy within the past 5 years with FOBT in the last 3 years, or colonoscopy within the last 10 years.

§ The weighted number of persons who received a test divided by the estimated population total of all states within the quartile.

Preventive Services (http://www.thecommunityguide.org/index.html) to increase population-level CRC screening. Funded states and tribes are encouraged to partner with health-care systems, insurers, worksites, and others to maximize the impact of implemented interventions. To date, all funded states and tribes have implemented at least one evidence-based intervention, with the majority implementing two or more. Grantees have partnered with federally qualified health centers (i.e., organizations that receive grants under Section 330 of the Public Health Service act) and private and nonprofit health-care systems to implement patient navigation programs and interventions to reduce structural barriers to screening, with private health insurers and state Medicaid offices to implement provider and patient reminder systems, and with comprehensive cancer control coalitions and local health departments to implement small media campaigns.

CDC also funds the National Comprehensive Cancer Control Program (NCCCP), which provides support to all 50 states and the District of Columbia, seven tribes/tribal organizations, and seven U.S.-associated Pacific Islands/Territories to establish partnerships, determine priorities, and create and implement cancer plans to reduce the burden of cancer in their communities (*34*). Activities that have been implemented successfully by selected NCCCP programs to reduce the burden of CRC have included initiation of professional education and practice improvement initiatives for primary care providers and collaboration with community-based organizations to promote CRC prevention (*35*). Many grantees also have made the elimination of health disparities a priority. Some include goals and objectives to improve cancer prevention, early detection, treatment, and survivorship care among disparate populations in their cancer plans (http://cancercontrolplanet.cancer.gov).

Limitations

The findings in this report are subject to at least six limitations. First, cancer registries have an interval of approximately 24 months after the close of the diagnosis year to submit cases to NPCR and SEER, which affects the timely calculation of cancer incidence rates. The mose recent year for which incidence data were available for this report was 2008. Second, variation in the quality of race and ethnicity information in medical records and death certificates (*36,37*) could influence the accuracy of surveillance data. Third, BRFSS results might underestimate or overestimate actual CRC screening test rates because BRFSS does not determine the indication for the test (screening versus diagnostic use) or whether the tests are conducted according to timelines recommended in CRC screening guidelines. Fourth, because BRFSS does not collect information from persons in institutions, nursing homes, long-term–care facilities, military installations, and correctional institutions, the results cannot be generalized to these populations. Fifth, BRFSS responses are self-reports and not validated by medical record or claims data review. Finally, participation rates for random-digit-dialed health surveys have been decreasing. However, although BRFSS has a low median response rate, the BRFSS weighting procedure partially corrects for nonresponse.

Conclusion

Disparities in CRC incidence, mortality, and screening persist. CRC incidence and death rates have decreased among adults in the United States since 1999 (*38*). However, men have higher rates of both incidence and mortality than women, and non-Hispanic blacks have higher rates than other racial and ethnic groups (*1*). Although increased screening could reduce mortality from CRC by an estimated 50% (*9*), the prevalence of up-to-date screening according to USPSTF guidelines among Asians/Pacific Islanders and American Indians/Alaska Natives remains lower than the prevalence for other racial and ethnic groups. Coordinated and systems-focused efforts by CDC and other federal agencies, state and local health departments, and the medical community to address barriers to end disparities in CRC screening should continue so that the incidence and mortality associated with this disease can be reduced among all populations.

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Health Insurance Coverage — United States, 2008 and 2010

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Introduction

One out of four adults aged 19–64 years reported not having health insurance at some time during 2011, with a majority remaining uninsured for ≥1 year (*1*). In the first quarter of 2010, an estimated 59.1 million persons had no health insurance for at least part of the year, an increase from 58.7 million in 2009 and 56.4 million in 2008 (*2*). The unemployment rate increased from 5.8% to 9.3% from 2008 to 2009, the largest 1-year increase on record (*3*). Losing or changing jobs was the primary reason persons experienced a gap in health insurance (*1*). Employment-based coverage for persons aged <65 years continued to erode for the ninth year in a row, falling 3.0 percentage points from 61.9% in 2008 to 58.9% in 2009 (*3*). Persons aged 18–64 years with no health insurance during the preceding year were seven times as likely as those continuously insured to forgo needed health care because of cost (*2*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*4*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*5*). This report provides updated information that complements the health insurance coverage data published in the 2011 CHDIR (*6*). This report on health insurance coverage discusses and raises awareness of differences in the characteristics of persons who lack health insurance coverage, and prompts actions to reduce these disparities.

Methods

To identify disparities in the lack of health insurance coverage for adults aged 18–64 years for different demographic and socioeconomic groups over time, CDC analyzed data from the 2008 and 2010 National Health Interview Survey (NHIS). NHIS is a cross-sectional survey of a representative sample of the civilian, noninstitutionalized U.S. household population. NHIS includes various questions on family health insurance (ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2010/English/qfamily.pdf). The 2010 NHIS included 27,157 respondents, of whom a total of 80 were excluded because of unknown insurance status. The overall response rate was 60.8%. The questionnaire begins with the question "are you/is anyone in the family covered by any kind of health insurance or some kind of health-care plan?" Respondents were considered uninsured if they did not have any private health insurance, Medicare, Medicaid, State Children's Health Insurance Program coverage, state-sponsored or other government-sponsored health plan, or a military health-care plan at the time of the interview. Persons also were considered uninsured if they reported having only Indian Health Service coverage or a private plan that paid for only one type of service (e.g., unintentional injuries or dental care). Rate of uninsured is the percentage of adults aged 18–64 who did not have health insurance.

Disparities were examined by characteristics that included race and ethnicity, sex, age (adults aged 18–64 years), household income, disability status, and educational attainment. Poverty status was defined by using the ratio of income to the federal poverty level (FPL), in which "poor" is <1.0 times FPL, "near poor" is 1.0–2.9 times FPL, and "nonpoor" is ≥3.0 times FPL. Educational attainment was defined as less than high school, high school graduate or equivalent, some college, and college graduate or higher. Disability was defined as limitations in a person's activity because of a health condition or impairment. Race was defined as white, black, American Indian/ Alaska Native, and other and multiple race. Ethnicity was defined as Hispanic or non-Hispanic.

Disparities were measured as deviations from a "referent" category for an uninsured rate; defined as the lowest percentage for a population group-specific without health insurance. Absolute difference was measured as the simple difference between an estimate for a population subgroup and the estimate for the referent category rate. The relative difference, a percentage, was calculated by dividing the absolute difference by the value in the referent category and multiplying by 100. The 95% confidence intervals for uninsured rates were estimated using statistical software (*7*). Pair-wise differences by sex, age

group, race/ethnicity, disability status, educational achievement, and differences between 2008 and 2010 were tested by the z-statistic (one-tailed) at the 0.05 level of significance. A covariance of zero between estimates in conducting these tests was assumed. When testing differences within demographic groups, the Bonferroni method was used to account for multiple comparisons. If κ comparisons existed within a group, the level of significance was set to 0.05/κ. Estimates with a relative standard error of >20% were considered unreliable.

Results

During 2010, substantial disparities persisted in uninsured rates for all demographic and socioeconomic groups. Statistically significant disparities by sex (p<0.001) also continued during 2010, with a higher percentage of males (24.1%) than females (18.8%) being uninsured (Table 1). The uninsured rate for young adults aged 18–34 years was approximately double the uninsured rate for adults aged 45–64 years (aged 18–34 years, 28.5%; aged 45–64 years, 15.4%). Uninsured rates for all the age groups analyzed were significantly higher (p<0.001) than with adults aged 45–64 years.

During 2010, among adults aged 18–64 years, approximately two out of five persons of Hispanic ethnicity and one out of four non-Hispanic blacks were classified as uninsured. Both these groups had significantly higher (p<0.001) uninsured rates (41.0% and 26.2%, respectively), compared with Asians/Pacific Islanders and non-Hispanic whites (17.3% and 16.1%, respectively). No significant difference in uninsured rates existed between non-Hispanic whites and Asians/Pacific Islanders. During 2010, approximately half of uninsured adults were non-Hispanic whites (Table 2). Hispanics accounted for 29.3% of the uninsured population. The estimate of uninsured rate for non-Hispanic American Indian and Alaska Native persons was not reliable enough to make comparisons with estimates from other subpopulations.

TABLE 1. Percentage* of adults aged 18–64 years without health insurance, by selected demographic characteristics — National Health Interview Survey, United States, 2008 and 2010

	2008				2010			
Characteristic	%	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	%	(95% CI)	Absolute difference (percentage points)	Relative difference (%)
Sex								
Male	22.2	(21.0–23.5)	4.9	28.3	24.1	(23.0–25.2)	5.3	28.5
Female	17.3	(16.2–18.3.)	Ref.	—	18.8	(17.8–19.7)	Ref.	Ref.
Age group (yrs)								
18–24	27.9	(25.4–30.4)	14.3	105.1	29.8	(27.6–31.9)	14.4	93.5
25–34	26.6	(24.7–28.5)	13.0	95.6	27.2	(25.6–28.9)	11.8	76.6
35–44	18.7	(17.3–20.2)	5.1	37.5	21.4	(20.1–22.7)	6.0	39.0
45–64	13.6	(12.6–14.6)	Ref.	—	15.4	(14.5.–16.2)	Ref.	Ref.
Poverty status†								
Poor	37.0	(34.0–40.0)	28.1	315.1	41.2	(38.9–43.5)	33.1	410.5
Near poor	30.5	(28.8–32.2)	21.6	242.2	34.2	(32.8–35.6)	26.1	323.6
Nonpoor	8.9	(8.1–9.8)	Ref.	—	8.1	(7.4–8.7)	Ref.	Ref.
Race/Ethnicity								
Hispanic§	41.6	(38.8–44.4)	27.6	197.1	41.0	(39.0–43.0)	24.9	154.2
White, non-Hispanic	14.6	(13.7–15.5)	0.6	4.3	16.1	(15.3–17.0)	Ref.	—
Black, non-Hispanic	22.1	(20.3–23.9)	8.1	57.9	26.2	(24.2–28.3)	10.1	62.6
American Indian/Alaska Native	33.7¶	—		—	33.5¶	—	—	—
Asian/Pacific Islander	14.0	(11.2–16.9)	Ref.	—	17.3	(14.7–19.8)	1.2	7.1
Other, non-Hispanic other, and multiple race	20.1¶	—	—	—	21.5¶	—	—	—
Disability status								
Persons with a disability	17.7	(16.4–19.0)	Ref.	—	19.6	(18.4–20.7)	Ref.	—
Persons without a disability	20.5	(19.4–21.5)	2.8	15.8	22.3	(21.4–23.1)	2.7	13.7
Educational attainment								
Less than high school	40.5	(37.6–43.3)	32.4	400.0	42.8	(40.6–45.0)	34.8	432.2
High school graduate or equivalent	24.4	(22.8–26.1)	16.3	201.2	27.5	(26.1–28.9)	19.5	242.5
Some college	16.6	(15.4–17.7)	8.5	104.9	20.0	(18.8–21.2)	12.0	148.8
College graduate or higher	8.1	(7.1–9.0)	Ref.	Ref.	8.0	(7.2–8.8)	Ref.	—

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.

* Rate of uninsured is the percentage of adults aged 18–64 who did not have health insurance.

† Poor = ≤1.0 times the federal poverty level (FPL), near poor = 1.0–2.9 times FPL, and nonpoor = ≥3.0 times FPL. FPL was based on U.S. Census Bureau poverty thresholds, available at http://www.census.gov/hhes/www/poverty/html.

§ Persons of Hispanic ethnicity might be of any race or combination of races.

¶ Estimates are considered unreliable because the relative standard errors are >20%.

TABLE 2. Number and percentage of adults aged 18–64 years without health insurance, by poverty status and race/ethnicity — National Health Interview Survey, United States, 2010

Characteristic	No.	(% of total)	% without health insurance
Poverty status*			
Poor	11,078,526	(30.8)	41.2
Near poor	18,246,425	(50.7)	34.2
Nonpoor	6,641,720	(18.5)	8.1
Total	**35,966,671§**	**(100.0)**	—
Race/Ethnicity			
Hispanic†	11,957,253	(29.3)	41.0
White, non-Hispanic	20,130,159	(49.5)	16.1
Black, non-Hispanic	6,097,277	(15.0)	26.2
American Indian/Alaska Native	363,140	(0.9)	33.5
Asian/Pacific Islander	1,575,972	(3.9)	17.3
Other, non-Hispanic and multiple race	560,459	(1.4)	21.5
Total	**40,684,260§**	**(100.0)**	—

* Poor = ≤1.0 time the federal poverty level (FPL), near poor = 1.0 2.9 times FPL, and nonpoor = ≥3.0 times FPL. FPL was based on U.S. Census Bureau poverty thresholds, available at http://www.census.gov/hhes/www/poverty/html.
† Persons of Hispanic ethnicity might be of any race or combination of races.
§ Totals are different because of unknown poverty status.

During 2010, among persons aged 18–64 years, uninsured rates for poor (those living at the federal poverty level [FPL]) and near poor persons (those at <3.0 times FPL) ranged from 34.2% to 41.2%, and these rates were significantly higher ($p<0.001$) than the uninsured rate among the nonpoor (those at ≥3.0 FPL) (Table 1). Approximately half (50.7%) of uninsured adults were near poor (Table 2). During 2010, income for the near poor ranged from $22,314 to $66,942 per year for a family of four. Uninsured rates for persons in the poor and near poor categories increased significantly ($p<0.014$) from 2008 (37.0% and 30.5%, respectively) to 2010 (41.2% and 34.2%, respectively). The uninsured rate for non-Hispanic blacks also increased significantly ($p<0.002$) from 22.1% in 2008 to 26.2% in 2010. No significant difference existed in the uninsured rate between 2008 (41.6%) and 2010 (41.0%) for the Hispanic population (Table 1).

Regarding educational attainment, when compared with college graduates, all groups continued to have significantly higher uninsured rates ($p<0.001$). From 2008 to 2010, uninsured rates for graduates from high school and with some college education increased significantly ($p<0.003$). The uninsured rate for persons without a disability (22.3%) also remained significantly higher ($p<0.001$) than persons with a disability (19.6%).

Discussion

During 2010, similar to the disparities observed in 2004 and 2008 (*6*), substantial disparities persisted in uninsured rates for all demographic and socioeconomic groups. From 2008 to 2010, uninsured rates increased significantly ($p<0.05$) for all groups considered in this report with the exception of persons with less than a high school diploma, college graduates, highest income group considered, Hispanics, and persons in age group 18–34 years. However, those with less than a high school diploma and Hispanics were groups with the highest uninsured rates. Chronically ill patients without insurance are more likely than those with coverage 1) not to have visited a health-care professional, and 2) either not to have a standard site for care or to identify their standard site of care as an emergency department (*8*). Because minority populations and the poor have high uninsured rates, these populations tend to visit the emergency department for nonurgent health care. Costly emergency department care could be saved if primary care were available to these populations (*9*).

Limitations

The findings in this report are subject to at least two limitations. First, health insurance coverage information in NHIS is self-reported and subject to recall bias. Second, because NHIS does not include institutionalized persons, the results are not generalizable to segments of the population that include prison inmates, military personnel, and adults in nursing homes and other long-term care facilities.

Conclusion

Disparities in health insurance coverage continue among all demographic and socioeconomic groups. Coverage expansion resulting from current or future reform of health insurance policies is likely to reduce disparities in uninsured rates. For example, after implementation of the 2010 Affordable Care Act, an estimated 6.6 million adults aged 19–25 years who might have been uninsured stayed on or joined their parents' health plans between November 2010 and November 2011 (*10*).

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Seasonal Influenza Vaccination Coverage — United States, 2009–10 and 2010–11

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Introduction

Infection with influenza viruses can cause severe morbidity and mortality among all age groups. Children, particularly those aged <5 years (*1–3*), have the highest incidence of infection during epidemic periods; however, the highest rates of influenza-associated hospitalizations and deaths are among the elderly (aged ≥65 years), children aged <2 years, and those of any age with underlying medical conditions (*1*,*4*,*5*). Each year, influenza-related complications are estimated to result in more than 226,000 hospitalizations (*6*). During 1976–2006, estimates of influenza-associated deaths in the United States ranged from approximately 3,000 to an estimated 49,000 persons (*7*,*8*) (http://www.cdc.gov/flu/keyfacts.htm#howserious). Annual vaccination is the most effective strategy for preventing influenza virus infection and its complications (*9*).

Racial and ethnic disparities in seasonal influenza vaccination coverage have been observed in previous influenza seasons among children and adults (*10*). This summary updates the evaluation of these disparities among all persons aged ≥6 months, previously reported for the 2000–01 through the 2009–10 season (*10*), with findings from the 2010–11 influenza season and compares coverage in 2009–10 and 2010–11. For the 2010–11 influenza season, the Advisory Committee on Immunization Practices (ACIP) expanded its recommendations to include annual influenza vaccination of all persons aged ≥6 months (*11*). For the first time, the 2010–11 ACIP flu season recommendations included healthy adults aged 18–49 years.

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR) (*12*). The 2011 CHDIR (*13*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The criteria for inclusion of topics that are presented in the 2013 CHDIR are described in the 2013 CHDIR Introduction (*14*). This report provides an update on the progress of influenza vaccination coverage in the United States, by age, race/ethnicity, and risk status. The purposes of this report on influenza vaccination are to discuss and raise awareness of differences in the characteristics of populations who received influenza vaccination, and to prompt actions to reduce disparities.

Methods

To estimate the progress of influenza vaccination coverage in the United States, by age, race/ethnicity, and risk status, various data sources were used. Age groups were defined as aged <45 years, 45–74 years, <75 years, ≥75 years, and ≥85 years. Race was defined as white, black, Asian/Pacific Islander (A/PI), American Indian/Alaska Native (AI/AN), and other and multiple race. Ethnicity was defined as Hispanic or non-Hispanic. Race/ethnicity categories are mutually exclusive. For the 2009–10 season, high risk conditions included asthma, other lung problems, diabetes, heart disease, kidney problems, anemia, and weakened immune system caused by a chronic illness or by medicines taken for a chronic illness. For the 2010–11 season, high risk conditions included asthma, diabetes, and heart disease. Other medical conditions that place persons at increased risk for complications from influenza (*11*) were not under surveillance for this report. For this update, vaccination by household income, educational attainment, poverty status, disability status, and geographic location were not analyzed. Data on place of birth was not available.

To estimate the proportion of persons aged ≥6 months who received influenza vaccination during the 2009–10 influenza season, combined data from the National 2009 H1N1 Flu Survey (NHFS) and the Behavioral Risk Factor Surveillance System (BRFSS) were used. The NHFS included children identified from the National Immunization Survey (NIS) and from a stand-alone telephone survey. To estimate the proportion of children aged 6 months through 17 years who received influenza vaccination during the 2010–11 influenza season, data from the NIS were used. To estimate the proportion of adults aged ≥18 years who received influenza vaccination during the 2010–11 influenza season, BRFSS data were used. Both NIS and BRFSS collected monthly data on vaccinations reported during August 2010 through May 2011 for all 50 states and the District of Columbia.

Comparisons between the 2010–11 and 2009–10 seasons used estimates for the recommended trivalent seasonal vaccines (*11*,*15*), and all 2009–10 estimates in this report are for trivalent seasonal vaccination, although for the 2009–10 seasons, two vaccines were recommended: the trivalent seasonal vaccine (*15*), along with the influenza A(H1N1)pdm09 monovalent vaccine to provide immunity against the pandemic strain that emerged in 2009 (*16*). Coverage estimates for all persons aged ≥6 months were determined using combined state-level monthly estimates weighted by the age-specific populations of each state. In 2009–10, the unweighted sample sizes for children aged 6 months through 17 years and persons ≥18 years were 149,872 and 361,485, respectively (http://www.cdc.gov/flu/professionals/vaccination/coverage_0910estimates.htm). For 2010–11, the unweighted sample size for children aged 6 months through 17 years was 116,799 and 377,569 for persons ≥18 years (http://www.cdc.gov/flu/professionals/vaccination/coverage_1011estimates.htm).

Disparities were measured as the deviations from a "referent" category cumulative proportion. Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. A description of the methods for estimating national influenza vaccination coverage and comparing coverage by age group and race/ethnicity has been published previously (*10*). The same statistical methods were used for both seasons (2009–10 and 2010–11). Estimates were suppressed if the sample size was <30 or the relative standard error was >0.3. Student t tests were used to determine statistical significance in differences between groups and between 2009–10 and 2010–11 vaccination coverage levels with significance defined as $p<0.05$. Only statistically significant results are highlighted in this report.

Results

Overall, influenza vaccination coverage was two percentage points higher for the 2010–11 season versus the 2009–10 season (43.0% versus 41.2%, respectively), primarily because of an increase in vaccine coverage among children aged 6 months–17 years (51.0% versus 43.7%, respectively) (Table). Vaccine coverage increased significantly among four groups of children: Hispanic and non-Hispanic whites, blacks, and those of other/multiple races. During the 2010–11 seasons, compared with non-Hispanic white children, coverage among Hispanic, Asian/Pacific Islander, and children of other and multiple races was higher (Table).

Overall, influenza vaccination coverage among adults aged ≥18 years remained relatively stable, at 40.4% during 2009–10 and 40.5% during the 2010–11 influenza season (Table). Among those aged 18–49 years (regardless of risk status) and 50–64 years, coverage was similar in both seasons. However, among adults aged ≥65 years, coverage decreased from 69.6% to 66.6%.

During 2010–11, among all adults, including persons aged 18–49 overall, 50–64, and ≥65 years, coverage remained lower among non-Hispanic blacks (28.1%, 38.4%, and 56.1%, respectively) than among non-Hispanic whites (31.6%, 45.7%, 67.7%, respectively). Coverage also was lower among Hispanic adults aged 18–49 and 50–64 years (27.1% and 41.9%, respectively) than among non-Hispanic whites (31.6% and 45.7%, respectively). During 2010–11, coverage was similar among Hispanics and non-Hispanic whites aged ≥65 years; however, compared with 2009–10, coverage decreased by 4.0 percentage points among non-Hispanic whites and increased by 10.7 percentage points among Hispanics (Table).

Discussion

Overall, influenza vaccination coverage estimates were significantly higher during the 2010–11 season than during the 2009–10 season because of an increase in vaccinations among children. Coverage among non-Hispanic black and Hispanic children has improved, and is either similar to, or slightly higher than, coverage among non-Hispanic white children. Efforts to improve coverage are ongoing. The federally funded Vaccines for Children program provides vaccines at no cost to children who might not otherwise be vaccinated because of inability to pay (*17*). Community demand for influenza vaccination can be increased by client reminder and recall systems (*18*). Provider and systems-based interventions (e.g., provider assessment and feedback, and use of immunization information systems) also can increase vaccination coverage (http://www.thecommunityguide.org/vaccines/universally/index.html) (*17*,*18*).

Among adults aged ≥65 years, influenza vaccination coverage was lower among non-Hispanic blacks than all other racial/ethnic groups, suggesting that additional efforts to reach this population are needed. Interventions (*18*) to provide all ACIP recommended vaccinations throughout the lifespan could be a step toward increasing coverage and addressing disparities among adults.

The revised ACIP recommendations to vaccinate all persons aged ≥6 months were in place for the entire 2010–11 influenza season, but did not appear to have an effect on coverage among those aged 18–49 years (regardless of risk status) compared with the previous season. Additional promotion of or education about the expanded recommendations might increase coverage in this age group. Promising strategies might include 1) expanding access through nontraditional settings (e.g., pharmacy, workplace, and school venues) for vaccination to reach persons who might not visit a traditional provider during the flu season; 2) improving the use of evidence-based practices at medical sites (e.g., standing orders, reminder/recall

TABLE. Seasonal influenza vaccination coverage,* by race/ethnicity† — Behavioral Risk Factor Surveillance System, National 2009 H1N1 Flu Survey, and National Immunization Survey, United States, 2009–2010 and 2010–2011.

	2009–2010			2010–2011			
Race/Ethnicity by age group	%	(95% CI)	Absolute difference§ (percentage points)	%	(95% CI)	Absolute difference§ (percentage points)	Coverage difference from 2009–10 to 2010–11 (percentage points)
≥6 mos							
Total	**41.2**	**(40.8–41.6)**		**43.0¶**	**(42.6–43.4)**		**1.8††**
White, non-Hispanic	43.9	(43.5–44.3)	Ref.	44.3	(43.9–44.7)	Ref.	0.4
Black, non-Hispanic	33.7	(32.5–34.9)	-10.2††	39.0	(37.5–40.5)	-5.3††	5.3††
Hispanic	33.6	(32.4–34.8)	-10.3††	40.0	(38.6–41.4)	-4.3††	6.4††
Asian/Pacific Islander	44.3	(42.0–46.6)	0.4	43.1	(40.3–45.9)	-1.2	-1.2
American Indian/Alaska Native	46.3	(43.7–48.9)	2.4	42.1	(38.1–46.1)	-2.2	-4.2
Other and multiple race	38.6	(36.6–40.6)	-5.3††	42.9	(40.4–45.4)	-1.4	4.3††
6 mos–17 yrs							
Total	**43.7**	**(42.8–44.6)**		**51.0¶**	**(50.1–51.9)**		**7.3††**
White, non-Hispanic	43.2	(42.3–44.1)	Ref.	48.5¶	(47.5–49.5)	Ref.	5.3††
Black, non-Hispanic	37.0	(34.4–39.6)	-6.2††	50.8¶	(47.9–53.7)	2.3	13.8††
Hispanic**	46.9	(44.3–49.5)	3.7††	55.1¶	(52.5–57.7)	6.6††	8.2††
Asian/Pacific Islander	56.1	(52.4–59.8)	12.9††	59.4	(54.7–64.1)	10.9††	3.3
American Indian/Alaska Native	51.7	(47.0–56.4)	8.5††	55.7	(47.7–63.7)	7.2	4.0
Other and multiple race	49.7	(45.7–53.7)	6.5††	55.6¶	(51.5–59.7)	7.1††	5.9††
≥18 yrs							
Total	**40.4**	**(40.0–40.8)**		**40.5**	**(40.1–40.9)**		**0.1**
18–49 yrs							
All, including high risk	**29.9**	**(29.4–30.4)**		**30.5**	**(29.9–31.1)**		**0.6**
White, non-Hispanic	31.9	(31.3–32.5)	Ref.	31.6	(30.8–32.4)	Ref.	-0.3
Black, non-Hispanic	25.3	(23.6–27.0)	-6.6††	28.1	(25.7–30.5)	-3.5††	2.8
Hispanic	24.7	(23.3–26.1)	-7.2††	27.1	(25.1–29.1)	-4.5††	2.4
Asian/Pacific Islander	35.5	(32.2–38.8)	3.6††	33.4	(29.5–37.3)	1.8	-2.1
American Indian/Alaska Native	39.3	(35.3–43.3)	7.4††	31.3	(25.2–37.4)	-0.3	-8.0††
Other and multiple race	27.9	(25.0–30.8)	-4.0††	32.1	(27.8–36.4)	0.5	4.2
High risk only§§	38.2	(36.9–39.5)		39.0	(36.8–41.2)		0.8
White, non-Hispanic	39.9	(38.3–41.5)	Ref.	39.2	(36.8–41.6)	Ref.	-0.7
Black, non-Hispanic	34.8	(31.5–38.1)	-5.1††	37.1	(30.2–44.0)	-2.1	2.3
Hispanic	35.9	(32.0–39.8)	-4.0	37.3	(30.8–43.8)	-1.9	1.4
Asian/Pacific Islander	42.9	(32.3–3.5)§§	3.0	34.0	(21.5–6.5)¶¶	-5.2	-8.9
American Indian/Alaska Native	45.8	(38.1–53.5)	5.9	40.3	(25.8–54.8)¶¶	1.1	-5.5
Other and multiple race	36.8	(30.7–42.9)	-3.1	45.5	(35.7–55.3)	6.3	-8.9
50–64 yrs							
Total	**45.0**	**(44.4–45.6)**		**44.5**	**(43.9–45.1)**		**-0.5**
White, non-Hispanic	46.5	(45.9–47.1)	Ref.	45.7	(44.9–46.5)	Ref.	-0.8
Black, non-Hispanic	40.3	(38.3–42.3)	-6.2††	38.4	(36.0–40.8)	-7.3††	-1.9
Hispanic	40.3	(37.5–43.1)	-6.2††	41.9	(38.6–45.2)	-3.8††	1.6
Asian/Pacific Islander	48.8	(42.6–55.0)	2.3	49.3	(43.6–55.0)	3.6	0.5
American Indian/Alaska Native	48.6	(44.2–53.0)	2.1	44.6	(37.9–51.3)	-1.1	-4.0
Other and multiple race	39.2	(35.7–42.7)	-7.3††	40.5	(36.2–44.8)	-5.2††	1.3
≥65 yrs							
Total	**69.6**	**(69.0–70.2)**		**66.6¶**	**(66.0–67.2)**		**-3.0††**
White, non-Hispanic	71.7	(71.2–72.2)	Ref.	67.7¶	(67.1–68.3)	Ref.	-4.0††
Black, non-Hispanic	55.1	(52.8–57.4)	-16.6††	56.1	(52.8–59.4)	-11.6††	1.0
Hispanic	56.1	(52.8–59.4)	-15.6††	66.8¶	(63.1–70.5)	-0.9	10.7††
Asian/Pacific Islander	70.7	(65.1–76.3)	-1.0	67.9	(61.6–74.2)	0.2	-2.8
American Indian/Alaska Native	61.6	(56.1–67.1)	-10.1††	68.7	(60.7–76.7)	1.0	7.1
Other and multiple race	64.2	(60.1–68.3)	-7.5††	60.7	(56.4–65.0)	-7.0††	-3.5

Abbreviations: 95% CI = 95% confidence interval; Ref = referent.

* Coverage estimates for 2010–2011 are for persons with reported vaccination during August 2010–May 2011 who were interviewed during September 2010–June 2011. Coverage estimates for 2009–2010 are for persons with reported vaccination during August 2009–May 2010 who were interviewed during October 2009–June 2010; estimates for 2009–2010 included data from NHFS; season estimates for 2010–2011 use NIS only for children and BRFSS only for adults.

† Race/ethnicity categories are mutually exclusive; Native Hawaiians, Pacific Islanders, and persons of other or multiple races were classified in the "Other and multiple race" group.

§ Absolute difference (percentage points): (percentage racial/ethnic group of interest) - (percentage white only, non-Hispanic).

¶ Estimated vaccination coverage for the 2010–2011 season is significantly different from the 2009–2010 season (referent) at (p<0.05).

** Persons of Hispanic ethnicity might be of any race or combination of races.

†† Estimated vaccination coverage is significantly different from the white only, non-Hispanic population (referent) within age group at (p<0.05).

§§ For the 2010–2011 season, high risk conditions included asthma, diabetes, and heart disease. For the 2009–2010 season, high risk conditions included asthma, other lung problems, diabetes, heart disease, kidney problems, anemia, and weakened immune system caused by a chronic illness or by medicines taken for a chronic illness.

¶¶ Estimates might be unreliable because the confidence interval half-width is >10.

notification, and provider recommendation) to ensure that all persons who visit a health-care provider during the flu season receive a vaccination recommendation and offer; or 3) using immunization information systems, also known as registries, at the point of clinical care and at the population level to guide clinical and public health vaccination decisions (*18*).

Limitations

The findings in this report are subject to at least five limitations. First, children aged 6 months to <9 years are recommended for up to 2 doses of vaccine depending on past vaccination history (*11*); however, this report only measured receipt of at least 1 dose for children of all ages. Second, the estimates are made on the basis of self-report for adults and parental-report for children, and were not validated by medical record reviews. Racial/ethnic disparities also might differ on the basis of parent versus provider report, child's age, and whether receipt of 1 dose or full vaccination status is measured; previous studies have shown racial/ethnic disparities in influenza vaccination coverage of children aged 6–23 months on the basis of provider-reported data for full vaccination; most children in this age group would need 2 doses to be considered fully vaccinated (*19*,*20*). Third, the sample might not be nationally representative because of incomplete sample frames (e.g., NIS and BRFSS surveys miss households without phones), and selection bias from survey nonresponse might remain after weighting adjustments (*1*,*17*,*21*,*22*). Fourth, misclassification of 2009 H1N1 vaccine for seasonal influenza vaccine, unique to this season, might have contributed to some overreporting. Finally, comparisons of estimates during 2009–10 and 2010–11 might be affected by different data sources used: NHFS and BRFSS for both children and adults for 2009–10, and NIS for children and BRFSS for adults in 2010–11.

Conclusion

Compared with the 2009–10 season, estimates for 2010–11 suggest that progress was made in increasing coverage among non-Hispanic white, black, Hispanic, and other and multiple race children. In contrast with the past, in which non-Hispanic white children generally had the highest coverage, estimates for both seasons indicated that Hispanic and A/PI children and those of other/multiple races had better coverage than non-Hispanic white children. Despite these improvements in coverage among historically underserved groups, *Healthy People 2020* targets for influenza vaccination of children and adults—to increase the percentage of children aged 6 months through 17 years and adults aged ≥18 years vaccinated to 70%—were not achieved. Efforts are needed to continue improving coverage for all persons (*18*–*23*).

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Behavioral Risk Factors

Pregnancy and Childbirth Among Females Aged 10–19 Years — United States, 2007–2010

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Introduction

Pregnancy and childbirth among females aged <20 years have been the subject of long-standing concern among the public, the public health community, and policy makers (*1–3*). Teenagers who give birth are much more likely than older women to deliver a low birthweight or preterm infant, and their babies are at higher risk for dying in infancy (*4–6*). The annual public costs associated with births among teenage girls are an estimated $10.9 billion (*7*). According to the 2006–2010 National Survey of Family Growth (NSFG), an estimated 77% of births to teenagers aged 15–19 years were unintended (*8*).

The 2010 U.S. birth rate among females aged 15–19 was 34.2 births per 1,000. This is a 10% decrease from 2009 (37.9) and an 18% decrease from 2007 (41.5) (*9*). A long-term decrease that began in 1991 was continuous except for a brief increase during 2005–2007; the birth rate among females aged 15–19 years decreased by 45% from 1991 (61.8 per 1,000) to 2010 (*9,10*). An analysis found that if the 1991 birth rates for females aged 15–19 years had remained the same during 1992–2010, an additional 3.4 million births would have occurred among women aged 15–19 years in the United States (*11*). Significant decreases in birth rates for females aged 15–19 years occurred among all race and Hispanic ethnicity groups from 2007 to 2010, including non-Hispanic whites, non-Hispanic blacks, American Indian/Alaska Natives (AI/ANs), Asians or Pacific Islanders (A/PIs), and Hispanics. Rates also decreased for certain Hispanic groups, including those of Mexican and Puerto Rican origin. Despite the widespread decreases, disparities persist (*9,11*), and the U.S. birth rate for females aged 15–19 years remains one of the highest among industrialized countries (*12*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR) and updates information presented in the first CHDIR (*13*). The 2011 CHDIR (*14*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topics presented in this report are based on criteria that are described in the 2013 CHDIR Introduction (*15*). The purposes of this pregnancy and childbirth analysis and discussion are to highlight and raise awareness of differences in the characteristics of females aged <20 years (including 10–14, 15–19, 15–17, and 18–19 years) who become pregnant and give birth and to prompt actions to reduce these disparities.

Methods

To analyze recent trends and variations in birth rates and pregnancy rates by selected characteristics among females aged 10–19 years, CDC examined final 2007 and 2010 natality data from the National Vital Statistics System (NVSS) and comparable data for earlier years. Characteristics analyzed varied by rate calculated and included four age groups (10–14, 15–19, 15–17, and 18–19 years), race, ethnicity, and state, including the District of Columbia. Household income and educational attainment were not analyzed because income information is not collected on the birth certificate, and data on educational attainment are collected in different ways across the states. Thus, national data on educational attainment are not available.

Data by maternal race and Hispanic ethnicity are based on information reported by the mother during the birth registration process. Race and ethnicity are reported separately on birth certificates, and persons of Hispanic origin might be of any race. Race categories are consistent with the 1977 Office of Management and Budget standards (*4,9*). In 2010, a total of 38 states and the District of Columbia reported multiple-race data that were bridged to the single-race categories for comparability with other states (*9*). Population estimates with bridged-race categories for the rates in this report were produced under a collaborative arrangement with the U.S. Census Bureau. Rates for 2010 are based on the 2010 U.S. census, and rates for earlier years are based on intercensal estimates (*9,16,17*). Rates are not shown when the number of births in a given group is <20 or, for specified Hispanic groups, if <50 females are in the denominator in the census year 2010 or <75,000 females are in the denominator for all other years.

Birth rates were calculated as the number of births to females per 1,000 female population in the specified age, race, and

Hispanic origin group. The rate in 2010 was compared with 2007 and previously published rates for 1991. The change in birth rate over time (i.e., relative difference) was calculated by subtracting the rate at the end of the period from the rate at the beginning of the period, dividing the difference by the rate at the beginning of the period, and then multiplying by 100. Percentage change for birth rates in 2007 and 2010 was assessed for statistical significance by using the z test at the 95% confidence level (*18*). Disparities were measured as the deviations from a referent category rate. Absolute difference was measured as the simple difference between a population group estimate and the estimate for its respective reference group. The relative difference, a percentage, was calculated by dividing the absolute difference by the value in the referent category and multiplying by 100.

Pregnancy rates are presented by pregnancy outcome (live births, induced abortions, and fetal losses), race, and Hispanic ethnicity. Data on live births are based on complete counts of births provided by every state to CDC through the Vital Statistics Cooperative Program of NVSS (*18*). Abortion estimates are from abortion surveillance information on the characteristics of women who have abortions collected from most states by CDC; these estimates are adjusted to national totals by the Guttmacher Institute (*19–22*). Fetal loss rates are derived from pregnancy history data collected from several cycles of the National Survey of Family Growth (NSFG) conducted by CDC (*22*,*23*). Data regarding pregnancy are not as current, complete, or comprehensive as NVSS data regarding births. The most recent pregnancy estimates that include data on live births, induced abortions, and fetal losses are for 2008 (*22*).

Results

In 2010, birth rates for females aged 15–19 years varied considerably by race and Hispanic origin (Table 1). The rates for Hispanics (55.7 births per 1,000 females aged 15–19 years) and non-Hispanic blacks (51.5 births) were approximately five times the rate for A/PIs (10.9 births) and approximately twice the rate for non-Hispanic whites (23.5 births). The rate for AI/ANs aged 15–19 years was intermediate (38.7 births per 1,000 females aged 15–19 years). Rates varied considerably across specified Hispanic groups. The rate in 2010 was highest for "other" Hispanics aged 15–19 years (65.4 births per 1,000), followed by Mexican (55.5 births), Puerto Rican (43.7 births), and Cuban (24.4 births).

From 2007 to 2010, birth rates for females aged 15–19 years decreased significantly for all race groups and for nearly all specified Hispanic groups (Table 1). Decreases for females aged 15–19 years ranged from 14% to 17% for non-Hispanic whites and non-Hispanic blacks, respectively, to 32% for Mexicans. Among females aged 15–17 years, significant decreases from 2007 to 2010 ranged from 16% to 21% among non-Hispanic whites and non-Hispanic blacks, respectively, to 35% for Mexicans. Among females aged 18–19 years, decreases ranged from 16% to 19% among non-Hispanic whites and non-Hispanic blacks, respectively, to 30% for Mexicans. The trends cannot be reliably analyzed for Cubans because the numbers of births were too few and for Puerto Ricans aged 18–19 years because the estimated number of females in this age group in 2007 was <75,000.

In 2010, birth rates among females aged 15–19 years by state ranged from <20 per 1,000 females aged 15–19 years in four states (New Hampshire [15.7 births], Massachusetts [17.2 births], Vermont [17.9 births], and Connecticut [18.7 births]) to 50 per 1,000 or more in five states (Oklahoma [50.4 births], Texas [52.2 births], Arkansas [52.5 births], New Mexico [53.0 births], and Mississippi [55.0 births]) (Table 2) (*9*,*11*). From 2007 to 2010, rates decreased significantly in all but three states (Montana, North Dakota, and West Virginia). Decreases in 16 states ranged from 20% to 30%.

The pregnancy rate for teenagers aged 15–19 years was 69.8 per 1,000 in 2008. The rates by pregnancy outcome were 40.2 for live births, 17.8 for induced abortions, and 11.8 for fetal losses; substantial demographic differences were found in these rates (Table 3) (*22*). Within each age group from 10–14 years through 18–19 years, pregnancy rates among non-Hispanic black and Hispanic females were two to three times higher than rates for non-Hispanic white females (*22*). The rate decreased by 3% from 71.9 pregnancies per 1,000 females aged 15–19 years in 2007 to 69.8 per 1,000 in 2008 (Table 3) (*22*). Pregnancy rates have decreased for females aged 10–14, 15–17, and 18–19 years and for non-Hispanic white, non-Hispanic black, and Hispanic females aged 15–19, 15–17, and 18–19 years.

Discussion

In 2010, the U.S. birth rate for females aged 15–19 years had decreased 45% since the 1991 peak (from 61.8 in 1991 to 34.2 in 2010) (*9–11*) Trends in birth rates by age and by race and Hispanic ethnicity group indictae that the long-term reductions since 1991 have been experienced by all population groups but were somewhat greater for certain groups (*9–11*). The birth rate for females aged 10–14 years decreased 71%, from 1.4 per 1,000 in 1991 to 0.4 in 2010; rates for those aged 10–14 years decreased approximately 60% in each racial and Hispanic origin group. The birth rate for all females aged

TABLE 1. Birth rates for females aged 10–19 years, by age, race/ethnicity, and Hispanic origin of mother — National Vital Statistics System, United States, 2007 and 2010

Characteristic	2007 Birth rate*	2007 Absolute difference (percentage points)	2007 Relative difference (%)	2010 Birth rate	2010 Absolute difference (percentage points)	2010 Relative difference (%)	Change in rate from 2007 to 2010 (%)†
Ages 10–14 yrs							
All races/ethnicities§	**0.6**	—	—	**0.4**	—	—	**-33**
White, non-Hispanic	0.2	Ref.	Ref.	0.2	Ref.	Ref.	0
Black, non-Hispanic	1.4	1.2	600	1.0	0.8	400	-29
Asian/Pacific Islander	0.2	0.0	0	0.1	-0.1	-50	-50
American Indian/Alaska Native	0.7	0.5	250	0.5	0.3	150	-29
Hispanic	1.2	1.0	500	0.8	0.6	300	-33
Mexican	1.2	1.0	500	0.8	0.6	300	-33
Puerto Rican	0.8	0.6	300	0.6	0.4	200	-25
Cuban	NA¶	NA	NA	NA	NA	NA	NA
Other Hispanic**	1.2	1.0	500	1.0	0.8	400	-17
Ages 15–19 yrs							
All races/ethnicities	**41.5**	—	—	**34.2**	—	—	**-18**
White, non-Hispanic	27.2	Ref.	Ref.	23.5	Ref.	Ref.	-14
Black, non-Hispanic	62.0	34.8	128	51.5	28.0	119	-17
Asian/Pacific Islander	14.8	-12.4	-46	10.9	-12.6	-54	-26
American Indian/Alaska Native	49.4	22.2	82	38.7	15.2	65	-22
Hispanic	75.3	48.1	177	55.7	32.2	137	-26
Mexican	86.6	54.5	200	55.5	32.0	136	-32
Puerto Rican	61.8	34.6	127	43.7	20.2	86	-29
Cuban	NA	NA	NA	24.4	0.9	4	NA
Other Hispanic	68.1	40.9	150	65.4	41.9	178	-4
Ages 15–17 yrs							
All races/ethnicities	**21.7**	—	—	**17.3**	—	—	**-20**
White, non-Hispanic	11.9	Ref.	Ref.	10.0	Ref.	Ref.	-16
Black, non-Hispanic	34.6	22.7	191	27.4	17.4	174	-21
Asian/Pacific Islander	7.4	-4.5	-38	5.1	-4.9	-49	-31
American Indian/Alaska Native	26.2	14.3	120	20.1	10.1	101	-23
Hispanic	44.4	32.5	273	32.3	22.3	223	-27
Mexican	49.9	38.0	319	32.4	22.4	224	-35
Puerto Rican	32.8	20.9	176	24.2	14.2	142	-26
Cuban	NA	NA	NA	8.7	-1.3	-13	NA
Other Hispanic	38.8	26.9	226	38.6	28.6	286	-1
Ages 18–19 yrs							
All races/ethnicities	**71.7**	—	—	**58.2**	—	—	**-19**
White, non-Hispanic	50.4	Ref.	Ref.	42.5	Ref.	Ref.	-16
Black, non-Hispanic	105.2	54.8	109	85.6	43.1	101	-19
Asian/Pacific Islander	24.9	-25.5	-51	18.7	-23.8	-56	-25
American Indian/Alaska Native	86.4	36.0	71	66.1	23.6	56	-23
Hispanic	124.7	74.3	147	90.7	48.2	113	-27
Mexican	130.6	80.2	159	91.5	49.0	115	-30
Puerto Rican	NA	NA	NA	69.7	27.2	64	NA
Cuban	NA	NA	NA	57.8	15.3	36	NA
Other Hispanic	113.4	63.0	125	101.3	58.8	138	-11

Abbreviations: NA = not available; Ref. = referent.

* Per 1,000 females in specified age, race, and ethnicity group. Reliable birth rates cannot be computed for Cuban women in these age groups except in U.S. census years.

† Statistical testing for significance was assessed by using the z test at the 95% confidence level. All changes are significant ($p<0.05$) except for the "other Hispanics" category of girls aged 15–17 years.

§ Data for persons of Hispanic origin are included in the data for each racial group according to the mother's reported race. Race and Hispanic origin are reported separately on birth certificates. Race categories are consistent with the 1977 Office of Management and Budget standards (available at http://www.whitehouse.gov/omb/fedreg_race-ethnicity). Persons of Hispanic ethnicity might be of any race or combination of races. Thirty-eight states and the District of Columbia reported multiple-race data on the birth certificate in 2010. The multiple-race data for these states were bridged to the single-race categories of the 1977 standards for comparability with other states.

¶ Data do not meet standards of reliability or precision because 1) <20 births are in the numerator or 2) for persons of specified Hispanic origin, <75,000 females were in the denominator in 2007.

** Includes Central American and South American as well as other and unknown Hispanic women.

TABLE 2. Number of births and birth rates for females aged 15–19 years, by state — National Vital Statistics System, United States, 2007 and 2010

State	No. of births 2010	No. of births 2007	Birth rate* 2010	Birth rate* 2007	Change in rate from 2007 to 2010 (%)†
United States	**367,678**	**444,899**	**34.2**	**41.5**	**-18**
Alabama	7,343	8,696	43.6	52.2	-16
Alaska	956	1,117	38.3	43.0	-11
Arizona	9,389	12,868	41.9	59.5	-30
Arkansas	5,229	5,926	52.5	60.1	-13
California	43,149	53,417	31.5	39.6	-20
Colorado	5,474	6,737	33.4	41.5	-20
Connecticut	2,274	2,837	18.7	23.0	-19
Delaware	974	1,244	30.5	39.2	-22
District of Columbia	951	1,053	45.4	50.4	-10
Florida	19,127	25,693	32.0	42.9	-25
Georgia	14,378	18,085	41.4	53.3	-22
Hawaii	1,347	1,610	32.5	38.9	-16
Idaho	1,863	2,257	33.0	40.0	-18
Illinois	14,798	18,089	33.0	40.1	-18
Indiana	8,665	9,948	37.3	42.9	-13
Iowa	3,017	3,529	28.6	32.8	-13
Kansas	3,865	4,271	39.3	42.4	-7
Kentucky	6,684	7,547	46.2	52.4	-12
Louisiana	7,689	8,974	47.7	55.1	-13
Maine	917	1,172	21.4	26.0	-18
Maryland	5,396	6,892	27.3	34.3	-20
Massachusetts	3,909	4,949	17.2	21.4	-20
Michigan	10,835	12,497	30.1	33.5	-10
Minnesota	4,035	5,193	22.5	27.9	-19
Mississippi	6,077	7,811	55.0	69.9	-21
Missouri	7,669	9,244	37.1	44.0	-16
Montana	1,128	1,200	35.0	35.3	-1
Nebraska	1,958	2,280	31.1	35.4	-12
Nevada	3,421	4,351	38.6	51.6	-25
New Hampshire	722	924	15.7	19.3	-19
New Jersey	5,793	7,255	20.1	24.9	-19
New Mexico	3,872	4,720	53.0	63.9	-17
New York	15,126	17,621	22.7	26.1	-13
North Carolina	12,309	15,079	38.3	47.9	-20
North Dakota	659	696	28.8	29.3	-2
Ohio	13,752	16,362	34.1	39.9	-15
Oklahoma	6,496	7,543	50.4	58.5	-14
Oregon	3,496	4,343	28.2	34.6	-18
Pennsylvania	11,959	13,841	27.0	30.7	-12
Rhode Island	891	1,192	22.3	29.3	-24
South Carolina	6,849	8,329	42.6	52.0	-18
South Dakota	975	1,191	34.9	41.3	-15
Tennessee	9,254	11,260	43.2	53.3	-19
Texas	47,751	54,281	52.2	61.7	-15
Utah	3,049	3,775	27.9	35.5	-21
Vermont	401	492	17.9	21.1	-15
Virginia	7,374	9,200	27.4	34.2	-20
Washington	6,002	7,430	26.7	33.4	-20
West Virginia	2,608	2,714	44.8	46.0	-3
Wisconsin	5,100	6,243	26.2	31.2	-16
Wyoming	723	921	39.0	50.1	-22

* Births per 1,000 females aged 15–19 years living in each state.
† Statistical testing for significance was assessed by using the z test at the 95% confidence level. All changes are significant (p<0.05) except for Montana, North Dakota, and West Virginia.

15–17 years decreased more by approximately half, from 38.6 per 1,000 in 1991 to 17.3 in 2010; decreases ranged from 53% for Hispanics aged 15–17 years to 68%–69% for non-Hispanic blacks and A/PIs (*9*). The overall decrease in the rate for females aged 18–19 years was 38%, from 94.0 per 1,000 in 1991 to 58.2 in 2010; decreases ranged from 40% and 42% for non-Hispanic white and Hispanic females aged 18–19 years, to 47% to 56% for non-Hispanic black, AI/AN, and A/PI females aged 18–19 years (*9,11*).

The recent decreases in birth rates have coincided with decreases in pregnancy, abortion, and fetal loss rates among females aged 10–14, 15–19, 15–17, and 18–19 years (*22*). The pregnancy rate in 2008 for females aged 15–19 years was the lowest ever in the more than 3 decades for which a national series of rates is available (*22*,*24*). However, disparities in rates by race and ethnicity have changed little since 1990.

The findings in this report and a recent overview of state-level birth rates both have documented the persistent large variation across states (Table 2) (*11*). Birth rates for females aged 15–19 years tend to be highest in the South and Southwest and lowest in the Northeast and upper Midwest, a pattern that has persisted for many years (*25*,*26*). Some of the variation among states reflects differences in the racial/ethnic composition of the population within states (*26*). More in-depth analysis of trends and variations in state-specific rates by race and Hispanic ethnicity is forthcoming with the recent availability of revised intercensal population estimates (*9*).

Limitations

The findings in this report are subject to at least four limitations. First, a full assessment of disparities in childbearing among females aged 10–19 years depends on having complete data on patterns of pregnancies in this age group. The downward trend since 1991 in abortions among females aged <20 years has been more substantial than the downward trend among births. For example, the abortion rate for females aged 15–19 years decreased 52% from 1991 to 2008, whereas the birth rate decreased 35% during this period. A full understanding of patterns in pregnancy among females aged <20 years requires timely data on abortions and fetal losses as well as live births. The birth rate decreased 15% during 2008–2010. The extent to which the downward trends in abortions continued from 2008 to 2010 is not yet known. Second, the components of the pregnancy estimates and pregnancy outcome estimates vary in quality and completeness. Birth data are complete counts, whereas the abortion estimates are based on incomplete surveillance and survey data, and the fetal loss estimates are based on pregnancy histories collected from survey data

TABLE 3. Pregnancy rates and rates of pregnancy outcomes (live births, induced abortions, and fetal losses) among females aged 10–19 years, by age, race, and Hispanic origin of female — National Vital Statistics System, National Survey of Family Growth, CDC Abortion Surveillance System, and Guttmacher Institute surveys,* United States, 2008

		Pregnancy outcome		
Characteristic	Pregnancy rate†	Live birth rate§	Induced abortion rate§	Fetal loss rate§
Aged 10–14 yrs				
All races/ethnicities¶	1.4	0.6	0.6	0.2
White, non-Hispanic	0.5	0.2	0.2	0.1
Black, non-Hispanic	3.8	1.4	2.0	0.5
Hispanic**	2.2	1.1	0.6	0.4
Aged 15–19 yrs				
All races/ethnicities	69.8	40.2	17.8	11.8
White, non-Hispanic	44.8	26.7	10.4	7.7
Black, non-Hispanic	121.6	60.4	43.4	17.8
Hispanic	111.5	70.3	20.1	21.1
Aged 15–17 yrs				
All races/ethnicities	39.5	21.1	10.4	7.9
White, non-Hispanic	21.6	11.6	5.7	4.3
Black, non-Hispanic	72.8	33.6	26.7	12.6
Hispanic	69.7	42.2	11.7	15.8
Aged 18–19 yrs				
All races/ethnicities	114.2	68.2	28.6	17.5
White, non-Hispanic	78.0	48.6	17.0	12.4
Black, non-Hispanic	193.8	100.0	68.2	25.6
Hispanic	176.4	114.0	33.2	29.2

* Birth data are from the National Vital Statistics System. Abortion estimates are from abortion surveillance information collected from most states by CDC on the characteristics of females who have abortions; these estimates are adjusted to national totals by the Guttmacher Institute (**Sources:** CDC. Abortion surveillance—United States, 2008. MMWR 2011;60[No. SS-15]; Henshaw SK. Unpublished tabulations. The Guttmacher Institute. 2000, 2011, 2012; Jones RK, Kooistra K. Abortion incidence and access to services in the United States, 2008. Perspect Sex Reprod Health 2011;43:41–50; Ventura SJ, Curtin SC, Abma JC, Henshaw SK. Estimates pregnancy rates and rates of pregnancy outcomes for the United States, 1990-2008. Natl Vital Stat Rep 2012;60[7]. Available at http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_07.pdf). Fetal loss rates are derived from pregnancy history data collected from several cycles of the National Survey of Family Growth (NSFG) conducted by CDC (**Sources:** Ventura SJ, Curtin SC, Abma JC, Henshaw SK. Estimated pregnancy rates and rates of pregnancy outcomes for the United States, 1990–2008. Natl Vital Stat Rep 2012;60[7]. Available at http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_07.pdf; Lepkowski JM, Mosher WD, Davis KE, et al. The 2006–2010 National Survey of Family Growth: sample design and analysis of a continuous survey. Vital Health Stat 2010;2[150]. Available at http://www.cdc.gov/nchs/data/series/sr_02/sr02_150.pdf).

† Per 1,000 females in specified age, race, and Hispanic origin group. Rates cannot be calculated for other population groups because the necessary data for abortions and fetal losses are not available.

§ Per 1,000 females in specified age, race, and Hispanic origin group.

¶ Rates for "all races/ethnicities" include other races not shown separately and origin not stated.

** Persons of Hispanic ethnicity might be of any race or combination of races.

(*9*,*19*,*21*,*22*,*24*). Third, data on teen pregnancy are available only for the largest population groups: non-Hispanic white, non-Hispanic black, and Hispanic. The necessary information on abortions and fetal losses is not available for other race groups (i.e., A/PI or AI/AN) or for specific Hispanic groups (*19–21*,*23*,*24*). Finally, evaluating trends and disparities in state-specific birth rates depends on having accurate population estimates by age, race, and Hispanic ethnicity. Recently released revised intercensal population estimates provide detailed data at the state and county level by single year of age. In years going forward, these newly released population estimates and estimates from the American Community Survey for Hispanic population groups will be used to improve the precision of the estimated rates.

Conclusion

Data from the 2006–2010 NSFG conducted by CDC have shown little change in the proportion of males and females aged 15–19 years who have ever had sex (*27*). This finding was corroborated in data released from the 2011 Youth Risk Behavior Surveillance report (*28*). For the period from 2002 to 2006–2010, NSFG found a significant decrease only among non-Hispanic black females aged 15–19 years in the percentage of those who were sexually experienced; changes for other groups were not significant. However, virtually all race and Hispanic origin groups have experienced significant long-term decreases in the proportion of those who are sexually experienced (*27*). The 2006–2010 NSFG also documents increased use, compared with 2002 and earlier rounds of the NSFG, of contraception at first intercourse and increased use of two methods of contraception (i.e., condoms and hormonal methods) among sexually active male and female teenagers (*27*). The recent NSFG data show fewer differences than in previous years by race and Hispanic origin in overall contraceptive use at first and last sex, largely reflecting increasing condom use among all groups (*27*). Various other factors contribute to the observed variations in teenage birth rates, including differences in education and income and in attitudes among teenagers toward pregnancy and childbearing; these factors in turn affect sexual activity and contraceptive use (*27*). The impact of strong and consistent pregnancy prevention messages and programs directed toward teenagers aged <20 years has been credited with the long-term decline in teenage birth rates. These programs were implemented in the aftermath of rapid increases in teenage birth rates from 1986 to 1991. Studies have shown that to be effective, programs must be designed to meet the specific needs of different groups of teenagers, and continually evaluating interventions and programs to assess their effectiveness is important (*1–3*,*29–32*).

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Binge Drinking — United States, 2011

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Introduction

During 2001–2005, excessive alcohol use accounted for an estimated average of 80,000 deaths and 2.3 million years of potential life lost (YPLL) in the United States each year, and an estimated $223.5 billion in economic costs in 2006 (*1*). Binge drinking, defined as consuming four or more alcoholic drinks on one or more occasions for women and five or more drinks on one or more occasions for men, was responsible for more than half of these deaths, two-thirds of the YPLL (*2*), and three quarters of the economic costs (*1*). Reducing the prevalence of binge drinking among adults is also a leading health indicator in *Healthy People 2020* (objective SA-14.3) (*3*).

The binge drinking prevalence, frequency, and intensity analysis, and discussion that follows is part of the second CDC Health Disparities and Inequalities Report (CHDIR) (*4*). The 2011 CHDIR (*5*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is described in the criteria for the 2013 CHDIR Introduction (*6*). This report provides more current information on binge drinking measures, and updates information on the status of evidence-based strategies recommended to prevent binge drinking presented in the 2011 CHDIR. The purposes of this report are to discuss and raise awareness of differences in the characteristics of people who binge drink, and to prompt actions to reduce these disparities.

Methods

To examine sociodemographic disparities in binge drinking nationwide and by state, CDC analyzed 2011 data from the Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is a state-based, random-digit–dialed landline and cellular telephone survey of the noninstitutionalized civilian U.S. adults that is conducted monthly in all states, the District of Columbia (DC), and three U.S. territories. BRFSS collects data on leading health conditions and health risk behaviors, including binge drinking. For this report, responses to questions regarding the prevalence, frequency, and largest number of drinks consumed by binge drinkers (a measure of the intensity of binge drinking) were analyzed, beginning with the question, "Considering all types of alcoholic beverages, how many times during the past 30 days did you have X [X = 5 for men; X = 4 for women] or more drinks on an occasion?" Respondents then were asked, "During the past 30 days, what is the largest number of drinks you had on any occasion?" Responses to this question were assessed for binge drinkers only. A more detailed description of BRFSS methods has been published (*4*,*7*). In 2011, the median survey response rate* was 49.7%, ranging from 33.8% to 64.1%. After excluding 48,912 persons who reported 'don't know/not sure' or 'refused,' those with missing information, and respondents from the U.S. territories, data from 457,555 respondents in the 50 states and DC were used for analysis.

This report describes binge drinking prevalence, frequency (i.e., the average number of binge drinking episodes), and intensity (i.e., the average largest number of drinks consumed by binge drinkers). Sociodemographic characteristics analyzed included sex, age group, race/ethnicity, education level, income level, and disability status. Race was defined as white, black, Asian/Pacific Islander, and American Indian/Alaska Native. Ethnicity was defined as Hispanic or non-Hispanic. Annual household income was defined as follows: <$25,000, $25,000–$49,999, $50,000–$74,999, and ≥$75,000. Educational attainment was defined as follows: less than high school, high school or equivalent, some college, and college graduate. Disability status was defined as respondents reporting limited activities in any way because of physical, mental, or emotional problems.

Binge drinking prevalence was calculated by dividing the total number of respondents who reported at least one binge drinking episode during the preceding 30 days by the total number of BRFSS respondents in all 50 states and

* Response rates for BRFSS are calculated using standards set by the American Association of Public Opinion Research (AAPOR) response rate formula no. 4, available at http://www.aapor.org/standard_definitions2.htm. The response rate is the number of respondents who completed the survey as a proportion of all eligible and likely eligible persons. Additional information is available at http://cdc.gov/brfss/pdf/2011_Summary_Data_Quality_Report.pdf.

DC. Frequency of binge drinking (i.e., the number of binge drinking episodes) was calculated by averaging the number of episodes reported by all binge drinkers during the preceding 30 days. Intensity of binge drinking was calculated by averaging the largest number of drinks consumed by binge drinkers during the past 30 days. BRFSS data were weighted to adjust for several demographic variables (e.g., educational attainment, marital status, home ownership, and telephone source) (*7*). Data were age- and sex-adjusted to the 2000 U.S. Census standard population to provide estimates for race/ethnicity, educational attainment, annual household income level, and disability status. We calculated 95% confidence intervals for binge drinking prevalence. Two-tailed t-tests were used to determine differences between subgroups.

Results

In 2011, the overall prevalence of binge drinking among adults in the 50 states and DC was 18.4% (Table). On average, binge drinkers reported a frequency of 4.1 binge drinking episodes during the preceding 30 days and an intensity of 7.7 drinks per occasion during the past 30 days. Binge drinking prevalence was significantly higher among persons aged 18–24 years (30.0%) and 25–34 years (29.7%) than among those in older age groups. Similarly, the intensity of binge drinking was highest among binge drinkers aged 18–24 and 25–34 (8.9 and 8.2 drinks, respectively); however, the frequency of binge drinking was highest among binge drinkers aged ≥65 years (4.9 episodes). The prevalence of binge drinking was also significantly higher among non-Hispanic whites (21.1%) than among all other race/ethnicity categories, but the intensity of binge drinking was highest among American Indians/Alaska Natives (8.4 drinks). Those with household incomes ≥$75,000 had significantly higher binge drinking prevalence (22.2%) than those with lower household incomes. In contrast, binge drinkers with household incomes <$25,000 reported the highest frequency (4.3 episodes) and intensity (7.1 drinks) of binge drinking.

Respondents who did not graduate from high school reported significantly lower binge drinking prevalence (16.8%) than those with high school or higher education. However, binge drinkers with less than high school education had the highest frequency (4.7 episodes) and intensity (7.4 drinks) of binge drinking. Respondents with disabilities also had a significantly lower prevalence of binge drinking (16.9%), but those who binge drank had a higher frequency (4.5 episodes) and intensity (7.2 drinks) of binge drinking, compared with those without disabilities.

Overall, areas with the highest age- and sex-adjusted prevalence of binge drinking were states in the Midwest, as well as DC and Hawaii (Figure 1). States with the highest intensity of binge drinking were generally located in the Midwest, and included some states (e.g. Oklahoma, Arkansas, Kentucky, West Virginia, and Utah) that had a lower prevalence of binge drinking (Figure 2).

Discussion

Binge drinking is a risk factor for many adverse health and social outcomes, including unintentional injuries (e.g., motor vehicle crashes); violence; suicide; hypertension; acute myocardial infarction; sexually transmitted diseases; unintended pregnancy; fetal alcohol syndrome; and sudden infant death syndrome (*8*). This report indicates that in 2011 binge drinking was common among U.S. adults, and persons who binge drank tended to do so frequently (average of four times per month) and with high intensity (average of eight drinks on occasion), placing themselves and others at a significantly greater risk for alcohol-attributable harms (*8*). In a number of states with a lower prevalence of binge drinking, those who binge drank did so with high intensity.

The groups at highest risk for binge drinking (i.e., persons aged 18–34 years, males, whites, non-Hispanics, and persons with higher household incomes), and those who reported the highest binge drinking frequency (i.e., binge drinkers aged ≥65 years) and intensity (i.e., persons aged 18–24 years) are consistent with previous reports (*4*,*9*), and might reflect differences in state and local laws on the marketing of alcoholic beverages (e.g., price and availability) (*10*), as well as other cultural and religious factors (*11*). These differences are reflected in state measures of the prevalence and intensity of binge drinking, and highlight that states with a lower prevalence of binge drinking might still include subgroups that binge drink with high intensity. Furthermore, unlike other leading health risks (e.g., smoking and obesity) binge drinking has not been widely recognized as a health risk or subjected to intense prevention efforts (*12*).

Limitations

The findings in this analysis are subject to at least three limitations. First, BRFSS data are self-reported; alcohol consumption, generally, and excessive drinking, in particular, is underreported in surveys because of recall bias, social desirability response bias, and nonresponse bias (*13*). A recent study reported that BRFSS identifies 22%–32% of presumed alcohol consumption in states when compared with alcohol

TABLE. Prevalence, frequency, and intensity of binge-drinking, by sex, age group, race/ethnicity, education, and disability — Behavioral Risk Factor Surveillance System, United States,* 2011

	Prevalence†			Frequency§			Intensity¶		
Characteristic	No.	Weighted %	(95% CI)	No.	No. of episodes	(95% CI)	No.	No. of drinks	(95% CI)
Total	**457,555**	**18.4**	**(18.1–18.6)**	**59,553**	**4.1**	**(4.0– 4.2)**	**55,929**	**7.7**	**(7.6– 7.7)**
Sex**									
Men	179,224	24.6	(24.2–25.0)	34,859	4.6	(4.0 – 4.7)	32,564	8.7	(8.6– 8.8)
Women	278,331	12.5	(12. 2–12.8)	24,694	3.2	(3.1– 3.3)	23,365	5.7	(5.6– 5.8)
Age group (yrs)**									
18–24	20,016	30.0	(28.9-31.1)	6,210	4.4	(4.1- 4.6)	5,792	8.9	(8.7- 9.1)
25–34	44,441	29.7	(28.9-30.5)	12,167	3.8	(3.7- 4.0)	11,493	8.2	(8.0- 8.4)
35–44	58,980	21.1	(20.5-21.8)	11,781	3.9	(3.8- 4.1)	11,158	7.4	(7.2- 7.5)
45–64	187,811	14.1	(13.8-14.5)	23,710	4.2	(4.1- 4.3)	22,293	6.6	(6.5- 6.7)
≥65	146,307	4.3	(4.1- 4.5)	5,685	4.9	(4.5- 5.3)	5,193	5.6	(5.5- 5.7)
Race/Ethnicity††									
White, non-Hispanic	363,127	21.1	(20.7-21.4)	47,879	4.1	(4.0- 4.2)	45,255	6.8	(6.8- 6.9)
Black, non-Hispanic	35,919	14.2	(13.4-15.0)	3,446	3.8	(3.5- 4.1)	3,111	6.1	(5.9- 6.3)
Hispanic§§	28,275	17.7	(16.9-18.4)	4,338	3.3	(3.0- 3.6)	3,978	6.8	(6.6- 7.0)
Asian/Pacific Islander	8,746	10.3	(9.1-11.4)	885	3.4	(2.5- 4.3)	839	6.1	(5.7- 6.5)
American Indian/Alaska Native	6,248	18.2	(16.1-20.4)	992	4.5	(3.7- 5.3)	906	8.4	(7.8- 9.1)
Educational attainment††									
Less than high school	39,348	16.8	(15.9–17.6)	3,888	4.7	(4.3– 5.1)	3,482	7.4	(7.2– 7.7)
High school or equivalent	133,510	18.7	(18.2–19.1)	16,670	4.2	(4.1– 4.4)	15,455	7.2	(7.0– 7.3)
Some college	124,124	20.1	(19.6–20.6)	17,353	4.0	(3.8 –4.1)	16,344	6.6	(6.5– 6.7)
College graduate	159,762	20.4	(20.0–20.9)	21,593	3.3	(3.2– 3.4)	20,611	6.2	(6.1– 6.3)
Annual household income ($)††									
<25,000	118,636	17.6	(17.0–18.1)	12,656	4.3	(4.1 –4.5)	11,733	7.1	(7.0– 7.2)
25,000–49,999	107,486	19.4	(18.8–19.9)	13,748	4.2	(4.0– 4.4)	12,945	6.9	(6.8– 7.0)
50,000–74,999	63,510	19.8	(19.0–20.5)	9,370	3.7	(3.5– 3.9)	8,916	6.7	(6.6– 6.9)
≥75,000	107,907	22.2	(21.6–22.9)	18,820	3.6	(3.4 –3.7)	17,998	6.5	(6.4– 6.6)
Disability status††									
Yes	131,816	16.9	(16.2–17.5)	11,592	4.5	(4.3– 4.7)	10,833	7.2	(7.0– 7.4)
No	323,525	19.6	(19.3–19.9)	47,763	3.8	(3.7– 3.9)	44,933	6.7	(6.6 6.7)

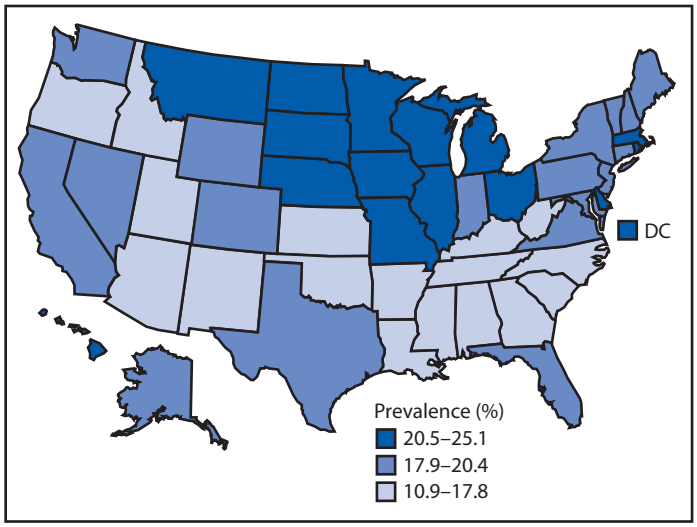
Abbreviation: 95% CI = 95% confidence interval.
* Respondents were from all 50 states and the District of Columbia.
† Prevalence = total number of respondents who reported at least one binge drinking episode during the past 30 days divided by the total number of respondents.
§ Frequency = average number of binge-drinking episodes reported by all binge drinkers during the past 30 days.
¶ Intensity = average largest number of drinks consumed by binge drinkers on any occasion during the past 30 days.
** Unadjusted estimates.
†† Age- and sex-adjusted to the 2000 U.S. Census standard population.
§§ Persons of Hispanic ethnicity might be of any race or combination of races.

sales data (*14*). However, a strong correlation existed between BRFSS estimates of alcohol consumption and per capita alcohol sales in states, suggesting that BRFSS data are still a useful measure of alcohol consumption even after taking into account known underreporting (*14*). Second, response rates for BRFSS were low, which can increase response bias. Third, BRFSS does not collect information from persons living in institutional settings (e.g., on college campuses), so findings might not be representative of those populations.

Conclusion

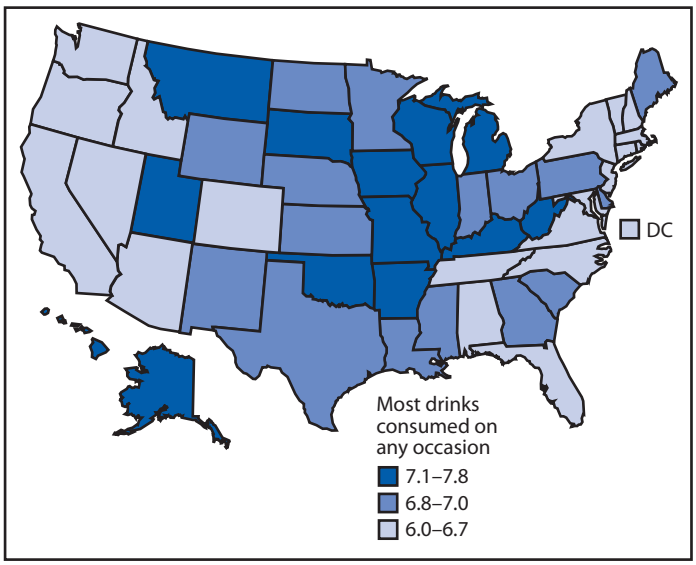
Binge drinking is common among U.S. adults, and persons who binge drink tend to do so frequently and with high intensity. The Community Preventive Services Task Force has recommended several population-level, evidence-based strategies to reduce binge drinking and related harms (*15*). These include 1) limiting alcohol outlet density (http://www.thecommunityguide.org/alcohol/outletdensity.html) (i.e., the concentration of retail alcohol establishments, including bars and restaurants and liquor or package stores, in a given geographic area), 2) holding alcohol retailers liable for harms related to the sale of alcoholic beverages to minors and intoxicated patrons (dram shop liability), 3) measures increasing the price of alcohol, 4) maintaining existing limits on the days and hours when alcohol is sold, 5) avoiding further privatization of alcohol sales in states with government-operated or contracted liquor stores, and 6) electronic screening and brief interventions (eSBI), including interventions delivered using computers, telephones, or mobile devices in the clinical setting.

FIGURE 1. Prevalence* of binge drinking† — Behavioral Risk Factor Surveillance System, United States,§ 2011



* Total number of respondents who reported at least one binge drinking episode during the preceding 30 days divided by the total number of respondents.
† Consuming ≥4 alcoholic drinks on ≥1 occasion for women and ≥5 drinks on ≥1 occasion for men.
§ States are divided into tertiles.

FIGURE 2. Intensity* of binge drinking† — Behavioral Risk Factor Surveillance System, United States,§ 2011



* Average largest number of drinks consumed by binge drinkers on any occasion during the past 30 days.
† Consuming ≥4 alcoholic drinks on ≥1 occasion for women and ≥5 drinks on ≥1 occasion for men.
§ States are divided into tertiles.

Despite the array of strategies that have been recommended, efforts are needed to implement them to a point of measurable success toward reducing binge drinking. The frequency and intensity of binge drinking also should be monitored routinely to support the implementation and evaluation of Community Guide recommendations for reducing binge drinking and to monitor changes in this behavior among groups at greater risk.

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Cigarette Smoking — United States, 2006-2008 and 2009-2010

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Introduction

Cigarette smoking is the leading cause of preventable disease and death in the United States, resulting in approximately 443,000 deaths and $193 billion in direct health-care expenditures and productivity losses each year (*1*). Declines in smoking prevalence would significantly impact the health-care and economic costs of smoking. Efforts to accelerate the decline in cigarette smoking include reducing cigarette smoking disparities among specific population groups. Findings from the previous report on cigarette use in the first CDC Health Disparities and Inequalities Report (CHDIR) indicated that progress has been achieved in reducing disparities in cigarette smoking among certain racial/ethnic groups (*2*). However, little progress has been made in reducing disparities in cigarette smoking among persons of low socioeconomic status (SES) and low educational attainment.

This report on cigarette smoking and the analysis and discussion that follows is part of the second CHDIR. The 2011 CHDIR (*3*) was the first CDC report to take a broad view of disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*4*). The report that follows provides more current information to what was presented in the 2011 CHDIR (*2*). The purposes of this report are to discuss and raise awareness of differences in the smoking prevalence of current smokers and to prompt actions to reduce disparities.

Methods

To assess the changes in disparities in smoking prevalence by selected sociodemographic characterisitcs during 2006-2008 and 2009-2010, CDC analyzed aggregated data from the National Survey on Drug Use and Health (NSDUH), which is sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) and provides annual data on alcohol, tobacco, and illegal drug use among the noninstitutionalized U.S. household population aged ≥12 years (http://www.sahmhsa.gov/data/NSDUH.aspx). Smoking prevalence was determined for youths and adults (aged ≥12 years). Current smokers include persons who reported smoking at least one cigarette during the 30 days before the survey.

Aggregated data were analyzed for two survey cycles. The 2006–2008 survey cycle included 42,693 respondents with response rates of 74.0%, 73.9%, and 74.2%, respectively. The 2009–2010 survey cycle included 27,636 respondents with response rates of 75.7% and 74.4%, respectively. Demographic characteristics analyzed included race and ethnicity, sex, age, household income, employment status, and educational attainment. Geographic location was not analyzed because of limited data for this variable. Race and ethnicity were defined as non-Hispanic white, non-Hispanic black, Hispanic, American Indian/Alaska Native, Native Hawaiian/Other Pacific Islander, Asian, and multirace. Household income was reported by poverty status, which is based on U.S. Census Bureau thresholds for federal poverty levels (FPL) (http://www.census.gov/hhes/www/poverty/html). Employment status was defined as fulltime, parttime, unemployed, and other. Educational attainment was defined as less than high school, high school diploma or equivalent, some college, and college graduate. For adults, low-SES was defined as those persons with less than a high school diploma unemployed or living at, near, or below the U.S. FPL. Disparities were measured as the absolute difference between rates. Population-weighted prevalence estimates and 95% confidence intervals (CIs) were calculated using statistical software to account for the multistage probability designs of NSDUH. No statistical testing was done for this analysis. In this approach, CIs were used as measure of variability and nonoverlapping CIs were considered statistically different. Using CIs in this way is a conservative evaluation of significance differences; infrequently, this might lead to a conclusion that estimates are similar when the point estimates do differ.

Results

Some progress in reducing smoking prevalence among certain racial/ethnic groups was observed; however, disparities among persons with low-SES persisted. For both youth and adults, little to no changes in smoking prevalence for those

below FPL was observed from 2006–2008 to 2009–2010; however, decreases were observed for youth and adults who were above FPL (Tables 1 and 2). During 2009–2010, the prevalence of smoking was 46.4% among 12th-grade–aged youth who had dropped out of school compared with 21.9% among youth who were still in the 12th grade (Table 1). Among adults, smoking prevalence was 34.6% for those who did not graduate from high school compared with 13.2% among those with a college degree (Table 2). From 2006–2008 to 2009–2010, smoking declined from 44.7% to 40.9% among adults who were unemployed (Table 2). Among racial/ethnic groups, smoking prevalence was lowest among black and Asian youth aged 12–17 years during both survey cycles (Table 1). Although smoking prevalence remained highest among American Indian/Alaska Native youth and adults, smoking declined from 17.2% to 13.6% in youth and from 42.2% to 34.4% in adults (Table 1 and 2).

Discussion

Prevalence of smoking is highest for persons aged ≥18 years who do not have high school diploma. Assessing and reporting the prevalence of smoking among youth aged <18 years who drop out of school is critical because this is the period when problems with academic achievement occur. The findings in this report indicate that during 2009–2010, approximately half of youth who dropped out of school were smokers. These findings underscore the need to address tobacco use early in the life span, particularly among school-aged youth, who might be more vulnerable, to eliminate tobacco-related disparities. Implementing the key effective strategies known to prevent and reduce tobacco use among youth are needed, including reducing tobacco industry influences towards minors, particularly those in low SES communities (*5*).

To make progress toward reducing the persistent higher prevalence of smoking among low-SES populations, current tobacco-control interventions should be targeted toward these

TABLE 1. Prevalence of current smoking* among persons aged 12–17 years, by selected characteristics — National Survey on Drug Use and Health, United States, 2006–2010†

Characteristic	2006–2008 %	2006–2008 (95% CI)	2009–2010 %	2009–2010 (95% CI)	Absolute difference from 2006–2008 to 2009–2010 (percentage points)
Sex					
Male	9.7	(9.2–0.2)	8.9	(8.3–9.5)	-0.8
Female	9.9	(9.4–0.4)	8.4	(7.8–8.9)	-1.5
Race/Ethnicity					
White, non-Hispanic	11.8	(11.4–2.3)	10.2	(9.6–10.8)	-1.6
Black, non-Hispanic	5.9	(5.2–6.5)	5.0	(4.2–5.7)	-0.9
Hispanic§	7.4	(6.7–8.2)	7.7	(6.9–8.4)	0.3
American Indian/Alaska Native	17.2	(13.2–1.2)	13.6	(9.6–17.7)	-3.6
Native Hawaiian/Other Pacific Islander	5.2	(1.7–8.8)	7.9	(0.515.2)	2.7
Asian	4.1	(3.0–5.3)	3.0	(1.4–4.5)	-1.1
Multirace	12.1	(9.5–14.7)	11.2	(8.5–13.9)	-0.9
Grade					
≤5	1.2	(0.8–1.6)	1.2	(0.6–1.7)	0
6	1.8	(1.4–2.2)	1.2	(0.8–1.6)	-0.6
7	4.6	(3.85.4)	3.5	(2.7–4.2)	-1.1
8	8.0	(7.3–8.7)	7.3	(6.6–8.0)	-0.7
9	12.1	(11.1–13.0)	10.8	(9.8–11.8)	-1.3
10	16.3	(15.3–17.2)	14.0	(12.715.3)	-2.3
11	18.8	(17.1–20.4)	16.5	(14.7–18.3)	-2.3
12	19.0	(14.024.0)	21.9	(15.9–27.9)	2.9
High school dropout	45.7	(40.7–50.7)	46.4	(39.4–53.5)	0.7
Poverty status¶					
<100% (below threshold)	10.4	(9.4–11.3)	9.6	(8.6–10.6)	-0.8
100%–199% (at or near threshold)	10.7	(10.0–11.5)	9.6	(8.8–10.3)	-1.1
≥200% (above threshold)	9.3	(8.9–9.7)	7.9	(7.4–8.5)	-1.4

Abbreviation: 95% CI = 95% confidence interval.
* Current smokers include all persons who smoked at least one cigarette during the 30 days before the survey.
† N = 42,693 for 2006–2009; N = 27,636 for 2009–2010.
§ Persons of Hispanic ethnicity might be of any race or combination of races.
¶ Based on self-reported family income or imputed family income and poverty thresholds published by the U.S. Census Bureau, 2005-2009. Available at http://www.census.gov/hhes/www/poverty.

more vulnerable smokers. Educating the public about the harms of tobacco use through mass media campaigns is an effective strategy for raising awareness and decreasing smoking prevalence in the general population (*6*). Advertisements that are emotionally provocative and contain personal testimonies are especially effective in reaching low-SES populations (*7*). CDC recently implemented its first paid national media campaign to encourage smokers to quit (www.cdc.gov/quitting/tips). Mass media campaigns can be most effective in reaching all populations when they are part of a comprehensive tobacco-control program that includes comprehensive smoke-free policies that make all indoor public places 100% smoke-free, increase tobacco price, counter tobacco industry marketing activities, and increase the availability and accessibility of evidence-based cessation services (*6,8*).

Limitations

The findings in this report are subject to at least five limitations. First, data were based on self-reports and were not validated biochemically. However, studies have indicated that self-reported smoking status validated by measured serum cotinine levels yield similar prevalence estimates (*9*). Second, the NSDUH questionnaire is administered only in English and Spanish; therefore, estimates for certain racial/ethnic populations might be underestimated if neither English nor Spanish is the primary language spoken. Moreover, race/ethnicity was not adjusted by socioeconomic status. Third, because NSDUH does not include institutionalized populations and persons in the military, these results might not be generalizable to these groups. Fourth, although smoking

TABLE 2. Prevalence of current smoking* among persons aged ≥18 years, by selected characteristics — National Survey on Drug Use and Health, United States, 2006–2010†

Characteristic	2006–2008 %	2006–2008 (95% CI)	2009–2010 %	2009–2010 (95% CI)	Absolute difference from 2006–2008 to 2009–2010 (percentage points)
Age group (yrs)					
18–25	36.8	(36.3–37.4)	35.0	(34.2-35.8)	-1.8
26–34	33.7	(32.8–34.7)	33.6	(32.4-34.9)	-0.1
35–49	28.1	(27.5–28.8)	26.1	(25.1-27.1)	-2.0
50–64	22.9	(21.8–23.9)	22.4	(21.1-23.7)	-0.5
≥65	9.4	(8.5–10.4)	9.2	(8.1–10.3)	-0.2
Sex					
Male	29.2	(28.6–29.8)	27.5	(26.8–28.3)	-1.7
Female	23.0	(22.5–23.5)	22.4	(21.7–23.1)	-0.6
Race/Ethnicity					
White, non-Hispanic	26.9	(26.4–27.3)	25.8	(25.1–26.6)	-1.1
Black, non-Hispanic	26.9	(25.6–28.1)	25.4	(23.9–27.0)	-1.5
Hispanic§	22.9	(21.7–24.1)	22.9	(21.3–24.5)	0
American Indian/Alaska Native	42.2	(35.5–48.8)	34.4	(27.9–40.9)	-8.0
Native Hawaiian/Other Pacific Islander	28.5	(20.9–36.1)	18.6	(11.5–25.8)	-9.9
Asian	14.7	(13.0–16.4)	11.8	(9.9–13.6)	-2.9
Multirace	35.2	(31.4–39.0)	33.2	(29.1–37.2)	-2.0
Educational attainment					
Less than high school	34.3	(33.0–35.6)	34.6	(33.3–35.9)	0.3
High school graduate or equivalent	31.1	(30.3–32.0)	30.4	(29.4–31.4)	-0.7
Some college	27.1	(26.3–28.0)	25.6	(24.6–26.5)	-1.5
College graduate	14.1	(13.4–14.8)	13.2	(12.4–13.9)	-0.9
Employment status					
Full-time	27.8	(27.2–28.4)	25.4	(24.7–26.1)	-2.4
Part-time	24.5	(23.5–25.4)	24.2	(23.1–25.4)	-0.3
Unemployed	44.7	(42.3–47.2)	40.9	(39.2–42.7)	-3.8
Other (including not in work force)	20.9	(20.2–21.7)	20.7	(19.6–21.8)	-0.2
Poverty status¶					
<100% (below threshold)	36.5	(35.1–37.8)	37.9	(36.4–39.4)	1.4
100%–199% (at or near threshold)	32.8	(31.8–33.8)	31.5	(30.3–32.7)	-1.3
≥200% (above threshold)	22.5	(21.9–23.0	20.5	19.9–21.0	-2.0

Abbreviation: 95% CI = 95% confidence interval.
* Current smokers include all persons who smoked at least one cigarette during the 30 days before the survey.
† N = 42,693 for 2006–2008; N = 27,636 for 2009–2010.
§ Persons of Hispanic ethnicity might be of any race or combination of races.
¶ Based on self-reported family income or imputed family income and poverty thresholds published by the U.S. Census Bureau, 2005-2009. Available at http://www.census.gov/hhes/www/poverty.

prevalence was determined to be lowest among Asian and Hispanic women, variations in smoking prevalence have been observed with specific Asian and Hispanic groups (e.g., Korean and Vietnamese men and Puerto Rican men and women) (*10*). Finally, because of limited sample sizes for certain population groups (e.g., AI/AN), single-year estimates might have resulted in imprecise estimates.

Conclusion

Comprehensive tobacco-control strategies should be implemented in an equitable manner to be effective in addressing tobacco-related disparities. These strategies should ensure that all populations are covered by comprehensive smoke-free policies, including workplaces, restaurants, and bars; prices are increased on all tobacco products and coupled with access to evidence-based cessation services; exposure to industry advertising, promotions, and sponsorship are reduced among all populations; and the availability, accessibility, and effectiveness of tailored cessation services are increased for all populations (*11*).

The findings in this report underscore conclusions from the 2011 CHDIR that efforts to reduce future tobacco-related disparities associated with low SES should take a lifespan approach (*2*). Specifically, continuing population-based strategies that target youth, particularly among those with low academic achievement and drop-outs, will be critical in preventing future tobacco-related disparities. Coordinated, multicomponent interventions that combine mass media campaigns, price increases including those that result from tax increases, school-based policies and programs, and statewide or community-wide changes in smoke-free policies and norms are effective in reducing the initiation, prevalence, and intensity of smoking among youth and young adults (*5,6*). Finally, addressing the social determinants of health (e.g., socioeconomic status, cultural characteristics, acculturation, stress, targeted advertising, price of tobacco products, and varying capacities of communities to mount effective tobacco-control initiatives) will be necessary to disrupt the cycle of smoking among low-SES populations (*2,12,13*).

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Health Outcomes: Morbidity

Expected Years of Life Free of Chronic Condition–Induced Activity Limitations — United States, 1999–2008

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Introduction

Over the 20th century, the U.S. population has witnessed major changes in fatal and nonfatal health outcomes. Mortality has declined, and life expectancy has increased continuously; chronic conditions have replaced acute diseases as leading causes of both illness and death (*1*). During 1900–2008, average life expectancy at birth for the total U.S. population increased from 47.3 years in 1900 to 78.1 years in 2008 (*2*), a gain of 30.8 years. In addition, an increasing proportion of the U.S. population is aged >65 years. According to the U.S. Census Bureau estimates, at the beginning of the 20th century, the U.S. population aged >65 years constituted only 4.1 percent of the total population; by 2008, the percentage of the total U.S. population aged >65 years was 12.8% (*3,4*). However, declines in mortality are not necessarily associated with declines in morbidity or the consequences of chronic conditions on life activities. The possibility that longer life might be accompanied by poor health makes it essential to develop measures that account for both mortality and morbidity at the same time. Hence, over the past 40 years, a new set of health measures (e.g., "healthy life expectancies") have been developed that account for both mortality and life spent free of the consequences of ill health. One of these newly developed set of measures (called "active life expectancy") is the average number of years expected to be lived without activity limitations.

In general, being "active" entails the continuing participation of a person in social, economic, cultural, spiritual, and civic affairs (*5*). In health studies, the context in which "being active" has been used has varied depending on the population group under study (*6–9*). In this report, "active" is used to differentiate between a person with limitations in social roles and one without such limitations. This analysis focuses on activity limitations caused by chronic conditions. Active life expectancy or active life at any age is defined as the remaining years of life free of activity limitations (YFAL) caused by chronic conditions.

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*10*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*11*). This report provides information on disparities in YFAL as a result of chronic conditions, a topic that was not discussed in the 2011 CHDIR. The purposes of this report are to discuss and raise awareness of differences in the characteristics of persons who experience chronic condition–induced physical activity limitations and to prompt actions to reduce these disparities.

Methods

To assess disparities in YFAL as a result of chronic conditions, CDC analyzed data from the National Vital Statistics System (NVSS) and the National Health Interview Survey (NHIS). Demographic variables analyzed included sex and race. Period life tables for males and females and for the white and black populations of the United States for each year from 1999 through 2008 come from CDC's National Center for Health Statistics (NCHS). Expected years free of chronic condition–induced activity limitations by ethnicity, environmental, or behavior risk factors and socioeconomic determinants of access to health care were not included in this analysis because officially released NCHS life expectancy estimates by these and other similar factors for the years 1999 through 2008 were not available. Hence, because officially released annual life tables by ethnicity were not available for all the 10 years of the study period, the expected YFAL for Hispanics, non-Hispanic whites, and non-Hispanic blacks were not analyzed separately. The racial category "white" includes person of Hispanic origin who identified themselves as white, and the racial category "black" includes persons of Hispanic origin who identified themselves as black.

Data on activity status come from NHIS, which defines an activity limitation as a limit on a person's ability to perform activities normally expected of someone of his or her age. Depending on how they answered questions on activity status, survey respondents were classified into four categories: 1) not limited, 2) unable to perform major activity, 3) limited in kind or amount of major activity, and 4) limited in other activities. Whenever any form of activity limitation was identified, NHIS survey participants also were asked the health condition causing the limitation, and the cause was classified as chronic

or nonchronic. Conditions were considered chronic if they cannot be cured once acquired or had existed continuously for >3 months after onset (*12*).

Expected years of life with and without chronic condition–induced activity limitations were estimated by using a demographic-epidemiologic model (*13–16*) that combined average life expectancy and the prevalence of being with and without chronic condition–induced activity limitation. The expected years without any activity limitations then were used to calculate the percentage of remaining life expected to be lived without such limitations. Expected years of life with and without chronic condition–induced activity limitations were estimated separately for four population subgroups: males, females, whites, and blacks. The definition of standard error of expected YFAL and the statistical test and level of significance used have been summarized (Appendix).

Disparities were measured as the deviations from a "referent" category rate or prevalence. Absolute difference was measured as the simple difference between the rate for a population subgroup and the rate for its respective reference group. The relative difference, a percentage, was calculated by dividing the absolute difference by the value in the referent category and multiplying by 100. Whether a disparity in expected YFAL between a male and a female or between a white person and a black person of the same age was statistically significant was tested by using a 2-tailed test at the 95% level of significance. A hypothesis of equality was rejected if the value of the absolute value of the z-score exceeded 1.96.

Results

During 1999–2008, total life expectancy improved (Table 1). During this 10-year period, total life expectancy at birth for males increased by 1.7 years, from 73.9 years in 1999 to 75.6 years in 2008, and female life expectancy at birth increased by 1.2 years, from 79.4 years in 1999 to 80.6 years in 2008. Expectation of life at birth for the white population increased by 1.2 years, from 77.3 years in 1999 to 78.5 years in 2008. Life expectancy for the black population increased by 2.6 years, from 71.4 years in 1999 to 74.0 years in 2008.

The percentage of total life expectancy that was estimated to be spent free of chronic condition–induced activity limitations fluctuated over the 10-year period, with the percentage of life expectancy spent free of activity limitations slightly lower in 2008 than in 1999. For males, the percentage of life expected to be free of activity limitations was 86.5% in 1999 and declined to 86.1% in 2008. In 1999, blacks expected to spend about 82.9% of their total expected life free of activity limitations compared with 82.6% in 2008. For whites, the percentage of life expected to be spent free of activity limitations declined from 85.6% in 1999 to 85.4% in 2008, while it remained almost the same for females (84.5% in 1999 and 84.4% in 2008).

In 1999, males would expect to spend 63.9 of their 73.9 years of life expectancy free of chronic condition–induced activity limitations compared with 67.1 years out of 79.4 years of total expected years of life free of such limitations for females. The white and black populations would expect to spend 66.2 years of 77.3 years of total life expectancy and 59.2 years of 71.4 years of total life expectancy respectively free of chronic condition–induced activity limitations.

By 2008, males would expect to live 65.1 years out of total expected years of life of 75.6 years free of activity limitations. Females would expect to live 68.0 years of the total life expectancy of 80.6 years limitation-free. The white and black populations would expect to live 67 activity limitation–free years (out of a total life expectancy of 78.5 years) and 61.1 activity limitation–free years (out of a total life expectancy of 74.0 years) respectively.

Over the 10 years, improvements in the expected YFAL were observed (Table 2). The increase in expected YFAL caused by chronic conditions during the 10-year period was 1.2 years for males (from 63.9 years in 1999 to 65.1 years in 2008), 0.9 years for females (from 67.1 years in 1999 to 68.0 years in 2008), 0.8 years for whites (from 66.2 years in 1999 to 67.0 years in 2008), and 1.9 years for blacks (from 59.2 in 1999 to 61.1 years in 2008). In the 10-year period, the black population had the largest increase both in life expectancy at birth as well as in expected YFAL caused by chronic conditions.

The changes in the differences in YFAL caused by chronic conditions between males and females and between whites and blacks from 1999 to 2008 have been calculated (Figure). In 1999, the difference in expected YFAL at birth between the white and the black populations was 7 years (Figure), and the difference between males and females was 3.2 years. After 10 years, the difference between the white and the black populations had decreased to 5.9 years, and the difference between males and females had dropped to 2.9 years.

During the 10-year period, the disparity between the white and the black populations declined by 1.1 years, and the disparity between males and females dropped by slightly more than 0.3 years. However, the observed disparities in expected YFAL caused by chronic conditions between men and women as well as that between whites and blacks remained statistically significant at the 5% level throughout the 10-year period (Table 2).

TABLE 1. Life expectancy at birth and expected years free of activity limitations caused by chronic conditions, by sex and race — United States, 1999–2008

	Male			Female			White			Black		
Year	LE	YFAL	YFAL as % of LE	LE	YAFL	YFAL as % of LE	LE	YAFL	YFAL as % of LE	LE	YAFL	YFAL as % of LE
1999	73.9	63.9	86.5	79.4	67.1	84.5	77.3	66.2	85.6	71.4	59.2	82.9
2000	74.1	64.3	86.8	79.3	67.7	85.4	77.3	66.6	86.2	71.8	60.2	83.8
2001	74.2	64.0	86.3	79.4	67.5	85.0	77.4	66.4	85.8	72.0	59.5	82.6
2002	74.3	64.1	86.3	79.5	67.2	84.5	77.4	65.3	84.4	72.1	59.4	82.4
2003	74.5	64.5	86.6	79.5	67.2	84.5	77.6	66.5	85.7	72.3	59.6	82.4
2004	74.9	64.8	86.5	79.9	67.8	84.9	77.9	66.9	85.9	72.8	60.0	82.4
2005	74.9	64.9	86.6	79.9	68.1	85.2	77.9	67.0	86.0	72.8	61.1	83.9
2006	75.1	65.1	86.7	80.2	68.4	85.3	78.2	67.3	86.1	73.2	61.2	83.6
2007	75.4	65.1	86.3	80.4	68.0	84.6	78.4	67.1	85.6	73.6	60.2	81.8
2008	75.6	65.1	86.1	80.6	68.0	84.4	78.5	67.0	85.4	74.0	61.1	82.6

Abbreviations: LE = life expectancy at birth; YFAL = years free of activity limitations.
Source: National Vital Statistics System and National Health Interview Survey, 1999–2008.

TABLE 2. Difference in expected years free of activity limitations caused by chronic conditions, by sex and race — United States, 1999–2008

	Expected YFAL			Expected YFAL		
Year	Male	Female	Difference (yrs)*	White	Black	Difference (yrs)*
1999	63.9	67.1	3.2	66.2	59.2	7.0
2000	64.3	67.7	3.4	66.6	60.2	6.4
2001	64.0	67.5	3.5	66.4	59.5	6.9
2002	64.1	67.2	3.1	65.3	59.4	5.9
2003	64.5	67.2	2.7	66.5	59.6	6.9
2004	64.8	67.8	3.0	66.9	60.0	6.9
2005	64.9	68.1	3.2	67.0	61.1	5.9
2006	65.1	68.4	3.3	67.3	61.2	6.1
2007	65.1	68.0	2.9	67.1	60.2	6.9
2008	65.1	68.0	2.9	67.0	61.1	5.9

Abbreviation: YFAL = years free of activity limitations.
Source: National Vital Statistics System and National Health Interview Survey, 1999–2008.
* Implies statistically significant difference in expected years without activity limitations at $p<0.05$.

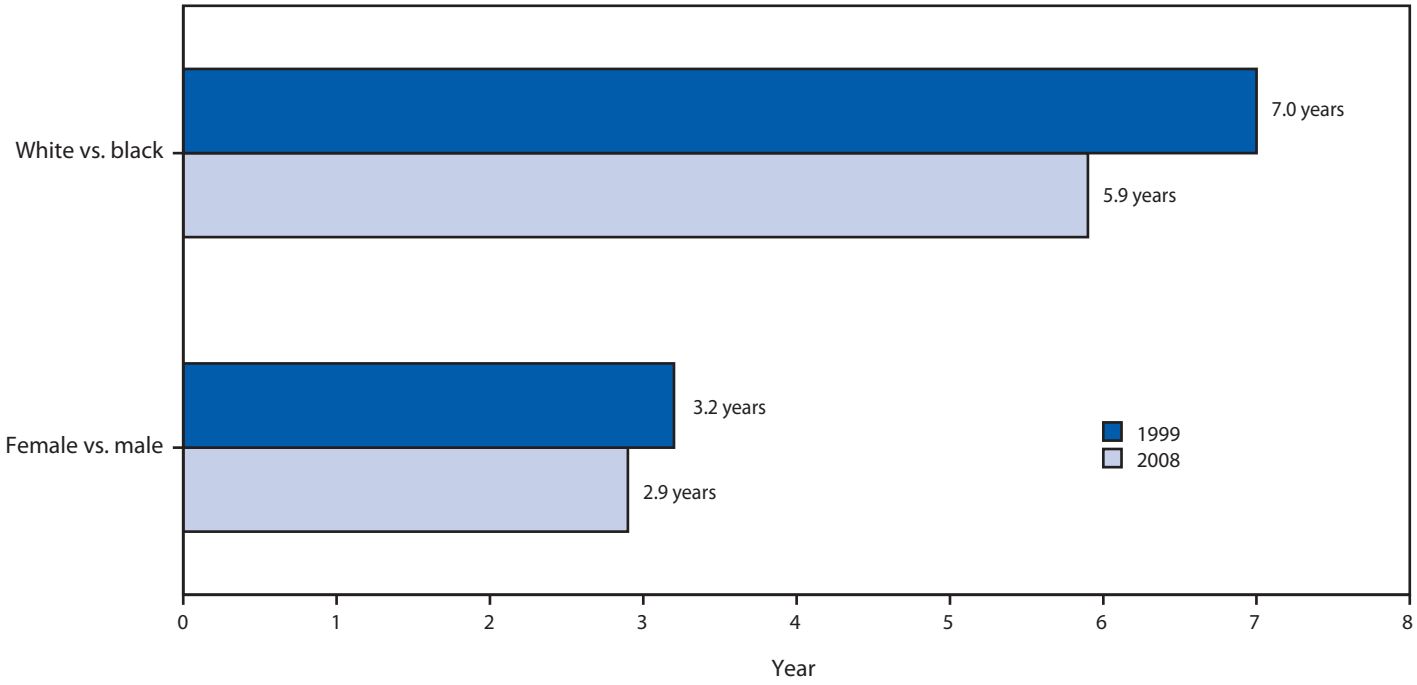
Discussion

Between 1999 and 2008, life expectancy and expected YFAL at birth increased for all the population subgroups indicating the expected improvements both in mortality and quality of life. For males, life expectancy at birth increased from 73.9 in 1999 to 75.6 years in 2008. For females, life expectancy increased from 79.4 years in 1999 to 80.4 years in 2008. For the white population, life expectancy increased from 77.3 years in 1999 to 78.5 years in 2008, and for the black population, it increased from 71.4 years in 1999 to 74.0 years in 2008. During the same 10-year period, expected male YFAL at birth increased from 63.9 years in 1999 to 65.1 years in 2008. For females, expected YAFL at birth increased from 67.1 years in 1999 to 68.0 years in 2008. For the white population, expected YFAL at birth increased from 66.2 years in 1999 to 67.0 years in 2008, and for the black population, it increased from 59.2 years in 1999 to 61.1 years in 2008.

Significant disparities in expected YFAL existed between males and females as well as between the white and the black populations throughout the 10-year period. However, the disparities in expected YFAL have been declining throughout the course of the 10-year period. Disparities in YFAL between males and females decreased by 0.3 year, from 3.2 years in 1999 to 2.9 years in 2008. In the same period, disparities between the white and the black populations decreased by more than one year from 7.0 years in 1999 to 5.9 years in 2008. These results are consistent with results of other similar studies and federal government health reports (*17–18*).

The 10-year health initiative *Healthy People 2010* had as its two overarching goals when it was launched in 2000 increasing the quality and years of healthy life of the U.S. population and eliminating health disparities. The final assessment of this initiative has concluded that during the 10-year period 2000–2010, life expectancy improved for the populations that could be assessed; women had longer life expectancy than men, and the white population had a longer life expectancy than the black population; and differences were observed both by race and sex in life expectancy measure (at birth) and expected YFAL. On the basis of data from 2006–2007, on average, the

FIGURE. Disparities in expected (at birth) years free of activity limitations caused by chronic conditions, by race and sex — United States, 1999 and 2008



Source: National Vital Statistics System and National Health Interview Survey, 1999 and 2008.

U.S. population was expected to spend 66.2 years of their entire lives free of activity limitations (*19*).

During 1999–2008, expected YFAL caused by chronic conditions increased for both males and females and for both blacks and whites. During the entire 10 years, although disparities in expected YFAL existed between males and females as well as between whites and blacks, the extent of these disparities declined during the 10-year period.

Limitations

The findings provided in this report are subject to at least two limitations. First, estimates of expected YFAL caused by chronic conditions are based on current life expectancy estimates and the prevalence of activity limitations. Annual life expectancy estimates are based on the total U.S. population whereas prevalence rates on activity limitations come from NHIS, which does not include the institutionalized population of the United States. However, because the size of this population is very small compared with the total household population, the effect of the exclusion of the group on the comparison of estimates over time is assumed to be minimal. Second, estimates in this analysis might have been sensitive to the operational definition of expected YFAL caused by chronic conditions. Activity limitation is part of a larger continuum process known as the "disablement process." Hence, whenever measures such as activity limitations induced by chronic conditions (which are discrete in nature) are used, cut-off points on the continuum have to be determined to differentiate those with and without limitations. These cut-off points are functions of the operational definitions and might vary from one study to another. Although the estimates could be sensitive to these operational definitions, the effect of such definitions on the comparison of estimates over time is assumed to be minimal.

Conclusion

The findings provided in this report indicate that during the 10-year period 1999–2008, while disparities in expected years free of chronic condition caused activity limitations still existed between males and females as well as between the white and the black populations, expected YFAL increased for all four population subgroups studied, and disparities decreased. Increasing the length of life, improving the quality of life, and eliminating health disparities among population groups have been the major health goals of all the *Healthy People* initiatives since the decade-long health programs were initiated with the publication of the Surgeon General 's Report on Health Promotion and Disease Prevention in 1979 (*20*).

The overarching goals of the first *Healthy People* initiative were to decrease mortality and increase independence among older adults by 1990. The first two of the three major goals of the second 10-year health initiative (*Healthy People 2000*) were to increase the span of healthy life and to reduce disparities in health status (*21*). *Healthy People 2010* focused on two major goals: to increase quality of years of healthy life and to eliminate health disparities. *Healthy People 2020*, the fourth 10-year national health initiative, has four major goals, one of which focuses on achieving health equity by eliminating health disparities.

The findings of this report as well as reports of the first three *Healthy People* programs demonstrate that expected years of life are getting longer, health-related quality of life is improving, and health disparities between population groups are decreasing. However, group comparisons also demonstrate that disparities in mortality (as measured by expectation of life at birth) and health-related quality of life (as measured by expected YFAL caused by chronic conditions) still exist.

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Appendix

Definition of Terms Used in This Report

Standard Errors for Expected Years Free of Activity Limitations

Expected years free of activity limitations (YFAL) ($e_x^{'}$) at age x is defined as the remaining years of life that is free of limitations caused by chronic conditions and is given by:

$$e_x^{'} = \frac{1}{l_x} \sum (1 - {}_n\pi_i)\, {}_nL_i \ , \qquad [1]$$

where

$e_x^{'}$ is the remaining years free of activity limitation due to chronic conditions for persons who have reached age x;

l_x is the number of survivors at age x;

$(1 - {}_n\pi_x)$ represents the age-specific health state free of activity limitations due to chronic conditions;

${}_nL_x$ is the total number of years lived by a cohort in the age interval (x, x+n); and

ω is the oldest age category.

The variance and standard errors of the estimated YFAL can be calculated based on the variances of the prevalence rates of the different health states. Within each age group, the prevalence of each health state is a proportion with an associated standard error. Since there are only two health states, the variance of the health state with activity limitations equals to the variance of its complement. The variance S^2 of $({}_n\pi_x)$ or $(1 - {}_n\pi_x)$ is given by the variance of a binomial distribution as follows:

$$S^2({}_n\pi_x) = [{}_n\pi_x (1 - {}_n\pi_x) / {}_xN_x]. \qquad [2]$$

where ${}_nN_x$ is the number of persons in the interval (x, x+n) of the sample from which the prevalence rates were computed.

Equation 2 can then be used to calculate the variance of expected YFAL, $e_x^{'}$ using the following formula:

$$VAR(e_x^{'}) = \frac{1}{l_x^2} \sum_{i=x}^{\varpi} [{}_nL_i^2 S^2 (1 - {}_n\pi_i)]. \qquad [3]$$

The standard error of the expected YFAL caused by chronic conditions at age x is simply the square root of its variance.

Test of Significance

Disparities between the expected years of life free of activity limitations of two population subgroups of the same age group can be tested by using a statistical method commonly used for testing the significance of a difference between two means using the following formula:

$$z = \frac{e_{x,1}^{'} - e_{x,2}^{'}}{\sqrt{S^2(e_{x,1}^{'} - e_{x,2}^{'})}} \ , \qquad [4]$$

where, $e_{x,1}^{'}$ and $e_{x,2}^{'}$ are the expected YFAL of two different population subgroups of the same age x.

The critical value of a z-score for a 2-tailed test at the 95% level of significance is 1.96, i.e., the hypothesis of equality is rejected if the absolute value of z exceeds 1.96.

Asthma Attacks Among Persons with Current Asthma — United States, 2001–2010

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Introduction

Asthma is a chronic inflammatory disorder of the airways that is characterized by episodic and reversible airflow obstruction, airway hyper-responsiveness, and underlying inflammation. Common asthma symptoms include wheezing, coughing, and shortness of breath (*1*). With correct treatment and avoidance of exposure to environmental allergens and irritants that are known to exacerbate asthma, the majority of persons who have asthma can expect to achieve optimal symptom control (*2*).

Multiple reports published previously provide detailed surveillance information on asthma (*1,3–8*). A 1987 report that included asthma surveillance data for 1965–1984 identified differences among certain demographic groups by age, sex, and race/ethnicity (*5*). Subsequent asthma surveillance reports confirmed these differences and documented that the differences have persisted over time (*1,3,4,6*). These reports indicate that population-based asthma prevalence rates, emergency department visit rates, and hospitalization rates were higher among blacks than among whites, higher among females than among males, higher among children (aged 0–17 years) than among adults (aged ≥18 years), and higher among males aged 0–17 years than among females in the same age group. In addition, more detailed analysis of ethnicity data demonstrated that asthma health outcomes differed among Hispanic groups. Hispanics of Puerto Rican descent (origin or ancestry) had higher asthma prevalence and death rates than other Hispanics (e.g., Hispanics of Mexican descent), non-Hispanic blacks, and non-Hispanic whites (*7,8*).

Current asthma prevalence rates among the demographic groups for the years covered in this report were similar to those in previous CDC reports (*1,3,4,6*). During 2006–2010, an estimated 8.0% of the U.S. population had current asthma. Asthma prevalence varied by demographic group: 6.9% among males, 9.0% among females, 9.4% among children, 7.6% among adults, 7.9% among whites, 10.5% among blacks, 10.8% among American Indians/Alaska Natives, 5.0% among Asians, 14.4% among multi-race/other-race persons, 15.9% among Puerto Ricans, and 5.4% among Mexicans.

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*9*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*10*). This report provides information regarding asthma attacks among persons with current asthma that supplements information about current asthma prevalence provided in the 2011 CHDIR (*4*). The purposes of this report are to discuss and raise awareness of differences in asthma attacks among persons with current asthma and to prompt actions to reduce these disparities.

Methods

To examine whether disparities in asthma attacks exist among persons with current asthma by selected demographic characteristics, CDC analyzed data from the 2001–2010 National Health Interview Survey (NHIS). NHIS is an annual, in-person survey of the civilian, noninstitutionalized U.S. population based on a multistage sampling of households (*11*). An adult family member is selected to act as a proxy respondent for children aged 0–17 years. NHIS includes several questions about asthma. The first question, "Have you ever been told by a doctor or other health professional that you had asthma?" has been used as a lifetime prevalence measure for asthma since 1997. A second question, "Do you still have asthma?" was added in 2001. Respondents are considered to have current asthma if they answer "yes" to both of these questions. A response of "yes" to a third question, "During the past 12 months, have you had an episode of asthma or an asthma attack?" indicates an attack in the past year and was used in this analysis as an indicator of symptom control (*1,3,4,6*).

The percentage of persons with current asthma who reported an asthma attack in the past year, crude prevalence ratios, and adjusted prevalence ratios were estimated for selected demographic characteristics: race/ethnicity, sex, age (children aged 0–17 years, adults aged ≥18 years, and eight age groups),

educational attainment for adults, place of birth, geographic region, and federal poverty level (FPL). Estimated percentages with standard errors and prevalence ratios with 95% confidence intervals (CIs) are presented for 2006–2010. Estimated percentages with standard errors for more limited demographic groups are presented for both 2001–2004 and 2006–2010 for a historical comparison. Race/ethnicity is categorized on the basis of the respondents' self-reported race and ethnicity. Non-Hispanic race groups include white, black, American Indian/Alaska Native, Asian, and other or multiple races. Persons of Hispanic ethnicity might be of any race or combination of races. Hispanic subgroups include Puerto Rican, Mexican, and other Hispanic. FPL is based on U.S. Census Bureau poverty thresholds. The poverty threshold is based on the size of the family and the ages of family members. Income divided by the poverty threshold is called the "income-to-poverty ratio" (*12*).

Multiple years of survey data were combined to provide stable estimates for relatively small respondent groups. If the relative standard error was >30%, or if the sample size (denominator) was <50, estimates were considered unreliable and were suppressed. Analysis software was used to account for the complex survey design, and sample weights were used to produce national estimates. A multivariate (binary response) logistic regression model was used to determine the association (adjusted prevalence ratio [APR]) between reporting an asthma attack in the past year and demographic variables including age, sex, race/ethnicity, educational attainment, FPL, place of birth, and geographic region. A univariate logistic regression model was used to determine the association (crude prevalence ratio) between an asthma attack and each variable separately. The Wald chi-square test statistic was used for all logistic regression models to test for an association between the dependent variable (asthma attack status) and independent variables of interest. Chi-square tests and z-tests were used to test for demographic group and time period differences. All statistical tests were 2-sided, with $p<0.05$ denoting statistical significance. Comparative terms used to describe findings in this report (e.g., "higher" and "similar") indicate the results of statistical testing at $p<0.05$.

Results

During 2006–2010, reported attacks among those with current asthma were higher for females (53.5%) than for males (48.8%) (Table 1). The difference in reporting an asthma attack by sex was not statistically significant among children (adjusted prevalence ratio [APR]: 1.1) but was significant among adults (APR: 1.4) after adjusting for age, race/ethnicity, educational attainment, federal poverty level, place of birth, and geographic region (Table 2). Overall, asthma attacks were reported more frequently for children (56.1%) than for adults (49.6%) (Table 1). Asthma attacks were reported more frequently for children aged 0–4 years (APR: 1.9) and 5–11 years (APR: 1.3) than for children aged 12–17 years (Table 2). Among adults, persons aged 18–34 (APR: 1.4), 35–44 (APR: 2.0), 45–54 (APR: 1.9), and 55–64 years (APR: 1.6) were more likely to report asthma attacks than persons aged ≥65 years. Regardless of age, persons with asthma living in the West (54.5%) and the South (53.1%) were more likely to report asthma attacks than persons living in the Midwest (49.4%) and the Northeast (47.8%) (Table 1). The differences in reporting an asthma attack between the South and West regions compared with the reference region (Northeast) remained statistically significant after adjusting for covariates (Table 2). No significant interaction terms or multicollinearity effects were identified among any of the variables in the final model.

For children, reporting an asthma attack did not differ significantly by poverty level (range: 56.3% [FPL <100%]–57.8% [FPL ≥450%]) (Table 1). However, for adults, reporting an asthma attack did differ significantly by poverty level. Adults with incomes <100% of FPL (53.9%; APR: 1.4) and adults with incomes of 100%–249% of FPL (50.1%; APR: 1.2) were more likely to report asthma attacks than adults with incomes ≥450% of FPL (48.9%) (Tables 1 and 2). Among persons with incomes <100% of FPL, asthma attacks did not differ significantly by race/ethnicity, sex, age, level of education, place of birth, or geographic region (Table 1). However, subgroup differences in reported asthma attacks were observed among persons with higher income levels (100%–249% of FPL, 250%–449% of FPL, and ≥450% of FPL). In the three higher income groups, asthma attacks were reported more frequently among females, children, and persons living in the West than among males, adults, and persons living in the Northeast, respectively (Table 1). Notable changes in reporting an asthma attack in the past year were observed between 2001–2004 and 2006–2010 (Table 3). For many demographic groups (whites, blacks, Puerto Ricans, males, females, children, adults, male children, persons with incomes <450% of FPL, and those living in the Northeast and Midwest), reporting an asthma attack decreased significantly. Between 2001–2004 and 2006–2010, the disparity between the various Hispanic subgroups and that between male children and female children were eliminated, and the disparity between adults and children and that among the FPL groups decreased. However, more women than men now report having had an asthma attack in the past year, and persons in the West and the South now report having had an attack more often than persons in the Midwest and the Northeast.

TABLE 1. Percentage of persons with current asthma* who reported an asthma attack in the past year,† by selected characteristics — National Health Interview Survey, United States, 2006–2010

				FPL§											
	Total			<100% FPL			100%–249% FPL			250%–449% FPL			≥450% FPL		
Characteristic	Weighted %	SE	Sample size¶	Weighted %	SE	Sample size	Weighted %	SE	Sample size	Weighted %	SE	Sample size	Weighted %	SE	Sample size
Race/Ethnicity															
Non-Hispanic	51.1	(0.6)	11,586	54.3	(1.3)	2,533	52.0	(1.2)	3,476	48.8	(1.2)	2,843	50.3	(1.2)	2,734
White**	51.1	(0.7)	7,552	56.3	(1.8)	1,229	52.1	(1.5)	2,157	48.6	(1.4)	1,982	50.0	(1.3)	2,184
Black**	49.4	(1.1)	3,015	52.1	(2.1)	1,066	48.1	(1.9)	1,042	48.4	(2.7)	606	45.9	(3.9)	138
American Indian/ Alaska Native**	61.6	(7.8)	92	—††	(—)	36	—	(—)	28	—	(—)	17	—	(—)	11
Asian**	53.7	(3.1)	474	50.1	(7.9)	72	46.8	(5.9)	94	55.1	(5.3)	138	57.3	(5.1)	170
Other§§	56.3	(3.3)	436	50.2	(5.8)	126	68.7	(4.4)	147	42.4	(6.3)	97	60.6	(8.0)	66
Hispanic¶¶	53.8	(1.5)	2,644	57.0	(2.4)	899	52.1	(2.3)	935	49.3	(3.0)	497	58.1	(3.8)	313
Puerto Rican	55.6	(3.4)	663	61.0	(4.4)	299	54.1	(4.8)	102	47.8	(8.1)	52	53.6	(9.9)	64
Mexican	52.6	(2.1)	1,338	54.0	(3.4)	396	52.3	(3.5)	521	49.6	(4.2)	266	55.8	(5.3)	155
Other***	54.6	(2.6)	643	57.9	(4.2)	204	50.1	(4.3)	214	49.8	(5.7)	131	66.6	(6.8)	94
Sex															
Male	48.8	(0.9)	5,699	52.7	(2.0)	1,242	50.0	(1.5)	1,754	46.1	(1.8)	1,388	47.0	(1.8)	1,316
Female	53.5	(0.7)	8,531	56.3	(1.4)	2,190	53.4	(1.3)	2,657	50.9	(1.4)	1,952	53.9	(1.5)	1,731
Age															
Child (aged 0–17 yrs)	56.1	(0.9)	4,739	56.3	(1.9)	1,208	56.1	(1.7)	1,544	54.3	(2.1)	1,111	57.8	(2.2)	876
Adult (aged ≥18 yrs)	49.6	(0.7)	9,491	53.9	(1.4)	2,224	50.1	(1.2)	2,867	46.9	(1.4)	2,228	48.9	(1.4)	2,171
Child															
Male	55.7	(1.4)	2,740	54.4	(2.7)	717	57.1	(2.3)	884	54.3	(2.7)	631	56.7	(3.0)	508
Female	56.7	(1.5)	1,999	59.4	(2.7)	491	54.8	(3.0)	660	54.3	(3.1)	480	59.5	(3.5)	368
Adult															
Male	44.1	(1.2)	2,959	50.5	(2.8)	525	44.8	(2.1)	870	41.6	(2.5)	757	42.8	(2.2)	807
Female	52.6	(0.8)	6,532	55.2	(1.5)	1,699	53.0	(1.4)	1,997	50.0	(1.7)	1,472	52.9	(1.1)	1,364
Educational attainment (aged ≥18 yrs)															
Less than high school	51.2	(1.5)	1,889	55.5	(2.2)	889	49.2	(2.3)	712	47.4	(4.6)	215	46.4	(7.5)	73
High school graduate or equivalent	44.6	(1.3)	2,349	50.4	(2.7)	584	44.5	(2.3)	864	40.6	(2.7)	570	44.8	(3.3)	331
Some college	50.3	(1.3)	2,090	53.4	(3.0)	464	53.1	(2.4)	680	46.7	(2.4)	552	48.8	(3.3)	394
College graduate or higher	52.1	(1.2)	3,099	59.1	(3.6)	273	56.7	(2.6)	586	51.0	(2.2)	876	50.2	(1.8)	1,364
Place of birth															
U.S. and U.S. territories	51.2	(0.6)	13,277	54.6	(1.2)	3,177	52.0	(1.1)	4,110	48.5	(1.2)	3,148	50.3	(1.2)	2,842
Outside U.S. and U.S. territories†††	55.5	(2.1)	950	58.4	(4.4)	255	51.8	(3.6)	300	54.8	(5.4)	192	58.2	(4.8)	203
Geographic region§§§															
Northeast	47.8	(1.3)	2,731	52.9	(3.0)	699	47.1	(2.2)	781	45.4	(2.9)	608	47.1	(2.4)	642
Midwest	49.4	(1.1)	3,263	51.9	(2.2)	810	50.2	(2.4)	986	45.4	(2.4)	774	50.5	(2.7)	693
South	53.1	(1.0)	4,957	56.1	(1.9)	1,255	53.8	(1.7)	1,669	51.5	(2.0)	1,113	50.7	(2.1)	920
West	54.5	(1.3)	3,279	58.3	(2.9)	669	55.1	(2.2)	974	51.3	(2.5)	844	54.9	(2.2)	792
Total	**51.5**	**(0.6)**	**14,230**	**54.8**	**(1.2)**	**3,432**	**52.0**	**(1.0)**	**4,411**	**48.8**	**(1.2)**	**3,340**	**50.8**	**(1.2)**	**3,047**

Abbreviations: FPL = federal poverty level; SE = standard error.

* Persons who answered "yes" to the questions, "Have you ever been told by a doctor or other health professional that you had asthma?" or "Has a doctor or other health professional ever told you that (sample child) had asthma?" and "yes" to the question, "Do you (does sample child) still have asthma?"

† Persons who answered "yes" to the question, "During the past 12 months, have you (has sample child) had an episode of asthma or an asthma attack?"

§ FPL was based on U.S. Census Bureau poverty thresholds (available at http://www.census.gov/hhes/www/poverty.html). Imputed income values were used when income was not reported.

¶ Unweighted pooled sample size, 2006–2010. Because of item nonresponse, individual characteristic categories might not sum to total.

** Includes persons who indicated only a single race.

†† If the relative SE is >30%, or if the sample size (denominator) is <50, estimates are considered unreliable and are suppressed.

§§ Includes Native Hawaiians and Other Pacific Islanders, persons reporting more than one race, and persons reporting their race as something other than those listed.

¶¶ Persons of Hispanic ethnicity can be of any race or combination of races.

*** Includes persons reporting Cuban, Dominican, Central or South American, Spanish, multiple, and unspecified Hispanic ancestry.

††† Includes U.S. citizens born abroad (one or both of whose parents were U.S. citizens) as well as naturalized citizens and noncitizens.

§§§ *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

TABLE 2. Multivariate association between reporting an asthma attack in the past year* and selected characteristics of persons with current asthma† — National Health Interview Survey, United States, 2006–2010

	Child (aged 0–17 yrs)				Adult (aged ≥18 yrs)			
	Crude		Adjusted		Crude		Adjusted	
Characteristic	**PR**	**(95% CI)**	**PR**	**(95% CI)**	**PR**	**(95% CI)**	**PR**	**(95% CI)**
Race/Ethnicity								
Non-Hispanic, white§	1.0	Ref.	1.0	Ref.	1.0	Ref.	1.0	Ref.
Non-Hispanic, black§	0.8	(0.7–1.0)	0.8	(0.7–1.0)	0.9	(0.8–1.0)	0.8	(0.7–0.9)
Non-Hispanic, other¶	1.0	(0.8–1.4)	0.9	(0.7–1.3)	1.2	(1.0–1.5)	1.1	(0.9–1.4)
Hispanic**	0.9	(0.5–1.1)	0.8	(0.7–1.0)	1.1	(1.0–1.3)	1.0	(0.8–1.2)
Puerto Rican	1.3	(0.9–1.8)	1.6	(1.2–2.3)	1.0	(0.7–1.5)	1.2	(0.8–1.7)
Mexican/Other††	1.0	Ref.	1.0	Ref.	1.0	Ref.	1.0	Ref.
Sex								
Male	1.0	Ref.	1.0	Ref.	1.0	Ref.	1.0	Ref.
Female	1.0	(0.9–1.3)	1.1	(0.9–1.3)	1.4	(1.3–1.6)	1.4	(1.2–1.5)
Age group (yrs)								
0–4	1.9	(1.5–2.4)	1.9	(1.5–2.5)	NA	NA	NA	NA
5–11	1.3	(1.1–1.5)	1.3	(1.1–1.6)	NA	NA	NA	NA
12–17	1.0	Ref.	1.0	Ref.	NA	NA	NA	NA
18–34	NA	NA	NA	NA	1.3	(1.1–1.5)	1.4	(1.2–1.6)
35–44	NA	NA	NA	NA	1.9	(1.6–2.3)	2.0	(1.7–2.4)
45–54	NA	NA	NA	NA	1.8	(1.5–2.2)	1.9	(1.6–2.3)
55–64	NA	NA	NA	NA	1.5	(1.3–1.8)	1.6	(1.4–1.9)
≥65	NA	NA	NA	NA	1.0	Ref.	1.0	Ref.
Educational attainment (aged ≥18 years)								
Less than high school education	NA	NA	NA	NA	1.0	(0.8–1.1)	0.9	(0.8–1.1)
High school graduate or equivalent	NA	NA	NA	NA	0.7	(0.7–0.9)	0.7	(0.6–0.9)
Some college	NA	NA	NA	NA	0.9	(0.8–1.1)	0.9	(0.8–1.1)
College graduate or higher	NA	NA	NA	NA	1.0	Ref.	1.0	Ref.
Federal poverty level (FPL)§§								
<100% FPL	0.9	(0.8–1.2)	1.0	(0.8–1.2)	1.2	(1.1–1.4)	1.4	(1.2–1.6)
100%–249% FPL	0.9	(0.4–1.2)	0.9	(0.8–1.2)	1.1	(0.9–1.2)	1.2	(1.1–1.4)
250%–449% FPL	0.9	(0.7–1.1)	0.9	(0.7–1.1)	0.9	(0.8–1.1)	1.0	(0.8–1.2)
≥450% FPL	1.0	Ref.	1.0	Ref.	1.0	Ref.	1.0	Ref.
Place of birth								
U.S. and U.S. territories	1.0	Ref.	1.0	Ref.	1.0	Ref.	1.0	Ref.
Outside U.S. and U.S. territories¶¶	1.1	(0.7–1.8)	1.3	(0.8–2.0)	1.3	(1.1–1.5)	1.2	(1.0–1.4)
Geographic region* **								
Northeast	1.0	Ref.	1.0	Ref.	1.0	Ref.	1.0	Ref.
Midwest	1.2	(1.0–1.6)	1.2	(1.0–1.6)	1.0	(0.9–1.2)	1.0	(0.9–1.2)
South	1.3	(1.1–1.7)	1.3	(1.1–1.7)	1.2	(1.0–1.4)	1.2	(1.1–1.4)
West	1.5	(1.1–1.9)	1.5	(1.2–2.0)	1.3	(1.1–1.5)	1.3	(1.1–1.5)

Abbreviations: 95% CI = 95% confidence interval; NA = not applicable; PR = prevalence ratio; Ref. = Referent.

* Persons who answered "yes" to the question, "During the past 12 months, have you (has sample child) had an episode of asthma or an asthma attack?

† Persons who answered "yes" to the questions, "Have you ever been told by a doctor or other health professional that you had asthma?" or "Has a doctor or other health professional ever told you that (sample child) had asthma?" and "yes" to the question, "Do you (does sample child) still have asthma?"

§ Includes persons who indicated only a single race group.

¶ Includes Asians, American Indians/Alaska Natives, Native Hawaiians and Other Pacific Islanders, persons reporting more than one race, and persons reporting their race as something other than those listed.

** Persons of Hispanic ethnicity can be of any race or combination of races.

†† Includes persons reporting Mexican, Cuban, Dominican, Central or South American, Spanish, multiple, and unspecified Hispanic ancestry.

§§ FPL was based on U.S. Census Bureau poverty thresholds (available at http://www.census.gov/hhes/www/poverty.html). Imputed income values were used when income was not reported.

¶¶ Includes U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens.

*** *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Discussion

Findings from this report are comparable to those of previous reports (*1,3,4,6*). Within the U.S. population, the percentage of persons with current asthma reporting an asthma attack in the past year varies by demographic and economic groups. Similar to current asthma prevalence, asthma attacks were more prevalent among females, children, the poor, persons of multiple races, and Puerto Ricans. However, while current asthma prevalence was higher in the Northeast, attacks were reported more frequently in the South and in the West than in other regions.

Demographic and socioeconomic characteristics associated with more frequent reporting of asthma attacks (e.g., females, children, persons living in the South and the West, Puerto Ricans, and the poor) were identified. However, causality cannot be determined from cross-sectional survey data. Surveillance data on asthma attacks cannot be used to determine the reasons for the observed differences among the demographic and economic subgroups examined in this report. The differences might be attributable to differing levels of exposure to environmental irritants and allergens (e.g., environmental irritants such as tobacco smoke or air pollutants and environmental allergens such as house dust mites, cockroach particles, and cat and dog dander) (*7,9,13*) or they might be attributable to differences in disease self-management or medical treatment. The reasons for the differences in the frequency of reported asthma attacks can be addressed only by research studies designed to determine the effect of a specific exposure or a specific disease management protocol.

Limitations

The results of this analysis are subject to at least three limitations. First, the asthma attack prevalence estimates in this report rely on self-reported data and thus are subject to recall bias. The respondent must recall a physician's diagnosis of asthma correctly, which in turn requires that the physician's diagnosis was correct and conveyed successfully to the person. Because no definitive test exists for asthma, the diagnosis and self-report cannot be validated; however, a 1993 review of asthma questionnaires documented a mean sensitivity of 68% and a mean specificity of 94% when self-reported data on an asthma diagnosis were compared with a clinical diagnosis (*1*). Second, because NHIS includes only the civilian, noninstitutionalized population of the United States, results might not be representative of other populations. Finally, because NHIS is conducted only in English and Spanish, results might not be representative of households whose residents have other primary languages.

TABLE 3. Percentage of persons with current asthma* who reported an asthma attack in the past year,† by selected characteristics — National Health Interview Survey, United States, 2001–2004 and 2006–2010

	2001–2004		2006–2010	
Characteristic	**%**	**(SE)**	**%**	**(SE)**
Race/Ethnicity				
Non-Hispanic	55.2	(0.6)	51.1	(0.6)
White§	54.6	(0.7)	51.1	(0.7)
Black§	56.6	(1.2)	49.4	(1.1)
Other¶	59.2	(2.3)	55.9	(2.2)
Hispanic**	55.7	(1.3)	53.8	(1.5)
Puerto Rican	64.2	(2.3)	55.6	(3.4)
Mexican	50.3	(1.9)	52.6	(2.1)
Sex				
Male	54.3	(0.8)	48.8	(0.9)
Female	56.0	(0.7)	53.5	(0.7)
Child (aged 0–17 yrs)	**62.6**	**(1.0)**	**56.1**	**(0.9)**
Male	63.9	(1.2)	55.7	(1.4)
Female	60.8	(1.6)	56.7	(1.5)
Adult (aged ≥18 yrs)	**52.0**	**(0.6)**	**49.6**	**(0.7)**
Male	47.2	(1.2)	44.1	(1.2)
Female	54.6	(0.8)	52.6	(0.8)
Federal poverty level (FPL)††				
<100% FPL	58.9	(1.3)	54.8	(1.2)
100%–249% FPL	56.4	(1.0)	52.0	(1.0)
250%–449% FPL	57.3	(1.2)	48.8	(1.2)
≥450% FPL	53.2	(1.1)	50.8	(1.2)
Geographic region§§				
Northeast	54.3	(1.1)	47.8	(1.3)
Midwest	55.7	(1.1)	49.4	(1.1)
South	55.5	(0.9)	53.1	(1.0)
West	55.3	(1.2)	54.5	(1.3)
Total	**55.3**	**(0.5)**	**51.5**	**(0.6)**

Abbreviation: SE = standard error.

* Persons who answered "yes" to the questions, "Have you ever been told by a doctor or other health professional that you had asthma?" or "Has a doctor or other health professional ever told you that (sample child) had asthma?" and "yes" to the question, "Do you (does sample child) still have asthma?"

† Persons who answered "yes" to the question, "During the past 12 months, have you (has sample child) had an episode of asthma or an asthma attack?

§ Includes persons who indicated only a single race.

¶ Includes Asians, American Indians/Alaska Natives, Native Hawaiians and Other Pacific Islanders, persons reporting more than one race, and persons reporting their race as something other than those listed.

** Persons of Hispanic ethnicity can be of any race or combination of races.

†† FPL was based on U.S. Census Bureau poverty thresholds (available at http://www.census.gov/hhes/www/poverty.html). Imputed income values were used when income was not reported.

§§ *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Conclusion

With the exception of a few specific occupational exposures, the exact cause of asthma is unknown. Once diagnosed, asthma requires ongoing comprehensive management on a long-term basis. Appropriate management requires both access to the health system and appropriate use of that system. Financial resources and social support are instrumental in long-term management of all chronic conditions, not just asthma (*13–15*). Acquiring self-management knowledge and skills and limiting exposure to environmental allergens and irritants are necessary to improve health and quality of life for persons with asthma, and especially for those with uncontrolled asthma (*2,13–15*).

Although surveillance data can identify disproportionately affected groups, research is needed into the role of self-management factors, environmental exposures, health-care system factors, and financial factors to understand better how their interrelations affect individual asthma management and control. Identifying the population-specific factors that contribute to asthma exacerbations among disproportionately affected demographic and socioeconomic groups can lead to targeted interventions. Strategies for asthma self-management and medical treatment protocols for asthma that are culturally appropriate and take into consideration population-specific characteristics can reduce the occurrence and severity of asthma exacerbations (*14*). For example, an intervention for children with asthma that included the use of multitrigger, multicomponent environmental factors resulted in improved symptom control and reduced the number of school days missed (*16*). Similar effective interventions are needed to address other disproportionately affected demographic and economic groups identified in this report.

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Diabetes — United States, 2006 and 2010

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Introduction

In 2011, an estimated 26 million persons aged ≥20 years (11.3% of the U.S. population) had diabetes (*1*). Both the prevalence and incidence of diabetes have increased rapidly since the mid-1990s, with minority racial/ethnic groups and socioeconomically disadvantaged groups experiencing the steepest increases and most substantial effects from the disease (*2–5*).

This analysis and discussion of diabetes is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*6*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The 2011 CHDIR report discussed the magnitude and patterning of absolute and relative measures of disparity in the prevalence and incidence rate of medically diagnosed diabetes during 2004 and 2008 and identified marked disparities in terms of race/ethnicity, socioeconomic status, disability status, and geography (*7*). The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*8*). This report updates information on disparities in prevalence and incidence rates of diagnosed diabetes presented in the 2011 CHDIR. The purposes of this report are to discuss and raise awareness about group differences in the level of diagnosed diabetes and to prompt actions to reduce these disparities.

Methods

To monitor progress toward eliminating health disparities in the prevalence and incidence rate of medically diagnosed diabetes, CDC used data from the 2006 and 2010 National Health Interview Survey (NHIS). NHIS is an ongoing, cross-sectional, in-person household interview survey of a probability sample of the civilian, noninstitutionalized U.S. population. Household interviews were completed for 75,716 persons in 2006 and 89,976 persons in 2010, with response rates of 87.3% and 79.5%, respectively (*9,10*).

The methods used to assess prevalence and incidence rates of medically diagnosed diabetes have been described previously (*7*). Analyses were repeated to assess disparities in each year and changes in disparity over time (*11*), according to the selected characteristics of age, sex, race/ethnicity, socioeconomic status,* geographic region as defined by the U.S. Census Bureau,† and disability status. Because of the association between place of birth and diabetes, the data also were examined by place of birth, defined as U.S.-born or not U.S.-born§ (*12,13*).

Prevalence (cases of diabetes of any duration per 100 population) was calculated for adults aged ≥18 years. Incidence rate (cases of diabetes ≤1 year's duration per 1,000 population) was calculated for adults aged 18–79 years. Estimates were standardized by the direct method to the age distribution of the U.S. 2000 Census adult population (*14*). Age-specific estimates were not age-standardized. CDC used software to account for the complex sample design of NHIS and to produce point estimates, standard errors, and 95% confidence intervals (CIs).

Disparities were measured as the deviations from a referent category incidence rate or prevalence. Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The relative difference, a percentage, was calculated by dividing the difference by the value in the referent category and multiplying by 100. To assess change in disparities over time, CDC calculated change in relative difference by subtracting the relative difference in the ending time period from the relative difference for the beginning period. To test for the statistical significance of the observed absolute and relative differences, CDC used the z statistic and a 2-tailed test at $p<0.05$ with

* Measured as educational attainment and household income by income-to-poverty ratio [IPR]. Following the Office of Management and Budget's Statistical Policy Directive 14, the U.S. Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. IPR is the total family income expressed as a ratio or percentage of the family's official poverty threshold. An IPR <1.00 or <100% of poverty denotes a family in poverty; an IPR ≥1.00 or ≥100% of the poverty threshold denotes family income equal to or higher than poverty. Official poverty thresholds are corrected for inflation using the Consumer Price Index.

† *Northeast:* Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

§ Includes U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens.

Bonferroni correction for multiple comparisons; 95% CIs were calculated. Statistically significant increases and decreases in relative differences from 2009 to 2011 were interpreted as increases and decreases in disparity, respectively. Estimates with relative standard error ≥30% were not reported.

Results

Racial/ethnic and socioeconomic disparities were identified in the age-standardized prevalence and incidence rate of medically diagnosed diabetes in 2006 and 2010 (Tables 1 and 2). In both years, overall, and for both males and females, significant absolute differences for race and ethnicity were present between non-Hispanic whites and non-Hispanic blacks or Hispanics ($p<0.05$ for all comparisons). The only significant temporal decline in disparity was found for age-standardized prevalence of diagnosed diabetes among non-Hispanic black females (change: -23.3 percentage points; $p<0.05$). Temporal increases in disparities from 2006 to 2010 were identified for prevalence of diagnosed diabetes among Hispanics, with increases greater among Hispanic females (change: 34.6 percentage points; $p<0.05$) than among Hispanic males (change: 11.6 percentage points; $p<0.05$). Temporal increases in disparities in incidence rates were greater among Hispanics (change: 79.0 percentage points; $p<0.05$) than among non-Hispanic blacks (change: 12.6 percentage points; $p<0.05$).

In 2006 and 2010, the groups with the lowest levels of education and income continued to experience the greatest socioeconomic disparity in age-standardized prevalence and incidence rate of diagnosed diabetes (Tables 1 and 2). Among these disadvantaged groups, no significant change in the relative difference in prevalence occurred from 2006 to 2010, but the disparity in the incidence rate worsened over time. In addition, a significant decline in disparity in the prevalence and incidence of diagnosed diabetes occurred among persons with a high school education ($p<0.05$ for both comparisons). From 2006 to 2010, age disparities in the age-standardized prevalence and age-standardized incidence rate of diagnosed diabetes worsened, and no significant change occurred in the geographic and disability disparities in age-standardized prevalence. However, for the age-standardized incidence rate, disparities between the Northeast and each of the other U.S. Census Bureau regions worsened significantly while disability disparities improved (Table 2). No significant disparities between U.S.-born and not U.S.-born persons were identified in the total population or in any racial/ethnic population.

Discussion

From 2006 to 2010, a decline occurred in the disparity between the prevalence of diagnosed diabetes among non-Hispanic black women and that among white women; among men, no evidence of a decline in racial/ethnic disparities in diagnosed diabetes was identified. In addition, during the survey years, socioeconomic disparities in the incidence of diagnosed diabetes worsened among the groups with the lowest level of education and income.

Although racial/ethnic and socioeconomic disparities in the prevalence and incidence rate of diagnosed diabetes persist in the U.S. adult population, some improvements occurred from 2006 to 2010. Significant improvements were noted for prevalence of diagnosed diabetes among non-Hispanic black women compared with non-Hispanic white women, among those with a high school diploma or some college compared with those with a college degree or higher, and among the poor (IPR <1.0 federal poverty level [FPL]) and middle income (IPR 2.0–2.9 FPL) groups compared with persons whose incomes were high (IPR ≥4.0 FPL). A significant improvement also occurred in the disparity in the diabetes incidence rate by disability status.

Although improvements are noted for disparities in prevalence of diagnosed diabetes, the annual incidence of diagnosed diabetes among the U.S. population is increasing (*2,4*), and mortality is declining among age, racial/ethnic, socioeconomic, and disabled subgroups in the adult diabetic population (*15,16*). If these circumstances continue, then the prevalence of diabetes among the U.S. population is projected to increase to as high as 33% by 2050 (*15*), posing major challenges for U.S. public health. Diabetes is the principal cause of kidney failure, nontraumatic lower extremity amputation, and new cases of blindness, and it is a major cause of cardiovascular disease among U.S. adults (*1*). The economic costs of diagnosed diabetes reflect the substantial burden imposed on the U.S. society (*18*). Between 2007 and 2012, the total estimated annual cost increased by 41% (in 2007 dollars) to $245 billion, including $69 billion in reduced productivity (*18*). Medical expenditure among persons with diabetes is two to three times that of persons without diabetes, and the largest component (43%) of total medical expenditures attributed to diagnosed diabetes is hospital inpatient care.

Limitations

The findings presented in this report are subject to at least two limitations. First, all data are self-reported and therefore subject to recall and social desirability bias. However, self-reported diabetes data have been reported to have high

TABLE 1. Age-standardized prevalence* of medically diagnosed diabetes among adults aged ≥18 years, by selected characteristics — National Health Interview Survey, United States, 2006 and 2010

	2006				2010				Change in relative difference from 2006 to 2010 (percentage points)
Characteristic	Age-standardized prevalence (%)	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Age-standardized prevalence (%)	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	
Sex									
Male	7.0	(6.4–7.6)	0.3	4.5	8.6	(8.1–9.2)	1.5†	21.1	16.6
Female	6.7	(6.2–7.3)	Ref.	Ref.	7.1	(6.7–7.6)	Ref.	Ref.	
Age group (yrs)§									
18–44	2.7	(2.3–3.0)	Ref.	Ref.	2.7	(2.4–3.1)	Ref.	Ref.	
45–64	11.4	(10.3–12.6)	8.8†	330.2	12.3	(11.5–13.1)	9.6†	350.5	20.3¶
65–74	18.9	(16.9–20.9)	16.3†	613.2	21.8	(19.9–23.8)	19.1†	698.5	85.3¶
≥75	18.2	(16.1–20.2)	15.6†	586.8	21.7	(19.8–23.5)	19.0†	694.9	108.1¶
Race/Ethnicity									
Both sexes									
White, non-Hispanic	6.0	(5.6–6.5)	Ref.	Ref.	6.8	(6.4–7.2)	Ref.	Ref.	
Black, non-Hispanic	10.9	(9.8–12.1)	4.9†	81.7	11.3	(10.4–12.2)	4.5†	66.2	-15.5
Asian	7.4	(5.7–9.5)	1.4	23.3	7.9	(6.6–9.5)	1.1	16.2	-7.1
Mixed race/Other	10.6	(8.3–10.9)	4.6†	60.0	14.0	(9.2–20.8)	7.2†	105.9	45.9¶
Hispanic**	9.0	(7.9–10.2)	3.0†	50.0	11.5	(10.8–13.0)	4.7†	69.1	19.1¶
Male									
White, non-Hispanic	6.3	(5.7–7.0)	Ref.	Ref.	7.8	(7.1–8.5)	Ref.	Ref.	
Black, non-Hispanic	9.9	(8.4–11.7)	3.6†	57.1	12.4	(10.9–14.0)	4.6†	59.0	1.9
Asian	8.8	(6.3–12.2)	2.5	39.7	10.2	(8.1–12.7)	2.4	30.8	-8.9
Mixed race/Other	—††	—	NA	NA	16.3	(11.5–22.7)	8.5†	109.0	NA
Hispanic	8.4	(6.9–10.2)	2.1†	33.3	11.3	(9.9–12.9)	3.5†	44.9	11.6¶
Female									
White, non-Hispanic	5.8	(5.3–6.4)	Ref.	Ref.	6.0	(5.4–6.5)	Ref.	Ref.	
Black, non-Hispanic	11.6	(10.0–13.4)	5.8†	100.0	10.6	(9.4–11.9)	4.6†	76.7	-23.3¶
Asian	6.3	(4.4–8.9)	0.5	8.6	6.1	(4.6–8.0)	0.1	1.7	-6.9
Mixed race/Other	8.3	(4.2–15.6)	2.5	43.1	13.5	(7.9–22.0)	7.5†	125.0	81.9
Hispanic	9.4	(8.0–10.9)	3.6†	62.1	11.8	(10.6–13.2)	5.8†	96.7	34.6¶
Educational attainment (aged ≥25 years)									
Less than high school	9.1	(8.3–10.1)	4.5†	97.8	11.6	(10.6–12.8)	5.8†	100.0	2.2
High school or equivalent	7.7	(6.8–8.7)	3.1†	67.4	8.5	(7.7–9.3)	2.7†	46.6	-20.8¶
Some college	8.0	(7.3–8.8)	3.4†	74.1	8.8	(8.1–9.6)	3.0†	51.7	-22.4¶
College degree or higher	4.6	(3.9–5.3)	Ref.	Ref.	5.8	(5.1–6.5)	Ref.	Ref.	
Income-to-poverty ratio§§									
Poor	10.1	(8.9–11.4)	4.6†	83.1	10.6	(9.6–11.6)	4.6†	71.5	-11.6¶
Near poor	8.1	(7.2–9.0)	2.6†	46.3	9.6	(8.8–10.5)	3.4†	53.9	7.7¶
Middle income	6.8	(6.1–7.4)	1.2†	22.5	7.6	(7.0–8.2)	1.2†	18.6	-4.0¶
High income	5.5	(4.9–6.2)	Ref.	Ref.	6.4	(5.7–7.1)	Ref.	Ref.	

See table footnotes on the next page.

reliability (*18,19*). Second, differences were not assessed for total prevalence of diabetes (i.e., diagnosed and undiagnosed); therefore, the findings might underestimate the extent of the disparities in prevalence and incidence among the U.S. population. The percentage of persons with undiagnosed diabetes is estimated to range from 24% to 40% of the total prevalence of diabetes (*1,20*). However, the racial/ethnic, socioeconomic, geographic, disability, and change over time of the disparities in prevalence and incidence of medically diagnosed diabetes provided in this report are consistent with data provided in previously published reports on diabetes risk among U.S. adults (*2–5,12,20,21*).

Conclusion

Obesity and lack of physical activity are major risk factors for diabetes (*22,23*). The Community Preventive Task Force has recommended several effective evidence-based interventions that communities, policy makers, and public health authorities can use to delay or prevent onset of diabetes by reducing obesity and increasing physical activity. Strategies to increase physical activity and physical fitness include communitywide campaigns, school-based physical education, and creation of or enhanced access to places for physical activity (*22*). Interventions to prevent or control obesity include behavior interventions to reduce screen time, multicomponent

TABLE 1. (*Continued*) Age-standardized prevalence* of medically diagnosed diabetes among adults aged ≥18 years, by selected characteristics — National Health Interview Survey, United States, 2006 and 2010

Characteristic	2006 Age-standardized prevalence (%)	2006 (95% CI)	2006 Absolute difference (percentage points)	2006 Relative difference (%)	2010 Age-standardized prevalence (%)	2010 (95% CI)	2010 Absolute difference (percentage points)	2010 Relative difference (%)	Change in relative difference from 2006 to 2010 (percentage points)
Place of birth									
All racial/ethnic groups									
U.S.-born	6.9	(6.5–7.3)	Ref.	Ref.	7.7	(7.4–8.1)	Ref.	Ref.	
Not U.S.-born¶¶	7.2	(6.3–8.2)	0.3	4.3	8.6	(7.8–9.5)	0.9	11.7	7.4
White, non-Hispanic									
U.S.-born	6.1	(5.6–6.6)	Ref.	Ref.	6.8	(6.4–7.2)	Ref.	Ref.	
Not U.S.-born	4.7	(3.5–6.3)	-1.4	-23.0	6.8	(5.2–8.9)	0.0	0.0	-23.0
Black, non-Hispanic									
U.S.-born	11.3	(10.1–12.6)	Ref.	Ref.	11.6	(10.6–12.7)	Ref.	Ref.	
Not U.S.-born	7.3	(4.6–11.4)	-4.0	-35.4	8.9	(6.6–12.0)	-2.7	-23.3	12.1
Asian/Pacific Islander									
U.S.-born	5.9	(2.9–11.6)	Ref.	Ref.	8.7	(5.7–13.0)	Ref.	Ref.	
Not U.S.-born	8.4	(6.6–10.7)	2.5	42.4	7.8	(7.5–8.1)	-0.9	-10.3	-27.2
Hispanic									
U.S.-born	9.7	(8.0–11.6)	Ref.	Ref.	13.1	(11.5–15.0)	Ref.	Ref.	
Not U.S.-born	8.3	(6.9–10.0)	-1.4	-14.4	10.3	(9.1–11.8)	-2.8†	-21.4	-7.0
Geographic region* **									
Northeast	6.2	(5.3–7.3)	Ref.	Ref.	6.3	(5.4–7.4)	Ref.	Ref.	
Midwest	7.1	(6.3–8.1)	0.9	14.5	7.9	(7.3–8.6)	1.6†	25.4	10.9
South	7.1	(6.5–7.8)	0.9	14.5	8.8	(8.3–9.4)	2.5†	39.7	25.2
West	6.6	(5.9–7.4)	0.4	6.5	7.3	(6.7–8.0)	1.0†	15.9	9.4
Disability status									
Has a disability	10.8	(9.9–11.8)	6.4†	145.5	12.1	(11.2–13.0)	7.2†	160.0	14.5
Does not have a disability	4.4	(4.0–4.8)	Ref.	Ref.	4.9	(4.6–5.3)	Ref.	Ref.	

Abbreviations: 95% CI = 95% confidence interval; NA = not available; Ref. = Referent.

* Cases of diabetes of any duration per 100 population. Estimate standardized by the direct method to the U.S. Census 2000 population.

† Simple difference between group estimate and Referent category significant at p<0.05 by z statistic and a 2-tailed test with Bonferroni correction for multiple comparisons.

§ Age-specific estimates are not age-standardized.

¶ Difference between the relative differences in 2010 and 2006 significant at p<0.05 by z statistic and 2-tailed test with Bonferroni correction for multiple comparisons.

** Persons of Hispanic ethnicity might be of any race or combination of races.

†† Unstable estimate; relative standard error ≥30%.

§§ Following the Office of Management and Budget's Statistical Policy Directive 14, the U.S. Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. The Income-to-Poverty Ratio (IPR) is the total family income expressed as a percentage of the family's official poverty threshold. An IPR <100% of poverty denotes a family in poverty; an IPR ≥100% of the poverty threshold denotes a family income equal to or higher than poverty. Official poverty thresholds are corrected for inflation using the Consumer Price Index. Additional information is available at http://www.census.gov/hhes/www/poverty/methods/definitions.html. Poor = <1.0 times the federal poverty level (FPL), near-poor = 1.0–1.9 times FPL, middle income = 2.0–3.9 times FPL, and high income = ≥4.0 times FPL. FPL was calculated on the basis of U.S. Census Bureau poverty thresholds (available at http://www.census.gov/hhes/www/poverty.html).

¶¶ Includes U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens.

*** *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, and Wyoming.

counseling intended to reduce weight and maintain weight loss, and worksite programs intended to reduce weight among employees by improving diet and physical activity (*23*). The CDC-led National Diabetes Prevention Program (*24*) is designed to bring to communities strategies for adopting evidence-based lifestyle changes known to prevent or delay the onset of type 2 diabetes among adults at high risk for diabetes, including modest weight loss, increased physical activity, and reduced fat and calorie intake. Widespread implementation of these and similar interventions to prevent obesity and promote physical activity might reduce future incidence and prevalence of diabetes and reduce disparities in diabetes risk.

TABLE 2. Age-standardized incidence rate* of medically diagnosed diabetes among adults aged 18–79 years, by selected characteristics — National Health Interview Survey, United States, 2006 and 2010.

	2006				2010				Change in relative difference from 2006 to 2010 (percentage points)
Characteristic	Age-standardized incidence rate	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Age-standardized incidence rate	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	
Sex									
Male	7.6	(5.8–9.9)	0.1	0.8	8.9	(7.0–11.3)	2.8†	47.0	46.2§
Female	7.5	(6.1–9.3)	Ref.	Ref.	6.0	(4.8–8.0)	Ref.	Ref.	
Age group (yrs)¶									
18–44	5.1	(3.9–6.7)	Ref.	Ref.	3.8	(2.8–5.2)	Ref.	Ref.	
45–64	10.8	(8.7–13.5)	5.7†	112.0	11.5	(9.4–14.0)	7.7†	200.0	88.0§
65–74	10.7	(7.0–16.3)	5.6†	109.4	14.7	(10.1–21.3)	10.9†	283.9	174.5§
≥75	14.4	(8.1–25.4)	9.3†	182.3	16.4	(9.4–28.4)	12.6†	328.3	146.0§
Race/Ethnicity									
Both sexes									
White, non-Hispanic	6.8	(5.5–8.5)	Ref.	Ref.	6.0	(4.7–7.5)	Ref.	Ref.	
Black, non-Hispanic	9.6	(6.7–13.8)	2.8†	41.1	9.2	(6.6–12.6)	3.2†	53.7	12.6§
Hispanic**	8.6	(5.7–13.0)	1.8†	25.6	12.2	(8.8–17.0)	6.2†	104.6	79.0§
Male									
White, non-Hispanic	6.7	(4.7–9.6)	Ref.	Ref.	7.2	(5.1–10.0)	Ref.	Ref.	
Black, non-Hispanic	10.0	(6.1–16.5)	3.3†	49.6	11.8	(7.3–19.1)	4.6†	64.7	15.1§
Hispanic	6.6	(3.6–11.9)	-0.1	-1.8	15.4	(9.4–25.1)	8.2†	114.6	116.4§
Female									
White, non-Hispanic	7.0	(5.4–9.2)	Ref.	Ref.	4.9	(3.5–6.7)	Ref.	Ref.	
Black, non-Hispanic	9.3	(5.6–15.5)	2.3†	32.0	7.1	(4.9–10.3)	2.2†	45.7	13.7§
Hispanic	10.5	(6.0–18.4)	3.5†	49.8	9.5	(6.1–14.7)	4.6†	94.0	44.2§
Educational attainment (aged ≥25 yrs)									
Less than high school	10.2	(7.1–14.8)	5.9†	136.4	13.7	(9.5–19.6)	9.4	219.9	83.6§
High school or equivalent	10.7	(7.6–15.1)	6.4†	147.1	8.3	(5.8–11.8)	4.0	93.9	-53.2§
Some college	9.9	(7.0–13.8)	5.5†	127.9	10.0	(7.5–13.3)	5.7	133.3	5.4§
College degree or higher	4.3	(2.8–6.8)	Ref.	Ref.	4.3	(2.7–6.8)	Ref.	Ref.	
Income-to-poverty ratio††									
Poor	10.9	(6.9–17.1)	4.9†	82.5	11.5	(7.5–16.3)	7.1†	113.7	31.2§
Near poor	8.4	(6.1–11.1)	2.5†	41.4	8.2	(5.9–11.4)	2.2	35.5	-5.9
Middle income	8.4	(6.1–11.3)	2.4†	40.2	8.0	(6.0–10.7)	1.5	24.7	-15.6
High income	6.0	(3.9–9.2)	Ref.	Ref.	6.2	4.2–9.2)	Ref.	Ref.	
Place of birth									
All races/ethnicities									
U.S.-born	7.6	(6.3–9.2)	Ref.	Ref.	7.3	(6.1–8.8)	Ref.	Ref.	
Not U.S.-born§§	6.6	(4.5–9.8)	-1.0	11.7	7.6	(5.1–11.5)	0.3	11.7	0.0
White, non-Hispanic									
U.S.-born	6.9	(5.5–8.6)	Ref.	Ref.	6.1	(4.8–7.8)	Ref.	Ref.	
Not U.S.-born	—¶¶	—	NA	NA	—	—	NA	NA	NA
Black, non-Hispanic									
U.S.-born	9.9	(6.8–14.4)	Ref.	Ref.	10.3	(7.4–14.2)	Ref.	Ref.	
Not U.S-born	—	—	NA	NA	—††	—††	NA	NA	NA
Hispanic									
U.S.-born	—	—	Ref.	Ref.	14.8	(8.6–25.4)	Ref.	Ref.	
Not U.S.-born	6.8	(4.1–11.2)	NA	NA	10.8	(7.2–16.3)	-4.0†	-26.9	8.0
Geographic region* **									
Northeast	7.4	(5.2–10.6)	Ref.	Ref.	6.3	(3.9–10.1)	Ref.	Ref.	
Midwest	6.7	(4.8–9.6)	-0.7	-9.0	7.2	(4.9–10.4)	0.8†	13.4	22.5§
South	8.4	(6.3–11.2)	1.0	13.8	8.3	(6.5–10.4)	2.0†	31.1	17.3§
West	6.6	(4.5–9.9)	-0.8	-10.5	7.2	(4.9–10.5)	0.9	13.7	24.2§
Disability status									
Has a disability	14.1	(10.8–18.4)	9.2†	187.2	12.0	(9.4–15.2)	6.7†	125.5	-61.6§
Does not have a disability	4.9	(3.8–6.3)	Ref.	Ref.	5.3	(3.2–7.3)	Ref.	Ref.	

See table footnotes on the next page.

TABLE 2. (*Continued*) Age-standardized incidence rate* of medically diagnosed diabetes among adults aged 18–79 years, by selected characteristics — United States, National Health Interview Survey, 2006 and 2010.

Abbreviations: 95% CI = 95% confidence interval; NA = not available; Ref. = Referent.

* Cases of diabetes of ≤1 year duration per 1,000 population. Estimates standardized by the direct method to the US Census Bureau 2000 population.

† Difference between group estimate and referent group estimate statistically significant at p<0.05 by z statistic and a 2-tailed test with Bonferroni correction for multiple comparisons.

§ Difference between the group relative differences in 2010 and 2006 statistically significant at p<0.05 by z statistic and a 2-tailed test with Bonferroni correction for multiple comparisons.

¶ Age-specific estimates are not age-standardized.

** Persons of Hispanic ethnicity might be of any race or combination of races.

†† Following the Office of Management and Budget's Statistical Policy Directive 14, the U.S. Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. The Income-to-Poverty Ratio (IPR) is the total family income expressed as a percentage of the family's official poverty threshold. An IPR <100% of poverty denotes a family in poverty; an IPR ≥100% of the poverty threshold denotes a family income equal to or higher than poverty. Official poverty thresholds are corrected for inflation using the Consumer Price Index. Additional information is available at http://www.census.gov/hhes/www/poverty/methods/definitions.html. Poor = <1.0 times the federal poverty level (FPL), near-poor = 1.0–1.9 times FPL, middle income = 2.0–3.9 times FPL, and high income = ≥4.0 times FPL. FPL was calculated on the basis of U.S. Census Bureau poverty thresholds (available at http://www.census.gov/hhes/www/poverty.html).

§§ Includes U.S. citizens born abroad (one or both of whose parents were U.S. citizens), naturalized citizens, and noncitizens.

¶¶ Unstable estimate; relative standard error ≥30%.

*** *Northeast:* Connecticut, Maine, Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, and Wyoming.

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Health-Related Quality of Life — United States, 2006 and 2010

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Introduction

Health-related quality of life is physical and mental health, as perceived by a person or group of people, during a period of time (*1*,*2*). This measure complements traditional public health measures of mortality and morbidity. Fair or poor self-rated health, physically unhealthy days, and mentally unhealthy days are reported by higher percentages of women, older persons, minority racial/ethnic groups (except Asian/Pacific Islanders), and persons with less education, with lower annual household incomes, who are unemployed, with a disability or a chronic disease, and who are widowed, separated, or divorced than, respectively, men, younger persons, and non-Hispanic whites, and those with more education, with higher annual household incomes, who are employed by others or self-employed, without a disability or a chronic disease, and who are married (*1*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*3*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*4*). This report provides information concerning disparities in health-related quality of life, a topic that was not discussed in the 2011 CHDIR. The purposes of this health-related quality of life report are to describe and raise awareness of how different kinds of disparities affect health-related quality of life among adults in the United States, whether and how these effects changed from 2006 to 2010 and to prompt actions to reduce disparities.

Methods

To examine health-related quality of life disparities by selected characteristics among adults (aged ≥18 years) in the United States, CDC analyzed 2006 and 2010 data from the Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is a continuous, random-digit–dialed telephone survey of noninstitutionalized adults aged ≥18 years in the 50 states, the District of Columbia (DC), Puerto Rico, the U.S. Virgin Islands, Guam (*5*,*6*) (available at http://www.cdc.gov/brfss/index.htm). This analysis compares health-related quality of life measures stratified by specific characteristics in respondents from the 50 states and DC in 2006 (N = 347,790) and 2010 (N = 444,927).

Two indicators of BRFSS survey quality are its cooperation rate and its overall response rate (*7*,*8*). The cooperation rate is the proportion of all respondents interviewed of all eligible units in which a respondent was selected and actually contacted. In 2006, the cooperation rate ranged from 56.9% in California to 83.5% in Minnesota; in 2010, the cooperation rate ranged from 56.8% in California to 86.1% in Minnesota. The overall response rate is an outcome rate with the number of complete and partial interviews in the numerator and an estimate of the number of eligible units in the sample in the denominator that assumes that more unknown records are eligible, specifically, that all likely households are households and that 98% of known or probable households contain an adult who uses the telephone number. In 2006, the overall response rate ranged from 20.5% in Georgia to 58.4% in Utah, and in 2010, from 19.2% in Oregon to 57.4% in Utah.

The three health-related quality of life measures represented in BRFSS are 1) self-rated health status, 2) number of physically unhealthy days, and 3) number of mentally unhealthy days. The related BRFSS questions were as follows: 1) "Would you say that in general your health is excellent, very good, good, fair, or poor?" 2) "Now thinking about your physical health, which includes physical illness and injury, for about how many days during the past 30 days was your physical health not good?" and 3) "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for about how many days during the past 30 days was your mental health not good?" CDC calculated the percentage reporting fair or poor self-rated health, mean number of physically unhealthy days, and mean number mentally unhealthy days as the primary health-related quality of life outcome measures. Respondents with the responses "do not know/not sure" or "refused to respond" were excluded from the analysis on a question-by-question basis.

Health-related quality of life disparities were assessed by stratifying results by sex, age group (18–24, 25–34, 35–44, 45–64, 65–79, and ≥80 years), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic [might be of any race or any combination of races], non-Hispanic Asian/Pacific Islander [A/PI], non-Hispanic American Indian/Alaska Native [AI/AN], and other), educational attainment at the time of

the survey (less than high school, high school graduate or equivalent, some college, and college graduate), the primary language spoken at home (English, Spanish, or other), and disability status, which was defined as an affirmative answer to either or both of the following questions (*9*): "Are you limited in any way in any activities because of physical, mental, or emotional problems?" and "Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed, or a special telephone?") Each outcome measure was analyzed separately. Household income was not examined because educational attainment was considered a sufficient indicator of socioeconomic status for examination of disparities and because approximately 14% of BRFSS respondents did not know or refused to report household income, but <2% did not know or refused to report their educational attainment.

CDC used statistical software for the analyses to account for the stratified, complex sampling design of BRFSS (*10*). Data were weighted using the respondents' sampling weights based on the population of noninstitutionalized adults aged ≥18 years in their states of residence and aggregated across the 50 states and DC. Because age is associated with the health-related quality of life measures and because the age composition differs among the various categories analyzed, CDC adjusted the health-related quality of life measures by using age group categories in the specific survey year as covariates in logistic regression (for fair or poor self-rated health) and linear regression (for number of physically and mentally unhealthy days). No formal statistical testing was conducted for this analysis. Differences were assessed by calculating and comparing the 95% confidence intervals (CIs) around the age-adjusted percentages and means. In this approach, CIs were used as measure of variability, and nonoverlapping CIs were considered statistically different. Using CIs in this way is a conservative evaluation of significance differences; this might lead to a conclusion that estimates are similar when the point estimates differ at a significance level of 0.05. CIs were assessed before rounding for the tables.

Disparities were measured as the deviations from a referent group, which was the group that had the most favorable estimate for the variables used to assess disparities during the time reported. Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The relative difference, a percentage, was calculated by dividing the difference by the value in the referent category and multiplying by 100. Change in percentage and mean from 2006 to 2010 was calculated by subtracting the estimate for 2010 from the estimate for 2006. The significance of changes over time was assessed by comparing CIs as described in this section.

Results

Overall, the age-adjusted percentage of respondents rating their health as fair or poor did not change significantly from 2006 (16.3%) to 2010 (16.1%) (Table 1). A higher percentage of women than men reported fair or poor health in both years. However, neither of the groups experienced a significant change from 2006 to 2010. A higher percentage of persons in older age groups than younger groups rated their health as fair or poor in both years. The percentage of persons aged ≥65 years reporting fair or poor health significantly decreased approximately 2 percentage points from 2006 to 2010. Both in 2006 and 2010, a significantly lower percentage of non-Hispanic whites rated their health as fair or poor than all other racial/ethnic groups except A/PIs. However, only two of these racial/ethnic groups experienced a significant change in self-rated health from 2006 to 2010: the percentage of non-Hispanic blacks reporting fair or poor health increased by 2 percentage points, and that of Hispanics decreased approximately 3 percentage points. In both 2006 and 2010, a higher percentage of those who had not graduated from high school reported fair or poor health than did high school graduates, and a lower percentage of college graduates reported fair or poor health than did high school graduates. From 2006 to 2010, the percentage of high school graduates who reported fair or poor self-rated health increased by 1.2 percentage points, and the percentage of persons with some college education who reported fair or poor self-rated health decreased by 1.6 percentage points. A higher percentage of persons who spoke a language other than English at home reported fair or poor health than those who spoke English at home. However, the percentage of those who spoke Spanish at home and reported fair or poor health decreased by 7 percentage points from 2006 to 2010. A higher percentage of persons with a disability rated their health as fair or poor than did those without a disability both in 2006 and 2010. Nonetheless, the percentage of persons without a disability who rated their health as fair or poor decreased by 0.8 percentage points from 2006 to 2010.

From 2006 to 2010, the overall age-adjusted mean number of physically unhealthy days in the last 30 days increased by approximately 0.1 days (2006: 3.6 days; 2010: 3.7 days (Table 2). A higher mean number of physically unhealthy days were reported by women than men in 2006 and 2010. However, only men experienced a statistically significant increase in mean number of days (0.2 days) over time. A higher mean number of physically unhealthy days was reported by older respondents than younger respondents. From 2006 to 2010, only persons aged 25–34 years reported a statistically significant increase in mean number of physically unhealthy days (0.3 days). In both 2006 and 2010, the fewest physically

TABLE 1. Estimated percentage of adults aged ≥18 years who rated their health as fair or poor, by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2006 and 2010

	2006				2010				
Characteristic	Age-adjusted percentage	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Age-adjusted percentage	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Change from 2006 to 2010 (percentage points)
Total	**16.3**	**(15.9–16.6)**	—	—	**16.1**	**(15.9–16.4)**	—	—	**-0.2**
Sex									
Male	15.8	(15.3–16.3)	-0.8*	-5.3*	15.4	(15.0–15.8)	-1.4*	-8*	-0.4
Female	16.7	(16.3–17.0)	Ref.	Ref.	16.8	(16.5–17.1)	Ref.	Ref.	0.1
Age group (yrs)									
18–24	9.3	(8.3–10.2)	-2.4*	-21*	7.6	(6.8–8.4)	-4.0*	-34*	-1.7
25–34	9.9	(9.2–10.7)	-1.7*	-15*	9.9	(9.3–10.5)	-1.6*	-14*	0.0
35–44	11.7	(11.0–12.3)	Ref.	Ref.	11.5	(11.0–12.1)	Ref.	Ref.	-0.2
45–64	18.8	(18.3–19.3)	7.2*.	61*	19.0	(18.6–19.4)	7.5*	65*	0.2
65–79	27.4	(26.6–28.2)	15.8*	135*	25.1	(24.6–25.6)	13.6*	118*	-2.3*
≥80	33.2	(31.9–34.5)	21.6*	185*	31.1	(30.3–31.9)	19.6*	170*	-2.1*
Race/Ethnicity									
White, non-Hispanic	13.1	(12.8–13.4)	Ref.	Ref.	13.3	(13.0–13.5)	Ref.	Ref.	0.1
Black, non-Hispanic	21.3	(20.3–22.2)	8.1*	62*	23.3	(22.5–24.1)	10.0*	76*	2.0*
Hispanic†	31.0	(29.5–32.5)	17.9*	137*	28.1	(27.1–29.1)	14.8*	112*	-2.9*
Asian/Pacific Islander	11.8	(9.8–13.7)	-1.3	-10	11.9	(10.7–13.1)	-1.4	-10	0.1
American Indian/ Alaska Native	26.7	(23.9–29.6)	13.6*	104*	30.8	(28.0–33.6)	17.6*	133*	4.1
Other	22.0	(18.5–25.5)	8.9*	68*	18.6	(15.9–21.3)	5.3*	40*	-3.4
Educational attainment									
Less than high school	39.1	(37.8–40.5)	20.0*	104*	38.4	(37.4–39.5)	18.1*	89*	-0.7
High school graduate or equivalent	19.2	(18.6–19.7)	Ref.	Ref.	20.3	(19.8–20.8)	Ref.	Ref.	1.2*
Some college	13.8	(13.3–14.3)	-5.3*	-28*	15.5	(15.0–15.9)	-4.9*	-24*	1.6*
College graduate	7.1	(6.8–7.4)	-12.0*	-63*	7.3	(7.0–7.6)	-13.0*	-64*	0.2
Language spoken at home									
English	14.8	(14.5–15.1)	Ref.	Ref.	15.0	(14.8–15.3)	Ref.	Ref.	0.2
Spanish	44.8	(42.3–47.3)	30.0*	203*	37.6	(35.9–39.3)	22.6*	151*	-7.2*
Other language	41.9	(18.2–65.6)	27.1*	183*	40.7	(31.3–50.1)	25.7*	171*	-1.2
Disability status									
With disability	38.7	(37.9–39.6)	29.3*	312*	39.4	(38.7–40.0)	30.7*	356*	0.6
Without disability	9.4	(9.1–9.7)	Ref.	Ref.	8.6	(8.4–8.9)	Ref.	Ref.	-0.8*

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.
* Difference considered statistically significantly different by comparison of nonoverlapping 95% CIs. Unrounded CIs do not overlap.
† Persons of Hispanic ethnicity might be of any race or combination of races.

unhealthy days were reported by A/PIs (2006: 2.4 days; 2010: 2.5 days) and the most were reported by AI/ANs, (2006: 6.2 days; 2010: 6.3 days). Hispanics showed an increase in mean number of physically unhealthy days from 2006 to 2010 (0.6 days). Compared with high school graduates, more physically unhealthy days were reported by those who had not graduated from high school than by those with at least some college. However, all but college graduates experienced an increase in physically unhealthy days from 2006 to 2010, with the least educated showing the largest increase (0.8 days). More physically unhealthy days were reported by those who spoke a language other than English at home than by those who spoke English at home. From 2006 to 2010, those who spoke Spanish at home had an 0.8-day increase in physically unhealthy days, compared with an almost 10-day decrease among those who spoke languages other than English and Spanish. Approximately 8 more physically unhealthy days were reported by persons with a disability (10 days) than by those without a disability (1.8 days). Neither group had a significant change in number of days from 2006 to 2010.

From 2006 to 2010, the overall age-adjusted mean number of mentally unhealthy days in the last 30 days increased by approximately 0.1 days (2006: 3.4 days; 2010: 3.5 days) (Table 3). The mean number of mentally unhealthy days for women exceeded those for men by approximately 1 day in both years. However, only men showed a significant increase from 2006 to 2010 (by 0.2 days). A higher percentage of younger respondents reported a mean number of mentally unhealthy days than older respondents. Only those aged 35–79 years experienced an increase in mean number of days from 2006

TABLE 2. Mean number of physically unhealthy days in the past 30 days among adults aged ≥18 years, by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2006 and 2010

	2006				2010				
Characteristic	Age-adjusted mean no. of days	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Age-adjusted mean no. of days	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Change from 2006 to 2010 (percentage points)
Total	**3.6**	**(3.5–3.6)**	—	—	**3.7**	**(3.6–3.7)**	—	—	**0.1***
Sex									
Male	3.2	(3.1–3.3)	-0.7*	-19*	3.4	(3.3–3.5)	-0.6*	-14*	0.2*
Female	3.9	(3.8–4.0)	Ref.	Ref.	4.0	(3.9–4.0)	Ref.	Ref.	0.1
Age group (yrs)									
18–24	2.1	(1.9–2.3)	-0.7*	-24*	2.0	(1.9–2.2)	-0.8*	-29*	-0.1
25–34	2.2	(2.1–2.3)	-0.6*	-20*	2.5	(2.4–2.6)	-0.4*	-13*	0.3*
35–44	2.8	(2.7–2.9)	Ref.	Ref.	2.9	(2.8–3.0)	Ref.	Ref.	0.1
45–64	4.3	(4.2–4.4)	1.6*	55*	4.3	(4.3–4.4)	1.5*	51*	0.1
65–79	5.3	(5.2–5.5)	2.6*	92*	5.1	(5.0–5.2)	2.3*	79*	-0.2
≥80	6.6	(6.3–6.9)	3.8*	127*	6.2	(6.0–6.4)	3.3*	116*	-0.4
Race/Ethnicity									
White, non-Hispanic	3.4	(3.4–3.5)	Ref.	Ref.	3.5	(3.4–3.6)	Ref.	Ref.	0.1
Black, non-Hispanic	4.0	(3.9–4.2)	0.6*	18*	4.3	(4.1–4.4)	0.8*	22*	0.2
Hispanic†	3.8	(3.6–4.0)	0.4*	10*	4.4	(4.2–4.5)	0.9*	25*	0.6*
Asian/Pacific Islander	2.4	(2.2–2.7)	-1.0*	-30*	2.5	(2.3–2.7)	-1.0*	-29*	0.1
American Indian/ Alaska Native	6.2	(5.5–6.9)	2.8*	82*	6.3	(5.7–6.9)	2.8*	79*	0.0
Other	5.2	(4.3–6.1)	1.8*	52*	4.3	(3.9–4.8)	0.9*	24*	-0.9
Educational attainment									
Less than high school	5.7	(5.4–5.9)	1.6*	40*	6.5	(6.3–6.7)	2.2*	51*	0.8*
High school graduate or equivalent	4.0	(3.9–4.2)	Ref.	Ref.	4.3	(4.2–4.4)	Ref.	Ref.	0.3*
Some college	3.7	(3.6–3.8)	-0.4*	-9*	3.9	(3.8–4.0)	-0.4*	-9*	0.2*
College graduate	2.2	(2.2–2.3)	-1.8*	-44*	2.3	(2.2–2.3)	-2.1*	-48*	0.0
Language spoken at home									
English	3.5	(3.5–3.6)	Ref.	Ref.	3.6	(3.6–3.7)	Ref.	Ref.	0.1
Spanish	4.0	(3.6–4.4)	0.5*	13*	4.8	(4.5–5.1)	1.2*	33*	0.8*
Other language	12.7	(4.4–21.0)	9.2*	260*	2.9	(1.8–4.0)	-0.7	20	-9.8*
Disability status									
With disability	10.0	(9.8–10.2)	8.3*	464*	10.2	(10.0–10.3)	8.4*	471*	0.1
Without disability	1.8	(1.7–1.8)	Ref.	Ref.	1.8	(1.7–1.8)	Ref.	Ref.	0.0

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.
* Difference considered statistically significantly different by comparison of nonoverlapping 95% CIs. Unrounded CIs do not overlap.
† Persons of Hispanic ethnicity might be of any race or combination of races.

to 2010 (0.2–0.3 days). A/PIs reported the fewest mentally unhealthy days, and AI/ANs reported the most. However, from 2006 to 2010, only Hispanics showed a significant increase (0.6 days). The number of mentally unhealthy days in 2006 and 2010 was higher for persons with less education than for those with more education. However, all groups without a college degree experienced a significant increase in the number of days from 2006 to 2010. Similar to the change among Hispanic respondents, who experienced an increase of 0.6 mentally unhealthy days from 2006 to 2010, the mean number of mentally unhealthy days increased among those who spoke Spanish at home by 0.9 days. The mean number of mentally unhealthy days among persons with a disability (7 days) was approximately five more than among persons without a disability (2 days). Nonetheless, only persons with a disability showed a statistically significant increase from 2006 to 2010 (0.3 days).

Discussion

The patterns of the health-related quality of life measures among the various groups in this report are similar to previous findings (*1*,*11*). Groups with higher percentages of fair or poor health and who report more physically unhealthy days and more mentally unhealthy days are usually women, older persons (with respect to physical health), younger persons (with respect to mental health), minority racial/ethnic groups (except for A/PIs), those with less education, those who speak another language besides English at home, and those with a disability.

Groups that had statistically significant changes in health-related quality of life from 2006 to 2010 differ from groups with statistically significant differences from the reference groups during the individual years. Although minimal change occurred overall, statistically significant changes occurred in

TABLE 3. Mean number of mentally unhealthy days in the past 30 days among adults aged ≥18 years, by selected characteristics — Behavioral Risk Factor Surveillance System, United States, 2006 and 2010

	2006				2010				
Characteristic	Age-adjusted mean no. of days	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Age-adjusted mean no. of days	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	Change from 2006 to 2010 (percentage points)
Total	**3.4**	**(3.3–3.5)**	—	—	**3.5**	**(3.5–3.6)**	—	—	**0.1***
Sex									
Male	2.7	(2.7–2.8)	-1.3*	-32	3.0	(2.9–3.0)	-1.2*	-28*	0.2*
Female	4.0	(4.0–4.1)	Ref.	Ref.	4.1	(4.0–4.2)	Ref.	Ref.	0.1
Age group (yrs)									
18–24	4.3	(4.0–4.5)	0.9*	26*	4.0	(3.8–4.2)	0.4*	10*	-0.3
25–34	3.7	(3.5–3.8)	0.3*	9*	3.8	(3.7–4.0)	0.2	6	0.2
35–44	3.4	(3.3–3.5)	Ref.	Ref.	3.6	(3.5–3.8)	Ref.	Ref.	0.3*
45–64	3.6	(3.5–3.7)	0.2	6	3.8	(3.8–3.9)	0.2*	6*	0.3*
65–79	2.1	(2.0–2.3)	-1.2*	-37*	2.3	(2.3–2.4)	-1.3*	-36*	0.2*
≥80	2.0	(1.9–2.2)	-1.3*	-40*	2.0	(1.9–2.1)	-1.7*	-46*	-0.1
Race/Ethnicity									
White, non-Hispanic	3.4	(3.3–3.4)	Ref.	Ref.	3.5	(3.4–3.5)	Ref.	Ref.	0.1
Black, non-Hispanic	3.8	(3.6–4.0)	0.5*	13*	4.0	(3.8–4.2)	0.5*	15*	0.2
Hispanic†	3.2	(3.0–3.5)	-0.1	4	3.8	(3.6–4.0)	0.3*	10*	0.6*
Asian/Pacific Islander	2.1	(1.9–2.4)	-1.2*	-37*	2.0	(1.7–2.3)	-1.5*	-42*	-0.1
American Indian/ Alaska Native	5.7	(5.0–6.3)	2.3*	68*	5.7	(5.1–6.4)	2.3*	65*	0.1
Other	5.1	(4.3–6.0)	1.7*	52*	3.9	(3.4–4.5)	0.5	14	-1.2
Educational attainment									
Less than high school	4.9	(4.6–5.1)	1.1*	28*	5.6	(5.4–5.8)	1.6*	40*	0.7*
High school graduate or equivalent	3.8	(3.7–3.9)	Ref.	Ref.	4.0	(3.9–4.1)	Ref.	Ref.	0.2*
Some college	3.6	(3.5–3.8)	-0.2	-5	3.9	(3.8–4.0)	-0.1	-3	0.3*
College graduate	2.3	(2.2–2.4)	-1.5*	-39*	2.3	(2.3–2.4)	-1.7*	-42*	0.0
Language spoken at home									
English	3.5	(3.4–3.5)	Ref.	Ref.	3.5	(3.5–3.6)	Ref.	Ref.	0.1
Spanish	2.9	(2.6–3.3)	-0.5*	-15*	3.8	(3.6–4.1)	0.3	9	0.9*
Other language	8.9	(0.0–17.9)	5.5	159	3.9	(2.3–5.5)	0.4	11	-5.0
Disability status									
With disability	7.2	(7.1–7.4)	4.9*	207*	7.5	(7.4–7.7)	5.2*	220*	0.3*
Without disability	2.4	(2.3–2.4)	Ref.	Ref.	2.4	(2.3–2.4)	Ref.	Ref.	0.0

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.
* Difference considered statistically significantly different by comparison of nonoverlapping 95% CIs. Unrounded CIs do not overlap.
† Persons of Hispanic ethnicity might be of any race or combination of races.

specific groups. Men (but not women) reported an increase in the number of physically and mentally unhealthy days over time. Persons aged ≥65 years rated their overall health better in 2010 than in 2006. Hispanics and those who spoke Spanish at home also rated their overall health better in 2010 than in 2006, despite reporting increases in numbers both of physically and mentally unhealthy days. Numbers of physically and mentally unhealthy days increased from 2006 to 2010 among persons without a college degree. The number of mentally unhealthy days but not of physically unhealthy days increased among persons with a disability, although persons without a disability rated their overall health better.

Reasons for particular changes in health-related quality are unclear. Differences in risky and protective health behaviors, in socioeconomic circumstances such as employment status and household income, and in disease status have been associated with differences in the measures used in this analysis to assess health-related quality of life (*1,11*). Hispanics and those without a college degree reported more physically and mentally unhealthy days in 2010 than in 2006; however, others in similar socioeconomic circumstances (e.g., non-Hispanic blacks and AI/ANs) did not. What accounted for these differences is unclear. Additional analyses that adjust for changes in employment status, the effects of housing loss, and the recent increase in enforcement against illegal immigrants might clarify these differences.

Limitations

The findings in this report are subject to at least four limitations. First, although the BRFSS health-related quality of life questions have been shown to be reliable in predicting 30-day and 1-year hospitalization and mortality (*12*,*13*), because the health-related quality of life data are self-reported, they might be misclassified because they are not objectively verifiable and are subject to recall bias and measurement error. Second, although BRFSS uses poststratification to adjust respondent sampling weights for non-response (*7*,*8*), this adjustment assumes that nonrespondents would have answered in similar ways to respondents with similar demographic characteristics; such poststratification might not have fully adjusted for differences between nonrespondents and respondents, given the low, state-specific overall response rates. Third, BRFSS data are cross-sectional; therefore, changes in the composition of the BRFSS sample from 2006 to 2010 that affect responses to the health-related quality of life questions might affect measured differences from 2006 to 2010. Finally, the results were adjusted for age only; therefore, other confounding variables also might have affected measured differences from 2006 to 2010.

Conclusion

Although direct interventions to improve health-related quality of life are not possible, indirect interventions to change characteristics associated with health-related quality of life might result in improvements. For example, risky health behaviors can decrease health-related quality of life. Persons who smoke cigarettes have worse health-related quality of life than former smokers or never smokers (*14*), and smoking is more prevalent among those with certain health conditions such as epilepsy (*15*).

Cigarette smoking is a well-known cause of multiple types of cancer (*16*). Persons with epilepsy (*17*) and cancer (*18*) have worse health-related quality of life than those without these conditions. Moreover, protective health behaviors can increase health-related quality of life. For example, persons who engage in physical activity have better health-related quality of life than those who are sedentary (*19*). Physical activity also reduces obesity (*20*) and its complications and has been associated both with reduced colon cancer rates (*20*) and reduced complications from different kinds of arthritis (*21*). Persons who are obese (*22*), have cancer (*18*), or have arthritis (*23*) have worse health-related quality of life than those without these conditions. Therefore, interventions to eliminate risky behaviors, promote protective behaviors, and delay or prevent complications from diseases and other conditions would probably improve health-related quality of life.

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HIV Infection — United States, 2008 and 2010

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Introduction

At the end of 2009, approximately 1.1 million persons in the United States were living with human immunodeficiency virus (HIV) infection (*1*), with approximately 50,000 new infections annually (*2*). The prevalence of HIV continues to be greatest among gay, bisexual, and other men who have sex with men (MSM), who comprised approximately half of all persons with new infections in 2009 (*2*). Disparities also exist among racial/ethnic minority populations, with blacks/African Americans and Hispanics/Latinos accounting for approximately half of all new infections and deaths among persons who received an HIV diagnosis in 2009 (*2,3*). Improving survival of persons with HIV and reducing transmission involve a continuum of services that includes diagnosis, linkage to and retention in HIV medical care, and ongoing HIV prevention interventions (*4*).

The HIV analysis and discussion that follows is part of the second CDC Health Disparities and Inequalities Report (CHDIR) and updates information presented in the first CHDIR (*5*). The 2011 CHDIR (*6*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*7*). The purposes of this HIV infection report are to discuss and raise awareness of differences in the characteristics of people with HIV infection and to prompt actions to reduce these disparities

Methods

To estimate the number of adults aged ≥18 years who received a diagnosis of HIV infection during 2008 and 2010, CDC analyzed data reported through June 2011 to the National HIV Surveillance System (NHSS). CDC funds and assists state and local health departments to collect case information on persons with an HIV diagnosis. Health departments report deindentified data to CDC, which are compiled for national analyses. Analysis of HIV case surveillance data was limited to the 46 states that had reported HIV cases since at least January 2007 to allow for estimation of diagnoses rates: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming. Rates per 100,000 population were calculated for 2008 and 2010 by age, sex, and race/ethnicity, with population denominators based on postcensal estimates for 2009 from the U.S. Census Bureau (*8*). Household income and educational attainment were not calculated because these data are not collected by NHSS. Geographic location was not calculated because estimates of HIV diagnoses among persons in all 50 states and the District of Columbia were unable to be calculated at the time of this analysis. Analysis of transmission categories was limited to all men and MSM because denominator data for transmission categories other than MSM were unavailable (*9*); the category of all men was used as the referent group. To compute estimated MSM population denominators used for calculating HIV diagnosis rates, CDC applied the estimated proportion of men in the United States who reported ever having male-to-male sex (6.9%; 95% confidence interval [CI]: 5.1%–8.6%) to postcensal estimated populations for men (*9*). Analyses were adjusted for reporting delays (i.e., the time between diagnosis and report) and for missing risk factor information but not for underreporting (*3*).

Data from the Medical Monitoring Project (MMP) were used to estimate percentages of adults aged ≥18 years receiving outpatient medical care whose medical record documented that they 1) were prescribed antiretroviral therapy (ART) during

the past 12 months, 2) had a suppressed viral load (defined as undetectable or ≤200 copies/mL at their most recent test), and 3) reported receiving prevention counseling in a clinical setting during the 12 months preceding the interview. Nationally representative percentages and associated standard errors were estimated for patients in care in 2009 and interviewed during 2009–2010. MMP collects behavioral and clinical information from a nationally representative sample of adults receiving medical care for HIV infection in outpatient facilities in the United States and Puerto Rico (*10–12*). A total of 23 project areas were funded to conduct data collection activities for the 2009 MMP data collection cycle: California; Chicago, Illinois; Delaware; Florida; Georgia; Houston, Texas; Illinois; Indiana; Los Angeles County, California; Michigan; Mississippi; New Jersey; the state of New York; New York City, New York; North Carolina; Oregon; Pennsylvania; Philadelphia, Pennsylvania; Puerto Rico; San Francisco, California; Texas; Virginia; and Washington. Patients who received medical care during January–April 2009 at an MMP participating facility were interviewed once during June 2009–April 2010 regarding the 12 months preceding the interview. In addition, patients' medical records were abstracted for documentation of medical care (including prescription of ART and HIV viral load) for the 12 months preceding the interview. All percentages were weighted for the probability of selection and adjusted for nonresponse bias. Standard errors were calculated and account for weighting and complex sample survey design. Associations between variables were assessed using Rao-Scott chi-square tests, with significance set at $p<0.05$. Detailed methods for MMP have been described previously (*10–12*).

Data from the 2008 MSM cycle of the National HIV Behavioral Surveillance System (NHBS)[§] were used to estimate percentages of MSM aged 18–64 years who 1) engaged in unprotected anal sex with a casual partner, 2) reported testing for HIV during the previous 12 months, and 3) who participated in a behavioral intervention. Men who reported being infected with HIV or who had no male sex partners during the 12 months before interview were excluded from this analysis. NHBS monitors HIV-associated behaviors and HIV positivity within selected metropolitan statistical areas (MSAs) with a high prevalence of acquired immunodeficiency syndrome (AIDS) among three populations at high risk for HIV infection: MSM, injection-drug users, and heterosexual adults at increased risk for HIV infection. Data for NHBS are collected in annual rotating cycles. All NHBS participants must be aged ≥18 years, live in a participating MSA, and be able to complete a behavioral survey in English or Spanish. MSM participants were recruited using venue-based sampling. Detailed methods for NHBS have been described previously (*13*).

Disparities were measured as the deviations from a referent category rate or prevalence. Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The percentage relative difference was calculated by dividing the difference by the value in the referent category and multiplying by 100 (*14*).

Results

In the 46 states for which HIV case surveillance data from the NHSS were analyzed, a total of 46,379 adults aged ≥18 years received a diagnosis of HIV in 2008, and 46,381 received an HIV diagnosis in 2010. During 2010, the relative difference in the HIV diagnosis rate among blacks/African Americans compared with whites was eightfold and for Hispanics/Latinos, persons of multiple races, and Native Hawaiians/other Pacific Islanders (NH/OPI), the relative difference was twofold compared with whites (Table 1).

Although the racial/ethnic disparities in rates of HIV diagnoses among men were similar to the disparities observed for the racial/ethnic groups overall, larger differences occurred among women. In 2010, among women, the relative difference in HIV diagnosis rates among black/African American women was twentyfold compared with whites, among women of multiple races was fourfold compared with whites, among Hispanic/Latino women was threefold compared with whites, and among AI/ANs was twofold compared with whites (Table 1). From 2008 to 2010, the relative differences increased for all racial/ethnic groups of women except NH/OPIs and women of multiple races compared with whites. The largest relative difference was observed for MSM compared with all other men (an approximate 46-fold difference) in 2010, as well as the largest change from 2008 to 2010 (763 percentage points).

Among adults aged ≥18 years in MMP, representing persons receiving medical care in 2009, assessment of the data by age group indicated that the percentages of persons who were prescribed ART increased as age increased. Compared with adults aged ≥55 years, a lower percentage of young persons (aged 18–24 years and 25–34 years) were prescribed ART (relative difference: -18% and -16%, respectively). By race/ethnicity, lower percentages of blacks/African Americans were prescribed ART than were whites (relative difference: -7%) (Table 2). A higher percentage of men were prescribed ART than were women, with a relative difference of 5%. Among men, lower percentages of blacks/African Americans were prescribed ART than were whites, with a relative difference of -6%. A similar pattern was observed in the percentage of women prescribed ART, with a lower percentage of blacks/African Americans prescribed ART than whites, (relative difference: -7%).

TABLE 1. Estimated rate* of HIV infection diagnoses among adults aged ≥18 years† — National HIV Surveillance System, 46 states,§ 2008 and 2010

Characteristic	2008 rate	Absolute difference (percentage points)	Relative difference (%)	2010 rate	Absolute difference (percentage points)	Relative difference (%)
Age group (yrs)						
18–24	27.7	21.9	377.6	32.0	26.2	451.7
25–34	32.2	26.4	455.2	32.3	26.5	456.9
35–44	31.7	25.9	446.6	28.5	22.7	391.4
45–54	21.9	16.1	277.6	21.2	15.4	265.5
≥55	5.8	Ref.	Ref.	5.8	Ref.	—
Race/Ethnicity						
American Indian/Alaska Native	13.3	4.1	44.6	13.5	4.4	48.4
Asian	8.1	-1.1	-12.0	8.4	-0.7	-7.7
Black/African American	86.0	76.8	834.8	84.0	74.9	823.1
Hispanic/Latino¶	31.1	21.9	238.0	30.9	21.8	239.6
Native Hawaiian/Other Pacific Islander	26.9	17.7	192.4	27.0	17.9	196.7
White	9.2	Ref.	Ref.	9.1	Ref.	Ref.
Multiple races	34.7	25.5	277.2	28.4	19.3	212.1
Sex						
Male	33.3	23.6	243.3	34.0	25.4	295.3
Female	9.7	Ref.	Ref.	8.6	Ref.	Ref.
Male						
American Indian/Alaska Native	21.3	5.1	31.5	20.2	3.7	22.4
Asian	14.6	-1.6	-9.9	14.8	-1.7	-10.3
Black/African American	125.4	109.2	674.1	128.4	111.9	678.2
Hispanic/Latino	49.7	33.5	206.8	49.9	33.4	202.4
Native Hawaiian/Other Pacific Islander	46.8	30.6	188.9	49.2	32.7	198.2
White	16.2	Ref.	Ref.	16.5	Ref.	Ref.
Multiple races	52.1	35.9	221.6	46.9	30.4	184.2
Female						
American Indian/Alaska Native	5.7	3.1	119.2	7.1	4.9	222.7
Asian	2.2	-0.4	-15.4	2.6	0.4	18.2
Black/African American	51.8	49.2	1,892.3	45.3	43.1	1,959.1
Hispanic/Latino	11.0	8.4	323.1	10.2	8.0	363.6
Native Hawaiian/Other Pacific Islander	7.2	4.6	176.9	5.0	2.8	127.3
White	2.6	Ref.	Ref.	2.2	Ref.	Ref.
Multiple races	18.7	16.1	619.2	11.4	9.2	418.2
Transmission category						
Men who have sex with men**	359.1	349.9	3,803.3	382.6	374.4	4,565.9
All other men	9.2	Ref.	Ref.	8.2	Ref.	Ref.

Abbreviations: HIV = human immunodeficiency virus; Ref. = referent.

* Per 100,000 population.

† A total of 46,379 adults aged ≥18 years received a diagnosis of HIV in 2008; 46,381 received a diagnosis in 2010.

§ Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

¶ Persons of Hispanic/Latino ethnicity might be of any race or combination of races.

** Denominator calculated by applying the estimated proportion of men in the United States who reported ever having male-to-male sex (6.9%; 95% confidence interval: 5.1%–8.6%) to postcensal estimated populations for men.

Among persons prescribed ART in 2009, persons aged 25–34 years and 35–44 years accounted for the lowest percentages of persons with a suppressed viral load. Compared with persons aged ≥55 years, relative differences in viral suppression were -18% for persons aged 25–34 years and -15% for persons aged 35–44 years. By race/ethnicity, lower percentages of blacks/African Americans and Hispanics/Latinos had a suppressed viral load than whites, with relative differences of -15% and –5%, respectively (Table 2). A higher percentage of men had a suppressed viral load at their most recent test than women (relative difference: 10%). Among men, lower percentages of blacks/African Americans and Hispanics/Latinos had a suppressed viral load than whites, with relative differences of -16% and -6%, respectively. Examination of other demographic characteristics indicated that a higher percentage of persons who spoke Spanish with friends and family had a suppressed viral load at their most recent test than English-speaking persons, with a relative difference of 6%. A higher percentage of persons who self-identified as homosexual had a suppressed viral load than persons who self-identified as heterosexual, with a relative difference of 11%. The percentage

TABLE 2. Percentage of adults aged ≥18 years receiving care for HIV infection who were prescribed antiretroviral therapy, had viral load suppression at their most recent HIV viral load test, and received prevention counseling during the past 12 months, by selected characteristics — Medical Monitoring Project, United States, 2009*

	Prescribed ART				Prescribed ART and most recent HIV viral load test was undetectable or ≤200 copies/mL				Received prevention counseling from a health-care provider†			
Characteristic	%	(SE)§	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)
Age group (yrs)												
18–24	75.8	(5.8)¶	-16.4	-17.8	77.8	(4.6)	-7.5	-8.8	73.3	(5.4)¶	37.5	104.7
25–34	77.6	(2.8)¶	-14.6	-15.8	70.1	(2.5)¶	-15.2	-17.8	59.0	(3.4)¶	23.2	64.8
35–44	88.3	(1.4)¶	-3.9	-4.2	72.8	(2.3)¶	-12.5	-14.7	46.7	(2.6)¶	10.9	30.4
45–54	91.4	(0.7)	-0.8	-0.9	79.2	(1.6)¶	-6.1	-7.2	41.6	(2.9)¶	5.8	16.2
≥55	92.2	(1.1)	Ref.	Ref.	85.3	(1.4)	Ref.	Ref.	35.8	(2.6)	Ref.	Ref.
Race/Ethnicity												
Black/African American	86.0	(1.3)¶	-6.2	-6.7	71.4	(1.8)¶	-12.7	-15.1	54.2	(2.7)¶	25.5	88.9
Hispanic/Latino**	89.2	(1.4)	-3.0	-3.3	79.8	(1.8)¶	-4.3	-5.1	51.9	(2.2)¶	23.2	80.8
White	92.2	(0.8)	Ref.	Ref.	84.1	(1.7)	Ref.	Ref.	28.7	(1.8)	Ref.	Ref.
Other	85.7	(3.5)¶	-6.5	-7.0	76.7	(2.9)¶	-7.4	-8.8	47.9	(4.0)¶	19.2	66.9
Sex												
Male	89.9	(0.9)¶	4.1	4.8	79.7	(1.6)¶	6.9	9.5	42.6	(2.7)¶	-7.3	-14.6
Female	85.8	(1.5)	Ref.	Ref.	72.8	(1.8)	Ref.	Ref.	49.9	(2.2)	Ref.	Ref.
Male												
Black/African American	87.1	(1.5)¶	-5.4	-5.8	71.7	(2.4)¶	-13.8	-16.1	55.5	(3.1)¶	27.9	101.1
Hispanic/Latino	90.7	(1.4)	-1.8	-1.9	80.4	(1.9)¶	-5.1	-6.0	50.8	(2.6)¶	23.2	84.1
White	92.5	(0.9)	Ref.	Ref.	85.5	(1.7)	Ref.	Ref.	27.6	(1.9)	Ref.	Ref.
Other	85.3	(4.1)¶	-7.2	-7.8	79.4	(2.8)	-6.1	-7.1	45.3	(4.5)¶	17.7	64.1
Female												
Black/African American	84.4	(1.7)¶	-6.3	-6.9	71.0	(2.1)	-4.1	-5.5	52.2	(2.5)¶	17.1	48.7
Hispanic/Latino	85.2	(3.3)	-5.5	-6.1	77.9	(3.6)	2.8	3.7	55.3	(4.0)¶	20.2	57.5
White	90.7	(2.0)	Ref.	Ref.	75.1	(3.2)	Ref.	Ref.	35.1	(3.8)	Ref.	Ref.
Other	87.2	(5.2)	-3.5	-3.9	66.1	(11.8)	-9.0	-12.0	58.5	(6.6)¶	23.4	66.7
Place of birth												
United States or U.S. territory	88.9	(0.9)	Ref.	Ref.	77.3	(1.5)	Ref.	Ref.	43.6	(2.8)	Ref.	Ref.
Other	87.5	(2.1)	-1.4	-1.6	81.7	(2.4)	4.4	5.7	51.1	(3.1)¶	7.5	17.2
Language most comfortable speaking with family and friends												
English	88.6	(1.0)	Ref.	Ref.	77.3	(1.5)	Ref.	Ref.	43.1	(2.8)	Ref.	Ref.
Spanish	90.1	(1.7)	1.5	1.7	81.7	(1.9)¶	4.4	5.7	54.9	(2.9)¶	11.8	27.4
Other	88.9	(4.1)	0.3	0.3	79.9	(4.3)	2.6	3.4	54.3	(7.4)	11.2	26.0
Sexual identity												
Heterosexual (straight)	88.6	(1.1)	Ref.	Ref.	74.4	(1.5)	Ref.	Ref.	49.0	(2.5)	Ref.	Ref.
Homosexual (gay or lesbian)	89.7	(0.9)	1.1	1.2	82.2	(1.6)¶	7.8	10.5	38.5	(2.5)¶	-10.5	-21.4
Bisexual	85.1	(2.3)	-3.5	-4.0	76.2	(2.9)	1.8	2.4	49.3	(4.1)	0.3	0.6
Educational attainment												
Less than high school	90.1	(1.2)	0.7	0.8	70.9	(2.0)¶	-15.6	-18.0	53.4	(2.5)¶	18.7	53.9
High school graduate or equivalent	89.1	(1.0)	-0.3	-0.3	75.0	(1.9)¶	-11.5	-13.3	47.8	(3.0)¶	13.1	37.8
Some college	87.2	(1.4)	-2.2	-2.5	80.3	(1.8)¶	-6.2	-7.2	41.3	(2.5)¶	6.6	19.0
College graduate	89.4	(1.4)	Ref.	Ref.	86.5	(1.8)	Ref.	Ref.	34.7	(2.6)	Ref.	Ref.

Abbreviations: ART = antiretroviral therapy; HIV = human immunodeficiency virus; MMP = Medical Monitoring Project; Ref. = referent; SE = standard error.

* A total of 23 project areas were funded to conduct data collection activities for the 2009 MMP data collection cycle: California; Chicago, Illinois; Delaware; Florida; Georgia; Houston, Texas; Illinois; Indiana; Los Angeles County, California; Michigan; Mississippi; New Jersey; the state of New York; New York City, New York; North Carolina; Oregon; Pennsylvania; Philadelphia, Pennsylvania; Puerto Rico; San Francisco, California; Texas; Virginia; and Washington. Information regarding prescription of ART and HIV viral load was abstracted from the patient's medical record. Patients who received medical care during January–April 2009 at an MMP participating facility were interviewed once during June 2009–April 2010 regarding all medical visits during the 12 months before the interview. In addition, patients' medical records were abstracted for documentation of medical care for the 12 months before the interview.

† Based on self-reported information from the patient interview about discussions with a physician, nurse, or other health-care provider. Topics might have included condom negotiation, how to practice safer sexual behavior or injection use, or how to talk with partners about safe sex. Discussion occurring during sessions that were part of HIV testing and counseling encounters were not included.

§ All percentages are weighted for probability of selection and nonresponse bias adjustment.

¶ Significant difference between group estimate and referent category, with significance set at $p<0.05$ by Rao-Scott chi-square test.

** Persons of Hispanic/Latino ethnicity might be of any race or combination of races.

of persons with a suppressed viral load increased as educational attainment increased.

Of persons receiving HIV care in the United States in 2009, persons in younger age groups reported higher percentages of receipt of HIV prevention counseling than those aged ≥55 years. Higher percentages of blacks/African Americans and Hispanics/Latinos had received HIV prevention counseling from a health-care provider during the 12 months before their interview than whites, with relative differences of 89% and 81%, respectively (Table 2). A lower percentage of men received HIV prevention counseling from a health-care provider than women (relative difference: -15%). Among men, higher percentages of blacks/African Americans and Hispanics/Latinos received HIV prevention counseling than whites, with relative differences of 101% and 84%, respectively. Findings were similar among women; higher percentages of blacks/African Americans and Hispanics/Latinas had received HIV prevention counseling than whites, with relative differences of 49% and 58%, respectively. A higher percentage of persons born outside the United States received HIV prevention counseling than persons born in the United States, with a relative difference of 17%. A higher percentage of persons who spoke Spanish with friends and family had received HIV prevention counseling than English-speaking persons, with a relative difference of 27%. A lower percentage of persons who self-identified as homosexual had received HIV prevention counseling than persons who self-identified as heterosexual, with a relative difference of -21%. The percentage of persons receiving prevention counseling increased as educational attainment decreased. Compared with college graduates, relative differences in the percentage of persons who received HIV prevention counseling were 54% for persons with less than a high school education, 38% for high school graduates, and 19% for persons with some college or the equivalent.

Among MSM in NHBS in 2008, unprotected anal sex with a casual male partner was most common in younger age groups, with relative differences of 38% among MSM aged 25–34 years and 26% among those aged 35–44 years, compared with MSM aged ≥55 years (Table 3). By race/ethnicity, Hispanic/Latino MSM and MSM of multiple races accounted for the largest percentages of MSM who engaged in unprotected anal sex with a casual partner, with relative differences of 14% and 17%, respectively, compared with whites.

The percentages of MSM who had been tested for HIV infection in the 12 months before the interview were higher among younger than older MSM and those who identified as homosexual than those who did not, similar among racial and ethnic groups, and increased with educational attainment (Table 3). Specifically, HIV testing in the 12 months before interview was highest among MSM aged 18–24 and 25–34 years, with relative differences of 37% and 36%, respectively, compared with men aged ≥55 years. The percentage of MSM who reported HIV testing in the 12 months before interview was lowest among MSM with less than a high school education, with a relative difference of -27% compared with MSM who were college graduates.

The percentages of MSM who reported participation in a behavioral HIV intervention in the 12 months before interview were higher among younger than older MSM and among MSM of minority racial/ethnic groups than whites (Table 3). MSM aged 18–24 years accounted for the highest percentage of MSM who participated in a behavioral intervention, with a relative difference of 148% compared with men aged ≥55 years. The percentage of MSM who participated in a behavioral intervention varied by level of educational attainment. Compared with MSM who had graduated from college, the percentage of MSM who had participated in a behavioral intervention was higher among MSM with lower levels of educational attainment, with relative differences of 17%, 29%, and 46% for less than high school, high school graduate, and some college or technical school, respectively.

Discussion

Although the relative difference in HIV infection diagnoses between whites and blacks/African Americans decreased from 2008 to 2010, all racial/ethnic minorities, except Asians, continue to experience higher rates of HIV diagnoses than whites. These differences might reflect HIV incidence, testing patterns, or both. Compared with whites, lower percentages of blacks/African Americans were prescribed ART and lower percentages of both blacks/African Americans and Hispanics/Latinos had suppressed viral loads. Differences in rates of ART prescription and viral suppression might reflect differences in insurance coverage, prescription drug costs, health-care providers' perceptions of patients, or other factors associated with adherence (*4*). Rates of HIV infection are increasing among MSM, particularly young black/African American MSM (*2*). However, among MSM, similar percentages of blacks/African American and Hispanic/Latino MSM reported HIV testing compared with white MSM, and higher percentages reported receipt of behavioral interventions than white MSM.

Limitations

The NHSS data presented in this report are subject to at least three limitations. First, data were not available from all states. According to the cumulative estimated number of AIDS diagnoses through 2010, the 46 states with confidential

TABLE 3. Percentage of men aged 18–64 years who have sex with men, who are at risk for acquiring HIV infection,* and who engaged in selected HIV-related risk behaviors during the 12 months before the interview — National HIV Behavioral Surveillance System, 21 U.S. cities,† 2008

	Unprotected anal sex with a casual partner§			Received an HIV test			Participated in a behavioral intervention¶			
Characteristic	%	Absolute difference (percentage points)	Relative difference %	%	Absolute difference (percentage points)	Relative difference %	%	Absolute difference (percentage points)	Relative difference %	No. of participants
Age group (yrs)										
18–24	24.2	4.3	21.6	67.5	18.4	37.4	26.2	15.6	147.7	1,997
25–34	27.4	7.5	37.7	66.6	17.5	35.7	17.8	7.2	67.6	2,737
35–44	25.1	5.2	26.1	58.4	9.3	18.9	13.2	2.7	25.0	2,076
45–54	24.4	4.5	22.8	52.1	3.1	6.2	11.2	0.7	6.2	978
55–64	19.9	Ref.	Ref.	49.1	Ref.	Ref.	10.6	Ref.	Ref.	387
Race/Ethnicity										
American Indian/Alaska Native	20.5	-4.2	-17.2	63.6	1.2	1.9	20.5	7.5	58.1	44
Asian	20.6	-4.1	-16.6	60.3	-2.1	-3.4	13.1	0.1	1.0	199
Black/African American	23.9	-0.8	-3.1	62.0	-0.4	-0.7	22.8	9.9	76.3	1,938
Hispanic/Latino**	28.0	3.3	13.5	61.7	-0.8	-1.3	20.2	7.3	56.2	2,019
Native Hawaiian/Other Pacific Islander	23.7	-1.0	-3.9	64.4	2.0	3.1	30.5	17.6	135.8	59
White	24.7	Ref.	Ref.	62.4	Ref.	Ref.	12.9	Ref.	Ref.	3,579
Multiple races	28.9	4.2	16.9	62.7	0.2	0.4	19.7	6.8	52.4	284
Other single race	19.1	-5.6	-22.5	66.0	3.5	5.6	29.8	16.9	130.3	47
Place of birth										
United States or U.S. territory	24.9	Ref.	Ref.	62.7	Ref.	Ref.	16.9	Ref.	Ref.	6,741
Other	27.5	2.6	10.5	59.8	-2.8	-4.5	20.9	4.1	24.1	1,434
Sexual identity										
Heterosexual (straight)	26.3	Ref.	Ref.	40.4	Ref.	Ref.	17.2	Ref.	Ref.	99
Homosexual (gay)	25.4	-0.8	-3.2	64.0	23.6	58.4	17.6	0.4	2.4	6,553
Bisexual	24.9	-1.3	-5.1	55.6	15.2	37.6	17.6	0.4	2.4	1,513
Educational attainment										
Less than high school	33.6	10.1	43.2	48.8	-17.7	-26.6	16.8	2.4	16.9	512
High school graduate or equivalent	25.5	2.0	8.6	57.3	-9.2	-13.9	18.5	4.1	28.6	1,868
Some college	25.8	2.4	10.2	63.0	-3.6	-5.4	20.9	6.6	45.7	2,627
College graduate	23.5	Ref.	Ref.	66.5	Ref.	Ref.	14.4	Ref.	Ref.	3,167
Total	**25.3**			**62.2**			**17.6**			**8,175**

Abbreviations: HIV = human immunodeficiency virus; MSA = metropolitan statistical area; MSM = men who have sex with men; Ref. = referent.

* Participants at risk for acquiring HIV infection were defined as those who reported having never had an HIV test or that their most recent HIV test result was negative, indeterminate, or unknown. This group includes those who did not know they were HIV positive before the interview but tested positive during the interview. Analyses were limited to men who reported oral or anal sex with another man during the 12 months before interview and did not report a previous positive HIV test result or diagnosis.

† Data were collected in the following 21 MSAs; if a metropolitan division is listed, sampling was conducted within that specific division of that MSA: Atlanta-Sandy Springs-Marietta, Georgia; Baltimore-Towson, Maryland; Boston-Quincy, Massachusetts; Chicago-Naperville-Joliet, Illinois; Dallas-Plano-Irving, Texas; Denver-Aurora-Broomfield, Colorado; Detroit-Livonia-Dearborn, Michigan; Houston-Sugar Land-Baytown, Texas; Los Angeles-Long Beach-Glendale, California; Miami-Miami Beach-Kendall, Florida; Nassau-Suffolk, New York; Newark-Union, New Jersey-Pennsylvania; New Orleans-Metairie-Kenner, Louisiana; New York-White Plains-Wayne, New York-New Jersey; Philadelphia, Pennsylvania; San Diego-Carlsbad-San Marcos, California; San Francisco-San Mateo-Redwood City, California; San Juan-Caguas-Guaynabo, Puerto Rico; Seattle-Bellevue-Everett, Washington; St. Louis, Missouri-Illinois; and Washington-Arlington-Alexandria, DC-Virginia-Maryland-West Virginia.

§ Unprotected sex was defined as insertive or receptive anal sex without a condom. A casual partner was defined as a man with whom the participant did not feel committed, whom he did not know very well, or with whom he had sex in exchange for something such as money or drugs.

¶ Includes behavioral interventions received as an individual or as part of a group. An individual intervention was defined as a one-on-one conversation with an outreach worker, a counselor, or a prevention program worker about ways to protect against HIV infection or other sexually transmitted diseases. This excludes conversations that took place solely as part of obtaining HIV testing (e.g., pretest or posttest counseling). A group behavioral intervention was defined as a small-group discussion about ways to protect against HIV or other sexually transmitted diseases.

** Persons of Hispanic ethnicity might be of any race or combination of races.

name-based reporting since at least 2007 for which data were used represent approximately 92% of AIDS diagnoses in the 50 states and the District of Columbia. Second, adjustments made to HIV case surveillance data for reporting delays and missing transmission category information are subject to a degree of uncertainty that might result in less stable rates for the most recent years. Finally, although postcensal estimates were used to determine population denominators for women, estimated population denominators were calculated for MSM and other men by applying the estimated proportion of men in the United States who reported ever having male-to-male sex (6.9%; 95% CI: 5.1%–8.6%) to the 2009 postcensal estimated population for men (*9*). Population denominators for other men were calculated by subtracting the MSM population

denominators from the 2009 postcensal estimated population for men.

The MMP data presented in this report are subject to at least three limitations. First, MMP estimates are not representative of all persons with HIV in the United States because only HIV-infected persons in care during the first 4 months of 2009 were eligible for selection into the MMP sample. Second, MMP data might include persons more likely to be retained in care or adhere to ART, leading to overestimation of certain measures. For example, measures might be overestimated because persons in MMP are more engaged in care and adherent to ART use. Finally, documentation of a recent suppressed viral load might not indicate persistent viral suppression over time.

The NHBS data presented in this report are subject to at least two limitations. First, participants in the MSM cycle of NHBS were recruited from venues, primarily bars and clubs, within 21 MSAs with a high AIDS prevalence and might not be representative of MSM who do not attend such venues or of MSM in other areas. Second, NHBS data regarding risk behaviors and use of prevention services are self-reported. Social desirability might lead to underreporting of risk behaviors and overreporting of recent HIV testing and participation in HIV behavioral interventions.

Conclusion

The findings in this report highlight a need for continued expansion of effective HIV prevention efforts for racial/ethnic minorities and MSM. In 2007, CDC initiated the Expanded HIV Testing Initiative, Expanded and Integrated HIV Testing for Populations Disproportionately Affected by HIV, which was expanded in 2010 to include MSM. (Additional information is available at http://www.cdc.gov/hiv/topics/funding/ps10-10138/index.htm.) In addition, the 2010 national HIV/AIDS strategy has goals that include reducing HIV incidence, increasing access to care, improving health outcomes for persons living with HIV, and reducing HIV-related disparities and health inequities. These goals are interdependent (*4,15*) and also consistent with the *Healthy People 2020* goal of achieving health equity, eliminating disparities, and improving the health of all groups. (Additional information available at http://healthypeople.gov/2020/about/default.aspx.) Reducing HIV incidence and improving individual health outcomes require increased access to care and elimination of disparities in the quality of care received (*4*). CDC is working with health departments throughout the United States to expand efforts in using local data (in accordance with privacy and confidentiality policies, laws, and regulations) to 1) identify HIV-infected persons who are not receiving care and to facilitate efforts to ensure they receive appropriate care and 2) identify populations within their local areas at greatest risk for HIV and with greatest need for prevention services. CDC will continue using its national HIV surveillance systems to monitor HIV incidence and diagnosis in the population and to monitor receipt of ART, risk behaviors, and receipt of prevention services among HIV-infected persons in care to identify opportunities for improvement. Information will be shared with grantees, partners, health-care providers, and other federal agencies (e.g., the Health Resources and Services Administration) to improve delivery of care, treatment, and prevention services for those with HIV infection (*4*). Behaviors of populations at high risk for HIV infection also will be monitored as part of CDC's comprehensive approach to reducing the spread of HIV infection in the United States.

To reduce the number of new HIV infections, CDC has devoted HIV resources to High-Impact Prevention, a combination of scientifically proven, cost-effective, and scalable interventions that have demonstrated the potential to reduce new HIV infections in the relevant populations and geographic areas to yield a greater reduction in HIV incidence (*16*). Optimally scaled implementation of the most cost-effective interventions will have the greatest impact on reducing the spread of HIV in the United States.

The progress in HIV prevention since the beginning of the U.S. epidemic is a result of a multisectoral approach to HIV from governmental, non governmental, and community-based organizations, academia, and the business sector. Reducing the higher prevalence of HIV infection in racial/ethnic minority groups and MSM also will require public health interventions and societal actions as a whole that address social, economic, health system, and other environmental factors that play a role in HIV prevalence in these communities (*17*). These factors might include poverty, which can limit access to health care and HIV testing; stigma and discrimination, which can discourage individuals from seeking testing, prevention, and treatment services; barriers to timely access and use of medical and social services; and higher rates of incarceration, which can disrupt social and safe sexual networks. The results of this report underscore the need for high-priority, carefully targeted HIV prevention efforts in these communities to ensure that individual, social, health system, and other environmental determinants of health are considered in the design and implementation of HIV prevention and care programs.

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Obesity — United States, 1999–2010

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Introduction

Obesity is a major public health problem affecting adults and children in the United States. Since 1960, the prevalence of adult obesity in the United States has nearly tripled, from 13% in 1960–1962 to 36% during 2009–2010 (*1,2*). Since 1970, the prevalence of obesity has more than tripled among children, from 5% in 1971–1974 (*3*) to 17% in 2009–2010 (*4,5*). Although the prevalence of obesity is high among all U.S. population groups, substantial disparities exist among racial/ethnic minorities and vary on the basis of age, sex, and socioeconomic status.

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*6*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*7*). This report provides more current information regarding what was presented in the 2011 CHDIR (*8*). The purposes of this report are to discuss and raise awareness of differences in the characteristics of persons who are obese and to prompt actions to reduce these disparities.

Methods

To assess disparities and trends over time in obesity prevalence among adults aged ≥18 years and children and adolescents aged 2–17 years, CDC analyzed data from the National Health and Nutrition Examination Survey (NHANES) between 1999 and 2008 that were included in the 2011 CDC Health Disparities and Inequities Report (CHDIR) (*8*) and data from NHANES for 2009–2010. To assess disparities and trends over time in obesity prevalence among adults aged ≥18 years and children and adolescents aged 2–17 years, CDC analyzed data from the National Health and Nutrition Examination Survey (NHANES) between 1999 and 2008 that were included in the 2011 CDC Health Disparities and Inequities Report (CHDIR) (*8*) and data from NHANES for 2009–2010. CDC examined obesity prevalence by sex, age, and race/ethnicity and by the following variables that were not included in the previous report: educational attainment, disability status, country of birth, and language spoken at home. Geographic location was not examined because this information was not available in the publicly available datasets, and educational attainment was analyzed rather than family income because a smaller number of participants had missing data for educational attainment than for income. In addition, for many persons, income was categorized into very broad ranges (e.g., <$20,000 and ≥$20,000). The highest income category was ≥$75,000.

NHANES is a complex, multistage probability sample of the noninstitutionalized population of the United States. Information regarding the survey's methodology has been published previously (*9*). Data for NHANES 2-year samples were collected from 1999–2000 through 2009–2010 (*10*) using a stratified, multistage cluster design. The sample was representative of the U.S. civilian, noninstitutionalized population. Weight and height were measured using standardized techniques and equipment, and body mass index (BMI) (weight [kg]/height [m]^2) was calculated (*11*). Persons aged ≥20 years were classified as obese if they had a BMI ≥30 kg/m^2 (*12*). Persons aged 2–17 years were considered obese if they had a BMI ≥95th (sex- and age-specific) percentile of the 2000 CDC growth charts (*13*). Persons aged 18–19 years were classified as obese if they had a BMI ≥30 kg/m^2 or ≥95th percentile of the CDC growth charts. This age classification differs from that used in other studies of obesity using NHANES data (*2,5*), which grouped persons aged 18–19 years with children and adolescents. Information on race/ethnicity was self-reported for persons aged ≥16 years. For persons aged <16 years, race/ethnicity was reported by a family member. Respondents reported race/ethnicity from a list provided to them that included an open-ended response. Analyses that focused on race/ethnicity were restricted to non-Hispanic whites, non-Hispanic blacks, and Mexican-Americans because of insufficient numbers of persons in other racial/ethnic groups. However, all race/ethnicity groups were included in analyses of other characteristics (e.g., educational attainment). Non-Hispanic blacks and Mexican-Americans were oversampled to improve the precision of estimates for these race/ethnicity groups (*14*).

During each household interview, adult respondents were asked to report the highest level of school completed or the highest degree that they had received. For children and adolescents, this information was collected for the adult head of household. This information was summarized into four categories of education attainment: less than high school, high school graduate or equivalent, some college, and college degree or higher. Because adults aged 18–22 years were unlikely to have completed college, analyses of educational attainment among adults were restricted to subjects who were aged ≥23 years. For approximately 2% of the sample, information on education attainment was missing, and these persons were excluded from the analyses that focused on this characteristic.

Disability status was determined by self-reports among persons aged ≥60 years and was based on responses to 11 questions concerning problems in memory (confusion) and hearing, along with ambulatory difficulties (e.g., difficulties in walking, going up steps, and standing) and self-care difficulties (e.g., dressing, eating, and getting out of bed). A response of "some difficulty" or "much difficulty" was considered to indicate that the activity was difficult. The number of positive responses was then summed, and this variable was categorized into three groups: no difficulties or problems (reported by 50% of adults aged ≥60 years), difficulties in one to three activities (33%), and difficulties in four or more activities (17%). Although this type of classification is based on various assumptions, it allows for the assessment of whether a dose-response relationship is evident. Standard disability classifications also include vision problems (*15*), but these data were not available for NHANES 2009–2010.

Information also was collected on country of birth and, on the basis of a question in the acculturation data file, the language usually spoken at home. Because few non-Hispanic white or non-Hispanic black subjects were born outside the United States or spoke a language other than English at home, analyses of country of birth and language spoken at home were restricted to Mexican-Americans. Of the Mexican-American adults for whom information was collected, 57% reported that they were born in Mexico, and 56% reported that they usually spoke Spanish at home.

Trends in obesity prevalence over the 2-year study cycles were examined, with year coded as a six-level interval variable. To decrease the variability of the estimates of the prevalence of obesity within categories of the examined characteristics, this report presents estimates for three 4-year periods: 1999–2002, 2003–2006, and 2007–2010. Within these three 4-year periods, the number of children aged 2–17 years ranged from 6,081 to 7,293, and the number of adults ranged from 9,630 to 12,067. All estimates of the prevalence of obesity among adults have been age adjusted to the 2000 Standard U.S. Population. The estimated prevalence is considered to be unstable if the relative SE (SE ÷ prevalence) is ≥30%. Estimates that have a relative SE ≥40% are not presented.

The overall (12-year) prevalence of obesity was examined across categories of the various characteristics (race/ethnicity, educational attainment, number of disabilities, country of birth, and language spoken at home). Separate analyses were performed by age and sex (i.e., for men, women, boys, and girls). Differences in obesity prevalence across these characteristics were examined, using an interaction term in logistic regression models. Educational attainment (four levels), number of disabilities (three levels), and 2-year study cycle (six levels) were coded as ordinal variables in these models. All analyses accounted for the examination sampling weights and for the complex sampling design. All estimate comparisons represent absolute differences. Statistical significance ($p<0.05$) was assessed in logistic regression models, with various models including age and study period as covariates. All analyses were performed with the survey package in R (*16,17*).

Results

Between 1999–2002 and 2007–2010, the age-adjusted prevalence of obesity among adults aged ≥18 years increased from 26.5% to 33.0% among men and from 32.4% to 34.9% among women (Table 1). Controlling for age and race/ethnicity in regression models indicated that the increase in the prevalence of obesity over the study period was statistically significant among men but not among women.

The prevalence of obesity differed substantially across categories of various demographic characteristics (Table 1). Among men, there was little difference in the prevalence of obesity by race/ethnicity, but among women, the overall (1999–2010) prevalence among non-Hispanic blacks (51%) was 10 percentage points higher than that among Mexican-Americans and 20 percentage points higher than that among non-Hispanic white women.

Inverse associations were identified between the prevalence of obesity and educational attainment that were statistically significant among both men and women; differences were much greater among women (Table 1). These associations appeared to be nonlinear. For example, among men, the prevalence was lowest (25%) among college graduates but highest (35%) among those who had completed some college. Among women, the overall prevalence of obesity among those who had completed college was 13–16 percentage points lower than in other groups, but there was little difference in obesity prevalence between those who had not finished high school and those who had completed some college. The analysis of disability status of adults aged ≥60

TABLE 1. Prevalence of obesity* among adults aged ≥18 years, by selected characteristics — National Health and Nutrition Examination Survey, United States, 1999–2010

	Prevalence in males								Prevalence in females							
	Total		1999–2002		2003–2006		2007–2010		Total		1999–2002		2003–2006		2007–2010	
Characteristic	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Total†	**30**	**(1)**	**26**	**(1)**	**31**	**(1)**	**33**	**(1)**	**34**	**(1)**	**32**	**(1)**	**33**	**(1)**	**35**	**(1)**
Race/Ethnicity																
White, non-Hispanic	**31**	**(1)**	27	(1)	31	(1)	33	(1)	**31§**	**(1)**	30	(1)	31	(1)	32	(1)
Black, non-Hispanic	**33**	**(1)**	27	(1)	35	(2)	37	(2)	**51§**	**(1)**	47	(2)	53	(2)	53	(2)
Mexican-American	**31**	**(1)**	26	(2)	29	(2)	35	(2)	**41§**	**(1)**	37	(2)	41	(2)	44	(2)
Educational attainment¶																
Less than high school	**29****	**(1)**	26	(2)	29	(2)	32	(2)	**40§**	**(1)**	39	(2)	40	(2)	41	(2)
High school graduate or equivalent	**33****	**(1)**	30	(2)	35	(2)	35	(2)	**38§**	**(1)**	36	(2)	38	(2)	41	(2)
Some college	**35****	**(1)**	28	(2)	35	(2)	41	(2)	**37§**	**(1)**	35	(2)	36	(2)	38	(1)
College graduate	**25****	**(1)**	23	(2)	26	(2)	26	(2)	**24§**	**(1)**	22	(2)	24	(2)	27	(2)
No. of disabilities††																
0	**31§**	**(1)**	30	(2)	29	(4)	34	(2)	**30§**	**(1)**	31	(3)	26	(2)	32	(2)
1–3	**41§**	**(2)**	35	(4)	40	(5)	46	(3)	**45§**	**(3)**	40	(4)	42	(5)	53	(4)
4–11	**47§**	**(3)**	50	(5)	48	(8)	44	(5)	**57§**	**(3)**	53	(4)	59	(5)	60	(4)
Country of birth§§																
United States	**39§**	**(2)**	37	(4)	35	(3)	44	(3)	**43****	**(1)**	38	(4)	45	(2)	44	(2)
Mexico	**26§**	**(1)**	19	(1)	25	(2)	31	(2)	**40****	**(1)**	36	(3)	39	(3)	43	(2)
Language spoken at home§§																
English	**38§**	**(2)**	36	(4)	34	(3)	41	(3)	**41**	**(2)**	35	(3)	42	(2)	44	(2)
Spanish	**26§**	**(1)**	20	(1)	25	(2)	32	(2)	**41**	**(1)**	37	(3)	41	(3)	43	(2)

Abbreviation: SE = standard error.

* All estimates have been age adjusted to the 2000 Standard U.S. Population.

† The increase in obesity prevalence over the 12-year study period was statistically significant among men (p<0.001) but not among women (p = 0.09).

§ p<0.001. P-values assess whether the overall prevalence of obesity differed across categories of each characteristic (i.e., a main effect). These p-values were calculated from sex-specific regression models that included year of study (a six-level ordinal variable) and age as covariates. Educational attainment and the number of disabilities were coded as ordinal variables in these models.

¶ Asked of persons aged ≥23 years.

** p<0.05.

†† Asked of persons aged ≥60 years. Disabilities were classified on the basis of responses to 11 questions concerning having memory and hearing problems and some or much difficulty in walking, carrying, preparing meals, standing, getting out of bed, eating, dressing, and going out.

§§ Asked of Mexican-Americans.

years indicated that the overall prevalence of obesity among those who reported having difficulties with four or more activities was substantially higher than obesity prevalence among those without a disability (men: 16 percentage points higher; women: 27 percentage points higher).

In contrast to these differences, which were larger among women, the association of obesity with country of birth and language spoken at home was stronger among men (Table 1). Mexican-American men who were born in the United States had 13 percentage points higher overall prevalence of obesity than men born in Mexico (39% versus. 26%), but the equivalent difference among Mexican-American women was only 3 percentage points. Similarly, Mexican-American men who spoke mostly English at home had a 12 percentage points higher overall prevalence of obesity compared with those who spoke mostly Spanish at home (38% versus 26%), while there was no significant difference among Mexican-American women. As assessed by an interaction term (each characteristic x study period) in sex-specific regression models, there was no indication that disparities in obesity prevalence varied across the 12-year study period among either men or women.

Between 1999–2002 and 2007–2010, the prevalence of obesity among children and adolescents aged 2–17 years increased from 15.4% to 18.6% among boys and from 13.8% to 15.1% among girls (Table 2). After adjustment for age and race/ethnicity in regression models, the increase over the six 2-year study cycles was statistically significant among boys but not among girls.

Differences in the prevalence of obesity among children and adolescents over the 12-year study period across categories of the various characteristics were somewhat similar to those among adults (Tables 1 and 2). Substantial differences existed in the prevalence of obesity by race/ethnicity; among boys, prevalence was highest among Mexican-Americans (24%), whereas among girls, prevalence was highest among non-Hispanic blacks (22%). Educational attainment of the adult head of household was associated inversely with obesity among both boys and girls. Overall, the prevalence of obesity among

TABLE 2. Prevalence of obesity among children and adolescents aged 2–17 years, by selected characteristics — National Health and Nutrition Examination Survey, United States, 1999–2010

	Prevalence in males								Prevalence in females							
	Total		1999–2002		2003–2006		2007–2010		Total		1999–2002		2003–2006		2007–2010	
Characteristic	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Total*	**17**	**(1)**	**15**	**(1)**	**17**	**(1)**	**19**	**(1)**	**15**	**(1)**	**14**	**(1)**	**15**	**(1)**	**15**	**(1)**
Race/Ethnicity																
White, non-Hispanic	**15†**	**(1)**	13	(1)	15	(1)	16	(1)	**13†**	**(1)**	11	(1)	14	(2)	13	(1)
Black, non-Hispanic	**18†**	**(1)**	16	(1)	17	(1)	21	(2)	**22†**	**(1)**	20	(1)	23	(1)	23	(2)
Mexican-American	**24†**	**(1)**	24	(1)	24	(2)	25	(2)	**18†**	**(1)**	17	(1)	19	(1)	18	(2)
Educational attainment§																
Less than high school	**21†**	**(1)**	21	(2)	19	(2)	24	(2)	**19†**	**(1)**	17	(1)	18	(2)	23	(2)
High school graduate or equivalent	**18†**	**(1)**	15	(2)	19	(2)	19	(1)	**18†**	**(1)**	15	(2)	20	(2)	19	(2)
Some college	**17†**	**(1)**	17	(2)	16	(2)	19	(2)	**14†**	**(1)**	12	(1)	14	(2)	14	(2)
College graduate	**11†**	**(1)**	11	(2)	12	(2)	12	(2)	**9†**	**(1)**	11	(2)	10	(2)	7	(1)
Country of birth¶																
United States	**24**	**(1)**	24	(1)	24	(2)	24	(2)	**18**	**(1)**	18	(2)	19	(2)	18	(2)
Mexico	**24**	**(2)**	24	(3)	22	(3)	27	(4)	**15**	**(2)**	13	(3)	16	(3)	17	(5)
Language spoken at home¶																
English	**26**	**(2)**	27	(3)	24	(3)	27	(4)	**22**	**(2)**	23	(3)	23	(2)	20	(4)
Spanish	**18**	**(4)**	26	(3)	19	(3)	41	(11)	**16**	**(3)**	21	(3)	16	(4)	—**	—

Abbreviation: SE = standard error.

* The increase in obesity prevalence over the 12-year study period was statistically significant among boys ($p<0.01$) but not girls ($p = 0.34$).

† $p<0.001$. P-values assess whether the overall prevalences of obesity differed across categories of each characteristic (i.e., a main effect). These p-values were calculated from sex-specific logistic regression models that included year of study (an ordinal variable with six levels) and age as covariates. Adult head of household educational attainment was coded as an ordinal variable in these models; other characteristics were considered to be categorical.

§ Asked of adult head of household. As assessed by an interaction term in logistic regression models, disparities in obesity prevalence across educational attainment of the head of household increased over the study period among girls ($p = 0.01$).

¶ Asked of Mexican-Americans.

** Not shown because SE was ≥40% of the estimated prevalence. During 2007–2010, data were available only for 50 Mexican-American girls whose families usually spoke Spanish at home.

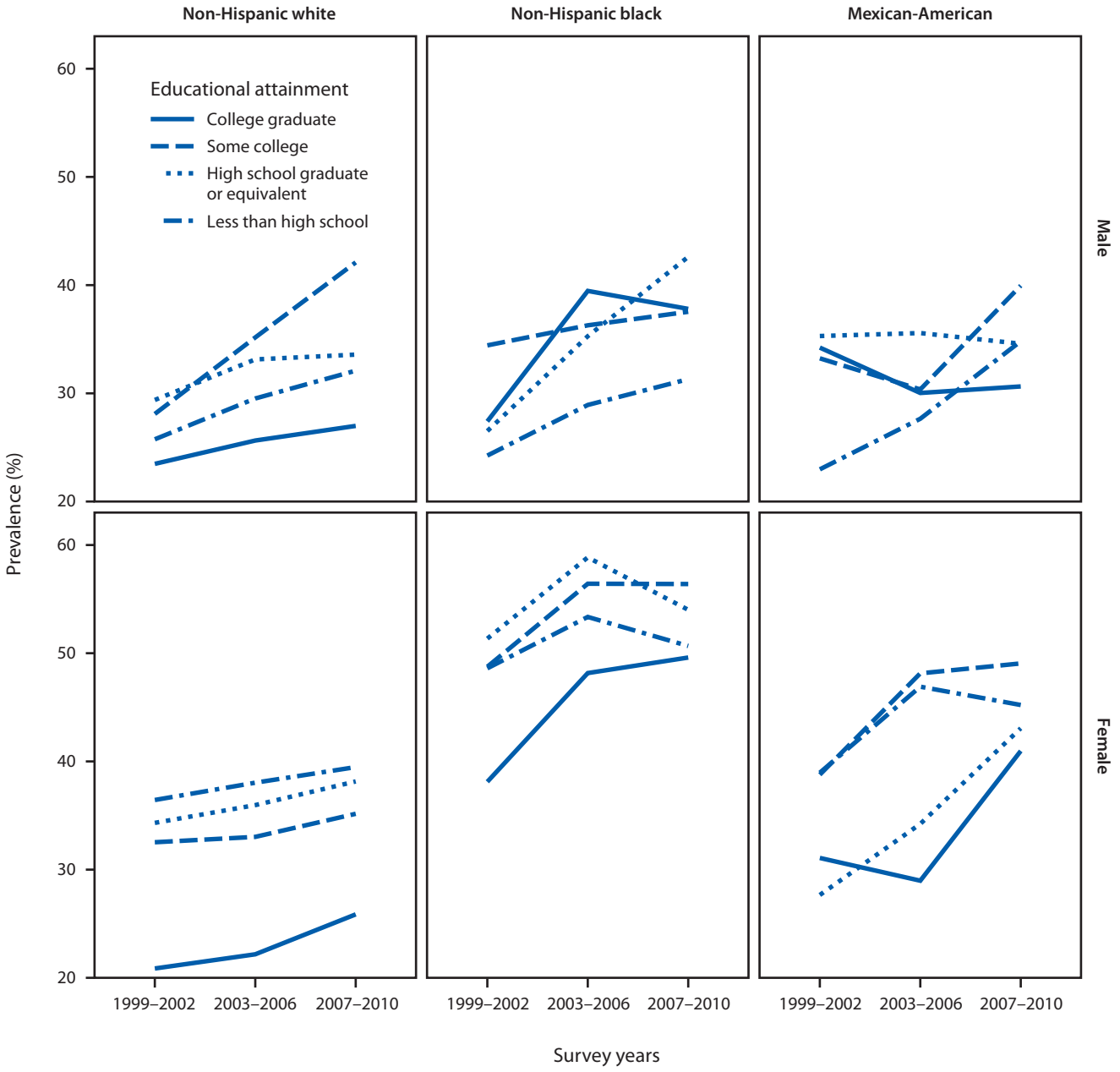
children and adolescents whose adult head of household had completed college was approximately half that of prevalence among children whose adult head of household did not complete high school. In contrast to the differences among adults, the prevalence of obesity among Mexican-American children did not differ significantly according to either country of birth or language spoken at home.

As assessed by an interaction term (each characteristic x study period, which was coded as 1–6) in sex-specific regression models, there was little indication that differences in the prevalence of obesity across most of the characteristics analyzed varied over the 12-year study period among children (Table 2). However, the prevalence of obesity among girls whose adult head of household had not finished high school increased (17% for 1999–2002 versus 23% for 2007–2010) while the prevalence decreased among girls whose adult head of household had completed college (11% for 1999–2002 versus 7% for 2007–2010). There was not a comparable interaction among boys. Because education attainment differs substantially across race/ethnicity groups, the associations between education attainment and obesity prevalence were examined.

The relation of educational attainment to obesity varied significantly by sex and race/ethnicity among both adults (Figure 1) and children (Figure 2). Among non-Hispanic white women (Figure 1), in each 4-year period, the prevalence of obesity was approximately 15% lower among those who had completed college than it was among those who had not completed high school. Although the prevalence of obesity among non-Hispanic white men and non-Hispanic black women was also lowest among those who had completed college, the trend over the four educational attainment categories was not consistent in these two groups. Furthermore, there was no evidence that educational attainment was associated with obesity among non-Hispanic black men or among Mexican-Americans. For example, Mexican-American men who did not complete high school had the lowest prevalence of obesity in 1999–2002 and in 2003–2006.

Associations between obesity and adult head of household education attainment among children and adolescents were also less consistent after stratifying for race/ethnicity (Figure 2). (The prevalence of obesity among Mexican-American children and adolescents is not shown because many of the estimates were unstable). Although the lowest prevalence of obesity among non-Hispanic white children and adolescents was observed among those whose adult head of household had completed college, this was not the case among non-Hispanic black children.

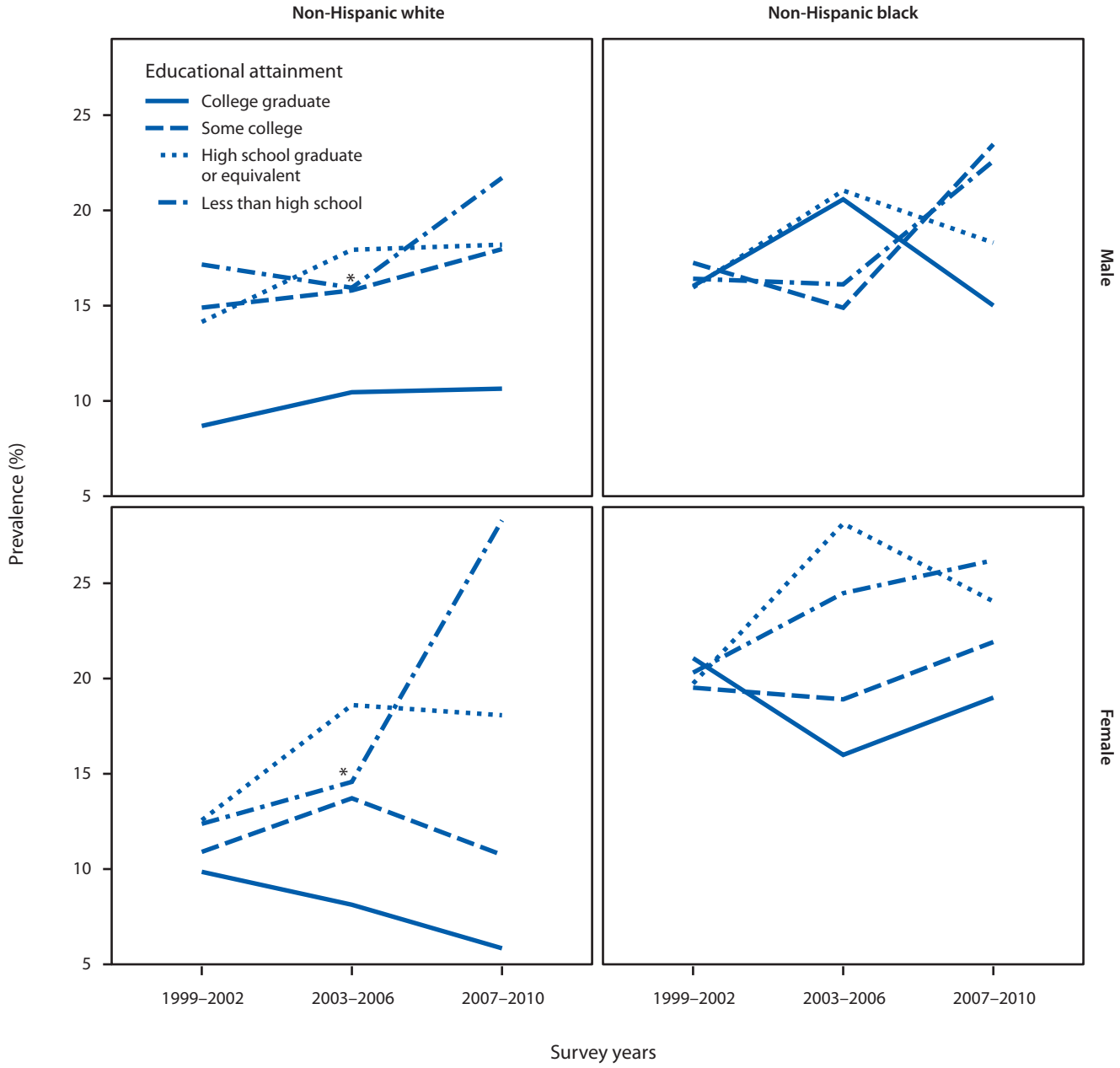
FIGURE 1. Prevalence of obesity among adults aged ≥23 years,* by sex, race/ethnicity, and educational attainment — National Health and Nutrition Examination Survey, United States, 1999–2010



* Adults aged 18–22 years were unlikely to have completed their education and were excluded from this analysis.

Furthermore, there was no evidence of any association between obesity and adult head of household educational attainment among non-Hispanic black boys, and the trend in the prevalence of obesity across the lower three categories of adult head of household educational attainment was not consistent in any of the sex-race groups. The observed interaction between study period and educational attainment among girls (Table 2) was largely attributable to the trend among non-Hispanic white girls, and the 2007–2010 prevalence of obesity among non-Hispanic white girls varied from 6% (± 2) to 28% (± 5) across the four groups of educational attainment by the adult head of household more than it did in previous years.

FIGURE 2. Prevalence of obesity among children and adolescents aged 2–17 years, by sex, race/ethnicity, and educational attainment of adult head of household — National Health and Nutrition Examination Survey, United States 1999–2010*



* Prevalences are not shown for Mexican-American children because many of the estimates were unstable (standard error [SE] >30% of the prevalence) with the relative SE reaching a maximum of 49%. An asterisk in the figure indicates that the relative SE is between 30% and 40% of the prevalence; this was seen during 2003–2006 among white non-Hispanic boys and girls from a household in which the adult head did not complete high school.

Discussion

Recent trends suggest that although increases in obesity prevalence have slowed or even stopped for some subgroups, the prevalence remains high (*2,5*). This report highlights the persistence of substantial disparities among certain population groups, all of which further complicate the efforts to understand, control, and prevent obesity. Although the specific causes of these disparities have not been identified, it is likely that they are associated with complex social and cultural factors that affect obesity-related behaviors. One possible contributing factor is that rates of breastfeeding are lower among non-Hispanic black women compared with non-Hispanic white women (*18*). In addition, greater

satisfaction in body size among racial/ethnic minority women (*19*), preferences for larger body types (*20,21*), and previous threats of, or experiences with, undernutrition (*22*) also might promote obesogenic behaviors. Further, racial/ethnic differences in physical activity levels among adults (*23*) and children (*24*) and differential preferences for specific types of physical activity (*25*) also might play a role. These and other behaviors occur within a broader context of obesity-promoting environments that limit opportunities for physical activity, encourage excess television viewing and passive screen time, and provide easy access to high-calorie, low-nutrient foods and beverages, including those high in added sugars and solid fats (*26,27*).

Limitations

The findings presented in this report are subject to at least two limitations. First, NHANES does not sample an adequate number of persons who are members of racial/ethnic minority communities other than non-Hispanic blacks and Mexican-Americans to permit estimating obesity prevalence in these communities; however, previous research has reported high prevalence levels among American Indians/Alaska Natives (*28,29*). Second, the data presented, although age adjusted, do not allow for assessment of covarying issues or stratification to further assess independent effects.

Conclusion

The data provided in this report can be used to help identify high-priority groups (e.g., those with low levels of educational attainment, Mexican-American boys, and non-Hispanic black girls and women) for intervention. Because high-priority groups frequently are defined by nonmodifiable characteristics (e.g., race/ethnicity and sex), designers of effective interventions should consider which dietary or physical activity behaviors contribute to the differences as well as how those behaviors are influenced by social and cultural factors and by the settings in which persons spend their time. For example, because studies have found that access to healthy foods is more limited in low-income communities and communities of color than in other communities (*30*), interventions could focus on neighborhood walkability (e.g., sidewalks), Complete Streets (*31*), and community design in these communities. Further, opportunities to reduce disparities related to nutrition are also present. For example, many low-income household members, who also tend to have low educational attainment, consume higher amounts of sugary drinks and fewer fruits and vegetables than persons in higher income households (*32,33*). Effective interventions that focus on increasing access to healthy food outlets, initiatives for local businesses to provide healthier foods and beverages such as fruits and vegetables (e.g., Healthy Food Financing Initiative [*34*]), and education combined with vouchers for low-income families (e.g., the Special Supplemental Nutrition Program for Women, Infants, and Children [WIC; *35*] participants) that can use to purchase healthy foods might help reduce this disparity.

Having a sustainable impact on reducing disparities associated with obesity includes making healthy choices easily assessable and available to all persons. Environmental strategies that support healthy eating and active living opportunities within communities can help provide healthy choices for persons. In addition, such changes can help provide ongoing training and support of public health practitioners with tools to implement effective responses to obesity in populations that are facing health disparities (*36,37*). CDC provides funding and support to multiple public health programs to improve access to healthy foods and beverages in underserved communities (*38,39*), including increased access to markets and convenience stores that offer healthier food and beverage choices; expanding programs that promote food affordability such as WIC farmers' markets; assisting persons through green carts and mobile vans in inner-city neighborhoods (Farm-to-Where-You-Are) (*40,41*); and promotion of food policy councils that include diverse stakeholders that often consider both food security and improvements of the food environment at the state and local levels.

Certain early child care education initiatives promote active play and healthier beverage and food offerings such as drinking water and fruits and vegetables. These initiatives can address disparities by providing age-appropriate health curricula, parental outreach, increased healthier foods and beverages served, and training and technical support for staff on menu planning and food preparation (*42*) for children of low socioeconomic status and children who hold immigrant and/or refugee status, among other high-priority groups (Adrienne Dorf, Child Care Health Program Public Health Seattle and King County, personal communication, 2012). Strategies such as promoting physical activity early in child care and school, increasing low- or no-cost physical activity opportunities, building and enhancing trails and parks, developing shared-use agreements with public venues such as schools, improving sidewalks, and other initiatives that promote physical activity to prevent and reduce obesity have been implemented to help all persons and communities to become physically active (*43*).

Although the rate of obesity has plateaued in recent years for some groups, the overall prevalence of the condition

remains high for all U.S. residents, and disparities persist in the prevalence of obesity. Continued monitoring of obesity prevalence and further research are needed to identify and understand the factors that influence individual behaviors, especially among high-priority groups, and to augment current population-based approaches with interventions that are tailored to their needs.

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Periodontitis Among Adults Aged ≥30 Years — United States, 2009–2010

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Introduction

Periodontal disease, or gum disease, is a chronic infection of the hard and soft tissue supporting the teeth (*1*) and is a leading cause of tooth loss in older adults (*2*). Tooth loss impairs dental function and quality of life in older adults (*2*). The chronic infections associated with periodontitis can increase the risk for aspiration pneumonia in older adults and has been implicated in the pathogenesis of chronic inflammation that impairs general health (*3*,*4*). The severity of periodontal disease can be categorized as mild, moderate, or severe on the basis of multiple measurements of periodontal pocket depth, attachment loss, and gingival inflammation around teeth (*5*).

At the national level, monitoring the reduction of moderate and severe periodontitis in the adult U.S. population is part of the health-promotion and disease-prevention activities of *Healthy People 2020* (*6*). Approximately 47% of adults aged ≥30 years in the United States (approximately 65 million adults) have periodontitis: 8.7% with mild periodontitis, 30.0% with moderate, and 8.5% with severe periodontitis (*7*). Periodontitis increases with age; adults aged ≥65 years have periodontitis at rates of 5.9%, 53.0%, and 11.2% for mild, moderate, and severe forms, respectively (*7*). As the U.S. adult population ages and is more likely to retain more teeth than previous generations, the prevalence of periodontitis is expected to increase and consequently could increase the need for expenditures for preventive care and periodontal treatment (*8*).

Periodontitis is directly associated with lower levels of education and higher levels of poverty, both of which influence the use of dental services by adults (*9*–*12*). Educational attainment and poverty might mediate significant differences in the prevalence of periodontal disease between different racial/ethnic populations. Smoking and some chronic diseases such as diabetes are important modifiable risk factors for periodontitis (*13*). Since the early 1960s, U.S. national surveys have assessed the periodontal status of adults (*14*). However, the validity of estimates from these surveys has been limited by the use of partial-mouth periodontal examination protocols, which significantly underestimate the prevalence of periodontitis (*15*–*17*). The 2009–2010 National Health and Nutrition Examination Survey (NHANES) cycle is the first to include a full-mouth periodontal examination for U.S. adults (aged ≥30 years) and provides the most direct evidence for the true prevalence of periodontitis in this population.

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*18*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*19*). This report provides information concerning disparities in periodontitis, a topic that was not discussed in the 2011 CHDIR (*18*). The purposes of this periodontitis in adults report are to discuss and raise awareness of differences in the characteristics of people with periodontal disease and to prompt actions to reduce these disparities.

Methods

To examine racial/ethnic disparities in the estimated percentage of adults aged ≥30 years with periodontitis by age, sex, education, poverty levels, and smoking status, CDC analyzed data from the 2009-2010 NHANES cycle. NHANES is a cross-sectional survey designed to monitor the overall health and nutritional status of civilian, noninstitutionalized U.S. population. NHANES uses a stratified multistage probability sampling design. For 2-year

data cycles, NHANES surveys a national representative sample. The technical details of the survey, including sampling design, periodontal data collection protocols, and data, are available online (http://www.cdc.gov/nchs/nhanes.htm). A total of 5,037 adults aged ≥30 years participated in the survey, and 951 were excluded for medical reasons or incomplete oral examinations. In this analysis, 343 edentulous participants were excluded, leaving a total of 3,743 participants, representing a weighted population of approximately 137.1 million civilian noninstitutionalized U.S. adults. The findings in this report cannot be compared with those of previous studies using NHANES data (*9*,*10*) because the case definitions and age range used in this analysis differed.

All periodontal examinations were conducted in a mobile examination center by dental hygienists registered in at least one U.S. state. Gingival recession was defined as the distance between the free gingival margin and the cementoenamel junction; pocket depth was defined as the distance from free gingival margin to the bottom of the sulcus or periodontal pocket. These measurements were made at six sites per tooth (mesiobuccal, midbuccal, distobuccal, mesiolingual, midlingual, and distolingual) for all teeth except third molars. For measurements at each tooth site, a periodontal probe (Hu-Friedy PCP 2) with graduations of 2 mm, 4 mm, 6 mm, 8 mm, 10 mm, and 12 mm was positioned parallel to the long axis of the tooth at each site. Each measurement was rounded to the lowest whole millimeter. Data were recorded directly into an NHANES oral health data management program that instantly calculated attachment loss as the difference between probing depth and gingival recession. Bleeding from probing and the presence of dental furcations were not assessed.

Periodontal measurements were used to classify participants as having mild, moderate, or severe disease by using standard case definitions for surveillance of periodontitis (*4*); total prevalence of periodontitis in the population was calculated by combining prevalence of mild, moderate, and severe periodontitis. Severe periodontitis was defined as having two or more interproximal sites with ≥6 mm attachment (not on the same tooth) and one or more interproximal sites with ≥5 mm pocket depth. Moderate periodontitis was defined as two or more interproximal sites with ≥4 mm clinical attachment (not on the same tooth) or two or more interproximal sites with pocket depth of ≥5 mm (not on the same tooth). Mild periodontitis was defined as two or more interproximal sites with ≥3 mm attachment and two or more interproximal sites with ≥4 mm pocket depth (not on the same tooth) or one site with ≥5 mm.

Race/ethnicity was self-reported; for this analysis, three race/ethnicity groups, each with a sample size large enough to ensure statistically reliable estimates, were used: non-Hispanic white, non-Hispanic black, and Mexican-American. Poverty status categories, or percentage of poverty relative to the federal poverty level (FPL), was based on family income, family size, and number of children in the family, for families with two or fewer adults, and on the age of the adults in the household. Families or individuals with income below their appropriate income thresholds, as determined by family size and composition, were classified as living below the FPL. The income thresholds are updated annually by the U.S. Census Bureau (available at http://aspe.hhs.gov/poverty/11poverty.shtml). Education was classified as less than high school, high school graduate or equivalent, and greater than high school. Smoking status was determined by responses to two questions: 1) "Have you smoked at least 100 cigarettes in your life?" and 2) "Do you now smoke cigarettes?" Participants who answered yes to both questions were categorized as current smokers, participants who answered yes to the first question and no to the second were categorized as former smokers, and participants who answered no to both questions were categorized as never smokers. Geographic regions were not analyzed because NHANES is not designed to be representative at regional (or lower) levels.

Disparities were assessed by age group, sex, race/ethnicity, education, FPL, and smoking status for the total population and by race/ethnicity. Referent groups for each category had the best overall periodontal health for the category. Disparities were measured as deviations from a referent group, which was the group that had the most favorable estimate for the variables used to assess disparities during the time reported. Absolute difference was measured as the simple difference between the periodontitis prevalence for the group of interest and the referent group. The relative difference, a percentage, was calculated by dividing the absolute difference by the value in the referent category and multiplying by 100. The z test was used to assess significant differences between absolute differences from the referent group, with significance set at $p<0.05$. Data (using mobile examination center weights) were analyzed using statistical software to adjust for the effects of the sampling design, including the unequal probability of selection, and to determine standard errors (SEs).

Results

During 2009–2010, an estimated 47.2% of adults aged ≥30 years in the United States had periodontitis (Table 1). The prevalence of total and moderate periodontitis increased with increasing age among all adults. However, the prevalence of mild and severe periodontitis remained relatively steady at <15% across all age groups (Figure).

TABLE 1. Prevalence of periodontitis among adults aged ≥30 years, by race/ethnicity and selected characteristics — National Health and Nutrition Examination Survey, United States, 2009–2010

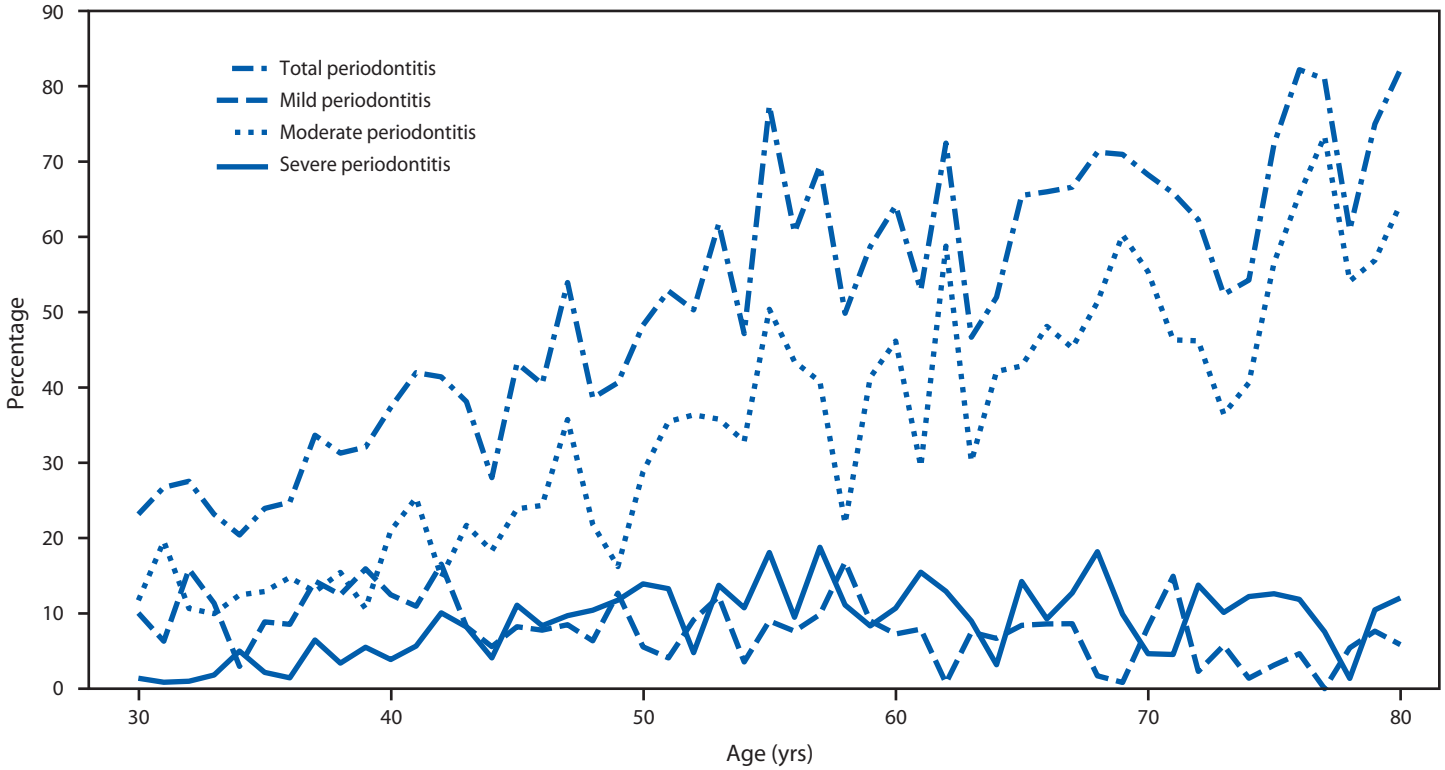
	Total* (N = 3,743)						White, non-Hispanic (N = 1,792)				Black, non-Hispanic (N = 673)				Mexican-American (N = 1,076)			
Characteristics	No. of adults	Weighted no. of adults (in millions)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)
Total	**3,743**	**137**	**47.2**	**(2.1)**	—	—	**42.6**	**(3.0)**	—	—	**58.6**	**(3.1)**	—	—	**59.7**	**(2.2)**	—	—
Age group (yrs)																		
30–34	435	16.7	24.4	(2.7)	Ref.	—	16.6	(3.3)	Ref.	—	37.9	(8.2)	Ref.	—	43.7	(3.0)	Ref.	—
35–49	1,352	54.0	36.6	(1.6)	12.2†	50.0	28.5	(2.3)	11.9†	71.7	51.0	(3.7)	13.1	34.6	56.9	(2.9)	13.2†	30.2
50–64	1,128	43.4	57.2	(2.6)	32.8†	134.4	51.2	(3.7)	34.6†	208.4	72.8	(3.2)	34.9†	92.1	72.9	(3.6)	29.2†	66.8
≥65	828	22.9	70.1	(3.0)	45.7†	187.3	68.0	(3.9)	51.4†	309.6	72.7	(4.7)	34.8†	91.8	78.4	(4.1)	34.7†	79.4
Sex																		
Female	1,871	69.6	38.4	(2.4)	Ref.	—	34.6	(3.4)	Ref.	—	47.1	(3.5)	Ref.	—	47.4	(2.5)	Ref.	—
Male	1,872	67.5	56.4	(2.1)	18.0†	46.9	50.7	(3.0)	16.1†	46.5	72.9	(3.9)	25.8†	54.8	70.8	(2.3)	23.4†	49.4
Education																		
Less than high school	1,030	23.8	66.9	(2.4)	27.6†	70.2	59.6	(4.6)	21.7†	57.3	64.9	(4.1)	14.5†	28.8	71.8	(2.2)	30.5†	73.8
High school graduate or equivalent	815	29.6	53.5	(3.2)	14.2†	36.1	49.3	(4.2)	11.4†	30.1	67.3	(4.0)	16.9†	33.5	59.5	(4.6)	18.2†	44.1
Greater than high school	1,889	83.3	39.3	(2.3)	Ref.	—	37.9	(3.0)	Ref.	—	50.4	(4.1)	Ref.	—	41.3	(3.2)	Ref.	—
Poverty level																		
<100% FPL	625	13.5	65.4	(2.5)	30.0†	84.7	62.7	(6.0)	28.4†	82.8	58.8	(5.7)	15.4	35.5	69.4	(2.9)	28.3†	68.9
100%–199% FPL	901	22.7	57.4	(3.0)	22.0†	62.1	52.6	(6.0)	18.3†	53.4	65.6	(4.1)	22.2†	51.2	59.9	(4.1)	18.8†	45.7
200%–499% FPL	905	37.7	50.2	(2.5)	14.8†	41.8	48.0	(3.0)	13.7†	39.9	62.0	(4.1)	18.6†	42.9	54.8	(3.9)	13.7†	33.3
≥400% FPL	960	52.4	35.4	(3.0)	Ref.	—	34.3	(3.4)	Ref.	—	43.4	(6.1)	Ref.	—	41.1	(4.4)	Ref.	—
Smoking status																		
Current smoker	728	23.2	64.2	(2.6)	24.4†	61.3	60.8	(3.0)	26.8†	78.8	79.1	(5.0)	32.6†	70.1	69.1	(3.6)	13.3†	23.8
Former smoker	957	35.7	52.5	(3.1)	12.7†	31.9	48.8	(4.1)	14.8†	43.5	67.1	(5.4)	20.6†	44.3	64.1	(5.7)	8.3	14.9
Nonsmoker	2,058	78.1	39.8	(2.1)	Ref.	—	34.0	(3.0)	Ref.	—	46.5	(3.5)	Ref.	—	55.8	(2.6)	Ref.	—

Abbreviations: FPL = federal poverty level; Ref. = referent; SE = standard error.
* The 202 respondents in "other" race group are not included.
† Significant at p<0.05 by z test.

The prevalence of periodontitis was significantly higher in non-Hispanic blacks (58.6%) and Mexican-Americans (59.7%) compared with non-Hispanic whites (42.6%). Among all racial/ethnic groups, the prevalence of periodontitis increased with age (24.4%–70.1%), with the largest relative difference in prevalence within age groups occurring among non-Hispanic whites (range: 16.6%–68.0%). The prevalence of periodontitis was significantly higher among men (56.4%) than women (38.4%) overall, and this finding was consistent among racial/ethnic groups. By education level, periodontitis was highest among persons with less than a high school education (66.9%), and the relative difference between those with greater than a high school education and those with less education was largest in Mexican-Americans (73.8%) and smallest in non-Hispanic blacks (28.8%). The prevalence of periodontitis increased as FPL percentage decreased, with an estimate of 65.4% of persons in the poorest families (<100% FPL), representing an 85% relative increase compared with families at ≥400% FPL. The relative difference in prevalence between these categories of FPL was largest among non-Hispanic whites (82.8%) and smallest among non-Hispanic blacks (35.5%). Periodontitis was more prevalent among current smokers (64.2%) than nonsmokers (39.8%) and significantly higher among non-Hispanic black current smokers (79.1%) than non-Hispanic white (60.8%) and Mexican-American current smokers (69.1%) (Table 1).

During 2009–2010, an estimated 8.7% of the U.S. adult population had mild periodontitis. The prevalence of moderate periodontitis was 30.0% (Table 2). Prevalence of moderate periodontitis increased with age and peaked at age ≥65 years. Overall, prevalence was higher in men (33.8%) than women (26.4%) and higher among non-Hispanic black men (42.7%) than men in other racial/ethnic groups. Increasing prevalence was associated with lower education and poverty levels. Specifically, the prevalence of moderate periodontitis at the lowest levels of education and poverty were higher among non-Hispanic whites and Mexican-Americans than non-Hispanic blacks. Prevalence of moderate periodontal disease was higher among current smokers (36.5%) and former smokers (35.6%) than among nonsmokers (25.6%). However, this pattern was not consistent among non-Hispanic blacks and Mexican-Americans, among whom the highest prevalence of moderate periodontitis was among former smokers. The relative difference in prevalence between poverty levels was smallest among non-Hispanic blacks, suggesting that income

FIGURE. Prevalence of total, mild, moderate, and severe periodontitis among adults aged ≥30 years, by age — National Health and Nutrition Examination Survey, United States, 2009–2010



had the least impact on moderate periodontitis in this racial/ethnic group. Significant absolute differences were found in moderate periodontitis among current smokers, former smokers, and nonsmokers and was significantly higher among non-Hispanic blacks.

Severe periodontitis was estimated to occur in 8.5% of U.S. adults aged ≥30 years (Table 3). Severe periodontitis was twice as common among non-Hispanic blacks (13.2%) and Mexican-Americans (13.3%) as among non-Hispanic whites (6.3%). Severe periodontitis increased with age and peaked at age 50 years among all racial/ethnic groups. Overall, severe disease was almost three times higher among men (12.5%) than women (4.2%) and approximately two times higher among non-Hispanic black men (19.3%) and Mexican-American men (18.8%) than among non-Hispanic white men (9.4%). Severe periodontitis among persons with less than a high school education was an estimated 17.3% and decreased with increasing levels of education. Among racial/ethnic groups, the smallest relative differences by level of education occurred among non-Hispanic blacks. Similarly, the prevalence of severe periodontitis increased with increasing poverty levels, with an estimated 16.3% of adults in families living at <100% FPL having severe disease. The relative difference in prevalence by poverty level (across all racial/ethnic groups) was smallest among non-Hispanic blacks, suggesting that income had the least influence on severe periodontitis in this racial/ethnic group. The prevalence of severe periodontitis was approximately two times as common among smokers at 17.7% than among former smokers (9%) and nonsmokers (5.4%) and was significantly higher among non-Hispanic blacks (24.4%) and Mexican-Americans (24.5%) than among non-Hispanic white smokers (13.9%)

Discussion

Overall, significant disparities exist in the prevalence of periodontitis by race/ethnicity, education and poverty level. These results suggest that non-Hispanic blacks and Mexican-Americans have similar prevalences of periodontitis but higher prevalences than non-Hispanic whites. In addition, the relative differences in the prevalence of total periodontitis (i.e., mild, moderate, and severe combined) among non-Hispanic blacks varied the least by poverty and education levels, possibly suggesting that poverty and education have less of an effect than other factors on the higher prevalence of periodontitis among non-Hispanic Blacks and Mexican-Americans. The highest prevalence of periodontitis was found among adults aged ≥65 years. By 2030, the number of adults aged ≥65 years in the U.S. will double to 71 million adults, or one in every five Americans (*8*), with significant changes in the distribution of demographic and socioeconomic groups.

TABLE 2. Prevalence of moderate periodontitis among adults aged ≥30 years, by race/ethnicity and selected characteristics — National Health and Nutrition Examination Survey, United States, 2009–2010

	Total* (N = 3,743)						White, non-Hispanic (N = 1,792)				Black, non-Hispanic (N = 673)				Mexican-American (N = 1,076)			
Characterisitcs	No. of adults	Weighted no. of adults (in millions)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)	%	(SE)	Absolute difference (percentage points)	Relative difference (%)
Total	**3,743**	**137**	**30.0**	**(1.6)**	—	—	**28.5**	**(2.3)**	—	—	**33.6**	**(2.1)**	—	—	**32.8**	**(1.7)**	—	—
Age groups (yrs)																		
30–34	435	16.7	13.0	(1.7)	Ref.	—	9.7	(1.6)	Ref.	—	18.6	(5.7)	Ref.	—	21.4	(3.4)	Ref.	—
35–49	1,352	54.0	19.4	(1.7)	6.4†	49.2	15.5	(2.2)	5.8†	59.8	24.3	(3.6)	5.7	30.6	29.7	(2.4)	8.3†	38.0
50–64	1,128	43.4	37.7	(2.5)	24.7†	190.0	34.2	(3.4)	24.5†	252.6	46.4	(3.0)	27.8†	149.5	42.9	(1.6)	21.5†	100.5
≥65	828	22.9	53.0	(2.3)	40.0†	307.7	52.8	(2.6)	43.1†	444.3	50.2	(4.4)	31.6†	169.9	51.9	(4.3)	30.5†	142.5
Sex																		
Female	1,871	69.6	26.4	(2.2)	Ref.	—	24.8	(3.0)	Ref.	—	26.2	(2.7)	Ref.	—	29.2	(2.2)	Ref.	—
Male	1,872	67.5	33.8	(1.4)	7.4†	28.0	32.3	(2.0)	7.5†	30.2	42.7	(3.3)	16.5†	63.0	36.1	(2.1)	6.9†	23.6
Education																		
Less than high school	1,030	23.8	40.6	(2.6)	15.2†	59.8	42.2	(5.4)	17.1†	68.1	33.0	(3.6)	4.0	13.8	40.1	(2.4)	17.5†	77.4
High school graduate or GED certificate	815	29.6	34.2	(2.2)	8.8†	34.6	32.6	(3.1)	7.5	29.9	41.8	(3.8)	12.8†	44.1	30.6	(4.2)	8.0	35.4
Greater than high school	1,889	83.3	25.4	(1.8)	Ref.	—	25.1	(2.3)	Ref.	—	29.0	(3.2)	Ref.	—	22.6	(2.4)	Ref.	—
Poverty level																		
<100% FPL	625	13.5	37.8	(3.9)	14.3†	60.9	39.2	(7.9)	16.4†	71.9	30.8	(4.4)	4.1	15.4	38.4	(3.0)	16.2†	73
100%–199% FPL	901	22.7	32.9	(2.2)	9.4†	40.0	31.2	(4.6)	8.4	36.8	40.9	(2.1)	14.2†	53.2	30.5	(3.6)	8.3	37.4
200%–499% FPL	905	37.7	34.4	(2.3)	10.9†	46.4	33.9	(3.0)	11.1†	48.7	35.9	(5.3)	9.2	34.5	32.6	(3.1)	10.4	46.8
≥400% FPL	960	52.4	23.5	(2.0)	Ref.	—	22.8	(2.4)	Ref.	—	26.7	(5.4)	Ref.	—	22.2	(4.6)	Ref.	—
Smoking status																		
Current smoker	728	23.2	36.5	(2.1)	10.9†	42.6	38.2	(2.8)	15.1†	65.4	41.5	(3.8)	15.7†	60.9	30.2	(2.6)	-0.7	2.3
Former smoker	957	35.7	35.6	(3.1)	10.0†	39.1	33.3	(4.0)	10.2†	44.2	47.0	(3.3)	21.2†	82.2	41.0	(3.8)	10.1†	32.7
Nonsmoker	2,058	78.1	25.6	(1.4)	Ref.	—	23.1	(2.1)	Ref.	—	25.8	(1.9)	Ref.	—	30.9	(2.1)	Ref.	—

Abbreviations: Ref. = referent; SE = standard error.
* The 202 respondents in "other" race group are not included.
† Significant at p<0.05 by z test.

Limitations

The findings in this report are subject to at least four limitations, all of which might have resulted in an underestimation of the prevalence of periodontitis cases. First, the case definitions for periodontitis used measures from four interproximal sites, and not all six of the sites were measured. Second, estimates did not include persons with gingivitis. Gingivitis is a form of periodontal disease that was not assessed in the NHANES 2009–2010 data cycle. Third, NHANES does not sample institutionalized persons such as older adults in nursing homes, which might have resulted in an underestimate for older adults. Fourth, NHANES does not collect data from third molars. This exclusion of third molars is consistent with previous NHANES data cycles; third molars are difficult to assess clinically because of their alignment in the mouth, and some are partially impacted.

Conclusion

Preventive dental care programs should be an integral part of preventive health services for all ages and should include strategies to make dental care programs accessible to all racial/ethnic groups to promote health and preserve health-related quality of life in older adults. Adults aged ≥65 years do not have dental coverage through Medicare, and approximately 70% of U.S. adults in this age group have no dental coverage (*20*). Management of diabetes and smoking is an important component of prevention and treatment of adult periodontitis (*13*). The findings in this report indicate that current smokers had a much higher prevalence of severe periodontitis; smoking is categorized as a major modifiable risk factor for periodontitis. This is consistent with the 2004 *Surgeon General's Report on the Health Consequences of Smoking,* which infers a causal relationship between smoking and periodontitis (*21*). Because the prevalence of severe periodontitis is higher among current smokers, tobacco cessation programs are a potential strategy to address disparities in periodontitis in the U.S. population (*22*).

TABLE 3. Prevalence of severe periodontitis among adults aged ≥30 years, by race/ethnicity and selected characteristics — National Health and Nutrition Examination Survey, United States, 2009–2010

	Total* (N = 3,743)						White, non-Hispanic (N = 1,792)				Black, non-Hispanic (N = 673)				Mexican-American (N = 1,076)			
Characteristics	No. of adults	Weighted no. of adults (in millions)	%	(SE)	Difference	Relative difference (%)	%	(SE)	Difference	Relative difference (%)	%	(SE)	Difference	Relative difference (%)	%	(SE)	Difference	Relative difference (%)
Total	**3,743**	**137**	**8.5**	**(0.9)**	—	—	**6.3**	**(1.1)**	—	—	**13.2**	**(1.8)**	—	—	**13.3**	**(1.8)**	—	—
Age groups (yrs)																		
30–34	435	16.7	1.9	(0.6)	Ref.	—	0.8	(0.6)	Ref.	—	3.1	(2.0)	Ref.	—	4.6	(2.3)	Ref.	—
35–49	1,352	54.0	6.7	(0.8)	4.8†	252.6	4.8	(0.9)	4.0†	500.0	10.4	(1.6)	7.3†	235.5	10.2	(1.8)	5.6	121.7
50–64	1,128	43.4	11.7	(1.6)	9.8†	515.8	8.3	(1.4)	7.5†	937.5	19.8	(3.3)	16.7†	538.7	25.2	(3.6)	20.6†	447.8
≥65	828	22.9	11.2	(2.2)	9.3†	489.5	8.8	(2.6)	8.0†	1000.0	17.8	(4.4)	14.7†	474.2	21.3	(3.0)	16.7†	363.0
Sex																		
Female	1,871	69.6	4.5	(0.7)	Ref.	—	3.3	(0.8)	Ref.	—	8.3	(2.0)	Ref.	—	7.3	(1.7)	Ref.	—
Male	1,872	67.5	12.6	(1.3)	8.1†	180.0	9.4	(1.7)	6.1†	184.8	19.3	(2.1)	11.0†	132.5	18.8	(2.0)	11.5†	157.5
Education																		
Less than high school	1,030	23.8	17.3	(2.1)	11.8†	214.5	12.0	(2.3)	7.2†	150	21.0	(5.0)	10.7	103.9	18.2	(2.1)	12.5†	219.3
High school graduate or equivalent	815	29.6	9.8	(1.6)	4.3†	78.2	8.5	(1.9)	3.7	77.1	11.5	(2.6)	1.2	11.7	14.1	(3.3)	8.4†	147.4
Greater than high school	1,889	83.3	5.5	(1.0)	Ref.	—	4.8	(1.1)	Ref.	—	10.3	(2.3)	Ref.	—	5.7	(1.2)	Ref.	—
Poverty level																		
<100% FPL	625	13.5	16.3	(2.2)	12.2†	297.6	14.2	(3.4)	10.6†	294.4	16.8	(3.5)	7.7	84.6	16.7	(3.5)	10.4†	165.1
100%–199% FPL	901	22.7	14.1	(1.8)	10.0†	243.9	11.9	(2.1)	8.3†	230.6	13.0	(3.5)	3.9	42.9	15.3	(3.1)	9.0†	142.9
200%–499% FPL	905	37.7	7.9	(1.3)	3.8†	92.7	7.0	(1.6)	3.4	94.4	13.0	(1.8)	3.9	42.9	10.0	(1.9)	3.7	58.7
≥400% FPL	960	52.4	4.1	(0.9)	Ref.	—	3.6	(1.0)	Ref.	—	9.1	(2.7)	Ref.	—	6.3	(2.8)	Ref.	—
Smoking status																		
Current smoker	728	23.2	17.7	(2.4)	12.3†	227.8	13.9	(3.2)	10.3†	286.1	24.4	(3.3)	17.0†	229.7	24.5	(4.9)	14.2†	137.9
Former smoker	957	35.7	9.0	(1.3)	3.6†	66.7	7.4	(1.6)	3.8†	105.6	14.9	(4.2)	7.5	101.4	13.8	(2.0)	3.5	34.0
Nonsmoker	2,058	78.1	5.4	(0.9)	Ref.	—	3.6	(0.9)	Ref.	—	7.4	(1.6)	Ref.	—	10.3	(1.5)	Ref.	—

Abbreviations: Ref. = referent; SE = standard error.
* The 202 respondents in "other" race group are not included.
† Significant at p<0.05 by z test.

Two related *Healthy People 2020* objectives are currently being monitored. One focuses on dental professionals providing tobacco cessation counseling in a dental setting, and another monitors consumers' self-report of tobacco cessation counseling in a dental office (*9*). Overall, this study demonstrates disparities in periodontitis by age, race, education, and income, and risk factors such as smoking status in the U.S. adult population. The capacity of oral health programs within state and local health agencies can be broadened to capture this subset of the population. The program activities might include efforts to 1) reduce tobacco use, particularly smoking; 2) educate persons on the benefits of regular dental care; and 3) facilitate health communication efforts to make key groups aware of effective preventive interventions.

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Preterm Births — United States, 2006 and 2010

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Introduction

Approximately one third of all infant deaths in the U.S. are related to preterm birth (*1*). Infants who survive a preterm birth are at greater risk than those born later in pregnancy for early death and lifelong effects such as neurologic and cognitive difficulties (*1–4*). The rate of preterm births (i.e., <37 completed weeks' gestation) increased approximately 30% during 1981–2006 (*5*). In 2007, this trend began to reverse; the U.S. preterm birth rate decreased for the fourth consecutive year in 2010, decreasing from the 2006 high of 12.8% to 12.0% in 2010 (*5*). A total of 4,265,555 births were reported for 2006, including 542,893 preterm births, and 3,999,386 births were reported for 2010, including 478,790 preterm births. Although most of the recent decrease in this rate was among infants born at 34 to 36 weeks' gestation (i.e., late preterm), with a decrease from 9.15% to 8.49% during 2006–2010, the rate of infants born at <34 weeks' gestation (i.e., early preterm) also decreased from 3.66% in 2006 to 3.50% in 2010 (*5*). Despite improvements in the rate of preterm births, the total number of infants born preterm remains higher than any year during 1981–2001 (*5*). Substantial differences in preterm birth rates by race/ethnicity persist; additional examination of these differences can provide insight into potential areas for interventions.

The preterm birth analysis and discussion that follows is part of the second CDC Health Disparities and Inequalities Report (CHDIR) and updates information presented in the 2011 CHDIR (*6*). The 2011 CHDIR (*7*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*8*). The purposes of this preterm birth report are to raise awareness of racial/ethnic differences among women giving birth to preterm infants and to motivate actions to reduce disparities.

Methods

To assess differences in preterm birth rates by race/ethnicity, CDC analyzed final 2006 and 2010 birth certificate data from the National Vital Statistics System (*9*). Birth certificates provide demographic and health information on the mother and newborn such as sex, race, ethnicity, gestational age, and geographic region. Geographic region was not analyzed independently because this variable is related to demographic characteristics that can influence preterm birth rates. Comparable information on educational attainment of the mother is not available for the entire national reporting area.

Gestational age measurement is based primarily on the interval between the date of the last normal menses, or last menstrual period (LMP), and the date of birth. The preterm birth rate is defined as births at <37 completed weeks of gestation per 100 total births in a given category; early preterm birth rate is defined as <34 weeks, and late preterm as 34–36 weeks. Race/ethnicity of the mother was self-reported in five categories; white, black, American Indian/Alaska Native (AI/AN), Asian/Pacific Islander (A/PI), and Hispanic. In this report, references to whites, blacks, AI/ANs, and A/PIs refer to non-Hispanic women. Women of Hispanic ethnicity might be of any race or combination of races.

Disparities were measured as the deviations from a referent category rate. Births to non-Hispanic white mothers were used as the referent group for racial/ethnic comparisons. Absolute difference was measured as the simple difference between the rate for a population subgroup and the rate for its respective reference group. The relative difference, a percentage, was calculated by dividing the difference by the value in the referent category and multiplying by 100. The statistical significance of the differences was determined by using the z test at the 95% confidence level (*10*).

Results

Decreases in preterm births occurred for each of the race/ethnicity groups; white, black, Hispanic, AI/AN, and A/PI from 2006 to 2010 (Table). From 2006 to 2010, the preterm birth rate for black infants decreased by 8% to 17.1%, the lowest level ever reported (*5*). Despite the decrease, the 2010 preterm rate for black infants (17.1%) was approximately 60% higher than that for white infants (10.8%). AI/AN (13.6%) and Hispanic (11.8%) infants were also at a higher risk for preterm birth in 2010 than white and A/PI infants.

TABLE. Total, early, and late preterm birth rates,* by race/ethnicity of mother — National Vital Statistics System, United States, 2006 and 2010

Weeks of gestation at birth and race/ethnicity of mother	2006 Rate %	2006 Absolute difference (percentage points)	2006 Relative difference (%)	2010 Rate %	2010 Absolute difference (percentage points)	2010 Relative difference (%)†
Total preterm births (<37 weeks' gestation)	**12.8**	—	—	**12.0**	—	—
White, non-Hispanic	11.7	Ref.	Ref.	10.8	Ref.	Ref.
Black, non-Hispanic	18.5	6.8	58	17.1	6.3	58
Hispanic§	12.2	0.5	4	11.8	1.0	9
Asian/Pacific Islander	10.9	-0.8	-7	10.7	-0.1	-1
American Indian/Alaska Native	14.2	2.5	21	13.6	2.8	26
Total early preterm births (<34 weeks' gestation)	**3.7**	—	—	**3.5**	—	—
White, non-Hispanic	3.1	Ref.	Ref.	2.9	Ref.	Ref.
Black, non-Hispanic	6.6	3.5	113	6.1	3.2	110
Hispanic	3.4	0.3	10	3.3	0.4	14
Asian/Pacific Islander	2.8	-0.3	-10	2.9	0.0	0
American Indian/Alaska Native	4.0	0.9	29	4.0	1.1	38
Total late preterm births (34–36 weeks' gestation)	**9.1**	—	—	**8.5**	—	—
White, non-Hispanic	8.6	Ref.	Ref.	7.8	Ref.	Ref.
Black, non-Hispanic	11.9	3.3	38	11.0	3.2	41
Hispanic	8.8	0.2	2	8.5	0.7	9
Asian/Pacific Islander	8.1	-0.5	-6	7.8	0.0	0
American Indian/Alaska Native	10.2	1.6	19	9.6	1.8	23

Abbreviation: Ref. = referent.
* Per 100 total births in a given category.
† Statistical significance was determined by using the z test at the 95% confidence level. All differences between the reference group and other groups are significant ($p<0.05$) except for Asian/Pacific Islander.
§ Persons of Hispanic ethnicity might be of any race or any combination of races.

The largest relative differences among the race/ethnicity groups are in early preterm births. Decreases in early preterm births occurred from 2006 to 2010 for white, black, and Hispanic infants. Despite an 8% decrease in the early preterm rate for black infants from 2006 to 2010, the 2010 early preterm birth rate among black infants (6.1%) was double the rate among white (2.9%) and A/PI (2.9%) infants.

The rate of late preterm births declined among each of the race/ethnicity groups during 2006–2010. In 2010, black infants were approximately 40% more likely to be born late preterm than white and A/PI infants. AI/AN and Hispanic infants also were more likely than white and A/PI infants to be born late preterm.

Discussion

Decreases occurred from 2006 to 2010 in preterm birth rates overall and in all racial/ethnic groups examined; however, substantial disparities persisted among racial ethnic groups in 2010. The greatest absolute difference by race/ethnicity in total preterm, early preterm, and late preterm birth rates was among black infants. Black infants have had the highest risk for preterm birth since comparable data on gestational age have been available (1981). The causes of preterm births are not well understood (*2*). However, disparities among groups might be related to differences in socioeconomic status, prenatal care, maternal risk behaviors, infection, nutrition, preconception stress, and genetics (*2*).

Limitations

The findings in this report are subject to at least one limitation. The date of the LMP is subject to error from imperfect maternal recall, transcription error, or misidentification of LMP because of postconception bleeding, delayed ovulation, or intervening early miscarriage (*5*).

Conclusion

Continued reduction in the preterm birth rate is important because approximately one out of every eight infants was born too early in 2010. If the preterm rate continues to decrease at the pace observed from 2006 to 2010, the *Healthy People 2020* objective to reduce the rate to 11.4% (objective no. MICH 9-1) (*11*) will be achieved for the nation overall and for some racial/ethnic groups (i.e., white and A/PI). The 2020 goal for preterm birth rates is further from reach for others; the 2010 rate among blacks (17.1%) must decrease by 50% percent for 2020 (or 5% per year), and the 2010 rate among AI/ANs (13.6%) must decrease by approximately 20% (2%

per year). Additional research is needed to clarify the causes of preterm delivery and to develop policies for a future in which preterm birth is a rare event for all populations.

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Potentially Preventable Hospitalizations — United States, 2001–2009

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Introduction

Potentially preventable hospitalizations are admissions to a hospital for certain acute illnesses (e.g., dehydration) or worsening chronic conditions (e.g., diabetes) that might not have required hospitalization had these conditions been managed successfully by primary care providers in outpatient settings. Although not all such hospitalizations can be avoided, admission rates in populations and communities can vary depending on access to primary care, care-seeking behaviors, and the quality of care available (*1,2*). Because hospitalization tends to be costlier than outpatient or primary care, potentially preventable hospitalizations often are tracked as markers of health system efficiency. The number and cost of potentially preventable hospitalizations also can be calculated to help identify potential cost savings associated with reducing these hospitalizations overall and for specific populations.

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*2*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*3*). This report updates information on potentially preventable hospitalizations that was presented in the first CHDIR (*4*). The purposes of this report are to discuss and raise awareness of differences in the race/ethnicity and income of persons with excess potential preventable hospitalizations and to prompt actions to reduce these disparities.

Methods

To examine trends in a composite measure of potentially preventable hospitalizations among adults aged ≥18 years in the United States, the Agency for Healthcare Research and Quality (AHRQ) analyzed data for 2001–2009 from the Healthcare Cost and Utilization Project (HCUP) databases (available at http://www.ahrq.gov/research/data/hcup/index.html). HCUP databases combine the data-collection efforts of state data organizations, hospital associations, private data organizations, and the federal government to create a national information resource of discharge-level health-care data. HCUP includes the largest collection of longitudinal hospital care data in the United States with all-payer, encounter-level information, beginning with 1988.

Numbers of potentially preventable hospitalizations in 2009 were estimated by race/ethnicity and income quartile for the following eight conditions: diabetes, hypertension, congestive heart failure, angina without procedure, asthma, dehydration, bacterial pneumonia, and urinary infections. Hospitalizations include all inpatient stays with these conditions listed as the principal diagnosis regardless of admitting source (e.g., admissions through an emergency room, transfers from other facilities, and direct admissions by a provider). Because coding of race/ethnicity varies across state hospital databases, analyses by race/ethnicity used a specially created 40% sample of hospitals from states that contribute comparable race/ethnicity data to HCUP (concerning approximately 16 million discharges from 2,000 hospitals in 36 states in 2009) (*5*). Race was classified as non-Hispanic white, non-Hispanic black, Asian/Pacific Islander (A/PI), and other. Ethnicity was classified as Hispanic and non-Hispanic. Persons of Hispanic ethnicity might be of any race or combination of races. Area income, based on the income of the neighborhood in which a patient lives, was used as a proxy for socioeconomic status. Area income was divided into quartiles on the basis of the mean household income by the patient's ZIP Code. Quartile 1 refers to the lowest income communities, and quartile 4 refers to the wealthiest communities. Analyses by area income used the Nationwide Inpatient Sample, a nationally stratified 20% sample of hospitals from states that contribute data to HCUP (concerning approximately 8 million discharges from 1,000 hospitals in 44 states in 2009). Data regarding patients' educational attainment or disability status were unavailable or insufficient to provide estimates for certain populations (i.e., American Indians/Alaska Natives, Native Hawaiians and Other Pacific Islanders, and persons of multiple races). Data on disparities related to sex and geographic location are not presented but are available at http://www.ahrq.gov/research/findings/nhqrdr/nhqrdr11/index.html#Efficiency.

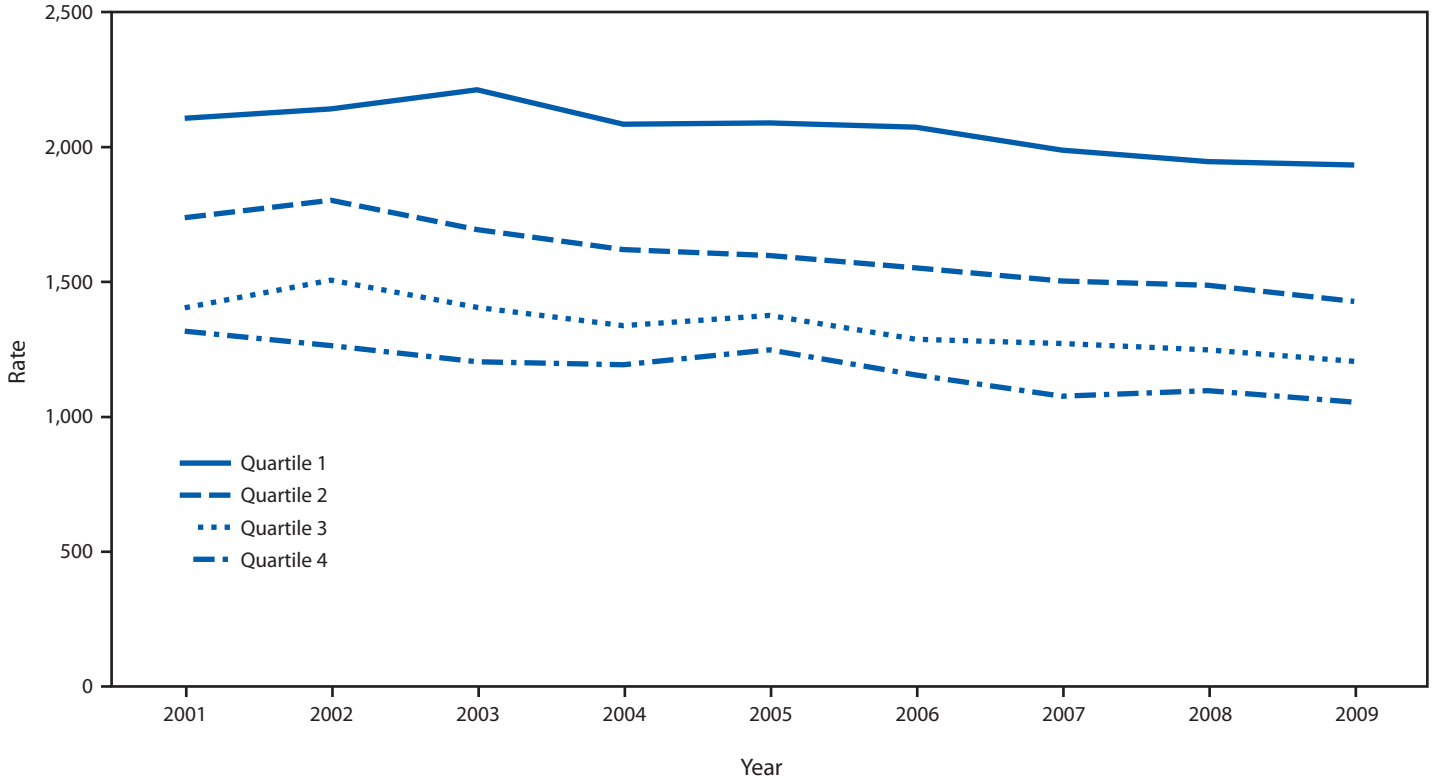
Disparities in hospital admission rates per 100,000 population for 2001–2009 were estimated, and potential cost savings related to income and race/ethnicity were examined. Hospitalization rates for the potentially preventable conditions were calculated by using the AHRQ Prevention Quality Indicators (PQIs) modified version 4.2, which were adjusted by age and gender on the basis of the 2000 U.S. standard population (*5*). Excess potentially preventable hospitalizations by area income were estimated by comparing the 2009 AHRQ PQI composite rate of hospitalizations for residents of the neighborhoods in the highest income quartile, the group with the lowest rate, with the composite rate for residents of neighborhoods in lower income quartiles. Similarly, excess potentially preventable hospitalizations by race/ethnicity were estimated by comparing the 2009 AHRQ PQI composite rate of hospitalizations for A/PIs, the group with the lowest rate, with the composite rate for other racial/ethnic groups. Total charges included on hospital claims were converted to costs by using hospital-level cost-to-charge ratios based on the Centers for Medicare and Medicaid Services' (CMS) hospital cost report data (*5*). Costs associated with potentially preventable hospitalizations were estimated by multiplying numbers of excess hospitalizations for a group by the average cost per hospitalization for that group. Costs are for the hospital cost of producing the services and do not include physician costs associated with hospital stay.

Results

During 2001–2009, the AHRQ PQI composite rate decreased from 1,635 to 1,395 per 100,000 adults. Declines in potentially preventable hospitalization rates were observed across all income quartiles between 2001 and 2009 (Figure 1). In all years, rates of hospitalizations were higher among residents of neighborhoods in the three lower income quartiles (quartiles 1–3) compared with residents of neighborhoods in the highest income quartile (quartile 4).

During 2009, if residents of the lowest income neighborhoods (quartile 1) had the same rate of hospitalizations as residents of the highest income neighborhoods (quartile 4), they would have had approximately 500,000 fewer hospitalizations and

FIGURE 1. Rate* of potentially preventable hospitalizations† among adults aged ≥18 years, by income quartile§ — United States, 2001–2009



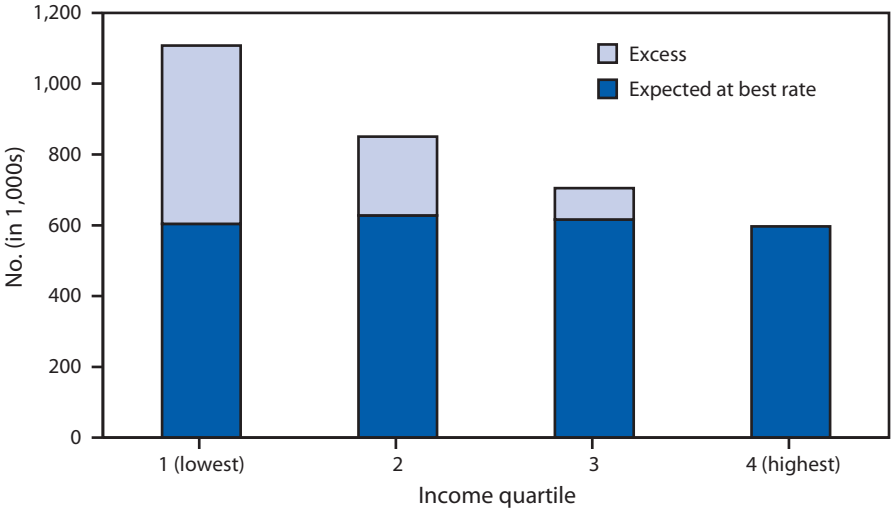
Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2001–2009.
* Per 100,000 population.
† For diabetes, hypertension, congestive heart failure, angina without procedure, asthma, dehydration, bacterial pneumonia, and urinary infections.
§ Area income was divided into quartiles based on the mean household income by the patient's ZIP Code. Quartile 1 refers to the lowest income communities, and quartile 4 refers to the wealthiest communities.

saved $3.6 billion in hospitalization costs (Figure 2). If residents of income quartiles 2 and 3 had had the same hospitalization rate as residents of income quartile 4, they would have had approximately 220,000 and 90,000 fewer hospitalizations and saved $1.7 billion and $700 million, respectively, in 2009.

Significant declines in hospitalization rates also were observed across all race/ethnicity groups during 2001–2009 (Figure 3). In general, non-Hispanic blacks and Hispanics had higher rates of hospitalizations than non-Hispanic whites, and A/PIs had lower rates than non-Hispanic whites.

During 2009, if non-Hispanic whites had had the same rate of hospitalizations as A/PIs, they would have had 700,000 fewer hospitalizations and saved $7.7 billion in hospitalization costs (Figure 4). If non-Hispanic blacks and Hispanics had the same hospitalization rate as A/PIs, they would have had 540,000 and 240,000 fewer hospitalizations, respectively, and saved $3.7 billion and $700 million, respectively, in 2009.

FIGURE 2. Number of potentially preventable hospitalizations* among adults aged ≥18 years, by income quartile† — United States, 2009



Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Inpatient Sample, 2009.

* For diabetes, hypertension, congestive heart failure, angina without procedure, asthma, dehydration, bacterial pneumonia, and urinary infections.

† Area income was divided into quartiles based on the mean household income by the patient's ZIP Code. Quartile 1 refers to the lowest income communities, and quartile 4 refers to the wealthiest communities.

Discussion

The findings in this report are consistent with previous studies showing decreasing rates of potentially preventable hospitalizations for specific conditions such as congestive heart failure (*6,7*) and for these hospitalizations in aggregate (*8*). Because rates of all groups defined by race/ethnicity and neighborhood income decreased at a similar pace, disparities that were present in 2001 persisted through 2009. These findings extend previous work by demonstrating that these disparities accounted for a considerable share of costs associated with potentially preventable hospitalizations.

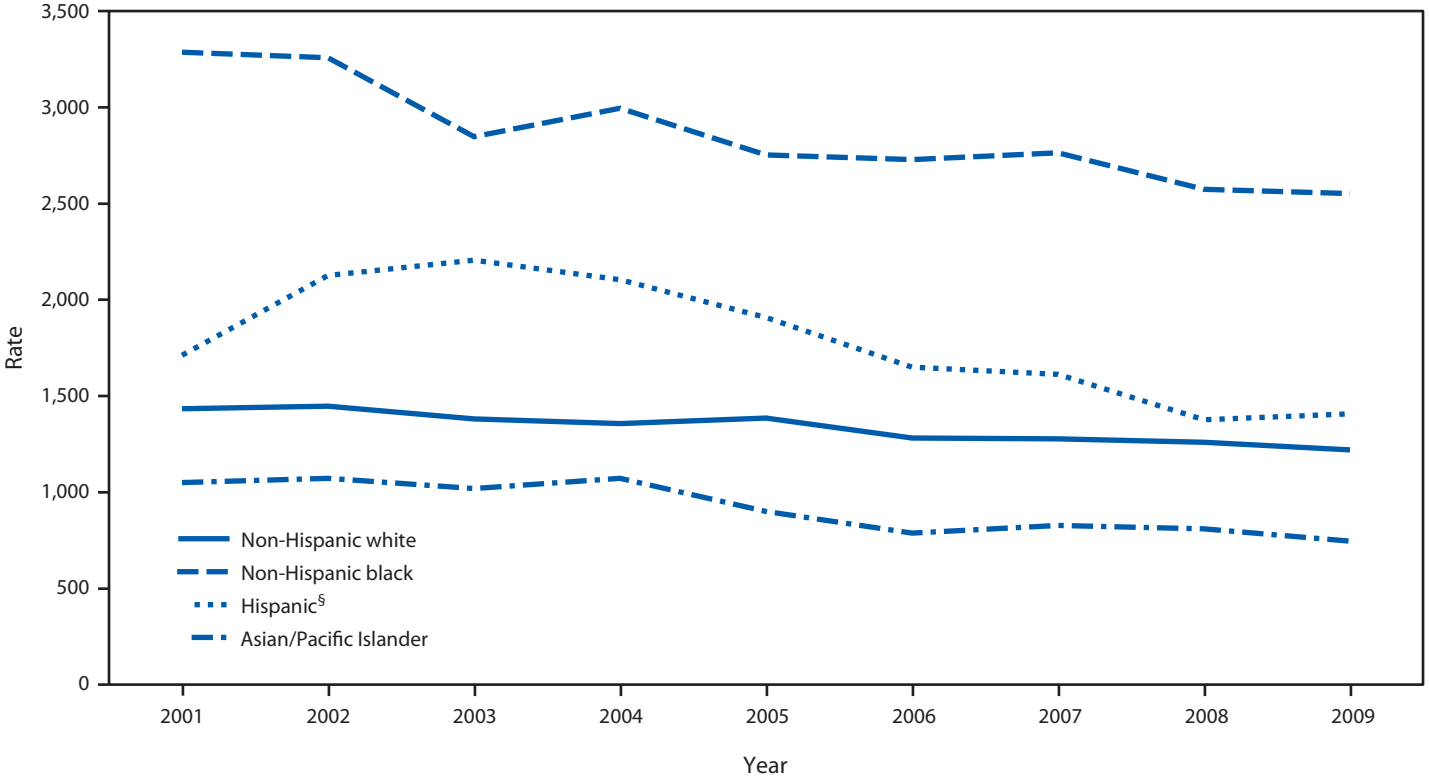
Reducing hospitalization rates is a key to controlling health-care costs. For many chronic conditions, inpatient costs are the dominant expense. For example, approximately half of the expenditures of persons with diabetes are spent on hospital inpatient care, compared with 12% spent on diabetes medications and supplies and 9% spent on physician office visits (*9*). Disease management programs typically incur higher outpatient and pharmacy costs that are offset by lower inpatient costs (*10*). Programs to prevent chronic diseases also generate savings by lowering rates of hospitalizations. Patient-centered medical homes generate most of their savings by reducing hospitalizations, and it is anticipated that the success of accountable care organizations also will depend on their ability to hold down inpatient costs (*11*).

Populations with the highest rates of potentially preventable hospitalizations have the largest potential for lower rates and inpatient costs. Communities with high rates of potentially preventable hospitalizations might see the benefit of investing in primary care, care coordination, and community health worker strategies that can lower inpatient costs. The national Million Hearts initiative (http://millionhearts.hhs.gov/index.html) aims to prevent one million heart attacks and strokes by focusing in primary care settings on the "ABCS": aspirin when appropriate, blood pressure control, cholesterol management, and smoking cessation. Community-based prevention efforts are focused on reducing sodium in the food supply, eliminating consumption of transfats, and promoting tobacco cessation. Implementation of these interventions can reduce potentially preventable hospitalizations and decrease disparities for hypertension, congestive heart failure, and angina.

Limitations

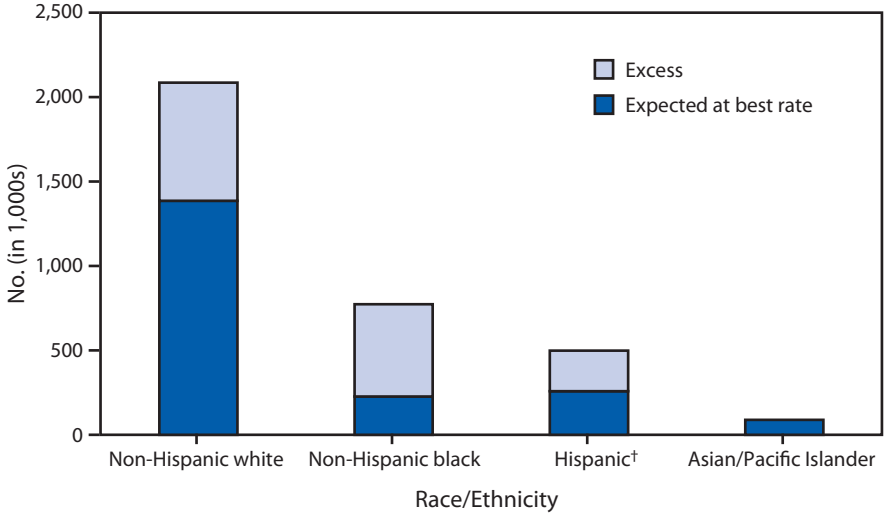
The data provided in this report are subject to at least three limitations. First, hospital administrative data might be incomplete. Data from only two thirds of the 50 states were usable in this analysis, and individual states might differ in how conditions and race/ethnicity are coded. Coding of conditions

FIGURE 3. Rate* of potentially preventable hospitalizations† among adults aged ≥18 years, by race/ethnicity — United States, 2001–2009



Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases disparities analytic file, 2001–2009.
* Per 100,000 population.
† For diabetes, hypertension, congestive heart failure, angina without procedure, asthma, dehydration, bacterial pneumonia, and urinary infections.
§ Persons of Hispanic ethnicity can be of any race or combination of races

FIGURE 4. Number of potentially preventable hospitalizations* among adults aged ≥18 years, by race/ethnicity — United States, 2009



Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, State Inpatient Databases disparities analytic file, 2009.
* For diabetes, hypertension, congestive heart failure, angina without procedure, asthma, dehydration, bacterial pneumonia, and urinary infections.
† Persons of Hispanic ethnicity can be of any race or combination of races.

by hospitals also might change over time. Second, cost estimates capture only hospital facility costs during the inpatient stay and do not include costs of inpatient or outpatient physician visits, including follow-up outpatient care. Although incomplete, because hospital facility costs are the largest type of health expenditure, analyses over time and across populations might be informative. Finally, these analyses cannot address causality. Rather than residence in low-income neighborhoods contributing to poorer health and thus requiring hospitalization, for some patients, poorer health might lead to residence in low-income neighborhoods. Moreover, whether providing improved primary care to residents of low-income neighborhoods can reduce their rates of potentially preventable hospitalizations to the rates experienced by residents of high-income neighborhoods is unclear.

Conclusion

Potentially preventable hospitalizations are common and costly. Identification of disparities in potentially preventable hospitalizations rates is necessary to address communities and groups that would benefit the most. Because residents of low-income neighborhoods have the highest rates or preventable hospitalizations, providing interventions among low-income neighborhoods might yield the largest reductions in hospitalizations.

Acknowledgment

This report is based in part on data provided by the partner organizations that participated in the HCUP Nationwide Inpatient Sample and the State Inpatient Databases. A list of these organizations is available at http://www.hcup-us.ahrq.gov/db/hcupdatapartners.jsp.

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Prevalence of Hypertension and Controlled Hypertension — United States, 2007–2010

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Introduction

Hypertension is a major risk factor for heart disease and stroke. As the first and fourth leading causes of death in the United States, heart disease and stroke occur in approximately 30% of adults aged ≥18 years in the United States (*1*). Disparities in the prevalence of hypertension among racial/ethnic groups have persisted at least since 1960, with the prevalence remaining highest among non-Hispanic black adults (*1–4*). Blood pressure control among those with hypertension can reduce the risk of subsequent cardiovascular diseases (*5*). Among adults with hypertension, Mexican-American persons born outside the United States, and persons without health insurance had lower rates of blood pressure control in 2005–2008 (*3*). Not only do non-Hispanic black adults have higher rates of hypertension, but among those with hypertension they also have lower rates of blood pressure control than non-Hispanic white adults (*2,3*).

Healthy People 2020 includes objectives to reduce the prevalence of hypertension among adults to 26.9% (objective HDS-5.1) and to increase the prevalence of blood pressure control among adults with hypertension to 61.2% (objective HDS-12) (*6*). Further, in 2011, the U.S. Department of Health and Human Services launched the Million Hearts initiative, which is intended to bring together communities, health systems, nonprofit organizations, federal agencies, and private-sector partners from across the country to prevent 1 million heart attacks and strokes over the course of 5 years (available at http://millionhearts.hhs.gov/index.html). Blood pressure control is a part of the initiative in the prevention of these adverse events. Therefore, hypertension prevalence and blood pressure control among those with hypertension are important indicators to monitor over time to identify improvements or persistent challenges in vulnerable segments of the U.S. population.

This analysis of hypertension and the discussion that follows are part of the second CDC Health Disparities and Inequalities Report (2013 CHDIR) (*3*).The 2011 CHDIR was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*7*). This report provides more current information on the prevalence of hypertension and blood pressure control among adults aged ≥18 years. The purposes of this report on hypertension and controlled hypertension are to discuss and raise awareness of differences in the characteristics of persons with hypertension and controlled hypertension, and to prompt actions to reduce disparities.

Methods

To estimate the age-adjusted prevalence of hypertension and blood pressure control among adults aged ≥18 years by selected demographic and health characteristics, CDC analyzed data from the National Health and Nutrition Examination Survey (NHANES) aggregated from two survey cycles: 2007–2008 and 2009–2010. NHANES is a national survey representative of the U.S. civilian noninstitutionalized population. Details of the NHANES survey methodology are available at http://www.cdc.gov/nchs/nhanes/about_nhanes.htm. During 2007–2010, the response rate among persons screened was 76.3%. Data were analyzed for 11,782 participants who had adequate data from the interview and examination components of the survey necessary to determine hypertension status. Blood pressure was determined by an average of up to three measurements taken during a single examination. Hypertension was defined as an average systolic blood pressure (SBP) ≥140 mmHg, an average diastolic blood pressure (DBP) ≥90 mmHg, or if the participant reported the current use of blood pressure lowering medication. Blood pressure control was defined as an average SBP <140 mmHg and an average DBP <90 mmHg among persons with hypertension. Pregnant women were excluded.

Hypertension prevalence and control estimates were analyzed by selected demographic and health characteristics: sex, age group (18–44, 45–64, and ≥65 years), race and ethnicity, marital status, educational attainment, country of birth, family income to federal poverty threshold, health insurance status (for persons aged 18–64 years), veteran status, diagnosed diabetes status,

obesity status, and disability. Race was defined as white, black, and Mexican American. Ethnicity was defined as Hispanic or non-Hispanic. Educational attainment among adults aged ≥25 years was defined as follows: less than high school, high school graduate or equivalent, some college or Associate of Arts (AA) degree, and college graduate or above. Household income was defined as family income to federal poverty threshold, as defined by the Department of Health and Human Services poverty guidelines (*8*), specific to family size and appropriate year and state. Health insurance status was defined as having either private or public insurance, or being uninsured. Obesity among adults aged ≥20 years is defined as a body mass index ≥30 kg/m^2 based on measured weight and height. Veteran status, diagnosed diabetes,* and disability† status were self-reported (Table).

Disparities were measured as the deviations from a "referent" category prevalence. The referent group was the group that had the most favorable estimate for the variables used to assess disparities during the period reported. Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The relative difference, a percentage, was calculated by dividing the absolute difference by the value in the referent category and multiplying by 100.

Statistical analyses were weighted to account for the complex survey design. Prevalence estimates, except those by age group, were age adjusted to the 2000 U.S. standard population using the direct method. Estimates of hypertension control that are age-adjusted to the 2000 U.S. standard population tend to be lower than those adjusted to the population with hypertension because of the difference between the age distribution of the general population and that of the population with hypertension (*9*).

Results

During 2007–2010, the overall age-adjusted prevalence of hypertension among persons aged ≥18 years was 29.6% (Table). Among persons aged ≥18 years with hypertension, the overall age-adjusted prevalence of blood pressure control was 48.0%. Substantial differences (relative difference >10%) in the prevalence of hypertension were indicated by age group, race/ethnicity, educational attainment, country of birth, family income, health insurance, diabetes, obesity, and disability status. The highest rates of hypertension were observed among those aged ≥65 years (71.6%), adults with diabetes (59.4%), and non-Hispanic black adults (41.3%). Although the difference in hypertension prevalence by sex was statistically significant, the difference was not substantial. Hypertension prevalence increased with age and decreased with increasing income level, but no significant trend was observed by educational attainment. Non-Hispanic blacks had a higher rate of hypertension (41.3%) than non-Hispanic whites (28.6%) and Hispanics (27.7%). Adults born in the United States had a higher rate of hypertension (30.6%) than non-U.S.-born adults (25.7%). Adults aged <65 years with public insurance had a higher rate of hypertension (28.3%) than those with private insurance (20.0%) and those with no insurance (20.4%). Persons with diabetes had a significantly higher rate of hypertension than those without diabetes (59.4% versus 27.7%), as did those who were obese compared with those who were not (40.5% versus 25.0%) and those with a disability compared with those with no disability (40.2% versus 29.0%).

Substantial differences in the prevalence of blood pressure control were observed among all population groups except veteran status. Among persons aged ≥18 years with hypertension, rates of blood pressure control were lowest among those without health insurance (27.9%), Mexican-Americans (30.3%), those who were never married (34.9%), and those born outside the United States (38.9%). Men, adults aged 18–44 years, Hispanics, Non-Hispanic blacks, those who were never married, non-U.S.-born, persons without health insurance had a lower prevalence of hypertension control than their counterparts. Men had a lower rate of hypertension control than women (42.7%). Adults aged 18–44 years had a lower rate of hypertension control (40.9%) than adults aged 45–64 years (53.3%) and 64 years and over (51.4%). The rate of controlled blood pressure was lower among Hispanics (34.4%) and non-Hispanic blacks (42.5%) than non-Hispanic whites (52.6%). Non-U.S.-born adults had a lower rate of hypertension control (38.9%) than U.S.-born adults (49.3%). Adults aged <65 years with no insurance had a lower rate of hypertension control (27.9%) than those with public insurance (60.2%) or private insurance (50.6%). Controlled hypertension was also lower among those classified as not obese compared with those who were obese (41.4% versus 54.0%), persons without diabetes compared with those with diabetes (45.4% versus 63.6%), and persons with no disability compared with those with a disability (45.0% versus 59.3%). Controlled hypertension was not linearly associated with age, educational attainment, or income level.

* Persons with diagnosed diabetes are defined as those who have ever been told by a health-care professional that they have diabetes. Persons without diabetes are defined as those who have never been told by a health-care professional that they have diabetes or have never been told that they have borderline diabetes.

† Persons classified as having a disability provided the answer 'Yes' to any of four questions:
- Unable to work at a job or business because of a physical, mental, or emotional problem
- Limited because of difficulty remembering or because of periods of confusion
- Limited in any activity because of a physical, mental or emotional problem
- Uses special equipment, such as a cane, a wheelchair a special bed, or a special telephone.

TABLE. Age-adjusted* prevalence of hypertension and blood pressure control among adults aged ≥18 years, by selected demographic and health characteristics — National Health and Nutrition Examination Survey, United States, 2007–2010

		Hypertension[§]				Blood pressure control[¶]			
Characteristic	Sample Size[†]	%	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	%	(95% CI)	Absolute difference (percentage points)	Relative difference (%)
Total	**11,782**	**29.6**	**(28.6–30.7)**			**48.0**	**(44.6–51.4)**		
Sex									
Male	5,854	30.5	(29.0–31.9)	1.9**	6.6	42.7	(38.3–47.2)	-12.8**	-23.1
Female	5,928	28.6	(27.4–29.7)	Ref.	Ref.	55.5	(51.8–59.3)	Ref.	Ref.
Age group (yrs), unadjusted[††]									
18–44	5,051	9.8	(8.9–10.7)	Ref.	Ref.	40.9	(34.4–47.5)	-12.4**	-23.3
45–64	3,854	40.4	(37.9–43.0)	30.6**	312.2	53.3	(49.8–56.8)	Ref.	Ref.
≥65	2,877	71.6	(68.4–74.7)	61.8**	630.6	51.4	(48.2–54.6)	-1.9	-3.6
Race/Ethnicity									
White, non-Hispanic	5,559	28.6	(27.1–30.2)	0.9	3.2	52.6	(48.8–56.5)	Ref.	Ref.
Black, non-Hispanic	2,305	41.3	(39.1–43.5)	13.6**	49.1	42.5	(37.6–47.5)	-10.1**	-19.2
Hispanic[§§]	3,372	27.7	(26.4–29.1)	Ref.	Ref.	34.4	(30.7–38.2)	-18.2**	-34.6
Mexican American	2,121	27.5	(25.8–29.2)	NA	NA	30.3	(26.1–34.5)	-22.3**	-42.4
Marital status (persons aged ≥20 years)									
Never married	1,885	31.8	(29.4–34.3)	1.7	5.6	34.9	(29.1–40.6)	-15.7**	-31.0
Married or living with partner	6,678	30.1	(28.6–31.6)	Ref.	Ref.	50.6	(46.8–54.5)	Ref.	Ref.
Divorced/separated or widowed	2,656	31.1	(29.2–33.1)	1.0	3.3	50.4	(42.3–58.4)	-0.2	-0.4
Educational attainment (persons aged ≥25 years)[††]									
Less than high school	3,127	36.9	(34.5–39.4)	8.9**	31.8	41.8	(33.9–49.6)	-10.8	-20.5
High school graduate or equivalent	2,422	36.3	(34.2–38.4)	8.3**	29.6	51.6	(45.6–57.7)	-1.0	-1.9
Some college or AA degree	2,677	34.5	(32.7–36.4)	6.5**	23.2	49.3	(44.3–54.2)	-3.3	-6.3
College graduate or higher	2,096	28.0	(25.3–30.6)	Ref.	Ref.	52.6	(46.0–59.2)	Ref.	Ref.
Country of birth									
United States	8,784	30.6	(29.5–31.7)	4.9**	19.1	49.3	(45.7–52.9)	Ref.	Ref.
Outside of the United States	2,993	25.7	(24.2–27.1)	Ref.	Ref.	38.9	(32.4–45.5)	-10.4**	-21.1
Family income to federal poverty threshold[††,¶¶] (%)									
<100	2,359	32.8	(30.6–34.9)	5.2	18.8	46.2	(38.0–54.3)	-6.9	-13.0
100–199	2,940	32.5	(30.9–34.1)	4.9**	17.8	42.0	(34.7–49.4)	-11.1	-20.9
200–399	2,777	30.6	(28.8–32.5)	3.0	10.9	53.1	(47.1–59.2)	Ref.	Ref.
400–499	840	28.0	(25.0–31.0)	0.4	1.4	45.7	(35.2–56.3)	-7.4	-13.9
≥500	1,773	27.6	(25.1, 30.1)	Ref.	Ref.	51.4	(46.6–56.2)	-1.7	-3.2
Health insurance status* (persons aged 18–64 years)**									
Private	4,555	20.0	(18.4–21.5)	Ref.	Ref.	50.6	(46.3–54.9)	-9.6**	-15.9
Public	1,489	28.3	(25.6–30.9)	8.3	41.5	60.2	(51.8–68.6)	Ref.	Ref.
Uninsured	2,829	20.4	(18.2–22.6)	0.4	2.0	27.9	(21.7–34.2)	-32.3**	-53.7

See table footnotes on the next page.

Discussion

The prevalence of hypertension has remained consistent over the past 10 years, at an overall rate of approximately 30% (*1,13*). During 2007–2010, the prevalence of hypertension by the analyzed demographic characteristics was highest among those aged ≥65 years (71.6%) and among non-Hispanic blacks (41.3%), two population groups known to be disproportionately affected (*1,3,12*). Although the overall prevalence of blood pressure control has improved over the past 10 years, non-Hispanic blacks and Hispanics continue to have lower prevalence of control than their non-Hispanic white counterparts (*8,12*). Also consistent with other research, the prevalence of hypertension was higher among those with diagnosed diabetes, obese persons, and persons with disabilities (*3*). However, all three of these groups had higher rates of blood pressure control than their counterparts in 2007–2010 (63.6%, 54.0%, and 59.3%, respectively, versus 45.4%, 41.4%, and 45.0% among those without diagnosed diabetes, obesity, and disabilities, respectively). This difference is likely because of higher rates of treatment with medication among these groups (*5,14*). In contrast, although the prevalence of hypertension was lowest among those aged 18–44 years (9.8%), the prevalence of blood pressure control was significantly lower among this group than their older counterparts. This is most likely because of lower rates of hypertension awareness and treatment with medication among younger adults (*13,15*).

TABLE. (*Continued*) Age-adjusted* prevalence of hypertension and blood pressure control among adults aged ≥18 years, by selected demographic and health characteristics — National Health and Nutrition Examination Survey, United States, 2007–2010

		Hypertension§				Blood pressure control¶			
Characteristic	Sample Size†	(%)	(95% CI)	Absolute difference (percentage points)	Relative difference (%)	(%)	(95% CI)	Absolute difference (percentage points)	Relative difference (%)
Veteran status									
Yes	1,473	30.8	(26.9–34.8)	1.1	3.7	52.5	(44.4–60.5)	Ref.	Ref.
No (referent)	10,307	29.7	(28.7–30.7)	Ref.	Ref.	47.4	(43.4–51.5)	-5.1	-9.7
Diagnosed diabetes status†††									
Yes	1,421	59.4	(54.1–64.7)	31.7	114.4	63.6	(56.2–71.1)	Ref.	Ref.
No (referent)	10,352	27.7	(26.6–28.8)	Ref.	Ref.	45.4	(41.7–49.0)	-18.2**	-28.6
Obesity status§§§ (persons aged ≥20 years)									
Yes	4,197	40.5	(39.0–41.9)	15.5	62.0	54.0	(50.2–57.8)	Ref.	Ref.
No (referent)	6,890	25.0	(23.5–26.4)	Ref.	Ref.	41.4	(36.5–46.3)	-12.6**	-23.3
Disability¶¶¶									
Yes	2,612	40.2	(37.6–42.9)	11.2	38.6	59.3	(53.2–65.3)	Ref.	Ref.
No (referent)	8,613	29.0	(27.8–30.1)	Ref.	Ref.	45.0	(41.2–48.8)	-14.3**	-24.1

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent; NA = not applicable.

* Age adjusted to the 2000 U.S. standard population. Age specific data are not age adjusted. Hypertension prevalence data (except those by education status, health insurance coverage, diabetes status, and age group) are age adjusted to the following seven age groups: 18–29, 30–39, 40–49, 50–59, 60–69, 70–79, and ≥80 years. Data by health insurance status are age adjusted using the age groups 18–29, 30–39, 40–49, 50–59, and 60–64 years. Data by diabetes status are age adjusted using the age groups 18–49, 50–59, 60–69, 70–79, and ≥80 years. Blood pressure control data (except those by education status, health insurance coverage, and age group) are age adjusted to the following five age groups: 18–49, 50–59, 60–69, 70–79, and ≥80 years. Data by education status are age adjusted using the age groups 25–49, 50–59, 60–69, 70–79, and ≥80 years. Data by health insurance status are age adjusted using the age groups 18–49, 50–59, and 60–64 years.

† Pregnant women were excluded.

§ Hypertension among adults is defined as an average systolic blood pressure ≥140 mmHg, an average diastolic blood pressure ≥90 mmHg, or self-reported current use of blood pressure lowering medication.

¶ Blood pressure control is defined as an average systolic blood pressure <140 mmHg and an average diastolic blood pressure <90 mmHg among adults with hypertension.

** p<0.05 for absolute difference compared with referent group, with Bonferroni adjustment for demographic variables with more than two categories.

†† p<0.05, test of trend for hypertension prevalence by income and age using weighted least squares regression on the categorical variable; not significant by education or for controlled hypertension.

§§ Persons of Hispanic ethnicity might be of any race or combination of races.

¶¶ Family income: income of all persons within a household who are related to each other by blood, marriage, or adoption. Family income to federal poverty threshold: the ratio of family income to the federal poverty threshold as defined by the Department of Health and Human Services' (HHS) poverty guidelines, specific to family size, as well as the appropriate year and state.

*** Private health insurance: private health insurance or Medigap insurance. Public health insurance: Medicare, Medicaid, State Children's Health Insurance Program, military health care, state-sponsored health plan, or other government insurance.

††† Persons with diagnosed diabetes: those who have ever been told by a health-care professional that they have diabetes. Persons without diabetes: those who have never been told by a health-care professional that they have diabetes or have never been told that they have borderline diabetes.

§§§ Obesity: body mass index ≥30 kg/m^2 based on measured weight and height.

¶¶¶ Disability: inability to work at a job or business because of a physical, mental, or emotional problem; limitation caused by difficulty remembering or periods of confusion; limitation in any activity because of a physical, mental, or emotional problem; or use of special equipment (e.g., a cane, wheelchair, special bed, or special telephone).

Limitations

The findings in this report are subject to at least four limitations. First, NHANES data are restricted to the civilian noninstitutionalized population; thus, results from this study are not generalizable to persons who live in nursing homes, long-term care facilities, or prisons, or to military personnel. Second, reliable data were not available for persons of certain racial/ethnic groups or sexual orientation/gender identity. Only non-Hispanic blacks and Hispanics were oversampled; consequently, estimates cannot be calculated for other racial/ethnic populations (e.g., American Indians/Alaska Natives, Asians/Pacific Islanders). Third, the cross-sectional study design provides a one-time only assessment of blood pressure, although blood pressure can be measured multiple times during one visit. This one-time assessment can overestimate or underestimate hypertension prevalence. However, the standardized measurement of blood pressure in a mobile examination center makes NHANES the best source of national data on hypertension. Finally, this report does not examine time trends in disparities to assess progress toward eliminating disparities. Although other studies included time trends, only a limited number of demographic characteristics such as race/ethnicity, age, and sex were examined (*10*).

Conclusion

Consistent with the 2011 CHDIR and other studies, no change has occurred in the prevalence of hypertension over the last decade, although the rate of hypertension control continues to improve (*2,3,10*). Disparities in hypertension prevalence and control persist among most population groups assessed similar to what has been published elsewhere. Although rates of control have continued to show improvement (*2,10*), more time is needed to determine whether the population will meet the *Healthy People 2020* target of 61.2%. Certain subgroups of persons with hypertension exhibit even lower rates of blood pressure control, indicating a need for interventions that span the population and focus on vulnerable subgroups. The United States Preventive Services Task Force (USPSTF) recommends blood pressure screening for all adults aged ≥18 years, and as a result of provisions in the Patient Protection and Affordable Care Act (ACA), Medicare now covers certain adult clinical preventive services recommended by the USPSTF without patient cost sharing (§4103) (*11,12*). The law also requires that "nongradfathered" private health plans include these same services without cost sharing (§1001). In addition, the ACA ensures certain preventive and wellness services without cost-sharing for Medicare recipients (§4103), a group most in need of hypertension management. The national Million Hearts initiative endeavors to increase the number of persons in the United States whose hypertension is under control by 10 million, as part of its goal to prevent 1 million heart attacks and strokes by the year 2017. The Guide to Community Preventive Services Task Force recommends system interventions to improve blood pressure control, including clinical decision support systems, reducing out-of-pocket costs for CVD preventive services for patients with hypertension, and team-based care. Because the rate of blood pressure control is lowest among persons without health insurance, compared to those with insurance coverage, it will be important to monitor this and other vulnerable population groups in the future.

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Tuberculosis — United States, 1993–2010

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Introduction

Tuberculosis (TB) is transmitted via the airborne route by person-to-person contact. Although TB is a leading cause of death on a global scale (*1*), most cases can be cured with treatment. From 1993 to 2010, the number of TB cases reported in the United States decreased from 25,103 to 11,182. Despite the decrease, TB continues to affect many communities in the United States disproportionately and unequally, especially racial/ethnic minorities and foreign-born persons (*2*). TB remains one of many diseases and health conditions with large disparities and inequalities by income, race/ethnicity, educational attainment, and other sociodemographic characteristics (*3*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*4*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*5*). This report provides new information on TB, a topic not covered in the 2011 CHDIR. The purposes of this TB report are to discuss and raise awareness of differences in the characteristics of people who have TB in the United States and to prompt actions to reduce these disparities.

Methods

Tuberculosis (TB) is a disease caused by bacteria that is spread from person to person through the air when a TB sufferer coughs, sneezes, speaks, sings, or laughs. TB usually affects the lungs, but it can also affect other parts of the body, such as the brain, the kidneys, or the spine. This analysis included all TB cases, and no cases or latent TB infection (LTBI). To assess disparities in newly reported cases of TB disease among persons of all ages in the United States, CDC analyzed 1993–2010 data from the National TB Surveillance System (NTSS). TB is a nationally notifiable disease (*2*). Since 1953, state and local health departments have submitted information to CDC on each newly reported case of TB disease in the United States. Currently, all 50 U.S. states and the District of Columbia (DC) as well as Puerto Rico, the U.S. Virgin Islands, and six other jurisdictions in the Pacific region (American Samoa, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, Guam, the Republic of the Marshall Islands, and the Republic of Palau) report information on newly diagnosed TB cases electronically using NTSS. The Report of a Verified Case of TB (RVCT) form (http://ftp.cdc.gov/pub/software/tims/2009%20rvct%20documentation/rvct%20training%20materials/rvct%20instruction%20manual.pdf), which was released in 1993, was expanded to collect additional information for each case, including human immunodeficiency virus (HIV) status, occupation, and history of substance abuse, homelessness, and drug susceptibility test results (*2*). Subsequent revisions of the RVCT form in 2009 include risk factors (e.g., diabetes, end-stage renal disease, and contact with a drug-resistant person), residential status, immigration status, and reasons for longer than usual TB therapy.

This report examines the number of TB cases and rates during 2006 and 2010 by patient-reported sex at birth, race/ethnicity, country of birth, patient primary occupation, employment status, number of years patient has been living in the United States, and type of health-care provider. Race was defined as white, black, Asian/Pacific Islander, and American Indian/Alaska Native. Ethnicity was defined as Hispanic and non-Hispanic. A person was considered U.S.-born or foreign-born on the basis of definitions used in the 2010 TB surveillance report (*2*). For employment status, a person was considered unemployed if not employed during the 12 months preceding TB diagnosis. During 1993–2008, occupation was assessed for the previous 2 years and multiple choices were accepted, but starting in 2009, occupation was assessed for 1 year before and multiple choice answers were no longer accepted. Geographic region was not analyzed because, in 2010, approximately half (49.2%) of all TB cases were concentrated in a small number of states (California, Florida, Texas, and New York), in which 67.5% of cases occurred in foreign-born persons (*2*).

Trends in TB rates during 1993–2010 by race/ethnicity and cases by country of birth are presented. TB case rates per 100,000 population and by sex and race/ethnicity were calculated using population estimates from the U.S. Census Bureau's Federated Electronic Research, Review, Extra, and Tabulation Tool (DataFerrett version 1.3.3), which were available during 2006–2010. The 2010 Current Population Survey was used to obtain population estimates stratified by

country of birth (*6*). Disparities were measured as deviations from a "referent" category rate or percentage. Referent categories were selected because they demonstrated the most favorable group estimates for the variables used to assess disparities during 2006 and 2010 (*7–8*). For example, non-Hispanic white was selected as the referent category for the racial/ethnic variable. Absolute difference was measured as the simple difference between a group estimate and the estimate for its respective reference category, or referent group. Relative difference, a percentage, was obtained by dividing the absolute difference by the value in the referent category and multiplying by 100. To evaluate changes in disparity over time, relative differences for the groups in 2006 were subtracted from relative differences in 2010. No statistical testing was performed.

Results

During 2006–2010, a total of 62,642 verified TB cases were reported to CDC's NTSS from the 50 states, DC, Puerto Rico, the U.S. Virgin Islands, and six other jurisdictions in the Pacific region. Of these, 13,732 were reported in 2006 and 11,182 were reported in 2010. The national TB case rate was 4.6 cases per 100,000 population in 2006 and 3.6 cases per 100,000 population in 2010, a 20% decline over 5 years. The rate for males was 5.8 in 2006 and 4.5 in 2010.

The relative difference between males and females in reported TB rates was 70.6% in 2006 and 66.7% in 2010 (Table). From 2006 to 2010, the changes in relative differences for the various age groups were as follows: persons aged 15–24 years (22.9%), persons aged 25–44 years (40.0%), persons aged 45–64 years (44.3%), and persons aged ≥65 years (35.7%) (Table). In 2010, the relative difference between persons aged ≥65 years and the referent group was 450%.

From 2006 to 2010, all racial/ethnic minorities experienced decreases in TB case rates (Table). In 2006, Hispanics had case rates of 9.2 per 100,000, compared with 6.5 in 2010**.** Asians/Pacific Islanders had a rate of 26.1 in 2006 and 22.4 in 2010. Compared with whites, TB rates in 2010 were approximately seven times higher among Hispanics, eight times higher among blacks, and 25 times higher among Asians/Pacific Islanders.

During 2006–2010, 59% of 62,642 reported TB cases occurred among foreign-born persons. In 2006, the relative difference among foreign-born persons compared with U.S.-born persons was 857% and in 2010, the relative difference in reported TB rates among foreign-born persons compared with U.S.-born persons was 1,031%. The change in the relative difference from 2006 to 2010 was 175% (1,031% versus 856.5%, respectively) (Table).

Although racial/ethnic relative differences in TB case rates were similar in both U.S.-born and foreign-born persons, the magnitude of the relative disparities varied markedly between U.S.-born and foreign-born persons and was three-to-four times greater among foreign-born persons. In U.S.-born persons in 2010, the relative difference in TB rates compared with whites was 614% for blacks, 429% for Asians/Pacific Islanders, 286% for Hispanics, and 757% for American Indians/Alaska Natives (Table). Among foreign-born persons in 2010, the relative difference in TB rates compared with whites was 2,271% for Asians/Pacific Islanders, 1,771% for blacks, and 836% for Hispanics.

Among 6,748 foreign-born persons in the United States during 2010 with reported TB, approximately 21% received a diagnosis of TB disease within <2 years of arrival in the United States, approximately 18% within 2–5 years of arrival, and 50% in >5 years after arrival; an additional 11% had no information on arrival dates. The relative difference in TB cases diagnosed >5 years after arrival in the United States compared with cases diagnosed 2–5 years after arrival was 178.8% in 2010. The change in the relative difference between 2006 to 2010 for TB cases diagnosed >5 years after arrival in the United States was 41% (136.3% vs. 177.8%, respectively) (Table).

The proportion of TB cases among unemployed persons was 53% (7,245 of 13,732) in 2006 and 59% (6,217 of 10,520) in 2010. During 2010, the relative difference in reported TB cases among unemployed persons compared with those employed in fields other than health care (referent) was 74%. a change in the relative difference of 44.2% over time (Table).

The relative difference in reported TB cases among persons whose primary health-care provider for TB disease was a health department compared with persons whose primary health-care provider for TB disease was private/other providers (referent category) was 217% a change in the relative difference of 109% over time (326.3% in 2006 and 216.7% in 2010) (Table). The proportion of TB cases treated at health departments was 81% (10,830 of 13,308) in 2006 and 76% (4,587 of 6,011) in 2010.

From 1993 to 2010, TB case rates declined by approximately 63% (Figure 1). TB rates for Asians/Pacific Islanders were 41.2 per 100,000 population in 1993 and 22.4 per 100,000 in 2010, with differences in rates of 45.6%. From 1993 to 2010, among blacks, the rates ranged from 28.5 to 7.0 per 100,000 population, among Hispanics from 19.9 to 6.5, among American Indians/Alaska Natives from 14.0 to 6.4, and among non-Hispanic whites from 3.6 to 0.9.

From 1993 to 2010, the proportion of TB cases among foreign-born persons increased from 29% to 60% (Figure 2). From 1993 to 2010, the TB case rate in the United States has declined annually in both U.S.-born and foreign-born persons;

TABLE. Reported tuberculosis rates,* by date and selected characteristics — United States, 2006 and 2010

Characteristic	2006 TB rate†	2006 Absolute difference§ (percentage points)	2006 Relative difference (%)¶	2010 TB rate†	2010 Absolute difference§ (percentage points)	2010 Relative difference (%)¶
Sex at birth						
Male	5.8	2.4	70.6	4.5	1.8	66.7
Female	3.4	Ref	Ref	2.7	Ref.	Ref.
Age group (yrs)						
<15	1.4	Ref.	Ref.	1.0	Ref.	Ref.
15–24	3.6	2.2	157.1	2.8	1.8	180.0
25–44	5.6	4.2	300.0	4.4	3.4	340.0
45–64	5.4	4.0	285.7	4.3	3.3	330.0
≥65	7.2	5.8	414.3	5.5	4.5	450.0
Race/Ethnicity						
White, non-Hispanic	1.2	Ref.	Ref.	0.9	Ref.	Ref.
Black, non-Hispanic	10.2	9.0	750.0	7.0	6.1	677.8
Hispanic**	9.2	8.0	666.7	6.5	5.6	622.2
Asian/Pacific Islander	26.1	24.9	2,075.0	22.4	21.5	2,388.9
American Indian/Alaska Native	7.2	6.0	500.0	6.4	5.5	611.1
Country of birth						
Born in United States	2.3	Ref.	Ref.	1.6	Ref.	Ref.
Born outside United States	22.0	19.7	856.5	18.1	16.5	1,031.3
Born in the United States						
White, non-Hispanic	0.9	Ref.	Ref.	0.7	Ref.	Ref.
Black, non-Hispanic	7.7	6.8	755.6	5.0	4.3	614.3
Hispanic	3.9	3.0	333.3	2.7	2.0	285.7
Asian/Pacific Islander	3.4	2.5	277.8	3.7	3.0	428.6
American Indian/Alaska Native††	7.9	7.0	777.8	6.0	5.3	757.1
Born outside the United States						
White, non-Hispanic	1.7	Ref.	Ref.	1.4	Ref.	Ref.
Black, non-Hispanic	36.3	34.6	2,035.2	26.2	24.8	1,771.4
Hispanic	17.5	15.8	929.4	13.1	11.7	835.7
Asian/Pacific Islander	38.3	36.6	2,152.9	33.2	31.8	2,271.4
American Indian/Alaska Native††	1.3	-0.4	-23.5	1.9	0.5	35.7
Years in the United States (foreign-born)§§						
<2 years	27	8	42.1	21	3	16.7
2–5 years	19	Ref.	Ref.	18	Ref.	Ref.
>5 years	45	26	136.8	50	32	177.8
Patient's primary occupation¶¶						
Unemployed/no occupation	53	12	29.3	59	25	73.5
Health-care worker	3	-38	-92.7	4	-30	-88.2
Other employment¶¶,***	41	Ref.	Ref.	34	Ref.	Ref.
Unknown	3			3		
Health-care provider type§§						
Any health department	81	62	326.3	76	52	216.7
Private/other providers	19	Ref.	Ref.	24	Ref.	Ref.

Abbreviations: Ref. = referent group; TB = tuberculosis.

* This analysis included all TB cases, and no cases of latent TB infection (LTBI).

† Per 100,000 U.S. standard population; based on the U.S. Census Bureau's Federated Electronic Research, Review, Extra, and Tabulation tool (DataFerrett version 1.3.3) that were available during 2006–2010.

§ Absolute difference = the simple difference between a particular group rate and the rate for its respective referent group.

¶ Obtained by expressing the value for the difference as a percentage of the estimate for its respective referent group.

** Persons of Hispanic ethnicity might be of any race or combination of races.

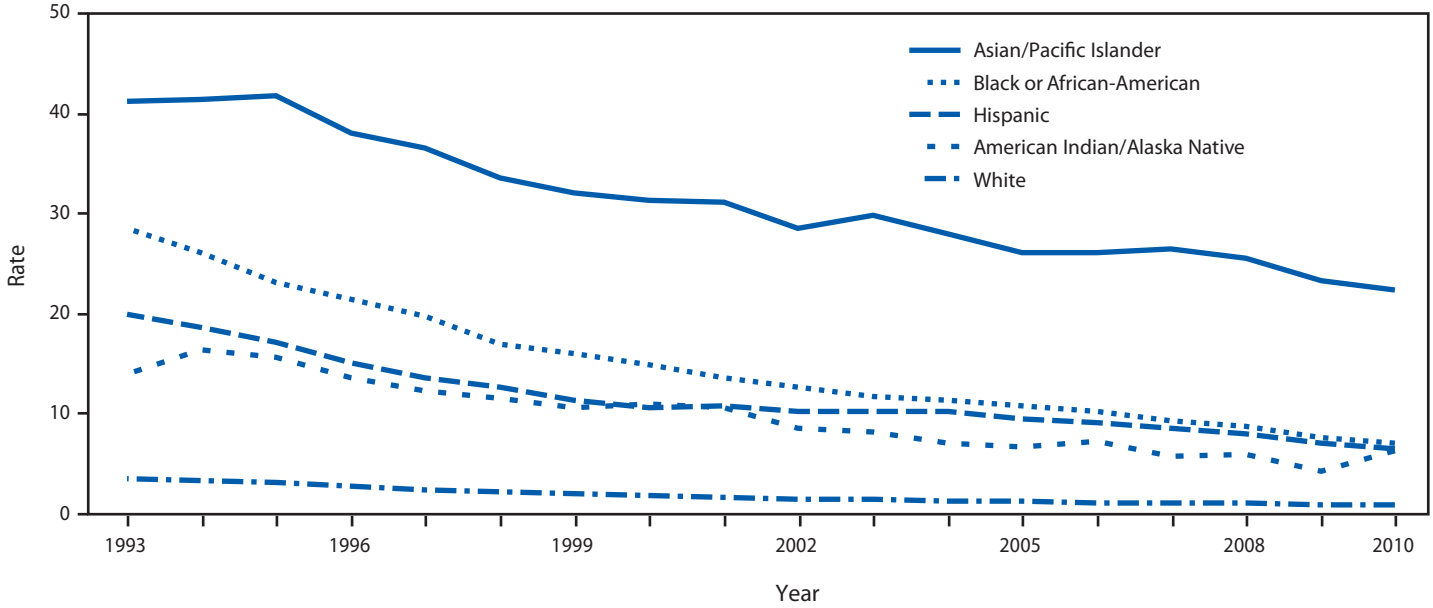
†† Small sample size (n = 4) and uncertainty of data quality, mostly misclassification.

§§ Includes available information for Patient's "Month-Year" Arrived in the United States.

¶¶ Used proportions of all reported and available information for Patient's Primary Occupation and Type of Health Care Provider. During 1993–2008, occupation was assessed for the previous 2 years and multiple choices were accepted, but starting in 2009, occupation was assessed for 1 year before and multiple choice answers were no longer accepted.

*** Includes migrant and seasonal workers.

FIGURE 1. Tuberculosis rates,* by race/ethnicity† — United States, 1993–2010



* Cases per 100,000 population, from the U.S. Census Bureau's Federated Research Review, Extra, and Tabulation too (DataFerrett version 1.3.3, available during 2006–2010 .

† All races are non-Hispanic. In 2003, the Asian/Pacific Islander category included persons who reported race as Asian only and/or Native Hawaiian or Other Pacific Islander only. Updated on July 21, 2011.

overall, TB cases have declined 78% among U.S.-born persons compared with 47% among foreign-born persons.

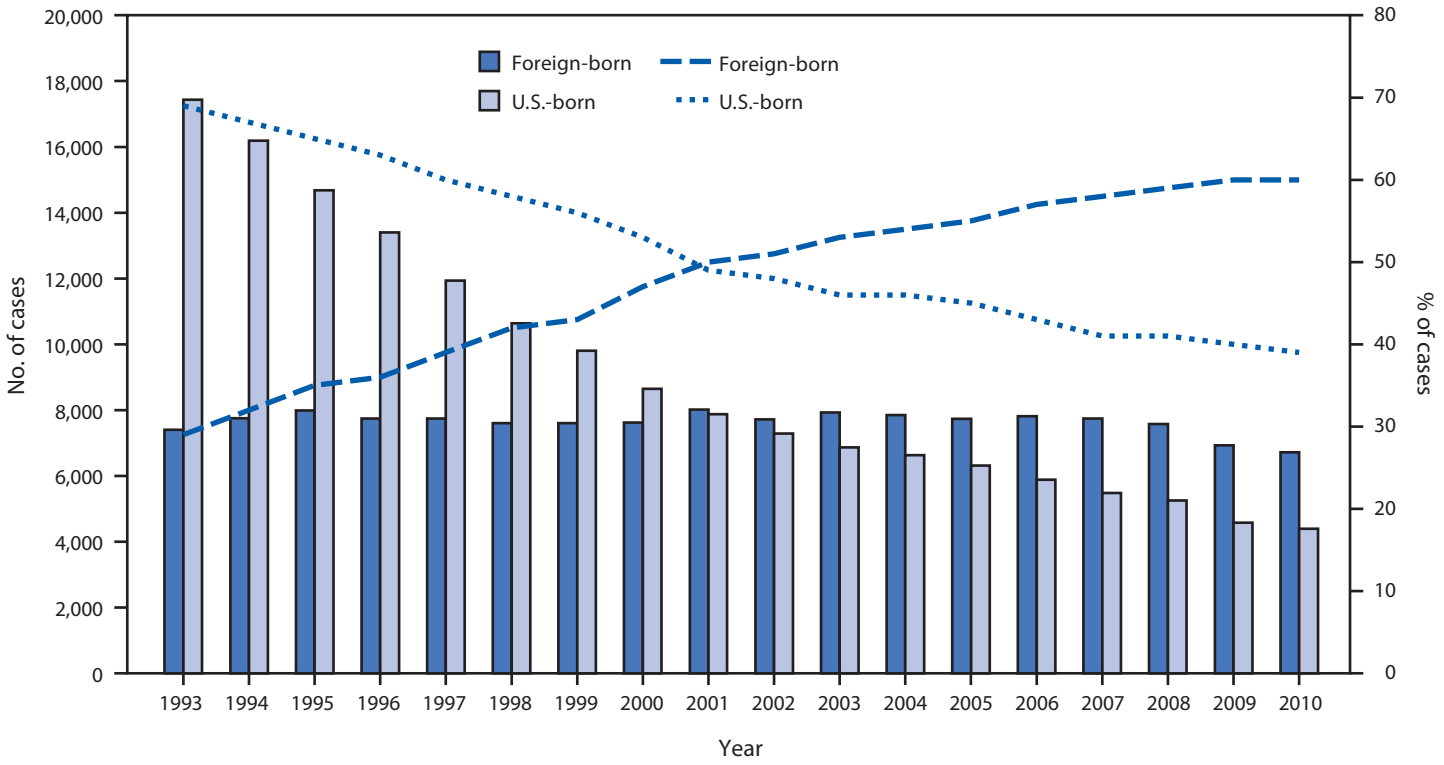
In 1993, approximately 69% of reported TB cases occurred among U.S.-born persons (7.4 cases per 100,000) and 29% occurred among foreign-born persons (34.0 cases per 100,000). In comparison, during 2006–2010, on average, approximately 59% of reported TB cases occurred among foreign-born persons and remained relatively stable, and the rates of cases reported were 1.9 per 100,000 for U.S.-born and 22.0 for foreign-born persons.

Discussion

The number of new TB cases reported in the United States in 2010 represented an 87% decrease since reporting began in 1953 and a 58% decrease since the peak resurgence of TB reported in 1992 (*2*). Despite the downward trend, TB continues to affect many U.S. racial/ethnic minorities disproportionately, both U.S.-born and foreign-born. Approximately half of new TB cases in the United States occur among foreign-born persons and the TB rate in foreign-born persons was approximately 10 times that of persons born in the United States. This disparity has become more recognizable since 1993, when surveillance was enhanced to include routine collection of country of birth information (*9*). The foreign-born population presents a challenge to health-care staff and TB programs for providing diagnosis and care, and these challenges include the unequal prevalence of TB risk factors and barriers to access to TB care.

Several factors contribute to the disproportionate prevalence of TB among racial/ethnic and foreign-born minorities. Persons who were born in countries where TB morbidity is high might have acquired TB before immigrating and not have symptoms of active TB disease until after arrival in the United States. Different social and environmental living conditions create large and predictable differences in health outcomes among nations and between population groups within nations (*10*). In the United States, adjusting for six socioeconomic indicators (i.e., crowding, income, poverty, public assistant, education, and unemployment), low socioeconomic status accounted for approximately half of the increased risk for TB among blacks, Hispanics, and Native Americans (*11*). Unequal prevalence of TB risk factors (e.g., HIV infection, homelessness, incarceration, substance use, and TB disease severity) among racial/ethnic groups also might contribute to increased exposure to TB or to an increased risk for developing TB once infected. Economically disadvantaged persons, the uninsured, low-income children, the elderly, the homeless, those with HIV, and those with other chronic health conditions (e.g., diabetes and severe mental illness) encounter barriers to accessing health-care services. The effects of these barriers on TB prevention and control

FIGURE 2. Number and and percentage of tuberculosis cases, by origin of birth — United States, 1993–2010



vary across racial/ethnic groups (*12–14*). In addition, poverty, language barriers, and immigration status also can be additional barriers to ameliorating TB disparities and inequality, jointly or independently (*15–17*).

Controlling and preventing TB in the United States necessitates addressing disparities among racial/ethnic minorities and foreign-born persons. The continuous arrival of new immigrants and refugees from countries with a high prevalence of TB has impeded elimination efforts. Reduction in TB rates among foreign born communities can be accomplished by identification of local at-risk populations, increased knowledge of issues affecting immigrants and foreign-born persons and modification of existing TB programs to meet the needs of these communities. In particular, training and education can aid health-care staff serving the foreign-born community at risk for TB disease.

Limitations

The findings in this report are subject to at least four limitations. First, certain data (e.g., race/ethnicity and years in the United States) were incomplete and did not include U.S. territories and the U.S.-affiliated Pacific Islands. Second, the analysis does not assess the effects of socioeconomic risk factors (e.g., homelessness, substance abuse, and incarceration), HIV coinfection, and drug resistance on TB disparities. The prevalence of certain risk factors is particularly extensive in minority groups (e.g., persons with HIV/AIDS and diabetes). Third, educational attainment and family or household income, two indicators used commonly to explain health disparities and inequalities, were not available. Finally, social aspects that include language barriers and cultural differences with respect to health-seeking behaviors and the ability to access the complex U.S. health-care system were not examined.

Conclusion

Progress toward TB elimination in the United States will require ongoing surveillance and improved TB control and prevention activities to address persistent disparities between U.S.-born and foreign-born persons and between whites and racial/ethnic minorities. Disparities and inequalities among racial/ethnic minorities are affected by many unmeasured factors. CDC recommends improving awareness, testing, and treatment of latent infection and TB disease in minorities and foreign-born populations to reduce TB (*9*).

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Health Outcomes: Mortality

Coronary Heart Disease and Stroke Deaths — United States, 2009

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Introduction

Heart disease and stroke are the first and fourth leading causes of death, respectively in the United States (*1,2*). In 2008, heart disease and stroke were responsible for nearly a third of all deaths in the United States (30.4%), killing more than three-quarters of a million people that year (*1*). Coronary heart disease (CHD) is the cause of more than two-thirds of all heart disease-related deaths (*1,2*). One of the *Healthy People 2020* objectives includes reducing the rate of CHD deaths by 20% from the baseline rate of 126 deaths per 100,000 population per year, to a goal of 100.8 deaths per 100,000 (objective HDS-2) (*3*). The objectives also include reducing the rate of stroke deaths by 20% over the baseline of 42.2 deaths per 100,000, to a goal of 33.8 deaths per 100,000 population. Although the rates of death from both CHD and stroke have declined continuously in recent decades and the *Healthy People 2010* goals for these two objectives were met among the overall U.S. population in 2004, the death rates remain high, particularly among men and blacks (*4–6*).

This heart disease and stroke analysis and discussion that follows is part of the second CDC Health Disparities and Inequalities Report (2013 CHDIR) (*6*). The 2011 CHDIR (*7*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria described in the 2013 CHDIR Introduction (*8*). This report provides more current information on CHD and stroke deaths among different age and racial/ethnic groups. The purposes of the coronary heart disease and stroke mortality report are to discuss and raise awareness of differences in the characteristics of persons dying from coronary heart disease and stroke, and to prompt actions to reduce disparities.

Methods

To examine the number and age-specific CHD and stroke mortality rates of persons of all ages, by sex, age group, and race/ethnicity, CDC analyzed final 2009 data from the National Vital Statistics System (NVSS). NVSS data are described in detail elsewhere (http://www.cdc.gov/nchs/nvss.htm). Race was defined as white, black, American Indian/Alaska Native (AI/AN), and Asian/Pacific Islander (A/PI). Ethnicity was defined as Hispanic or non-Hispanic. Sociodemographic information beyond age, sex, and race/ethnicity is not available in the NVSS.

CDC estimated the number of deaths and the rate of death per 100,000 population for which coronary heart disease or stroke were the underlying cause of death (ICD-10 codes I20–I25 for CHD, I60–I69 for stroke), and 95% confidence intervals were calculated based on a Poisson distribution, consistent with NCHS methodology (*1*). Rates per 100,000 population were age-adjusted to the 2000 U.S. standard population, except where stratified by age group (*9*). Disparities were measured as the deviations from a "referent" category rate and by characteristics that included sex, age, and race/ethnicity. Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The relative difference, a percentage, was calculated by dividing the difference by the value in the referent category and multiplying by 100. Significant differences between rates were determined by nonoverlapping 95% confidence intervals. All tests for differences in age-adjusted death rates were significant compared with the indicated referent group after Bonferroni adjustment for multiple comparisons.

Results

The age-adjusted rate of death from CHD in 2009 was 116.1 per 100,000 population (Table), and CHD was listed as the underlying cause of death in 386,324 persons in the United States. The age-adjusted death rate per 100,000 population from CHD was higher among men than women (155.8 versus 86.2) and higher among non-Hispanic blacks (141.3) than among any other racial/ethnic group. The rate of premature death (death among persons aged <75 years) was higher among non-Hispanic blacks than their white counterparts (65.5 versus 43.2).

Similar differences were observed for deaths from stroke, which was listed as the underlying cause of death in 128,842

TABLE. Number of deaths and age-adjusted death rates* from persons within coronary heart disease† and stroke§ by sex, age, and race/ethnicity — National Vital Statistics System, United States, 2009

		Age-adjusted (except where noted)			
Coronary heart disease†	**No.**	**Rate***	**(95% CI)**	**Absolute difference (rate)**	**Relative difference (%)**
Total	**386,324**	**116.1**	**(115.7–116.5)**		
Male¶	210,069	155.8	(155.2–156.5)	Ref.	Ref.
Female	176,255	86.2	(85.8–86.6)	-69.6	-44.7
Age in years					
<45	6,679	3.9	(3.8–4.0)	-129.3	-97.1
0–24	150	0.1	(0.1–0.2)		
25–44	6,529	8.4	(8.2–8.6)		
45–74¶	131,632	133.2	(132.5–133.9)	Ref.	Ref.
45–54	23,285	52.2	(51.5–52.9)		
55–64	46,018	132.3	(131.1–133.5)		
65–74	62,329	299.8	(297.4–302.2)		
<75	138,311	43.5	(43.3–43.8)		
≥75	247,990	1,245.80	(1,240.8–1,250.7)	1112.6	835.3
≥85 (crude)	143,204	2543.3	(2,530.1–2,556.5)		
Race/Ethnicity					
Hispanic**	20,228	86.5	(85.3–87.7)	-31.2	-26.5
Non-Hispanic	365,119	118.2	(117.8–118.6)		
White, non-Hispanic¶	315,810	117.7	(117.3–118.1)	Ref.	Ref.
Black, non-Hispanic	39,956	141.3	(139.9–142.8)	23.6	20.1
American Indian/Alaska Native	1,737	92	(87.5–96.5)	-25.7	-21.8
Asian/Pacific Islander	7,616	67.3	(65.8–68.8)	-50.4	-42.8
Age in years/race-ethnicity					
<45 years					
Hispanic**	561	1.9	(1.7–2.0)	-2.2	-53.7
Non-Hispanic	6,094	4.3	(4.2–4.4)		
White, non-Hispanic¶	4,459	4.1	(4.0– 4.3)	Ref.	Ref.
Black, non-Hispanic	1,369	6.2	(5.9–6.5)	2.1	51.2
45–74					
Hispanic**	8,176	98	(95.8–100.2)	-33.5	-25.5
Non-Hispanic	122,907	136.1	(135.3–136.9)		
White, non-Hispanic¶	99,389	131.5	(130.7–132.3)	Ref.	Ref.
Black, non-Hispanic	19,820	199.5	(196.7–202.3)	68	51.7
<75					
Hispanic**	8,737	31.3	(30.7–32.0)	-11.9	-27.5
Non-Hispanic	129,001	44.7	(44.5–45.0)		
White, non-Hispanic¶	103,848	43.2	(42.9–43.5)	Ref.	Ref.
Black, non-Hispanic	21,189	65.5	(64.6–66.4)	22.3	51.6
≥75					
Hispanic**	11,490	945.7	(928.4–963.0)	-331.6	-26
Non-Hispanic	236,100	1,262.9	(1,257.8–1,268.1)		
White, non-Hispanic¶	211,949	1,277.3	(1,271.8–1,282.8)	Ref.	Ref.
Black, non-Hispanic	18,763	1,322.8	(1,303.9–1,341.8)	45.5	3.6
≥85					
Hispanic**	5,793	1,787.5	(1,741.5–1,833.5)	-841.1	-32
Non-Hispanic	137,234	2,586.1	(2,572.4–2,599.8)		
White, non-Hispanic¶	125,303	2,628.6	(2,614.0–2,643.2)	Ref.	Ref.
Black, non-Hispanic	9,085	2,555.2	(2,502.7–2,607.7)	-73.4	-2.8

See table footnotes on the next page.

persons in the United States in 2009, an age-adjusted rate of 38.9 deaths per 100,000 population. The age-adjusted death rate per 100,000 population from stroke was higher among non-Hispanic blacks (73.6) than among any other racial/ethnic group. The rate of premature death (death among persons aged <75 years) from stroke was higher among non-Hispanic blacks than their white counterparts (25.0 versus 10.2).

Discussion

Although death rates from CHD and stroke are declining overall (*4*), disparities still remain in the rate of death from these events between racial/ethnic groups. The premature death rate from CHD and stroke continues to be higher among black adults than their white counterparts. The *Healthy People 2020*

TABLE. (*Continued*) Number of deaths and age-adjusted death rates* from persons within coronary heart disease† and stroke§ by sex, age, and race/ethnicity — National Vital Statistics System, United States, 2009

		Age-adjusted (except where noted)			
Stroke§	**No.**	**Rate***	**(95% CI)**	**Absolute difference (rate)**	**Relative difference (%)**
Total	**128,842**	**38.9**	**(38.7–39.1)**		
Male¶	52,073	39.7	(39.3–40.0)	Ref.	Ref.
Female	76,769	37.8	(37.5–38.1)	-1.9	-4.8
Age in years					
<45	2,914	1.6	(1.6–1.7)	-33.4	-95.4
0–24	461	0.4	(0.4–0.5)		
25–44	2,453	3.1	(3.0–3.2)		
45–74¶	34,264	35	(34.6–35.3)	Ref.	Ref.
45–54 (crude)	6,163	13.8	(13.5–14.1)		
55–64 (crude)	10,523	30.2	(29.6–30.8)		
65–74 (crude)	17,578	84.5	(83.3–85.7)		
<75	37,178	11.9	(11.7–12.0)		
≥75	91,660	460.1	(457.1–463.1)	425.1	1,214.6
≥85 (crude)	53,253	945.8	(937.8–953.8)		
Race/Ethnicity					
Hispanic**	7,065	29.5	(28.8–30.2)	-8.3	-22.0
Non-Hispanic	121,540	39.5	(39.3–39.7)		
White, non-Hispanic¶	101,703	37.8	(37.5–38.0)	Ref.	Ref.
Black, non-Hispanic	15,718	55.7	(54.8–56.6)	17.9	47.4
American Indian/Alaska Native	533	29.8	(27.2–32.4)	-8	-21.2
Asian/Pacific Islander	3,586	31.6	(30.6–32.7)	-6.2	-16.4
Age in years/race-ethnicity					
<45 years					
Hispanic	498	1.5	(1.4–1.6)	0.2	1.5
Non-Hispanic	2,406	1.7	(1.6–1.7)	0.4	3.1
White, non-Hispanic¶	1,439	1.3	(1.3–1.4)	Ref.	Ref.
Black, non-Hispanic	796	3.5	(3.2–3.7)	2.2	16.9
45–74					
Hispanic	2,654	31.5	(30.3–32.7)	1.2	0.4
Non-Hispanic	31,506	35.2	(34.8– 35.6)		
White, non-Hispanic¶	22,699	30.3	(29.9–30.7)	Ref.	Ref.
Black, non-Hispanic	7,338	73.6	(71.9–75.3)	43.3	142.9
<75					
Hispanic	3,152	10.7	(10.3–11.1)	0.5	0.5
Non-Hispanic	33,912	12	(11.8–12.1)		
White, non-Hispanic¶	24,138	10.2	(10.1–10.3)	Ref.	Ref.
Black, non-Hispanic	8,134	25	(24.4–25.5)	14.8	14.5
≥75					
Hispanic	3,913	322.5	(312.4–332.6)	-144	-30.9
Non-Hispanic	87,624	468.3	(465.1–471.4)		
White, non-Hispanic¶	77,562	466.5	(463.5–469.8)	Ref.	Ref.
Black, non-Hispanic	7,584	534.5	(522.5–546.5)	68	14.6
≥85 (crude)					
Hispanic	1,901	586.6	(560.2–613.0)	-387.3	-39.8
Non-Hispanic	51,292	966.6	(958.2–975.0)		
White, non-Hispanic¶	46,426	973.9	(965.0–982.8)	Ref.	Ref.
Black, non-Hispanic	3,619	1,017.9	(984.7–1,051.1)	44	4.5

Abbreviations: 95% CI = 95% confidence interval; Ref = referent.
* Per 100,000. Directly standardized to the 2000 U.S. standard population, except where stratified by age.
† ICD-10 codes: I20–I25
§ ICD-10 codes: I60–I69
¶ All tests for differences in age-adjusted death rates were significant compared with the indicated referent group after Bonferroni adjustment for multiple comparisons.
** Persons of Hispanic ethnicity might be of any race or combination of races.

objectives and goals for heart disease and stroke are intended to reduce premature deaths by promoting prevention of these events and reducing their recurrence. In 2011, CDC launched the Million Hearts initiative, which is intended to bring together communities, health systems, nonprofit organizations, federal agencies, and private-sector partners from across the country to prevent 1 million heart attacks and strokes over 5 years.

Limitations

The findings in this report are subject to at least three limitations. First, misclassification of race and ethnicity of the decedent on the death certificate might underestimate rates among AI/ANs, A/PIs, and Hispanics (*10*). Second, results from a study in New York City, New York, indicated that CHD is overreported as a cause of death on death certificates (*11*). However, these results might be specific to New York City. Third, the death rates reflect only the underlying cause of death and no other contributing causes of death such as diabetes, which vary substantially across racial/ethnic groups.

Conclusion

Risk factors for cardiovascular disease include tobacco use, physical inactivity, poor diet, diabetes, obesity, hypertension, and dyslipidemia. Preventing or controlling hypertension and high low-density lipoprotein (LDL) cholesterol have been shown to greatly reduce the risk for stroke and CHD, respectively (*12,13*). In 2011, the U.S. Department of Health and Human Services launched the Million Hearts initiative to prevent 1 million heart attacks and strokes by the year 2017, through focused clinical and policy strategies. The Guide to Community Preventive Services Task Force recommends system interventions to improve CVD risk factors, including clinical decision support systems, reducing out-of-pocket costs for CVD preventive services for patients with hypertension and high cholesterol, and team-based care to improve blood pressure control. The United States Preventive Services Task Force (USPSTF) recommends blood pressure screening for all adults aged ≥18 years and LDL-cholesterol screening for adults in certain sex, age, and heart disease risk groups (*14,15*). As a result of provisions in the Patient Protection and Affordable Care Act, USPSTF-recommended clinical preventive services covered by Medicare now have no patient cost sharing (§4104) (*16,17*). The law also requires that "nongrandfathered" private health plans include these same services without cost sharing (§1001) and encourages Medicaid to cover them through an increase in the federal matching rate for those services (§4006). Because the rates of premature death from CHD and stroke are higher among blacks, it will be important to monitor this and other vulnerable population groups (i.e., those with limited access to regular medical care) to determine if improvements are evident in the future.

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Drug-Induced Deaths — United States, 1999–2010

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Introduction

Drug-induced deaths include all deaths for which drugs are the underlying cause (*1*), including those attributable to acute poisoning by drugs (drug overdoses) and deaths from medical conditions resulting from chronic drug use (e.g., drug-induced Cushing's syndrome). A drug includes illicit or street drugs (e.g., heroin and cocaine), as well as legal prescription and over-the-counter drugs; alcohol is not included. Deaths from drug overdose have increased sharply in the past decade. This increase has been associated with overdoses of prescription opioid pain relievers, which have more than tripled in the past 20 years, escalating to 16,651 deaths in the United States in 2010 (*2*). Most drug-induced deaths are unintentional drug poisoning deaths, with suicidal drug poisoning and drug poisoning of undetermined intent comprising the majority of the remainder (*3*).

This drug-induced deaths analysis and discussion that follows are part of the second CDC Health Disparities and Inequalities Report (CHDIR) (*3*). The 2011 CHDIR (*4*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*5*). This report provides more current information to what was presented in the 2011 CHDIR (*3*). The purpose of this drug-induced deaths analysis is to raise awareness of disparities by age, gender, racial/ethnic and/or geographic differences, and to prompt actions to reduce disparities.

Methods

To determine differences in the prevalence of drug-induced deaths by sex, race/ethnicity, age, and geographic region in the United States, CDC analyzed 2010 data from the mortality component of the National Vital Statistics System (NVSS). To examine patterns of drug-induced death rates by age group and race/ethnicity, NVSS data from 1999 through 2010 were aggregated because limited sample sizes are available for any single year for certain groups.

Death certificates provide information on the decedent's age, sex, race, ethnicity, and geographic region. They do not provide information on decedent income, disability, or language spoken at home. Race is categorized as white, black, American Indian/Alaska Native, or Asian/Pacific Islander. Ethnicity was categorized as Hispanic or non-Hispanic. Geographic location is categorized as Northeast, Midwest, South, and West.* Adverse effects from drugs taken as directed and infections resulting from drug use are not included.

The number of drug-induced deaths are presented and unadjusted (crude) drug-induced death rates per 100,000 population are calculated for 2010 by age, racial/ethnic group, sex, and geographic region (based on the U.S. Census 2010 population survey) (Table). The 95% confidence intervals (CIs) for unadjusted drug-induced death rates are based on ≥100 deaths and were calculated using a normal approximation; CIs based on <100 deaths were calculated using a gamma method. (Additional information is available from Vital Statistics of the United States: Mortality, 1999 Technical Appendix, available at http://wonder.cdc.gov/wonder/sci_data/mort/mcmort/type_txt/mcmort05/techap99.pdf).

Results

During 2010 (the year in which the latest national NVSS mortality data are available), a total of 40,393 drug-induced deaths occurred in the United States. The majority of drug-induced deaths were unintentional 74.3%; remainder: 13.1%; suicidal drug poisoning; 7.3% drug poisoning of undetermined intent; 5.1% mental and behavioral disorders from drug use; <1% homicide; <1% medical conditions from chronic drug use. Drug-induced mortality was highest among persons aged 40–49 years (25.1) (Table). Rates for males exceeded those for females aged ≥10 years. Rates were lowest in the Northeast region of the United States (11.6), and the largest percentage of cases was in the South (38.2%). Non-Hispanic whites

* *Northeast* (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont), *Midwest* (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin), *South* (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia), and *West* (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming).

TABLE. Number and rate* of drug-induced deaths, by age group, race/ethnicity, and sex — National Vital Statistics System, United States, 2010

Characteristic	Female			Male			Total			Percentage of total
	No. of deaths	Rate	(95% CI)†	No. of deaths	Rate	(95% CI)†	No. of deaths	Rate	(95% CI)†	
Total	**16,017**	**10.2**	**(10.0–10.4)**	**24,376**	**16.1**	**(15.9–16.3)**	**40,393**	**13.1**	**(13.0–13.2)**	**100.00**
Age group (yrs)										
0–9	32	0.2	(0.1–.02)	48	0.2	(0.2–0.3)	**80**	**0.2**	**(0.2–0.2)**	0.0
10–19	258	1.2	(1.1–1.4)	636	2.9	(2.7–3.1)	**894**	**2.1**	**(2.0–2.2)**	2.2
20–29	1,943	9.2	(8.8–9.6)	4,788	22.1	(21.5–22.7)	**6,731**	**15.8**	**(15.4–16.1)**	16.7
30–39	2,978	14.8	(14.3–15.3)	5,115	25.5	(24.8–26.2)	**8,093**	**20.2**	**(19.7–20.6)**	20.0
40–49	4,620	21.0	(20.4–21.6)	6,333	29.3	(28.6–30.0)	**10,953**	**25.1**	**(24.7–25.6)**	27.1
50–59	4,240	19.7	(19.1–20.3)	5,474	26.8	(26.0–27.5)	**9,714**	**23.1**	**(22.7–23.6)**	24.0
60–69	1,258	8.2	(7.8–8.7)	1,447	10.4	(9.9–10.9)	**2,705**	**9.2**	**(8.9–9.6)**	6.7
70–79	373	4.1	(3.7–4.5)	314	4.2	(3.8–4.7)	**687**	**4.1**	**(3.8–4.4)**	1.7
≥80	314	4.4	(3.9–4.9)	218	5.3	(4.6–6.0)	**532**	**4.7**	**(4.3–5.1)**	1.3
Geographic region§										
Northeast	2,245	7.9	(7.6–8.2)	4,154	15.5	(15.0–15.9)	**6,399**	**11.6**	**(11.3–11.9)**	15.8
Midwest	3,480	10.2	(9.9–10.6)	5,298	16.1	(15.71–6.5)	**8,778**	**13.1**	**(12.8–13.4)**	21.7
South	6,243	10.7	(10.4–11.0)	9,202	16.4	(16.1–16.7)	**15,445**	**13.5**	**(13.3–13.7)**	38.2
West	4,049	11.2	(10.9–11.6)	5,722	16	(15.5–16.4)	**9,771**	**13.6**	**(13.3–13.9)**	24.2
Race/Ethnicity										
White, non-Hispanic	13,456	13.2	(13.0–13.4)	19,689	20.0	(19.7–20.3)	**33,145**	**16.6**	**(16.4–16.7)**	82.1
Black, non-Hispanic	1,332	6.5	(6.1–6.8)	2,170	11.5	(11.0–12.0)	**3,502**	**8.9**	**(8.6–9.2)**	8.7
American Indian/ Alaska Native	200	15.3	(13.2–17.4)	239	19.0	(16.5–21.4)	**439**	**17.1**	**(15.5–18.7)**	1.1
Asian/Pacific Islander	129	1.5	(1.3–1.8)	205	2.7	(2.3–3.0)	**334**	**2.1**	**(1.8–2.3)**	0.8
Hispanic¶	844	3.4	(3.2–3.6)	1,944	7.6	(7.3–7.9)	**2,788**	**5.5**	**(5.3–5.7)**	6.9
Unknown**	56	—	—	129	—	—	**185**	—	—	0.5

Abbreviation: 95% CI = 95% confidence interval.

* Unadjusted (crude) death rates per 100,000 population.

† CIs based on ≥100 deaths were calculated using a normal approximation; CIs based on <100 deaths were calculated using a gamma method. (Additional information available from Vital Statistics of The United States: Mortality, 1999 Technical Appendix. Available at http://wonder.cdc.gov/wonder/sci_data/mort/mcmort/type_txt/mcmort05/techap99.pdf).

§ *Northeast:* Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

¶ Persons of Hispanic ethnicity might be of any race or combination of races.

** Rates for persons with unknown race/ethnicity were not included because population data were unavailable.

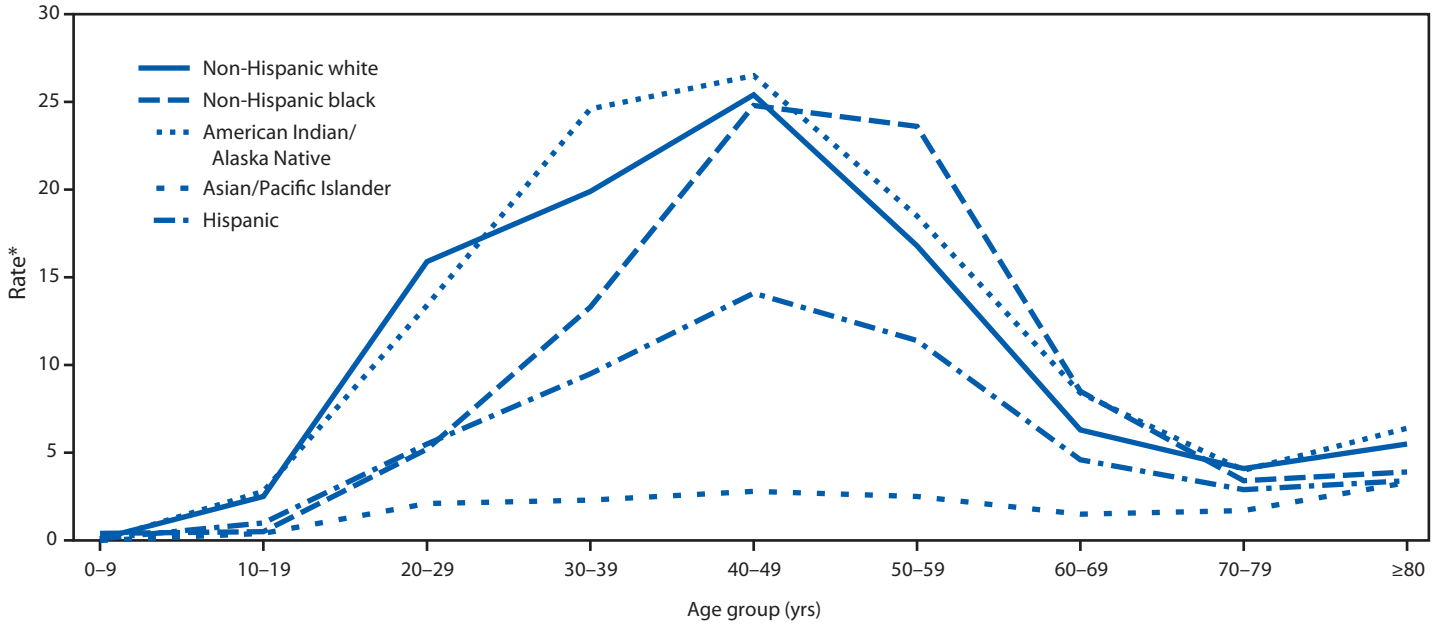
accounted for 82.1% of all 40,393 drug-induced deaths. The highest rates were among American Indians/Alaska Natives (17.1) and non-Hispanic whites (16.6).

During 1999–2010, drug-induced death rates by race/ethnicity and age group demonstrated varying patterns by racial/ethnic group, although the highest rate occurred in the 40–49 year age group for non-Hispanic whites, American Indians/Alaska Natives, and non-Hispanic blacks (Figure). Rates among American Indians/Alaska Natives were highest in the 30–39 and 40–49 year age groups and then decreased in the older ages. Rates among non-Hispanic blacks increased dramatically in persons aged 40–49, remained high in persons aged 50–59, and then decreased. Rates were lowest at all ages for Asians/Pacific Islanders.

Discussion

American Indians/Alaska Natives and non-Hispanic whites had the highest drug-induced death rates overall. This finding is consistent with the previous report for rates during 2003–2007 (*6*). However, it does reflect a change from the 1980s and 1990s, when drug-induced mortality rates were higher among blacks than whites (*3*). Prescribed drugs have replaced illicit drugs as a leading cause of drug-related overdose deaths (*7*). Non-Hispanic blacks are less likely than non-Hispanic whites to use prescription drugs, and therefore might be less likely to misuse such drugs (*8*).

FIGURE. Drug-induced death rates,* by race/ethnicity and age group — National Vital Statistics System, United States, 1999–2010



* Crude death rates per 100,000 population.

Limitations

The findings in this report are subject to at least two limitations. First, overdose deaths are likely underestimated because lengthy investigations are often required. This sometimes results in a "pending manner and cause of death" category being selected at the close of the mortality file. Second, injury mortality data might underestimate the actual number of deaths for American Indians/Alaska Natives and certain other racial/ethnic populations (e.g., Hispanics) because of the misclassification of race/ethnicity of decedents on death certificates (*9*).

Conclusion

Preventing drug-induced deaths will require change at many levels (*10*). Improving prescription drug monitoring programs, which are electronic databases that track prescriptions for opioid pain relievers and other controlled prescription drugs in a state, can assist with identification of improper prescribing and use of these drugs. Health insurers and pharmacy benefit managers can develop prescription claims review programs to identify and address improper prescribing and use of pain relievers. Health-care providers can follow guidelines for responsible prescribing, including screening and monitoring for substance abuse and mental health problems. Patients also should be encouraged to use prescription pain relievers only as directed by a health-care provider, and store and dispose of them properly (http://www.cdc.gov/injury/pdfs/NCIPC_Overview_FactSheet_PPO-a.pdf).

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Homicides — United States, 2007 and 2009

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Introduction

According to 1981–2009 data, homicide accounts for 16,000–26,000 deaths annually in the United States and ranks within the top four leading causes of death among U.S. residents aged 1–40 years (*1*). Homicide can have profound long-term emotional consequences on families and friends of victims and on witnesses to the violence (*2*,*3*), as well as cause excessive economic costs to residents of affected communities (*1*,*4*). For years, homicide rates have been substantially higher among certain populations. Previous reports have found that homicides are higher among males (*5*–*7*), adolescents and young adults (*6*), and certain racial/ethnic groups, such as non-Hispanic blacks, non-Hispanic American Indian/Alaska Natives (AI/ANs), and Hispanics (*6*–*9*). The 2011 CDC Health Disparities and Inequalities Report (CHDIR) described similar findings for the year 2007 (*10*). For example, the 2011 report showed that the 2007 homicide rate was highest among non-Hispanic blacks (23.1 deaths per 100,000), followed by AI/ANs (7.8 deaths per 100,000), Hispanics (7.6 deaths per 100,000), non-Hispanic whites (2.7 deaths per 100,000), and Asian/Pacific Islanders (A/PIs) (2.4 deaths per 100,000) (*10*). In addition, non-Hispanic black men aged 20–24 years were at greatest risk for homicide in 2007, with a rate that exceeded 100 deaths per 100,000 population (*10*). Other studies have reported that community factors such as poverty and economic inequality and individual factors such as unemployment and involvement in criminal activities can play a substantial role in these persistent disparities in homicide rates (*11*). Public health strategies are needed in communities at high risk for homicide to prevent violence and save lives.

The homicide analysis and discussion that follow are part of the second CHDIR and update information presented in the first CHDIR (*10*). The 2011 CHDIR (*12*) was the first CDC report to take a broad view of disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*13*). The purposes of this homicide report are to discuss and raise awareness of differences in homicide rates by some of these characteristics and to prompt actions to reduce these disparities.

Methods

To assess disparities in homicide rates in the United States, CDC analyzed data from the CDC National Vital Statistics System (NVSS), the same data source used for the 2011 CHDIR on homicides (*10*). In this report, NVSS data provided as of February 2012 were used. NVSS collects death certificate data filed in the 50 states and the District of Columbia (DC) (*14*). Death certificates provide information on the decedent's age, sex, race, ethnicity, and geographic region. They do not provide information on decedent income, sexual orientation, disability, or language spoken at home.

This report summarizes the homicide data by providing the number, proportion, and rates of homicides by age, sex, and race/ethnicity for the year 2009; providing the homicide rates by U.S. state for the year 2009; and comparing 2009 with 2007 data. Data in this report are based on homicides caused by any mechanism. More details on homicide rates by age, sex, and race/ethnicity for each state and census region can be accessed through the CDC Web-based Injury Statistics Query and Reporting System — Fatal (WISQARS Fatal) Injury Data module (available at http://www.cdc.gov/injury/wisqars/index.html). Data on individual and socioeconomic risk factors for homicide were unavailable for analysis. In addition, sufficient data were not available to assess disparities by certain racial/ethnic subgroups, household income, disability status, and sexual orientation. NVSS codes racial categories as white, black, AI/AN, and A/PI, and ethnicity is coded separately as Hispanic or non-Hispanic (*14*). In this report, references to whites, blacks, AI/ANs, and A/PIs refer to non-Hispanic persons. Hispanics might be of any race or combination of races. Crude homicide rates per 100,000 population were calculated by age, sex, and race/ethnicity, as well as by the combination of these three variables. Crude rates per 100,000 population by state in 2009 also are provided. Confidence intervals (CIs) of rates were calculated in two ways: 1) groupings of annual death counts of <100 were calculated by using a gamma estimation method (*14*), and 2) groupings of annual death counts of ≥100 were calculated by using a normal approximation approach. Rates calculated from <20 deaths were considered unreliable and are not reported.

Disparities were measured as deviations from a referent category rate or prevalence. The group with the largest population of the U.S. census data in each demographic category was used as the referent (e.g., females, non-Hispanic whites, or persons aged 30–49 years). Absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The relative difference as a percentage was calculated by dividing the absolute difference by the value in the referent category and multiplying by 100. Relative differences in rates between each race/ethnic category were also stratified by sex and age. Rate comparisons were considered significantly different if they had nonoverlapping 95% CIs, which provide a conservative test for statistical significance.

Results

An estimated 18,361 homicides occurred in 2007 and 16,799 occurred in 2009 (Table 1). The relative rate difference reported for males was at least 250% higher than that of females in both data years. In addition, in each data year, the relative rate difference for non-Hispanic blacks was at least 650% higher than the rate reported for non-Hispanic whites. Non-Hispanic AI/ANs and Hispanics also had rates that far exceeded those of non-Hispanic whites in both years. Rates were highest among persons aged 15–29 years both in 2007 and 2009 and then decreased with each subsequent age group; however, the lowest rates reported in both years were among children aged 0–14 years.

The homicide rate for the U.S. population in 2009 was significantly lower than the U.S. homicide rate reported in 2007. Differences in rates also occurred among certain populations. Specifically, homicide rates were lower in 2009 than those reported in 2007 for males, non-Hispanic whites, non-Hispanic blacks, Hispanics, persons aged 15–29 years, and persons aged 30–49 years. None of the demographic groups had significantly higher rates in 2009 compared with 2007.

Among males, the risk for homicide was greatest among non-Hispanic blacks aged 15–29 years in both 2007 and 2009 (Table 2). Furthermore, for both years, the male homicide rate was significantly higher among non-Hispanic blacks than among those in other racial/ethnic groups in each age category assessed, except among men aged 50–64 years, for whom the 95% CIs overlapped with the rate for AI/ANs in 2009. Hispanic males had higher rates than non-Hispanic white males in every age group among males aged ≥15 years in both years as well.

TABLE 1. Number, percentage, and crude rate* of homicides, by sex, race/ethnicity, and age group — National Vital Statistics System, United States, 2007 and 2009

	2007						2009					
Characteristic	No. of deaths	(%)	Rate	(95% CI)†	Absolute difference (percentage points)	Relative difference§ (%)	No. of deaths	(%)	Rate	(95% CI)	Absolute difference (percentage points)	Relative difference (%)
Sex												
Male	14,538	(79.2)	9.8	(9.6–10.0)	7.3	291.4	13,126	(78.1)	8.7	(8.5–8.8)	6.3	267.1
Female	3,823	(20.8)	2.5	(2.4–2.6)	Ref.	Ref.	3,673	(21.9)	2.4	(2.3–2.4)	Ref.	Ref.
Race/Ethnicity												
White, non-Hispanic	5,512	(30.0)	2.7	(2.7–2.8)	Ref.	Ref.	5,163	(30.7)	2.6	(2.5–2.6)	Ref.	Ref.
Black, non-Hispanic	8,746	(47.6)	23.1	(22.6–23.6)	20.3	742.5	7,733	(46.0)	19.9	(19.5–20.3)	17.3	679.1
American Indian/Alaska Native	199	(1.1)	7.8	(6.7–8.9)	5.1	185.9	235	(1.4)	9.0	(7.9–10.2)	6.5	252.6
Asian/Pacific Islander	341	(1.9)	2.4	(2.2–2.7)	-0.3	-11.9	325	(1.9)	2.2	(1.9–2.4)	–0.4	-14.9
Hispanic¶	3,466	(18.9)	7.6	(7.4–7.9)	4.9	178.3	3,179	(18.9)	6.6	(6.3–6.8)	4.0	157.1
Age group (yrs)												
0–14	1,096	(6.0)	1.8	(1.7–1.9)	-5.6	-75.7	998	(5.9)	1.6	(1.5–1.7)	–5.2	-76.5
15–29	8,268	(45.0)	13.0	(12.8–13.3)	5.6	76.1	7,241	(43.1)	11.2	(10.9–11.4)	4.3	63.1
30–49	6,327	(34.5)	7.4	(7.2–7.6)	Ref.	Ref.	5,776	(34.4)	6.9	(6.7–7.0)	Ref.	Ref.
50–64	1,886	(10.3)	3.5	(3.4–3.7)	-3.9	-52.6	1,906	(11.3)	3.4	(3.2–3.5)	–3.5	-50.8
≥65	759	(4.1)	2.0	(1.9–2.1)	-5.4	-73.0	860	(5.1)	2.2	(2.0–2.3)	–4.7	-68.3
Total**	**18,361**	**(100.0)**	**6.1**	**(6.0–6.2)**	—	—	**16,799**	**(100.0)**	**5.5**	**(5.4–5.6)**	—	—

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.

* Per 100,000 population.

† CIs based on <100 deaths were calculated using a gamma method, and those based ≥100 deaths were calculated using a normal approximation (**Source:** Xu J, Kockanek KD, Murphy SL, Tejada-Vera B. Deaths: final data for 2007. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics. Natl Vital Stat Rep 2010;58).

§ Relative differences were calculated based on rates that were estimated to five decimal places. Therefore, relative differences calculated based on the rates provided in the table might differ from those displayed because of rounding.

¶ Persons of Hispanic ethnicity might be of any race or combination of races.

** Total counts for 2007 include 97 deaths of persons of unknown race/ethnicity and 25 deaths of persons unknown age. Total counts for 2009 include 164 deaths of persons of unknown race/ethnicity and 18 deaths of persons of unknown age.

TABLE 2. Crude homicide rates,* by sex, age group, and race/ethnicity — National Vital Statistics System, United States, 2007 and 2009

Characteristic	2007 Rate	2007 (95% CI)†	2007 Relative difference§ (%)	2009 Rate	2009 (95% CI)	2009 Relative difference (%)
Male						
0–14 yrs						
White, non-Hispanic	1.3	(1.1–1.4)	Ref.	1.2	(1.0–1.4)	Ref.
Black, non-Hispanic	5.4	(4.7–6.0)	319.6	4.6	(4.0–5.2)	280.5
Hispanic¶	1.8	(1.5–2.1)	39.8	1.5	(1.2–1.8)	21.9
American Indian/Alaska Native	—**	—	—	—	—	—
Asian/Pacific Islander	—	—	—	—	—	—
15–29 yrs						
White, non-Hispanic	5.4	(5.0–5.7)	Ref.	4.3	(4.0–4.6)	Ref.
Black, non-Hispanic	90.1	(87.4–92.9)	1,584.5	75.3	(72.9–77.8)	1,640.6
Hispanic	27.4	(26.1–28.7)	411.2	22.7	(21.5–23.9)	424.4
American Indian/Alaska Native	20.1	(15.5–25.5)	275.0	24.7	(19.7–30.7)	471.8
Asian/Pacific Islander	6.1	(4.9–7.5)	14.4	4.5	(3.5–5.7)	4.3
30–49 yrs						
White, non-Hispanic	5.1	(4.8–5.4)	Ref.	4.7	(4.4–4.9)	Ref.
Black, non-Hispanic	47.2	(45.3–49.1)	826.0	43.1	(41.3–44.9)	821.7
Hispanic	13.0	(12.1–13.8)	154.0	11.3	(10.5–12.0)	141.0
American Indian/Alaska Native	17.1	(13.0–22.1)	235.8	18.6	(14.3–23.7)	296.6
Asian/Pacific Islander	3.7	(2.9–4.5)	-28.4	3.2	(2.5–4.0)	-32.3
50–64 yrs						
White, non-Hispanic	3.4	(3.2–3.7)	Ref.	3.3	(3.1–3.6)	Ref.
Black, non-Hispanic	20.7	(18.9–22.4)	504.0	16.5	(15.0–18.0)	392.9
Hispanic	6.7	(5.6–7.7)	95.6	6.2	(5.3–7.2)	85.9
American Indian/Alaska Native	—	—	—	9.9	(6.1–15.3)	196.5
Asian/Pacific Islander	3.4	(2.4–4.7)	-0.5	3.5	(2.5–4.8)	5.1
≥65 yrs						
White, non-Hispanic	2.0	(1.8–2.3)	Ref.	2.3	(2.1–2.6)	Ref.
Black, non-Hispanic	11.0	(9.2–12.9)	447.6	9.1	(7.4–10.7)	293.8
Hispanic	3.7	(2.7–5.1)	84.5	4.7	(3.6–6.1)	104.7
American Indian/Alaska Native	—	—	—	—	—	—
Asian/Pacific Islander	—	—	—	—	—	—
Female						
0–14 yrs						
White, non-Hispanic	1.1	(0.9–1.2)	Ref.	1.0	(0.8–1.1)	Ref.
Black, non-Hispanic	3.5	(2.9–4.0)	216.9	3.2	(2.7–3.8)	232.3
Hispanic	1.7	(1.4–2.0)	56.1	1.4	(1.1–1.7)	44.8
American Indian/Alaska Native	—	—	—	—	—	—
Asian/Pacific Islander	—	—	—	—	—	—

See table footnotes on the next page.

Among females, the homicide rates also were generally higher among racial/ethnic minorities (Table 2). For example, in both years, female homicide rates were markedly higher among non-Hispanic blacks than among non-Hispanic whites in every age group <65 years. Female homicide rates also were higher among Hispanic than among non-Hispanic whites in every age group <30 years for both years. In 2009, the female homicide rate was higher among AI/ANs than among non-Hispanic whites aged 15–29 years as well.

Compared with 2007, homicide rates were significantly lower in 2009 in certain demographic populations (Table 2). Among non-Hispanic blacks, rates were significantly lower among males aged 15–29, 30–49, and 50–64 years and women aged 30–49 years. The homicide rates for each age category among Hispanic males aged 15–49 years also were lower in 2009 than in 2007.

State-specific homicide rates for 2009 ranged from 1.1 to 12.8 deaths per 100,000 population, and rates were generally higher in the southern states (Figure 1). Most states did not have any significant changes in homicide rates from 2007 to 2009; however, 10 states experienced significant decreases: Arizona, California, Florida, Georgia, Idaho, Maryland, New Jersey, North Carolina, Ohio, and Pennsylvania. Decreases in rates ranged from 12.4% in California to 55.8% in Idaho. The 2009 crude homicide rate for DC was an estimated 22.8 per 100,000 population.

Discussion

Homicide rates are still particularly high among non-Hispanic black, Hispanic, and non-Hispanic AI/AN

TABLE 2. (*Continued*) Crude homicide rates,* by sex, age group, and race/ethnicity — National Vital Statistics System, United States, 2007 and 2009

Characteristic	2007 Rate	2007 (95% CI)†	2007 Relative difference (%)	2009 Rate	2009 (95% CI)	2009 Relative difference (%)
Female						
15–29 yrs						
White, non-Hispanic	2.3	(2.1–2.5)	Ref.	2.0	(1.8–2.2)	Ref.
Black, non-Hispanic	9.8	(8.9–10.7)	326.2	8.7	(7.8–9.5)	332.6
Hispanic	3.6	(3.1–4.2)	58.7	3.4	(2.9–3.9)	68.3
American Indian/Alaska Native	—	—	—	6.7	(4.2–10.2)	235.3
Asian/Pacific Islander	1.8	(1.2–2.7)	-20.0	1.5	(0.9–2.2)	-26.5
30–49 yrs						
White, non-Hispanic	2.5	(2.3–2.7)	Ref.	2.4	(2.2–2.6)	Ref.
Black, non-Hispanic	8.8	(8.0–9.5)	252.4	7.2	(6.5–7.9)	199.5
Hispanic	2.9	(2.5–3.3)	15.8	2.9	(2.5–3.3)	19.8
American Indian/Alaska Native	6.8	(4.4–10.2)	174.6	—	—	—
Asian/Pacific Islander	1.8	(1.3–2.4)	-28.3	1.8	(1.3–2.4)	-26.6
50–64 yrs						
White, non-Hispanic	1.4	(1.3–1.6)	Ref.	1.5	(1.3–1.7)	Ref.
Black, non-Hispanic	3.5	(2.9–4.2)	149.2	3.4	(2.7–4.0)	125.1
Hispanic	1.6	(1.1–2.2)	12.8	1.8	(1.3–2.3)	18.3
American Indian/Alaska Native	—	—	—	—	—	—
Asian/Pacific Islander	1.6	(1.0–2.5)	15.1	1.9	(1.2–2.8)	27.9
≥65 yrs						
White, non-Hispanic	1.3	(1.1–1.4)	Ref.	1.5	(1.3–1.7)	Ref.
Black, non-Hispanic	2.7	(2.0–3.5)	112.6	2.2	(1.6–3.0)	48.5
Hispanic	1.0	(0.5–1.6)	-23.7	1.3	(0.8–2.0)	-16.0
American Indian/Alaska Native	—	—	—	—	—	—
Asian/Pacific Islander	—	—	—	—	—	—

Abbreviations: 95% CI = 95% confidence interval; Ref. = referent.

* Per 100,000 population.

† CIs based on <100 deaths were calculated using a gamma method, and those based ≥100 deaths were calculated using a normal approximation (**Source:** Xu J, Kockanek KD, Murphy SL, Tejada-Vera B. Deaths: final data for 2007. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics. Natl Vital Stat Rep 2010;58).

§ Relative differences were calculated based on rates that were estimated to five decimal places. Therefore, relative differences calculated based on the rates provided in the table might differ from those displayed because of rounding.

¶ Persons of Hispanic ethnicity might be of any race or combination of races.

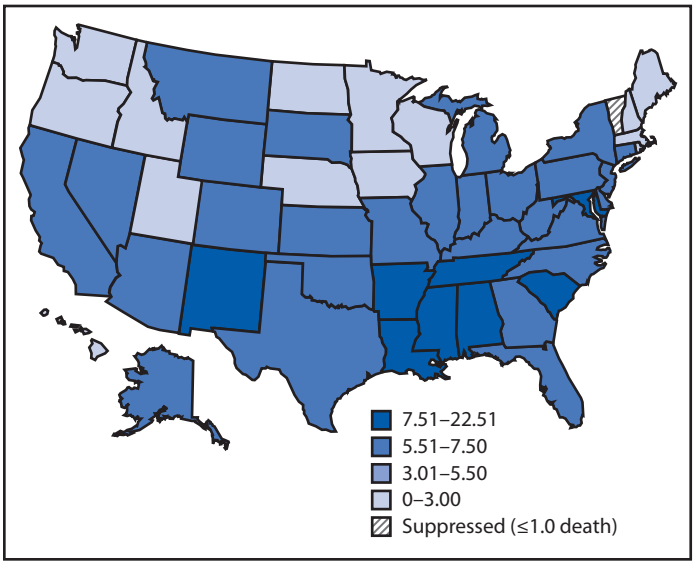
** Rates unreliable (calculated from <20 deaths).

populations and remain highest among young, non-Hispanic black males. The findings in this report estimate that 75 out of 100,000 non-Hispanic black males aged 15–29 years die from homicide in a given year. Moreover, 2009 data from the 16 U.S. states that report data on homicides to the National Violent Death Reporting System suggest that nearly half of homicides in this population were outcomes of escalated arguments and conflicts; one third were precipitated by another crime such as burglary, robbery, or assault; one fifth involved illicit drug activity; and approximately 16% were gang related (*1*,*6*).

Homicide remains less common among women; however, in 2009, homicide was the sixth leading cause of death among females aged 15–49 years (*1*). Similar to the findings from the 2011 CHDIR, data from this report indicate that non-Hispanic black and non-Hispanic AI/AN females experience death by homicide more frequently than women in other racial/ethnic populations (*10*). Female homicides are characteristically different from male homicides in that females are more likely to be killed by a family member during childhood or adolescence (*15*) and by an intimate partner during adulthood (*16*). Increased equality between men and women in regards to education, wages, and occupational status might increase women's access to services that prevent intimate partner homicide, such as protective orders, shelters, and advocacy services (*17*).

Although the findings in this report do not indicate whether a long-term decrease in homicide rates is occurring, rates were noticeably lower in 2009 than in 2007. The decrease in homicide rates between these 2 years was considerable, particularly among males aged 15–29 years, which is consistent with the long-term decreasing trend in homicide rate that has been observed among this demographic population since the early 1990s (*1*) (Figure 2). Possible explanations for this decreasing homicide rate among young males are reductions in drug trade and sales, increases in police response to youths who carry firearms, and increases in incarceration (*17*). Despite

FIGURE 1. Crude homicide rates,* by state — National Vital Statistics System, United States, 2009†



* Number of deaths per 100,000 population.
† Ten states experienced a significant decrease from 2007 to 2009: Arizona (29.3%), California (12.4%), Florida (15.5%), Georgia (19.5%), Idaho (55.6%), Maryland (21.1%), New Jersey (19.3%), North Carolina (19.1%), Ohio (15.5%), and Pennsylvania (13.9%).

the decreases, the disparity in homicide rates between non-Hispanic black males and non-Hispanic white males is still pronounced. Although the rate among non-Hispanic black males aged 15–29 years in 2009 is half the rate reported in 1993 (75 vs. 158 per 100,000, respectively) (*1*), similar decreases have been reported for males of similar age and of other races/ethnicities.

Socioeconomic factors play a substantial role in homicide disparities by race/ethnicity, sex, age, and geographic area. For example, racial/ethnic minorities are more likely to live in disadvantaged neighborhoods (*11*). Residential areas with high levels of poverty, unemployment, and jobs with low wages can increase risk of income-generating crimes such as burglary and robbery, stress and conflict, and substance abuse among residents (*18*,*19*), all factors that increase risk for homicide and violence (*11*,*20*). One longitudinal study reported that after controlling for similar socioeconomic factors, such as living in a disadvantaged community, being on welfare, and having a young or single parent, race was not predictive of being a homicide offender (*21*). Similar risk factors might explain the differences in homicide rates by age and geographic area. Future studies controlling for socioeconomic factors might offer additional support for this conclusion.

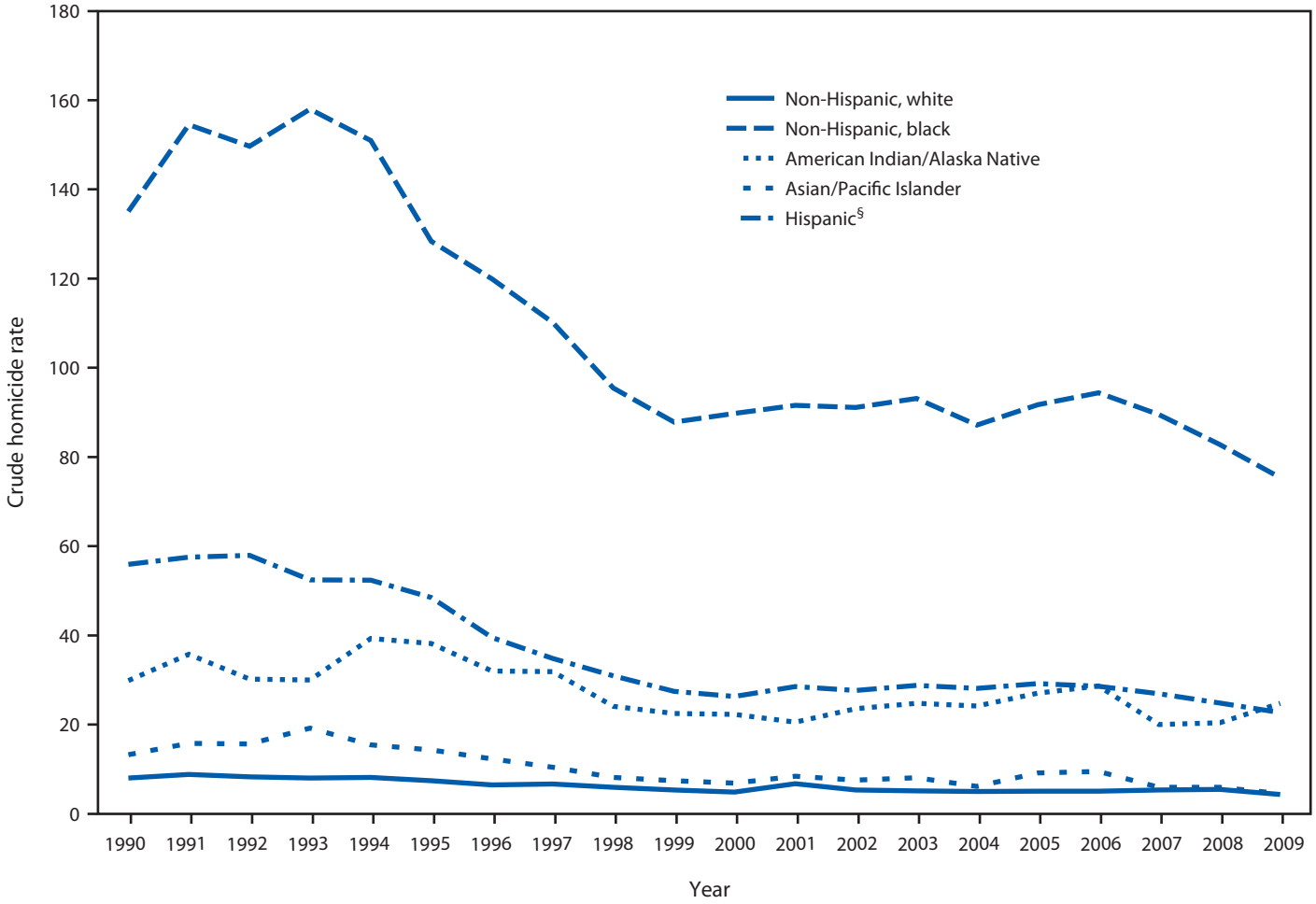
Prevention strategies that can change the characteristics of communities, relationships, and persons that are associated with violence perpetration might reduce violence rates not only for all persons in the United States but also among groups with the highest rates of violence (*22*). Certain promising strategies have been developed that use multicomponent approaches, involve coordinated efforts by numerous relevant stakeholders, and include an appropriate mix of both universal interventions and interventions that address the needs of groups at highest risk for violence (*22*). Communities That Care (*23*,*24*), Promoting School-community-university Partnerships to Enhance Resilience (PROSPER) (*25*,*26*), Striving to Reduce Youth Violence Everywhere (STRYVE) (available at http://www.safeyouth.gov), and Urban Networks to Increase Thriving Youth (UNITY) (available at http://preventioninstitute.org/unity.html) are examples of coalition-based operating systems and violence prevention initiatives that can assist communities in developing the type of tailored, broad strategies described. Promising multicomponent programs such as CeaseFire (*27*) and Safe Streets (*28*), which work to change community norms regarding violence, cultivate skills for using alternatives to violence, and interrupt escalating tensions, also are promising strategies for preventing general violence, shootings, and shooting-related homicides.

The high homicide rates among youths in late adolescence and young adulthood suggest that the school years are an important developmental point for intervention. Creating a positive school environment is an example of one way to improve youths' access to a safe, stable, nurturing setting; promote norms of nonviolence; facilitate the formation of supportive and positive social relationships; and maximize the development of social and problem-solving skills (*29*). The influences, experiences, and socialization provided by such school environments could help youths become more adept at navigating problematic interactions and adapting to challenges and difficulties that could lead to serious violence (*29*). Such school environments might particularly be important for youths who lack other positive influences (*29*).

Limitations

These findings in this report are subject to at least three limitations. First, small numbers of homicides precluded stable rate estimations among some populations. Second, data on individual and environmental risk factors for homicide were unavailable, which precluded closer examination of possible sources of disparities by age, sex, race/ethnicity, and geography. Third, racial misclassification might result in overestimated homicide rates for non-Hispanic blacks and non-Hispanic whites and underestimated rates for AI/ANs, A/PIs, and Hispanics (*8*).

FIGURE 2. Crude homicide rates* among males aged 15–29 years, by racial/ethnic group† and year — National Vital Statistics System, United States, 1990–2009



Abbreviations: ICD-10 = *International Classification of Diseases, 10th Revision*; ICD-9 = *International Classification of Diseases, 9th Revision*.
* ICD-10 to ICD-9 comparability ratio for homicides = 0.998.
† Number of deaths per 100,000 population.
§ Persons of Hispanic ethnicity might be of any race or combination of races.

Conclusion

Effective evidence-based strategies to reduce violence are available (*30*); however, additional work is needed to build organizational and community capacity to make best use of these programs, policies, and strategies. Many health-related disparities can be reduced by altering influential socially embedded conditions such as 1) neighborhood living conditions, 2) opportunities for learning and capacity for development, and 3) employment opportunities and community development (*31*,*32*). Because these outcomes mediate the effects of social determinants of health, they might be viable mechanisms for changing or eliminating social influences that create or increase disparities in homicide rates. Promising strategies such as implementing business or community improvement districts might help decrease levels of violent crimes by increasing employment opportunities for local residents and creating physical or cultural environments that are more aesthetically and economically attractive (*33*,*34*). These community-level strategies might reduce or offset the effects of poverty, improve the social environments of communities, and implement safety measures (*33*,*34*). To eliminate homicide disparities, more research is needed to understand the scope of the problem and the risk and protective factors implicated in these violent events, evaluate programs that prevent and reduce violence, and better understand how to adapt, disseminate, and implement these strategies in the communities and populations in greatest need.

Acknowledgment

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Infant Deaths — United States, 2005–2008

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Introduction

Infant mortality rates are associated with maternal health, quality of and access to medical care, socioeconomic conditions, and public health practices, which makes infant mortality an increasingly important public health concern (*1,2*). After large declines throughout the twentieth century, the U.S. infant mortality rate did not decline significantly during 2000–2005 (*3*). Analysis of 2000–2004 infant mortality in the United States indicated considerable disparities by race and Hispanic origin (*4*). Race and ethnic disparities in U.S. infant mortality have been apparent since vital statistics data began to be collected more than 100 years ago. These disparities have persisted over time, and research indicates that not all groups have benefited equally from social and medical advances (*5–7*).

The infant mortality analysis and discussion that follows is part of the second CDC Health Disparities and Inequalities Report (CHDIR) (*4*). The 2011 CHDIR (*8*) was the first CDC report to assess disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health-care access. The criteria for inclusion of topics that are presented in the 2013 CHDIR are based on criteria that are described in the 2013 CHDIR Introduction (*9*). This report provides more current information on infant mortality rates on the basis of race/ethnicity, mother's place of birth, and by state and region. The purposes of this infant mortality analysis are to raise awareness of differences in infant mortality by selected maternal and infant characteristics, and to prompt actions to reduce these disparities.

Methods

To estimate disparities in infant mortality rate by selected characteristics and specified group, CDC analyzed data from the United States linked birth/infant death data sets (linked files) for 2005 through 2008 (the latest year for which accurate race/ethnicity data are available) (5). In these data sets, information from the birth certificate is linked to information from the death certificate for each infant (aged <1 year) who dies in the United States. Characteristics analyzed included sex, maternal race/ethnicity, maternal place of birth, and the state of residence of the mother at the time of birth. Household income and educational attainment were not analyzed because they were either not collected or not collected consistently on birth certificates. Maternal race was defined as white, black, Asian/Pacific Islander, and American Indian/Alaska native. Ethnicity is defined as Hispanic or non-Hispanic. Hispanic data were further subdivided into Mexican, Puerto Rican, Cuban, and Central and South American. Place of birth was defined as born in the 50 states and DC, or born outside of the 50 states and DC.

Infant mortality rates were calculated as the number of infant deaths per 1,000 live births in the specified group (i.e., by maternal race/Hispanic origin, maternal birthplace, state of residence, and infant gender). Ratios of non-Hispanic black to non-Hispanic white infant mortality rates were computed to assess the magnitude of the disparity in non-Hispanic black and non-Hispanic white infant mortality rates by state. Data from 2006–2008 were aggregated to obtain statistically reliable state-specific rates by race and Hispanic origin; rates are not shown for cells with <20 infant deaths. Rates based on <20 infant deaths are not shown separately as they do not meet standards of reliability or precision. Differences between infant mortality rates were assessed for statistical significance by using the z test ($p<0.05$).

Disparities were measured as the deviations from a "referent" category rate. Absolute difference was measured as the simple difference between a population subgroup mortality rate and the rate for its respective reference group. The relative difference, a percentage, was calculated by dividing the difference by the value in the referent category and multiplying by 100.

Results

The U.S. infant mortality rate declined 10% from 2005 to 2010, from 6.86 infant deaths per 1,000 live births in 2005 to a preliminary estimate of 6.14 in 2010 (*5,13*). In 2008, the overall U.S. infant mortality rate was 6.61 infant deaths per 1,000 live births, with differences by race and Hispanic origin (Table 1). The highest infant mortality rate was for non-Hispanic black women (12.67), with a rate 2.3 times that for non-Hispanic white women (5.52) (Table 1). Compared with

TABLE 1. Infant mortality rates* by selected characteristics — United States, 2005 and 2008

Characteristic	2005 Infant mortality rate	2005 Absolute difference (rate)	2005 Relative difference (%)	2008 Infant mortality rate	2008 Absolute difference (rate)	2008 Relative difference (%)
Total	**6.86**			**6.61**		
Sex						
Male	7.56	1.4	23.5	7.22	1.3	20.9
Female	6.12	Ref.	Ref.	5.97	Ref.	Ref.
Race/Ethnicity†						
White, non-Hispanic	5.76	Ref.	Ref.	5.52	Ref.	Ref.
Black, non-Hispanic	13.63	7.9	136.6	12.67	7.2	129.5
Asian/Pacific Islander§	4.89	-0.9	-15.1	4.51	-1.0	-18.3
American Indian/Alaska Native	8.06	2.3	39.9	8.42	2.9	52.5
Hispanic¶	5.62	-0.1	-2.4	5.59	0.1	1.3
Mexican	5.53	-0.2	-4.0	5.58	0.1	1.1
Puerto Rican	8.30	2.5	44.1	7.29	1.8	32.1
Cuban	4.42	-1.3	-23.3	4.90	-0.6	-11.2
Central and South American	4.68	-1.1	-18.8	4.76	-0.8	-13.8
Place of birth						
Born in the 50 states and DC	7.26	2.2	42.9	6.99	1.9	38.4
Born outside the 50 states and DC	5.08	Ref.	Ref.	5.05	Ref.	Ref.

Abbreviation: Ref. = Referent.
Source: CDC. Period linked birth/infant death public-use data files (Downloadable data files). Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics. Available at http://www.cdc.gov/nchs/data_access/VitalStatsOnline.htm.
* Infant mortality rate = number of deaths among infants aged <1 year per 1,000 live births in a specific group.
† Race and Hispanic origin are reported separately on birth certificates. Race categories are consistent with the 1977 Office of Management and Budget standards. Thirty states reported multiple-race data on the birth certificate in 2008. For the <2% of events in these states that reported multiple race data, the multiple-race data were bridged to the single race categories of the 1977 standards for compatibility with other states.
§ Includes persons of Hispanic or non-Hispanic origin.
¶ Persons of Hispanic ethnicity might be of any race or combination of races.

non-Hispanic white women, infant mortality rates were 53% higher for American Indian/Alaska Native* women (8.42) and 32% higher for Puerto Rican women (7.29). Infant mortality rates for Asian/Pacific Islanders* (4.51) and Central or South American women (4.76) were lower than those for non-Hispanic white women. From 2005 to 2008, infant mortality rates declined approximately 4% for the total population and for non-Hispanic white women, approximately 7% for non-Hispanic black women, and 12% for Puerto Rican women; changes for other racial/ethnic groups were not statistically significant. When examined by place of birth of the mother, the 2008 infant mortality rate was 38% higher for women born in the 50 states and DC than for women born elsewhere (Table 1). The infant mortality rate was 21% higher for male than for female infants.

Differences also exist in infant mortality rates between various states, with a twofold or greater difference in rates between the states with the highest and lowest rates for the total population and for each race/ethnic group studied. Across the United States, infant mortality rates are generally higher in the South and Midwest and lower in other parts of the country. During 2006–2008, total infant mortality rates ranged from a high of 11.97 per 1,000 live births for DC and Mississippi 10.16 to a low of 4.94 for Massachusetts and Utah. However, because DC has high concentrations of high-risk women, its rate is more appropriately compared with rates for other large U.S. cities. For non-Hispanic white women, Alabama had the highest rate (7.67) and New Jersey the lowest rate (3.78). For non-Hispanic black women, the rate was highest in Hawaii (18.54) and lowest in Washington (7.66). For Hispanic women, the rate was highest in Pennsylvania (7.94) and lowest in Louisiana (3.92).

Ratios of non-Hispanic black to non-Hispanic white infant mortality rates were computed to assess the magnitude of the disparity in non-Hispanic black and non-Hispanic white infant mortality rates by state (Figure). Although the average rate ratio in the United States was 2.35, seven areas (Connecticut, DC, Hawaii, Massachusetts, New Jersey, New York, and Wisconsin) had rate ratios of 2.60 or greater. In contrast, seven other states (Arkansas, Alabama, Kentucky, Mississippi, Oklahoma, Oregon, and Washington) had ratios <2.10. Rate ratios are not shown for states with <20 non-Hispanic black infant deaths.

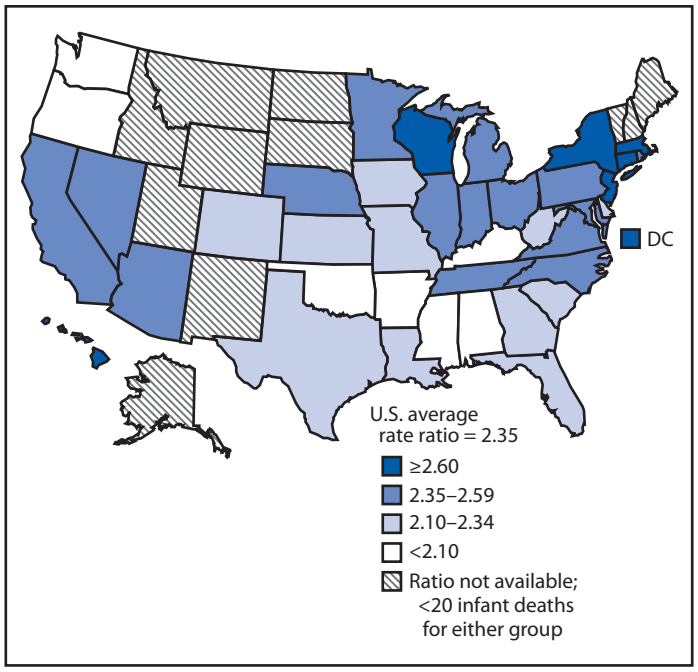
* Includes Hispanic and non-Hispanic women.

TABLE 2. Infant mortality rates,* by race and Hispanic origin of mother and by state — United States, 2006–2008

	Total	White, non-Hispanic	Black, non-Hispanic	Hispanic
United States	**6.68**	**5.58**	**13.11**	**5.50**
Alabama	**9.47**	7.67	13.73	7.50
Alaska	**6.54**	4.10	†	†
Arizona	**6.54**	6.04	14.85	6.13
Arkansas	**7.89**	6.70	13.53	5.71
California	**5.12**	4.51	10.72	4.88
Colorado	**6.04**	5.13	11.97	6.96
Connecticut	**6.27**	4.80	13.11	6.35
Delaware	**8.03**	5.89	13.46	7.10
District of Columbia	**11.97**	4.46	17.68	†
Florida	**7.21**	5.71	12.83	5.38
Georgia	**8.02**	5.87	12.70	5.06
Hawaii	**6.04**	4.58	18.54	4.98
Idaho	**6.46**	5.95	†	7.91
Illinois	**7.10**	5.70	13.45	5.91
Indiana	**7.44**	6.47	15.36	6.28
Iowa	**5.43**	5.06	11.10	6.61
Kansas	**7.50**	6.94	14.62	7.15
Kentucky	**7.04**	6.62	12.13	5.07
Louisiana	**9.38**	6.62	13.88	3.92
Maine	**6.04**	5.90	†	†
Maryland	**7.98**	5.50	12.98	5.33
Massachusetts	**4.94**	4.04	10.90	6.08
Michigan	**7.56**	5.87	14.70	7.09
Minnesota	**5.55**	4.77	11.33	4.64
Mississippi	**10.16**	7.07	13.82	6.64
Missouri	**7.34**	6.18	14.49	5.12
Montana	**6.47**	5.89	†	†
Nebraska	**5.93**	5.33	12.98	5.21
Nevada	**6.10**	5.29	12.54	5.69
New Hampshire	**5.10**	5.00	†	†
New Jersey	**5.35**	3.78	12.06	5.12
New Mexico	**5.81**	6.12	†	5.60
New York	**5.57**	4.29	11.29	5.01
North Carolina	**8.29**	6.17	14.62	6.32
North Dakota	**6.44**	5.63	†	†
Ohio	**7.74**	6.25	15.03	6.88
Oklahoma	**7.85**	7.52	13.91	5.09
Oregon	**5.41**	5.22	10.16	5.36
Pennsylvania	**7.52**	5.78	14.04	7.94
Rhode Island	**6.47**	4.28	10.56	7.77
South Carolina	**8.30**	6.04	12.97	5.87
South Dakota	**7.15**	5.59	†	†
Tennessee	**8.37**	6.54	15.36	6.47
Texas	**6.22**	5.48	11.69	5.61
Utah	**4.94**	4.73	†	5.03
Vermont	**5.12**	4.95	†	†
Virginia	**7.24**	5.48	13.40	5.97
Washington	**5.01**	4.33	7.66	5.28
West Virginia	**7.38**	7.11	14.93	†
Wisconsin	**6.57**	5.37	15.14	6.34
Wyoming	**7.05**	6.32	†	7.90

* Infant mortality rate = number of deaths among infants aged <1 year per 1,000 live births in a specific group.
† Does not meet standards of reliability or precision; based on <20 deaths in the numerator.

FIGURE. Ratio of non-Hispanic black and non-Hispanic white infant mortality rates,* by state — United States, 2006–2008



Source: National Vital Statistics System, NCHS, CDC.
* Infant mortality rate = number of deaths among infants aged <1 year per 1,000 live births in a specific group.

Discussion

The U.S. infant mortality rate has declined 10% from 2005 (6.86) to 2010 (preliminary estimate: 6.14) (*5,13*); however, disparities have persisted. Higher infant mortality rates for male than for female infants have persisted for many years and occur among most world populations, and have been explained in part by differences in genetic susceptibility to disease (*14*). Differences in infant mortality rates by race/ethnicity, maternal birthplace, and geographic area might reflect in part different population profiles, with regard to sociodemographic and behavioral risk factors. For example, infant mortality rates are higher than the U.S. average for adolescents, women aged ≥35 years, unmarried mothers, smokers, those with lower educational levels, or inadequate prenatal care (*5*). Substantial differences between groups in income and access to health care also might contribute to differences in infant mortality (*15*). Population groups with the lowest infant mortality rates tended to have a smaller percentage of births to women with some or all of these characteristics, whereas groups with the highest infant mortality rates tended to have a higher percentage of births in women with some or all of these characteristics. Other factors that might contribute to racial/ethnic differences in infant mortality include differences in maternal preconception health, infection, stress, racism, and social and cultural

differences (*7,16–21*). However, the influence of an individual risk factor can vary considerably between population groups, indicating different medical profiles and life experiences for women of different backgrounds (*7,16,21–22*).

The risk factors for infant mortality discussed earlier (e.g., maternal age, tobacco use, lower income or educational levels, and inadequate prenatal care) are very similar to the risk factors for preterm or low birthweight delivery, and these risk factors can affect infant mortality either directly or through the mechanism of preterm or low birthweight delivery. In 2008, the percentage of infants born preterm (<37 completed weeks' gestation) was higher for non-Hispanic black (17.5%), Puerto Rican (14.1%), and American Indian/Alaska Native (13.6%) mothers, than for non-Hispanic white mothers (11.1%) (*5*). Infant mortality rates are substantially higher for preterm and low birthweight infants, and even limited changes in the percentages of preterm or low birthweight births can have a major impact on infant mortality (*5,6*). In fact, the recent decline in U.S. infant mortality is linked to a recent decline in the percentage of preterm births, from a high of 12.8% in 2006 to 12.0% in 2010 (*5,22*). Still the U.S. infant mortality rate was higher than for the majority of other developed countries, in part because of a substantially higher percentage of preterm births, a critical risk factor for infant mortality (*23–24*).

Limitation

The findings in this report are subject to at least one limitation. Differences in infant mortality rates for smaller states and certain race/ethnic groups (e.g., American Indians/Alaska Natives, Asians/Pacific Islanders, and Cubans) should be interpreted with caution, as small numbers of infant deaths (i.e., <20) in specific subcategories might lead to a lack of statistical precision.

Conclusion

Infant mortality remains a complex and multifactorial problem that will continue to challenge researchers and policymakers in the years ahead. Despite recent declines in the overall infant mortality rate, the longstanding disparities in infant mortality by racial/ethnic group, mother's birthplace, and geographic area persist. One of the *Healthy People 2020* objectives is to achieve an infant mortality rate of 6.0 for the total population and for each race/ethnic group. Although the U.S. infant mortality rate of 6.14 in 2010 approximates the *Healthy People 2020* objective, rates for several racial/ethnic groups are substantially higher than the goal (*25*). Prevention of preterm birth is critical to both lowering the overall infant mortality rate and to reducing racial/ethnic disparities (*5,6*).

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Motor Vehicle–Related Deaths — United States, 2005 and 2009

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Introduction

Motor vehicle crashes are a leading cause of death for children, teenagers, and young adults in the United States (*1*). In 2009, approximately 36,000 persons were killed in motor vehicle crashes, and racial/ethnic minorities were affected disproportionally (*1,2*). Approximately 4.3% of all American Indian/Alaska Native (AI/AN) deaths and 3.3% of all Hispanic deaths were attributed to crashes, whereas crashes were the cause of death for <1.7% of blacks, whites, and Asian/Pacific Islanders (A/PI) (*1*).

The motor vehicle–related death rate analysis and discussion that follows is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*3*) was the first CDC report to take a broad view of disparities across a wide range of diseases, behavioral risk factors, environmental exposures, social determinants, and health care access. The topic presented in this report is based on criteria that are described in the CHDIR Introduction (*4*). The report that follows provides more current information to what was presented in the 2011 CHDIR (2). The purposes of this motor vehicle–related death report are to discuss and raise awareness of differences in the characteristics of persons who die from motor vehicle–related crashes and to prompt actions to reduce disparities.

Methods

To assess disparities in motor vehicle–related death rates by race/ethnicity and sex, CDC analyzed data from the National Vital Statistics System (NVSS). NVSS does not collect data on other variables such as education and income. Race/ethnicity was divided into five mutually exclusive categories: non-Hispanic whites, non-Hispanic blacks, non-Hispanic AI/ANs, non-Hispanic A/PIs, and Hispanics of all races.

Bridged-race postcensal population estimates from the U.S. Census Bureau were used to calculate death rates. Death rates and corresponding 95% confidence intervals were calculated and age-adjusted to the 2000 standard U.S. population. Absolute and relative differences in rates were calculated by sex and race/ethnicity. Disparities were measured as the deviations from a "referent" category rate. The absolute difference was measured as the simple difference between a population subgroup estimate and the estimate for its respective reference group. The relative difference, a percentage, was calculated by dividing the difference by the value in the referent category and multiplying by 100. Differences between age-adjusted death rates in 2005 and 2009 were compared using the z statistic based on a normal approximation, and p values ≤0.05 were considered statistically significant.

Results

The overall motor vehicle–related age-adjusted death rate was 11.7 deaths per 100,000 population in 2009 (Table 1). The death rate for males was 2.5 times that for females (16.8 vs. 6.8). In 2009, AI/ANs consistently had the highest motor vehicle–related death rates among both males and females (Table). Among males, the AI/AN death rate (33.6) was approximately 2–5 times the rates of other races/ethnicities. Black males had the second-highest death rate (18.5), followed by whites (17.3), Hispanics (14.7), and A/PIs (6.3). Among females, the AI/AN motor vehicle–related death rate (17.3) was approximately 2-4 times the rates of other races/ethnicities. White females had the second-highest death rate (7.1), followed by blacks (6.4), Hispanics (5.7), and A/PIs (4.0).

Between 2005 and 2009, age-adjusted death rates showed statistically significant declines by sex among all race/ethnicities with the exception of AI/AN women (Table). The greatest decrease in rates for males occurred among AI/AN, from a death rate of 42.7 per 100,000 population in 2005 to 33.6 in 2009 (absolute rate change: -9.1). Among females, the greatest decrease occurred among whites, from a death rate of 9.4 in 2005 to 7.1 in 2009 (absolute rate change: -2.3).

Discussion

Evidence-based strategies to reduce overall motor vehicle–related deaths and injuries include primary seat belt laws (i.e., legislation allowing police to stop a vehicle solely for a safety belt violation), age- and size-appropriate child safety seat and booster seat use laws, focused child restraint distribution plus education programs, ignition interlock devices (i.e., devices that disable a vehicle's ignition after detection of alcohol in the

TABLE. Age-adjusted rates* of motor vehicle–related deaths, by race/ethnicity, sex, and year — National Vital Statistics System, United States, 2005 and 2009

Characteristic	2005				2009				Absolute change in rate from 2005 to 2009	P-value for difference between 2005 and 2009
	Age-adjusted death rate	(95% CI)	Absolute difference (rate)	Relative difference (%)	Age-adjusted death rate	(95% CI)	Absolute difference (rate)	Relative difference (%)		
Total	**15.2**	**(15.1–15.4)**	—	—	**11.7**	**(11.6–11.8)**	—	—	**-3.55**	**<0.0001**
Sex										
Male	21.8	(21.6–22.1)	12.9	143.4	16.8	(16.6–17.0)	10.0	148.2	-5.0	<0.0001
Female	9.0	(8.8–9.1)	Ref.	Ref.	6.8	(6.6–6.9)	Ref.	Ref.	-2.2	<0.0001
Race/Ethnicity										
White	15.6	(15.41–5.8)	Ref.	Ref.	12.1	(11.9–12.2)	Ref.	Ref.	-3.5	<0.0001
Black	14.9	(14.5–15.4)	-0.7	-4.2	12.0	(11.6–12.3)	-0.1	-0.9	-3.0	<0.0001
Hispanic†	14.8	(14.4–15.3)	-0.8	-4.9	10.4	(10.1–10.7)	-1.7	-14.0	-4.5	<0.0001
American Indian/ Alaska Native	30.6	(28.3–32.8)	15.0	96.0	25.2	(23.2–27.2)	13.2	109.0	-5.4	0.0004
Asian/Pacific Islander	7.7	(7.2–8.2)	-7.9	-50.7	5.1	(4.85–.5)	-6.9	-57.5	-2.6	<0.0001
Race/Ethnicity (Males)										
White	22.1	(21.8–22.4)	Ref.	Ref.	17.3	(17.0–17.5)	Ref.	Ref.	-4.9	<0.0001
Black	23.3	(22.6–24.1)	1.2	5.5	18.5	(17.8–19.1)	1.2	6.9	-4.9	<0.0001
Hispanic	21.4	(20.7–22.2)	-0.7	-3.1	14.7	(14.2–15.3)	-2.6	-14.8	-6.7	<0.0001
American Indian/ Alaska Native	42.7	(38.9–46.5)	20.6	93.1	33.6	(30.3–36.9)	16.3	94.6	-9.1	0.0004
Asian/Pacific Islander	9.7	(8.9–10.5)	-12.4	-56.2	6.3	(5.7–7.0)	-11.0	-63.4	-3.4	<0.0001
Race/Ethnicity (Females)										
White	9.4	(9.2–9.6)	Ref.	Ref.	7.1	(6.9–7.2)	Ref.	Ref.	-2.3	<0.0001
Black	7.9	(7.5–8.3)	-1.5	-16.2	6.4	(6.1–6.8)	-0.6	-9.1	-1.5	<0.0001
Hispanic	7.9	(7.5–8.4)	-1.5	-15.6	5.7	(5.4–6.1)	-1.3	-19.0	-2.2	<0.0001
American Indian/ Alaska Native	18.9	(16.4–21.4)	9.5	100.7	17.3	(15.0–19.5)	10.2	144.6	-1.6	0.3469
Asian/Pacific Islander	5.9	(5.3–6.5)	-3.5	-37.2	4.0	(3.6–4.5)	-3.0	-42.9	-1.9	<0.0001

Abbreviation: 95% CI = 95% confidence interval; Ref. = Referent.
* Age adjusted death rates per 100,000 population.
† Persons of Hispanic ethnicity might be of any race or combination of races.

driver's breath), sobriety checkpoints, minimum drinking age laws (21 years), and 0.08 g/dL blood alcohol concentration laws (*5*). Tailoring these strategies to the unique cultures of different racial/ethnic groups can help reduce disparities in motor vehicle–related mortality (*6,7*).

To address the disparities in motor vehicle–related death and injury among AI/AN, CDC funded four American Indian tribes during 2004–2009 to tailor, implement, and evaluate evidence-based interventions to reduce motor vehicle–related injury and death in their communities. These pilot programs were successful at increasing seat belt use, increasing child safety seat use, and decreasing motor vehicle crashes (*6,7*). Across the four pilot programs, relative increases in drivers' observed seat belt use ranged from a 38% increase to a 315% increase and child safety seat use increases ranged from a 45% increase to an 85% increase in use. Declines in motor vehicle crashes ranged from a 29% decrease to a 36% decrease in the number of motor vehicle crashes and the number of motor vehicle crashes in which someone was injured, respectively. As a result, CDC has expanded the tribal programs and is funding eight new tribes during 2010–2014.

Limitations

The findings in this report are subject to at least one limitation. Because NVSS data are extracted from death certificates and not self-reported, some racial misclassification is likely, particularly for AI/AN (*8*).

Conclusion

Despite the recent declines in motor vehicle–related death rates noted in this report, the need remains for increased use of evidence-based strategies to reduce disparities. More translational research is warranted on the scalability of interventions that have successfully been tailored to communities of different racial/ethnic and cultural backgrounds.

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Suicides — United States, 2005–2009

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Introduction

Injury from self-directed violence, which includes suicidal behavior and its consequences, is a leading cause of death and disability. In 2009, suicide was the 10th-leading cause of death in the United States and the cause of 36,909 deaths (*1*). In 2005, the estimated cost of self-directed violence (fatal and nonfatal treated) was $41.2 billion (including $38.9 billion in productivity losses and $2.2 billion in medical costs) (*2*). Suicide is a complex human behavior that results from an interaction of multiple biological, psychological, social, political, and economic factors (*3*). Although self-directed violence affects members of all racial/ethnic groups in the United States, it often is misperceived to be a problem affecting primarily non-Hispanic white males (*4*).

This report is part of the second CDC Health Disparities and Inequalities Report (CHDIR). The 2011 CHDIR (*5*) was the first CDC report to assess disparities across a wide range of diseases, behavior risk factors, environmental exposures, social determinants, and health-care access. The topic presented in this report is based on criteria that are described in the 2013 CHDIR Introduction (*6*). This report updates information that was presented in the 2011 CHDIR (*7*) by providing more current data on suicide in the United States. The purposes of this report are to discuss and raise awareness of differences in the characteristics of suicide decedents and to prompt actions to reduce these disparities.

Methods

To determine differences in the prevalence of suicide by sex, race/ethnicity, age, and educational attainment in the United States, CDC analyzed 2005–2009 data from the Web-based Injury Statistics Query and Reporting System — Fatal (WISQARS Fatal) (*8*) and the National Vital Statistics System (NVSS). In this report, NVSS data provided as of February 2012 were used. The 2009 data were used to describe the overall patterns in suicides. The aggregate 2005–2009 reporting period was used to describe patterns for the combined age group and race/ethnicity because sample sizes for any single year were limited. Mortality data were drawn from CDC's National Vital Statistics System (NVSS), which collects death certificate data filed in the 50 states and the District of Columbia (*1*). Data in this report include suicides from any cause during 2005–2009. The WISQARS database contains mortality data based on NVSS and population counts for all U.S. counties based on U.S. Census data. Counts and rates of death can be obtained by underlying cause of death, mechanism of injury, state, county, age, race, sex, year, injury cause of death (e.g., firearm, poisoning, or suffocation) and by manner of death (e.g., suicide, homicide, or unintentional injury) (*8*).

NVSS codes racial categories as non-Hispanic white, non-Hispanic black, American Indian/Alaska Native (AI/AN), and Asian/Pacific Islander (A/PI); ethnicity is coded separately as Hispanic or non-Hispanic (*1*). Persons of Hispanic ethnicity might be of any race or combination of races. Absolute differences in rates between two populations were compared using a test statistic, z, based on a normal approximation at a critical value of $\alpha = 0.05$ (*9*).

Educational attainment is recorded by two methods on death certificates. In 28 states* and the District of Columbia (DC), the 2003 version of the standard certificate of death is used (which collects the highest degree completed), whereas 20 states† use the 1989 version of the certificate (which collects the number of years of education completed). For this reason, these two groups of states were analyzed separately. Death rates by educational attainment were based on population estimates from the U.S. Census Bureau's 2009 American Community Survey (ACS) (*10*). Data for Georgia and Rhode Island were excluded because educational attainment was not recorded on their death certificates. Rates are presented only for persons aged ≥25 years because persons aged <25 years might not have completed their formal education (*9*).

* Arkansas, California, Connecticut, Delaware, Florida, Idaho, Illinois, Indiana, Kansas, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, South Carolina, South Dakota, Texas, Utah, Vermont, Washington, and Wyoming.

† Alabama, Alaska, Arizona, Colorado, Hawaii, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, North Carolina, Pennsylvania, Tennessee, Virginia, Wisconsin, and West Virginia.

Unadjusted (crude) suicide rates were based on resident population data from the U.S. Census Bureau (*10*). Rates based on <20 deaths were considered unreliable and not included in the analysis. Confidence intervals were calculated in two ways: 1) groupings of <100 deaths were calculated by using the gamma method (*9*), and 2) groupings of ≥100 deaths were calculated by using a normal approximation (*9*).

Results

In 2009, a total of 36,909 suicides occurred in the United States, 83.5% of which were among non-Hispanic whites, 7.0% among Hispanics, 5.5% among non-Hispanic blacks, 2.5% among A/PIs, and 1.1% among AI/ANs (Table). Although AI/ANs represented the smallest proportion of suicides of all racial/ethnic groups, they shared the highest rates with whites. Overall, the crude suicide rate for males (19.2 per 100,000 population) was approximately four times higher than the rate for females (5.0 per 100,000 population). In each of the racial/ethnic groups, suicide rates were higher for males than for females, but the male-female ratio for suicide differs among these groups. Among non-Hispanic whites, the male-female ratio was 3.8:1; among Hispanics it was 4.5:1; among non-Hispanic blacks it was 4.7:1; among A/PIs it was 2.3:1; and among AI/ANs it was 2.8:1. These male-female ratios did not change significantly from those reported previously (*7*).

Overall, suicide rates varied by the level of educational attainment. Persons with the highest educational attainment had the lowest rates, those with the lowest educational attainment had intermediate rates, and those who had completed only the equivalent of high school (or 12 years of education) had the highest rates. This pattern was consistent for males, but the pattern of educational inequalities was different among females. Females with a lower educational level had the lowest suicide rates followed by those with the highest educational level, while those females with a high school education (12 years of education) had the highest suicide rates. For each version of the death certificate, whether overall or by sex, suicide rates differed significantly between levels of educational attainment, except that rates for females did not differ significantly between the lowest and highest educational attainment levels in the states on the basis of data from the 1989 death certificate version.

Suicide rates by race/ethnicity and age group demonstrated different patterns by racial/ethnic group, with the highest rates occurring among AI/AN adolescents and young adults aged 15–34 years (Figure). Rates among AI/ANs and non-Hispanic blacks were highest among adolescents and young adults, then declined or leveled off with increasing age, respectively. Among A/PIs and Hispanics, rates were highest among young adults in their early 20s, then leveled off among other adults but increased for those aged ≥65 years. In contrast, rates among non-Hispanic whites were highest among those aged 40–54 years. Although the 2009 overall rates for AI/ANs are similar to those of non-Hispanic whites, the 2005–2009 rates among adolescent and young adult AI/ANs aged 15–29 years were substantially higher.

Discussion

The burden of suicide among AI/AN youths is considerably higher than that among other racial/ethnic groups. In 2009, suicide ranked as the fourth leading cause of years of potential life lost (YPLL) for AI/ANs aged <75 years, accounting for 6.8% of all YPLL among AI/ANs (*8*). Studies examining the historical and cultural context of suicide among AI/AN populations have identified multiple contributors to the high rates such as individual-level factors (e.g., alcohol and substance misuse and mental illness), family- or peer-level factors (e.g., family disruption or suicidal behavior of others), and societal-level factors (e.g., poverty, unemployment, discrimination, and historic trauma [i.e., cumulative emotional and psychological wounding across generations]) (*11*). Although certain protective factors exist within AI/AN communities, including spirituality and cultural continuity, these factors often are overwhelmed by the magnitude of the risk factors (*11*). If the overall suicide rate among the AI/AN population (highest rate) could be decreased to that of non-Hispanic blacks (lowest rate), 271 (66.6%) of the total 407 AI/AN deaths during 2009 might have been prevented. This idea of achieving rates of the lowest group is similar to that proposed in the *Healthy People 2010* objectives (*12*).

Prevention efforts and resources also should be directed toward adults aged 40–54 years because this age group has the highest (and increasing) suicide rate, but this age group often is overlooked as a group at which prevention efforts should focus (*13*). The National Strategy for Suicide Prevention has identified males in this age group as one of the populations at increased risk for suicide for whom additional surveillance, research, and prevention programs need to be focused (*14*).

The findings regarding the association of suicide rates and educational attainment are mixed in this study and in others. Certain studies (*15*) have found an inverse relationship between educational status and suicide among males (i.e., suicide rates decrease as educational attainment increases), whereas other studies (*16*) have not found this pattern. Patterns among females identified in other studies seem more consistent (i.e., the lowest rates occur among those with the lowest educational attainment) or find no association, but the

TABLE. Number and rate* of suicides, by selected characteristics — National Vital Statistics System, United States, 2009

Characteristic	Male			Female			Total			
	No. of deaths	Rate	(95% CI)†	No. of deaths	Rate	(95% CI)	No. of deaths	Rate	(95% CI)	% of total
Age group (yrs)										
0–4	0	—§	—	0	—	—	**0**	—	—	—
5–9	4	—	—	2	—	—	**6**	—	—	—
10–14	171	1.7	(1.4–1.9)	88	0.9	(0.7–1.1)	**259**	**1.30**	**(1.1–1.5)**	**0.7**
15–19	1,325	12.0	(11.3–12.6)	344	3.3	(2.9–3.6)	**1,669**	**7.75**	**(7.4–8.1)**	**4.5**
20–24	2,270	20.5	(19.6–21.3)	432	4.1	(3.8–4.5)	**2,702**	**12.5**	**(12.1–13.0)**	**7.3**
25–29	2,184	19.7	(18.8–20.5)	515	4.9	(4.5–5.3)	**2,699**	**12.5**	**(12.0–12.9)**	**7.3**
30–34	2,109	20.9	(20.0–21.8)	512	5.2	(4.8–5.7)	**2,621**	**13.2**	**(12.7–13.7)**	**7.1**
35–39	2,414	23.3	(22.4–24.3)	681	6.7	(6.2–7.2)	**3,095**	**15.1**	**(14.5–15.6)**	**8.4**
40–44	2,728	26.0	(25.0–27.0)	854	8.1	(7.6–8.7)	**3,582**	**17.1**	**(16.5–17.6)**	**9.7**
45–49	3,176	28.1	(27.1–29.1)	1,036	9.0	(8.4–9.5)	**4,212**	**18.5**	**(17.9–19.0)**	**11.4**
50–54	3,293	30.8	(29.8–31.9)	1,093	9.9	(9.3–10.5)	**4,386**	**20.2**	**(19.6–20.8)**	**11.9**
55–59	2,661	28.9	(27.8–30.0)	830	8.5	(7.9–9.1)	**3,491**	**18.4**	**(17.8–19.0)**	**9.5**
60–64	1,796	23.7	(22.6–24.8)	521	6.3	(5.8–6.9)	**2,317**	**14.7**	**(14.1–15.3)**	**6.3**
65–69	1,357	24.6	(23.3–25.9)	312	5.0	(4.4–5.5)	**1,669**	**14.2**	**(13.5–14.8)**	**4.5**
70–74	1,037	25.4	(23.9–27.0)	211	4.3	(3.7–4.9)	**1,248**	**13.9**	**(13.1–14.6)**	**3.4**
75–79	945	30.0	(28.1–31.9)	157	3.8	(3.2–4.4)	**1,102**	**15.0**	**(14.2–15.9)**	**3.0**
80–84	844	36.7	(34.3–39.2)	117	3.3	(2.7–3.9)	**961**	**16.5**	**(15.5–17.6)**	**2.6**
≥85	763	42.8	(39.8–45.8)	115	3.0	(2.4–3.5)	**878**	**15.6**	**(14.6–16.6)**	**2.4**
Unknown	12	—	—	0	—	—	**12**	—	—	—
Race/Ethnicity										
White, non-Hispanic	24,248	24.4	(24.1–24.7)	6565	6.4	(6.2–6.5)	**30,813**	**15.2**	**(15.1–15.4)**	**83.5**
Black, non-Hispanic	1,649	8.9	(8.5–9.3)	385	1.9	(1.7–2.1)	**2,034**	**5.2**	**(5.0–5.5)**	**5.5**
American Indian/Alaska Native	298	23.2	(20.6–25.8)	109	8.2	(6.7–9.8)	**407**	**15.6**	**(14.1–17.1)**	**1.1**
Asian/Pacific Islander	639	8.8	(8.1–9.5)	295	3.8	(3.4–4.3)	**934**	**6.2**	**(5.8–6.6)**	**2.5**
Hispanic¶	2,135	8.5	(8.2–8.9)	438	1.9	(1.7–2.1)	**2,573**	**5.3**	**(5.1–5.5)**	**7.0**
Unknown	120	—	—	28	—	—	**148**	—	—	**0.4**
Educational attainment (28 states and DC)**										
Less than high school graduate or equivalent	2,211	22.4	(21.5–23.4)	431	4.5	(4.0–4.9)	**2,642**	**13.6**	**(13.0–14.1)**	**14.0††**
High school graduate or equivalent	6,283	37.1	(36.2–38.0)	1,436	7.9	(7.5–8.4)	**7,719**	**22.0**	**(21.6–22.5)**	**40.8††**
Some college/college graduate	6,336	18.1	(17.7–18.6)	2,242	5.9	(5.7–6.1)	**8,578**	**11.8**	**(11.5–12.0)**	**45.3††**
Educational attainment (20 states§§)										
<12 yrs	1,548	33.3	(31.7–35.0)	244	5.4	(4.7–6.1)	**1,792**	**19.5**	**(18.6–20.5)**	**16.0††**
12 yrs	3,963	39.7	(38.4–40.9)	948	9.0	(8.4–9.6)	**4,911**	**23.9**	**(23.3–24.6)**	**43.9††**
≥13 yrs	3,273	18.5	(17.8–19.1)	1,203	6.0	(5.7–6.3)	**4,476**	**11.9**	**(11.5–12.2)**	**40.0††**
Total	**29,089**	**19.2**	**(19.0–19.4)**	**7,820**	**5.0**	**(4.9–5.1)**	**36,909**	**12.0**	**(11.9–12.1)**	**100.0**

Abbreviations: 95% CI = 95% confidence interval; DC = District of Columbia; GED =general equivalency diploma.

* Unadjusted (crude) suicide rates per 100,000 population.

† CIs based on <100 deaths were calculated by using a gamma method; CIs based on ≥100 deaths were calculated by using a normal approximation. Additional information available from Xu J, Kochanek KD, Murphy SL, Tejada-Vera B. Deaths: final data for 2007. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2010. National Vital Statistics Reports Vol. 58, No. 19. Available at http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf.

§ Rates based on <20 deaths were considered unreliable and not included in the analysis.

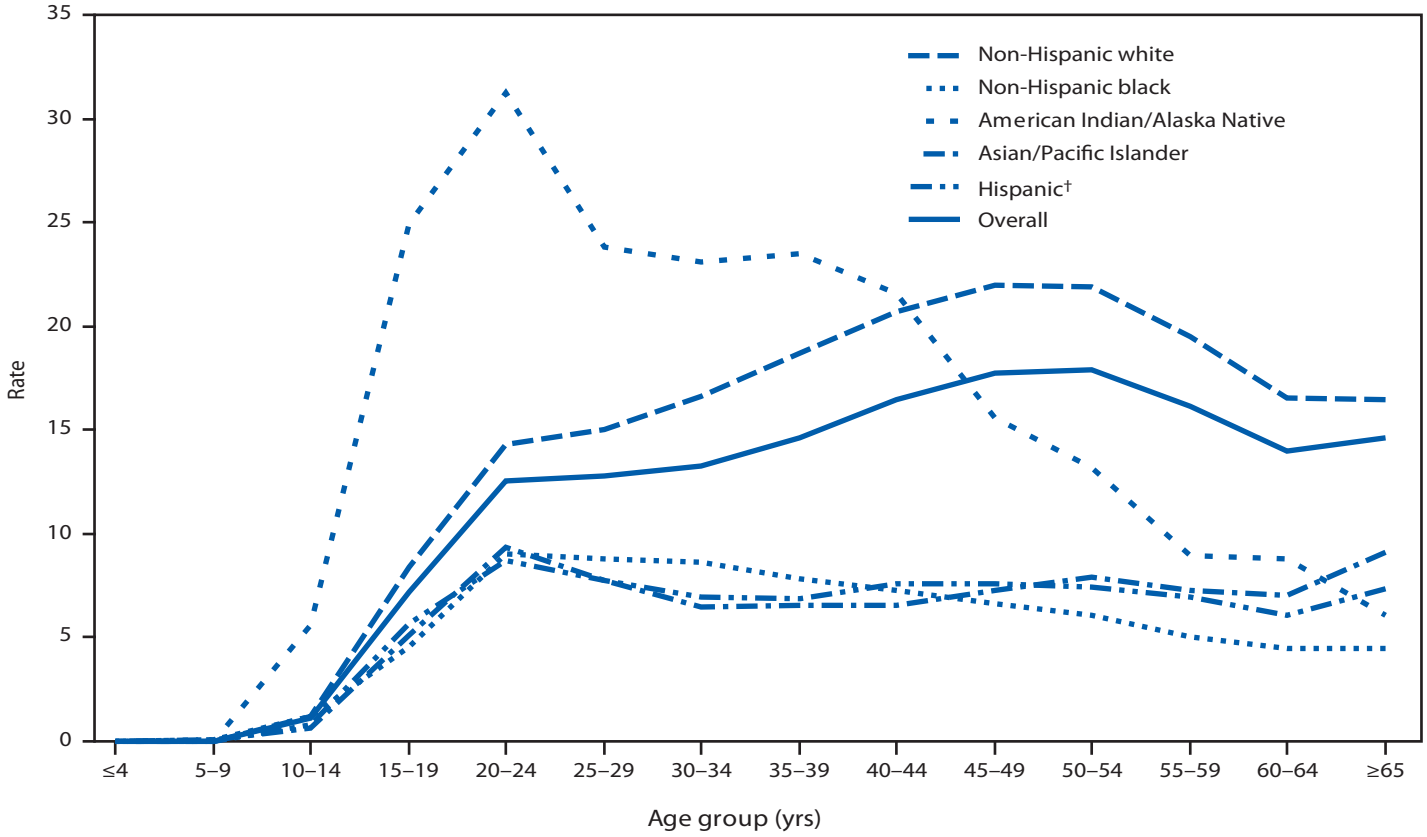
¶ Persons of Hispanic ethnicity might be of any race or combination of races.

** Arkansas, California, Connecticut, Delaware, Florida, Idaho, Illinois, Indiana, Kansas, Michigan, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, South Carolina, South Dakota, Texas, Utah, Vermont, Washington, and Wyoming used the 2003 version of the Standard Certificate of Death for persons aged ≥25 years.

†† Percentages reflect a percentage of the three levels of educational attainment shown for each set of states with their respective versions of the Standard Certificate of Death, not a percentage of the total count of suicides. Suicide counts shown do not include 1) 4,648 suicides for persons aged 0–24 years or whose age was unknown; 2) 1,104 suicides from Georgia and Rhode Island, which do not collect data on educational attainment; and 3) 1,039 suicides for whom the state in which the suicide occurred records educational attainment in a different version than that used by the deceased's state of residence.

§§ Alabama, Alaska, Arizona, Colorado, Hawaii, Iowa, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, North Carolina, Pennsylvania, Tennessee, Virginia, Wisconsin, and West Virginia used the 1989 version of the Standard Certificate of Death for persons aged ≥25 years. For rates, the definition of educational attainment differs for the numerator and the denominator. Additional information available from Xu J, Kochanek KD, Murphy SL, Tejada-Vera B. Deaths: final data for 2007. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2010. National Vital Statistics Reports Vol. 58, No. 19. Available at http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf.

FIGURE. Suicide rates,* by race/ethnicity and age group — National Vital Statistics System, United States, 2005–2009



* Unadjusted (crude) suicide rates per 100,000 population.
† Persons of Hispanic ethnicity might be of any race or combination of races.

underlying explanation is unclear (*17,18*). It has been suggested that studies on the association between education and suicide should perform more specific analysis (e.g., by examining combinations of age, ethnicity, culture, and sex variables to assess the true association) (*19*).

As a result of multiple challenges (e.g., narrow theoretical focus, lack of longitudinal studies to provide a range of modifiable risk and protective factors, and insufficient study designs), the evidence for the proven effectiveness of suicide prevention programs is sparse (*20*). Suicide prevention efforts often focus on counseling, education, and clinical intervention strategies for persons at high risk for suicide, neglecting a broader population-based approach (*20*). Although these efforts might assist those persons at the highest risk for adverse outcomes, they also require high levels of effort and commitment and might have a limited population-level impact, a critical goal of public health (*21*). In contrast, strategies that seek to address societal-level factors demonstrated to be associated with suicide (e.g., economic strain, poverty, and misuse of alcohol and other psychoactive substances) and improving the health-care system infrastructure in impoverished and underserved communities to address this problem might have a greater population impact but need additional development and testing (*22*).

Limitations

The findings presented in this report are subject to at least four limitations. First, suicides often are undercounted on death certificates, and studies have indicated that they are differentially undercounted for females and racial/ethnic minorities (*23*); therefore, the suicide rates in this analysis are likely to be underestimated. Second, injury mortality data likely underestimate by 25%–35% the actual numbers of deaths for AI/ANs and certain other racial/ethnic populations (e.g., Hispanics) because of the misclassification of race/ethnicity of decedents on death certificates (*24*). Third, data on educational attainment must be interpreted with caution because of misclassification of the decedent's years of education, which has been shown with comparisons between educational attainment as recorded on the death certificate versus that in census surveys (*9*). Finally, certain variables that have been associated with

suicidal behavior (e.g., psychiatric illness, sexual orientation, and social isolation) are not collected in U.S. mortality data, and therefore patterns of suicide based on these factors cannot be described. Other data sources (e.g., the National Violent Death Reporting System) that collect a broader array of information about the circumstances surrounding suicides and other violent deaths can provide additional insight (*25*).

Conclusion

Comprehensive suicide prevention programs focus on risk and protective factors, including coping skills, access to mental health treatment, substance misuse, and social support. However, only a limited number of programs have been developed specifically for higher risk or racial/ethnic minority populations (*3*). An example of a comprehensive prevention program that has been reported to reduce suicidal behavior within an AI/AN community is the Natural Helpers Program (*26*). This program includes health education and outreach activities to the community and at-risk persons, training for community members in identification of at-risk persons, and support for local behavioral health efforts like alcohol and substance abuse programs.

Strategies that address the health and well-being of persons at risk and that support the widespread implementation of culturally relevant and effective programs are needed to reduce the rates of suicide among groups that are disproportionately affected. To address some of these issues, CDC has focused on studying and promoting individual and organizational connectedness as a way to prevent suicide (*27*).

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Conclusion and Future Directions: CDC Health Disparities and Inequalities Report — United States, 2013

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The reports in this supplement document persistent disparities between some population groups in health outcomes, access to health care, adoption of health promoting behaviors, and exposure to health-promoting environments. Some improvements in overall rates and even reductions in some health disparities are noted; however, many gaps persist. These finding highlight the importance of monitoring health status, outcomes, behaviors, and exposures by population groups to assess trends and target interventions. In this report, disparities were found between race and ethnic groups across all of the health topics examined. Differences also were observed by other population characteristics. For example, persons with low socioeconomic status were more likely to be affected by diabetes, hypertension, and human immunodeficiency virus (HIV) infection and were less likely to be screened for colorectal cancer and vaccinated against influenza.

CDC plays a key role in addressing disparities by collecting and analyzing data and identifying, monitoring, and reporting differences and trends. CDC's national survey data and some state level data are used by the *Healthy People* initiative to monitor trends in health outcomes and determinants. The *Healthy People* initiative provides goals and objectives with 10-year targets designed to guide national health promotion and disease prevention efforts to improve the health of all persons in the United States. It is grounded in the principle that setting national objectives and monitoring progress can prompt action and improve health. The *Healthy People 2000* initiative had goals to reduce health disparities among persons in the United States. *Healthy People 2010* added elimination, not just reduction, of health disparities, and *Healthy People 2020* goes even further to achieve health equity, eliminate disparities, and improve the health of all population groups (*1*). State and local health departments use the *Healthy People* program as a way to track the effectiveness of local health initiatives.

This supplement provides decision makers with information that they can use to select interventions for certain populations to reduce health disparities. There is a growing awareness that limited health-care coverage and lack of access are only part of the reason why health disparities exist. Many of the strongest predictors of health are social, economic, and environmental factors. Reducing disparities requires national leadership to engage a diverse array of stakeholders; facilitate coordination and alignment among federal departments, agencies, offices, and nonfederal partners; champion the implementation of effective policies and programs; and ensure accountability (*2*). In addition, a complementary national strategy is required that focuses on a comprehensive, community-driven approach to reduce health disparities in the United States and achieve health equity through collaboration and synergy (*3*).

Data to Identify Health Disparities

A persistent barrier to documenting health disparities is the lack of data on certain population characteristics. All of the reports in this supplement (n=29) examined differences by race/ethnicity. The next most frequent population characteristics that were examined were age (n=24), sex (n=24), education (n=17), poverty (n=14), place of birth (n=11), and disability (n=nine). The least frequently reported characteristics were the language spoken at home (n=four) and sexual orientation (n=one). Only the paper on HIV infection reported rates by sexual orientation. Some data sources used in this report have very limited information on social and demographic characteristics. For example, death certificates do not have information on sexual orientation, poverty level, or disability (*4*). Some national health surveys have begun to collect data on sexual orientation, but there are issues that affect the usability of this data. In many instances, the sample sizes are too small to provide meaningful estimates for categories other

than heterosexual, and the response rate to the questions on sexual identity is often low. In addition, lack of familiarity with terminology used to describe sexual orientation might have resulted in some misclassification (*5*).

To promote uniform collection of data on sex, race, ethnicity, primary language, and disability status, in October 2011, the U.S. Department of Health and Human Services (HHS) promulgated standards pursuant to Sec. 4302 of the Patient Protection and Affordable Care Act (ACA) (*6*). The standards were developed by the Section 4302 Workgroup organized by the HHS Data Council in collaboration with the Office of Management and Budget (OMB) and the U.S. Census Bureau. These data standards apply to all population health surveys conducted or supported by the federal government that use self- or proxy-reported data "to the extent practicable." The recommended data standards require that questions be tested and demonstrate adequate performance in national surveys and comply with any existing mandates by OMB (*7*). The recommended questions are considered to be a minimum set, and additional questions can be asked in surveys "provided that the additional detail could be aggregated back to the minimum standard and the sample design and sample size support estimates at that level of granularity" (*7*). The purpose of this provision of ACA is to provide standard approaches for collecting, analyzing, and reporting on health disparities that might exist between various demographic segments of the U.S. population. A standard set of questions to be asked in all national population surveys will improve understanding of the role of certain conditions as a risk factor for preventable poor health. CDC is evaluating the feasibility of incorporating the new data standards into many of its surveys and public health surveillance systems. Some modes of questionnaire administration might not readily support elements of the data standards because of the length of time needed to collect the data. For example, the 2011 data standard for classifying race establishes 14 categories that can be collapsed into the five categories established in 1997 by OMB. The 14 categories are preferred when sample sizes can support the increased detail. More than one race can be specified but there is no "multiracial" category.

Although a mandatory minimum set of six questions was established for determining disability status, no provision exists for modifying data collection modes to accommodate the new questions. One of the questions is, "Are you deaf or do you have serious difficulty hearing?" Notably, persons with serious hearing difficulties might not be able to participate in telephone surveys without the assistance of a Telecommunications Relay Service or other adaptive telephone equipment or services, making it problematic to collect reliable information on the prevalence of this disability and health outcomes for which they might be at risk. Another option for gathering data on persons with serious hearing difficulty is internet panel surveys.

CDC Initiatives to Reduce and Prevent Health Disparities

CDC is conducting many activities that support reducing health disparities and promoting health equity. For example, CDC provides technical support to the independent Community Preventive Services Task Force (Task Force). The Task Force makes recommendations based on systematic reviews of published studies on many important public health topics (*8*). These recommendations identify programs, services, and policies proven effective in a variety of real-world settings (e.g., communities, worksites, schools, and health plans). One topic the Task Force considered was effectiveness of interventions to improve colorectal, breast, and cervical cancer screening. After reviewing the evidence, the Task Force recommended nine strategies for helping bring those who are eligible for colorectal, breast, and cervical cancer screening to the point of care, including such services and programs as client reminders, one-on-one education, reducing structural barriers (e.g., providing scheduling assistance and transportation and offering extended hours), and provider reminders to screen patients. Many of these services have been effective for underserved populations and communities that are at greatest risks for cancer (*9*).

CDC's Office of Minority Health and Health Equity (OMHHE) advances policy, scientific, and programmatic efforts to eliminate health disparities affecting populations at social, economic, or environmental disadvantage and achieve health equity in the U.S. population. For example, OMHHE provides leadership in the development and promotion of *Healthy People 2020* Social Determinants of Health objectives and is leading an effort to compile promising practices and strategies used by CDC-funded programs to address health disparities. Through all of its activities, OMHHE focuses attention on efforts to achieve health equity, facilitating implementation of relevant policies, furthering the science of health equity and its application, and building and strengthening national and global partnerships for health equity.

CDC provides scientific and technical support to the National Prevention Council. Created by ACA, the National Prevention Council developed the National Prevention Strategy (NPS) to realize the benefits of prevention for all persons in the United States. Eliminating health disparities is one of four strategic directions identified in NPS (*2*). NPS recommends five approaches to reducing disparities: 1) focus on communities at greatest risk, 2) increase access to quality

health care, 3) increase workforce capacity to address disparities, 4) support research to identify effective strategies to eliminate disparities, and 5) standardize and collect data to better identify and address disparities. Recognizing that disparities are closely linked with social, economic, and environmental disadvantage (e.g., lack of access to quality affordable health care, healthy food, safe opportunities for physical activity, and educational and employment opportunities), the National Prevention Council has representation from 20 federal departments including Agriculture, Housing and Urban Development, Defense, Education and Transportation, and is chaired by the Surgeon General.

CDC supports the implementation of the National Prevention Council Action Plan (*10*). The plan outlines the Federal commitment to implementing the vision, goal, and recommendations of NPS. CDC is working with the U.S. Department of Housing and Urban Development and the Environmental Protection Agency on Health Impact Assessments (HIAs). HIAs examine ways to create healthy communities, provide health protection, and promote health.

CDC also works to reinforce cross-sector collaborations that can advance CDC programs, priorities, and initiatives. CDC's Community Transformation Grant (CTG) program seeks to improve health and wellness by implementing strategies included in NPS. CTG communities are engaging partners from multiple sectors, such as education, transportation, housing, and business, to create healthier communities where persons work, live, learn, and play. CDC's grant programs strive to achieve the greatest possible health impact and eliminate health disparities. Since October 1, 2012, all CDC domestic nonresearch funding opportunity announcements require that grantees describe how health disparities will be addressed, where relevant. When addressing health disparities, CDC programs might require grantees to identify existing health disparities in their communities and develop or implement evidence-based strategies to address those disparities.

Future Directions

Despite persistent racial, ethnic, and socioeconomic gaps in health care and health status, awareness of such disparities remains low among the general public (*11*). Much can be accomplished within the health and public health arena; however, the multiple and complex web of causes of health disparities can be fully addressed only with the involvement of many partners in fields that influence health such as housing, transportation, education and business. Identifying disparities and monitoring them over time is a necessary first step toward the development and evaluation of evidence-based interventions that can reduce disparities. CDC will continue to document health disparities and promote awareness of disparities as part of its contribution to the national goal to eliminate health disparities for vulnerable populations as defined by race/ethnicity, socioeconomic status, geography, sex, age, disability status, sexual orientation, and primary language, and among other populations identified to be at-risk for health disparities.

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