

## Million Hearts: Strategies to Reduce the Prevalence of Leading Cardiovascular Disease Risk Factors — United States, 2011

Cardiovascular disease (CVD) causes one in three (approximately 800,000) deaths reported each year in the United States (1). Annual direct and overall costs resulting from CVD are estimated at \$273 billion and \$444 billion, respectively (2). Strategies that address leading CVD risk factors, such as hypertension, high cholesterol levels, and smoking, can greatly reduce the burden of CVD (3). To estimate the U.S. prevalence of these three risk factors, CDC analyzed data from the National Health and Nutrition Examination Survey (NHANES) on uncontrolled hypertension, uncontrolled high levels of low-density lipoprotein cholesterol (LDL-C), and current smoking. This report summarizes the results of that analysis, which found that 49.7% of U.S. adults aged  $\geq 20$  years (an estimated 107.3 million persons) have at least one of the three risk factors. To reduce the prevalence of CVD risk factors among persons in the United States, the U.S. Department of Health and Human Services, in collaboration with nonprofit and private organizations, is launching Million Hearts, a multifaceted combination of evidence-based interventions and strategies aimed at preventing 1 million heart attacks and strokes over the next 5 years.

NHANES is a complex, multistage probability sample of the civilian, noninstitutionalized U.S. population that combines interviews and physical examinations.\* Data from 2007–2008, the most recent NHANES survey data available, were used to estimate the current U.S. prevalence of uncontrolled hypertension, uncontrolled high levels of LDL-C, and current smoking among adults aged  $\geq 20$  years; five NHANES survey cycles (1999–2000, 2001–2002, 2003–2004, 2005–2006, and 2007–2008) were analyzed to examine changes in prevalence over time. Examination participation rates for the five cycles ranged from 75% to 80%. During 1999–2008, a total of 24,693 persons aged  $\geq 20$  years were interviewed and examined for NHANES. From that total, 1,154 pregnant women were

excluded. Of the 23,539 remaining adults, 9,891 had been randomly assigned to a morning examination and had fasted for 8–24 hours. Of the 9,891 examined, 790 with missing blood pressure or LDL-C measurements were excluded (none were missing smoking status), yielding a final sample of 9,101.

Uncontrolled hypertension was defined as a systolic blood pressure  $\geq 140$  mm Hg or a diastolic blood pressure  $\geq 90$  mm Hg, based on the average of up to three measurements.† Uncontrolled high levels of LDL-C were defined as levels above the treatment goals established by the National Cholesterol Education Program (NCEP) Adult Treatment Panel-III (ATP-III) guidelines:  $< 160$  mg/dL,  $< 130$  mg/dL, and  $< 100$  mg/dL for low-, intermediate-, and high-risk groups, respectively.§ LDL-C was used because it is identified by NCEP as the primary target for lipid-lowering therapy. Current cigarette smoking was defined in persons who 1) reported having smoked  $\geq 100$  cigarettes in their lifetime and who currently smoke every day or some days, or 2) had a measured serum cotinine (the primary nicotine metabolite) level  $> 10$  ng/mL.

All analyses were conducted using statistical software to account for the complex sampling design and to calculate prevalence estimates and 95% confidence intervals (CIs). The estimated number of persons with at least one of the three CVD risk factors was derived from Current Population Surveys, based on weighted, unstandardized prevalence estimates.

In 2007–2008, among U.S. adults aged  $\geq 20$  years, an estimated 49.7% (CI = 46.4%–53.0%) had at least one of the following CVD risk factors: uncontrolled hypertension, uncontrolled high levels of LDL-C, or current smoking. That prevalence represented an estimated 107.3 million (CI = 99.9–114.8) persons aged  $\geq 20$  years. Of the 107.3

† Among the participants, 92% had two or three blood pressure measurements during a single physical examination at the mobile examination center; for those with only one blood pressure measurement, that single measurement was used in place of an average.

§ Available at <http://www.nhlbi.nih.gov/guidelines/cholesterol>.

\* Additional information available at <http://www.cdc.gov/nchs/nhanes.htm>.



million persons, an estimated 21.3% had two of the three risk factors, and 2.4% had all three. After adjusting for sex, age group, race/ethnicity, and poverty-income ratio, a significant decline in prevalence, from 57.8% (CI = 52.9%–62.5%) to 49.7%, was observed from 1999–2000 to 2007–2008 ( $p < 0.01$  for linear trend). However, because of U.S. population growth, the number of persons represented by those prevalences did not change significantly (109 million versus 107 million) (Figure).

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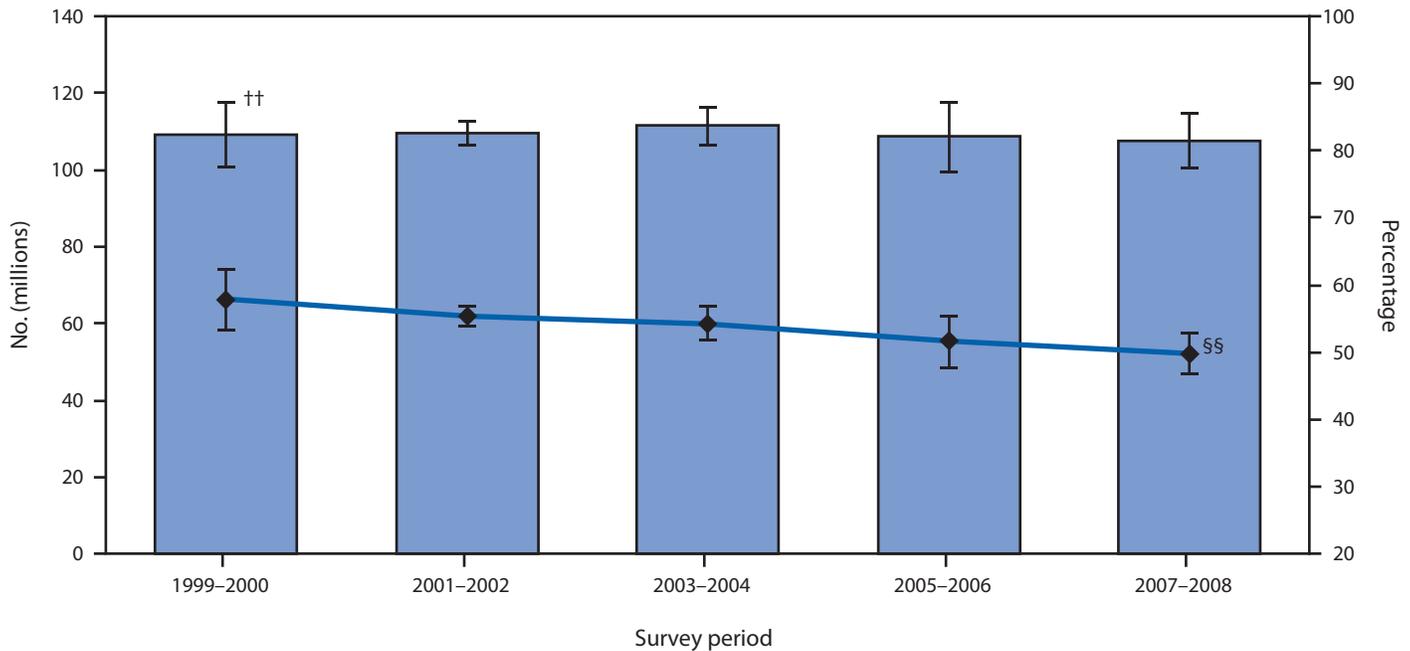
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**Editorial Note**

The decrease in the prevalence of U.S. adults aged  $\geq 20$  years with uncontrolled hypertension, uncontrolled high levels of LDL-C, or current smoking might, in part, reflect improved treatment and control of hypertension and high levels of LDL-C (4,5) and implementation of effective smoking interventions, such as smokefree policies for public places, increased cigarette excise taxes, and cessation treatments and services (6). Nevertheless, approximately half of the U.S. adult population still has one or more of these preventable risk factors for CVD.

Optimal prevention of CVD will require complementary clinical and community efforts and monitoring of interventions, risk factors, and disease at individual and population levels. Although safe, feasible, and effective clinical preventive services are available that can substantially reduce cardiovascular

**FIGURE. Age-standardized prevalence\* and estimated number of adults aged  $\geq 20$  years<sup>†</sup> who currently smoke,<sup>§</sup> or have uncontrolled hypertension,<sup>¶</sup> or have uncontrolled high levels of cholesterol\*\*— National Health and Nutrition Examination Survey, United States, 1999–2008**



\* Weighted prevalence estimates, directly standardized to the 2000 U.S. standard population, based on the following age groups: 20–39, 40–59, and  $\geq 60$  years.  
<sup>†</sup> Numbers were calculated using Current Population Survey data and weighted, unstandardized prevalence estimates. Additional information available at <http://www.cdc.gov/nchs/tutorials/nhanes/faqs.htm>.  
<sup>§</sup> Defined as 1) a “Yes” response to the question, “Have you smoked at least 100 cigarettes in your entire life?” plus a response of “Every day” or “Some days” to the question, “Do you now smoke cigarettes . . . ?” or 2) a measured serum cotinine level of  $>10$  ng/mL.  
<sup>¶</sup> Average systolic blood pressure  $\geq 140$  mm Hg or average diastolic pressure  $\geq 90$  mm Hg.  
<sup>\*\*</sup> Low-density lipoprotein cholesterol (LDL-C) level above the treatment goals established by the National Cholesterol Education Program Adult Treatment Panel-III guidelines:  $<160$  mg/dL,  $<130$  mg/dL, and  $<100$  mg/dL for low-, intermediate-, and high-risk groups, respectively.  
<sup>††</sup> 95% confidence interval.  
<sup>§§</sup> Linear trend in prevalence shows significant decline ( $p < 0.01$ ) from 1999–2000 to 2007–2008 after adjustment for sex, age group, race/ethnicity, and poverty-income ratio.

morbidity and mortality (e.g., the ABCS: aspirin therapy, blood pressure control, cholesterol management, and smoking cessation), these basic preventive and control measures are underprovided and underused (Table). Community interventions also could be enhanced. The prevention, treatment, and control of CVD are influenced by a wide range of diverse community and clinical factors (2,3). Approximately 90% of persons in the United States consume sodium at levels above those recommended in dietary guidelines (7), trans fat remains an avoidable hazard in restaurant and processed food, and approximately one in five adults currently smoke (8). In addition, funding of state tobacco control programs is significantly below levels recommended by CDC (6). Communitywide changes and policies addressing these issues

have the potential to reduce CVD and have a substantial positive impact on the health of the public.

The findings in the report are subject to at least one limitation. NHANES only surveys the noninstitutionalized U.S. population and does not include military personnel and persons who reside in nursing homes and other institutions. The prevalence of the three CVD risk factors might be underestimated because older persons living in nursing homes and other institutions might be more likely to have age-related hypertension and high levels of LDL-C (1).

To reduce the burden of CVD risk factors, the U.S. Department of Health and Human Services, in collaboration with nonprofit and private organizations, is launching Million Hearts, with the goal of preventing 1 million heart attacks

**TABLE. Estimated performance level for ABCS (aspirin therapy, blood pressure control, cholesterol management, and smoking cessation) measures to prevent cardiovascular disease — United States, 2011**

Preventive measure	Data source	Definition of measure	Estimated performance level	Discussion
Aspirin therapy	NAMCS and NHAMCS, 2007–2008	% of outpatient visits by patients aged ≥18 yrs with ischemic vascular disease who are prescribed aspirin or other antiplatelet medication	47%*	Antiplatelet medication use among patients with ischemic vascular disease is strongly recommended by many guidelines and incorporated in many National Quality Forum–approved measures to prevent atherosclerotic heart disease, ischemic stroke and transient ischemic attacks, and symptomatic peripheral vascular disease.
Blood pressure control	NHANES, 2005–2008	% of adults aged ≥18 yrs with hypertension who have adequately controlled blood pressure <sup>†</sup>	46% <sup>§</sup>	Approximately 68 million U.S. adults have high blood pressure. <sup>§</sup> Predictive modeling in a recent study suggests that a 10% increase in treatment of hypertension could prevent 14,000 premature deaths each year in adults aged <80 years. <sup>¶</sup>
Cholesterol management	NHANES, 2005–2008	% of adults aged ≥20 yrs with high cholesterol who have adequately controlled LDL-C**	33% <sup>††</sup>	Approximately 71 million U.S. adults have high LDL-C. <sup>††</sup> Predictive modeling in a recent study suggests that a 10% increase in treatment of elevated cholesterol could prevent 8,000 premature deaths each year in adults aged <80 years. <sup>¶</sup>
Smoking cessation	NAMCS, 2005–2008	% of outpatient visits by persons aged ≥18 yrs who screened positive for current tobacco use where tobacco cessation counseling or cessation medications were provided	23% <sup>§§</sup>	Among visits by patients who screened positive for tobacco use, 20.9% (CI = 19.1%–22.7%) were provided tobacco cessation counseling, and 7.6% (CI = 6.5%–8.7%) were provided cessation medications. <sup>§§</sup> Tobacco cessation rates can be increased by offering and providing cessation counseling and the seven FDA-approved medications. <sup>¶¶</sup> *** Frequent interaction with a health-care professional, as well as provider-reminder systems (e.g., chart stickers, vital sign stamps, medical record flow sheets, and checklists), are effective in treating tobacco use and improving the probability of successful quitting and abstinence. <sup>***</sup>

**Abbreviations:** NAMCS = National Ambulatory Medical Care Survey; NHAMCS = National Hospital Ambulatory Medical Care Survey; NHANES = National Health and Nutrition Examination Survey; LDL-C = low-density lipoprotein cholesterol; CI = 95% confidence interval; FDA = Food and Drug Administration.

\* Source: CDC, unpublished data, 2011.

<sup>†</sup> Systolic blood pressure <140 mm Hg and diastolic blood pressure <90 mm Hg.

<sup>§</sup> Source: CDC. Vital signs: prevalence, treatment, and control of hypertension—United States, 1999–2002 and 2005–2008. MMWR 2011;60:103–8.

<sup>¶</sup> Source: Farley TA, Dalal MA, Mostashari F, Frieden TR. Deaths preventable in the U.S. by improvements in use of clinical preventive services. Am J Prev Med 2010;38:600–9.

\*\* According to LDL-C treatment goals established by the National Cholesterol Education Program Adult Treatment Panel-III guidelines: <160 mg/dL, <130 mg/dL, and <100 mg/dL for low-, intermediate-, and high-risk groups, respectively.

<sup>††</sup> Source: CDC. Vital Signs: prevalence, treatment, and control of high levels of low-density lipoprotein cholesterol—United States, 1999–2002 and 2005–2008. MMWR 2011;60:109–14.

<sup>§§</sup> Source: CDC, unpublished data, 2011.

<sup>¶¶</sup> Except when medically contraindicated or among persons in populations (e.g., pregnant women, smokeless tobacco users, light smokers, and adolescents) for whom evidence of effectiveness is insufficient.

\*\*\* Source: Fiore MC, Jaen CR, Baker TB, et al. Treating tobacco use and dependence: 2008 update. Clinical practice guideline. Rockville, MD: US Department of Health and Human Services, Public Health Service; 2008. Available at [http://www.surgeongeneral.gov/tobacco/treating\\_tobacco\\_use08.pdf](http://www.surgeongeneral.gov/tobacco/treating_tobacco_use08.pdf).

**What is already known on this topic?**

Cardiovascular disease (CVD) causes one in three (approximately 800,000) deaths each year in the United States. Total annual costs resulting from CVD are estimated at \$444 billion.

**What is added by this report?**

Based on data from the 2007–2008 National Health and Nutrition Examination Survey, 49.7%, or an estimated 107.3 million U.S. adults aged  $\geq 20$  years, have at least one of the following three preventable CVD risk factors: uncontrolled hypertension, uncontrolled high cholesterol, or smoking.

**What are the implications for public health practice?**

To reduce the prevalence of these CVD risk factors, the U.S. Department of Health and Human Services, in conjunction with nonprofit and private organizations, is launching Million Hearts, a multifaceted combination of evidence-based interventions designed to prevent 1 million heart attacks and strokes over the next 5 years. Among the effective clinical services that can substantially reduce cardiovascular morbidity and mortality are the ABCS: aspirin therapy, blood pressure control, cholesterol management, and smoking cessation.

and strokes over the next 5 years. Million Hearts is expected to align policies, programs, and resources to improve access to care; focus attention on improved care through use of the ABCS and health information technology; increase public awareness about risk factors; improve medication adherence; promote healthier behaviors and environments; and enhance surveillance and monitoring.

Million Hearts incorporates technological advances occurring in the clinical setting (e.g., health information technology development and linkages with electronic medical records), modifications in health-care coverage and reimbursement (e.g., Physician Quality Reporting System and increased coverage of clinical preventive services), and comprehensive environmental and policy initiatives (e.g., Community Transformation Grants) that are under way at worksites and in communities. Million Hearts draws upon the extensive evidence base of

established standards in clinical (e.g., U.S. Preventive Services Task Force) and community (e.g., *Guide to Community Preventive Services*) settings, complements *Healthy People 2020* objectives,<sup>‡</sup> and serves as the tactical implementation of the National Strategy for Quality Improvement in Health Care's focus on CVD prevention. Although Million Hearts has a 5-year goal, improvements in clinical and community prevention are intended to continue to produce benefits over a much longer period.

<sup>‡</sup>Additional information available at <http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx>.

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