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Predicted 10-Year Risk of Developing Cardiovascular Disease at the State Level in the U.S.

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Abstract

Background: Cardiovascular disease (CVD) is the leading cause of death in the U.S. State-specific predicted 10-year risk of developing CVD could provide useful information for state health planning and policy.

Purpose: To estimate state-specific 10-year risk of developing CVD.

Methods: Using the updated non–laboratory-based Framingham CVD Risk Score (RS), this study estimated 10-year risk of developing CVD; coronary heart disease (CHD); and stroke, stratified by demographic factors and by state among 2009 Behavioral Risk Factors Surveillance System participants aged 30–74 years. Data analysis was completed in June 2014.

Results: The age-standardized mean CVD, CHD, and stroke RSs for adults aged 30–74 years were 14.6%, 10.4%, and 2.3% among men, respectively, and 7.5%, 4.5%, and 1.8% among women. RSs increased significantly with age and were highest among non-Hispanic blacks, those with less than high school education, and households with incomes <$35,000. State-specific age-standardized CVD, CHD, and stroke RS ranged, among men, from lows in Utah (13.2%, 9.6%, and 2.1%, respectively) to highs in Louisiana (16.2%, 11.7%, and 2.6%), and among women, from lows in Minnesota (6.3%, 3.8%, and 1.5%) to highs in Mississippi (8.7%, 5.3%, and 2.1%).

Conclusions: The predicted 10-year risk of developing CVD varies significantly by age, gender, race/ethnicity, educational attainment, household income, and state of residence. These results support the development and implementation of targeted prevention programs by states to address the risk of developing CVD, CHD, and stroke among their populations.

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Supplementary Data

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Introduction

In the U.S., annual total cardiovascular disease (CVD) costs are $312.6 billion, including $192.1 billion in direct medical expenses and more than $120.5 in lost productivity from premature mortality.[1] Nearly 800,000 people die each year from CVD, making it the leading cause of death in the U.S.[1] Although CVD mortality has continued to decline during the past 40 years,[2] the rates of decline vary significantly among the states.[1,3,4] Across states, significant variation has been described in the prevalence of CVD and cardiovascular health[5-7] and risk factors, including hypertension,[8] smoking,[9] high blood cholesterol,[10] diabetes,[11] overweight/obesity,[12] physical inactivity,[13,14] and limited consumption of vegetables and fruits.[14]

The updated 10-year CVD Framingham Risk Score (RS)[15] was established to be a more comprehensive measure of an individual's risk for developing any CVD-related condition over the next 10 years. The RS combines a number of components, including *modifiable risk factors* (i.e., systolic blood pressure [BP]; antihypertensive medication use; smoking status; and total and high-density lipoprotein [HDL] cholesterol levels) and *non-modifiable risk factors* (i.e., age and sex), into a CVD risk prediction algorithm. RS results can then be multiplied by gender-specific calibration factors to estimate coronary heart disease (CHD) or stroke-specific risk. The RS can be used to understand disparities in predicted CVD risk among populations. Although multiple studies have used data from the National Health and Nutrition Examination Survey (NHANES) to estimate distribution and trends of predicted 10-year CVD risk at the national level,[16-18] no state-level estimates are available. Having these estimates will improve priority-setting efforts so that geographic disparities in CVD incidence and mortality can be better addressed.[19] Overcoming geographic disparities is critical for meeting the USDHHS Million Hearts® initiative's[20] goal of preventing one million heart attacks and strokes by 2017 and the Healthy People 2020[21] objectives of reducing the CHD and stroke death rates by 20%. The objective of this study is to estimate, using RS and 2009 Behavioral Risk Factor Surveillance System (BRFSS) data, the state-specific predicted 10-year risk of developing CVD, CHD, or stroke.

Methods

Behavioral Risk Factor Surveillance System

The BRFSS is a state-based, random-digit–dialed landline telephone survey of the U.S. civilian, non-institutionalized population aged 18 years or older. It is the world's largest ongoing telephone health surveillance system that tracks health conditions and health-related behaviors in all 50 states and Washington DC. A complete, detailed description of the BRFSS can be found at www.cdc.gov/brfss. This study used the information derived from the core BRFSS questions to calculate consistent and comparable estimates of predicted CVD risk across all states and the District of Columbia. Among 432,607 participants in BRFSS 2009, 94,686 participants aged < 30 or > 74 years were excluded to meet the recommended RS age standards.[15] Subsequently, 31,685 participants with self-reported CHD or stroke at baseline, 1,427 pregnant women, and 3,296 participants with missing RS component data were excluded, leaving 297,910 participants for analysis.

Definition of Cardiovascular Disease Risk Factors Included in the Risk Score Calculation

The laboratory-based RS is determined using the following components: age, sex, total and HDL cholesterol, systolic BP, smoking, and diabetes status.[15] Because the laboratory-based measurements of total or HDL cholesterol were not available in BRFSS, this study used the coefficients derived from the non–laboratory-based RS and replaced the cholesterol measures with the participant's BMI.[15] Participant age was self-reported, and self-reported weight and height were used to calculate BMI (weight [kg]/height [m^2]). Current smoking was defined as having smoked at least 100 cigarettes in one's lifetime and reporting smoking every day or some days at the time of survey. Diagnosed diabetes was defined as having ever been told by a doctor that respondents had diabetes, excluding gestational diabetes.

Estimate of Systolic Blood Pressure in the Behavioral Risk Factor Surveillance System

The non–laboratory-based RS includes the systolic BP in the risk estimation, but measured blood pressure was not available in BRFSS. This study used an approach similar to that developed by Ezzati and colleagues[22] to estimate the systolic BP for BRFSS participants, but included a different set of predictors based on its model selection criterion. First, multivariable linear regression models were developed to predict participants' systolic BP based on the information derived from NHANES 2005–2010. NHANES is a series of cross-sectional national, stratified, multistage probability surveys of the civilian, non-institutionalized U.S. population. Detailed descriptions of the plan and operation of each survey are published elsewhere.[23,24] This study pooled three cycles of NHANES data (2005–2006, 2007–2008, and 2009–2010) to develop stable parameter estimates that overlapped with the time period of the 2009 BRFSS survey so the NHANES-derived parameters could be applied to BRFSS participants. The dependent variable of the prediction models was the individual's systolic BP measurement. The independent variables included a set of health system and sociodemographic covariates chosen a priori that are related to systolic BP, including age; race/ethnicity; educational attainment; BMI; physical activity level (inactive, insufficiently active, or active); household income (<$35,000 or ≥$35,000); smoking status (never, former, or current); alcohol consumption (none, < 1 drink/day, or ≥1 drink/day); health insurance (yes or no); diabetes (yes or no); and antihypertensive medication use (yes or no). In addition to main effects of the independent variables, PROC GLMSELECT procedure (SAS, version 9.3) with stepwise selection and the Schwarz Bayesian Criterion[25] were used to screen for the significant interactions among all covariates. This study stratified NHANES data by sex and hypertension status (yes or no). Hypertension was defined as systolic BP ≥ 140 mmHg, diastolic BP ≥ 90 mmHg, or reported use of antihypertensive medication. This study then developed four multivariable prediction regression models. The coefficients of each prediction model are presented in the online Appendix Tables 1 and 2. Then, these regression coefficients derived from NHANES 2005–2010 were applied to similar questions in BRFSS 2009 to estimate systolic BP for each BRFSS participant by each stratum.[22]

Statistical Analysis

This study calculated the predicted 10-year CVD risk using the gender-specific non–laboratory-based RS for each BRFSS 2009 participant and applied gender-specific

calibration factors to estimate the 10-year risk of CHD and stroke.[15] In addition, this study also calculated the age-standardized (to U.S. Census 2000 population) and weighted mean and 95% CI of CVD, CHD, or stroke RS, and the prevalence of CVD and CHD RS ≥ 20% (95% CI) by sex, race/ethnicity, educational attainment, and household income. Those with RS ≥ 20% are often identified as the group with greatest CVD risk; however, a stable estimate of RS ≥ 20% for stroke could not be obtained owing to the limited sample size. For the state-specific estimates, the age-standardized mean CVD, CHD, or stroke RS, and the prevalence of predicted CVD and CHD RS ≥ 20% were calculated. The survey weights were used to represent the target population, and age standardization was used to control for the possible confounding effect of difference in age structure by sociodemographic status and across state. All results are from the weighted analyses.

This study conducted multiple sensitivity analyses. First, this study compared the characteristics of participants aged 30–74 years by the selected sociodemographic variables in NHANES 2005–2010 with those of BRFSS 2009 participants (Appendix Table 3). Second, this study calculated the national predicted 10-year risk of developing CVD, CHD, or stroke by sex using the measured systolic BP in NHANES 2005–2010 and compared the results with those from the BRFSS 2009 estimates (Appendix Tables 4 and 5). Third, this study compared the distributions of the predicted 10-year risk of developing CVD by three approaches (laboratory-based, non–laboratory-based, and non–laboratory-based with predicted systolic BP using NHANES 2005–2010 data [Appendix Figure 1]). Fourth, this study presented the age-standardized (Appendix Tables 6 and 7) and crude (Appendix Tables 8 and 9) predicted 10-year risk of developing CVD, CHD, or stroke by state in BRFSS 2009. Finally, the bias associated with using a point-estimate of systolic BP in the CVD RS estimate was quantified (Appendix Table 10).

Data were analyzed using SAS, version 9.3, and SUDAAN, version 10, taking into account the complex sampling design and weights in NHANES and BRFSS. To account for multiple statistical testing, the significance level was set to control for a false discovery rate (FDR) at 5.0%, and adjusted *p*-values were calculated. The FDR represents the proportion of incorrectly rejected null hypotheses among all rejected null hypotheses.[26] SAS PROC MULTTEST with the FDR option was used to calculate the FDR-adjusted *p*-values and $p<0.05$ was considered significant. This study presents the usual *p*-values and highlights those that were significant after controlling for FDR at 5.0%. All tests were two-sided. Data analysis was completed in June 2014.

Results

The characteristics of participants aged 30–74 years in BRFSS 2009 were largely comparable to those from NHANES 2005–2010. The prevalence of less than high school education, current smoking, and obesity (BMI ≥ 30) were lower in BRFSS 2009 than in NHANES 2005–2010 (Table 1 and Appendix Table 3).

Nationally, the absolute difference in age-standardized predicted 10-year CVD risk for the population aged 30–74 years was nearly twice as high in men compared with women (14.6% vs 7.5%; Tables 2 and 3). Prevalence of CVD RS ≥ 20% was almost threefold higher in men

than in women (25.0% vs 8.7%). Similar patterns of gender differences were observed for CHD and stroke risk.

The predicted risk among men increased significantly with age, and was highest among non-Hispanic blacks, those who had less than high school education, and those with household income <$35,000 (Table 2). The pattern of the predicted risk was similar among women (Table 3). The pattern of the predicted national CVD risk using BRFSS 2009 was consistent with that of NHANES 2005–2010, which used measured BMI and systolic BP (Appendix Tables 4 and 5).

Among men, the mean age-standardized predicted state-level 10-year risk of developing CVD, CHD, or stroke ranged from lows in Utah (13.2% [12.9, 13.5], 9.5% [9.3, 9.7], and 2.1% [2.1, 2.1], respectively) to highs in Louisiana (16.2% [15.8, 16.7], 11.7% [11.3, 12.0], and 2.6% [2.5, 2.7], respectively) (Figure 1 Map A, Figure 3A, and Appendix Table 6). Prevalence of age-standardized CVD and CHD RS ≥ 20% ranged from lows in Colorado for both RS measures (21.6% [20.5, 22.7], 11.6% [10.7, 12.5], respectively) to highs for CVD in Mississippi (29.8% [28.3, 31.3]) and for CHD in Kentucky (19.4% [17.4, 21.5]) (Figure 2 Map A and Appendix Table 6). Among women, the mean age-standardized CVD, CHD, or stroke RS ranged from lows in Minnesota (6.3% [6.1, 6.5], 3.8% [3.7, 3.9], and 1.5% [1.5, 1.6], respectively) to highs in Mississippi (8.7% [8.5, 8.9], 5.3% [5.2, 5.4], and 2.1% [2.0, 2.1], respectively) (Figure 1 Map B, Figure 3B, and Appendix Table 7). Prevalence of RS ≥20% ranged from lows in Minnesota (5.5% [4.9, 6.2] for CVD and 1.4% [1.1, 1.8] for CHD) to highs for CVD in Mississippi (11.4% [10.6, 12.2]) and for CHD in Indiana (4.0% [3.5, 4.7]) (Figure 2 Map B and Appendix Table 7). In addition, the higher predicted 10-year CVD risk tended to cluster in the southeastern states and the lower risk in the northwestern states (Figures 1 and 2 Maps A and B).

The sensitivity analysis using NHANES 2005–2010 data showed that the distribution of predicted 10-year risk was nearly identical using predicted versus measured systolic BP (Appendix Figure 1). The ranking and pattern of crude CVD, CHD, or stroke RS remained unchanged as compared to the age-standardized estimate (Appendix Tables 8 and 9). The bias associated with using the point-estimate of systolic BP on RS was quite small (Appendix Table 10).

Discussion

By applying the RS to BRFSS 2009 data for participants aged 30–74 years, this study estimates the predicted 10-year risk of developing CVD, CHD, or stroke by selected characteristics and by state of residence. The results indicate that the predicted 10-year risk varies significantly by sex, race/ethnicity, educational attainment, and household income, consistent with previous studies on disparities in prevalence of CVD risk factors, incidence, prevalence, and mortality.[1,7,16,17] In addition, this study estimates, for the first time, CVD, CHD, and stroke RS at the state level, and documents significant variations by state. The patterns of differences in the predicted 10-year risk by selected groups at the national level in this study are consistent with the findings of other studies.[17,18] However, the level of the predicted 10-year risk of CVD in this study is higher than that of other studies, which

might be due to the use of different CVD prediction models.[27] The predicted 10-year risks of developing CVD, CHD, or stroke at the national level by the selected characteristics in BRFSS 2009 are largely comparable to the predicted 10-year risk using NHANES 2005–2010 with measured BP (Tables 2 and 3 and Appendix Tables 4 and 5).

The clinically based prevention efforts of Million Hearts focuses on the "ABCs" of heart health (i.e., appropriate aspirin use, blood pressure control, cholesterol management, and smoking assessment and cessation treatment).[28] The state-specific data on the distribution of CVD, CHD, and stroke RS provide essential information for targeting interventions to achieve effective reductions in CVD, CHD, and stroke morbidity and mortality. Although all states with high levels of predicted 10-year CVD risk are in need of interventions, the states with the highest predicted risk need even more interventions to effectively reduce the disparities in CVD morbidity and mortality. By better understanding the predicted 10-year CVD RS, efforts to address these disparities can be implemented.

Hypertension is a major risk factor for CVD and stroke, and it affects approximately one in three U.S. adults.[1] Many studies have documented geographic variations in BP status, prevalence of self-reported hypertension, and antihypertensive medications use.[8,22,29-31] A recent study indicated that, among 2009 BRFSS participants, the age-adjusted prevalence of self-reported hypertension among adults ranged from 20.9% in Minnesota to 35.9% in Mississippi. The proportion of those with hypertension who reported use of antihypertensive medications ranged from 52.3% in California to 74.1% in Tennessee.[8] Our finding supports the Million Hearts goal of improving hypertension control to reduce CVD morbidity and mortality, especially among states with high hypertension prevalence and a low proportion of antihypertensive medication use among people with hypertension.

Diabetes mellitus is another established major risk factor for CVD and stroke.[32] Previous studies examined geographic variation and trends in diabetes by state.[33-36] Although the prevalence of diagnosed diabetes increased by 95% among all states from 1995 to 2010 (from 4.2% to 8.2%), the disparities of the relative increase in prevalence varied from 27.1% in Vermont to 226.7% in Oklahoma.[36] U.S. incidence and prevalence of diabetes are projected to continue to increase until 2050, suggesting that diabetes might play an increasingly important role in predicted CVD risk in the future, especially among non-Hispanic blacks.[37] Effective prevention strategies, such as increasing physical activity, having a healthy diet, and weight control, which target the high-risk groups as well as the whole population, are needed to reverse the trend of increasing diabetes prevalence and reduce the risk of developing CVD (www.diabetes.org/diabetes-basics/prevention/).

Smoking and obesity are important risk factors for CVD and stroke.[38] The prevalence of smoking among U. S. adults has declined over the last [40] years,[39] but an estimated 46.6 million adults (aged ≥18 years), or 20.6%, were current cigarette smokers in 2009.[40] Many studies have documented the increased prevalence of obesity among U.S. adults, although the rate of increase has slowed since the mid-2000s.[41-43] During 2009–2010, about 36% of U.S. adults, >78 million, were obese (BMI ≥ 30).[43] Continued public health intervention programs aimed at improving lifestyle choices are central to reducing the prevalence of obesity as well as the risk of CVD (www.cdc.gov/obesity/strategies/index.html).

Limitations

First, this study uses the model-estimated systolic BP, instead of measured systolic BP, for BRFSS participants to calculate RS,[22] and the accuracy of predicted 10-year risk of developing CVD using this method is unknown. However, mean predicted systolic BP in BRFSS participants is nearly identical to that of NHANES participants with measured SBP (Table 1 and Appendix Table 3). In addition, in the sensitivity analysis using NHANES 2005–2010 data, the distribution of predicted 10-year risk is nearly identical using predicted versus measured systolic BP (Appendix Figure 1). Second, this study uses the point-estimate of systolic BP for BRFSS participants to calculate the RS, which did not take into account the variability associated with such estimates. However, the results of the simulation study suggest that the potentially introduced bias is quite small (Appendix Table 10). Third, this study uses the non–laboratory-based RS to predict the CVD risk, which tends to overestimate CVD risk as compared to the laboratory-based RS (Appendix Figure 1).[16] Different CVD prediction models are known to yield different predicted risks of developing CVD for the same population[27,44]; therefore, the present predicted risk estimates should be interpreted with some caution. Fourth, this study uses self-reported BMI and diagnosed diabetes by BRFSS participants to predict CVD risk, as measured BMI and diabetes were not available. Under-reporting of BMI is well documented in BRFSS, which might underestimate the CVD risk for some participants.[45] However, studies indicate that self-reported diabetes status and those based on actual diagnoses are in substantial agreement in BRFSS.[46] In addition, the estimated prevalence of diagnosed diabetes in BRFSS is in close agreement with other national estimates.[47] Fifth, the RS predicts the 10-year CVD risk for people aged 30–74 years only; therefore, interpretation of these results should be mainly focused on that population. Finally, the 52.5% response rate to the 2009 BRFSS, though acceptable, could limit the generalizability of the results if non-respondents systematically differ from respondents in their answers. Despite these limitations, BRFSS data, collected via the largest ongoing state-based cross-sectional survey in the U.S., are reliable and valid as measured against other national population–based surveys and provide the opportunity to report health indicators at the state level.

In summary, this study demonstrates significant state-level variation in predicted 10-year risk of developing CVD, CHD, and stroke. The results of this analysis support the development and implementation of targeted prevention programs by states to address the risk of developing CVD, CHD, and stroke among their populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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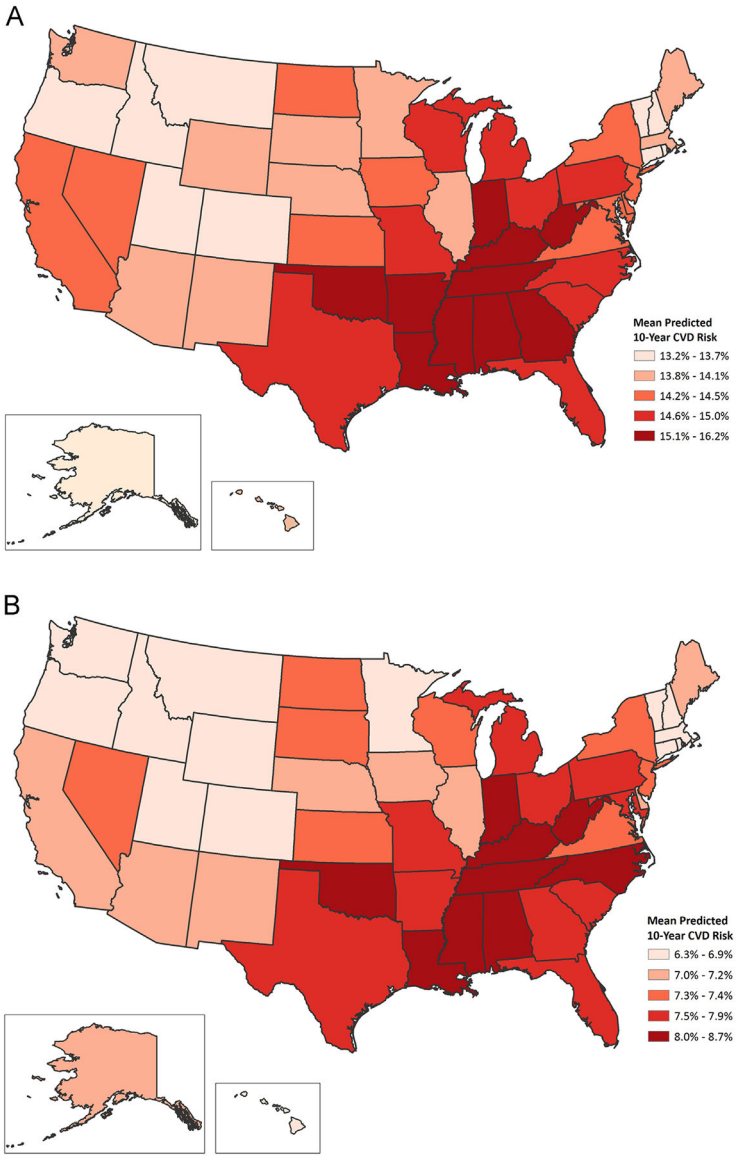


Figure 1. Age-standardized mean predicted 10-year risk of developing cardiovascular disease (CVD) among men (A) and women (B) by state, Behavioral Risk Factor Surveillance System, 2009.

Note: For A, the CVD risk for men was classified into five categories: ≤ 13.7%, 13.8%–14.1%, 14.2%–14.5%, 14.6%–15.0%, and ≥15.1%. For B, the CVD risk for women was classified into five categories: ≤6.9%, 7.0%–7.2%, 7.3%–7.4%, 7.5%–7.9%, and >7.9%.

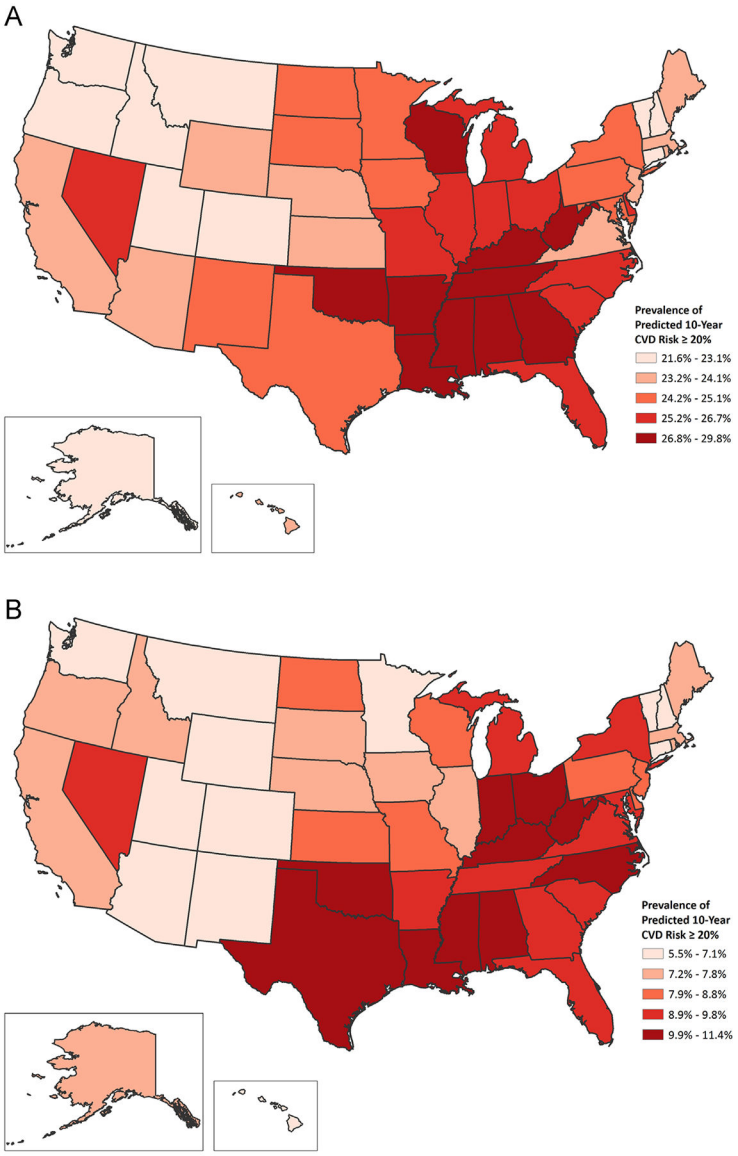
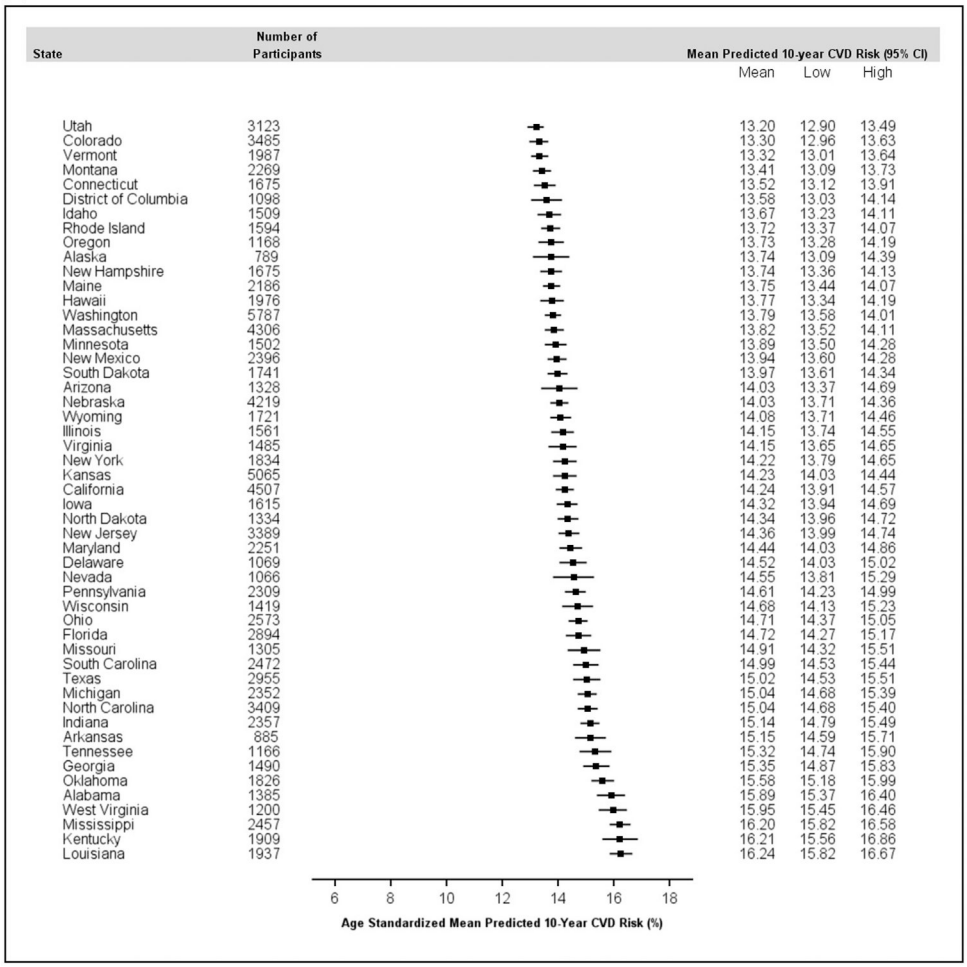


Figure 2. Age-standardized prevalence of predicted 10-year risk of developing cardiovascular disease (CVD) ≥20% among men (A) and women (B) by state, Behavioral Risk Factor Surveillance System, 2009.

Note: For A, the CVD risk ≥20% for men was classified into five categories: ≤23.1%, 23.2%–24.1%, 24.2%–25.1%, 25.2%–26.7%, and >26.7%. For B, the CVD risk ≥20% for women was classified into five categories: ≤7.1%, 7.2%–7.8%, 7.9%–8.8%, 8.9%–9.8%, and ≥9.9%.

A



B

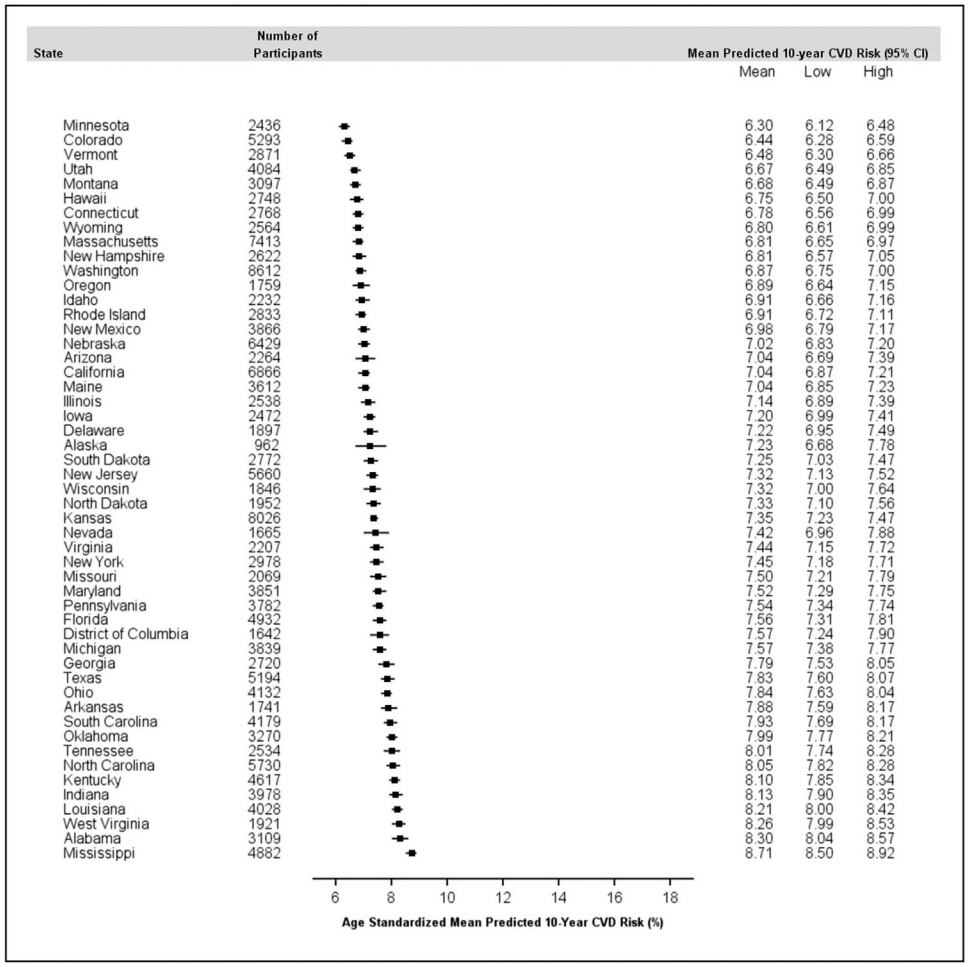


Figure 3.

State-specific distribution of age standardized mean predicted 10-year risk of developing cardiovascular disease (CVD) among men (A) and women (B), Behavioral Risk Factor Surveillance System, 2009.

Table 1.

Characteristics of adult participants 30–74 years of age, Behavioral Risk Factor Surveillance System, 2009, % (95% CI) unless otherwise noted.

Characteristics	N	Men	N	Women	*p*-value
Mean age (years)	112,856	47.6 (47.5, 47.8)	185,054	48.7 (48.6, 48.8)	<**0.001**
Race/ethnicity					
Non-Hispanic white	90,322	68.9 (68.3, 69.5)	144,542	70.1 (69.6, 70.5)	
Non-Hispanic black	7,397	9.3 (8.9, 9.7)	16,353	10.6 (10.3, 10.9)	
Hispanic	7,300	14.4 (13.9, 15.0)	13,224	13.7 (13.3, 14.0)	
Others	6,671	7.4 (7.0, 7.8)	9,597	5.7 (5.5, 5.9)	< **0.001**
Educational attainment					
<High school	8,008	9.2 (8.8, 9.6)	13,238	8.5 (8.2, 8.7)	
High school	31,037	25.7 (25.2, 26.2)	51,903	25.6 (25.3, 26.0)	
> High school	73,556	65.1 (64.5, 65.7)	119,474	65.9 (65.5, 66.3)	**0.009**
Household income ($)					
<35k	29,999	27.9 (27.3, 28.5)	60,519	32.9 (32.4, 33.3)	
≥35k	73,646	72.1 (71.5, 72.7)	101,959	67.1 (66.7, 67.6)	<**0.001**
Smoking status					
Current smoking	20,301	19.0 (18.5, 19.5)	30,628	16.1 (15.8, 16.4)	
Former	37,970	29.2 (28.7, 29.7)	47,446	22.4 (22.1, 22.8)	
Never	54,585	51.8 (51.2, 52.4)	106,980	61.5 (61.1, 61.9)	<**0.001**
BMI [a]					
<25.0	26,770	23.3 (22.8, 23.8)	68,510	38.3 (37.9, 38.8)	
25.0–29.9	51,186	45.2 (44.6, 45.8)	54,730	28.8 (28.4, 29.2)	
≥30.0	34,900	31.5 (30.9, 32.0)	61,814	32.9 (32.5, 33.3)	<**0.001**
Diabetes					
Yes	11,878	8.9 (8.6, 9.3)	17,996	8.1 (7.9, 8.3)	
No	100,978	91.1 (90.7, 91.4)	167,058	91.9 (91.7, 92.1)	<**0.001**
Hypertension					
No	73,028	70.1 (69.6, 70.6)	124,651	73.4 (73.1, 73.8)	
Yes	39,828	29.9 (29.4, 30.4)	60,403	26.6 (26.2, 26.9)	<**0.001**
Taking anti-hypertensive medication	30,975	71.9 (70.9, 72.9)	51,066	81.0 (80.3, 81.6)	**0.001**

Characteristics	N	Men	N	Women	*p*-value
Systolic blood pressure (mmHg; M) [b]	112,856	123.4 (123.3, 123.5)	185,054	120.0 (119.8, 120.0)	**0.001**

Note: Values within parentheses are 95% CIs. Boldface indicates significant p-value after controlling for the false discovery rate at 5.0% for multiple comparisons; comparisons were made between men and women based on t tests for the continuous variables and χ^2 tests for the categorical variables; all tests were two-tailed.

[a] BMI was based on self-reported weight and height.

[b] Systolic blood pressure was estimated based on the multivariable regression models developed using NHANES 2005–2010 data.

Table 2.

Distribution of predicted 10-year cardiovascular disease risk scores for men 30–74 years of age, Behavioral Risk Factor Surveillance System, 2009

		CVD predicted risk scores[a]		CHD predicted risk scores[a]		Stroke predicted risk scores[a,b]
Characteristics	**N**	**M**	**% Risk scores ≥20%**	**M**	**% Risk scores ≥20%**	**M**
Total	112,856 (52.5%)[c]	14.6 (14.5, 14.7)	25.0 (24.8, 25.3)	10.4 (10.4, 10.5)	14.9 (14.6, 15.1)	2.32 (2.30, 2.33)
Age (years)						
30–39	18,005	4.1 (4.0, 4.2)	0.3 (0.2, 0.4)	2.95 (2.90 – 2.99)	0.04 (0.02, 0.09)	0.65 (0.64, 0.66)
40–49	26,636	9.3 (9.1, 9.4)	5.0 (4.5, 5.5)	6.64 (6.55, 6.74)	1.6 (1.4, 1.9)	1.47 (1.45, 1.49)
50–59	32,689	18.6 (18.4, 18.8)	33.3 (32.4, 34.3)	13.3 (13.2, 13.5)	14.0 (13.3, 14.7)	2.95 (2.92, 2.99)
60–74	35,526	33.2 (32.9, 33.5)	81.5 (80.7 – 82.3)	23.8 (23.6, 24.1)	56.8 (55.8, 57.7)	5.28 (5.24, 5.33)
Race/ethnicity						
Non-Hispanic white	90,322	14.1 (14.0, 14.2)	24.1 (23.9, 24.4)	10.13 (10.07-10.18)	13.9 (13.7, 14.2)	2.24 (2.23, 2.26)
Non-Hispanic black	7,397	17.5 (17.2, 17.9)	31.5 (30.4, 32.7)	12.6 (12.3, 12.9)	22.2 (21.0, 23.4)	2.79 (2.73, 2.85)
Hispanics	7,300	15.3 (14.9, 15.8)	25.9 (24.5, 27.4)	11.0 (10.7, 11.3)	15.7 (14.5, 17.0)	2.44 (2.37, 2.51)
Others	6,671	14.0 (13.6, 14.3)	23.9 (22.6, 25.2)	10.0 (9.8, 10.3)	14.6 (13.5, 15.9)	2.22 (2.16, 2.28)
Educational attainment						
<High school	8,008	17.4 (17.0, 17.8)	31.1 (29.9, 32.3)	12.5 (12.2, 12.8)	20.6 (19.5, 21.7)	2.77 (2.71, 2.83)
High school	31,037	16.0 (15.8, 16.2)	28.6 (28.0, 29.2)	11.5 (11.4, 11.6)	17.7 (17.2, 18.2)	2.54 (2.52, 2.57)
>High school	73,556	13.5 (13.4, 13.6)	22.7 (22.4, 23.1)	9.7 (9.6, 9.8)	12.9 (12.6, 13.2)	2.15 (2.14, 2.17)
Household income ($)						
<35k	29,999	16.6 (16.4, 16.8)	30.0 (29.3, 30.7)	11.9 (11.8, 12.1)	18.7 (18.2, 19.3)	2.64 (2.61, 2.68)
≥35k	73,646	13.5 (13.4, 13.6)	22.7 (22.4, 23.1)	9.7 (9.6, 9.8)	12.8 (12.5, 13.1)	2.15 (2.14, 2.16)

Note: Values within parentheses are 95% CIs.

[a] Age-standardized by the direct method to the US 2000 census population using the age groups 30–39, 40–49, 50–59, and 60–74 years. Predicted 10-year risk of developing cardiovascular disease were based on the predicted systolic blood pressure using multivariable linear regression models developed from NHANES 2005–2010.

[b] Stable estimates of risk score prevalence ≥20% for stroke could not be obtained due to the limited sample size.

[c] Percentage in parentheses is the survey response rate.

CHD, coronary heart disease; CVD, cardiovascular disease; NHANES, National Health and Nutrition Examination Survey.

Table 3.

Distribution of predicted 10-year cardiovascular disease for women participants 30–74 years of age, Behavioral Risk Factor Surveillance System, 2009

Characteristics	n	CVD predicted risk scores[a]		CHD predicted risk scores[a]		Stroke predicted risk scores[a,b]
		M	% Risk scores ≥20%	M	% Risk scores ≥20%	M
Total	185,054 (52.5%)[c]	7.5 (7.4, 7.5)	8.7 (8.6, 8.9)	4.53 (4.51, 4.56)	2.8 (2.7, 3.0)	1.78 (1.77, 1.79)
Age (years)						
30–39	29,337	1.68 (1.66, 1.71)	0.0	1.03 (1.01, 1.04)	0.0	0.40 (0.39, 0.41)
40–49	41,054	4.26 (4.20, 4.32)	0.7 (0.6, 0.8)	2.59 (2.56, 2.63)	0.07 (0.04, 0.12)	1.02 (1.00, 1.03)
50–59	52,346	9.0 (8.9, 9.2)	7.7 (7.2, 8.1)	5.5 (5.4, 5.6)	1.3 (1.2, 1.5)	2.16 (2.13, 2.18)
60–74	62,317	18.8 (18.6, 19.0)	34.3 (33.7, 35.0)	11.4 (11.3, 11.5)	12.7 (12.2, 13.2)	4.48 (4.44, 4.52)
Race/ethnicity						
Non-Hispanic white	144,542	7.01 (6.97, 7.05)	7.6 (7.5, 7.8)	4.27 (4.24, 4.29)	2.3 (2.2, 2.4)	1.67 (1.66, 1.68)
Non-Hispanic black	16,353	10.2 (10.0, 10.4)	15.1 (14.4, 15.8)	6.2 (6.1, 6.3)	6.6 (6.1, 7.2)	2.43 (2.38, 2.48)
Hispanic	13,224	8.0 (7.8, 8.2)	10.8 (9.9, 11.6)	4.9 (4.7, 5.0)	3.6 (3.1, 4.2)	1.99 (1.97, 2.01)
Others	9,597	7.4 (7.1, 7.7)	9.1 (8.2, 10.1)	4.5 (4.3, 4.7)	3.1 (2.6, 3.8)	1.77 (1.76, 1.79)
Educational attainment						
<High school	13,238	10.2 (10.0, 10.4)	15.6 (14.8, 16.4)	6.2 (6.1, 6.3)	6.1 (5.6, 6.6)	2.43 (2.38, 2.48)
High school	51,903	8.34 (8.25, 8.42)	10.7 (10.3, 11.0)	5.08 (5.02, 5.13)	3.4 (3.2, 3.6)	1.99 (1.97, 2.01)
>High school	119,474	6.64 (6.59, 6.69)	6.75 (6.5, 6.8)	4.04 (4.01, 4.07)	2.0 (1.9, 2.1)	1.58 (1.57, 1.60)
Household income ($)						
<35k	60,519	9.11 (9.01, 9.20)	12.8 (12.5, 13.1)	5.54 (5.48, 5.60)	4.6 (4.4, 4.8)	2.17 (2.15, 2.19)
≥35k	101,959	6.33 (6.28, 6.38)	5.7 (5.5, 5.9)	3.85 (3.82, 3.88)	1.4 (1.3, 1.5)	1.51 (1.50, 1.52)

Note: Values within parentheses are 95% CIs.

[a] Age-standardized by the direct method to the U.S. 2000 census population using the age groups 30–39, 40–49, 50–59, and 60–74 years. Predicted 10-year risk of developing cardiovascular disease were based on the predicted systolic blood pressure using multivariable linear regression models developed from NHANES 2005–2010.

[b] Stable estimates of risk score prevalence ≥20% for stroke could not be obtained because of the limited sample size.

[c] Percentage in parentheses is the survey response rate.

CHD, coronary heart disease; CVD, cardiovascular disease; NHANES, National Health and Nutrition Examination Survey.