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# Trends in Racial/Ethnic and Nativity Disparities in Cardiovascular Health Among Adults Without Prevalent Cardiovascular Disease in the United States, 1988 to 2014

**Arleen F. Brown, MD, PhD; Li-Jung Liang, PhD; Stefanie D. Vassar, MS; Jose J. Escarce, MD, PhD; Sharon Stein Merkin, PhD; Eric Cheng, MD, MSHS; Adam Richards, MD, PhD; Teresa Seeman, PhD; and W.T. Longstreth Jr., MD, MPH**

**Background:** Trends in cardiovascular disparities are poorly understood, even as diversity increases in the United States.

**Objective:** To examine U.S. trends in racial/ethnic and nativity disparities in cardiovascular health.

**Design:** Repeated cross-sectional study.

**Setting:** NHANES (National Health and Nutrition Examination Survey), 1988 to 2014.

**Participants:** Adults aged 25 years or older who did not report cardiovascular disease.

**Measurements:** Racial/ethnic, nativity, and period differences in Life's Simple 7 (LS7) health factors and behaviors (blood pressure, cholesterol, hemoglobin $A_{1c}$, body mass index, physical activity, diet, and smoking) and optimal composite scores for cardiovascular health (LS7 score ≥10).

**Results:** Rates of optimal cardiovascular health remain below 40% among whites, 25% among Mexican Americans, and 15% among African Americans. Disparities in optimal cardiovascular health between whites and African Americans persisted but decreased over time. In 1988 to 1994, the percentage of African Americans with optimal LS7 scores was 22.8 percentage points (95% CI, 19.3 to 26.4 percentage points) lower than that of whites in persons aged 25 to 44 years and 8.0 percentage points (CI, 6.4 to 9.7 percentage points) lower in those aged 65 years or older. By 2011 to 2014, differences decreased to 10.6 percentage points (CI, 7.4 to 13.9 percentage points) and 3.8 percentage points (CI, 2.5 to 5.0 percentage points), respectively. Disparities in optimal LS7 scores between whites and Mexican Americans were smaller but also decreased. These decreases were due to reductions in optimal cardiovascular health among whites over all age groups and periods: Between 1988 to 1994 and 2011 to 2014, the percentage of whites with optimal cardiovascular health decreased 15.3 percentage points (CI, 11.1 to 19.4 percentage points) for those aged 25 to 44 years and 4.6 percentage points (CI, 2.7 to 6.5 percentage points) for those aged 65 years or older.

**Limitation:** Only whites, African Americans, and Mexican Americans were studied.

**Conclusion:** Cardiovascular health has declined in the United States, racial/ethnic and nativity disparities persist, and decreased disparities seem to be due to worsening cardiovascular health among whites rather than gains among African Americans and Mexican Americans. Multifaceted interventions are needed to address declining population health and persistent health disparities.

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For author affiliations, see end of text.

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Cardiovascular disease (CVD), including heart disease and stroke, is a leading cause of morbidity and mortality in the United States and disproportionately affects minority adults at an earlier age than whites (1, 2). Several modifiable risk factors, both biological and behavioral, contribute to premature CVD in African American and Latino adults, and the higher prevalence in these groups is expected to continue (3, 4). Cardiovascular disease is also a major contributor to the economic burden of U.S. health disparities (5). To reduce disparities, CVD prevention through control of biological and behavioral risk factors is increasingly emphasized.

One such effort is Life's Simple 7 (LS7), a set of goals developed by the American Heart Association to define, monitor, and enhance cardiovascular health through primary prevention of heart disease and stroke (6). The LS7 score summarizes control of the following 7 health factors and behaviors: blood pressure, serum lipids, blood glucose, weight, physical activity, diet, and smoking. Lower scores are associated with higher all-cause and CVD-related death (7) and higher incidence of CVD (8), stroke (9, 10), heart failure (11), diabetes (12), cognitive impairment (13), depressive symptoms (14), and end-stage renal disease (15). The LS7 score is also easier for patients and providers to use to identify targets for change than other measures of cardiovascular and stroke risk.

Despite national efforts to improve cardiovascular health and reduce related disparities (16, 17), trends in these measures remain inadequately understood among African Americans, Latinos, other racial/ethnic groups, and immigrant populations (3, 18), even as the United States becomes increasingly diverse (19, 20). We used data from NHANES (National Health and Nutrition Ex-

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***Table.*** Cardiovascular Health Metrics and Definitions

| Health Metric | Poor (Score = 0) | Intermediate (Score = 1) | Ideal (Score = 2) |
|---|---|---|---|
| Blood pressure, *mm Hg* | SBP ≥140 or DBP ≥90 | SBP 120–139 and DBP 80–89 or treated to ideal goal | SBP <120 and DBP <80 and not receiving blood pressure medications |
| Total cholesterol level | | | |
| *mmol/L* | ≥6.21 | 5.18–6.20 or treated to ideal goal | <5.18 and not receiving lipid-lowering medications |
| *mg/dL* | ≥240 | 200–239 or treated to ideal goal | <200 and not receiving lipid-lowering medications |
| Hemoglobin $A_{1c}$ level, % | ≥5.7 | 5.0–5.6 | <4.9 |
| Body mass index, $kg/m^2$ | ≥30 | 25–29.9 | <25 |
| Physical activity, *min/wk** | 0 | 1–149 moderate intensity, 1–74 vigorous intensity, or 1–149 moderate plus vigorous intensity | ≥150 moderate intensity, ≥75 vigorous intensity, or ≥150 moderate plus vigorous intensity |
| Healthy diet score† | <50 | 50–80 | >80 |
| Smoking status | Current | Former; stopped ≤12 mo ago | Never smoked or quit >12 mo ago |

DBP = diastolic blood pressure; SBP = systolic blood pressure.
* Based on leisure and recreational activities but does not include work-related physical activity.
† Calculated using 4 components of the Healthy Eating Index (fruits, vegetables, grains, and sodium), a diet quality scale that assesses conformance to federal dietary guidance.

amination Survey) between 1988 and 2014 to examine overall trends in the LS7 components and overall score by race/ethnicity and nativity. Understanding these changes may help identify and prioritize approaches to improving health in both the population overall and vulnerable subgroups.

## METHODS

The NHANES consists of cross-sectional, multistage, stratified, clustered probability samples of noninstitutionalized U.S. civilians. Each wave is a representative sample of the U.S. population. We used data from NHANES III (1988 to 1994) and four 4-year waves of the continuous NHANES from 1999 to 2014 to create 5 periods for these analyses: 1988 to 1994, 1999 to 2002, 2003 to 2006, 2007 to 2010, and 2011 to 2014 (21). The resulting sample sizes provided at least 80% power at a type I error rate of 5% to detect a clinically meaningful reduction of 5% in a binary outcome between whites and the other racial/ethnic and nativity groups across periods, assuming that the percentage of white participants with optimal cardiovascular health ranged from 18.5% to 31.4%.

We analyzed data from adults aged 25 years or older who reported their race/ethnicity as non-Hispanic white (white), non-Hispanic African American (African American), or Mexican American. We distinguished Mexican Americans by nativity: born in the United States (U.S.-born) versus born in Mexico (non–U.S.-born). Before 2007, NHANES included too few Hispanics who were not Mexican American to calculate reliable estimates for other groups (22). Persons with prevalent CVD—defined as self-reported stroke, myocardial infarction, angina, or heart failure—were excluded. We also excluded Mexican Americans who indicated that they were born outside of Mexico and the United States or whose birthplace was unknown or missing (**Appendix Figure**, available at Annals.org). We categorized age into the following 3 groups: 20 to 44 years, 45 to 64 years, and 65 years or older.

The primary outcomes were the 7 health factors and behaviors and a composite variable representing optimal cardiovascular health. The **Table** defines poor, intermediate, and ideal levels for each LS7 component (blood pressure, total cholesterol, hemoglobin $A_{1c}$ [$HbA_{1c}$], body mass index [BMI], physical activity, diet, and smoking) (6, 23). To score each component, we assigned 2 points for the ideal category, 1 point for intermediate values, and 0 points for the poor category. The study collected data on blood pressure, cholesterol level, $HbA_{1c}$ level, body weight, and height. Blood pressure was read 3 times during the visit; the first reading was discarded, and the mean of the 2 remaining was used for these analyses. During an interview, participants reported cigarette smoking, medications, and frequency and duration of participation in leisure-time physical activity over the prior 30 days (21). Diet was assessed using a single 24-hour recall questionnaire for 1988 to 1994 and 1999 to 2002 or the average of 2 questionnaires for 2003 to 2014. The healthy diet measure included 4 components from the 2005 Healthy Eating Index (fruits, vegetables, whole grains, and sodium) (24).

As in prior studies (10), each participant's total LS7 score was calculated by summing the scores for all 7 components (range, 0 to 14 points). We categorized a total score of 10 or higher as optimal cardiovascular health (11). Although no cut point for optimal LS7 score has been validated, prior literature shows that scores of 10 or 11 or greater are associated with lower incident and prevalent CVD, stroke, and mortality than lower scores (10, 25, 26). We calculated weighted, unadjusted percentages of participants with optimal cardiovascular health using both cut points and plotted the percentages by age group, cohort, and race/ethnicity and nativity. Visual inspection of the graphs showed similar patterns between the 2 cutoffs. However, because the 11-or-higher cut point requires an ideal score for at least 4 items, some groups in the analysis had no



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participants at the optimal level. For these reasons, we selected the cut point of 10 or higher.

### Statistical Analysis

Frequency distributions of sample characteristics and adjusted, weighted percentages of participants with poor scores on each LS7 component were summarized and plotted by race/ethnicity and nativity for the 3 age groups across the 5 periods. Total scores were estimated and used to calculate the optimal cardiovascular health scores, which were similarly summarized and plotted.

We estimated racial/ethnic and nativity differences and changes by period in each age group for poor scores on each LS7 component and for the optimal cardiovascular health score. We used generalized linear regression models with a probit link for binary outcomes or identity link for continuous outcomes, using the SAS survey procedures (PROC SURVEYLOGISTIC and SURVEYREG) with appropriate sample weights accounting for unequal probabilities of selection, oversampling, and nonresponse. The base 3-way model included 3 main effects (race/ethnicity and nativity, age, and period), three 2-way interactions between the main effects, and the 3-way interaction of the main effects. Adjusted models also included age, sex, education, and income–poverty ratio, a ratio of self-reported family income to the poverty threshold for the period. For NHANES III (1988 to 1994), all adults aged 90 years or older were assigned an age value of 90 years; for 1999 to 2014, all adults aged 85 years or older were assigned a value of 85 years (27). Age category alone may not fully explain the association between age and outcome variable, so we added the individual age to improve model fit. The amount of missing data on income–poverty ratio varied across race/ethnicity and nativity. Thus, a multiple imputation approach accounting for survey sample weights and design structure was used to impute missing income–poverty ratios and to combine results from 5 imputation data sets (SAS PROC MI and MIANALYZE) (28). The absolute differences in probabilities for prespecified comparisons of interest were estimated through model contrasts. Corresponding 95% CIs were calculated using a bootstrap method with 1000 iterations (29). All analyses were done using SAS, version 9.4 (SAS Institute), and figures were generated using Microsoft Excel.

### Role of the Funding Source

The funders had no role in the design or conduct of the study; collection, management, analysis, or interpretation of the data; preparation, review, or approval of the manuscript; or the decision to submit the manuscript for publication.

## RESULTS

The final sample comprised 21 003 whites, 10 426 African Americans, 3961 U.S.-born Mexican Americans, and 5486 non–U.S.-born Mexican Americans, all with no prior CVD events (**Appendix Figure**). Across all 5 periods, whites had a higher mean age, more years of education, and a higher income–poverty ratio than participants from the other racial/ethnic groups (**Appendix Table 1**, available at Annals.org). Non–U.S.-born Mexican Americans were younger and had a higher proportion of male participants, fewer years of education, and a lower income–poverty ratio than the other groups.

In weighted, adjusted models, the percentage of participants who had poor control for each LS7 component varied substantially by race, ethnicity, and nativity for the 5 periods (**Figure 1** and **Appendix Tables 2** and **3**, available at Annals.org). In general, disparities persisted between whites and all other groups in high BMI and poor levels of $HbA_{1c}$ and physical activity. Disparities in percentages of participants with poor scores on blood pressure, cholesterol, diet, and smoking were not consistent by race/ethnicity and nativity. Over time, whites—and to a lesser extent, U.S.-born Mexican Americans—had disproportionate increases in poor levels of physical activity and diet relative to most other groups.

Rates of optimal cardiovascular health never increased above 40% among whites, 25% among Mexican Americans, and 15% among African Americans (**Figure 2**). In adjusted analyses (**Figure 2** and **Appendix Table 4**, available at Annals.org), disparities in optimal cardiovascular health were generally highest for African Americans relative to whites, with the most pronounced differences in the youngest age group. For example (**Figure 2** and **Appendix Table 4**), in 1988 to 1994 the adjusted difference in the percentage of African Americans aged 25 to 44 years with optimal LS7 scores was 22.8 percentage points (95% CI, 19.3 to 26.4 percentage points) lower than that of whites, whereas the difference for African Americans aged 65 years or older was 8.0 percentage points (CI, 6.4 to 9.7 percentage points) lower than that for whites. By 2011 to 2014, the differences had decreased to 10.6 percentage points (CI, 7.4 to 13.9 percentage points) and 3.8 percentage points (CI, 2.5 to 5.0 percentage points), respectively. The differences between whites and both U.S.-born and non–U.S.-born Mexican Americans were generally smaller. However, as with African Americans, although whites differed from both groups of Mexican Americans for almost all age groups in 1988 to 1994, the disparities generally decreased over time and were most pronounced in the youngest age groups.

By survey period, differences in the adjusted percentages of participants with optimal LS7 scores varied substantially by race/ethnicity and nativity (**Appendix Table 5**, available at Annals.org). Among whites aged 25 to 44 years, compared with 1988 to 1994 the percentages with optimal LS7 scores were lower by 5.8 percentage points (CI, 1.1 to 10.4 percentage points) in 1999 to 2002, by 9.1 percentage points (CI, 4.9 to 13.3 percentage points) in 2003 to 2006, by 14.8 percentage points (CI, 10.6 to 19.0 percentage points) in 2007 to 2010, and by 15.3 percentage points (CI, 11.1 to 19.4 percentage points) in 2011 to 2014. For those aged 45 to 64 years, percentages did not change in 1999 to 2002, and reductions were 6.1 percentage points (CI, 2.9 to 9.2 percentage points), 9.3 percentage points (CI, 6.1 to 12.5 percentage points), and 10.2



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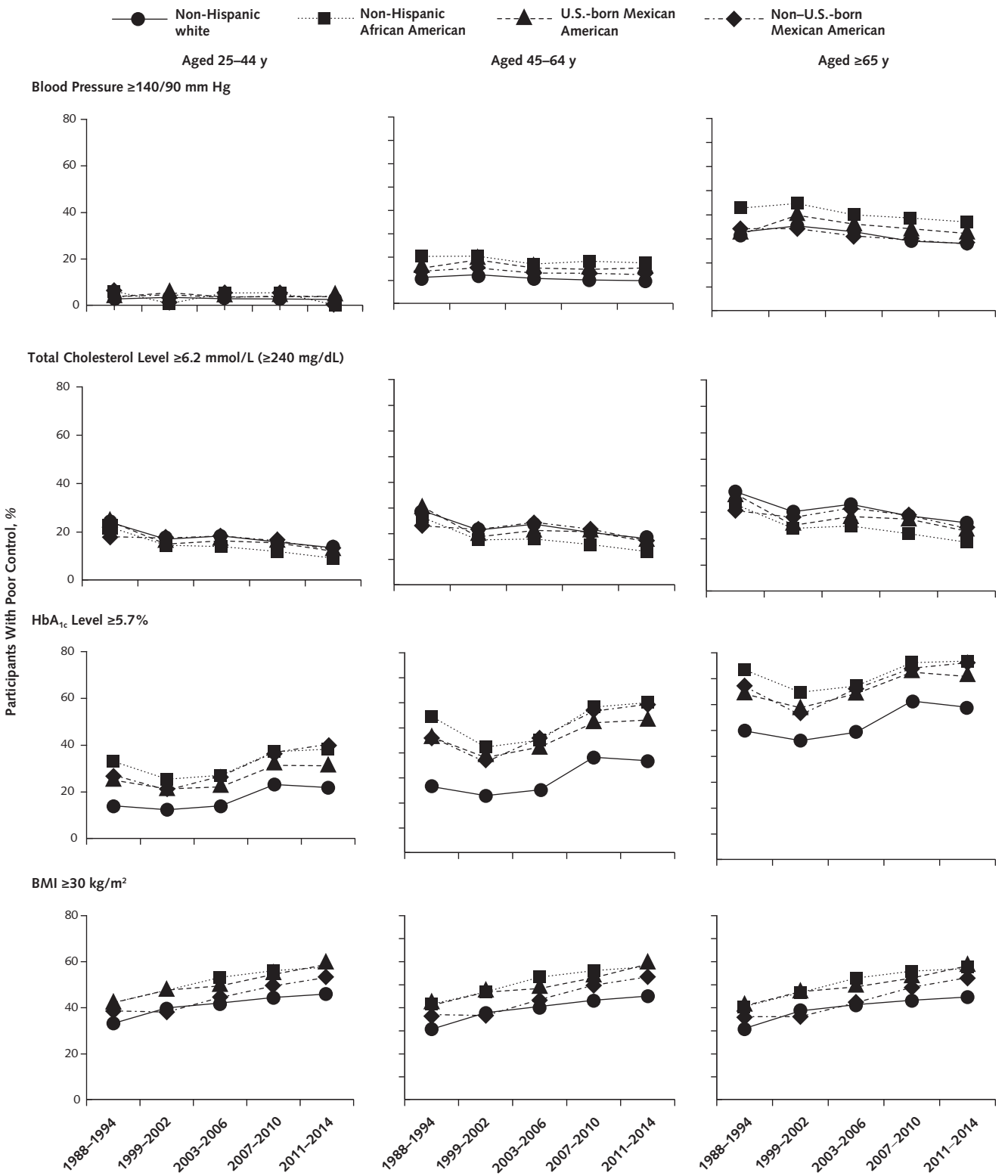
***Figure 1.*** Adjusted, weighted percentage of participants with poor control of individual components for Life's Simple 7.




Percentages were adjusted for age, sex, education, and income–poverty ratio. Appropriate NHANES (National Health and Nutrition Examination Survey) sample weights were used. The figure represents repeated analyses of cross-sectional data for the periods indicated. They do not represent longitudinal surveys of the same respondents. BMI = body mass index; $HbA_{1c}$ = hemoglobin $A_{1c}$.



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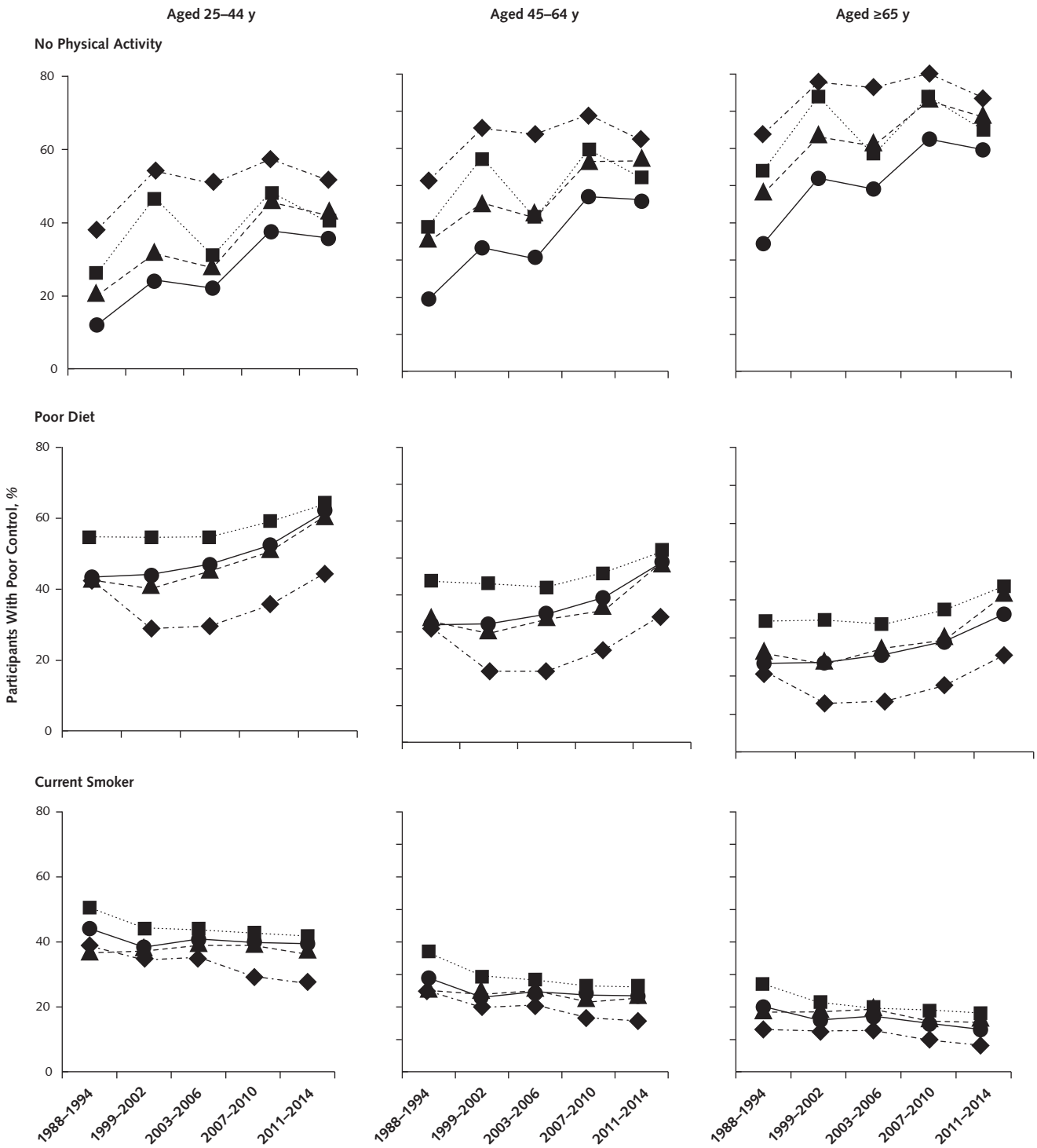
***Figure 1***–Continued.




percentage points (CI, 7.1 to 13.3 percentage points) in subsequent periods. For those aged 65 years or older, the reductions compared with 1988 to 1994 were 2.6 percentage points (CI, 0.4 to 4.7 percentage points), 3.9 percentage points (CI, 2.1 to 5.7 percentage points), 4.5 percentage points (CI, 2.4 to 6.6 percentage points), and 4.6 percentage points (CI, 2.7 to 6.5 percentage points). In contrast, for African Americans, U.S.-born Mexican Americans, and non–U.S.-born Mexican Americans, the only consistent declines in optimal



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cardiovascular health were for individuals aged 25 to 44 years between 2007 to 2010 and 2011 to 2014.

## DISCUSSION

In these analyses of nationally representative, population-based, multiyear samples of U.S. adults without CVD from 1988 to 2014, we observed persistent disparities in LS7 scores between whites and African Americans, U.S.-born Mexican Americans, and non–U.S.-born Mexican Americans but decreases in absolute disparities. The reduced disparities were due to larger declines in LS7 scores for whites rather than gains in cardiovascular health among African Americans and Mexican Americans. Disparities in cardiovascular health and decreases over time were most pronounced and most consistent between whites and African Americans. Disparities between whites and non–U.S.-born Mexican Americans were smaller, whereas the smallest and least consistent disparities were between U.S.-born Mexican Americans and whites.

Individual risk factors show substantial heterogeneity across the racial/ethnic and nativity groups. Although cholesterol levels, smoking, and (in some age groups) blood pressure improved, $HbA_{1c}$ levels, BMI control, diet, and physical activity worsened. The long-term effect of these diverging temporal changes in CVD risk factors and their implications for disparities in CVD and stroke require further study.

Our findings are consistent with prior research using national data to examine trends in CVD risk by race/ethnicity and nativity. One study used NHANES data between 1999 and 2010 to examine the prevalence of uncontrolled CVD risk factors (blood pressure ≥140/90 mm Hg, elevated low-density lipoprotein cholesterol, and current smoking) (30–35). In this study, the proportion of whites and Mexican Americans with at least 1 uncontrolled risk factor decreased, but that of African Americans did not change; these results are generally consistent with our findings for blood pressure, cholesterol, and smoking trends. Our composite score also incorporated cardiometabolic risk factors, including $HbA_{1c}$ level, BMI, diet, and physical activity, many of which worsened over the periods studied. A recent analysis using data from 1988 to 1994 through 1999 to 2012 found increasing rates of diabetes in all U.S. adults, with the highest prevalence among nonwhite groups (36). For adults aged 20 years or older, diabetes prevalence increased from 8.6% to 9.5% among whites, from 16.3% to 20.6% among African Americans, and from 17.5% to 20.5% among Mexican Americans. Several studies have also tracked rates of overweight and obesity in the United States, showing long-term increases in BMI, with some stabilization in recent years (32–35). Among both obese and nonobese adults, rates of smoking, uncontrolled hypertension, and hyperlipidemia decreased, but rates of diabetes remained stable or increased (32, 35). In addition, among the growing population of obese adults between 1988 and 2014, the proportion with all 3 risk factors increased in whites, African Americans, and Mexican Americans (33).

Our repeated cross-sectional analyses of population-based data build on other cross-sectional studies examining the association between nativity and cardiovascular health. Using data from NHANES between 1999 and 2002, one analysis found that blood pressure risk and metabolic risk (cholesterol, BMI, and $HbA_{1c}$) were significantly lower among non–U.S.-born than U.S.-born Mexican Americans (37), but neither group differed from whites. Another analysis that used data from 2003 to 2008 found that foreign-born Mexican Americans had higher odds than whites of having low cardiovascular risk status (defined as nonsmoking, no diabetes, untreated total cholesterol level <5.2 mmol/L [200 mg/dL], untreated blood pressure <120/80 mm Hg, and BMI <25 kg/$m^2$), whereas U.S.-born Mexican Americans had lower odds than whites of having low risk (38, 39). The difference from our findings, which showed lower risk for whites than both Mexican American groups, seems to be due to the inclusion of dietary patterns and exercise in our composite risk measure.

Recent evidence shows consistent reductions in CVD mortality for all racial/ethnic groups (1, 40–42). However, our findings of suboptimal control of risk factors in the population as a whole and declines in cardiovascular health among whites and some younger adults may foreshadow higher rates of heart disease and stroke and poorer outcomes from these conditions in the coming decades. The long-term effect of these trends on heart disease and stroke incidence, case fatality, and mortality will depend on many factors, including socioeconomic differences; competing health and social risks; cultural factors; racial/ethnic variation in the effects of biological and behavioral risk factors on CVD (43–46); and differences in access to high-quality, evidence-based health care. Our analyses indicate the need for greater emphasis on prevention in all groups and earlier and more effective use of evidence-based therapies to control CVD risk factors. They also suggest a need for better understanding of the underlying socioeconomic, biological, and policy contributors to the observed trends.

These analyses have limitations. Because we restricted the analytic cohort to persons without CVD, the older adults in our sample have fewer comorbid conditions than the U.S. population as a whole, and the cohort may underrepresent some groups at high risk for disparities (such as younger African Americans and Mexican American adults with early heart disease and stroke). Underreporting of CVD may have been more common among those with less education and lower access to health care but would not have accounted for the declines we observed among whites relative to the other racial/ethnic groups. Another potential limitation is heterogeneity among non–U.S.-born Mexican Americans in the sample, who likely represent very different groups over the 5 periods studied due to the sharp decline in net immigration from Mexico during those years (47). We could not examine cardiovascular health among persons of Latino heritage other than Mexican Americans; other racial or ethnic subgroups, such as Asians, Pacific Islanders, and American Indians; and im-



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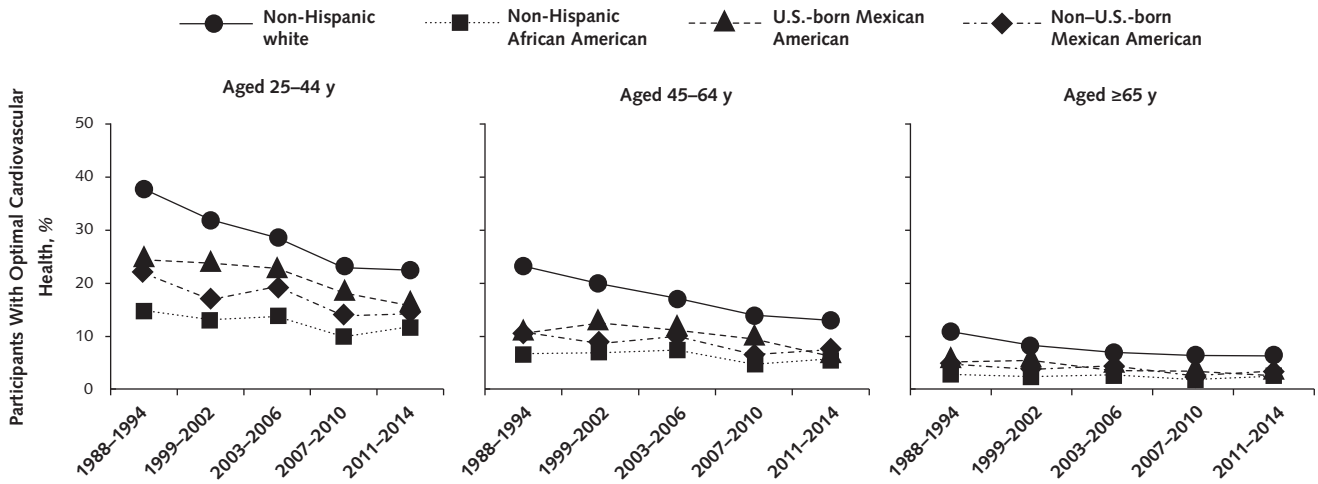
***Figure 2.*** Adjusted, weighted percentage of participants with optimal cardiovascular health.




Percentages were adjusted for age, sex, education, and income–poverty ratio. Appropriate NHANES (National Health and Nutrition Examination Survey) sample weights were used. Optimal cardiovascular health was defined as Life's Simple 7 score ≥10. The figure represents repeated analyses of cross-sectional data for the periods indicated. They do not represent longitudinal surveys of the same respondents.

migrants from countries other than Mexico (48). We also lacked data on work-related physical activity, which is frequently higher among Mexican Americans and African Americans than whites (49–51) and differs by nativity and duration of residence in the United States (52). This concern is somewhat mitigated by evidence indicating that although higher levels of leisure-time physical activity have been associated with better overall health and physical functioning, more favorable profiles of inflammatory biomarkers, and lower rates of coronary heart disease, the associations between work-related physical activity and health outcomes are less consistent (53–55). Finally, although our analyses included nativity, education, and income as variables, other measures of social class and acculturation may be important in CVD disparities (56).

The LS7 composite score helps to predict overall health risk and can be used to identify, prioritize, and monitor targets for interventions to improve overall cardiovascular health (57). Our findings support the growing evidence suggesting that multifaceted strategies will be needed to improve the overall cardiovascular health of the population and associated health disparities (58–62). High-quality medical care can promote and sustain control of blood pressure, cholesterol, and glucose and can play a pivotal role in encouraging behavior change related to diet, exercise, and tobacco use (63–66). However, medical care alone cannot address worsening trends in risk factor profiles. Community and policy interventions may improve health outcomes through decreased rates of and disparities in smoking, obesity, sedentary lifestyles, poor diet, and poor glycemic control. These risk factors present complex challenges, many of which will require multilevel, multisector approaches to intervene on biological and genetic risk, cultural norms, social networks, clinical care, the built environment, and food policy (67–70).

From University of California, Los Angeles, Los Angeles, California (A.F.B., L.L., S.D.V., J.J.E., S.S.M., E.C., A.R., T.S.); Olive View-UCLA Medical Center (A.F.B.); and University of Washington, Seattle, Washington (W.L.J.).

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**Reproducible Research Statement:** *Study protocol and statistical code:* Available from Dr. Brown (e-mail, ABrown@mednet.ucla.edu). *Data set:* Publicly available at www.cdc.gov/nchs/nhanes/index.htm.

**Requests for Single Reprints:** Arleen F. Brown, MD, PhD, Professor, UCLA Department of Medicine, Division of General Internal Medicine and Health Services Research, Box 951736, 911 Broxton Avenue, Los Angeles, CA 90095; e-mail, ABrown@mednet.ucla.edu.

Current author addresses and author contributions are available at Annals.org.

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**Current Author Addresses:** Drs. Brown, Liang, Escarce, and Richards and Ms. Vassar: UCLA Department of Medicine, Division of General Internal Medicine and Health Services Research, Box 951736, 911 Broxton Avenue, Los Angeles, CA 90095.

Drs. Merkin and Seeman: UCLA Department of Medicine, Division of Geriatrics, Box 951687, 2339 PVUB, Los Angeles, CA 90095.

Dr. Cheng: UCLA Neurology, Box 957250, Oppenheimer Tower, 10880 Wilshire Boulevard, Suite 700, Los Angeles, CA 90095.

Dr. Longstreth: Department of Neurology, Box 359775, Harborview Medical Center, 325 Ninth Avenue, Seattle, WA 98104.

**Author Contributions:** Conception and design: A.F. Brown, L.J. Liang, E. Cheng, A. Richards, W.T. Longstreth.

Analysis and interpretation of the data: A.F. Brown, L.J. Liang, S.D. Vassar, J.J. Escarce, S.S. Merkin, A. Richards, T. Seeman.

Drafting of the article: A.F. Brown, L.J. Liang, S.D. Vassar, J.J. Escarce.

Critical revision of the article for important intellectual content: A.F. Brown, L.J. Liang, S.D. Vassar, S.S. Merkin, E. Cheng, A. Richards, T. Seeman, W.T. Longstreth.

Final approval of the article: A.F. Brown, L.J. Liang, S.D. Vassar, J.J. Escarce, S.S. Merkin, E. Cheng, A. Richards, T. Seeman, W.T. Longstreth.

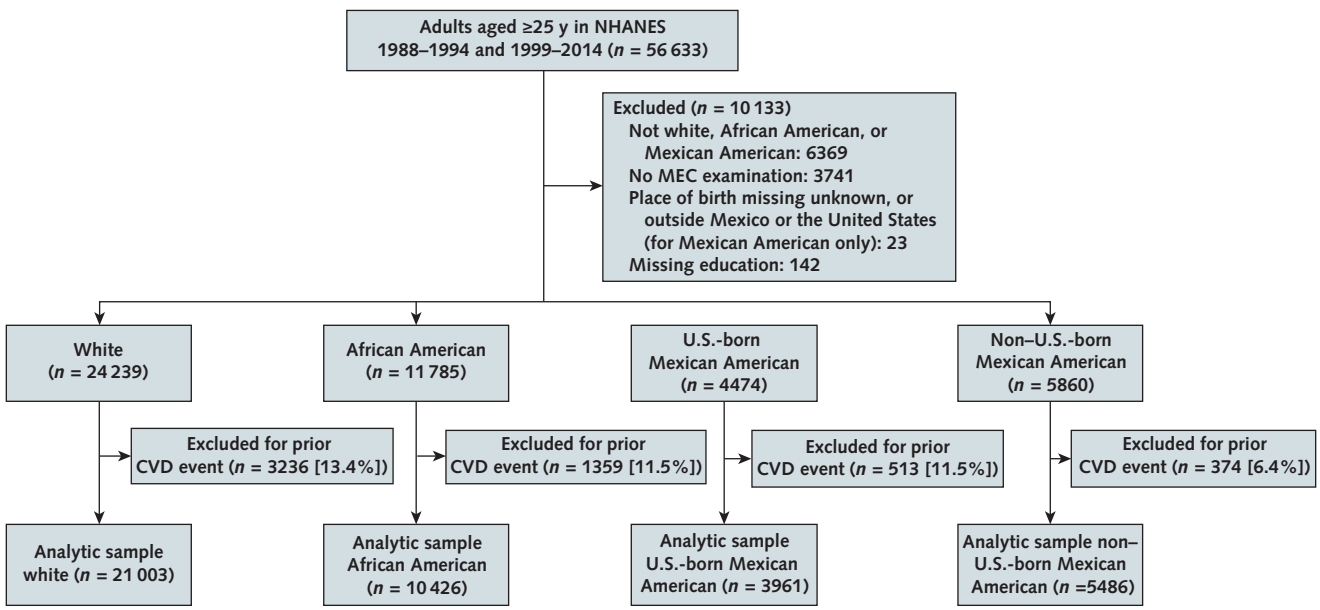
Statistical expertise: L.J. Liang.

Obtaining of funding: A.F. Brown, S.D. Vassar, J.J. Escarce.

Administrative, technical, or logistic support: S.D. Vassar.

Collection and assembly of data: A.F. Brown, S.D. Vassar.

***Appendix Figure.*** Study flow diagram.




Prior CVD event included self-reported stroke, myocardial infarction, heart failure, or angina. CVD = cardiovascular disease; MEC = mobile examination center; NHANES = National Health and Nutrition Examination Survey.



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*Appendix Table 1.* Characteristics of Participants in NHANES, by Period, Race/Ethnicity, and Nativity

| Characteristic | 1988–1994 | | | | 1999–2002 | | | |
|---|---|---|---|---|---|---|---|---|
| | White (*n* = 5443) | African American (*n* = 3561) | U.S.-Born Mexican American (*n* = 1662) | Non-U.S.-Born Mexican American (*n* = 1689) | White (*n* = 3710) | African American (*n* = 1457) | U.S.-Born Mexican American (*n* = 707) | Non-U.S.-Born Mexican American (*n* = 1081) |
| **Mean age ± SE, *y*** | 46.6 ± 0.52 | 43.2 ± 0.40 | 42.2 ± 0.33 | 38.6 ± 0.42 | 47.8 ± 0.37 | 44.0 ± 0.50 | 42.4 ± 0.84 | 39.2 ± 0.72 |
| **Age group, *n (%)*** | | | | | | | | |
| 25–44 y | 1956 (53.3) | 2091 (64.4) | 857 (65.2) | 1099 (75.2) | 1438 (47.7) | 667 (58.8) | 285 (62.7) | 581 (73.6) |
| 45–64 y | 1598 (30.0) | 917 (24.5) | 519 (27.4) | 371 (19.3) | 1181 (35.9) | 499 (31.1) | 250 (28.8) | 332 (22.0) |
| 65–74 y | 893 (10.9) | 372 (7.4) | 223 (5.8) | 141 (3.6) | 520 (9.9) | 185 (6.5) | 124 (5.9) | 123 (3.2) |
| ≥75 y | 996 (5.8) | 181 (3.7) | 63 (1.7) | 78 (1.9) | 571 (6.6) | 106 (3.7) | 48 (2.7) | 45 (1.2) |
| **Male, *n (%)*** | 2469 (47.8) | 1622 (45.1) | 788 (48.5) | 886 (55.0) | 1745 (48.1) | 683 (44.0) | 313 (46.2) | 530 (55.1) |
| **Education level, *n (%)*** | | | | | | | | |
| Less than high school | 1444 (18.6) | 1292 (30.7) | 788 (36.2) | 1331 (76.9) | 574 (13.1) | 566 (34.9) | 299 (30.1) | 842 (74.0) |
| High school/GED | 1849 (35.0) | 1277 (37.9) | 494 (35.3) | 202 (12.5) | 997 (26.9) | 332 (23.9) | 156 (27.4) | 109 (12.3) |
| More than high school | 2150 (46.4) | 992 (31.4) | 380 (28.5) | 156 (10.6) | 2139 (60.0) | 559 (41.1) | 252 (42.5) | 130 (13.7) |
| **Income–poverty ratio, *n (%)**** | | | | | | | | |
| 0–1.0 | 409 (6.0) | 905 (23.3) | 400 (20.0) | 635 (36.6) | 291 (6.8) | 293 (20.9) | 99 (12.7) | 333 (31.3) |
| 1.1–3.0 | 2150 (36.0) | 1579 (44.0) | 704 (41.1) | 709 (44.2) | 1176 (28.8) | 561 (37.5) | 281 (38.9) | 489 (44.9) |
| ≥3.0 | 2513 (53.0) | 747 (24.2) | 420 (32.4) | 96 (6.2) | 1927 (56.4) | 417 (29.8) | 258 (40.2) | 117 (11.7) |
| Missing | 371 (4.9) | 330 (8.5) | 138 (6.6) | 249 (13.1) | 316 (8.0) | 186 (11.8) | 69 (8.2) | 142 (12.0) |

NHANES = National Health and Nutrition Examination Survey.
* The ratio of self-reported family income to the poverty threshold for the period.



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*Appendix Table 1*–Continued

| 2003-2006 | | | | 2007-2010 | | | | 2011-2014 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **White (*n* = 3820)** | **African American (*n* = 1574)** | **U.S.-Born Mexican American (*n* = 577)** | **Non-U.S.-Born Mexican American (*n* = 949)** | **White (*n* = 4539)** | **African American (*n* = 1817)** | **U.S.-Born Mexican American (*n* = 627)** | **Non-U.S.-Born Mexican American (*n* = 1093)** | **White (*n* = 3491)** | **African American (*n* = 2017)** | **U.S.-Born Mexican American (*n* = 388)** | **Non-U.S.-Born Mexican American (*n* = 674)** |
| 48.9 ± 0.48 | 45.3 ± 0.36 | 42.9 ± 0.92 | 39.6 ± 0.86 | 49.7 ± 0.33 | 46.2 ± 0.61 | 43.3 ± 0.72 | 42.3 ± 0.86 | 50.6 ± 0.36 | 47.2 ± 0.54 | 42.4 ± 0.69 | 42.7 ± 0.74 |
| 1472 (43.0) | 721 (52.2) | 233 (61.2) | 547 (72.6) | 1665 (40.0) | 710 (49.3) | 261 (57.9) | 534 (64.6) | 1358 (37.1) | 751 (46.5) | 178 (62.6) | 324 (62.9) |
| 1244 (39.6) | 576 (36.7) | 178 (27.9) | 256 (22.5) | 1559 (41.5) | 741 (38.9) | 258 (32.4) | 412 (28.5) | 1236 (43.7) | 874 (40.9) | 144 (28.7) | 262 (30.7) |
| 520 (10.3) | 178 (6.8) | 103 (6.8) | 106 (3.5) | 649 (10.7) | 243 (7.6) | 69 (5.8) | 109 (4.7) | 432 (11.4) | 262 (7.9) | 50 (6.9) | 71 (5.0) |
| 584 (7.1) | 99 (4.4) | 63 (4.1) | 40 (1.5) | 666 (7.8) | 123 (4.2) | 39 (3.9) | 38 (2.1) | 465 (7.9) | 130 (4.6) | 16 (1.9) | 17 (1.3) |
| 1821 (47.8) | 763 (45.2) | 252 (47.2) | 487 (56.7) | 2192 (47.3) | 881 (44.1) | 275 (49.3) | 549 (55.1) | 1666 (47.7) | 978 (44.6) | 182 (48.7) | 347 (52.8) |
| 531 (10.5) | 437 (25.3) | 212 (27.1) | 688 (68.3) | 798 (12.9) | 512 (25.2) | 188 (26.7) | 789 (68.3) | 465 (9.3) | 431 (19.3) | 110 (25.6) | 455 (65.0) |
| 1049 (27.3) | 385 (25.4) | 141 (26.5) | 139 (17.3) | 1159 (24.2) | 469 (26.7) | 166 (27.3) | 148 (15.6) | 740 (19.8) | 545 (26.0) | 77 (20.6) | 110 (18.1) |
| 2240 (62.3) | 750 (49.3) | 224 (46.4) | 122 (14.4) | 2582 (63.0) | 836 (48.0) | 273 (46.1) | 156 (16.1) | 2286 (70.9) | 1041 (54.7) | 201 (53.8) | 109 (16.9) |
| 347 (6.7) | 283 (18.6) | 109 (16.1) | 349 (34.3) | 604 (7.5) | 323 (18.0) | 118 (19.8) | 347 (32.5) | 595 (9.1) | 480 (24.9) | 67 (15.6) | 219 (32.9) |
| 1326 (30.1) | 660 (42.3) | 248 (40.5) | 424 (47.5) | 1634 (29.6) | 759 (40.9) | 234 (37.6) | 503 (45.9) | 1225 (29.1) | 730 (35.9) | 150 (39.5) | 283 (41.5) |
| 1983 (59.4) | 570 (35.4) | 203 (41.1) | 102 (11.2) | 2006 (56.8) | 557 (30.9) | 209 (33.4) | 91 (8.7) | 1493 (56.8) | 620 (30.8) | 144 (38.9) | 70 (11.8) |
| 164 (3.9) | 61 (3.6) | 17 (2.4) | 74 (6.9) | 295 (6.1) | 178 (10.1) | 66 (9.2) | 152 (12.9) | 178 (5.1) | 187 (8.4) | 27 (6.0) | 102 (13.8) |



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*Appendix Table 2.* Adjusted, Weighted Racial/Ethnic and Nativity Differences in Percentages of Participants With Poor Life's Simple 7 Components, by Age Group*

| Variable | Blood Pressure ≥140/90 mm Hg | Total Cholesterol Level ≥6.22 mmol/L (≥240 mg/dL) | Hemoglobin $A_{1c}$ Level ≥5.6% | BMI ≥30 kg/m² | No Physical Activity | Unhealthy Diet | Current Smoker |
|---|---|---|---|---|---|---|---|
| **Age group 25-44 y** | | | | | | | |
| 1988-1994 | | | | | | | |
| AA | **3.34 (2.45 to 4.23)** | −1.94 (−4.25 to 0.37) | **18.9 (16.4 to 21.4)** | **9.04 (6.55 to 11.5)** | **14.0 (11.3 to 16.7)** | **11.33 (8.41 to 14.3)** | **6.43 (3.08 to 9.78)** |
| MA US | 0.88 (−0.11 to 1.87) | 0.47 (−4.24 to 5.18) | **11.0 (7.84 to 14.1)** | **8.92 (5.48 to 12.4)** | **7.99 (4.99 to 11.0)** | −0.82 (−4.53 to 2.89) | **−7.48 (−11.4 to −3.62)** |
| MA non-US | **1.01 (0.18 to 1.84)** | **−5.84 (−9.58 to −2.10)** | **13.1 (10.3 to 16.0)** | **5.45 (1.57 to 9.33)** | **26.0 (21.2 to 30.8)** | −0.79 (−4.48 to 2.90) | **−5.34 (−9.57 to −1.10)** |
| 1999-2002 | | | | | | | |
| AA | **3.52 (2.32 to 4.72)** | −2.56 (−5.53 to 0.41) | **13.1 (10.2 to 16.0)** | **7.71 (4.83 to 10.6)** | **22.5 (18.4 to 26.6)** | **10.5 (5.92 to 15.0)** | **5.89 (1.86 to 9.92)** |
| MA US | **1.95 (0.37 to 3.53)** | −2.04 (−5.13 to 1.06) | **8.91 (4.30 to 13.5)** | **7.82 (1.26 to 14.4)** | **7.21 (1.76 to 12.7)** | −4.02 (−9.65 to 1.60) | −1.25 (−7.08 to 4.58) |
| MA non-US | 1.11 (−0.10 to 2.31) | 0.44 (−3.83 to 4.70) | **8.45 (5.52 to 11.4)** | −1.72 (−5.32 to 1.88) | **29.8 (25.0 to 34.7)** | **−15.2 (−19.3 to −11.1)** | −3.93 (−8.66 to 0.80) |
| 2003-2006 | | | | | | | |
| AA | **2.52 (1.62 to 3.42)** | **−4.42 (−6.87 to −1.97)** | **13.0 (10.3 to 15.8)** | **11.1 (8.24 to 14.0)** | **8.84 (4.32 to 13.4)** | **7.70 (3.75 to 11.7)** | 2.79 (−1.97 to 7.56) |
| MA US | 0.83 (−1.13 to 2.80) | −1.99 (−6.03 to 2.05) | **8.11 (5.44 to 10.8)** | **7.43 (3.45 to 11.4)** | 5.51 (−2.18 to 13.2) | −1.91 (−8.14 to 4.32) | −1.96 (−7.21 to 3.28) |
| MA non-US | 0.59 (−0.52 to 1.70) | −0.03 (−3.42 to 3.37) | **12.6 (9.50 to 15.8)** | 2.39 (−1.08 to 5.86) | **28.5 (24.2 to 32.8)** | **−17.4 (−22.5 to −12.3)** | **−5.63 (−9.30 to −1.96)** |
| 2007-2010 | | | | | | | |
| AA | **2.67 (1.33 to 4.02)** | **−3.88 (−6.41 to −1.35)** | **14.0 (10.6 to 17.5)** | **11.6 (8.93 to 14.3)** | **10.6 (5.85 to 15.3)** | **6.70 (3.05 to 10.4)** | 2.84 (−1.79 to 7.46) |
| MA US | 0.99 (−0.27 to 2.25) | −0.31 (−3.87 to 3.25) | **8.25 (3.13 to 13.4)** | **10.0 (5.71 to 14.4)** | **7.81 (1.54 to 14.1)** | −1.78 (−7.25 to 3.69) | −0.93 (−8.05 to 6.19) |
| MA non-US | 1.18 (−0.21 to 2.56) | 0.49 (−2.67 to 3.65) | **13.8 (9.13 to 18.5)** | **5.00 (1.29 to 8.71)** | **19.6 (12.9 to 26.3)** | **−16.8 (−21.3 to −12.4)** | **−10.4 (−15.4 to −5.47)** |
| 2011-2014 | | | | | | | |
| AA | **2.52 (1.46 to 3.57)** | **−4.31 (−6.30 to −2.33)** | **16.4 (12.7 to 20.1)** | **11.6 (8.40 to 14.8)** | **4.32 (0.44 to 8.20)** | 2.04 (−1.19 to 5.26) | 2.36 (−1.55 to 6.28) |
| MA US | 1.23 (−0.28 to 2.73) | −1.41 (−6.21 to 3.39) | **9.29 (4.04 to 14.5)** | **12.8 (6.95 to 18.6)** | 6.14 (−0.27 to 12.6) | −1.12 (−6.55 to 4.31) | −3.27 (−10.4 to 3.82) |
| MA non-US | 1.32 (−0.53 to 3.18) | −0.85 (−4.95 to 3.26) | **18.5 (14.2 to 22.8)** | **7.22 (2.82 to 11.6)** | **15.7 (11.4 to 20.0)** | **−17.2 (−23.6 to −10.7)** | **−12.2 (−17.6 to −6.89)** |
| **Age group 45-64 y** | | | | | | | |
| 1988-1994 | | | | | | | |
| AA | **9.02 (6.88 to 11.2)** | −2.60 (−5.36 to 0.15) | **28.0 (24.9 to 31.1)** | **10.9 (8.07 to 13.7)** | **19.7 (16.1 to 23.2)** | **11.7 (9.24 to 14.2)** | **7.77 (4.64 to 10.9)** |
| MA US | **3.96 (1.12 to 6.79)** | 1.47 (−3.94 to 6.89) | **19.7 (15.5 to 24.0)** | **10.4 (6.59 to 14.2)** | **15.4 (11.3 to 19.5)** | 9.1 (−2.70 to 4.52) | **−3.78 (−7.39 to −0.16)** |
| MA non-US | **2.69 (0.16 to 5.22)** | **−6.01 (−10.2 to −1.87)** | **19.8 (15.9 to 23.7)** | **6.35 (1.97 to 10.7)** | **31.8 (27.2 to 36.5)** | −0.71 (−4.28 to 2.86) | −4.02 (−8.55 to 0.50) |
| 1999-2002 | | | | | | | |
| AA | **7.90 (5.13 to 10.7)** | **−3.83 (−7.03 to −0.64)** | **19.4 (15.3 to 23.6)** | **9.08 (5.86 to 12.3)** | **24.2 (19.2 to 29.3)** | **10.9 (6.45 to 15.4)** | **6.59 (2.80 to 10.4)** |
| MA US | **6.28 (2.64 to 9.91)** | −2.67 (−6.52 to 1.19) | **15.2 (7.96 to 22.5)** | **8.95 (1.44 to 16.5)** | **12.0 (5.15 to 18.8)** | −2.61 (−7.41 to 2.19) | 0.89 (−4.19 to 5.97) |
| MA non-US | 2.87 (−0.49 to 6.23) | 0.15 (−4.55 to 4.85) | **13.4 (9.03 to 17.7)** | −1.23 (−5.32 to 2.87) | **32.0 (26.8 to 37.1)** | **−12.8 (−16.4 to −9.25)** | −3.13 (−6.73 to 0.47) |
| 2003-2006 | | | | | | | |
| AA | **6.14 (4.12 to 8.16)** | **−5.72 (−8.35 to −3.08)** | **19.9 (16.5 to 23.2)** | **12.8 (9.86 to 15.7)** | **10.8 (5.77 to 15.9)** | **7.36 (3.29 to 11.4)** | 3.57 (−0.34 to 7.47) |
| MA US | 4.47 (−1.68 to 10.6) | −2.39 (−7.39 to 2.61) | **17.1 (12.8 to 21.3)** | **7.89 (3.88 to 11.9)** | 11.0 (−0.04 to 21.9) | −1.41 (−7.93 to 5.11) | 0.27 (−5.06 to 5.59) |
| MA non-US | 2.32 (−0.66 to 5.29) | 0.75 (−3.05 to 4.55) | **20.8 (16.9 to 24.7)** | 3.01 (−1.06 to 7.08) | **33.5 (29.0 to 38.0)** | **−15.5 (−19.7 to −11.2)** | **−4.16 (−7.37 to −0.95)** |
| 2007-2010 | | | | | | | |
| AA | **8.02 (4.44 to 11.6)** | **−4.75 (−7.76 to −1.74)** | **20.1 (15.8 to 24.4)** | **12.8 (9.99 to 15.7)** | **12.7 (7.42 to 18.0)** | **6.76 (3.27 to 10.3)** | 2.81 (−0.90 to 6.53) |
| MA US | **4.57 (0.94 to 8.20)** | 0.24 (−3.44 to 3.92) | **13.8 (7.11 to 20.4)** | **9.74 (5.09 to 14.4)** | **9.44 (1.63 to 17.3)** | −3.54 (−8.63 to 1.54) | −2.11 (−8.79 to 4.57) |
| MA non-US | 2.89 (−0.37 to 6.15) | 1.27 (−2.20 to 4.75) | **18.4 (13.4 to 23.4)** | **6.44 (2.38 to 10.5)** | **22.1 (14.6 to 29.6)** | **−14.2 (−18.6 to −9.75)** | **−6.98 (−10.5 to −3.48)** |
| 2011-2014 | | | | | | | |
| AA | **7.64 (5.04 to 10.2)** | **−5.06 (−7.32 to −2.80)** | **23.2 (18.5 to 27.9)** | **12.7 (9.29 to 16.2)** | **5.77 (0.88 to 10.7)** | 2.89 (−0.69 to 6.47) | 2.71 (−1.55 to 6.96) |
| MA US | **5.48 (0.93 to 10.0)** | −1.15 (−6.14 to 3.83) | **16.3 (10.2 to 22.3)** | **13.8 (6.57 to 21.1)** | **10.5 (3.06 to 17.8)** | 0.06 (−5.98 to 6.10) | −0.61 (−6.07 to 4.86) |
| MA non-US | 2.55 (−1.80 to 6.89) | −0.78 (−5.10 to 3.55) | **22.6 (17.9 to 27.3)** | **8.34 (3.18 to 13.5)** | **16.0 (11.7 to 20.2)** | **−14.3 (−20.9 to −7.79)** | **−7.77 (−12.7 to −2.85)** |

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*Appendix Table 2*–Continued

| Variable | Blood Pressure ≥140/90 mm Hg | Total Cholesterol Level ≥6.22 mmol/L (≥240 mg/dL) | Hemoglobin $A_{1c}$ Level ≥5.6% | BMI ≥30 kg/m² | No Physical Activity | Unhealthy Diet | Current Smoker |
|---|---|---|---|---|---|---|---|
| **Age group ≥65 y** | | | | | | | |
| 1988-1994 | | | | | | | |
| AA | **9.98 (6.66 to 13.3)** | **−4.82 (−7.84 to −1.79)** | **23.5 (19.7 to 27.4)** | **9.54 (6.60 to 12.5)** | **19.7 (15.7 to 23.6)** | **11.1 (8.74 to 13.5)** | **6.90 (3.98 to 9.82)** |
| MA US | −0.98 (−5.79 to 3.82) | −0.89 (−6.42 to 4.65) | **14.3 (9.65 to 18.9)** | **9.92 (6.01 to 13.8)** | **13.4 (8.98 to 17.8)** | 2.64 (−0.38 to 5.66) | −1.81 (−4.67 to 1.05) |
| MA non-US | 1.41 (−3.54 to 6.37) | **−7.16 (−11.3 to −3.00)** | **17.1 (12.7 to 21.6)** | **5.20 (0.85 to 9.55)** | **29.4 (24.1 to 34.8)** | −2.19 (−5.52 to 1.14) | **−7.07 (−9.91 to −4.23)** |
| 1999-2002 | | | | | | | |
| AA | **9.31 (4.81 to 13.8)** | **−6.21 (−9.66 to −2.76)** | **18.6 (13.9 to 23.4)** | **7.99 (4.60 to 11.4)** | **21.9 (17.8 to 26.1)** | **11.1 (6.89 to 15.3)** | **5.46 (2.10 to 8.82)** |
| MA US | 4.34 (−2.10 to 10.8) | **−5.13 (−9.70 to −0.56)** | **12.6 (4.80 to 20.5)** | **8.39 (1.57 to 15.2)** | **11.1 (5.24 to 16.9)** | −0.52 (−4.86 to 3.83) | 2.53 (−1.55 to 6.61) |
| MA non-US | −1.18 (−6.98 to 4.63) | −2.15 (−7.05 to 2.74) | **9.85 (4.47 to 15.2)** | −2.46 (−6.43 to 1.51) | **25.8 (20.6 to 30.9)** | **−10.8 (−13.6 to −7.90)** | **−3.35 (−6.09 to −0.62)** |
| 2003-2006 | | | | | | | |
| AA | **7.05 (3.29 to 10.8)** | **−8.18 (−11.0 to −5.36)** | **17.9 (14.0 to 21.7)** | **11.5 (8.57 to 14.5)** | **9.13 (3.22 to 15.0)** | **7.92 (3.92 to 11.9)** | 2.40 (−0.98 to 5.79) |
| MA US | 3.20 (−7.16 to 13.6) | −4.59 (−9.93 to 0.74) | **14.9 (10.4 to 19.4)** | **7.71 (3.88 to 11.5)** | **11.5 (1.26 to 21.8)** | 1.67 (−4.10 to 7.45) | 2.10 (−2.29 to 6.49) |
| MA non-US | −1.71 (−7.17 to 3.74) | −1.36 (−5.40 to 2.68) | **16.8 (12.0 to 21.6)** | 0.96 (−2.82 to 4.74) | **27.2 (23.2 to 31.2)** | **−12.3 (−15.8 to −8.76)** | **−4.41 (−7.20 to −1.61)** |
| 2007-2010 | | | | | | | |
| AA | **9.68 (4.29 to 15.1)** | **−6.75 (−9.97 to −3.53)** | **14.9 (11.2 to 18.6)** | **12.6 (9.69 to 15.5)** | **11.4 (6.36 to 16.5)** | **8.25 (4.98 to 11.5)** | **4.14 (1.07 to 7.21)** |
| MA US | 5.24 (−1.47 to 12.0) | −1.22 (−4.94 to 2.50) | **11.2 (5.66 to 16.6)** | **9.57 (5.39 to 13.8)** | **10.3 (4.35 to 16.2)** | 0.38 (−4.12 to 4.88) | 0.67 (−4.51 to 5.86) |
| MA non-US | 0.46 (−4.80 to 5.72) | 0.15 (−3.64 to 3.94) | **12.7 (7.98 to 17.5)** | **5.62 (1.47 to 9.77)** | **18.0 (11.2 to 24.7)** | **−11.6 (−15.0 to −8.19)** | **−5.13 (−7.68 to −2.58)** |
| 2011-2014 | | | | | | | |
| AA | **8.96 (4.66 to 13.3)** | **−7.31 (−10.1 to −4.58)** | **17.9 (13.8 to 21.9)** | **12.4 (9.04 to 15.7)** | **5.31 (0.85 to 9.76)** | 7.31 (3.99 to 10.6) | **5.12 (2.66 to 7.57)** |
| MA US | 4.14 (−3.16 to 11.4) | −3.12 (−8.43 to 2.18) | **11.9 (6.20 to 17.6)** | **13.6 (6.26 to 21.0)** | **8.75 (2.94 to 14.6)** | 5.07 (−0.75 to 10.9) | 2.28 (−2.34 to 6.90) |
| MA non-US | −0.19 (−7.31 to 6.94) | −2.04 (−6.92 to 2.83) | **17.2 (12.8 to 21.6)** | **8.43 (3.23 to 13.6)** | **13.9 (10.0 to 17.9)** | **−10.8 (−16.9 to −4.60)** | **−4.82 (−7.56 to −2.08)** |

AA = African American; BMI = body mass index; MA non-US = non-U.S.-born Mexican American; MA US = U.S.-born Mexican American.
* Values are differences (95% CIs) in percentage points compared with reference group of non-Hispanic white persons. Boldface values indicate significant differences ($P < 0.05$).

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*Appendix Table 3.* Adjusted, Weighted Period Differences in Percentages of Participants With Poor Life's Simple 7 Components, by Age Group*

| Variable | Blood Pressure ≥140/90 mm Hg | Total Cholesterol Level ≥6.22 mmol/L (≥240 mg/dL) | Hemoglobin $A_{1c}$ Level ≥5.6% | BMI ≥30 kg/m² | No Physical Activity | Unhealthy Diet | Current Smoker |
|---|---|---|---|---|---|---|---|
| **Age 25-44 y** | | | | | | | |
| NH white | | | | | | | |
| 1999-2002 | **0.70 (0.05 to 1.34)** | **−6.90 (−9.10 to −4.70)** | −1.73 (−4.14 to 0.68) | **6.66 (3.90 to 9.43)** | **12.3 (9.11 to 15.5)** | 0.77 (−2.66 to 4.19) | **−5.71 (−9.12 to −2.29)** |
| 2003-2006 | 0.05 (−0.60 to 0.69) | **−5.60 (−7.50 to −3.70)** | −0.05 (−2.23 to 2.13) | **8.86 (6.37 to 11.3)** | **10.1 (7.06 to 13.1)** | **3.62 (0.45 to 6.79)** | −3.22 (−6.79 to 0.35) |
| 2007-2010 | −0.04 (−0.60 to 0.53) | **−8.10 (−10.1 to −6.09)** | **9.03 (6.60 to 11.5)** | **11.2 (8.78 to 13.6)** | **25.7 (20.9 to 30.6)** | **8.84 (5.22 to 12.5)** | **−4.26 (−7.96 to −0.56)** |
| 2011-2014 | −0.24 (−0.87 to 0.38) | **−10.5 (−12.6 to −8.37)** | **7.79 (5.53 to 10.1)** | **12.7 (10.3 to 15.2)** | **23.8 (20.3 to 27.3)** | **18.8 (15.7 to 21.9)** | **−4.66 (−8.65 to −0.66)** |
| AA | | | | | | | |
| 1999-2002 | 0.88 (−0.46 to 2.21) | **−7.52 (−11.0 to −4.06)** | **−7.56 (−10.9 to −4.19)** | **5.33 (1.99 to 8.66)** | **20.8 (16.1 to 25.4)** | −0.11 (−4.15 to 3.92) | **−6.25 (−10.0 to −2.49)** |
| 2003-2006 | −0.77 (−1.97 to 0.42) | **−8.08 (−11.0 to −5.14)** | **−5.95 (−9.25 to −2.65)** | **10.9 (7.85 to 14.0)** | **4.89 (0.89 to 8.89)** | 0.00 (−3.80 to 3.79) | **−6.86 (−11.3 to −2.40)** |
| 2007-2010 | −0.70 (−2.21 to 0.80) | **−10.0 (−13.1 to −6.99)** | **4.15 (0.21 to 8.09)** | **13.8 (10.7 to 16.9)** | **22.3 (18.5 to 26.1)** | **4.22 (0.90 to 7.54)** | **−7.85 (−13.1 to −2.63)** |
| 2011-2014 | −1.06 (−2.26 to 0.13) | **−12.9 (−15.4 to −10.3)** | **5.27 (1.41 to 9.13)** | **15.3 (12.1 to 18.5)** | **14.1 (10.1 to 18.1)** | **9.50 (6.17 to 12.8)** | **−8.73 (−12.4 to −5.08)** |
| MA US | | | | | | | |
| 1999-2002 | **1.77 (0.03 to 3.51)** | **−9.40 (−14.7 to −4.10)** | −3.79 (−8.86 to 1.29) | 5.56 (−1.50 to 12.6) | **11.5 (5.81 to 17.2)** | −2.44 (−8.81 to 3.94) | 0.53 (−5.70 to 6.76) |
| 2003-2006 | 0.00 (−1.99 to 1.99) | **−8.06 (−14.1 to −2.04)** | −2.91 (−6.85 to 1.02) | **7.37 (3.01 to 11.7)** | **7.59 (0.47 to 14.7)** | 2.53 (−3.91 to 8.97) | 2.30 (−2.89 to 7.49) |
| 2007-2010 | 0.07 (−1.40 to 1.55) | **−8.88 (−14.7 to −3.11)** | **6.31 (0.65 to 12.0)** | **12.3 (7.41 to 17.3)** | **25.6 (20.5 to 30.6)** | **7.88 (2.07 to 13.7)** | 2.30 (−5.26 to 9.85) |
| 2011-2014 | 0.11 (−1.61 to 1.83) | **−12.4 (−19.2 to −5.52)** | **6.11 (0.09 to 12.1)** | **16.6 (10.5 to 22.7)** | **22.0 (15.5 to 28.4)** | **18.5 (12.7 to 24.3)** | −0.44 (−7.60 to 6.72) |
| MA non-US | | | | | | | |
| 1999-2002 | 0.79 (−0.65 to 2.23) | −0.63 (−5.81 to 4.55) | **−6.38 (−9.94 to −2.82)** | −0.51 (−5.29 to 4.28) | **16.1 (10.0 to 22.1)** | **−13.7 (−18.6 to −8.70)** | −4.30 (−9.72 to 1.12) |
| 2003-2006 | −0.38 (−1.63 to 0.88) | 0.22 (−4.67 to 5.10) | −0.52 (−4.47 to 3.43) | **5.79 (1.42 to 10.2)** | **12.6 (6.51 to 18.7)** | **−13.0 (−19.0 to −6.95)** | −3.51 (−8.11 to 1.09) |
| 2007-2010 | 0.13 (−1.41 to 1.66) | −1.77 (−6.28 to 2.73) | **9.73 (4.65 to 14.8)** | **10.8 (6.09 to 15.4)** | **19.3 (12.4 to 26.3)** | **−7.20 (−12.3 to −2.10)** | **−9.37 (−14.3 to −4.46)** |
| 2011-2014 | 0.07 (−1.87 to 2.01) | **−5.48 (−10.7 to −0.29)** | **13.2 (8.62 to 17.7)** | **14.5 (8.93 to 20.1)** | **13.5 (7.38 to 19.6)** | 2.42 (−4.56 to 9.40) | **−11.6 (−16.8 to −6.30)** |
| **Age 45-64 y** | | | | | | | |
| NH white | | | | | | | |
| 1999-2002 | 1.24 (−0.57 to 3.04) | **−7.59 (−10.2 to −4.95)** | −3.60 (−7.88 to 0.68) | **7.14 (4.11 to 10.2)** | **13.8 (9.86 to 17.8)** | 0.21 (−2.84 to 3.26) | **−5.91 (−8.81 to −3.00)** |
| 2003-2006 | −0.41 (−2.33 to 1.51) | **−5.36 (−7.76 to −2.95)** | −1.30 (−4.90 to 2.30) | **9.83 (7.03 to 12.6)** | **10.8 (6.96 to 14.7)** | 2.83 (−0.04 to 5.71) | **−4.15 (−7.23 to −1.06)** |
| 2007-2010 | −1.12 (−2.78 to 0.54) | **−8.55 (−11.0 to −6.07)** | **11.7 (7.96 to 15.4)** | **12.6 (9.92 to 15.3)** | **27.5 (22.3 to 32.7)** | **7.39 (4.21 to 10.6)** | **−5.24 (−8.53 to −1.96)** |
| 2011-2014 | −1.39 (−3.23 to 0.46) | **−10.9 (−13.3 to −8.53)** | **10.3 (6.78 to 13.9)** | **14.4 (11.7 to 17.1)** | **26.7 (23.0 to 30.4)** | **16.9 (13.8 to 20.0)** | **−5.47 (−9.09 to −1.84)** |
| AA | | | | | | | |
| 1999-2002 | 0.12 (−2.74 to 2.99) | **−8.82 (−12.6 to −5.05)** | **−12.2 (−16.1 to −8.36)** | **5.34 (1.49 to 9.19)** | **18.4 (13.2 to 23.6)** | −0.62 (−4.50 to 3.26) | **−7.09 (−11.0 to −3.21)** |
| 2003-2006 | **−3.29 (−5.96 to −0.62)** | **−8.47 (−11.6 to −5.32)** | **−9.46 (−13.0 to −5.87)** | **11.8 (8.48 to 15.0)** | 1.97 (−2.77 to 6.71) | −1.53 (−5.42 to 2.36) | **−8.35 (−12.5 to −4.24)** |
| 2007-2010 | −2.11 (−5.83 to 1.61) | **−10.7 (−14.1 to −7.28)** | 3.79 (−0.56 to 8.15) | **14.6 (11.2 to 18.0)** | **20.5 (16.3 to 24.8)** | 2.42 (−0.87 to 5.71) | **−10.2 (−14.8 to −5.62)** |
| 2011-2014 | −2.77 (−5.55 to 0.02) | **−13.4 (−16.2 to −10.6)** | **5.53 (1.35 to 9.70)** | **16.2 (12.7 to 19.8)** | **12.8 (7.70 to 17.9)** | **8.08 (4.82 to 11.3)** | −10.5 (−14.5 to −6.55) |
| MA US | | | | | | | |
| 1999-2002 | 3.56 (−0.72 to 7.83) | **−11.7 (−17.9 to −5.53)** | **−8.11 (−15.3 to −0.93)** | 5.71 (−2.20 to 13.6) | **10.5 (3.25 to 17.7)** | −3.31 (−8.96 to 2.34) | −1.24 (−6.85 to 4.36) |
| 2003-2006 | 0.11 (−5.91 to 6.13) | **−9.22 (−16.2 to −2.20)** | −3.97 (−9.52 to 1.58) | **7.35 (2.81 to 11.9)** | 6.38 (−3.73 to 16.5) | 0.51 (−6.08 to 7.11) | −0.11 (−5.57 to 5.35) |
| 2007-2010 | −0.50 (−4.72 to 3.72) | **−9.78 (−16.0 to −3.59)** | 5.71 (−1.68 to 13.1) | **12.0 (6.64 to 17.3)** | **21.5 (14.7 to 28.4)** | 2.93 (−2.64 to 8.51) | −3.58 (−10.6 to 3.40) |
| 2011-2014 | 0.14 (−4.95 to 5.22) | **−13.6 (−20.8 to −6.30)** | 6.86 (−0.27 to 14.0) | **17.8 (10.4 to 25.3)** | **21.8 (13.8 to 29.7)** | **16.1 (9.71 to 22.4)** | −2.30 (−7.76 to 3.17) |
| MA non-US | | | | | | | |
| 1999-2002 | 1.42 (−2.51 to 5.34) | −1.43 (−7.05 to 4.18) | **−9.98 (−14.4 to −5.54)** | −0.44 (−5.90 to 5.02) | **14.0 (8.08 to 19.9)** | **−11.9 (−16.4 to −7.45)** | −5.01 (−10.1 to 0.11) |
| 2003-2006 | −0.78 (−4.41 to 2.85) | 1.41 (−4.09 to 6.90) | −0.27 (−4.87 to 4.33) | **6.49 (1.40 to 11.6)** | **12.5 (6.61 to 18.4)** | **−11.9 (−17.2 to −6.61)** | −4.28 (−9.22 to 0.66) |
| 2007-2010 | −0.92 (−4.94 to 3.10) | −1.26 (−6.19 to 3.67) | **10.3 (4.92 to 15.7)** | **12.7 (7.50 to 17.9)** | **17.7 (10.6 to 24.9)** | **−6.10 (−11.1 to −1.09)** | **−8.20 (−12.7 to −3.67)** |
| 2011-2014 | −1.53 (−6.15 to 3.09) | **−5.70 (−11.1 to −0.29)** | **13.1 (8.29 to 18.0)** | **16.4 (9.89 to 22.9)** | **10.8 (5.33 to 16.3)** | 3.28 (−3.67 to 10.2) | **−9.21 (−14.5 to −3.89)** |

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*Appendix Table 3*–Continued

| Variable | Blood Pressure ≥140/90 mm Hg | Total Cholesterol Level ≥6.22 mmol/L (≥240 mg/dL) | Hemoglobin $A_{1c}$ Level ≥5.6% | BMI ≥30 kg/m² | No Physical Activity | Unhealthy Diet | Current Smoker |
|---|---|---|---|---|---|---|---|
| **Age ≥65 y** | | | | | | | |
| NH white | | | | | | | |
| 1999-2002 | 2.58 (−0.94 to 6.11) | **−7.64 (−10.6 to −4.65)** | −3.76 (−8.95 to 1.44) | **7.65 (4.51 to 10.8)** | **17.6 (13.1 to 22.2)** | 0.28 (−2.26 to 2.82) | **−4.23 (−6.57 to −1.89)** |
| 2003-2006 | 0.11 (−3.84 to 4.06) | **−4.84 (−7.44 to −2.24)** | −0.55 (−4.87 to 3.78) | **10.4 (7.51 to 13.2)** | **14.7 (10.6 to 18.8)** | **2.38 (0.05 to 4.72)** | **−2.98 (−5.65 to −0.31)** |
| 2007-2010 | **−3.82 (−7.22 to −0.42)** | **−9.14 (−11.9 to −6.36)** | **11.5 (7.18 to 15.7)** | **12.3 (9.41 to 15.3)** | **28.1 (22.6 to 33.6)** | **5.77 (3.05 to 8.49)** | **−5.21 (−7.62 to −2.81)** |
| 2011-2014 | **−4.75 (−8.42 to −1.07)** | **−11.8 (−14.6 to −9.07)** | **9.05 (5.04 to 13.1)** | **13.7 (10.8 to 16.6)** | **25.2 (21.0 to 29.5)** | **12.9 (10.4 to 15.5)** | **−7.21 (−9.45 to −4.98)** |
| AA | | | | | | | |
| 1999-2002 | 1.91 (−2.13 to 5.95) | **−9.04 (−13.2 to −4.86)** | **−8.66 (−12.6 to −4.75)** | **6.10 (2.29 to 9.90)** | **19.9 (15.2 to 24.6)** | 0.28 (−3.61 to 4.16) | **−5.67 (−9.24 to −2.11)** |
| 2003-2006 | −2.82 (−7.12 to 1.49) | **−8.21 (−11.6 to −4.80)** | **−6.21 (−9.78 to −2.65)** | **12.3 (9.09 to 15.6)** | 4.18 (−2.00 to 10.4) | −0.79 (−4.89 to 3.31) | **−7.48 (−11.3 to −3.64)** |
| 2007-2010 | −4.12 (−9.28 to 1.05) | **−11.1 (−14.7 to −7.41)** | 2.80 (−0.80 to 6.39) | **15.4 (12.0 to 18.7)** | **19.9 (15.4 to 24.3)** | 2.92 (−0.13 to 5.97) | **−7.98 (−11.8 to −4.13)** |
| 2011-2014 | **−5.77 (−9.89 to −1.64)** | **−14.3 (−17.5 to −11.1)** | 3.36 (−0.14 to 6.86) | **16.5 (13.1 to 19.9)** | **10.9 (5.96 to 15.8)** | **9.15 (6.03 to 12.3)** | **−9.00 (−12.1 to −5.90)** |
| MA US | | | | | | | |
| 1999-2002 | **7.91 (0.91 to 14.9)** | **−11.9 (−18.5 to −5.26)** | −5.39 (−12.5 to 1.72) | 6.11 (−1.28 to 13.5) | **15.3 (9.16 to 21.5)** | −2.88 (−7.93 to 2.17) | 0.11 (−4.60 to 4.81) |
| 2003-2006 | 4.29 (−5.96 to 14.5) | **−8.55 (−15.8 to −1.34)** | 0.12 (−5.37 to 5.61) | **8.14 (3.67 to 12.6)** | **12.8 (3.20 to 22.5)** | 1.41 (−4.55 to 7.37) | 0.93 (−3.11 to 4.97) |
| 2007-2010 | 2.41 (−4.70 to 9.52) | **−9.47 (−15.5 to −3.41)** | **8.35 (2.09 to 14.6)** | **12.0 (6.96 to 17.0)** | **25.0 (19.5 to 30.5)** | 3.50 (−1.46 to 8.46) | −2.73 (−8.37 to 2.92) |
| 2011-2014 | 0.37 (−7.68 to 8.42) | **−14.1 (−21.3 to −6.76)** | **6.67 (0.08 to 13.3)** | **17.4 (9.76 to 25.0)** | **20.6 (13.6 to 27.6)** | **15.4 (9.30 to 21.4)** | −3.12 (−8.30 to 2.05) |
| MA non-US | | | | | | | |
| 1999-2002 | −0.01 (−6.79 to 6.78) | −2.64 (−8.16 to 2.89) | **−11.0 (−15.9 to −6.17)** | −0.01 (−5.22 to 5.20) | **14.0 (7.73 to 20.2)** | **−8.29 (−11.9 to −4.64)** | −0.52 (−3.69 to 2.65) |
| 2003-2006 | −3.02 (−9.53 to 3.50) | 0.96 (−4.63 to 6.54) | −0.87 (−5.86 to 4.11) | **6.12 (1.36 to 10.9)** | **12.5 (6.52 to 18.5)** | **−7.70 (−12.1 to −3.26)** | −0.32 (−3.25 to 2.61) |
| 2007-2010 | −4.77 (−11.5 to 1.97) | −1.83 (−6.89 to 3.23) | **7.06 (1.90 to 12.2)** | **12.8 (7.61 to 17.9)** | **16.7 (9.78 to 23.6)** | −3.64 (−7.79 to 0.51) | **−3.28 (−5.96 to −0.59)** |
| 2011-2014 | −6.35 (−13.9 to 1.25) | **−6.69 (−12.4 to −1.04)** | **9.14 (4.48 to 13.8)** | **16.9 (10.4 to 23.4)** | **9.78 (3.94 to 15.6)** | 4.37 (−1.88 to 10.6) | **−4.96 (−8.02 to −1.91)** |

AA = African American; BMI = body mass index; MA non-US = non-U.S.-born Mexican American; MA US = U.S.-born Mexican American; NH = non-Hispanic.
* Values are differences (95% CIs) in percentage points compared with reference group of participants during the 1988–1994 period. Boldface values indicate significant differences ($P < 0.05$).

*Appendix Table 4.* Adjusted, Weighted Racial/Ethnic and Nativity Differences in Percentages of Participants With Optimal Cardiovascular Health (Life's Simple 7 Score ≥10) Across Age Group*

| Variable | Age 25–44 Years | Age 45–64 Years | Age ≥65 Years |
|---|---|---|---|
| **1988–1994** | | | |
| African American | **−22.8 (−26.4 to −19.3)** | **−16.5 (−18.8 to −14.2)** | **−8.0 (−9.7 to −6.4)** |
| U.S.-born Mexican American | **−13.3 (−17.1 to −9.5)** | **−12.7 (−15.5 to −9.9)** | **−5.7 (−7.7 to −3.7)** |
| Non–U.S.-born Mexican American | **−15.9 (−20.3 to −11.4)** | **−12.4 (−15.4 to −9.5)** | **−6.1 (−7.8 to −4.3)** |
| **1999–2002** | | | |
| African American | **−18.8 (−23.1 to −14.5)** | **−13.0 (−16.3 to −9.7)** | **−5.9 (−7.7 to −4.1)** |
| U.S.-born Mexican American | **−8.2 (−12.5 to −3.8)** | **−7.4 (−10.9 to −3.9)** | **−2.8 (−5.1 to −0.6)** |
| Non–U.S.-born Mexican American | **−15.1 (−20.7 to −9.4)** | **−11.2 (−15.1 to −7.4)** | **−4.5 (−6.6 to −2.5)** |
| **2003–2006** | | | |
| African American | **−14.8 (−18.2 to −11.5)** | **−9.7 (−12.2 to −7.3)** | **−4.2 (−5.7 to −2.8)** |
| U.S.-born Mexican American | −5.8 (−12.5 to 0.9) | **−6.0 (−10.8 to −1.2)** | **−3.4 (−5.5 to −1.3)** |
| Non–U.S.-born Mexican American | **−9.2 (−13.7 to −4.7)** | **−7.2 (−10.2 to −4.2)** | **−2.5 (−4.6 to −0.4)** |
| **2007–2010** | | | |
| African American | **−13.0 (−16.8 to −9.2)** | **−9.2 (−12.1 to −6.4)** | **−4.5 (−6.1 to −2.9)** |
| U.S.-born Mexican American | −4.7 (−9.5 to 0.0) | **−4.5 (−8.2 to −0.8)** | **−2.9 (−5.2 to −0.7)** |
| Non–U.S.-born Mexican American | **−9.1 (−13.8 to −4.4)** | **−7.4 (−10.7 to −4.1)** | **−3.8 (−5.5 to −2.0)** |
| **2011–2014** | | | |
| African American | **−10.6 (−13.9 to −7.4)** | **−7.3 (−9.6 to −4.9)** | **−3.8 (−5.0 to −2.5)** |
| U.S.-born Mexican American | **−6.7 (−11.2 to −2.2)** | **−6.8 (−9.9 to −3.7)** | **−3.7 (−5.5 to −1.9)** |
| Non–U.S.-born Mexican American | **−8.2 (−12.3 to −4.1)** | **−5.5 (−8.5 to −2.5)** | **−2.8 (−4.6 to −1.1)** |

* Values are differences (95% CIs) in percentage points compared with reference group of white persons. Differences were adjusted for age ($P < 0.001$), sex ($P < 0.001$), education ($P < 0.001$), and income-poverty ratio ($P < 0.001$). Appropriate NHANES (National Health and Nutrition Examination Survey) sample weights were used. 95% CIs were based on 1000 bootstrap samples. Boldface values indicate significant differences ($P < 0.05$).

*Appendix Table 5.* Adjusted, Weighted Period Differences in Percentages of Participants With Optimal Cardiovascular Health (Life's Simple 7 Score ≥10) Across Age Group*

| Variable | Age 25–44 Years | Age 45–64 Years | Age ≥65 Years |
|---|---|---|---|
| **White** | | | |
| 1999–2002 | **−5.8 (−10.4 to −1.1)** | −3.3 (−7.1 to 0.4) | **−2.6 (−4.7 to −0.4)** |
| 2003–2006 | **−9.1 (−13.3 to −4.9)** | **−6.1 (−9.2 to −2.9)** | **−3.9 (−5.7 to −2.1)** |
| 2007–2010 | **−14.8 (−19.0 to −10.6)** | **−9.3 (−12.5 to −6.1)** | **−4.5 (−6.6 to −2.4)** |
| 2011–2014 | **−15.3 (−19.4 to −11.1)** | **−10.2 (−13.3 to −7.1)** | **−4.6 (−6.5 to −2.7)** |
| **African American** | | | |
| 1999–2002 | −1.7 (−4.6 to 1.1) | 0.2 (−1.6 to 2.0) | −0.4 (−1.5 to 0.6) |
| 2003–2006 | −1.1 (−4.2 to 2.0) | 0.7 (−1.2 to 2.6) | −0.1 (−1.3 to 1.1) |
| 2007–2010 | **−4.9 (−7.8 to −2.1)** | **−2.0 (−3.6 to −0.4)** | **−1.0 (−1.8 to −0.1)** |
| 2011–2014 | **−3.0 (−5.8 to −0.3)** | −1.0 (−2.6 to 0.6) | −0.3 (−1.2 to 0.5) |
| **U.S.-born Mexican American** | | | |
| 1999–2002 | −0.6 (−5.2 to 4.0) | 1.9 (−1.0 to 4.8) | 0.3 (−1.8 to 2.4) |
| 2003–2006 | −1.6 (−7.0 to 3.8) | 0.6 (−3.1 to 4.2) | −1.6 (−3.6 to 0.4) |
| 2007–2010 | **−6.2 (−10.4 to −2.0)** | −1.1 (−4.2 to 2.0) | −1.7 (−3.8 to 0.4) |
| 2011–2014 | **−8.6 (−13.2 to −4.1)** | **−4.3 (−7.1 to −1.6)** | **−2.6 (−4.5 to −0.6)** |
| **Non-U.S.-born Mexican American** | | | |
| 1999–2002 | −4.9 (−10.1 to 0.1) | −2.1 (−5.4 to 1.1) | −1.0 (−3.0 to 1.0) |
| 2003–2006 | −2.5 (−7.7 to 2.8) | −0.8 (−4.3 to 2.7) | −0.3 (−2.7 to 2.0) |
| 2007–2010 | **−8.0 (−12.9 to −3.1)** | **−4.2 (−7.5 to −1.0)** | **−2.2 (−4.0 to −0.4)** |
| 2011–2014 | **−7.6 (−12.1 to −3.1)** | **−3.3 (−6.3 to −0.3)** | −1.3 (−3.2 to 0.6) |

* Values are differences (95% CIs) in percentage points compared with reference group of participants during the 1988–1994 period. Differences were adjusted for age ($P < 0.001$), sex ($P < 0.001$), education ($P < 0.001$), and income-poverty ratio ($P < 0.001$). Appropriate NHANES (National Health and Nutrition Examination Survey) sample weights were used. 95% CIs were based on 1000 bootstrap samples. Boldface values indicate significant differences ($P < 0.05$).



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