

HISPANIC COMMUNITY HEALTH STUDY/ STUDY OF LATINOS (HCHS/SOL)

## Rate of Heart Disease Risk Factors Vary Across Hispanic/Latino Background Groups

---

### Media Tool Kit

11/5/2012



**--FOR IMMEDIATE RELEASE--**

**FOR IMMEDIATE CONTACT:**

Barbara Rodriguez  
Community Relations Coordinator/ Communications Specialist  
619-548-3122 (c)  
[barodriguez@mail.sdsu.edu](mailto:barodriguez@mail.sdsu.edu)

Dr. Greg Talavera  
619-884-8239  
[gtalavera@mail.sdsu.edu](mailto:gtalavera@mail.sdsu.edu)

**Rate of Heart Disease Risk Factors Vary Across Hispanic/Latino Background Groups**

SDSU professor publishes results of the largest, comprehensive and contemporary study of heart disease risk factors across Hispanic Latinos.

SAN DIEGO – (Monday, November 5, 2012) – Heart disease risk factors are widespread among Hispanic/Latino adults in the United States, with 80 percent of men and 71 percent of women having at least one risk factor for heart disease, according to a San Diego State University study funded by the National Institutes of Health. These percentages are much higher than the general population, where approximately 49 percent of adults have at least one major risk factor for heart disease and stroke.

Findings from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), which will be published in the, Nov. 7, *Journal of the American Medical Association* (JAMA), shows that the prevalence of risk factors varies across Hispanic/Latino background groups, with some groups, particularly those with Puerto Rican background, experiencing high rates of heart disease risk factors compared to other groups.

Participants who are more “acculturated” (born in the United States or lived in the United States for 10 years or longer, and preferred English vs. Spanish) were significantly more likely to have three or more risk factors. The more individuals are the higher rates of self-reported heart disease and stroke. Individuals with lower education or incomes were also significantly more likely to have multiple risk factors.

Findings from this phase of the study include self-reported information on heart disease and stroke and clinically measured risk factors. The study team will continue to follow participants to learn how risk factors change over time and how they influence the risk of developing cardiovascular disease.

“Clinicians now have more data to understand the prevalence of cardiovascular risk factors in Hispanic/Latino communities,” said Greg Talavera, MD, MPH, professor in the Graduate School of Public Health at SDSU and principal investigator for the HCHS/SOL Field Center. “For example, here in San Diego the majority of Hispanic/Latinos are of Mexican background and the study found that the prevalence of diabetes was generally higher compared to other Hispanic/Latino background groups.”

“Heart disease is the leading cause of death among Hispanic/Latino people in the United States; however, prior research has underestimated the burden of heart disease risk factors in

Hispanic/Latino populations,” said Larissa Avilés-Santa, MD, MPH, project officer for HCHS/SOL, Division of Cardiovascular Sciences in the NIH’s National Heart, Lung, and Blood Institute (NHLBI), which supported the study. “Additionally, previous studies on heart disease risk factors among Hispanics/Latinos have mainly involved Mexican-American participants, or have considered Hispanics/Latinos as a single group.”

HCHS/SOL is the first to examine the prevalence of heart disease risk factors—high blood pressure, cholesterol, obesity, diabetes, and smoking—within a large, diverse Hispanic/Latino population. The study also looked at the association between acculturation and socioeconomic status (education and income) with heart disease risk factors, and self-reported heart disease and stroke.

The HCHS/SOL is a multi-center, prospective, population-based study that included over 16,000 Hispanic/Latino adults of different backgrounds—including Cuban, Dominican, Mexican, Puerto Rican, Central American, and South American—between the ages of 18 and 74 years.

### **Participants, Collaborators and Sponsorships**

These participants were recruited from randomly selected households in four U.S. communities: Bronx, N.Y.; Chicago, Ill.; Miami, Fla.; and San Diego, Calif. They underwent an extensive clinical exam and assessment, and also answered questionnaires about their personal and family medical history, diet, physical activity, cigarette smoking, education and income status, and acculturation (including years of residence in the United States, immigration generational status, and language preference). Findings are based on data that were collected from participants between March 2008 and June 2011.

HCHS/SOL activities were carried out by more than 250 staff members at four field centers affiliated with SDSU, Northwestern University, Albert Einstein College of Medicine, and the University of Miami, with a coordinating center at the University of North Carolina in Chapel Hill.

HCHS/SOL is sponsored by the NHLBI and six other institutes and offices of the NIH, including the National Institute on Diabetes, Digestive and Kidney Diseases, National Institute on Minority Health and Health Disparities, National Institute on Deafness and Other Communication Disorders, National Institutes of Dental and Craniofacial Research, National Institute of Neurological Disorders and Stroke, and the NIH Office of Dietary Supplements.

### **More information**

For more information or to arrange an interview with an HCHS/SOL San Diego Field Center spokesperson, please contact Barbara Rodriguez, Community Relations Coordinator at 619-548-3122 ([Barodriguez@projects.sdsu.edu](mailto:Barodriguez@projects.sdsu.edu)).

HCHS/SOL: <http://www.nhlbi.nih.gov/resources/obesity/pop-studies/hchs.htm>

The NHLBI website has information and resources, in both English and Spanish, about heart and vascular diseases: <http://www.nhlbi.nih.gov/health/public/heart/index.htm>.

## TALKING POINTS

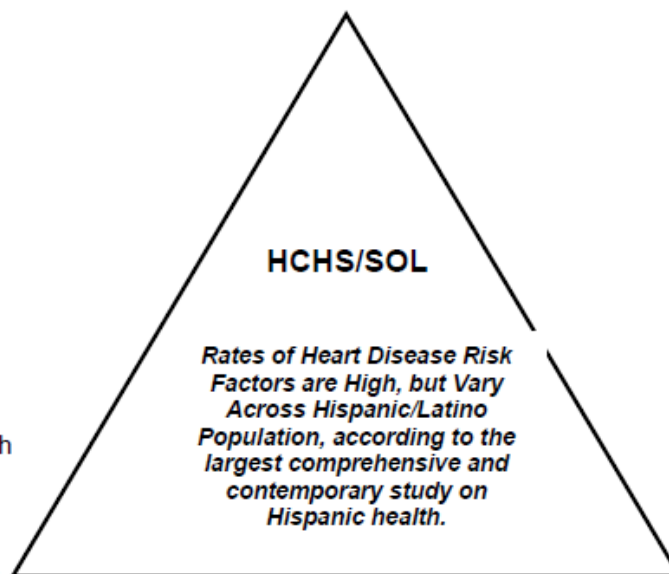
*HCHS/SOL Results -  
AHA 2012*

***The vast majority of Hispanic/Latino adults—80 percent of men, 71 percent of women—have at least one risk factor for heart disease***

- Rates varied across Latino cultural backgrounds, with Puerto Rican risk rates among the highest.
- Largest study to date to examine a host of risk and protective factors against chronic diseases within a diverse Hispanic/Latino population.
- Study included more than 16,000 Hispanic/Latino adults of different backgrounds—including Cuban, Dominican, Mexican, Puerto Rican, Central American, and South American—between the ages of 18 and 74.
- First study to expand from prior studies which involved Mexican-American participants or have considered Hispanics/Latinos as a single group.
- This phase of the study includes self-reported history of heart disease and stroke and clinically measured risk factor data; long-term follow-up with participants will provide information on heart disease and non-heart disease-related outcomes.

***HCHS/SOL shows the need for individuals and communities to take action to manage and reduce preventable heart disease risk***

- Clinicians now have more data to understand the prevalence in Hispanic and Latino communities.
- Many heart disease risk factors are preventable or manageable.
- HCHS/SOL investigators are working with national and local organizations to develop materials to disseminate study findings that can serve as the foundation for education and intervention strategies.



***Adults living in the U.S. for 10 years or more or born here had higher prevalence of risk factors.***

- *Time living in the U.S. affects risk, reinforcing previous research in other populations. Adults born in the U.S, or who have lived in the U.S. for 10 years or longer, or those speaking predominately English were more likely to have three or more risk factors as well as self-reported heart disease and stroke.*
- *Levels of education/income affect risk, as in other populations. Those with less than high school education or incomes less than \$20k are significantly more likely to have multiple risk factors..*

## --QUESTIONS AND ANSWERS--

### Hispanic Community Health Study/Study of Latinos (HCHS-SOL)

#### Questions & Answers

##### **Q. Why is this study significant?**

**A.** In the last decades, the U.S. Hispanic and Latino population has increased dramatically, now comprising the nation's largest minority group. Heart disease is the leading cause of death among Hispanic/Latino individuals in the United States.

This Hispanic Community Health Study/Study of Latinos (HCHS-SOL) represents the largest comprehensive and contemporary study of Hispanic health in the United States. We found that rates of heart disease risk factors are generally high among Hispanics and vary across Hispanic/Latino populations.

HCHS-SOL is the first study to expand from prior studies that involved only Mexican-American participants or considered Hispanics/Latinos as a single group. The study included individuals with Cuban, Dominican, Mexican, Puerto Rican, Central American, and South American backgrounds.

Study findings also show that Hispanic and Latino adults living in the U.S. for 10 years or more or who were born in the U.S. had higher prevalence of risk factors.

##### **Q. How do these findings compare to heart disease risk factors in other non-Hispanic/Latino populations and for the United States as a whole?**

**A.** For this particular study we focused solely on Hispanic/Latino populations. We did not draw comparisons to other non-Hispanic groups. The goal of this study was to give clinicians more data to understand the prevalence of heart disease risk in Hispanic and Latino communities, as many heart disease risk factors are preventable or manageable. HCHS-SOL investigators are now working with national and local organizations to develop materials to disseminate study findings that can serve as the foundation for education and intervention strategies.

This report is the first of many to come from the study. By studying data from these participants, we will have a more complete picture of Hispanic health in the U.S. than we've had before. We plan to publish specific analyses of each of the risk factors within the next six months.

##### **Q. But are Hispanics at greater risk for heart disease than other populations in the U.S.?**

**A.** [If pushed] As a group, for some CV risk factors, Hispanics are similar to non-Hispanic whites. But again, the goal of this study was to give clinicians more data to understand the prevalence of heart disease risk in Hispanic and Latino communities, so that HCHS-SOL investigators can work with national and local organizations to develop materials to serve as the foundation for education and intervention strategies. This study is just the beginning. We plan to publish specific analyses of each of the risk factors within the next 6 months.

##### **Q. Do Hispanics/Latinos have greater genetic risk for heart disease than other populations? Does the genetic risk vary among Hispanic/Latino populations?**

**A.** Further analysis will address the role genetics play in the risk for heart disease within Hispanic/Latino populations.

**Q. Within each Hispanic/Latino population, who had the greatest risk factors and why?**

A. Prevalence of three or more risk factors was highest among Puerto Rican men and lowest among South American men. Among women, 30 percent had one risk factor only (most commonly obesity); 23 percent and 17 percent had any two or three or more risk factors. Prevalence of three or more risk factors was highest among Puerto Rican women and lowest among South American women.

**Q. You draw interesting comparisons between risk and acculturation, education and income level. What did you find?**

A. Reinforcing research in other populations, we found that the period of time living in the U.S. affects risk. In fact, adults born in the United States, or who have lived in the United States for 10 years or longer, or those speaking predominately English were more likely to have three or more risk factors as well as self-reported heart disease and stroke. Again, as in other populations, we found that those with less than high school education or incomes less than \$20k were significantly more likely to have multiple risk factors.

**Q. Why do these factors (acculturation, education, and income level) affect one's risk for heart disease?**

A. We didn't study *why* this is the case and wouldn't want to speculate, as that was not the focus of the study.

**Q. But you are using the data to inform strategies for intervention. In order to effectively intervene, you have to have some sense of the cause.**

A. Other studies have shown a link or correlation between income and education and health risk factors. More analysis of our data set would be needed to determine the reasons for the apparent correlations here.

We do know the healthy behaviors that help prevent CV risk—healthy eating, physical activity, no smoking, and keeping blood pressure, cholesterol, weight and blood sugar in check. These healthy preventative strategies are effective in every population.

**Q. How confident are you in the accuracy of your findings – since your study is based on self-reported data?**

A. This phase of the study includes self-reported history of heart disease and stroke and clinically measured risk factor data; long-term follow-up with participants will provide clinically measured information on heart disease and non-heart disease-related outcomes.

**Q. Where was the study conducted? How and why did you choose those sites?**

A. The study concept was derived from the need to conduct a study of this magnitude given that heart disease is the leading cause of death among Hispanic/Latino people in the United States. In addition to the NHLBI, six other NIH Institutes and Centers are contributing to the study. It is conducted through four field centers affiliated with San Diego State University, Northwestern University in Chicago, Albert Einstein College of Medicine in New York and the University of Miami. There was a

**Q. With the U.S. Hispanic and Latino population now comprising the nation's largest minority group it seems that spending to address cardiovascular disease will become a significant issue in the coming years. What percentage of health care spending currently goes to treat heart disease for Hispanic/Latinos – and what could this spending look like in the future?**

**A.** It is our goal at NHLBI to promote the prevention and treatment of heart, lung, and blood diseases and enhance the health of all individuals so that they can live longer and more fulfilling lives. Along those lines, our goal for this study was to give clinicians more data to understand the prevalence of heart disease risk in Hispanic and Latino communities, as many heart disease risk factors are preventable or manageable. HCHS-SOL investigators are now working with national and local organizations to develop materials to disseminate study findings that can serve as the foundation for education and intervention strategies. We did not analyze the financial significance of cardiovascular disease among Hispanic/Latino adults when it comes to health care spending.

**Q. Why a study on Hispanics and not other populations?**

**A.** The NHLBI leads many studies in many other populations, including African Americans, American Indians and others, such as CARDIA, MESA, ARIC, and the Jackson Heart Study.

**Q. Did you recruit unauthorized aliens?**

**A.** We did not ask participants about their immigration status, as it was not relevant to the study. The study design included Hispanic/Latinos who live in the United States.

**Q. In 2010, the CDC reported that Hispanics live longer than African- Americans and non-Hispanic whites, and that Hispanic women have the longest life expectancy in the United States. How can this be the case when you are now reporting such an increased level of heart disease risk?**

**A.** The follow-up to this study will help us really answer this question. While the analysis presented in this article is based on baseline (examination) data, the follow-up will allow us to collect specific information about incidence of heart disease and stroke, whether fatal or non-fatal, as well as all-cause mortality. Because we have collected very detailed baseline data about many health aspects in this cohort, we expect to be able to determine the influence of the baseline health profile on future changes in health, including life expectancy.

**--SPOKESPERSON--**

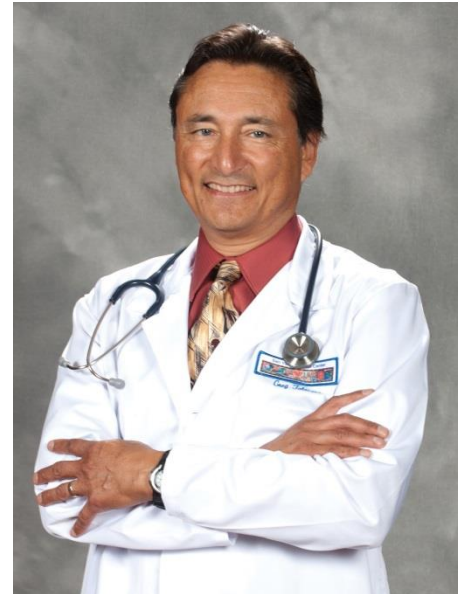
**FOR IMMEDIATE CONTACT:**

Dr. Greg Talavera

619-884-8239

[gtalavera@mail.sdsu.edu](mailto:gtalavera@mail.sdsu.edu)

Dr. Talavera is a bilingual, bicultural physician with over 30 years of community-based clinical and public health experience. He obtained his BA from the University of California, San Diego, his Medical Degree from the University of Utah and received his MPH and Preventive Medicine residency training from the SDSU/UCSD joint program. Currently he is professor in the Graduate School of Public Health at San Diego State University and Co-Director of the Institute for Community and Behavioral health. He has dedicated his clinical practice, research and advocacy to reducing disparities in the Latino Community. During the early part of his career, he practiced medicine in the Spanish-speaking, underserved communities of San Diego's border region. As a family practitioner, he came to understand the culture-specific beliefs that serve as barriers to quality chronic disease health care. Over the last 28 years he has designed and managed research programs involving cardiovascular disease prevention, breast and cervical cancer screening promotion, behavioral interventions for diabetes care, recruitment of minorities into long-term clinical trials, and smoking cessation. All of these service and research programs have been culturally- and linguistically- appropriate for indigent, low-literacy Spanish-speaking Latinos. He is currently the PI for a series of chronic disease clinical trials evaluating the efficacy of the chronic care model on adherence to recommended treatment plan among Spanish-speaking Latinos in a community health center. He has authored and co-authored publications in the areas of health promotion, disease prevention, and behavioral epidemiology. He has lectured on chronic disease programs in Mexico, Colombia and Chile. He is a member of the National Hispanic Medical Association and the California Latino Medical Association.





**--BULLETED SUMMARY--**

*Prevalence of Major Cardiovascular Risk Factors and Cardiovascular Diseases among Hispanic/Latino Individuals of Diverse Backgrounds in the United States*

**Hypercholesterolemia**

- Hypercholesterolemia was 52% among men and ranged from 48% to 55% and was 37% for women and ranged from 31% to 41%.

**Hypertension**

- Hypertension was 24% among women and ranged from 16% to 29%.

**Obesity**

- Obesity prevalence ranged from 27% to 41%. For women, obesity prevalence was 43%.

**Diabetes**

- Prevalence ranged from 10% to 19%

**Smoking**

- About 25% of men were current smokers and for women was 15%.

Citation: Daviglus, M. L., G. A. Talavera, et al. (2012). "Prevalence of Major Cardiovascular Risk Factors and Cardiovascular Diseases Among Hispanic/Latino Individuals of Diverse

# Prevalence of Major Cardiovascular Risk Factors and Cardiovascular Diseases Among Hispanic/Latino Individuals of Diverse Backgrounds in the United States

Martha L. Daviglus, MD, PhD

Gregory A. Talavera, MD, MPH

M. Larissa Avilés-Santa, MD, MPH

Matthew Allison, MD, MPH

Jianwen Cai, PhD

Michael H. Criqui, MD, MPH

Marc Gellman, PhD

Aida L. Giachello, PhD

Natalia Gouskova, MS

Robert C. Kaplan, PhD

Lisa LaVange, PhD

Frank Penedo, PhD

Krista Perreira, PhD

Amber Pirzada, MD

Neil Schneiderman, PhD

Sylvia Wassertheil-Smoller, PhD

Paul D. Sorlie, PhD

Jeremiah Stamler, MD

IN THE LAST DECADES, THE US Hispanic and Latino population has increased dramatically, now comprising the nation's largest minority group.<sup>1</sup> Cardiovascular diseases (CVDs) are leading causes of mortality among Hispanic/Latino individuals in the United States,<sup>2</sup> and this relatively young ethnic group is at high risk of future CVD morbidity and mortality as it ages. Evidence also suggests that CVD risk factors and disease rates may vary considerably among Hispanic/Latino groups. Risk for CVDs among

**Context** Major cardiovascular diseases (CVDs) are leading causes of mortality among US Hispanic and Latino individuals. Comprehensive data are limited regarding the prevalence of CVD risk factors in this population and relations of these traits to socioeconomic status (SES) and acculturation.

**Objectives** To describe prevalence of major CVD risk factors and CVD (coronary heart disease [CHD] and stroke) among US Hispanic/Latino individuals of different backgrounds, examine relationships of SES and acculturation with CVD risk profiles and CVD, and assess cross-sectional associations of CVD risk factors with CVD.

**Design, Setting, and Participants** Multicenter, prospective, population-based Hispanic Community Health Study/Study of Latinos including individuals of Cuban (n=2201), Dominican (n=1400), Mexican (n=6232), Puerto Rican (n=2590), Central American (n=1634), and South American backgrounds (n=1022) aged 18 to 74 years. Analyses involved 15 079 participants with complete data enrolled between March 2008 and June 2011.

**Main Outcome Measures** Adverse CVD risk factors defined using national guidelines for hypercholesterolemia, hypertension, obesity, diabetes, and smoking. Prevalence of CHD and stroke were ascertained from self-reported data.

**Results** Age-standardized prevalence of CVD risk factors varied by Hispanic/Latino background; obesity and current smoking rates were highest among Puerto Rican participants (for men, 40.9% and 34.7%; for women, 51.4% and 31.7%, respectively); hypercholesterolemia prevalence was highest among Central American men (54.9%) and Puerto Rican women (41.0%). Large proportions of participants (80% of men, 71% of women) had at least 1 risk factor. Age- and sex-adjusted prevalence of 3 or more risk factors was highest in Puerto Rican participants (25.0%) and significantly higher ( $P < .001$ ) among participants with less education (16.1%), those who were US-born (18.5%), those who had lived in the United States 10 years or longer (15.7%), and those who preferred English (17.9%). Overall, self-reported CHD and stroke prevalence were low (4.2% and 2.0% in men; 2.4% and 1.2% in women, respectively). In multivariate-adjusted models, hypertension and smoking were directly associated with CHD in both sexes as were hypercholesterolemia and obesity in women and diabetes in men (odds ratios [ORs], 1.5-2.2). For stroke, associations were positive with hypertension in both sexes, diabetes in men, and smoking in women (ORs, 1.7-2.6).

**Conclusion** Among US Hispanic/Latino adults of diverse backgrounds, a sizeable proportion of men and women had adverse major risk factors; prevalence of adverse CVD risk profiles was higher among participants with Puerto Rican background, lower SES, and higher levels of acculturation.

JAMA. 2012;308(17):1775-1784

www.jama.com

Hispanic/Latino individuals has been reported to differ by degree of acculturation and duration of residence in the United States.<sup>3-7</sup>

**Author Affiliations** are listed at the end of this article.  
**Corresponding Author:** Martha L. Daviglus, MD, PhD, Institute for Minority Health Research, University of Illinois at Chicago, 1819 W Polk St, Ste 246, Chicago, IL 60612 (daviglus@uic.edu, daviglus@northwestern.edu).

See also pp 1768 and 1804.

Existing research on CVD risk factors among Hispanic/Latino groups in the United States has largely involved Mexican-American individuals.<sup>2,8-10</sup> The few studies that have attempted to examine differences in CVD risk factors within this heterogeneous population have been limited to a few Hispanic/Latino groups<sup>11,12</sup> or small sample sizes.<sup>13,14</sup>

This report expands the literature on Hispanic/Latino health by describing the prevalence of 5 major, readily measured biomedical CVD risk factors (high serum cholesterol and blood pressure levels, obesity, hyperglycemia/diabetes, cigarette smoking), adverse CVD risk profiles (combinations of CVD risk factors; ie, any 1 only, any 2 only, or  $\geq 3$  risk factors), and CVD (coronary heart disease [CHD] and stroke) among US Hispanic/Latino adults of diverse backgrounds. Relationships of socioeconomic status (SES), acculturation, and lifestyle factors with adverse CVD risk factor profiles and CVD were examined, and cross-sectional associations of CVD risk factors with self-reported CVD were assessed using data from the landmark Hispanic Community Health Study/Study of Latinos (HCHS/SOL).

## METHODS

The HCHS/SOL is a population-based cohort study designed to examine risk and protective factors for chronic diseases and to quantify morbidity and mortality prospectively. Details of the sampling methods and design have been published.<sup>15,16</sup> Briefly, between March 2008 and June 2011, the HCHS/SOL examined 16 415 self-identified Hispanic/Latino persons aged 18 to 74 years recruited from randomly selected households in 4 US communities (Bronx, New York; Chicago, Illinois; Miami, Florida; San Diego, California). Households were selected using a stratified 2-stage area probability sample design.<sup>15</sup> Census block groups were randomly selected in the defined community areas of each field center, and households were randomly selected in each sampled block group. Households were screened for eligibility, and Hispanic/Latino per-

sons aged 18 to 74 years were selected in each household agreeing to participate. Oversampling occurred at each stage, with block groups in areas of Hispanic/Latino concentration, households associated with a Hispanic/Latino surname, and persons aged 45 to 74 years selected at higher rates than their counterparts. Sampling weights were generated to reflect the probabilities of selection at each stage. The HCHS/SOL included participants from Cuban, Dominican, Mexican, Puerto Rican, Central American, and South American backgrounds. The study was approved by institutional review boards at each participating institution; written informed consent was obtained from all participants.

## Examination Methods

Participants were asked to fast and refrain from smoking for 12 hours prior to the examination and to avoid vigorous physical activity the morning of the visit. Height was measured to the nearest centimeter and body weight to the nearest 0.1 kg. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. After a 5-minute rest period, 3 seated blood pressure measurements were obtained with an automatic sphygmomanometer; the second and third readings were averaged. Blood samples, including plasma glucose (fasting and after a 2-hour oral glucose load) were collected according to standardized protocols. Total serum cholesterol was measured using a cholesterol oxidase enzymatic method and high-density lipoprotein (HDL) cholesterol with a direct magnesium/dextran sulfate method. Plasma glucose was measured using a hexokinase enzymatic method (Roche Diagnostics). Low-density lipoprotein (LDL) cholesterol was calculated using the Friedewald equation.<sup>17</sup> Hemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) was measured using a Tosoh G7 Automated HPLC Analyzer (Tosoh Bioscience).

Information was obtained by questionnaires on demographic factors, SES (education and income), acculturation (including years of residence in the

United States, generational status, and language preference), cigarette smoking, physical activity (moderate/heavy intensity work and leisure activities in a typical week), and medical history. Participants were instructed to bring all prescription and nonprescription medications taken in the past month. Dietary intake was ascertained by two 24-hour dietary recalls administered 6 weeks apart. A diet score was calculated by assigning participants a score of 1 to 5 according to sex-specific quintile of daily intake of saturated fatty acids, potassium, calcium, and fiber (with 5 the most favorable quintile). The 4 scores were summed and the highest 40 percentile considered a healthier diet.<sup>18</sup>

## Risk Factors, CHD, and Stroke

Major CVD risk factors were defined based on current national guidelines. Hypercholesterolemia and dyslipidemia were defined as total cholesterol 240 mg/dL or greater, LDL cholesterol 160 mg/dL or greater, or HDL cholesterol less than 40 mg/dL (for persons with and without diabetes) or receiving cholesterol-lowering medication.<sup>19</sup> Hypertension was a systolic blood pressure 140 mm Hg or greater, diastolic blood pressure 90 mm Hg or greater, or receiving antihypertensive medication.<sup>20</sup> Obesity was defined as a BMI of 30.0 or greater.<sup>21</sup> Diabetes mellitus was a fasting plasma glucose 126 mg/dL or greater, 2-hour-postload plasma glucose 200 mg/dL or greater, an HbA<sub>1c</sub> 6.5% or greater, or use of antihyperglycemic medications.<sup>22</sup> Smoking was defined as currently smoking cigarettes. (To convert total, LDL, and HDL cholesterol to mmol/L, multiply by 0.0259; to convert glucose to mmol/L, multiply by 0.0555.)

Prevalent CHD was defined as self-reported history of myocardial infarction, coronary bypass surgery, balloon angioplasty, or stent placement in coronary arteries. Prevalence of stroke was ascertained from self-reported history of stroke.

## Statistical Analyses

All reported values (means, prevalence, and odds ratios [ORs]) were

weighted to adjust for sampling probability and nonresponse.<sup>15,16</sup> Descriptive characteristics, age-standardized to the year 2010 US population, were computed by sex and for all participants by Hispanic/Latino background. Additional analyses age-standardized to the year 2000 US population were also conducted. Mean levels and prevalence of individual risk factors, adverse CVD risk profiles (ie, presence of 0, any 1 only, any 2 only, any  $\geq 3$  risk factors), and self-reported CVD were computed by sex and by Hispanic/Latino group. Prevalence was also assessed of various combinations of risk factors, and self-reported CHD and stroke stratified by age and sex. Survey-specific procedures were used to compute 95% confidence intervals to account for the 2-stage sampling design, stratification, and clustering. Comparisons across Hispanic/Latino groups were performed using the overall Wald test.

Age- and sex-adjusted prevalence of adverse CVD risk profiles and self-reported CHD and stroke were calculated for the total cohort by age group (sex-adjusted only), sex (age-adjusted only), SES, acculturation, and lifestyle factors. Similar analyses were done for individual risk factors.

Logistic regression analyses were used to examine associations of CVD risk factors with CHD and stroke prevalence for men and women separately. Models were adjusted for age only (model 1); age plus all other major CVD risk factors (model 2); and all variables in model 2 plus education, annual family income, Hispanic/Latino background, language preference, nativity (US-born), Short Acculturation Scale for Hispanics (SASH) score, physical activity, diet (model 3). Age, years of education, years resided in the United States, and SASH score were continuous variables, and the remaining variables were categorical. Odds ratios with 95% CIs were computed. All statistical tests were 2-sided at a significance level of .05. No adjustments were made for multiple comparisons. All analyses were performed using SAS version 9.2 (SAS Institute) and SUDAAN release 10.0.0 (RTI).

## RESULTS

Household-level response rate was 33.5%. Of 39 384 individuals who were screened and selected and who met eligibility criteria, 41.7% were enrolled, representing 16 415 persons from 9872 households.

Of the 16 415 HCHS/SOL participants, 772 were excluded from analyses here because of missing data on total cholesterol ( $n=16$ ), BMI ( $n=48$ ), cigarette smoking ( $n=39$ ), self-reported CHD ( $n=19$ ), stroke ( $n=9$ ), or other covariates ( $n=641$ ). In addition, 9 participants 75 years and older and 555 participants who did not self-identify as any of the 6 aforementioned Hispanic/Latino groups were excluded. Thus, these analyses are based on data from 15 079 participants (5979 men; 9100 women).

### Participant Characteristics

Mean baseline ages standardized to year 2010 US population were similar in all Hispanic/Latino groups (range 43 to ~44 years) (TABLE 1). About 15% of the sample had a college degree, and 37% had annual family income between \$20 000 and \$50 000. Approximately 51% were married or living with a partner. Seventy percent had lived in the United States for 10 or more years. Spanish was the preferred language for the majority (78%). These demographic characteristics varied across Hispanic/Latino groups. Sex-specific and other characteristics are described in eTable 1 and eTable 2 (available at <http://www.jama.com>).

### Prevalence of Major CVD Risk Factors

The overall prevalence of hypercholesterolemia was 52% among men and ranged from 48% (Dominican and Puerto Rican men) to 55% (Central American men). In women, prevalence of hypercholesterolemia was 37% and ranged from 31% (South American women) to 41% (Puerto Rican women) (TABLE 2).

Overall, 25% of men had hypertension; hypertension prevalence was highest among Dominican men. Hyperten-

sion prevalence overall among women was 24%. The prevalence of hypertension ranged from 16% (South American women) to 29% (Puerto Rican women) (Table 2).

About 37% of men were obese; prevalence of obesity ranged from 27% (South American men) to 41% (Puerto Rican men). Among women, overall prevalence of obesity was 43%. Prevalence of obesity was highest among Puerto Rican women (Table 2).

Overall, 17% of men and women had diabetes. Prevalence ranged from 10% in South American men and women to 19% in Mexican men and women and Puerto Rican women (Table 2).

About 26% of men were current smokers, with highest prevalence of smoking among Puerto Rican men. Overall, current smoking prevalence in women was low (15%). However, 32% of Puerto Rican women and 21% of Cuban women were current smokers (Table 2).

Mean levels of individual risk factors varied by Hispanic/Latino group (eTable 3 and eTable 4). For example, among men, those of Central American background had the highest mean level of total cholesterol, and those of Central and South American backgrounds had higher mean levels of LDL cholesterol compared with others. Among women, those of Cuban and Central American background had higher mean total cholesterol levels than other groups; Cuban women also had the highest average level of LDL cholesterol.

About 15% of men and women were currently using an antihypertensive medication. Use of antihypertensive medications was highest among Dominican men; in women, antihypertensive medication use was higher among those of Puerto Rican and Dominican backgrounds. Dominican and Mexican men and Puerto Rican women had the highest rate of antihyperglycemic medication use (eTable 3 and eTable 4).

When analyses were repeated on the whole sample without exclusions other

**Table 1.** Descriptive Characteristics for All Participants and by Hispanic/Latino Group (Age Standardized)<sup>a</sup>

Characteristic	% (95% CI)						
	All (N = 15 079)	Cuban (n = 2201)	Dominican (n = 1400)	Mexican (n = 6232)	Puerto Rican (n = 2590)	Central American (n = 1634)	South American (n = 1022)
Women, No.	9100	1167	920	3895	1523	986	609
Age, mean, y <sup>b</sup>	43.2 (43.1-43.3)	43.5 (43.3-43.7)	43.1 (42.9-43.3)	43.0 (42.9-43.2)	43.2 (43.0-43.4)	43.4 (43.2-43.6)	43.2 (42.9-43.4)
Education <sup>b</sup>							
<High school	35.3 (33.8-36.8)	21.2 (19.2-23.4)	40.2 (36.9-43.6)	41.5 (38.9-44.2)	35.7 (32.8-38.8)	40.1 (36.9-43.5)	24.0 (20.4-28.0)
High school graduate	27.4 (26.4-28.5)	30.9 (28.2-33.7)	22.3 (19.0-25.9)	26.9 (25.4-28.5)	28.0 (25.8-30.4)	24.4 (21.7-27.2)	26.8 (23.5-30.4)
Some college	22.0 (20.9-23.1)	27.7 (25.1-30.5)	21.9 (19.2-24.9)	19.2 (17.7-20.9)	21.7 (19.1-24.5)	20.6 (17.8-23.8)	26.8 (23.4-30.4)
College degree	15.3 (14.0-16.6)	20.2 (17.5-23.2)	15.6 (13.4-18.1)	12.4 (10.2-14.9)	14.5 (12.6-16.7)	14.8 (12.6-17.4)	22.4 (19.3-25.9)
Annual family income, \$ <sup>b</sup>							
<20 000	42.6 (40.9-44.3)	45.1 (42.3-48.0)	50.9 (47.0-54.7)	38.0 (35.2-40.9)	44.0 (40.6-47.5)	47.3 (43.4-51.2)	40.3 (36.1-44.6)
20 000-50 000	37.3 (36.1-38.5)	31.4 (28.6-34.4)	32.4 (29.2-35.8)	42.2 (40.4-44.0)	33.6 (30.4-36.9)	34.6 (31.2-38.2)	40.0 (36.3-43.9)
>50 000	11.4 (10.1-12.9)	8.2 (6.3-10.7)	7.2 (5.3-9.5)	14.0 (11.7-16.6)	14.0 (11.9-16.4)	7.2 (5.6-9.3)	11.6 (9.3-14.4)
Not reported	8.7 (8.0-9.4)	15.3 (13.2-17.5)	9.5 (7.8-11.6)	5.9 (5.1-6.7)	8.4 (7.1-9.9)	10.9 (9.1-12.9)	8.0 (6.0-10.7)
Marital status <sup>b</sup>							
Single	31.0 (29.9-32.1)	30.0 (27.6-32.4)	41.1 (37.9-44.4)	23.3 (21.9-24.8)	45.6 (42.5-48.8)	34.2 (31.4-37.1)	29.5 (26.5-32.7)
Married or living with a partner	51.1 (49.6-52.5)	50.3 (47.3-53.2)	39.8 (36.2-43.5)	61.3 (59.2-63.3)	34.9 (31.9-38.1)	47.8 (44.6-51.1)	50.4 (46.5-54.3)
Separated, divorced, or widowed	18.0 (17.0-18.9)	19.8 (17.9-21.7)	19.1 (16.5-22.0)	15.4 (14.1-16.9)	19.5 (17.2-21.9)	18.0 (15.8-20.4)	20.1 (17.4-23.1)
US residence >10 y <sup>b</sup>	69.5 (67.6-71.4)	45.1 (41.1-49.1)	73.6 (70.0-76.9)	73.2 (71.1-75.3)	92.7 (90.9-94.2)	62.6 (58.8-66.3)	53.9 (49.4-58.3)
Immigrant generational status <sup>b</sup>							
First	78.5 (77.1-79.8)	90.9 (88.4-93.0)	86.9 (83.8-89.5)	77.8 (75.9-79.6)	49.6 (47.1-52.2)	93.4 (91.1-95.1)	94.1 (91.8-95.8)
Second or higher	21.5 (20.2-22.9)	9.1 (7.0-11.6)	13.1 (10.5-16.2)	22.2 (20.4-24.1)	50.4 (47.8-52.9)	6.6 (4.9-8.9)	5.9 (4.2-8.2)
Language preference <sup>b</sup>							
Spanish	77.5 (75.9-79.0)	91.9 (88.9-92.9)	80.4 (76.8-83.7)	81.4 (79.6-83.1)	42.7 (39.4-46.2)	89.0 (86.0-91.4)	89.9 (87.1-92.1)
English	22.5 (21.0-24.1)	8.9 (7.1-11.1)	19.6 (16.3-23.2)	18.6 (16.9-20.4)	57.3 (53.8-60.6)	11.0 (8.6-14.0)	10.1 (7.9-12.9)
Health insurance <sup>b</sup>	50.9 (49.2-52.5)	40.0 (37.1-43.0)	72.3 (68.4-75.9)	44.7 (42.4-46.9)	77.3 (74.5-79.9)	34.4 (30.8-38.2)	41.9 (37.6-46.3)
Physical activity, higher 40% <sup>b,c</sup>	39.1 (37.9-40.2)	29.7 (27.3-32.3)	37.1 (33.1-41.2)	42.1 (40.3-43.8)	41.1 (38.3-44.0)	43.2 (40.1-46.2)	37.0 (33.1-41.1)
Diet score, higher 40% <sup>b,d</sup>	46.1 (44.2-48.0)	36.2 (33.6-38.9)	19.6 (17.0-22.5)	69.2 (67.3-71.0)	18.9 (16.6-21.3)	39.5 (36.2-43.0)	40.7 (36.8-44.7)

<sup>a</sup>Values (except No. of women) are weighted for study design and nonresponse and age standardized to Census 2010 US population.

<sup>b</sup>P < .001.

<sup>c</sup>Higher sex-specific 40% of mean total physical activity.

<sup>d</sup>Diet score was calculated by assigning participants a score of 1-5 according to their sex-specific quintile of daily intake of saturated fatty acids, potassium, calcium, and fiber, with 5 representing the most favorable quintile (ie, lowest quintile of intake for saturated fatty acids and highest quintile of intake for potassium, calcium, and fiber). The 4 scores were summed and the higher 40 percentile considered a healthier diet.

**Table 2.** Prevalence of Cardiovascular Disease Risk Factors for All Participants and by Hispanic/Latino Group and Sex (Age Standardized)<sup>a</sup>

Characteristic <sup>b</sup>	% (95% CI)						
	All	Cuban	Dominican	Mexican	Puerto Rican	Central American	South American
Men, No.	5979	1034	480	2337	1067	648	413
Hypertension <sup>c</sup>	25.4 (24.1-26.7)	28.9 (26.6-31.4)	32.6 (28.2-37.4)	21.4 (19.1-24.0)	27.4 (24.5-30.5)	25.0 (21.8-28.5)	19.9 (16.0-24.4)
Hypercholesterolemia	51.7 (50.1-53.3)	53.7 (50.3-57.1)	47.6 (42.3-52.9)	53.9 (51.4-56.3)	48.2 (43.8-52.6)	54.9 (50.5-59.1)	52.2 (45.3-58.9)
Obesity <sup>c</sup>	36.5 (34.7-38.3)	33.6 (30.2-37.3)	38.6 (33.1-44.5)	36.8 (33.9-39.8)	40.9 (36.8-45.1)	32.7 (28.7-36.9)	26.8 (22.4-31.9)
Diabetes mellitus <sup>c</sup>	16.7 (15.5-17.9)	13.2 (11.3-15.3)	18.2 (15.0-21.9)	19.3 (17.0-21.8)	16.2 (14.0-18.7)	16.3 (13.1-20.1)	10.1 (7.2-14.1)
Smoking <sup>c</sup>	25.7 (24.1-27.4)	31.1 (27.6-34.8)	11.1 (7.7-15.7)	23.1 (20.8-25.7)	34.7 (30.7-38.9)	19.9 (16.4-24.0)	15.1 (11.0-20.4)
Women, No.	9100	1167	920	3895	1523	986	609
Hypertension <sup>c</sup>	23.5 (22.4-24.5)	26.4 (24.5-28.3)	26.1 (23.2-29.3)	19.5 (17.8-21.3)	29.1 (26.4-31.9)	25.6 (22.9-28.4)	15.9 (13.2-19.0)
Hypercholesterolemia <sup>d</sup>	36.9 (35.6-38.3)	37.5 (33.8-41.4)	33.1 (29.7-36.6)	36.2 (30.4-38.4)	41.0 (36.9-45.1)	39.4 (35.4-43.5)	31.4 (27.3-35.8)
Obesity <sup>c</sup>	42.6 (41.0-44.2)	38.9 (35.3-42.7)	42.5 (37.8-47.2)	41.5 (38.8-44.2)	51.4 (47.6-55.1)	41.6 (37.9-45.4)	30.8 (26.0-36.0)
Diabetes mellitus <sup>c</sup>	17.2 (16.3-18.3)	13.9 (12.0-16.0)	18.0 (15.4-21.0)	18.5 (16.8-20.2)	19.4 (17.0-22.1)	17.9 (15.0-21.3)	9.8 (7.8-12.3)
Smoking <sup>c</sup>	15.2 (14.1-16.5)	21.2 (18.6-24.0)	11.7 (8.3-16.4)	10.0 (8.3-11.9)	31.7 (28.3-35.2)	8.7 (6.7-11.2)	11.3 (8.6-14.8)

<sup>a</sup>Values (except No.) weighted for survey design and nonresponse and age standardized to Census 2010 US population.

<sup>b</sup>Hypertension was defined as systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or receiving treatment. Hypercholesterolemia was defined as total cholesterol ≥240 mg/dL, high-density lipoprotein cholesterol <40 mg/dL, low-density lipoprotein cholesterol ≥160 mg/dL, or receiving treatment. Obesity was defined as a body mass index ≥30, calculated as weight in kilograms divided by height in meters squared. Diabetes mellitus was defined as fasting glucose ≥126 mg/dL, 2-hour-postload plasma glucose ≥200 mg/dL, hemoglobin A<sub>1c</sub> ≥6.5%, or use of diabetes medications. Smoking was defined as currently smoking cigarettes. (To convert total, LDL, and HDL cholesterol to mmol/L, multiply by 0.0259; to convert glucose to mmol/L, multiply by 0.0555.)

<sup>c</sup>P < .001.

<sup>d</sup>P < .01.

than missing data for the major CVD risk factors, prevalences were almost identical to those in Table 2.

Prevalence rates age-standardized to year 2000 US population were slightly lower (~1 percentage point) than rates reported earlier in this section.

**CVD Risk Profiles and Self-reported CVD**

Overall, 31% of men had an adverse level of any 1 major risk factor only (most commonly hypercholesterolemia); 28% and 21% had any 2 only or 3 or more risk factors (FIGURE 1). Prevalence of 3 or more risk factors was highest among Puerto Rican men and lowest among South American men. Among women, 30% had 1 risk factor only (most commonly obesity); 23% and

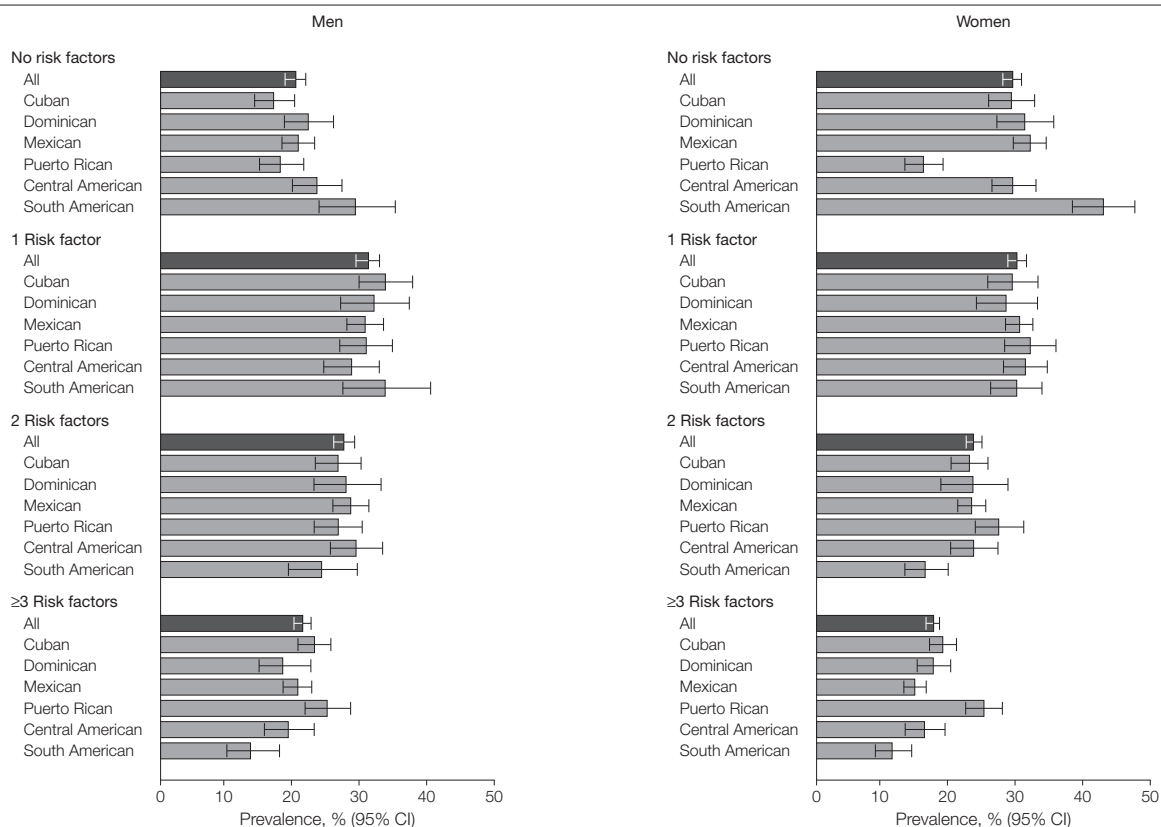
17% had any 2 or 3 or more risk factors (Figure 1). Prevalence of 3 or more risk factors was highest among Puerto Rican women and lowest among South American women. Specific combinations of individual risk factors by sex are shown in eTable 5 and eTable 6.

The overall prevalence of CHD and stroke was, respectively, 4% and 2% for men and 2% and 1% for women. Prevalence of CHD was highest among Puerto Rican men and women and Cuban and Dominican men (5%); self-reported stroke was highest for Dominican men (4%) and Puerto Rican women (2%) (eTable 7).

A significantly higher proportion of men than women, and those aged 65 to 74 years compared with younger persons had 3 or more risk factors (TABLE 3). Prevalence of 3 or more

risk factors was significantly higher ( $P < .001$ ) with lower education or income. In general, participants with lower income or education had higher rates of smoking, diabetes, obesity, and hypercholesterolemia (eTable 8). Compared with those who were less acculturated (ie, were foreign-born or first-generation immigrants, had lived in the United States <10 years, or for whom Spanish was the preferred language), more acculturated participants had higher prevalence of 3 or more risk factors. In sensitivity analyses excluding Puerto Rican participants (the most acculturated group who also had the highest prevalence of multiple risk factors), the magnitude of difference in prevalence of 3 or more risk factors by acculturation level was slightly lower;

**Figure 1.** Prevalence of Adverse Cardiovascular Disease Risk Profiles for All Participants and by Hispanic/Latino Group and Sex



Risk factors were hypercholesterolemia (serum total cholesterol  $\geq 240$  mg/dL or taking cholesterol-lowering medication), hypertension (systolic blood pressure  $\geq 140$  mm Hg or diastolic blood pressure  $\geq 90$  mm Hg or taking antihypertensive medication), obesity (body mass index  $\geq 30$ , calculated as weight in kilograms divided by height in meters squared), diabetes mellitus (use of diabetes medication, fasting glucose  $\geq 126$  mg/dL, 2-hour-postload plasma glucose  $\geq 200$  mg/dL, or hemoglobin A<sub>1c</sub>  $\geq 6.5\%$ ), and smoking (current cigarette smoker). Values were weighted for survey design and nonresponse and adjusted for age. Error bars indicate 95% CI.

**Table 3.** Number of Adverse CVD Risk Factors and Prevalence of Self-reported CVD (CHD and Stroke) by Age, Education, Income, Acculturation, and Lifestyle Factors Among Hispanic/Latino Participants (Age and Sex Adjusted)<sup>a</sup>

Characteristic	% (95% CI)				CHD	Stroke
	No Risk Factors <sup>b</sup>	1 Risk Factor <sup>b</sup>	2 Risk Factors <sup>b</sup>	≥3 Risk Factors <sup>b</sup>		
Age group <sup>a</sup>						
18-44	35.8 (34.0-37.7) <sup>c</sup>	33.8 (32.2-35.5)	21.5 (20.1-22.9) <sup>c</sup>	8.9 (8.0-9.8) <sup>c</sup>	0.7 (0.5-1.2) <sup>c</sup>	0.6 (0.4-0.9) <sup>d</sup>
45-64	14.0 (12.9-15.3)	30.1 (28.6-31.7)	29.0 (27.5-30.6)	26.8 (25.2-28.5)	4.5 (3.9-5.2)	2.0 (1.6-2.5)
65-74	6.5 (4.7-8.8)	18.0 (15.2-21.1)	32.5 (28.7-36.5)	43.1 (39.4-46.8)	9.0 (7.2-11.3)	4.3 (3.2-5.8)
Sex <sup>a</sup>						
Male	19.4 (17.8-21.1) <sup>c</sup>	34.1 (32.3-36.0)	29.2 (27.5-31.0) <sup>c</sup>	17.2 (15.8-18.8) <sup>c</sup>	2.0 (1.5-2.6) <sup>c</sup>	1.2 (0.8-1.7) <sup>d</sup>
Female	30.4 (28.9-32.0)	33.5 (31.9-35.1)	23.7 (22.3-25.2)	12.4 (11.5-13.4)	1.1 (0.8-1.5)	0.7 (0.5-1.0)
Education						
<High school	21.2 (19.3-23.2) <sup>c</sup>	34.8 (32.9-36.7)	27.1 (25.5-28.9) <sup>d</sup>	16.9 (15.5-18.4) <sup>c</sup>	1.6 (1.1-2.4)	0.9 (0.6-1.2)
High school graduate	23.6 (21.8-25.5)	32.9 (30.7-35.1)	28.7 (26.5-31.1)	14.8 (13.3-16.4)	1.3 (1.0-1.7)	1.0 (0.6-1.5)
Some college	26.0 (23.9-28.3)	34.8 (32.2-37.6)	25.9 (23.6-28.3)	13.3 (11.8-14.9)	1.5 (1.0-2.1)	1.0 (0.6-1.5)
College degree	32.5 (29.0-36.3)	33.9 (30.8-37.2)	21.7 (19.4-24.2)	11.8 (9.9-14.1)	1.4 (0.9-2.0)	0.8 (0.4-1.3)
Annual family income, \$						
<20 000	21.1 (19.6-22.7) <sup>c</sup>	34.9 (32.9-36.8)	27.9 (26.2-29.7)	16.2 (14.8-17.6) <sup>d</sup>	1.8 (1.3-2.5)	1.3 (1.0-1.7) <sup>d</sup>
20 000-50 000	26.4 (24.5-28.3)	33.4 (31.5-35.3)	25.7 (24.1-27.3)	14.6 (13.3-15.9)	1.2 (1.0-1.6)	0.7 (0.5-1.1)
>50 000	31.7 (27.0-36.7)	35.0 (31.5-38.7)	23.1 (20.0-26.4)	10.3 (8.2-12.8)	1.2 (0.7-2.0)	0.3 (0.1-1.1)
Not reported	26.0 (22.6-29.8)	32.3 (28.8-36.0)	27.6 (24.2-31.3)	14.1 (12.0-16.5)	1.4 (0.9-2.2)	1.0 (0.5-1.8)
Country of birth						
Foreign	26.4 (25.1-27.8) <sup>c</sup>	34.7 (33.3-36.0)	25.4 (24.2-26.7) <sup>d</sup>	13.5 (12.5-14.4) <sup>c</sup>	1.3 (1.0-1.8) <sup>e</sup>	0.7 (0.5-0.9) <sup>c</sup>
US	18.5 (16.2-21.0)	32.1 (29.4-34.9)	30.1 (27.4-33.0)	19.3 (17.0-21.8)	2.1 (1.4-3.1)	1.8 (1.2-2.8)
US residence >10 y						
No	29.2 (27.1-31.4) <sup>c</sup>	34.7 (32.7-36.8)	24.8 (23.1-26.6)	11.2 (9.9-12.7) <sup>c</sup>	0.8 (0.5-1.1) <sup>c</sup>	0.7 (0.4-1.1)
Yes	22.7 (21.3-24.1)	33.8 (32.3-35.3)	27.2 (25.9-28.6)	16.3 (15.2-17.5)	1.8 (1.3-2.4)	1.0 (0.8-1.4)
Language preference						
Spanish	26.3 (24.8-27.9) <sup>c</sup>	34.4 (32.9-35.8)	25.8 (24.6-27.1)	13.5 (12.6-14.5) <sup>c</sup>	1.3 (1.0-1.8) <sup>e</sup>	0.8 (0.6-1.1) <sup>d</sup>
English	19.6 (17.5-21.8)	33.2 (30.7-35.9)	28.5 (26.1-31.1)	18.7 (16.6-20.9)	2.0 (1.4-2.8)	1.4 (1.0-2.0)
Immigrant generational status						
First	26.5 (25.1-27.9) <sup>c</sup>	34.6 (33.3-36.1)	25.5 (24.3-26.8) <sup>e</sup>	13.3 (12.4-14.3) <sup>c</sup>	1.3 (0.9-1.8) <sup>e</sup>	0.7 (0.5-1.0) <sup>c</sup>
Second or higher	18.8 (16.6-21.2)	32.2 (29.6-34.8)	29.6 (27.0-32.3)	19.4 (17.2-21.8)	2.1 (1.5-3.1)	1.7 (1.1-2.5)
Age at immigration						
US born	17.6 (15.4-20.0) <sup>c</sup>	32.6 (29.9-35.4)	30.4 (27.6-33.2) <sup>e</sup>	19.5 (17.2-22.0) <sup>c</sup>	2.1 (1.4-3.1) <sup>c</sup>	1.8 (1.2-2.8) <sup>c</sup>
≤10 y	21.5 (18.2-25.2)	36.2 (31.4-41.3)	25.1 (21.0-29.7)	17.3 (13.6-21.7)	1.5 (1.0-2.3)	1.2 (0.6-2.3)
11-24 y	24.5 (22.7-26.4)	35.5 (33.6-37.5)	25.9 (24.1-27.9)	14.0 (12.7-15.4)	1.7 (1.1-2.5)	0.5 (0.3-0.8)
≥25 y	29.4 (27.2-31.7)	33.3 (31.4-35.3)	25.0 (23.3-26.7)	12.3 (11.2-13.6)	1.0 (0.8-1.3)	0.7 (0.5-1.0)
Acculturation, SASH score <sup>f</sup>						
Low, 1-<3	25.8 (24.4-27.2) <sup>c</sup>	34.6 (33.2-36.0)	25.9 (24.7-27.2)	13.8 (12.8-14.8) <sup>c</sup>	1.3 (1.0-1.8)	0.7 (0.5-1.0) <sup>c</sup>
High, ≥3	20.7 (18.3-23.2)	32.2 (29.6-35.0)	28.7 (26.0-31.5)	18.4 (16.1-20.9)	2.0 (1.3-2.9)	1.7 (1.2-2.5)
Physical activity, higher 40% <sup>g</sup>						
Yes	25.9 (24.1-27.8)	35.3 (33.5-37.1)	26.4 (24.7-28.2)	12.5 (11.4-13.6) <sup>c</sup>	1.4 (1.0-2.0)	0.9 (0.6-1.4)
No	24.0 (22.4-25.6)	33.3 (31.8-34.8)	26.5 (25.1-28.0)	16.2 (15.0-17.5)	1.5 (1.1-1.9)	0.9 (0.7-1.2)
Diet score, higher 40% <sup>h</sup>						
Yes	28.1 (26.0-30.2) <sup>c</sup>	33.9 (32.1-35.7)	25.1 (23.5-26.7)	12.9 (11.7-14.2) <sup>c</sup>	1.1 (0.8-1.4) <sup>c</sup>	0.7 (0.5-0.9) <sup>d</sup>
No	21.9 (20.5-23.3)	34.3 (32.6-35.9)	27.6 (26.2-29.1)	16.2 (15.1-17.4)	1.8 (1.3-2.4)	1.1 (0.8-1.5)

Abbreviations: CHD, coronary heart disease; CVD, cardiovascular disease; SASH, Short Acculturation Scale for Hispanics.

<sup>a</sup>Prevalence by age group was adjusted for sex. Prevalence by sex was adjusted for age. The average age used for the computation was 41.02 years (overall weighted mean age). Values (except No.) were weighted for survey design and nonresponse. Model-adjusted prevalence was obtained based on multinomial logistic regression for risk factor profiles and logistic regression for CHD and stroke.

<sup>b</sup>Adverse CVD risk factors were defined as follows. Hypercholesterolemia was total cholesterol ≥240 mg/dL, high-density lipoprotein cholesterol <40 mg/dL, low-density lipoprotein cholesterol ≥160 mg/dL, or receiving treatment. Hypertension was defined as systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or receiving treatment. Obesity was defined as a body mass index ≥30, calculated as weight in kilograms divided by height in meters squared. Diabetes mellitus was defined as use of diabetes medications, fasting glucose ≥126 mg/dL, 2-hour-postload plasma glucose ≥200 mg/dL, or hemoglobin A<sub>1c</sub> ≥6.5%. Smoking was defined as currently smoking cigarettes. (To convert total, LDL, and HDL cholesterol to mmol/L, multiply by 0.0259; to convert glucose to mmol/L, multiply by 0.0555.)

<sup>c</sup>P < .001.

<sup>d</sup>P < .01.

<sup>e</sup>P < .05.

<sup>f</sup>An abbreviated 10-question SASH was used; the range of scores was 1-5. Average scores <3 indicate lower acculturation and scores ≥3 indicate higher acculturation.

<sup>g</sup>Higher sex-specific 40% of mean total physical activity.

<sup>h</sup>Diet score was calculated by assigning participants a score of 1-5 according to their sex-specific quintile of daily intake of saturated fatty acids, potassium, calcium, and fiber, with 5 representing the most favorable quintile (ie, lowest quintile of intake for saturated fatty acids and highest quintile of intake for potassium, calcium, and fiber). The 4 scores were summed and the higher 40 percentile considered a healthy diet.

findings remained significant although level of significance was diminished. In general, more acculturated participants had markedly higher rates of current smoking and obesity compared with others. Additionally, participants with lower physical activity levels and less healthy diets had higher prevalence of 3 or more CVD risk factors.

Age- and sex-adjusted prevalence of CHD and stroke were significantly higher among men, older participants (aged 65-74 years compared with younger), those who were second- or third-generation immigrants, and those who preferred English (Table 3). Ad-

ditionally, CHD prevalence was significantly higher among participants who had resided in the United States 10 or more years, and stroke prevalence was significantly higher among participants with lower family income and those born in the United States. Unweighted cell counts corresponding to weighted prevalences in eTables 1-8 are presented in eTables 9-16.

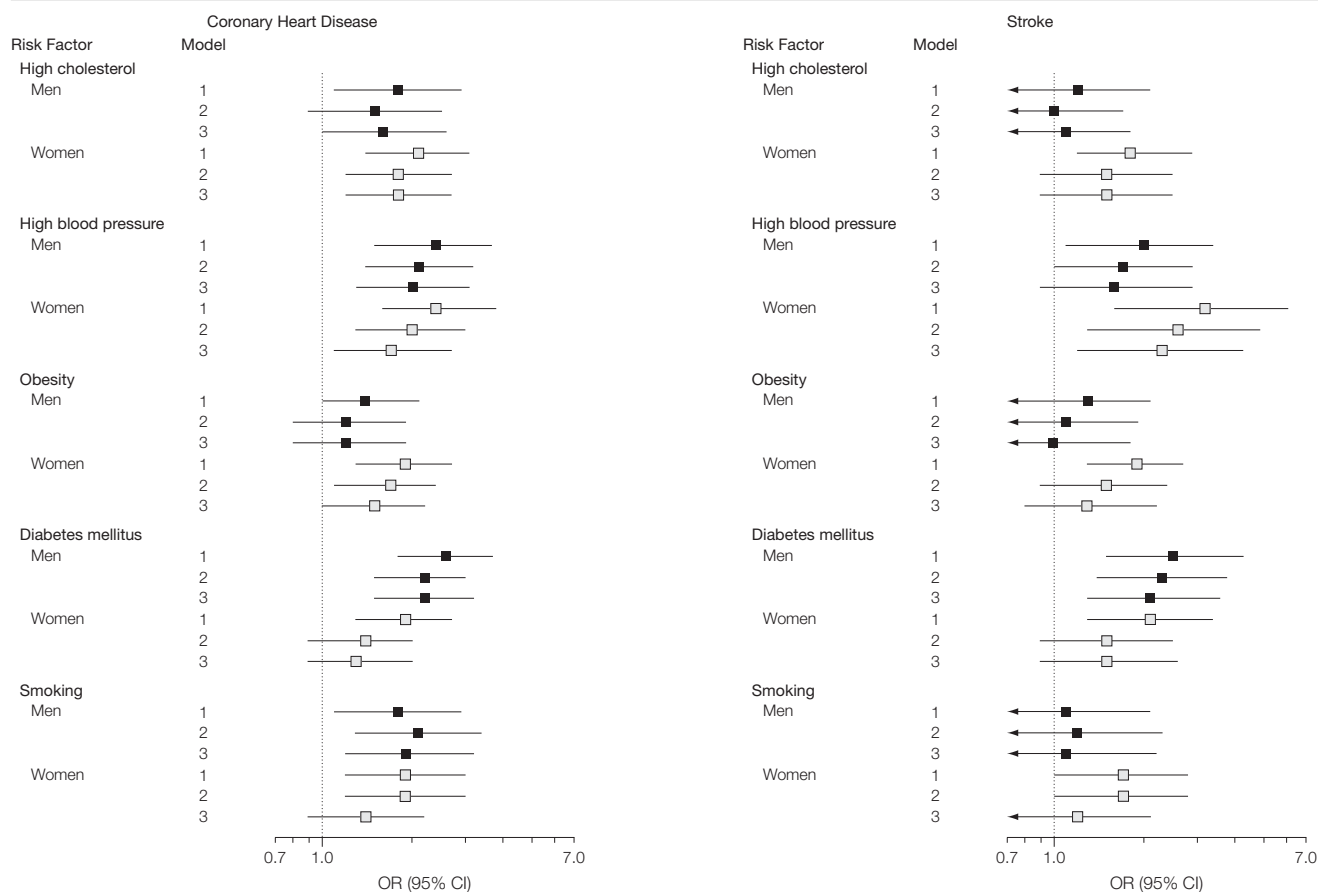
**Association of CVD Risk Factors With CHD and Stroke**

In age-adjusted analyses (model 1), all individual CVD risk factors were associated with higher odds of prevalent CHD (FIGURE 2); associations were es-

pecially strong for hypertension and diabetes. Associations of CVD risk factors with self-reported CHD were attenuated and in some cases lost statistical significance, with additional adjustment for other CVD risk factors (model 2) or for variables in model 3.

Associations of risk factors with prevalent stroke were less consistent (Figure 2). In age-adjusted analyses (model 1), hypertension and diabetes mellitus were strongly associated with prevalent stroke in both sexes; high cholesterol and obesity were significantly associated and cigarette smoking was borderline significantly associated with prevalent stroke among

**Figure 2.** Association of Cardiovascular Disease Risk Factors With Cardiovascular Disease Prevalence Among Hispanic/Latino Participants by Sex



High cholesterol was defined as serum total cholesterol level  $\geq 240$  mg/dL or taking cholesterol-lowering medication. High blood pressure was defined as systolic blood pressure  $\geq 140$  mm Hg or diastolic blood pressure  $\geq 90$  mm Hg or taking antihypertensive medication. Obesity was defined as a body mass index  $\geq 30$  (calculated as weight in kilograms divided by height in meters squared). Diabetes mellitus was defined as use of diabetes medication, fasting glucose  $\geq 126$  mg/dL, 2-hour-postload plasma glucose  $\geq 200$  mg/dL, or hemoglobin A<sub>1c</sub>  $\geq 6.5\%$ . Smoking was defined as current cigarette smoker. Model 1 was adjusted for age. Model 2 was adjusted for age and all other major biomedical cardiovascular disease risk factors. Model 3 was adjusted for all variables in model 2 plus education, annual family income, Hispanic/Latino background, language preference, nativity (US born), Short Acculturation Scale for Hispanics score, physical activity, and diet. Error bars indicate 95% CI.



women only. With further adjustment for other CVD risk factors (model 2), the association of hypertension with prevalent stroke was attenuated but remained significant in women and borderline significant in men, diabetes remained significantly associated with stroke in men, and smoking was borderline significantly associated with stroke in women only. With additional adjustment for variables in model 3, diabetes and hypertension remained positively associated with stroke among men and women, respectively.

## COMMENT

The HCHS/SOL baseline examination has yielded several insights about CVD risk factors among adult Hispanic/Latino men and women living in the United States. Prevalence of individual major CVD risk factors varied markedly across Hispanic background groups. Moreover, as compared with first-generation participants (born outside of the United States), participants who were US-born were more likely to report a history of CHD and stroke and to have multiple CVD risk factors. Additionally, higher prevalence of CVD was associated with longer duration of residence in the United States and greater acculturation. Thus, although numerous US studies have demonstrated racial/ethnic variations in CVD and its risk factors, our findings demonstrate a great deal of diversity within a population that would typically be classified as a single “Hispanic/Latino” group in biomedical research.

Previous studies of US Hispanic/Latino individuals have primarily involved Mexican American participants or have considered Hispanics/Latinos as a single group.<sup>2,8-10,23-26</sup> The limited available data on Hispanic/Latino people from diverse ethnic, geographic, cultural, and socioeconomic backgrounds suggest that CVD risk factor burden may vary by Hispanic/Latino origin and sociocultural characteristics. However, findings on intergroup variation in individual CVD risk factor prevalence have been inconsistent.<sup>11-14,27</sup>

The HCHS/SOL aimed to address the gap in current knowledge on prevalence of CVD risk factors and adverse CVD risk profiles within the diverse Hispanic/Latino population and relationships of sociocultural factors and acculturation to risk factors. Baseline HCHS/SOL findings demonstrate the sizeable burden of CVD risk factors among all Hispanic/Latino groups with prevalence of risk factors comparable or higher than those reported for non-Hispanic white individuals.<sup>28,29</sup> The HCHS/SOL data show marked variation in CVD risk factor prevalence within the Hispanic/Latino population with some groups, particularly those of Puerto Rican background, experiencing strikingly high rates of individual adverse CVD risk factors or overall risk factor burden compared with others. For example, women of Puerto Rican background had the highest prevalence of each of the major CVD risk factors, and Mexican men and women both had high rates of diabetes. Thus, results from the HCHS/SOL suggest that previous prevalence estimates based on data primarily from Mexican American participants may have underestimated the CVD risk factor burden and diversity among US Hispanics/Latinos.

Studies in diverse Latin American countries have demonstrated similar variations in prevalence of CVD risk factors. The cross-sectional population-based Cardiovascular Risk Factor Multiple Evaluation in Latin America (CARMELA) study<sup>30</sup> examined participants from Mexico and 6 South American countries; Mexican participants had higher prevalence of obesity and diabetes compared with South American participants, consistent with findings reported here. Rates of hypertension and cigarette smoking were higher in CARMELA participants from some South American countries, in contrast to generally lower risk factor burden among South American participants in the HCHS/SOL; these differences are likely due to differential patterns of immigration to the United States.

Among HCHS/SOL participants, major CVD risk factors were strongly associated with prevalent self-reported CVD. These findings are consistent with those reported by studies in Latin American populations such as the INTERHEART Study, ie, strong associations of CVD risk factors with risk of acute myocardial infarction.<sup>31,32</sup>

In other racial/ethnic groups with little or no CVD originally, migration and adoption of Western lifestyles have been associated with development of unfavorable risk factor profiles and CVD.<sup>33-35</sup> In the HCHS/SOL, higher degrees of acculturation by multiple proxy measures were associated with higher prevalence of multiple adverse CVD risk factors. Moreover, more acculturated participants—particularly those born in the United States—were significantly more likely to have prevalent CHD and stroke. Mexican background participants from the HCHS/SOL had higher rates of hypertension and obesity compared with those from the CARMELA study (based on similar definitions for these risk factors).<sup>30</sup> Thus, findings from the HCHS/SOL suggest that CVD risk status of Hispanic/Latino individuals is likely to worsen over time with increasing adoption of US lifestyles.

Findings here are limited to self-reported information on prevalent CHD and stroke (possibly biased by access to health care) and the cross-sectional nature of the data. However, the planned long-term follow-up of HCHS/SOL participants will produce objective information on incident CVD and non-CVD outcomes. A further limitation is that the HCHS/SOL did not include any other US racial/ethnic groups for comparison. However, the data were age-standardized to the year 2000 US population to allow for comparisons with observations from national surveys, and protocols used were similar to those of other epidemiological studies.

In conclusion, findings from the HCHS/SOL demonstrate the pervasive burden of CVD risk factors in all Hispanic/Latino groups in the United States and identify specific groups by origin,

sociodemographic characteristics, and sociocultural backgrounds at particularly high risk of CVD. These data may enhance the impetus to implement interventions to lower the burden of CVD risk factors among Hispanic/Latino people overall and targeted at-risk groups, as well as develop strategies to prevent future development of adverse CVD risk factors starting at the youngest ages.

**Author Affiliations:** Institute for Minority Health Research, Section of General Internal Medicine, Department of Medicine, University of Illinois at Chicago (Dr Daviglus); Graduate School of Public Health, San Diego State University, San Diego, California (Dr Talavera); Division of Cardiovascular Sciences, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland (Drs Avilés-Santa and Sorlie); Department of Family and Preventive Medicine, University of California, San Diego, La Jolla (Drs Allison and Criqui); Collaborative Studies Coordinating Center, University of North Carolina at Chapel Hill (Drs Cai, LaVange, and Perreira and Ms Gouskova); Behavioral Medicine Research Center, Department of Psychology, University of Miami, Miami, Florida (Drs Gellman and Schneiderman); Departments of Preventive Medicine (Drs Daviglus, Giachello, Pirzada, and Stamler) and Medical Social Sciences (Dr Penedo), Northwestern University Feinberg School of Medicine, Chicago; and Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, New York (Drs Kaplan and Wassertheil-Smolter).

**Author Contributions:** Drs Daviglus and Talavera had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Drs Daviglus and Talavera, as co-first authors, contributed equally to this article.

**Study concept and design:** Daviglus, Talavera, Gellman, Kaplan, LaVange, Penedo, Perreira, Schneiderman, Wassertheil-Smolter, Sorlie.

**Acquisition of data:** Daviglus, Talavera, Avilés-Santa, Allison, Criqui, Gellman, Kaplan, Penedo, Perreira, Schneiderman, Wassertheil-Smolter, Stamler.

**Analysis and interpretation of data:** Daviglus, Talavera, Avilés-Santa, Cai, Criqui, Giachello, Gouskova, Kaplan, LaVange, Penedo, Pirzada, Schneiderman, Wassertheil-Smolter, Sorlie, Stamler.

**Drafting of the manuscript:** Daviglus, Talavera, Cai, Kaplan, Pirzada.

**Critical revision of the manuscript for important intellectual content:** Daviglus, Talavera, Avilés-Santa, Allison, Cai, Criqui, Gouskova, Kaplan, LaVange, Penedo, Perreira, Pirzada, Schneiderman, Wassertheil-Smolter, Sorlie, Stamler.

**Statistical analysis:** Cai, Gouskova, LaVange, Perreira.

**Obtained funding:** Daviglus, Talavera, Avilés-Santa, Criqui, Kaplan, Penedo, Perreira, Schneiderman, Wassertheil-Smolter, Sorlie, Stamler.

**Administrative, technical, or material support:** Daviglus, Talavera, Cai, Gellman, Kaplan, Perreira, Pirzada, Schneiderman, Wassertheil-Smolter.

**Study supervision:** Daviglus, Talavera, Allison, Cai, Criqui, Gellman, Kaplan, Schneiderman, Stamler.

**Conflict of Interest Disclosures:** All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Cai reported having consulted for Outcomes Research Solutions. Dr Gellman reported receiving book royalties from Springer. No other disclosures were reported.

**Funding/Support:** The Hispanic Community Health Study/Study of Latinos was carried out as a collaborative study supported by contracts from the National Heart, Lung, and Blood Institute (NHLBI) to the University of North Carolina (N01-HC65233), University of Miami (N01-HC65234), Albert Einstein College of Medicine (N01-HC65235), Northwestern University (N01-HC65236), and San Diego State University (N01-HC65237). The following institutes, centers, or offices contribute to the HCHS/SOL through a transfer of funds to the NHLBI: National Center on Minority Health and Health Disparities, the National Institute on Deafness and Other Communications Disorders, the National Institute of Dental and Craniofacial Research, the National Institute of Diabetes and Digestive and Kidney Diseases, the National Institute of Neurological Disorders and Stroke, and the Office of Dietary Supplements.

**Role of the Sponsor:** The funding agency had a role in the design and conduct of the study; in the collection, analysis, and interpretation of the data; and in the review and approval of the manuscript.

**The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) Investigators:** Program Office: National Heart, Lung, and Blood Institute, Bethesda, Maryland; Larissa Avilés-Santa, Paul Sorlie, Lorraine Silsbee. Field Centers: *Bronx Field Center*, Albert Einstein School of Medicine, Bronx, New York: Robert Kaplan, Sylvia Wassertheil-Smolter. *Chicago Field Center*, Northwestern University Feinberg School of Medicine and University of Illinois at Chicago: Martha L. Daviglus, Aida L. Giachello, Kiang Liu. *Miami Field Center*, University of Miami, Miami, Florida: Neil Schneiderman, David Lee, Leopoldo Raij. *San Diego Field Center*, San Diego State University and University of California, San Diego: Greg Talavera, John Elder, Matthew Allison, Michael Criqui. Coordinating Center: University of North Carolina, Chapel Hill: Jianwen Cai, Gerardo Heiss, Lisa LaVange, Marston Youngblood. Central Laboratory: University of Minnesota, Minneapolis: Bharat Thyagarajan, John H. Eckfeldt. Central Reading Centers: *Audiometry Center*: University of Wisconsin: Karen J. Cruickshanks. *ECG Reading Center*: Wake Forest University: Elsayed Soliman. *Neurocognitive Reading Center*: University of Mississippi Medical Center: Hector González, Thomas Mosley. *Nutrition Reading Center*: University of Minnesota: John H. Himes. *Pulmonary Reading Center*: Columbia University: R. Graham Barr, Paul Enright. *Sleep Center*: Case Western Reserve University: Susan Redline.

**Online-Only Material:** The eTables are available at <http://www.jama.com>.

**Additional Contributions:** We thank the staff and participants of HCHS/SOL for their important contributions. A complete list of staff and investigators was published in *Ann Epidemiol*. 2010;20:642-649 and is also available on the study website, <http://www.csc.unc.edu/hchs/>.

## REFERENCES

- Ennis S, Rios-Vargas M, Albert N. 2010 Census Briefs: The Hispanic Population: 2010. US Census Bureau. <http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf>. Accessed October 11, 2012.
- Roger VL, Go AS, Lloyd-Jones DM, et al; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics: 2012 update: a report from the American Heart Association. *Circulation*. 2012;125(1):e2-e220.
- Diez Roux AV, Detrano R, Jackson S, et al. Acculturation and socioeconomic position as predictors of coronary calcification in a multiethnic sample. *Circulation*. 2005;112(11):1557-1565.
- Kandula NR, Diez-Roux AV, Chan C, et al. Association of acculturation levels and prevalence of diabetes in the multi-ethnic study of atherosclerosis (MESA). *Diabetes Care*. 2008;31(8):1621-1628.

5. Morales LS, Leng M, Escarce JJ. Risk of cardiovascular disease in first and second generation Mexican-Americans. *J Immigr Minor Health*. 2011;13(1):61-68.

6. Mainous AG III, Majeed A, Koopman RJ, et al. Acculturation and diabetes among Hispanics: evidence from the 1999-2002 National Health and Nutrition Examination Survey. *Public Health Rep*. 2006;121(1):60-66.

7. Bethel JW, Schenker MB. Acculturation and smoking patterns among Hispanics: a review. *Am J Prev Med*. 2005;29(2):143-148.

8. Crimmins EM, Kim JK, Alley DE, Karlamangla A, Seeman T. Hispanic paradox in biological risk profiles. *Am J Public Health*. 2007;97(7):1305-1310.

9. Mitchell BD, Stern MP, Haffner SM, Hazuda HP, Patterson JK. Risk factors for cardiovascular mortality in Mexican Americans and non-Hispanic whites: San Antonio Heart Study. *Am J Epidemiol*. 1990;131(3):423-433.

10. Sundquist J, Winkleby MA. Cardiovascular risk factors in Mexican American adults: a transcultural analysis of NHANES III, 1988-1994. *Am J Public Health*. 1999;89(5):723-730.

11. Flegal KM, Ezzati TM, Harris MI, et al. Prevalence of diabetes in Mexican Americans, Cubans, and Puerto Ricans from the Hispanic Health and Nutrition Examination Survey, 1982-1984. *Diabetes Care*. 1991;14(7):628-638.

12. Crespo CJ, Loria CM, Burt VL. Hypertension and other cardiovascular disease risk factors among Mexican Americans, Cuban Americans, and Puerto Ricans from the Hispanic Health and Nutrition Examination Survey. *Public Health Rep*. 1996;111(suppl 2):7-10.

13. Allison MA, Budoff MJ, Wong ND, Blumenthal RS, Schreiner PJ, Criqui MH; The Multi-Ethnic Study of Atherosclerosis. Prevalence of and risk factors for subclinical cardiovascular disease in selected US Hispanic ethnic groups: the Multi-Ethnic Study of Atherosclerosis. *Am J Epidemiol*. 2008;167(8):962-969.

14. Derby CA, Wildman RP, McGinn AP, et al. Cardiovascular risk factor variation within a Hispanic cohort: SWAN, the Study of Women's Health Across the Nation. *Ethn Dis*. 2010;20(4):396-402.

15. Lavange LM, Kalsbeek WD, Sorlie PD, et al. Sample design and cohort selection in the Hispanic Community Health Study/Study of Latinos. *Ann Epidemiol*. 2010;20(8):642-649.

16. Sorlie PD, Avilés-Santa LM, Wassertheil-Smolter S, et al. Design and implementation of the Hispanic Community Health Study/Study of Latinos. *Ann Epidemiol*. 2010;20(8):629-641.

17. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clin Chem*. 1972;18(6):499-502.

18. Liu K, Daviglus ML, Loria CM, et al. Healthy lifestyle through young adulthood and the presence of low cardiovascular disease risk profile in middle age: the Coronary Artery Risk Development in (Young) Adults (CARDIA) study. *Circulation*. 2012;125(8):996-1004.

19. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA*. 2001;285(19):2486-2497.

20. Chobanian AV, Bakris GL, Black HR, et al; National Heart, Lung, and Blood Institute Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure; National High Blood Pressure Education Program Coordinating Committee. The Seventh Report of the Joint National Committee

on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*. 2003; 289(19):2560-2572.

21. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: the evidence report [NIH Publication No. 98-4083]. National Heart, Lung, and Blood Institute. [http://www.nhlbi.nih.gov/guidelines/obesity/ob\\_gdlns.pdf](http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf). Accessed October 11, 2012.

22. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*. 2010; 33(suppl 1):S62-S69.

23. Rewers M, Shetterly SM, Hoag S, Baxter J, Marshall J, Hamman RF. Is the risk of coronary heart disease lower in Hispanics than in non-Hispanic whites? the San Luis Valley Diabetes Study. *Ethn Dis*. 1993; 3(1):44-54.

24. Swenson CJ, Trepka MJ, Rewers MJ, Scarbro S, Hiatt WR, Hamman RF. Cardiovascular disease mortality in Hispanics and non-Hispanic whites. *Am J Epidemiol*. 2002;156(10):919-928.

25. Hunt KJ, Resendez RG, Williams K, Haffner SM, Stern MP, Hazuda HP. All-cause and cardiovascular mortality among Mexican-American and non-

Hispanic White older participants in the San Antonio Heart Study: evidence against the "Hispanic paradox." *Am J Epidemiol*. 2003;158(11):1048-1057.

26. Stern MP, Rosenthal M, Haffner SM, Hazuda HP, Franco LJ. Sex difference in the effects of socio-cultural status on diabetes and cardiovascular risk factors in Mexican Americans: the San Antonio Heart Study. *Am J Epidemiol*. 1984;120(6):834-851.

27. Pabon-Nau LP, Cohen A, Meigs JB, Grant RW. Hypertension and diabetes prevalence among US Hispanics by country of origin: the National Health Interview Survey 2000-2005. *J Gen Intern Med*. 2010; 25(8):847-852.

28. Keenan NL, Rosendorf KA; Centers for Disease Control and Prevention (CDC). Prevalence of hypertension and controlled hypertension: United States, 2005-2008. *MMWR Surveill Summ*. 2011;60(suppl): 94-97.

29. Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999-2008. *JAMA*. 2010;303(3):235-241.

30. Schargrodsky H, Hernández-Hernández R, Champagne BM, et al; CARMELA Study Investigators.

CARMELA: assessment of cardiovascular risk in seven Latin American cities. *Am J Med*. 2008;121(1): 58-65.

31. Yusuf S, Hawken S, Öunpuu S, et al; INTERHEART Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet*. 2004;364(9438):937-952.

32. Lanás F, Avezum A, Bautista LE, et al; INTERHEART Investigators in Latin America. Risk factors for acute myocardial infarction in Latin America: the INTERHEART Latin American study. *Circulation*. 2007; 115(9):1067-1074.

33. Marmot MG, Syme SL. Acculturation and coronary heart disease in Japanese-Americans. *Am J Epidemiol*. 1976;104(3):225-247.

34. Mooteri SN, Petersen F, Dagubati R, Pai RG. Duration of residence in the United States as a new risk factor for coronary artery disease (The Konkani Heart Study). *Am J Cardiol*. 2004;93(3):359-361.

35. Reed D, McGee D, Cohen J, Yano K, Syme SL, Feinleib M. Acculturation and coronary heart disease among Japanese men in Hawaii. *Am J Epidemiol*. 1982; 115(6):894-905.

It is one of the paradoxes of the human race and possibly its last paradox, that the people who control the fortunes of our community should at the same time be wildly radical in matters that concern our own change of our environment, and rigidly conservative in the social matters that determine our adaptation to it.

—Norbert Wiener (1894-1964)



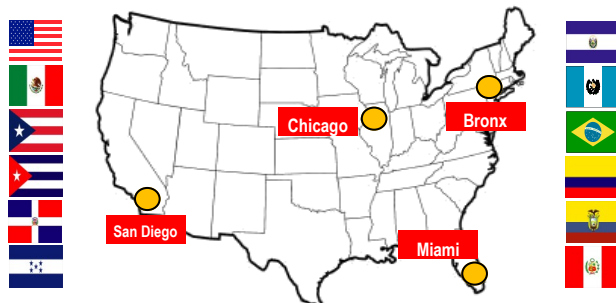
# Cardiovascular Risk Factors among Participants of the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)

The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) is the largest study on Hispanic/Latino health in the United States being conducted in the Bronx, Chicago, Miami, and San Diego. The purpose of HCHS/SOL is to learn more about the health of Hispanics/Latinos living in the United States.

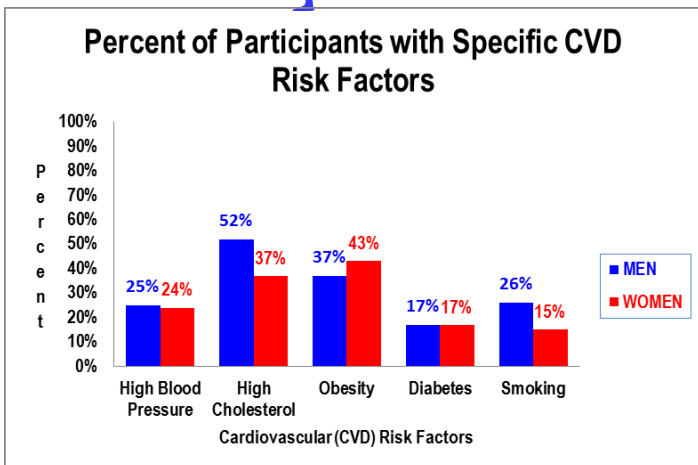
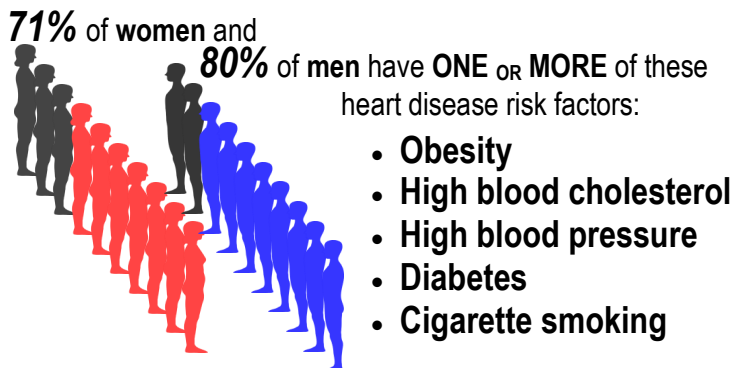
We want to share some findings that were recently published by SOL investigators in the *Journal of the American Medical Association (JAMA)*.

For more information, please contact Barbara Rodriguez: [barodriguez@projects.sdsu.edu](mailto:barodriguez@projects.sdsu.edu) or (619) 594-2470

The HCHS/SOL study recruited over 16,000 Hispanic/Latino adults of different backgrounds—including Cuban, Dominican, Mexican, Puerto Rican, Central American, and South American.



## Results from the HCHS/SOL study show that:



The two **highest heart disease risk factors** for both men and women were **high cholesterol** and **obesity**. The lowest risk factor was diabetes.

About half of men had high cholesterol and about half of women were obese.

Source: *JAMA*. 2012;308(17):1775-1784 ([www.jama.com](http://www.jama.com))

## Did you know that heart disease is a serious problem among Hispanic/Latinos?

It is **one of the leading causes of death** among Hispanic/Latinos in the United States.



### What is heart disease?

It happens when the blood vessels going to the heart become narrow and clogged. As a result, a heart attack can occur.

Heart disease develops over many years.

### What are risk factors?

Risk factors are **personal characteristics** and **habits** that make you more likely to get heart disease.

You can do something about some risk factors but some risk factors you cannot change.

### To reduce your risk of heart disease, you can:

- EXERCISE:** Try to get at least 30 minutes of moderate-intensity physical activity five days a week.
- EAT LESS SATURATED FAT AND SODIUM:** Bake chicken instead of frying. Use herbs instead of salt to season your food.
- MAINTAIN A HEALTHY WEIGHT:** Eat smaller portions, and make smart food choices.
- HAVE REGULAR CHECKUPS:** Keep track of your weight, waist measurement, blood pressure, blood cholesterol, and blood sugar (test for diabetes).
- EAT MORE FRUITS AND VEGETABLES:** Enjoy them with meals, as a snack or for dessert.
- QUIT SMOKING:** Keep your home smoke free! Call **1-800-QUIT NOW** (English and Spanish).

Source: <http://www.nhlbi.nih.gov/health/public/heart/other/latino/chd/heartdisease.pdf>, <http://ndep.nih.gov/am-i-at-risk/MoveMore.aspx>



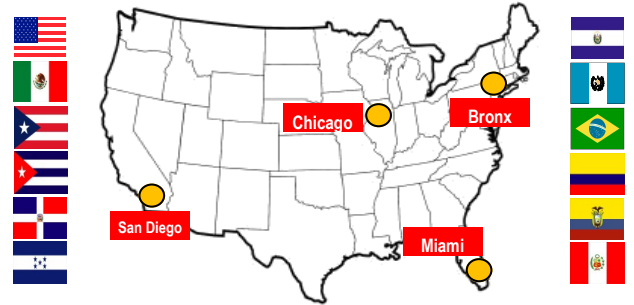
# Factores de Riesgo Cardiovascular entre los Participantes del Estudio de la Salud de la Comunidad Hispana/Estudio de los Latinos (HCHS/SOL)

El Estudio de la Salud de la Comunidad Hispana/Estudio de los Latinos (HCHS/SOL) es el estudio más amplio sobre la salud hispana/latina en los Estados Unidos. HCHS/SOL está siendo llevado a cabo en El Bronx, Chicago, Miami y San Diego. El propósito de HCHS/SOL es aprender más sobre la salud de la población hispana/latina que reside en los Estados Unidos.

Queremos compartir algunos resultados del estudio recientemente publicados por nuestro equipo de investigadores de SOL en la *Revista de la Asociación Médica Americana (JAMA)*, por sus siglas en inglés).

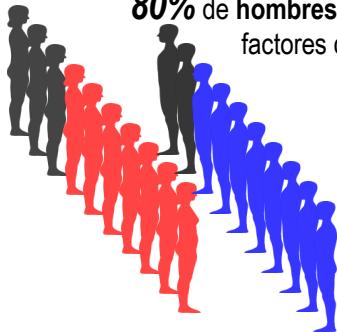
Para obtener más información, póngase en contacto con Barbara Rodriguez: [barodriguez@projects.sdsu.edu](mailto:barodriguez@projects.sdsu.edu) o (619) 594-2407

El estudio HCHS/SOL reclutó alrededor de 16,000 adultos hispanos o latinos de diferente origen—que incluye cubanos, dominicanos, mexicanos, puertorriqueños, centroamericanos y suramericanos.



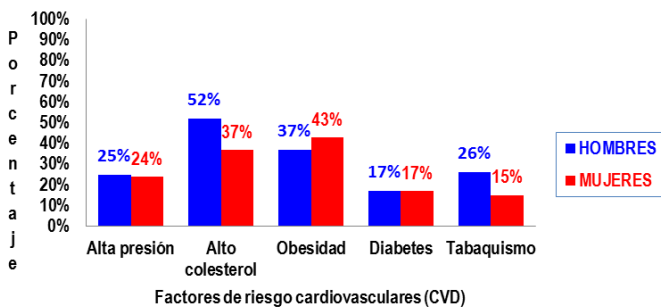
## Los resultados del estudio HCHS/SOL demuestran que:

**71%** de mujeres y **80%** de hombres tienen UNO o MAS de los siguientes factores de riesgos de enfermedades cardíacas:



- **Obesidad**
- **Alto colesterol**
- **Alta presión**
- **Diabetes**
- **Tabaquismo**

Porcentaje de participantes con factores de riesgo específicos en enfermedades cardiovasculares (CVD)



El **colesterol alto** y la **obesidad** fueron los factores de riesgo mayormente identificados tanto en hombres como en mujeres. La diabetes fue el factor menos común.

Alrededor de la mitad de los hombres tenía el colesterol alto, y la mitad de las mujeres tenía obesidad.

Source: *JAMA*. 2012;308(17):1775-1784 ([www.jama.com](http://www.jama.com))

## ¿Sabía usted que la enfermedad cardíaca es un problema serio entre los hispanos o latinos?

Es **una de las principales causas de muerte** entre los hispanos o latinos en los Estados Unidos.



### ¿Qué es la enfermedad cardíaca?

Sucede cuando los vasos sanguíneos que van al corazón se estrechan y se obstruyen. Como resultado, puede ocurrir un ataque al corazón.

Una enfermedad cardíaca se desarrolla durante muchos años.

### ¿Qué son factores de riesgo?

Son **características personales** y **hábitos** que lo hacen más propenso a contraer enfermedades cardíacas.

Usted puede hacer algo sobre algunos factores de riesgo pero otros no los puede cambiar.

## Para reducir el riesgo de una enfermedad cardíaca, usted puede:

**HACER EJERCICIO:** Trate de hacer por lo menos 30 minutos de actividad física de intensidad moderada cinco días a la semana.

**COMER MENOS GRASAS SATURADAS Y SODIO:** Hornee el pollo en vez de freírlo. Utilice hierbas en vez de sal para sazonar sus comidas.

**MANTENER UN PESO SALUDABLE:** Coma pequeñas porciones y tome decisiones inteligentes sobre alimentos.

**TENER CHEQUEOS REGULARES:** Mantenga un registro de su peso, medida de su cintura, presión sanguínea, colesterol en la sangre y azúcar en la sangre (prueba de diabetes).

**COMER MAS FRUTAS Y VERDURAS:** Disfrútelas en comidas, como un almuerzo o como postre.

**DEJAR DE FUMAR:** ¡Mantenga su hogar libre de humo! Llame **1-800-QUIT NOW** (Inglés y Español).

Source: <http://www.nhlbi.nih.gov/health/public/heart/other/latino/chd/heartdisease.pdf>, <http://ndep.nih.gov/am-i-at-risk/MoveMore.aspx>