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Challenges in Preventing Heart Disease in Hispanics: Early Lessons Learned from the Hispanic Community Health Study/ Study of Latinos (HCHS/SOL)

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Abstract

The challenge of preventing cardiovascular disease (CVD) in US Hispanics depends upon being able to understand and communicate about the diversity within this population in terms of environmental exposures, health behaviors, socio-cultural experiences and genetic background to CVD risk factor profiles and disease burdens. Recent publications from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) launched by the National Institutes of Health (NIH) have begun to accomplish this task. In this article we review some of the HCHS/SOL findings concerning cardiometabolic and other CVD risk factors and relate them to the need for increased access to health care and attention to lifestyle variables including nutrition. A major challenge that needs to be accomplished is to alert our lawmakers, public health officials, health care providers and the Hispanic population at large about how to lighten the CVD risk factor and disease burdens now carried by our Hispanic population.

Keywords

Cardiometabolic Risk Factors; Health Insurance; Hispanic Community Health Study/Study of Latinos; Lifestyle Risk Factors

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Introduction

Considerable evidence indicates that the health of a population is strongly influenced by economic and social circumstances as well as access to health care services[1,2]. Although Hispanics living in the United States (US) have less education, a higher poverty rate and worse access to health care than non-Hispanic whites, it has been widely reported that Hispanics have better health outcomes[3,4;5,6]. Thus, the average life expectancy in 2006 for Hispanics was 80.6 years, for non-Hispanic whites 78.1 years and for non-Hispanic blacks 72.9 years[3]. The incongruity between the relatively disadvantaged life circumstances of the overall Hispanic population and their apparent mortality advantage compared to non-Hispanic whites is referred to as the Hispanic health paradox.

The limited information available concerning Hispanic health raises important questions and potential challenges. First, given the relatively disadvantaged life circumstances of the Hispanic population, what can be done to ameliorate the consequences of these disadvantages and improve Hispanic health? In order to confront these challenges, we need to know how specific adverse circumstances are influencing health among Hispanics. Second, is the mortality advantage among Hispanics accompanied by good health and perceived health quality of life? Third, how widely does the morbidity in the overall Hispanic population vary as a function of ethnic background or geographic location? Fourth, does the prevalence of morbidity vary between those born in the US and those who have immigrated, and how does duration of time living in the US relate to morbidity? Fifth, is the apparent mortality advantage enjoyed by the Hispanic population likely to last? Given the substantial changes that have been occurring in recent decades in Hispanic population size, shifting demographics and changing lifestyles, it is conceivable that belief in the sustainability of the Hispanic mortality advantage may be promoting a false sense of security among public health officials, health care providers and the Hispanic population. This could have severe negative consequences. The purpose of the present paper is to examine the preceding questions within the context of early research findings from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL).

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

According to the 2010 US Census, there are approximately 50.5 million Hispanics in the US, comprising about 16% of the population[7]. Demographers expect that the proportion of Hispanics will grow to 30% by the year 2050[8]. Although Hispanics are a diverse group in terms of sociocultural and genetic backgrounds, there is a paucity of information about Hispanic health derived from national exams and surveys. The National Health and Nutrition Examination Survey (NHANES), initiated in 1959, consists of a series of programs that combines interviews and physical examinations to assess the health and nutritional status in a nationally representative sample of adults and children in the US[9,10]. Until 2010 NHANES' Hispanic arm was almost exclusively Mexican-American. Thus, participants were classified as non-Hispanic white, non-Hispanic black and Mexican-Americans. NHANES assesses a variety of health variables and indicators, but does not assess the incidence of chronic diseases. The Hispanic Health and Nutrition Examination Study (HHANES), conducted between 1982 and 1984, examined 11,653 Hispanics in a one-

time cross sectional examination of the prevalence of specific health factors[11,12,13]. Carried out in a manner similar to NHANES, it provided a nationally representative sample of individuals from Mexican, Puerto Rican and Cuban origins enrolled in Texas, Colorado, New Mexico, Arizona, California, Florida, New York, New Jersey and Connecticut. The survey was estimated to represent 76% of the total 1980 US Hispanic civilian population. Although a valuable contribution to the study of Hispanic health, the data are now more than 30 years old.

In order to characterize the contemporary health status, health risks and CVD disease burden of Hispanics living in the US and to identify likely causal factors of many chronic diseases in a population with diverse environmental exposures, genetic backgrounds and early life experiences, the US National Institutes of Health (NIH) launched the HCHS/SOL with the National Heart, Lung and Blood Institute (NHLBI) serving as the lead sponsor.

The design and sampling methods of HCHS/SOL have previously been described[14,15]. Briefly, HCHS/SOL is a longitudinal cohort study of 16,415 Hispanics, aged 18–74 years at their baseline visit in 4 of 11 urban metropolitan areas with the largest number of Hispanics in the US (Bronx, NY: Chicago, IL; Miami, FL; and San Diego, CA)[16]. The cohort self-identified as Mexican, Puerto Rican, Cuban, Dominican, Central or South American. HCHS/SOL used a stratified 2-stage area probability sample design in which census blocks were randomly selected in the defined community areas of each field center, and households were randomly selected in each sampled block group. Sampling weights were established based on the probability of selection, adjustment for non-response, trimming to handle extreme values of the weights, calibration to the known population distribution and normalization to the entire HCHS/SOL target population based on the 2010 US census. At baseline (2008–2011) participants underwent a clinical exam that included assessment of CVD risk factors (e.g., elevated blood pressure, diabetes mellitus/DM, dyslipidemia, smoking, obesity, sleep apnea) and information on demographics, medical history, medication usage, diet, physical activity, socioeconomic and sociocultural (acculturation) factors. The study also involves annual follow-up data since 2009 and a planned second clinic visit for each participant from 2014–2017.

Cardiometabolic Risk Factors

Various cardiometabolic risk factors have been examined in HCHS/SOL including the prevalence of: (a) DM, (b) metabolic syndrome (MetS), (c) obesity, (d) hypertension (HTN) and (e) sleep disordered breathing (SDB).

Diabetes Mellitus

DM increases the risk for coronary heart disease (CHD) or stroke approximately two-fold[17] and 2 of 3 people with DM die of cardiovascular disease (CVD)[18]. In HCHS/SOL DM is associated with increased prevalence of both CHD and stroke[19]; DM in the HCHS/SOL was defined as having a fasting plasma glucose ≥ 126 mg/dL or impaired glucose tolerance as indicated by a glucose level ≥ 200 mg/dL after a two-hour oral glucose tolerance test or elevated glycosylated hemoglobin (A1c ≥ 6.5%; 48 mmol/mol) or

documented (scanned) use of hypoglycemic agents[20]. In a few specific analyses (e.g., examining DM awareness), self-reported DM was assessed.

Although the prevalence of DM in HCHS/SOL using only objective measures was 16.9, the prevalence of diabetes across the 6 heritage groups ranged from 10.2 in South Americans to 18.3 in those from Mexican backgrounds (Table 1)[20]. Differences in prevalence as a function of Hispanic background remained significant after controlling for age, sex, body mass index (BMI), field center and years living in the US ($p<.0001$). Using slightly different metrics in those 20 years and older from 2007–2009 and sex and age standardized to the 2000 US population (the HCHS/SOL data are from 2008–2011 and age standardized to the 2010 US population), the Centers for Disease Control and Prevention (CDC) reported a prevalence estimate of 10.2% in non-Hispanic whites and 18.7% for non-Hispanic blacks[21]. Thus the range of DM prevalence among Hispanics/Latinos appears to approximate the prevalence range between non-Hispanic whites and non-Hispanic blacks. Moreover, the diversity in DM prevalence across Hispanic background groups is consistent with there being other variations in CVD risk factors observed among Hispanic groups in HCHS/SOL[19].

For those not born in the US, prevalence of DM increased from 12.3 for those living in the US for 5 years or less to a mean of 18.8 for those living in the US for more than 15 years[20]. The prevalence of DM in those living in the US for more than 10 years was higher than those living in the US 10 years or less after adjusting for age, sex, BMI, Hispanic background and field center community ($p<0.02$). However, the prevalence of DM in those living in the US ≤ 5 years did not differ from those born in the US after adjusting for the same variables. The present finding that DM prevalence significantly increased in relation to length of residence in the US is consistent with the findings of the National Health Interview Survey[22]. In contrast, the HCHS/SOL finding that participants born in the US did not differ significantly from those living in the US for 5 years or less is not consistent with the report that immigrants to the US are healthier than US born people of similar ethnic background[23]. Thus, the HCHS/SOL data confirm that migrant health tends to worsen with increased duration of living in the US, but is apparently not due to initial health status.

In a similar vein, several reports have indicated that African immigrants have less obesity, better cardiometabolic health and greater longevity than African Americans[24,25]. However, a recent study has indicated that while African immigrant men were less obese than African American men, they had worse cardiometabolic health including higher glucose levels, more HTN, and greater visceral adiposity[26]. This suggests that the supposed healthy immigrant effect may not be valid for either Hispanic or African immigrants.

The HCHS/SOL found that prevalence of DM is negatively related to household income ($p=0.0004$) and education ($p=0.0005$)[20]. Thus, the prevalence of DM was 16.9 and 18.5, respectively for men and women with household income less than $20,000 per year but was 12.8 and 8.3, respectively, in men and women with household incomes above $75,000 per year. Similarly prevalence of DM was 18.6 and 20.1, respectively, for men and women who had not completed high school but 15.4 and 12.9, respectively, for men and women who had more than a high school education. Interactions between sex and either household income or

education were not significant. The HCHS/SOL findings are consistent with those of a large-scale meta-analysis of type 2 DM(T2DM) incidence and socioeconomic status carried out worldwide[27]. That study found that risk of getting T2DM was associated with low socio-economic status including education and income in high-, middle-, and low-income countries. Moreover, the relationship was strongest in high-income countries such as the US

Among the HCHS/SOL participants with DM, 41.3% were unaware of their condition[20], which is about the same as those reported for non-Hispanic whites[10]. In contrast, the rate of adequate glycemic control (A1c <7.0; <53 mmol/mol) for Hispanics in the HCHS/SOL (48.0%) appears to be somewhat lower than those for either non-Hispanic blacks (52.6%) or non-Hispanic whites (52.9%) reported by NHANES for 2007–2010[28]. The rate of glycemic control for Hispanics in NHANES was 47.3%, which, together with the HCHS/SOL observations, indicate that fewer Hispanics with DM have adequate glycemic control.

It should be noted that among the HCHS/SOL participants at the baseline visit who had DM, only 52% had health insurance[20]. The percent of participants with health insurance (p=0.0001), DM awareness (p=0.0001) and glycemic control (p=0.0299) increased significantly with age after controlling for sex, Hispanic background, BMI, field center, education and years living in the US. Individuals with health insurance were less likely to present at the baseline exam with unrecognized diabetes (p=0.003). Those ≥ 65 years had greater rates of DM awareness (p=0.0001), glycemic control (p=0.0106) and insurance coverage (p=0.0001) than those < 65 years.

Given the above information, it is interesting to note that the percentage of Hispanic adults aged 18–64 years lacking health insurance in the National Health Interview Survey for 2008 was 41.6% compared with 14.6% in non-Hispanic Whites and 22.1% in non-Hispanic Blacks[29]. A meta-analysis comparing A1c levels between Hispanics and non-Hispanic white adults with DM found that A1c was 0.5% (5.5 mmol/mol) higher among Hispanics[30]. Although the reasons for the disparity in glycemic control between Hispanics and non-Hispanic whites have not yet been investigated, the implications appear to be important. Thus, the apparent similarity of DM awareness between non-Hispanic whites and Hispanics in conjunction with a large disparity in health insurance between the groups, suggest that the differences in health insurance and/or other aspects of access to health care such as ability to meet co-payments, may well account for the differences in glycemic control. This would appear to be particularly important, because a decrease of 0.5% (5.5 mmol/mol) in A1c is associated with a 10.5% decrease in risk of vascular complications[31].

Metabolic Syndrome

The MetS is a cluster of anthropometric, hemodynamic and metabolic disturbances that has been associated with increased risk for DM[32] and CVD morbidity and mortality[33]. Previous reports have noted that the MetS disproportionally affects Hispanics/Latinos with NHANES 1888–1994, for example, showing that Mexican Americans had the highest prevalence[34].

The HCHS/SOL defined the MetS according to the American Heart Association (AHA)/ NHLBI 2009 Joint Interim Statement that requires three or more of the following

components: (1) waist circumference ≥102 cm in men and ≥88 cm in women; (2) blood pressure ≥130 mm Hg systolic and/or ≥ 85 mm diastolic; (3) triglycerides ≥150 mg/dL; (4) high-density lipoprotein cholesterol <40 mg/dL; and (5) fasting glucose ≥100 mg/dL and or (6) on relevant medication. The age standardized prevalence of the MetS was 33.7% among men and 36.0% among women (Table 2)[35]. These estimates are comparable to those presented by other national samples[36,34] that have suggested that there is a higher frequency of occurrence of the MetS among Hispanics/Latinos when compared to Non-Hispanic whites and/or African Americans. There was significant variability in the prevalence of the MetS among HCHS/SOL participants of different Hispanic/Latino background[35]. Puerto Rican women had the highest prevalence at 40.9% while South American men had the lowest at 27.0% (Table 2). The prevalence of the MetS increased steeply with age and was as high as 72.0% among women between the ages of 70–74 years (Table 2)[35].

The most common components among participants with the MetS were abdominal obesity (73%), hyperglycemia (73%) and hypertriglyceridemia (73%) for men and abdominal obesity (96%) followed by low high-density lipoprotein cholesterol (75%) for women. Further, among HCHS/SOL participants 14% of women and 21% of men had no cardiometabolic abnormalities, while 3.8% of men and 4.6% of women had five[35].

Obesity

During the past decades, the prevalence and severity of obesity have increased in US adults of all ethnicities. National estimates have highlighted the increased vulnerability of Hispanics/Latinos to be classified as obese[37,38]. However, to date most studies have almost exclusively included Hispanics of Mexican descent.

The HCHS/SOL examined the prevalence and severity of Hispanics/Latinos of various backgrounds using the following BMI categories: class I obesity BMI≥ 30 kg/m^2; class II obesity BMI≥ 35; and class III obesity BMI≥ 40 kg/m^2. Results showed that among HCHS/SOL participants, women were more likely to be obese than men[39]. The prevalence of class I obesity was 37% and 42% for men and women, respectively. Approximately 8% of men and 11% of women met criteria for class II obesity and 4% and 7% of men and women, respectively, met criteria for class III obesity. Thus, one in five women and one in ten men within the HCHS/SOL cohort were classified as having class II or III obesity.

The impact of obesity on other cardiometabolic risk factors has been assessed in HCHS/SOL. Participants with elevated BMI were found to have high prevalences of traditional and novel CVD risk factors including DM, hypertension, low-density lipoprotein cholesterol, hypertriglyceridemia and increased inflammation (high C-reactive protein)[39].

Hypertension

HTN has long been identified as a major risk factor for CVD. In HCHS/SOL, HTN was strongly associated with the prevalence of CHD and stroke[19]. Although there have been significant improvements in the prevention and treatment of HTN during the last decades, blood pressure prevalence in the US population remains at undesirable levels.

In HCHS/SOL, the overall age-adjusted prevalence of HTN was 25.5% (26.1% for men and 25.3% for women)[19,40]; HTN was defined as average measured blood pressure of ≥140 mm Hg systolic or 90mm Hg diastolic or self-reported use of medications for HTN in the last 4 weeks. When compared to national estimates, prevalence rates of HTN reported by HCHS/SOL were comparable to those found in NHANES 2009–2010 for Hispanic participants (26.1%) and slightly lower than those reported for Non- Hispanic white participants (27.4%)[41].

The prevalence of HTN varied significantly across Hispanic background, with South American women having the lowest rates at 17.2% and Dominican men having the highest at 34.3%[40]. Interestingly, in HCHS/SOL the prevalence of HTN varied across study sites. Thus, within Hispanic backgrounds, there were differences in the prevalence of HTN according to geographic location. In fact, the Chicago site showed lower HTN prevalence for several Hispanic subgroups including Central and South Americans[40]. Finally, it is worth highlighting that the prevalence rates of HTN did not vary according to education level or income.

In addition to identifying HTN prevalence estimates and in order to better identify and address the specific needs of the Hispanic population, HCHS/SOL sought to examine the percentage of those with hypertension who (1) were aware of their condition, (2) were being treated with medications, and (3) had adequately controlled blood pressure. Participants were defined as “aware of HTN status” if they were classified as having HTN and they reported being informed by a medical provider that they had HTN. Participants were defined as “treated” if they were classified as having HTN and reported that they were taking medications for HTN. Further, participants’ HTN were classified as “controlled” if they were classified as having HTN (self-reported use of medications) and the measured blood pressure was <140/90 mm Hg.

The HCHS/SOL reported overall rates of awareness, treatment and control of 74.1%, 63.4% and 37.5%, respectively[40]. Of concern is the fact that these percentages are markedly lower than those reported by other national estimates, particularly when it comes to HTN control. While the percent controlled in the HCHS/SOL was only 37.5, NHANES 2009–2010 data showed 40.7% of Hispanics and 56.3% of Non-Hispanic Whites had controlled HTN[41].

In HCHS/SOL, men and women showed some differences in terms of their levels of awareness, treatment and control[40]. Among men, younger participants were less likely to be aware of and treated for their HTN and those within the 18 to 29 year old category had the most alarming rates. Within this age group, only 48% were classified as being aware of their condition, only 19% of them were treated for HTN and only 17% had controlled HTN. Among women, awareness and treatment increased steeply with age. Those in the oldest age category (70–74 years old) had the highest percentages of awareness and treatment (79% and 71%, respectively). However, they were the least likely to have controlled HTN with a percentage of only 30% in this category.

HTN awareness, treatment and control varied significantly among men, but not women, of different Hispanic background[40]. Central American men were found to be at considerable

disadvantage as they had the lowest percentages of HTN awareness at 57%. Similarly, only 39% of men within this Hispanic subgroup were treated and only 12% had controlled HTN. In contrast, Cuban men showed the greatest percentages of awareness, treatment and control with 78%, 65% and 40%, respectively. Levels of awareness, treatment and control were comparable among women across Hispanic background. These percentages were also comparable among men and women across education and income levels.

Of considerable note in this regard was the finding that in the HCHS/SOL study sample, the proportion of individuals who were aware, treated and controlled for HTN differed significantly by health insurance status[40]. This is not an unusual finding in the CVD health literature. In fact, the Agency of Healthcare Research and Quality latest report indicates that health insurance is the single most important factor relating to access to care. Similarly, a recent study using data from the Behavioral Risk Factor Surveillance System showed that lack of health insurance is the most important predictor of not having a personal doctor or health care provider or the inability to afford to visit a doctor[42]. Interestingly, this study also found important ethnic disparities in access to care among those with HTN and in line with HCHS/SOL study results, showed that those of younger age and those classified as Hispanics were more likely to report barriers in access to care[42].

Sleep Disordered Breathing

SDB is characterized by episodes of partial or complete upper airway collapse during sleep, leading to intermittent cyclic hypoxemia and sleep fragmentation[43,44]. SDB has been associated with various CVD risk factors, including HTN and metabolic conditions[45,46] and has been implicated in the etiology of CVD, including CHD[47], congestive heart failure[48,49], and stroke[50]. In HCHS/SOL severe SDB was associated with a 50% increase in the odds of presenting with impaired glucose tolerance and 90% higher odds of prevalent DM[51]. In addition, SDB was associated with HTN particularly among participants of Puerto Rican and Central American backgrounds[51].

Participants in HCHS/SOL were instructed in the use of a sleep apnea monitor overnight in order to determine the presence of SDB. Sleep records were scored by certified polysomnologists at a central sleep reading center and the apnea-hypopnea index (AHI), number of respiratory events per estimated sleep hour, was used to determine the severity of SDB. AHI values of 5–14, 15–29, and ≥ 30 were used to define minimal, moderate and severe SDB, respectively. SDB was defined as having both an AHI ≥ 5 and endorsement of sleepiness as indicated by the Epworth Sleepiness Scale. Overall, 25.8% of the HCHS/SOL participants met minimal criteria, 9.8% met moderate and 3.9% severe criteria for SDB[51].

In line with the literature, men, those classified as overweight or obese, and those reporting habitual snoring or “stop breathing” while asleep had increased odds of SDB[51]. Alarmingly, in spite of the high prevalence of SDB within the HCHS/SOL cohort, only 1.3% of study participants reported a previous physician diagnosis of obstructive sleep apnea (high SDB and daytime sleepiness)[51]. Given the high risk that untreated severe SDB conveys[52], particularly in regards to CVD and metabolic conditions, it is likely a large burden of disease may be attributable to unawareness and, thus, untreated SDB among Hispanic/Latinos in the US.

Lifestyle Risk Factors

During the last decade, important changes in lifestyle patterns have led to an increased prevalence of chronic conditions, including CVD and DM. In fact, the leading causes of death can be attributable to changes in lifestyle risk factors, including but not limited to: (a) smoking; and (b) poor dietary habits.

Smoking

Given that few national surveys have specifically examined smoking among US Hispanics, the HCHS/SOL sought to do so. Within this study, self-report was used to define current and past smokers. Results indicated that smoking behaviors varied widely across Hispanic groups. Prevalence of current smoking was highest among Puerto Ricans (35.0% for men, 32.6% for women) and Cubans (31.3% for men, 21.9% for women) and lowest among Dominicans (11.0% for men, 11.7% for women)[53]. Prevalence of current smoking among Puerto Ricans and Cubans was comparable to that of African Americans but largely exceeded the estimates for non-Hispanic whites (22.6%)[54], highlighting the need to develop interventions specifically targeting Hispanics of Puerto Rican and Cuban descents.

Men, those younger than 60 years, and those with lower income and education were more likely to be smokers[53]. Smoking was more common among those who were born in the US and those with higher levels of acculturation, suggesting vulnerability (particularly among women) to acculturation stress and media or cultural influences that may promote smoking in the US.

The likelihood of quitting was higher among older people with higher levels of socio-economic status (income and education)[53]. Although quitting was not associated with health insurance status, the proportion of participants who had ever used prescription or over-the-counter smoking-cessation products was significant higher ($p<0.05$) among those with health insurance. In fact, use of smoking-cessation products was low in the overall HCHS/SOL sample suggesting the need for increasing availability, awareness and acceptability of these products among Hispanics.

Nutrition

Dietary habits usually reflect cultural origin and country of origin. Although Hispanics/Latinos are often thought of as a homogenous group, the HCHS/SOL set out to examine the heterogeneity of this population. Dietary habits were assessed using two 24-hour recalls (Nutrition Data System for Research Software). Mean total energy intake varied significantly across Hispanic/Latino subgroups with Cubans reporting the highest mean intake at 2235 kcal and Dominicans the lowest at 1708 kcal[55]. Differences in nutrient and food-group intake appeared to reflect difference in prevalence rates of CVD and its risk factors reported in HCHS/SOL[19]. For instance, Cubans and Puerto Ricans showed higher intakes of foods and nutrients associated with CVD risk such as total and saturated fat, sodium, refined carbohydrates and red meats, as well as lower intakes of foods associated with reduced CVD risk including fiber, fish and fruits[55]. The opposite was true for South Americans (those with the lowest CVD risk in HCHS/SOL) who reported lower intake of

nutrients that promote CVD. In fact, South Americans appear to generally follow guidelines isomorphic to those established by the AHA[56]. These results highlight the importance of good dietary habits as a determinant of cardiovascular health and the need for developing interventions targeting specific Hispanic background groups.

Periodontitis—In the US, prevalence of periodontitis has been estimated to be higher among Hispanic/Latinos when compared to Non-Hispanic Whites[57]. However, little is known about variations in periodontal health among Hispanics from diverse backgrounds. In terms of the risk for CHD, components of MetS, including obesity, high triglycerides, low high-density lipoprotein cholesterol, HTN, and high plasma glucose have been associated with periodontal disease possibly related to inflammatory and immune host responses to pathogenic microorganisms and their byproducts[58,59,60]. Similarly, in people with DM, periodontal infection is associated with greater carotid artery intima-medial wall thickness[61] and elevated risk of CHD[62].

Periodontal health was examined in HCHS/SOL and periodontitis was classified according to the Centers for Disease Control and Prevention and American Academy of Periodontology definitions as mild, moderate, and severe[57,63]. The age-adjusted prevalence of moderate and severe periodontitis was 38.5% and varied significantly across Hispanic heritage backgrounds[63]. Central Americans had the highest estimates and Dominicans the lowest. It is important to note, that Central Americans were distinguished from other groups in being least likely to have used dental services within 5 years and having the smallest proportion in the high household income category. In contrast, Dominicans had the healthiest behavioral profile with respect to nonsmoking, central adiposity and recent use of dental services, which may have offset the hazard of their relatively poor socioeconomic status.

Level of acculturation was associated with periodontitis prevalence[63]. In fact, compared to people with short duration of US residence, people with longer duration of US residence had lower prevalence of periodontitis, adjusting for all covariates, as did people with English language preference. This suggests that the effect of acculturation on pathophysiology is likely complex, and the influence of acculturation on health risks and outcomes may vary by disease.

Discussion

Although Hispanics living in the US have less education, a higher poverty rate, and worse utilization and access for health care, life expectancy for Hispanics in 2006 was greater for Hispanics than for non-Hispanic whites[3]. This snapshot in time may be misleading since substantial changes have occurred in recent decades in the US in terms of Hispanic population size, immigration patterns, demographics, lifestyle practices and cardiometabolic risk. The baseline visits to HCHS/SOL, conducted from 2008–2011, documented high prevalences of CVD risk factors among Hispanics[19] especially for cardiometabolic risk factors including DM[20], MetS[35], obesity[39], HTN[40] and SDB[51]. Metabolic syndrome occurred more often in Hispanics compared to non-Hispanic whites and/or African Americans[36,35]. In HCHS/SOL abdominal obesity (73% in men; 96% in women) was the

most common component of MetS[35]. Conversely, participants with elevated BMI had high prevalences of traditional and novel CVD risk factors including DM, HTN, low-density lipoprotein cholesterol, hypertriglyceridemia and increased inflammation as indicated by elevated C-reactive protein[39]. In summary, Hispanics in HCHS/SOL revealed a great deal of overweight and obesity and this was associated with high prevalence of cardiometabolic risk factors that are likely to unfavorably impact CVD mortality.

A major lesson learned from HCHS/SOL is that Hispanics in the US constitute a highly heterogeneous population. The prevalence of MetS[35], obesity[19], DM[20] and HTN[40] in HCHS/SOL was lowest in South Americans and appeared to be related to consumption of a nutritious diet consistent with AHA guidelines[55]. In contrast, obesity, DM, HTN and hypercholesterolemia were all highest in Puerto Ricans compared to other women in the cohort[19] and this too appeared to be related to diet[55]. The data suggest that there are large variations in cardiometabolic risk among diverse US Hispanic background groups, and that these differences are related to diet. It should also be noted that the prevalence of smoking was highest for each sex among Puerto Ricans. In addition, HCHS/SOL has found that major ECG abnormalities occurred more frequently in those from Puerto Rican and Dominican than from Mexican American backgrounds[64].Thus, there appears to be a need to focus upon changes in preventive health behaviors among specific Hispanic background groups (e.g., Puerto Ricans) in order to promote CVD health among US Hispanics.

Another important lesson learned from HCHS/SOL is the importance of health insurance and access to health care in the control of CVD risk factors such as DM[20] HTN[40] and periodontal disease[63]. These findings are particularly important because the percentage of participants insured in HCHS/SOL was only 50.9% including those receiving medicare or Medicaid benefits[19]. Although the percentage of HCHS/SOL participants who were unaware of their DM[20] was comparable to those reported for non- Hispanic whites[10], the rate of adequate glycemic control in HCHS/SOL was considerably lower than that reported for either non-Hispanic blacks or non-Hispanic whites[28]. As previously noted, however, those individuals at least 65 years old had greater rates of DM awareness, glycemic control and insurance coverage than those under age 65. In similar fashion the proportion of people who were aware, treated and controlled for HTN differed by health insurance status[40]. Interestingly, in terms of periodontal disease in HCHS/SOL, Dominicans had the least periodontal disease and used dental services most during the preceding 5 years, whereas Central Americans had the most periodontal disease and used dental services least. It is of interest that the baseline visits for HCHS/SOL were all completed before implementation of the US Patient Protection and Affordable Care Act of 2010 and the second examination visits will be conducted between October 2014 and September 2017. Consequently, the HCHS/SOL will be able to monitor changes in health care coverage and examine some of their effects upon health practices, risks and status.

In conclusion, the major challenges needed to reduce CVD risk factors and disease burden in the US Hispanic population will be to inform our lawmakers, public health officials, health care providers and the Hispanic population about the current problems with Hispanic CVD health and what needs to be done to correct them. The solutions will require improved preventive education and intervention procedures to stop smoking, maintain proper weight

and correct poor nutrition. They will also require providing better health care access to the Hispanic population.

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Abbreviations

AHA	American Heart Association
A1c	Glycosylated hemoglobin
AHI	Apnea-hypopnea index
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
CHD	Coronary Heart Disease
CVD	Cardiovascular disease
DM	Diabetes mellitus
HCHS/SOL	Hispanic Community Health Study/Study of Latinos
HHANES	Hispanic Health and Nutrition Survey
HTN	Hypertension
MetS	Metabolic Syndrome
NHANES	National Health and Nutrition Examination Survey
NHLBI	National Heart, Lung and Blood Institute
NIH	National Institutes of Health
SDB	Sleep disordered breathing
T2DM	Type 2 diabetes mellitus
US	United States

References

1. Franks P, Clancy CM, Gold MR. Health insurance and mortality. Evidence from a national cohort. JAMA. 1993; 270:737–741. [PubMed: 8336376]

2. Marmot MG, Davey Smith G, Stansfeld SA, et al. Health inequalities among British Civil Servants: The Whitehall II study. Lancet. 1991; 337:1387–1393. [PubMed: 1674771]
3. Arias E. United States life tables by Hispanic origin. Natl Vital Stat Rep. Vital Health Stat. 2010; 2:1–32.
4. Markides KS, Coreil J. The health of Hispanics in the southwestern United States: an epidemiologic paradox. Public Health Rep. 1986; 101(3):253–265. [PubMed: 3086917]
5. Rosenberg HM, Maurer JD, Sorlie PD, et al. Quality of death rates by race and Hispanic origin: a summary of current research. Vital Health Stat 2. 1999; 128:1–13. [PubMed: 10611854]
6. Sorlie PD, Backlund E, Johnson NJ, Rogot E. Mortality by Hispanic status in the United States. JAMA. 1993; 270(20):2464–2468. [PubMed: 8031341]
7. US Census Bureau Briefs. The Hispanic Population. Washington, DC: US Census Bureau; 2010.
8. Cárdenas, V.; Ajinkya, J.; Léger, DG. Progress 2050: New Ideas for A Diverse America. Washington: Center for American Progress; 2011. available at http://www.americanprogress.org/issues/2011`/10/pdf/progress_2050.pdf.
9. Cowie CC, Rust KF, Byrd-Holt DD, et al. Prevalence of diabetes and impaired fasting glucose in adults in the U.S. population: National Health and Nutrition Examination Survery 199–2002. Diabetes Care. 2006; 29(6):1263–1268. [PubMed: 16732006]
10. Cowie CC, Rust KF, Ford ES, et al. Full accounting of diabetes and pre-diabetes in the U.S. population in 1988–1994 and 2005–2006. Diabetes Care. 2009; 32(2):287–294. [PubMed: 19017771]
11. Delgado JL, Johnson CL, Roy I, Treviño FM. Hispanic Health and Nutrition Examination Survey: methodological considerations. Am J Public Health. 1990; 80(S):6–10. [PubMed: 9187575]
12. Aponte J. Diabetes risk factors in Mexican Americans with diabetes. Medsurg Nurs. 2009; 18(5): 265–271. [PubMed: 19927961]
13. 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. [PubMed: 1914812]
14. Sorlie PD, Avilés-Santa LM, Wassertheil-Smoller S, et al. Design and implementation of the Hispanic Community Health Study/Study of Latinos. Ann Epidemiol. 2010; 20(8):629–641. [PubMed: 20609343]
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; 20:642–649. [PubMed: 20609344]
16. Brown A, Lopez M. Mapping the Latino population, by state, county and city. Pew Research Center Report. 2013 http://www.pewhispanic.org/2013/08/29/mapping-the-latino-population-by-state-county-and-city/.
17. Sarwar N, Gao P, et al. Emerging Risk Factors Collaboration. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta–analysis of 102 prospective studies. Lancet. 2010; 375:2215. [PubMed: 20609967]
18. Geiss, LS.; Herman, WH.; Smith, PJ. National Diabetes Data Group. Diabetes in America. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 1995. p. 233-257.
19. Daviglus ML, Talavera GA, Avilés-Santa ML, et al. Prevalence of major cardiovascular risk factors and cardiovascular diseases among Hispanic/Latino individuals of diverse backgrounds in the United States. JAMA. 2012; 308(17):1775–1784. [PubMed: 23117778]
20. Schneiderman N, Llabre M, Cowie CC, et al. Prevalence of Diabetes among Hispanics/Latinos from Diverse Backgrounds: the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). Diabetes Care. 2014; 37(8):2233–2239. [PubMed: 25061138]
21. Centers for Disease Control and Prevention. National Diabetes Fact Sheet: National Estimates and General Information on Diabetes and Prediabetes in the United States. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2011.
22. Oza-Frank R, Stephenson R, Narayan KM. Diabetes prevalence by length of residence among US immigrants. J Immigr Minor Health. 2011; 13(1):1–8. [PubMed: 19688263]

23. Singh GK, Siahpush M. All-cause and cause-specific mortality of immigrants and native born in the United States. Am J Public Health. 2001; 91(3):392–399. [PubMed: 11236403]
24. Venters H, Gany F. African immigrant health. J Immigr Minor Health. 2011; 13:333–344. [PubMed: 19347581]
25. Hamilton TG, Hummer RA. Immigration and the health of U.S. black adults: Does country of origin matter? Soc Sci Med. 2011; 73:1551–1560. [PubMed: 21982630]
26. O'Connor MY, Thoreson CK, Ricks M, et al. Worse Cardiometabolic Health in African Immigrant Men than African American Men: Reconsideration of the Health Immigrant Effect. Metab Syndr Relat Disord. 2014 May 9.
27. Agardh E, Allebeck P, Hallqvist J, et al. Type 2 diabetes incidence and socio-economic position: a systematic review and meta-analysis. Int J Epidemiol. 2011; 40(3):804–818. [PubMed: 21335614]
28. Stark CS, Fradkin JE, Saydah SH, et al. The prevalence of meeting A1C, blood pressure, and LDL goals among people with diabetes, 1988–2010. Diabetes Care. 2013; 36:2271–2279. [PubMed: 23418368]
29. Moonesinghe R, Zhu J, Truman BI, et al. Health insurance coverage – United States, 2004 and 2008. MMWR Surveill Summ. 2011; 60(S):35–37. [PubMed: 21430617]
30. Kirk JK, Passmore LV, Bell RA, et al. Disparities in A1c levels between Hispanic and non-Hispanic white adults with diabetes: a meta-analysis. Diabetes Care. 2008; 31(2):240–246. [PubMed: 17977939]
31. Stratton IM, Adler AI, Neil HA, et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. BMJ. 2000; 321:405–412. [PubMed: 10938048]
32. Lorenzo C, Okoloise M, Williams K, et al. The metabolic syndrome as predictor of type 2 diabetes: the San Antonio heart study. Diabetes Care. 2003; 26(11):3153–3159. [PubMed: 14578254]
33. Isomaa B, Almgren P, Tuomi T, et al. Cardiovascular morbidity and mortality associated with the metabolic syndrome. Diabetes Care. 2001; 24(4):683–689. [PubMed: 11315831]
34. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. JAMA. 2002; 287(3):356–359. [PubMed: 11790215]
35. Heiss G, Snyder ML, Teng Y, et al. Prevalence of Metabolic Syndrome among Hispanics/Latinos of Diverse Background: The Hispanic Community Health Study/Study of Latinos. Diabetes Care. 2014; 37(8):2391–2399. [PubMed: 25061141]
36. Ervin RB. Prevalence of metabolic syndrome among adults 20 years of age and over, by sex, age, race and ethnicity, and body mass index: United States, 2003–2006. Natl Health Stat Report. 2009; (13):1–7. [PubMed: 19634296]
37. Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999–2008. JAMA. 2010; 303(3):235–241. [PubMed: 20071471]
38. Pan L, Galuska D, Sherry B, et al. Differences in prevalence of obesity among black, white, and Hispanic adults-United States, 2006–2008. Morbidity and Mortality Weekly Report. 2009; 58(27): 740–744. [PubMed: 19609247]
39. Kaplan RC, Avilés-Santa ML, Parrinello CM, et al. Body mass index, sex and cardiovascular disease risk factors among Hispanic/Latino adults: Hispanic Community Health Study/Study of Latinos. JAHA. 2014; 3(4) XX-XX.
40. Sorlie PD, Allison MA, Aviles-Santa ML, et al. Prevalence of hypertension, awareness, treatment, and control in the Hispanic community health study/study of Latinos. Am J Hypertens. 2014; 27(6):793–800. [PubMed: 24627442]
41. Yoon SS, Burt V, Louis T, et al. Hypertension among adults in the United States, 2009–2010. NCHS data brief. 2012; (107):1–8. [PubMed: 23102115]
42. Fang J, Yang Q, Ayala C, et al. Disparities in Access to Care Among US Adults With Self-Reported Hypertension. Am J Hypertens. 2014
43. Punjabi NM. The epidemiology of adult obstructive sleep apnea. Proc Am Thorac Soc. 2008; 5(2): 136–143. [Research Support, N.I.H., Extramural Review]. [PubMed: 18250205]

44. Young T, Peppard PE, Gottlieb DJ. Epidemiology of obstructive sleep apnea: a population health perspective. Am J Respir Crit Care Med. 2002; 165(9):1217–1239. [Research Support, U.S. Gov't, P.H.S. Review]. [PubMed: 11991871]
45. Butt M, Dwivedi G, Khair O, et al. Obstructive sleep apnea and cardiovascular disease. Int J Cardiol. 2010; 139(1):7–16. [PubMed: 19505734]
46. Marin JM, Agusti A, Villar I, et al. Association between treated and untreated obstructive sleep apnea and risk of hypertension. JAMA. 2012; 307(20):2169–2176. [PubMed: 22618924]
47. Bradley TD, Floras JS. Obstructive sleep apnea and its cardiovascular consequences. Lancet. 2009; 373(9657):82–93. [Research Support, Non-U.S. Gov't Review]. [PubMed: 19101028]
48. Kasai T, Bradley TD. Obstructive sleep apnea and heart failure: pathophysiologic and therapeutic implications. J Am Coll Cardiol. 2011; 57(2):119–127. [Research Support, Non-U.S. Gov't Review]. [PubMed: 21211682]
49. Ozeke O, Ertan C, Demir AD. Sleep apnea, heart failure, and sleep position. Sleep Breath. 2011
50. Redline S, Yenokyan G, Gottlieb DJ, et al. Obstructive sleep apnea-hypopnea and incident stroke: the sleep heart health study. Am J Respir Crit Care Med. 2010; 182(2):269–277. [Research Support, N.I.H., Extramural]. [PubMed: 20339144]
51. Redline S, Sotres-Alvarez D, Loredo J, et al. Sleep-disordered breathing in Hispanic/Latino individuals of diverse backgrounds. The Hispanic Community Health Study/Study of Latinos. Am J Respir Crit Care Med. 2014; 189(3):335–344. [PubMed: 24392863]
52. Kendzerska T, Mollayeva T, Gershon AS, et al. Untreated obstructive sleep apnea and the risk for serious long-term adverse outcomes: a systematic review. Sleep Med Rev. 2014; 18(1):49–59. [PubMed: 23642349]
53. Kaplan RC, Bangdiwala SI, Barnhart JM, et al. Smoking among U.S. Hispanic/Latino adults: the Hispanic community health study/study of Latinos. Am J Prev Med. 2014; 46(5):496–506. [PubMed: 24745640]
54. Centers for Disease Control and Prevention. Vital signs: current cigarette smoking among adults aged≥ 18 years--United States, 2005–2010. MMWR. Morbidity and mortality weekly report. 2011; 60(35):1207. [PubMed: 21900875]
55. Siega-Riz AM, Sotres-Alvarez D, Ayala GX, et al. Food-group and nutrient-density intakes by Hispanic and Latino backgrounds in the Hispanic Community Health Study/Study of Latinos. Am J Clin Nutr. 2014; 99(6):1487–1498. [PubMed: 24760972]
56. Bermudez OI, Falcon LM, Tucker KL. Intake and food sources of macronutrients among older Hispanic adults: association with ethnicity, acculturation, and length of residence in the United States. J Am Diet Assoc. 2000; 100(6):665–673. [PubMed: 10863569]
57. Eke PI, Dye BA, Wei L, et al. Prevalence of periodontitis in adults in the United States, 2009 and 2010. J Dent Res. 2012; 91(10):914–920. [PubMed: 22935673]
58. Pischon N, Heng N, Bernimoulin JP, et al. Obesity, inflammation, and periodontal disease. J Dent Res. 2007; 86(5):400–409. [PubMed: 17452558]
59. D'Aiuto F, Sabbah W, Netuveli G, et al. Association of the metabolic syndrome with severe periodontitis in a large US population-based survey. J Clin Endocrinol Metab. 2008; 93(10):3989–3994. [PubMed: 18682518]
60. Marchetti E, Monaco A, Procaccini L, et al. Periodontal disease: the influence of metabolic syndrome. Nutr Metab (Lond). 2012; 9(1):88. [PubMed: 23009606]
61. Chavarry NG, Vettore MV, Sansone C, et al. The relationship between diabetes mellitus and destructive periodontal disease: a meta-analysis. Oral Health Prev Dent. 2009; 7(2):107–127. [PubMed: 19583037]
62. Southerland JH, Moss K, Taylor GW, et al. Periodontitis and diabetes associations with measures of atherosclerosis and CHD. Atherosclerosis. 2012; 222(1):196–201. [PubMed: 22440543]
63. Sanders AE, Campbell SM, Mauriello SM, et al. Heterogeneity in periodontitis prevalence in the Hispanic Community Health Study/Study of Latinos. Ann Epidemiol. 2014; 24(6):455–462. [PubMed: 24731697]
64. Denes P, Garside DB, Lloyd-Jones D, et al. Major and minor electrocardiographic abnormalities and their association with underlying cardiovascular disease and risk factors in Hispanic/Latinos

(from the Hispanic Community Health Study/Study of Latinos). Am J Cardiol. 2013; 112(10): 1667–1675. [PubMed: 24055066]

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Table 1

Prevalence of Diabetes by Sex, Hispanic/Latino Background, Age and Body Mass Index

		Prevalence (95% Confidence Interval: CI)				
	Sample Size	Men and Women[a,b]	Sample Size	Women[a,b]	Sample Size	Men[a,b]
Overall/Sex	16385	16.9 (16.11, 17.69)	9820	17.1 (16.16, 18.19)	6565	16.5 (15.41, 17.71)
Hispanic Background						
Dominican	1470	18.1 (16.21, 20.13)	961	18.2 (15.60, 21.08)	509	18.0 (14.83, 21.71)
Central American	1730	17.7 (15.36, 20.22)	1047	18.5 (15.59, 21.82)	683	16.9 (13.75, 20.57)
Cuban	2347	13.4 (12.03, 14.91)	1249	13.5 (11.64, 15.55)	1098	13.2 (11.45, 15.14)
Mexican	6466	18.3 (16.84, 19.86)	4018	17.9 (16.18, 19.74)	2448	18.7 (16.32, 21.33)
Puerto Rican	2719	18.1 (16.30, 19.98)	1586	19.5 (16.98, 22.23)	1133	16.6 (14.31, 19.27)
South American	1070	10.2 (8.36, 12.29)	634	9.8 (7.73, 12.36)	436	10.6 (7.85, 14.09)
Mixed/Other	502		276		226	
Missing	81		49		32	
Age Group (yrs)						
18–29	2675	2.6 (1.93, 3.36)	1427	2.9 (1.98, 4.11)	1248	2.2 (1.49, 3.38)
30–39	2389	6.7 (5.49, 8.15)	1384	6.4 (4.94, 8.31)	1005	7.0 (5.23, 9.28)
40–49	4204	14.1 (12.64, 15.69)	2573	14.5 (12.68, 16.59)	1631	13.6 (11.50, 16.07)
50–59	4330	25.0 (23.06, 27.09)	2727	26.2 (23.47, 29.08)	1603	23.6 (21.03, 26.32)
60–69	2287	38.7 (35.64, 41.79)	1396	37.3 (33.44, 41.28)	891	40.3 (36.00, 44.73)
70–74	500	48.6 (41.57, 55.64)	313	51.3 (42.17, 60.36)	187	44.3 (34.67, 54.34)
BMI (kg/m^2)						

	Prevalence (95% Confidence Interval: CI)					
	Sample Size	Men and Women[a,b]	Sample Size	Women[a,b]	Sample Size	Men[a,b]
<25	3317	9.8 (8.56, 11.24)	1942	9.5 (7.90, 11.42)	1375	10.2 (8.33, 12.52)
≥25 <30	6108	14.2 (13.10, 15.35)	3375	13.5 (11.98, 15.12)	2733	15.0 (13.39, 16.67)
≥30	6897	22.4 (21.08, 23.69)	4470	23.1 (21.39, 24.89)	2427	21.4 (19.49, 23.41)
Missing	63	31.3 (20.36, 44.88)	33	31.9 (18.27, 49.49)	30	33.6 (21.79, 47.83)

[a] Diabetes based on FPG, 2-h OGTT, A1c, or scanned medications

[b] Values except sample size are weighted for study design and nonresponse and age standardized to Census 2010 US population

Table 2

Age-standardized* Prevalence (95% Confidence Interval) of the Metabolic Syndrome by Hispanic/Latino Background and Sex, 2008–2011.

	All participants (N= 16,319)	Men (N=6,530)	Women (N=9,789)
Overall (N of Observations)	35.0 (34.0, 36.1)	33.7 (32.2, 35.2)	36.0 (34.6, 37.4)
Hispanic/Latino background			
Dominican (1,457)	31.5 (29.0, 34.0)	30.6 (26.3, 35.2)	32.2 (28.9, 35.8)
Central American (1,725)	35.8 (33.0, 38.7)	32.6 (28.5, 36.9)	37.7 (34.7, 40.8)
Cuban (2,343)	34.8 (32.6, 37.0)	34.7 (31.9, 37.6)	34.9 (32.0, 37.9)
Mexican (6,451)	35.0 (33.2, 36.9)	33.7 (31.3, 36.2)	36.0 (33.5, 38.6)
Puerto Rican (2,702)	37.1 (34.4, 39.9)	32.6 (28.7, 36.8)	40.9 (37.4, 44.6)***
South American (1,063)	27.3 (24.2, 30.7)*	27.0 (22.3, 32.4)	26.8 (23.1, 30.9)**
Age Groups (years)			
18–29 (2,644)	12.7 (11.1, 14.4)	12.9 (10.8, 15.3)	12.4 (10.3, 14.9)
30–39 (2,375)	24.7 (22.5, 27.1)	27.1 (23.6, 30.9)	22.4 (19.5, 25.7)
40–49 (4,194)	36.7 (34.5, 39.0)	36.1 (32.9, 39.4)	37.3 (34.5, 40.1)
50–59 (4,323)	48.6 (45.9, 51.4)	44.8 (41.3, 48.4)	51.6 (48.2, 55.1)
60–69 (2,283)	56.8 (53.8, 59.8)	52.3 (47.7, 56.9)	60.6 (56.3, 64.7)
70–74 (500)	66.6 (60.3, 72.3)	58.0 (49.6, 65.9)	72.0 (63.5, 79.3)

*Values weighted for survey design and nonresponse and age standardized to the Census 2010 U.S. population.

Statistically significant differences ($p<0.05$) were seen between Hispanic/Latino backgrounds overall*,

among women**,

and between sex***