Self-Reported Hypertension and Race Among Hispanics in the National Health Interview Survey

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Objectives: To investigate the association between race and hypertension among Hispanics and non-Hispanics by using data from the National Health Interview Survey (NHIS), an annual survey of US households and to compare the strength of these associations among Hispanics and non-Hispanics.

Design and Methods: Analyses were limited to Hispanics and non-Hispanics 18 years of age and older who self-identified as White or Black/African-American during the 2000–2002 NHIS for a final sample of 88,453 adults including 12,083 Hispanics. Hypertension was self-reported during the survey interview. Covariates included in the analyses as potential confounders were sociodemographic characteristics and risk factors for hypertension.

Results: Hispanic Blacks had higher prevalence of self-reported hypertension than Hispanic Whites. Hispanic Blacks had higher odds of hypertension than non-Hispanic and Hispanic Whites. However, these associations did not achieve significance level. No difference was seen on the strength of the association between race and hypertension among Hispanics and non-Hispanics (OR 1.31 vs 1.52, *P* interaction for race and ethnicity .91). The protective effect for hypertension on Hispanics had been disappearing over time (*P* interaction race/ethnicity and survey year .002).

Conclusions: This study underscores that racial categorization could be a significant predictor of health status for Hispanics in our society. As time goes by, we are curious to see how embedding in US racial categories and assimilation into Western culture influence the life and health of Hispanics. (*Ethn Dis*. 2006;16:71–77)

Key Words: Ethnicity, Hispanics, Non-Hispanics, Race, Self-Reported Hypertension

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INTRODUCTION

Disparities in health status among the US population have been documented for years;[1–6] the most common health status comparison is between Blacks and Whites. Since the late 1970's, the recognition of Hispanics as an ethnic group in the United States has motivated changes in data collection by including information on Hispanics' health status.[7,8] The US Census has grouped together all Spanish-speaking people (ie, Mexicans, Puerto Ricans, Cubans, Central and South Americans, etc) into a single category—Hispanics—under the assumption of common values, cultural norms, and behaviors.[9–11] Hispanics, the fastest-growing group in the US population,[12] represent a heterogeneous group, and they can be of any race (ie, White, Black, etc).[13] However, evidence suggests that Hispanics do not identify well with the existing Year 2000 US Census racial categories, and a large proportion self-identified as "other" (42.2%).[14–18] Although the issue of racial identity among Hispanics has been addressed in the social sciences,[14,19–23] few studies have investigated the effect of skin color among men on heart disease in Puerto Rico.[24,25] However, to the best of our knowledge, no studies have investigated the effect of race on health among Hispanics in the United States.

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Although Hispanics' hypertension profiles are similar to or better than those of non-Hispanic Whites, variation exists in the prevalence of hypertension among Hispanic subgroups.

Despite being the youngest group of the American population, Hispanics are affected by chronic diseases such as hypertension. Hypertension is a public health problem in the United States, and more than half of the population is expected to be affected by the age of 60 years. Although Hispanics' hypertension profiles are similar to or better than those of non-Hispanic Whites, variation exists in the prevalence of hypertension among Hispanic subgroups.[26,27] However, because of small sample sizes, health statistics for Hispanics tend to be presented for Hispanics as a whole or for Mexican Americans only. These estimates, although useful, ignore the variation associated with Hispanics' racial identity. For example, Puerto Ricans, one of the Hispanic subgroups more likely to self-identify as Black and be exposed to US culture the longest, have the worst health profiles among Hispanics.[3,16,17,28] Because the prevalence of hypertension is lower among Hispanics than non-Hispanic Whites and Blacks, we can investigate whether the observed lower prevalence among Hispanics could be associated with their racial identity.

The National Health Interview Survey (NHIS) affords the opportunity to investigate the effect of race among Hispanics on self-reported hypertension after adjusting for selected individual characteristics and known risk factors. Specifically, the aim of this study was two-fold: first, to investigate the association between race and hypertension among Hispanics and non-Hispanics; and second, to compare the strength of these associations among Hispanics and non-Hispanics. If identification with US racial categories penalizes Hispanics with exposures detrimental to health, Hispanic Blacks would have higher odds of hypertension than Hispanic and non-Hispanic Whites and similar odds of having hypertension to non-Hispanic Blacks. However, the magnitude of the association between race and hypertension would be weaker among Hispanics than among non-Hispanics.

MATERIALS AND METHODS

The NHIS is an annual, face-to-face interview of a household sample of US noninstitutionalized civilians, that uses a three-stage stratified cluster probability sampling design. A complete description of the plan and operation for the NHIS has been published elsewhere.[29–31] Briefly, the NHIS comprises a core set of questions (or questions that are repeated every year) and supplemental questions/modules. The survey oversamples Black and Hispanic persons to obtain reliable estimates for these groups. The interview sample for NHIS consisted of persons of all ages (85 years of age was adjudicated to persons >85 years) in families within households for a sample of 100,618, 100,760, and 93,386 in years 2000, 2001, and 2002, respectively. Data for these analyses were abstracted from the Person and Sample Adult files and included the records of adults ≥18 years of age, which yielded samples of 32,374, 33,326, and 31,044 for years 2000, 2001, and 2002, respectively, for a total of 96,744. These samples included 17% of Hispanic respondents in each year. These analyses were limited to Hispanics and non-Hispanics who identify themselves as White or Black/African-American for a final sample of 88,453 adults, including 12,083 Hispanics.

The outcome for this study was self-reported hypertension. Hypertension was collected with the question "Have you ever been told by a doctor or other health professional that you had hypertension, also called high blood pressure?" The main independent variable was race/ethnicity. Race was determined from two questions: "What race do you consider yourself to be?" and "Which one of these groups, would you say BEST represents yourself?" The choices were White, Black/African American, American Indian and Alaska Native, Native Hawaiian and Pacific Islander, and other. The first question was asked to all survey participants, while the second was asked to those who answered more than one race to the first question. Ethnicity was established from the question: "Do you consider yourself Hispanic/Latino?" The question for ethnicity was asked before the question for race. For these analyses, race/ethnicity was defined as Hispanic Blacks, Hispanic Whites, non-Hispanic Whites, and non-Hispanic Blacks.

Variables considered to be risk factors or potential confounders in studies of hypertension[32] and other relevant variables were included in these analyses. These variables included demographic characteristics (age, gender, marital status, US region of residence, place of birth and length of stay in the United States); access to care and socioeconomic position (health insurance, education, income and occupation); and selected risk factors (diabetes, BMI, physical activity, smoking and alcohol consumption). Due to the large number of missing values for income, the multiple imputations income files were used for these analyses.[33]

Statistical Analysis

Descriptive statistics for the characteristics of the population and prevalence of hypertension were calculated by race in each ethnic group. To determine significant differences, chi-square (categorical variables) and *t* tests (continuous variables) were used.

Logistic regression was used to estimate the strength of the association between race/ethnicity and self-reported hypertension among US adults (Hispanic Blacks, Hispanic Whites, non-Hispanic Blacks vs non-Hispanic Whites) before and after adjusting for selected covariates. These analyses were repeated for Hispanics and non-Hispanics (Blacks versus Whites) and for Whites and Blacks (Hispanics versus non-Hispanics). To test whether the strength of the association between race and the prevalence of hypertension differed between Hispanics and non-Hispanics, an interaction between race and ethnicity was tested. In addition, interactions between race/ethnicity and gender, income, education, and health insurance also were tested. Although three-year estimates were presented to improve reliability, an interaction term was tested between survey year and race/ethnicity to determine any change in the strength of the association between groups over time. Interaction terms between race and place of birth and length of stay in the United States were tested among Hispanics. The number of records available for the multivariable logistic regression varied according to the covariates included in the model.

Data management procedures were carried out with SAS,[34] and statistical analyses were conducted with SUDAAN.[35] SUDAAN takes into account the complex sampling design and yields unbiased standard error estimates. In the tables, the sample sizes were unweighted. However, estimates for means, proportions, standard errors,

Table 1. Distribution of selected characteristics[*] for Hispanic and non-Hispanic adults ≥18 years of age according to race: National Health Interview Survey (NHIS) 2000–2002

	Hispanic			Non-Hispanic			
Characteristics	Black (*n*=230)	White[†] (*n*=11,853)	Total (*n*=12,083)	Black (*n*=13,130)	White[†] (*n*=63,220)	Total[‡] (*n*=76,370)	Total (*N*=88,453)
Sociodemographic							
Age (y)	36.9 (0.97)	40.2 (0.26)	39.6 (0.23)	42.1 (0.25)	46.6 (0.12)	45.7 (0.11)	45.5 (0.11)
Male	42.8 (4.01)	49.5 (0.69)	49.4 (0.68)	44.5 (0.52)	48.1 (0.23)	47.6 (0.21)	47.7 (0.20)
Region							
Northeast	48.5 (5.13)	11.8 (0.63)	12.6 (0.64)	16.9 (0.55)	20.3 (0.34)	19.9 (.30)	19.2 (0.29)
Midwest	11.6 (2.32)	6.5 (0.57)	6.6 (0.56)	18.8 (0.74)	28.7 (0.43)	27.4 (0.40)	25.6 (0.37)
South	30.5 (5.36)	37.3 (1.31)	37.1 (1.29)	57.5 (1.07)	34.5 (0.45)	37.5 (0.42)	37.5 (0.40)
West	9.4 (2.13)	44.4 (1.22)	43.7 (1.20)	6.8 (0.35)	16.5 (0.34)	15.2 (0.31)	17.7 (0.31)
Marital status							
Married	48.1 (3.79)	65.8 (0.52)	65.5 (0.51)	44.5 (0.58)	66.7 (0.30)	63.8 (0.29)	63.9 (0.27)
Divorced	14.0 (0.33)	9.2 (0.26)	9.3 (0.26)	15.6 (0.36)	9.8 (0.13)	10.6 (0.13)	10.5 (0.12)
Widow	2.5 (1.18)	4.1 (0.24)	4.0 (0.24)	7.1 (0.26)	7.2 (0.11)	7.1 (0.10)	6.8 (0.10)
Single	35.4 (3.67)	20.9 (0.49)	21.2 (0.49)	32.7 (0.62)	16.4 (0.28)	18.5 (0.27)	18.8 (0.25)
Socioeconomic position and access to care							
Education							
Less than high school	29.6 (4.17)	48.4 (0.81)	48.0 (0.81)	26.2 (0.68)	15.4 (0.26)	16.9 (0.24)	19.9 (0.24)
High school/GED	29.3 (5.21)	26.0 (0.52)	26.1 (0.52)	35.0 (0.61)	37.8 (0.31)	37.4 (0.28)	36.3 (0.26)
Some college	25.8 (4.03)	16.1 (0.48)	16.3 (0.48)	24.3 (0.67)	24.5 (0.28)	24.5 (0.26)	23.7 (0.24)
Complete college or higher	15.3 (4.46)	9.5 (0.41)	9.6 (0.41)	14.5 (0.49)	22.3 (0.28)	21.2 (0.25)	20.1 (0.24)
Income							
<$20,000	41.2 (4.61)	53.8 (0.83)	53.5 (0.83)	44.7 (0.77)	35.5 (0.35)	36.7 (0.32)	38.2 (0.31)
$20,000–$44,999	46.2 (4.32)	34.2 (0.69)	34.5 (0.69)	39.9 (0.62)	37.3 (0.28)	37.6 (0.26)	37.4 (0.25)
≥$45,000	12.6 (4.51)	12.0 (0.52)	12.0 (0.52)	15.4 (0.65)	27.2 (0.33)	25.6 (0.30)	24.4 (0.28)
Health insurance							
Private	55.5 (4.78)	45.6 (0.66)	45.8 (0.66)	56.5 (0.65)	67.3 (0.29)	65.8 (0.27)	64.1 (0.26)
Public	16.8 (2.99)	17.2 (0.49)	17.2 (0.48)	23.4 (0.48)	21.8 (0.26)	22.0 (0.24)	21.6 (0.23)
None	27.7 (3.93)	37.2 (0.77)	37.0 (0.76)	20.1 (0.48)	10.9 (0.18)	12.2 (0.16)	14.3 (0.18)
Risk factors							
Diabetes (yes)	8.7 (3.13)	7.6 (0.30)	7.6 (031)	9.7 (0.31)	6.7 (0.12)	7.1 (0.11)	7.1 (0.11)
BMI, kg/m^2	27.9 (0.46)	27.2 (0.07)	27.3 (0.06)	28.4 (0.08)	26.5 (0.03)	26.7 (0.03)	26.8 (0.03)
Smoking status							
Current	18.0 (3.54)	17.3 (0.46)	17.3 (0.47)	22.6 (0.43)	23.9 (0.27)	23.7 (0.24)	23.2 (0.23)
Former	12.0 (3.35)	14.6 (0.43)	14.6 (0.43)	14.6 (0.35)	25.2 (0.21)	23.8 (0.20)	23.0 (0.19)
Never	70.0 (4.10)	68.1 (0.63)	68.1 (0.63)	62.8 (0.53)	50.9 (0.27)	52.5 (0.26)	53.8 (0.24

[*] Percentage and standard errors with the exception of age (mean and standard error).

[†] All *P* values for chi-square and *t* tests for comparing Blacks and Whites within ethnic groups were <.01 with the exception of health insurance, diabetes, BMI, and smoking status among Hispanics (*P* values >.05).

[‡] All *P* values for Hispanic and non-Hispanic comparisons were <.01.

GED=general equivalency diploma; BMI=body mass index.

and ORs with their 95% confidence intervals (CI) were weighted.

RESULTS

Characteristics of the study population are presented in Table 1. Compared to non-Hispanics, Hispanics were younger, more likely to have a higher proportion of males in their population, live in the West, be married, be less educated, have lower income, be un-

insured, be more likely to report having diabetes and never smoke. Hispanics were also more likely to be foreign-born, hold lower-rank occupations, and be less physically active and less likely to drink than non-Hispanic Whites (data not shown). When compared to Hispanic Whites, Hispanic Blacks were younger, more likely to live in the Northeast, be more educated, have higher income and more likely to report having diabetes. In addition, Hispanic Blacks were more likely to hold higher-

rank occupation and be less physically active than Hispanic Whites (data not shown). In general, non-Hispanic Blacks had worse sociodemographic and risk factor profiles than their White counterparts.

Table 2 shows the prevalence of self-reported hypertension for selected covariates for Hispanics and non-Hispanics by race. The overall prevalence for self-reported hypertension was 24.0 (data not shown); Hispanics had lower prevalence than non-Hispanics (16.8% vs

Table 2. Prevalence of hypertension for selected covariates among Hispanic and non-Hispanic adults ≥18 years of age by race: NHIS 2000–2002

| | Hypertension | | | | | |
| | Hispanic | | | Non-Hispanic | | |
Characteristics	Black	White*	Total	Black	White*	Total†
Overall	18.3 (3.23)	16.8 (0.43)	16.8 (0.43)	29.9 (0.52)	23.9 (0.20)	24.7 (0.19)
Sociodemographics						
Age (y)						
18–45	10.0 (2.77)	7.2 (0.33)	7.3 (0.33)	14.9 (0.45)	9.5 (0.20)	10.4 (0.19)
46–85	44.0 (9.81)	36.7 (1.01)	36.8 (1.01)	54.7 (0.93)	39.2 (0.29)	40.8 (0.28)
Gender						
Male	27.1 (7.05)	14.8 (0.59)	14.9 (0.59)	26.8 (0.76)	23.6 (0.28)	24.0 (0.27)
Female	11.8 (2.70)	18.8 (0.66)	18.6 (0.65)	32.3 (0.57)	24.1 (0.27)	25.2 (0.25)
Region						
Northeast	17.5 (3.86)	16.9 (1.16)	16.9 (1.14)	25.1 (1.32)	23.0 (0.37)	23.2 (0.36)
Midwest	7.8 (6.13)	16.9 (1.87)	16.6 (1.78)	30.5 (1.09)	22.9 (0.36)	23.6 (0.34)
South	22.0 (6.8)	17.7 (0.75)	17.7 (0.76)	31.0 (0.69)	25.5 (0.38)	26.6 (0.35)
West	22.7 (11.6)	16.0 (0.61)	16.0 (0.62)	30.3 (1.41)	23.3 (0.51)	23.6 (0.48)
Marital status						
Married	21.4 (6.84)	17.3 (0.55)	17.4 (0.56)	30.5 (0.78)	23.9 (0.25)	24.6 (0.24)
Divorced	22.6 (6.95)	22.1 (1.25)	49.5 (2.67)	39.0 (1.01)	26.7 (0.51)	54.2 (0.59)
Widow	5.5 (5.77)	50.1 (2.66)	22.1 (1.3)	66.6 (1.62)	52.3 (0.63)	29.1 (0.45)
Single	12.7 (4.71)	6.4 (0.54)	6.6 (0.56)	16.8 (0.66)	9.8 (0.31)	11.4 (0.30)
Socioeconomic position and access to care						
Education						
Less than high school	11.9 (3.79)	19.0 (0.69)	18.9 (0.69)	42.0 (1.14)	35.6 (0.60)	37.0 (0.55)
High school/GED	21.9 (6.45)	16.0 (0.94)	16.1 (0.94)	28.3 (0.84)	26.8 (0.35)	27.0 (0.33)
Some college	13.4 (5.78)	12.8 (0.94)	12.8 (0.94)	23.0 (0.90)	21.1 (0.43)	21.3 (0.39)
Complete college or higher	39.2 (16.7)	16.1 (1.36)	16.9 (1.47)	28.2 (1.27)	20.0 (0.40)	20.8 (0.38)
Income						
<$20,000	16.8 (5.66)	10.7 (0.53)	10.8 (0.53)	22.2 (0.74)	16.1 (0.39)	17.1 (0.35)
$20,000–$44,999	10.0 (3.86)	12.3 (0.83)	12.3 (0.83)	22.5 (0.85)	16.8 (0.36)	17.6 (0.32)
≥$45,000	49.2 (21.2)	17.1 (1.57)	17.8 (1.67)	25.3 (1.32)	17.7 (0.40)	18.3 (0.39)
Health insurance						
Private	16.4 (4.98)	14.4 (0.65)	14.4 (0.64)	24.5 (0.56)	17.4 (0.22)	18.2 (0.21)
Public	34.0 (7.31)	39.0 (1.38)	38.9 (1.36)	52.2 (1.13)	49.0 (0.43)	49.4 (0.41)
None	12.9 (5.51)	9.5 (0.49)	9.5 (0.49)	19.7 (0.91)	14.2 (0.49)	15.4 (0.44)
Risk factors						
Diabetes						
Yes	72.4 (14.75)	53.2 (2.02)	53.7 (2.03)	69.5 (1.50)	60.9 (0.84)	62.5 (0.78)
No	13.1 (2.48)	13.8 (0.40)	13.7 (0.40)	25.6 (0.49)	21.2 (0.19)	21.8 (0.18)
BMI (kg/mt²)						
<18.5	0	8.7 (2.58)	8.6 (2.54)	16.8 (2.61)	13.1 (1.00)	13.4 (0.96)
18.5–24.99	5.6 (3.20)	10.4 (0.59)	10.3 (0.58)	18.2 (073)	15.1 (0.25)	15.4 (0.24)
≥25.0	25.6 (5.40)	20.7 (0.58)	20.8 (0.59)	35.6 (0.66)	30.6 (0.29)	31.4 (0.26)
Smoking status						
Current	19.2 (7.14)	13.5 (0.85)	13.6 (0.87)	29.3 (1.01)	19.0 (0.35)	20.3 (0.33)
Former	38.3 (17.8)	28.6 (1.38)	28.7 (1.40)	48.3 (1.44)	32.9 (0.43)	34.2 (0.42)
Never	13.9 (3.08)	15.2 (0.54)	15.2 (0.53)	25.9 (0.59)	21.8 (0.26)	22.4 (0.24)

* All *P* values for chi-square tests for comparing Blacks and Whites within ethnic groups were <.01, with the exception of region among Hispanics and income among non-Hispanics (both *P* values >.05).

† All *P* values for Hispanic and non-Hispanic comparisons were <.01.

BMI=body mass index.

24.7%, *P*<.01). Overall, Blacks, regardless of their ethnicity, exhibited the highest prevalence of hypertension. However, non-Hispanic Blacks had higher prevalence than their Hispanic counterparts. Highly educated and high-income Hispanic Blacks exhibited a significantly higher prevalence of hypertension than their less educated and low-income White counterparts. The opposite was true for non-Hispanics: less-educated Blacks had a higher prevalence of hypertension than Whites, regardless of their education.

Table 3 shows the crude and adjusted ORs for hypertension and race/ethnicity. When compared to non-Hispanic Whites, non-Hispanic

Table 3. Crude and adjusted odds ratios (OR)[*] and 95% confidence intervals for hypertension by race/ethnicity among adults ≥18 years of age: NHIS 2000–2002

Race/ethnicity	Hypertension			
	Crude	Model 1	Model 2	Model 3
Non-Hispanic White	1.00	1.00	1.00	1.00
Non-Hispanic Black	1.36	1.92	1.56	1.53
	(1.29–1.43)	(1.82–2.03)	(1.46–1.66)	(1.40–1.68)
Hispanic White	0.64	1.04	0.85	0.81
	(0.60–0.68)	(0.96–1.13)	(0.78–0.93)	(0.71–0.93)
Hispanic Black	0.71	1.54	1.13	1.29
	(0.46–1.09)	(0.99–2.38)	(0.69–1.86)	(0.68–2.47)

* Crude association between race/ethnicity and self-reported hypertension (crude); ORs adjusted for age, gender, marital status, survey year, US region, place of birth and length in the US (model 1); additionally adjusted for health insurance, diabetes, BMI, physical activity, smoking, and alcohol consumption (model 2); and adjusted for all covariates as in model 2 plus education, income, and occupation (model 3).
BMI=body mass index.

Blacks were more likely to have hypertension and Hispanic Whites were less likely to have hypertension before and after adjustment for selected covariates. However, there was no difference between Hispanic Blacks and non-Hispanic Whites. Men, regardless of their race/ethnicity, showed decreased odds of having hypertension when compared to women (*P* interaction .01, data not shown). No interaction was seen between race/ethnicity and income, education, or health insurance. However, an interaction was detected between survey year and race/ethnicity (*P*=.002): when compared to non-Hispanic Whites, the odds of having hypertension decreased for non-Hispanic Blacks, but the protective effect on Hispanics has been disappearing over time. No difference was seen on the effect of race on hypertension among Hispanics and non-Hispanics (OR 1.31, 95% CI 0.69–2.50 vs OR 1.52, 95% CI 1.39–1.66, *P* interaction for race and ethnicity .91; data not shown).

No difference was seen in the odds of having hypertension between Hispanic Blacks and Whites; nor was a difference seen between Hispanic and non-Hispanic Blacks. However, hypertension was associated with ethnicity among Whites (odds for Hispanic Whites compared to non-Hispanic Whites 0.82, 95% CI 0.71–0.95; data not shown). No interaction was de-

tected between race and either place of birth or length of stay in the United States among Hispanics.

DISCUSSION

To the best of our knowledge, no studies have investigated the effect of race among Hispanics. However, few studies have examined the effect of skin color on heart disease in Puerto Rico.[24,25] These studies show that dark-skinned Puerto Rican men had higher prevalence of left ventricular hypertrophy and slightly higher systolic blood pressure than their light-skinned counterparts. This study shows that although Hispanics have a lower prevalence of hypertension, when race was accounted for Hispanic Blacks have a higher prevalence of hypertension than their White counterparts. Hispanic Blacks could experience the same exposures deleterious to health faced by non-Hispanic Blacks,[36] including conditions associated with hypertension among non-Hispanic Blacks such as discrimination and racism.[37] For example, Hispanics, specifically Puerto Ricans and Dominicans, report experiencing discrimination due to their race in New York City, although much less than non-Hispanic Blacks (7.5% vs 17.3%).[38] Moreover, Mexican Americans with dark skin were more likely to

report being discriminated against, have less education, and hold occupations with lower prestige than their light-skinned counterparts.[39] Further, Hispanic Blacks are also likely to experience racial residential segregation, which promotes lower social and environmental conditions that may lead to poor health.[40] Previous studies showed that Puerto Ricans were highly segregated from non-Hispanic Whites as a result of their African ancestry.[41–43] Thus, Hispanics could experience discrimination from non-Hispanic Whites, and Hispanic Blacks could face a double jeopardy by being discriminated against by Hispanic and non-Hispanic Whites based on their skin color. This study's results show that the health advantage was only observed for Hispanic Whites or for Hispanics as a whole. Therefore, the health advantage encountered when using aggregate data for Hispanics could be an artifact of ignoring race.

An issue open to debate among epidemiologists is the use and utility of counterfactual for causal inferences on social characteristics such as race.[44,45] As Krieger,[46] and more recently, Berkman,[47] suggested understanding the counterfactual is extremely useful to epidemiology in general. However, understanding it means identifying the causal component of a risk factor. In the case of race, the key is to identify what makes an individual's experience differ-

This study shows that although Hispanics have a lower prevalence of hypertension, when race was accounted for Hispanic Blacks have a higher prevalence of hypertension than their White counterparts.

ent as he/she belongs to a particular racial group in our society.[46] Hispanic Blacks and Whites could be the right counterfactual for non-Hispanic Blacks and Whites. This study shows that Hispanic Blacks and Whites have more similarity to their non-Hispanic counterparts as time goes by as they do to each other. This kind of comparison could help tease out the effect of race as a marker for inequality in opportunities and further as a fundamental cause[48] for existing health disparities.

Among the strengths of this study are the use of multiple years of a national representative sample and the large sample size that allows controlling for numerous potential confounders while also examining interactions. Limitations are the cross-sectional nature of the data, which precludes making inferences regarding cause and effect, and the self-reported nature of hypertension. However, self-reported data for this condition has been shown to be highly correlated with physician records.[49,50] Because Hispanics are younger and less likely to have access to health care, which would result in less awareness of hypertension than non-Hispanics, Hispanics could be likely to underreport their hypertension status. However, if any difference in reporting this disease was to occur, it would have been nondifferential among Hispanics, which would underestimate the study's results. An additional limitation was the exclu-

sion of 23% of Hispanics who self-identified as "other" ($n=3733$). However, we repeated the analyses including "other" as a separate category, and their odds of hypertension was not different from the one observed for Hispanic Whites. Therefore, their exclusion was not likely to have affected the results. Finally, the sample for Hispanic Blacks was small ($n=230$) and may have precluded our ability to detect significant differences when compared to other groups. However, using sensitivity analyses, we repeated the analyses with and without the Hispanic Black subsample as well as without accounting for the sampling weights to rule the effect of extreme weights. The exclusion of the data on Hispanic Blacks did not change the results significantly. Similarly the results did not change when only Hispanic Whites were considered. The use of unweighted data as sensitivity analysis did not change the results presented in this report. Therefore, the possibility of bias, if any, in extrapolating results from such small sample size may be minimal.

This study underscores that racial categorization could be a significant predictor of health status for Hispanics in our society. Ignoring race could mask variation in hypertension among Hispanics. In fact, the idealized Hispanic health advantage disappears when race is accounted for, and Hispanic Blacks and Whites hypertension profiles are getting closer to their non-Hispanic counterparts. As time goes by, how classification in US racial categories and assimilation into Western culture influence Hispanics' life and health should be examined. If we are serious about eliminating health disparities among Americans, race among Hispanics cannot be ignored and should be considered in the current discourse on racial/ethnic disparities in health.

REFERENCES

1. Manton KG, Patrick CH, Johnson KW. Health differentials between Blacks and Whites: recent trends in mortality and morbidity. *Milbank Q.* 1987;65(Suppl 1):100–128.
2. Cooper RS. Health and the social status of Blacks in the United States. *Ann Epidemiol.* 1993;3(2):137–144.
3. Williams DR, Collins C. US Socioeconomic and Racial Differences in Health - Patterns and Explanations. *Annu Rev Sociol.* 1995;21:349–386.
4. Hummer RA. Black-White differences in health and mortality: a review and conceptual model. *Sociol Q.* 1996;37(1):105–125.
5. Lillie-Blanton M, Parsons PE, Gayle H, Dievler A. Racial differences in health: not just Black and White, but shades of gray. *Annu Rev Public Health.* 1996;17:411–448.
6. Rubio M, Williams DR. The social dimension of race. In: Beech BM, Goodman M, eds. *Race and Research. Perspectives on Minority Participation in Health Studies.* 5th ed. Washington, DC: American Public Health Association; 2004:1–26.
7. US Department of Commerce, Office of Federal Statistical Policy and Standards. *Race and Ethnic Standards for Federal Agencies and Administrative Reporting.* Washington, DC: US Government Printing Office; May 1978. Federal Statistical Policy Directive No. 15.
8. Committee on National Statistics. *94th Congress: H. J. Res. 92, Joint Resolution Relating to the Publication of Economic and Social Statistics for Americans of Spanish-Origin or Descent (Public Law 93-311).* Washington, DC: Government Printing Office; June 16, 1978.
9. Hayes-Bautista DE, Chapa J. Latino terminology: conceptual bases for standardized terminology. *Am J Public Health.* 1987;77(1):61–68.
10. Trevino FM. Standardized terminology for Hispanic populations. *Am J Public Health.* 1987;77(1):69–72.
11. Gimenez ME. Latino/"Hispanic"–who needs a name? The case against a standardized terminology. *Int J Health Serv.* 1989;19(3):557–571.
12. US Department of Commerce, Economics and Statistics Administration. *The Hispanic*

Population. Census 2000 Brief. Washington, DC: US Census Bureau; 2001.

13. Amaro H, Zambrana RE. Criollo, mestizo, mulato, LatiNegro, indigena, White, or Black? The US Hispanic/Latino population and multiple responses in the 2000 census. *Am J Public Health.* 2000;90(11):1724–1727.

14. Rodriguez CE. Race, culture, and Latino otherness in the 1980 Census. *Soc Sci Q.* 1992; 73(4):930–937.

15. Rodriguez CE. *Changing Race. Latinos, the Census, and the History of Ethnicity in the United States.* New York, NY: New York University Press; 2000.

16. Rodriguez CE, Cordero Guzman H. Placing race in context. *Ethnic Racial Stud.* 1992; 15(4):523–542.

17. Rodriguez CE. Puerto Ricans: between Black and White. *N Y Affairs.* 1974;1(4):92–101.

18. Rodriguez CE, Castro A, Garcia O, Torres A. Latino racial identity: in the eye of the beholder. *Latino Stud J.* 1991;2(3):33–48.

19. Rodriguez CE. *Challenges and Emerging Issues: Race and Ethnic Identity Among Latinos.* Washington, DC: Committee on National Statistics, National Research Council; 1994.

20. Falcon A. Puerto Ricans and the politics of racial identity. In: Harris HW, Blue HC, Griffith EEH, eds. *Racial and Ethnic Identity: Psychological Development of Creative Expression.* New York, NY: Routledge; 1995: 193–207.

21. Whitten NE, Torres A. *Blackness in Latin America and the Caribbean.* Bloomington, Ind: Indiana University Press; 1998.

22. Bacal A. Citizenship and national identity in Latin America: the persisting salience of race and ethnicity. In: Oomen TK ed. *Citizenship and National Identity: From Colonialism to Globalism.* New Delhi, India: Sage Publications; 1997:281–312.

23. Martinez-Echazabal L. Mestizaje and the discourse of national/cultural identity in Latin America, 1845–1959. *Latin Am Persp.* 1998; 25(3):21–42.

24. Costas R Jr, Garcia-Palmieri MR, Sorlie P, Hertzmark E. Coronary heart disease risk factors in men with light and dark skin in Puerto Rico. *Am J Public Health.* 1981;71(6): 614–619.

25. Sorlie PD, Garcia-Palmieri MR, Costas R Jr. Left ventricular hypertrophy among dark- and light-skinned Puerto Rican men: the Puerto Rico Heart Health Program. *Am Heart J.* 1988;116(3):777–783.

26. Burt VL, Whelton P, Roccella EJ, et al. Prevalence of hypertension in the US adult population. Results from the Third National Health and Nutrition Examination Survey, 1988–1991. *Hypertension.* 1995;25(3):305–313.

27. Lethbridge-Cejku M, Schiller JS, Bernadel L. Summary health statistics for US adults: National Health Interview Survey, 2002. *Vital Health Stat 10.* 2004;222.

28. Vega WA, Amaro H. Latino outlook: good health, uncertain prognosis. *Annu Rev Public Health.* 1994;15:39–67.

29. 2000 National Health Interview Survey (NHIS). *Public Use Data Release. NHIS Survey Description.* Hyattsville, Md: National Center for Health Statistics, Centers for Disease Control and Prevention, US Department of Health and Human Services; March 2002.

30. 2001 National Health Interview Survey (NHIS). *Public Use Data Release. NHIS Survey Description.* Hyattsville, Md: National Center for Health Statistics, Centers for Disease Control and Prevention, US Department of Health and Human Services; January 2003.

31. 2002 National Health Interview Survey (NHIS). *Public Use Data Release. NHIS Survey Description.* Hyattsville, Md: National Center for Health Statistics, Centers for Disease Control and Prevention, US Department of Health and Human Services; December 2003.

32. Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension.* 2003;42(6):1206–1252.

33. Schenker N, Raghunathan TE, Chiu P, Makuc DM, Zhang G, Cohen AJ. *Multiple Imputation of Family Income and Personal Earnings in the National Health Interview Survey: Methods and Examples.* Hyattsville, Md: National Center for Health Statistics; 2004.

34. SAS Institute Inc. *SAS/STAT 9.1 User's Guide.* Cary, NC: SAS Institute Inc; 2004.

35. Research Triangle Institute. *SUDAAN Language Manual, Release 9.0.* Research Triangle Park, NC: Research Triangle Institute; 2004.

36. Borrell LN. Racial identity among Hispanics: implications for health and well-being. *Am J Public Health.* 2005;95(3):379–381.

37. Krieger N, Sidney S. Racial discrimination and blood pressure: the CARDIA study of young Black and White adults. *Am J Public Health.* 1996;86(10):1370–1378.

38. Stuber J, Galea S, Ahern J, Blaney S, Fuller C. The association between multiple domains of discrimination and self-assessed health: a multilevel analysis of Latinos and Blacks in four low-income New York City neighborhoods. *Health Serv Res.* 2003;38(6, pt 2): 1735–1759.

39. Arce CH, Murguia E, Frisbie WP. Phenotype and life chances among Chicanos. *Hispanic J Behav Sci.* 1987;9(1):19–32.

40. Williams DR, Collins C. Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Rep.* 2001;116(5):404–416.

41. Massey DS, Bitterman B. Explaining the paradox of Puerto-Rican segregation. *Soc Forces.* 1985;64(2):306–331.

42. Massey DS. Effects of socioeconomic factors on the residential segregation of Blacks and Spanish Americans in United States Urbanized Areas. *Am Sociol Rev.* 1979;44(6):1015–1022.

43. Massey DS. Residential segregation and neighborhood conditions in US metropolitan areas. In: Smelser N, Wilson WJ, Mitchell F, eds. *American Becoming: Racial Trends and their Consequences.* Washington, DC: National Academy of Sciences Press, 2001:391–434.

44. Holland PW. Statistics and causal inferences. *J Am Stat Assoc.* 1986;81:945–960.

45. Kaufman JS, Cooper RS. Seeking causal explanations in social epidemiology. *Am J Epidemiol.* 1999;150(2):113–120.

46. Krieger N. Does racism harm health? Did child abuse exist before 1962? On explicit questions, critical science, and current controversies: an ecosocial perspective. *Am J Public Health.* 2003;93(2):194–199.

47. Berkman LF. Introduction: seeing the forest and the trees–from observation to experiments in social epidemiology. *Epidemiol Rev.* 2004;26:2–6.

48. Link BG, Phelan JC. Social conditions as fundamental causes of disease. *J Health Soc Behav.* 1995;suppl:80–94.

49. Giles WH, Croft JB, Keenan NL, Lane MJ, Wheeler FC. The validity of self-reported hypertension and correlates of hypertension awareness among Blacks and Whites within the stroke belt. *Am J Prev Med.* 1995; 11(3):163–169.

50. Vargas CM, Burt VL, Gillum RF, Pamuk ER. Validity of self-reported hypertension in the National Health and Nutrition Examination Survey III, 1988–1991. *Prev Med.* 1997;26(5, pt 1):678–685.