

Race, Ethnicity, and Self-Reported Hypertension: Analysis of Data From the National Health Interview Survey, 1997–2005

Luisa N. Borrell, DDS, PhD

Hypertension affects more than 65 million US adults¹ and is a major risk factor for cardiovascular disease (CVD).^{2,3} The prevalence of hypertension in the US population increased by 30% between the third National Health and Nutrition Examination Survey (NHANES III, 1988–1994) and NHANES 1999–2000.¹ Previous studies have consistently reported that, compared with non-Hispanic Whites, Hispanics have a lower prevalence of hypertension and that non-Hispanic Blacks have a higher prevalence of hypertension.^{1,2,4–7} However, these studies focused mostly on Mexican Americans, ignoring the heterogeneity of the Hispanic population. For example, because of their colonization patterns, Hispanics can be of any race (i.e., White, Black, or some other race).⁸ Despite the impact of race on health in US society^{9–11} and the projected growth of the Hispanic population,^{12–14} there is a dearth of knowledge addressing the relationship between race and health among Hispanics. However, the evidence that does exist parallels findings observed among non-Hispanics: Hispanic Blacks experience worse health outcomes than do Hispanic Whites.^{15–18} Thus, the investigation of race and health outcomes in Hispanics is imperative.

Hypertension has been attributed to obesity, sodium and potassium intake, physical inactivity, alcohol consumption, smoking, and psychosocial stress.³ Of these, only psychosocial stress has been shown to be unequally distributed across racial/ethnic groups. Research suggests that racial discrimination—a trigger of psychosocial stress—is common in the everyday life of non-Hispanic Blacks and may lead to CVD.^{19–26} Given this, and consistent with the historical pattern of disadvantage among non-Hispanic Blacks,^{9,11,27,28} it is possible that Hispanic Blacks could be exposed to the same deleterious experiences of racial discrimination and racism as non-Hispanic Blacks because of the salience and social visibility associated with their race or dark skin color. These experiences may lead to

Objective. I estimated the association between race and self-reported hypertension among Hispanics and non-Hispanics and determined whether this association was stronger among non-Hispanics.

Methods. With data from the 1997–2005 National Health Interview Survey, I used logistic regression to estimate the strength of the association between race/ethnicity and self-reported hypertension among US adults.

Results. The overall prevalence of self-reported hypertension was 24.5%, with lower prevalence among Hispanics (16.7%) than among non-Hispanics (25.2%; $P < .01$). Blacks, regardless of ethnicity, had the highest prevalence. Compared with non-Hispanic Whites, non-Hispanic Blacks had 48% (odds ratio [OR]=1.48; 95% confidence interval [CI] = 1.41, 1.55) greater odds of reporting hypertension; Hispanic Whites had 23% (OR=0.81; 95% CI=0.76, 0.88) lower odds. There was no difference in the strength of the association between race and self-reported hypertension observed among non-Hispanics (OR for Blacks=1.47) and among Hispanics (OR for Blacks=1.20; for interaction, $P=0.43$).

Conclusions. The previously reported hypertension advantage of Hispanics holds for Hispanic Whites only. As Hispanics continue their rapid growth in the United States, race may have important implications on their disease burden, because most US health disparities are driven by race and its socially patterned experiences. (*Am J Public Health*. 2009;99:313–319. doi:10.2105/AJPH.2007.123364)

disadvantaged life chances, which then translate into poorer health.

The availability of 9 years of data from the National Health Interview Survey (NHIS, 1997–2005) afforded the opportunity to investigate the association between race and self-reported hypertension in Hispanics and non-Hispanics before and after adjustment for selected characteristics and known risk factors and to compare the strength of this association in Hispanics and non-Hispanics. If race as a social construct channels Hispanic Blacks to exposures detrimental to health as it does for non-Hispanic Blacks, the lower odds of hypertension for Hispanics observed in previous studies would apply only to Hispanic Whites whereas Hispanic Blacks would have odds of hypertension similar to those of non-Hispanic Whites or intermediate between non-Hispanic Whites and non-Hispanic Blacks. However, the magnitude of the association between race and hypertension would be stronger among non-Hispanics than among Hispanics.

METHODS

The NHIS is an annual face-to-face household interview of noninstitutionalized civilians in the United States that uses a 3-stage stratified cluster probability sampling design. A complete description of the plan and operation for the NHIS has been published elsewhere.^{29,30} Briefly, the NHIS comprises a core set of questions (repeated yearly) and supplemental questions or modules. The survey oversampled Black and Hispanic individuals to obtain reliable estimates for these groups. Data for these analyses were extracted from the Public Use Person and Sample Adult files for 1997 to 2005 and included the records of adults 18 years and older for a total of 289 707 adults. The response rates ranged from 86.1% (1999 and 2005) to 90.3% (1997) for the person sample and 69.0% (2005) to 80.4% (1997) for the adult sample.

Study Variables

The outcome for this study was self-reported hypertension. Hypertension status was

collected with the question, “Have you ever been told by a doctor or health professional that you have hypertension, also called high blood pressure?” The main independent variable was race/ethnicity. Ethnicity was asked first and established from the question: “Do you consider yourself Hispanic/Latino?” Race was determined from 2 questions: “What race do you consider yourself to be?” asked to all survey participants and “Which one of these groups would you say BEST represents yourself?” asked to those who reported more than 1 race to the first question, where the choices were White, Black/African American, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and Other. For these analyses, race/ethnicity was defined as Hispanic Black, Hispanic White, non-Hispanic White, and non-Hispanic Black by cross-classifying participants who answered “yes” and “no” to the ethnicity question with those who answered “White” or “Black” to the race question. This definition of race/ethnicity resulted in a final sample of 271 339 records, including 40 635 Hispanics (with 944 Blacks and 39 691 Whites). Although 42.2% of Hispanics identified with the “some other race” category in the 2000 Census,³¹ this group may be too heterogeneous and, therefore, was excluded from this analysis.

I examined variables considered risk factors or potential confounders in studies of hypertension³ and other relevant variables. 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 health indicators and behaviors (diabetes, body mass index [BMI; weight in kilograms divided by height in meters squared], physical activity, cigarette smoking, and alcohol consumption). Gender (male or female) and US region of residence (Northeast, Midwest, South, and West) were included in the analysis as collected during the interview. Age was included in the analysis as continuous and categorical (18–45 years and ≥46 years). Marital status was specified as married, divorced, widowed, and single.

Country of birth was coded as US-born (individuals born in the 50 US states and the District of Columbia) and foreign-born

(individuals born in Puerto Rico, Guam, and other outlying territories of the United States and persons not born in the United States). The foreign-born respondents were asked how long they had been in the United States, with categories ranging from less than 1 year to 15 years or more. A variable combining country of birth and length of stay in the United States was created and coded as foreign born with fewer than 5 years in the United States, foreign born with 5 to 9 years in the United States, foreign born with 10 or more years in the United States, and US born. Although 9 years of data were aggregated to improve the reliability of estimates, a variable to represent survey year was created and included in the analysis to adjust for any difference or secular trends in hypertension prevalence or awareness over the 9-year period.

Health insurance status was collected by using a detailed question regarding multiple sources of insurance and recoded as private, public, and noncoverage. Highest level of education was collected as a continuous variable in the NHIS and, based on its distribution in the study population, categorized as less than high school, high school graduate or equivalent, some college, and college graduate and higher. Income was collected by asking each participant to select his or her total annual income from 12 categories (ranging from \$0 to ≥\$75 000, as well as a category for those who refused to answer) and was adjusted to the year-1997 income by using the inflation calculator developed by the Consumer Price Index.³² Income was categorized as less than \$20 000, \$20 000 to \$34 999, \$35 000 to \$54 999, and \$55 000 or more. Because of the large number of missing values for this variable, NHIS multiple imputation income files were used for these analyses.³³ Occupation was collected among individuals who were working at a paying or nonpaying job in the past week, had a job or business but were not currently at work, or had ever worked. It was recoded into 6 categories by using the US Census^{34,35} as executive, managerial, and professional; technical, sales, and administrative support; services; farming, forestry, and fishing; precision production, craft, and repair; and operators, fabricators, and laborers.

Diabetes status was collected by using the question, “Have you ever been told by a doctor or health professional that you have diabetes or

sugar diabetes?” For women, the phrase “other than during pregnancy” was added prior to this question to exclude cases of gestational diabetes. Body mass index, calculated with self-reported weight and height by NHIS, was categorized as less than 18.5 kg/m² (underweight), 18.5 kg/m² to less than 25.0 kg/m² (healthy weight), and 25.0 kg/m² or higher (overweight including obese).^{36,37} Leisure-time physical activity, defined as vigorous activities for at least 10 minutes causing heavy sweating or large increases in breathing or heart rate, was categorized as 5 times a week or fewer, 6 times a week or more, never, and unable to do physical activity. Smoking status (current, former, or never) and alcohol consumption in the past year (current, former, or lifetime abstainer) were included in the analysis as collected by NHIS.

Statistical Analysis

I calculated descriptive statistics for the characteristics of the population and prevalence of hypertension by race in each ethnic group. To determine significant differences, I used the χ^2 statistic (categorical variables) and *t* test (continuous variables).

I used logistic regression to estimate the strength of the association between race/ethnicity and self-reported hypertension among US adults (Hispanic Blacks, Hispanic Whites, and non-Hispanic Blacks vs non-Hispanic Whites). Specifically, I performed 4 sets of analyses to estimate (1) crude odds ratios (ORs); (2) ORs adjusted for age, gender, marital status, survey year, US region of residence, and place of birth and length of stay in the United States (model 1); (3) ORs additionally adjusted for diabetes, BMI (continuous), physical activity, smoking, and alcohol consumption (model 2); and (4) ORs additionally adjusted for health insurance, education, income, and occupation (model 3). I tested interaction terms for race/ethnicity with gender, education, and income in the fully adjusted model. I repeated the analyses among Hispanics and non-Hispanics (comparing Blacks vs Whites) and among Blacks (comparing Hispanics vs non-Hispanics). To test whether the strength of the association between race and self-reported hypertension differed between Hispanics and non-Hispanics, I tested an interaction term between race and ethnicity. Finally, because racial identity among Hispanics may vary with acculturation,^{38,39}

I tested interaction terms of race with place of birth and length of stay in the United States. The number of records available for the multivariable logistic regression varied according to the covariates included in the model.

I carried out data management procedures with SAS version 9.1.3 (SAS Institute Inc, Cary, NC). I conducted statistical analyses with SUDAAN version 9.0.3 (Research Triangle Institute, Research Triangle Park, NC) because of its ability to account for the complex sampling design in calculating unbiased standard error estimates. In addition, to account for the population size across the NHIS surveys included in the analysis, data from the 9 survey years were first combined and then a new weight variable was created to average the

population size across the 9 years (Zakia Coriaty Nelson, National Center for Health Statistics, Centers for Disease Control and Prevention, oral and written communications, May 18, 2006). In Table 1, the sample sizes were unweighted but all estimates (means, proportions, standard errors, and ORs with their 95% confidence intervals [CIs]) were weighted.

RESULTS

Compared with non-Hispanics, Hispanics were younger; were more likely to be male, be foreign born, have lower education and income, and be uninsured; and were less likely to currently smoke (Table 1). In general, non-Hispanic Blacks had worse sociodemographic and

health-related profiles than did non-Hispanic Whites. For example, non-Hispanic Blacks had lower educational levels and lower income compared with non-Hispanic Whites. Compared with Hispanic Whites, Hispanic Blacks were less likely to be foreign-born, more likely to be more educated, less likely to report an income of less than \$20 000, and more likely to currently smoke. Compared with non-Hispanics, Hispanics were more likely to be physically inactive, less likely to drink, and more likely to hold a lower-rank occupation (data not shown). These conditions also were more common among Blacks, regardless of their ethnicity.

Table 2 shows the unadjusted prevalence of self-reported hypertension for selected characteristics comparing Hispanics and

TABLE 1—Distribution of Selected Characteristics of Black and White Adults, by Ethnicity: National Health Interview Survey, 1997–2005

Characteristics	Hispanic			Non-Hispanic			Total (N = 271 339)
	Black (n = 944)	White ^a (n = 39 691)	Total (n = 40 635)	Black (n = 39 783)	White ^a (n = 190 921)	Total ^b (n = 230 704)	
Age, y, mean (SD)	37.9 (0.57)	39.5 (0.18)	39.4 (0.17)	42.2 (0.18)	46.7 (0.10)	46.1 (0.09)	45.4 (0.09)
Men, % (SE)	44.3 (2.10)	50.6 (0.33)	50.5 (0.33)	44.4 (0.32)	48.1 (0.14)	47.6 (0.13)	47.9 (0.12)
Foreign born, % (SE)	45.5 (2.33)	59.4 (0.83)	59.0 (0.81)	9.2 (0.41)	4.6 (0.09)	5.2 (0.10)	10.6 (0.16)
Education, % (SE)							
Less than high school	29.7 (2.09)	44.8 (0.60)	44.5 (0.60)	23.3 (0.49)	12.8 (0.19)	14.2 (0.18)	17.2 (0.19)
High school or GED	27.4 (2.43)	24.7 (0.33)	24.8 (0.33)	31.6 (0.37)	31.0 (0.24)	31.1 (0.21)	30.4 (0.20)
Some college	21.2 (2.03)	14.9 (0.31)	15.0 (0.31)	21.8 (0.44)	20.1 (0.16)	20.3 (0.16)	19.8 (0.15)
College degree or more	21.8 (2.32)	15.6 (0.33)	15.7 (0.32)	23.3 (0.29)	36.2 (0.29)	34.5 (0.26)	32.6 (0.24)
Income, \$, % (SE)							
< 20 000	57.2 (2.57)	62.3 (0.51)	62.2 (0.50)	53.6 (0.69)	41.8 (0.26)	43.4 (0.24)	45.3 (0.22)
20 000–34 999	30.6 (2.26)	23.4 (0.36)	23.6 (0.36)	28.0 (0.42)	27.6 (0.18)	27.7 (0.17)	27.3 (0.15)
35 000–54 999	7.2 (1.33)	8.8 (0.26)	8.8 (0.25)	12.1 (0.33)	16.5 (0.14)	15.9 (0.13)	15.2 (0.12)
≥ 55 000	5.1 (1.59)	5.4 (0.20)	5.4 (0.20)	6.3 (0.30)	14.1 (0.19)	13.1 (0.17)	12.3 (0.16)
Health insurance, % (SE)							
Private	44.6 (2.38)	43.8 (0.46)	43.8 (0.45)	52.9 (0.51)	64.8 (0.24)	63.3 (0.22)	61.3 (0.21)
Public	24.4 (1.82)	17.9 (0.36)	18.0 (0.36)	26.1 (0.40)	23.4 (0.20)	23.8 (0.19)	23.2 (0.18)
None	30.9 (2.04)	38.4 (0.52)	38.2 (0.51)	21.0 (0.35)	11.8 (0.13)	13.0 (0.12)	15.5 (0.14)
Diabetes, % (SE)	6.6 (1.05)	7.4 (0.17)	7.3 (0.17)	9.7 (0.21)	6.8 (0.08)	7.2 (0.08)	7.2 (0.07)
BMI, kg/m ² , mean (SD)	27.5 (0.21)	27.2 (0.04)	27.3 (0.04)	28.3 (0.04)	26.5 (0.02)	26.7 (0.02)	26.8 (0.02)
Smoking status, % (SE)							
Current	21.4 (1.70)	17.0 (0.26)	17.1 (0.26)	23.0 (0.36)	23.7 (0.18)	23.6 (0.17)	23.0 (0.15)
Former	12.1 (1.38)	14.2 (0.23)	14.1 (0.23)	14.2 (0.23)	25.2 (0.14)	23.8 (0.13)	22.8 (0.13)
Never	66.5 (1.78)	68.8 (0.38)	68.8 (0.37)	62.7 (0.39)	51.1 (0.20)	52.6 (0.19)	54.2 (0.18)

Notes. GED = general equivalency diploma; BMI = body mass index (weight in kilograms divided by height in meters squared).

^aFor comparisons of Blacks and Whites within ethnic groups, all $P < .01$, by the χ^2 or t test, with the exception of BMI ($P = .17$) and diabetes ($P = .45$) among Hispanics.

^bFor comparisons of Hispanics and non-Hispanics, $P < .01$, with the exception of diabetes ($P = .39$).

TABLE 2—Prevalence of Self-Reported Hypertension for Selected Characteristics Among Hispanic and Non-Hispanic Adults, by Race: National Health Interview Survey, 1997–2005

	Hispanic			Non-Hispanic		
	Black, % (SE)	White, ^a % (SE)	Total, % (SE)	Black, % (SE)	White, ^a % (SE)	Total, ^b % (SE)
Overall	18.5 (1.56)	16.6 (0.27)	16.7 (0.27)	30.6 (0.38)	24.4 (0.16)	25.2 (0.15)
Age, y						
18–45	10.4 (1.37)	7.6 (0.21)	7.7 (0.20)	15.3 (0.30)	9.9 (0.13)	10.8 (0.12)
≥46	39.1 (4.15)	37.3 (0.56)	37.4 (0.56)	55.6 (0.56)	39.6 (0.21)	41.4 (0.20)
Gender						
Men	18.8 (2.36)	14.2 (0.35)	14.3 (0.34)	27.5 (0.46)	24.2 (0.20)	24.6 (0.19)
Women	18.4 (2.00)	19.1 (0.36)	19.1 (0.35)	33.0 (0.46)	24.7 (0.19)	25.9 (0.18)
Country of birth						
United States	16.1 (2.08)	19.3 (0.43)	19.2 (0.42)	31.6 (0.40)	24.5 (0.16)	25.4 (0.15)
Elsewhere	21.7 (2.61)	14.8 (0.30)	14.9 (0.30)	20.5 (0.90)	22.7 (0.55)	22.2 (0.46)
Education						
Less than high school	20.1 (2.83)	18.8 (0.47)	18.9 (0.46)	42.4 (0.79)	35.6 (0.37)	37.1 (0.34)
High school or GED	16.0 (2.99)	15.6 (0.51)	15.6 (0.50)	29.3 (0.56)	27.5 (0.23)	27.7 (0.22)
Some college	15.7 (2.70)	13.2 (0.48)	13.3 (0.48)	24.2 (0.54)	21.3 (0.29)	21.7 (0.26)
College degree or more	21.5 (3.59)	15.2 (0.55)	15.4 (0.54)	26.4 (0.59)	19.6 (0.18)	20.2 (0.18)
Income, \$						
<20 000	14.6 (2.09)	10.9 (0.33)	11.0 (0.32)	22.8 (0.51)	16.9 (0.24)	17.8 (0.23)
20 000–34 999	13.2 (3.10)	12.2 (0.56)	12.2 (0.56)	22.9 (0.61)	17.1 (0.28)	17.9 (0.25)
35 000–54 999	9.2 (4.92)	15.4 (1.10)	15.3 (1.09)	25.5 (0.91)	18.6 (0.33)	19.3 (0.30)
≥55 000	44.9 (15.16)	15.8 (1.30)	16.5 (1.37)	25.7 (1.41)	18.7 (0.37)	19.2 (0.37)
Health insurance						
Private	14.4 (1.96)	13.9 (0.35)	13.9 (0.34)	24.9 (0.40)	17.8 (0.15)	18.6 (0.14)
Public	32.4 (4.20)	36.9 (0.76)	36.7 (0.72)	50.5 (0.71)	47.5 (0.27)	47.9 (0.26)
None	13.1 (2.24)	10.4 (0.31)	10.4 (0.31)	20.7 (0.59)	15.1 (0.29)	16.3 (0.28)
Diabetes						
Yes	62.9 (7.34)	55.4 (1.15)	55.6 (1.13)	71.2 (0.91)	61.9 (0.48)	63.6 (0.42)
No	15.4 (1.48)	13.5 (0.25)	13.6 (0.24)	26.2 (0.35)	21.7 (0.15)	22.3 (0.14)
BMI, kg/m ²						
<18.5	...	9.2 (1.46)	9.1 (1.44)	17.1 (1.61)	14.0 (0.54)	14.3 (0.52)
18.5–24.99	12.6 (2.43)	10.0 (0.32)	10.0 (0.32)	18.6 (0.43)	15.5 (0.18)	15.8 (0.17)
≥25.0	22.7 (2.16)	20.6 (0.35)	20.6 (0.34)	36.7 (0.46)	31.4 (0.19)	32.2 (0.18)
Smoking status						
Current	18.8 (3.37)	14.9 (0.51)	15.1 (0.51)	30.3 (0.54)	19.3 (0.22)	20.7 (0.21)
Former	30.1 (6.64)	26.2 (0.76)	26.3 (0.76)	48.0 (0.77)	33.6 (0.27)	34.8 (0.26)
Never	16.5 (1.86)	15.2 (0.30)	15.2 (0.29)	26.9 (0.43)	22.4 (0.19)	23.1 (0.18)

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

^aFor comparisons of Blacks and Whites within ethnic groups, all $P < .01$, by the χ^2 statistic, with the exception of the overall prevalence for Hispanics ($P = .24$).

^bFor comparisons of Hispanics and non-Hispanics, $P < .01$.

non-Hispanics by race. The overall prevalence of self-reported hypertension was 24.4% (data not shown), with lower prevalence among Hispanics (16.7%) than among non-Hispanics (25.2%; $P < .01$). In general, although Blacks,

regardless of their ethnicity, had the highest prevalence of hypertension, the prevalence estimates were higher for non-Hispanic Blacks. Hispanic Blacks who had a college degree or more and those with less than a high school

diploma had similar prevalence of hypertension. This pattern was not observed for non-Hispanic Blacks. Further, Hispanic Blacks with an income of \$55 000 or more had a higher prevalence of hypertension than did Hispanic Whites and non-Hispanics regardless of their racial identification and incomes.

Unadjusted analysis showed that, compared with non-Hispanic Whites, non-Hispanic Blacks had 36% (OR=1.36; 95% CI=1.31, 1.42) greater odds of reporting hypertension and Hispanic Blacks and Hispanic Whites had 43% (OR=0.70; 95% CI=0.57, 0.86) and 61% (OR=0.62; 95% CI=0.59, 0.64) lower odds of reporting hypertension, respectively (Table 3). In the fully adjusted model (model 3), non-Hispanic Blacks had 48% (OR=1.48; 95% CI=1.41, 1.55) greater odds of reporting hypertension, whereas Hispanic Whites had 23% (OR=0.81; 95% CI=0.76, 0.88) lower odds of reporting hypertension than did non-Hispanic Whites. When the magnitude of the associations between race and self-reported hypertension for Hispanics (OR for Blacks=1.20; 95% CI=0.89, 1.60) and non-Hispanics (OR for Blacks=1.47; 95% CI=1.40, 1.54) was compared, there was no difference in the strength of these associations (interaction for race and ethnicity, $P=0.43$; data not shown). However, non-Hispanic Blacks had 1.36 (95% CI=1.00, 1.84) greater odds of reporting hypertension than did Hispanic Blacks.

Women had higher odds of reporting hypertension than did men, regardless of their race/ethnicity ($P < .001$; data not shown). There was no interaction between race/ethnicity and income. However, there was a multiplicative interaction between education and race/ethnicity ($P = .01$). Compared with non-Hispanic Whites, non-Hispanic Blacks with less than a high school education (OR=1.51; 95% CI=1.34, 1.71), a high school diploma or equivalent (OR=1.43; 95% CI=1.30, 1.58), some college (OR=1.37; 95% CI=1.23, 1.51), and college degree or more (OR=1.60; 95% CI=1.46, 1.75) were more likely to report hypertension, whereas Hispanic Whites with less than a high school education (OR=0.74; 95% CI=0.64, 0.86), a high school diploma or equivalent (OR=0.80; 95% CI=0.70, 0.92), and some college (OR=0.85; 95% CI=0.74, 0.99) were less likely to report hypertension. There was no interaction between race and either place of birth or length of stay in the United States for Hispanics.

TABLE 3—Crude and Adjusted Odds Ratios (ORs) for Self-Reported Hypertension Among Adults, by Race/Ethnicity: National Health Interview Survey, 1997–2005

	Crude ^a OR (95% CI)	Model 1, ^{b,c} AOR (95% CI)	Model 2, ^{b,d} AOR (95% CI)	Model 3, ^b AOR (95% CI)
Non-Hispanic White (Ref)	1.00	1.00	1.00	1.00
Non-Hispanic Black	1.36 (1.31, 1.42)	1.94 (1.88, 2.01)	1.60 (1.54, 1.67)	1.48 (1.41, 1.55)
Hispanic White	0.62 (0.59, 0.64)	1.10 (1.05, 1.15)	0.89 (0.84, 0.94)	0.81 (0.76, 0.88)
Hispanic Black	0.70 (0.57, 0.86)	1.38 (1.12, 1.71)	1.19 (0.93, 1.52)	1.08 (0.80, 1.44)

Note. CI = confidence interval; AOR = adjusted odds ratio.

^aCrude association between race/ethnicity and self-reported hypertension.

^bORs adjusted for age, gender, marital status, survey year, US region, and place of birth and length of residency in the United States.

^cModel 1 additionally adjusted for body mass index, physical activity, smoking status, alcohol consumption, and diabetes.

^dModel 2 additionally adjusted for health insurance, education, income, and occupation.

DISCUSSION

My findings suggest that, compared with non-Hispanic Whites, non-Hispanic Blacks have higher odds of reporting hypertension, whereas Hispanic Whites have lower odds of reporting hypertension. Hispanic Blacks had significantly lower odds than did non-Hispanic Blacks of reporting hypertension. Women, regardless of their race/ethnicity, were more likely than were men to report having hypertension. Finally, compared with non-Hispanic Whites, non-Hispanic Blacks, regardless of their education, had greater odds of reporting hypertension, whereas Hispanic Whites had lower odds of reporting hypertension.

Most studies that have examined the association between race/ethnicity and hypertension have shown that non-Hispanic Blacks have a higher prevalence of hypertension and Hispanics have a lower prevalence of hypertension than do non-Hispanic Whites.^{1,2,4–7} However, these studies have presented aggregate estimates for Hispanics ignoring their racial heterogeneity or used data for Mexican Americans (the largest subgroup and more likely to be studied) to extrapolate to the Hispanic population. Although few studies have examined the association between race or skin color and hypertension among Hispanics,^{15,17} these studies suggest that light-skinned Puerto Ricans and Hispanics who identified as White have lower prevalence of hypertension than do dark-skinned Puerto Ricans and non-Hispanic Whites, respectively.

For example, in a previous study, I found that the lower prevalence of hypertension observed in Hispanics compared with non-Hispanic Whites reported in most studies applies only to Hispanics who identify as White.¹⁷ These findings were confirmed in this study's results with 9 years of NHIS data (1997–2005): compared with non-Hispanic Whites, only Hispanic Whites had a lower prevalence of hypertension. In the current study, I also found that there was no difference in the strength of the association between race and self-reported hypertension observed in non-Hispanics than in Hispanics. Finally, although there were no significant differences in the odds of reporting hypertension between Hispanic Blacks and non-Hispanic Whites, the hypertension profile of Hispanic Blacks was closer to that of non-Hispanic Blacks than to that of non-Hispanic Whites. These findings suggest that Blacks, regardless of their ethnicity, report higher prevalence of hypertension than do Whites, underscoring the importance of the racial hierarchy in US society.

In the United States, hypertension is most common among non-Hispanic Blacks. Although genetics hypotheses have been proposed for this finding, evidence is far from confirmed.^{3,6,40–42} Even though hypertension results from an interaction of genes and the environment,^{3,41,43,44} it is difficult to distinguish between these 2 factors. For example, previous studies have examined the association between skin color and hypertension⁴⁵ and skin color, socioeconomic status (SES), and blood pressure.⁴⁶ These studies found that darker skin color was associated with higher levels of blood

pressure only among low-SES non-Hispanic Blacks. Apparently, having both low SES and dark skin color was especially deleterious to health.

These findings underscore the gene–environment interaction, which suggests that individual genetic characteristics or genetic proxies are unlikely to explain persistent socioeconomic differences in hypertension within and across racial/ethnic groups. Moreover, international studies that have included multiple Black and White populations have shown that non-Hispanic Blacks in the United States do not have the highest prevalence of hypertension, and that, in fact, Whites in Spain, Finland, and Germany had higher prevalence than did non-Hispanic Blacks in the United States.⁴⁴ In countries such as Cuba and Brazil, racial differences in hypertension have not been found between Blacks and Whites.^{47–50} Therefore, in the United States the observed racial differences may be the product of the social meaning of race and the deleterious health effects associated with racial discrimination and racism.

Although previous studies have found that women have higher prevalence of hypertension than do men regardless of their race/ethnicity,^{1–3,51} studies also have found similar prevalence of hypertension between Mexican American men and women.^{1,52} Consistent with previous studies,^{1,3,51} in this study I found that women have higher odds of reporting hypertension than do men, regardless of their race/ethnicity. Women are more likely to access the medical system and live longer than men. Thus, it is possible that women are more likely to be aware of their hypertension status because of their contacts with physicians. Finally, if women are living longer than men, the burden of hypertension in women may come in the sixth decade of life during postmenopause,^{3,53} which is associated with factors that tend to increase the risk of CVD such as estrogen withdrawal, weight gain, overproduction of pituitary hormones, or a combination of these factors.

Evidence suggests that the prevalence of hypertension decreases as education increases among non-Hispanic Blacks and Whites,^{54,55} but not among Mexican Americans.⁵⁵ In this study, I found that, compared with non-Hispanic Whites, non-Hispanic Blacks regardless of their education were more likely to report hypertension, with those with a college degree or more

having the greater odds. By contrast, Hispanic Whites with at least some college were less likely to report having hypertension than were non-Hispanic Whites, with Hispanic Whites with less than a high school education having the lower odds. These findings underscore that education does not translate into the same health benefits for non-Hispanic Blacks and Hispanic Whites, with non-Hispanic Blacks receiving a lower benefit from their education.⁵⁶ Moreover, even though the finding for Hispanic Whites concurs with the Hispanic paradox,^{57,58} which is observed mostly among Mexican Americans and links low education, low income, and lower rate of insurance coverage with low adult and infant mortality, it also could reflect a combination of the younger age of the Hispanic population^{13,14} and a healthy migrant effect from recent immigrants.⁵⁷

Strengths and Limitations

Among the strengths of this study were the use of 9 years of a national representative sample that used the same sampling and data collection methodology; the range of data on health outcomes, risk behaviors, and lifestyles available in the NHIS; and the large sample size, which allowed for controlling for numerous potential confounders while also examining interactions. Important limitations were the cross-sectional nature of the data, which precluded making inferences regarding cause and effect, and the self-reported nature of hypertension. However, self-reported data for hypertension has been shown to be highly correlated with physicians' records.^{59,60} Thus, if there is any underestimation in self-reported hypertension, it may be negligible and nondifferential across racial/ethnic groups. Finally, because Hispanics are younger and less likely to have access to health care, resulting in less awareness of their hypertension status than among non-Hispanics, Hispanics could be likely to underreport their hypertension status and, thus, cause underestimation of hypertension in the study's results.

An additional limitation was the exclusion of 12.7% of Hispanics who self-identified as "some other race" (n=6625) because of their heterogeneity. However, I repeated the analyses including "some other race" as a separate category, and their odds of reporting hypertension (OR=0.93; 95% CI=0.82, 1.07) were not different than the odds observed for Hispanic

Blacks (OR=1.08; 95% CI=0.80, 1.44) and, thus, were similar to those for non-Hispanic Whites. Therefore, it is very unlikely that their exclusion would have affected this study's results. Finally, although the percentage of Hispanics who identified with the "some other race" category in this study seems lower than the 42.2% reported by the US Census,³¹ the 42.2% included all age groups. Hispanics are the youngest population in the United States, with 34.8% of the Hispanic population aged younger than 18 years compared with 25.6% for the overall population.

Conclusions

The results of this study suggest that the hypertension advantage of Hispanics over non-Hispanics holds only for Hispanic Whites. Hispanic Blacks had odds of reporting hypertension intermediate between those for non-Hispanic Blacks and non-Hispanic Whites. As the Hispanic population continues its rapid growth and emigration from countries with strong African ancestry increases, a large proportion of the Hispanic population will resemble the non-Hispanic Black population. This segment of the Hispanic population could face the experience of racial discrimination, a psychosocial stressor with important implications for CVD, from within (Hispanic Whites) and without (non-Hispanic Whites and, in some cases, non-Hispanic Blacks) their ethnic group.^{17,61} Thus, the salience and visibility of race and skin color in the Hispanic population may have important implications on its disease burden in the years to come not only for hypertension but also for other health outcomes, because most health disparities in the United States are driven by race and its social patterned experiences. ■

About the Author

At the time of the study, Luisa N. Borrell was with the Department of Epidemiology, Columbia University Mailman School of Public Health, New York, NY, and the Department of Health Sciences, Graduate Program in Public Health at Lehman College, City University of New York, Bronx.

Requests for reprints should be sent to Luisa N. Borrell, DDS, PhD, Department of Health Sciences, Lehman College/CUNY, 250 Bedford Park Blvd West, Gillet 336, Bronx, NY 10468 (e-mail: luisa.borrell@lehman.cuny.edu).

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Human Participant Protection

The data were collected with the informed consent of the respondents to the National Health Interview Survey and followed procedures approved by the institutional review board of the National Center for Health Statistics. In addition, the analysis was approved by the institutional review boards at Columbia University Medical Center and Lehman College/City University of New York.

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