RACIAL/ETHNIC DISPARITIES ON SELF-REPORTED HYPERTENSION IN NEW YORK CITY: EXAMINING DISPARITIES AMONG HISPANIC SUBGROUPS

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Objectives: To investigate differences in self-reported hypertension among Hispanic subgroups as they compare to Asian, non-Hispanic Black and non-Hispanic White groups; and whether these differences depend on nativity status in the New York City Community Health Survey 2006–2008.

Design: Cross-sectional.

Setting: New York City.

Main Outcome Measure: Self-reported hypertension.

Methods: Log-binomial regression was used to estimate the strength of the association between race/ethnicity and self-reported hypertension before and after adjusting for selected covariates.

Results: In adjusted analyses, Puerto Ricans, Dominicans and Blacks had 17%, 28% and 34% greater probability of reporting hypertension than Whites. The association between race/ethnicity and self-reported hypertension appears to vary with nativity status/length of stay in the United States. ($P=.08$).

Conclusions: These findings underscore the need to investigate the prevalence of hypertension among subgroups of the Hispanic population. This issue is also relevant to Asians and Blacks, who are very heterogeneous populations regarding subgroups and nativity status. (*Ethn Dis*.2011;21(4):429-436)

Key Words: Self-reported Hypertension, Race/Ethnicity, Hispanic Subgroups, Nativity Status, New York City, Community Health Survey

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INTRODUCTION

One of the two overarching goals of *Healthy People 2010* was "to eliminate health disparities among segments of the population, including differences that occur by gender, *race or ethnicity*, education or income, disability, geographic location or sexual orientation."[1] Literature is readily available documenting health differences among non-Hispanic Whites, non-Hispanic Blacks, and Hispanics. However, heterogeneity within racial/ethnic categories as a contributor to health disparities has seldom been investigated. For instance, although the Hispanic population is usually seen as a homogeneous group, Hispanics are a diverse group in terms of country of origin.[2,3] According to the 2010 US Census, 16.3% (50.5 million) of the US population was of Hispanic origin, with Mexican Americans (63.0%) representing the largest proportion of the Hispanic population followed by Central and South Americans (13.4%), Puerto Ricans (9.2%), Cubans (3.5%) and Dominicans (2.8%).[3]

Despite this diversity, health statistics for the Hispanic population are usually presented for Hispanics as a whole or for Mexican Americans, the largest Hispanic subgroup in the United States. However, Mexican Americans may not represent Hispanic subgroups in areas such as New York City (NYC), New York, a place with the largest Hispanic population in the United States.[3] Out of the 27% Hispanic population in NYC, Puerto Ricans (36.5%) account for the largest proportion followed by Dominicans (18.8%), other Hispanics (18.5%), Central and South Americans (15.5%), Mexican Americans (8.6%), and Cubans (2.0%).[4] Thus, collection of local health data to capture Hispanic population diversity is needed to obtain an accurate health profile.

The prevalence of hypertension in the Hispanic population illustrates one of the main pitfalls of aggregating Hispanics as a single group. The age-adjusted prevalence for hypertension among adults 20 years or older in the United States was lower for Mexican Americans (26.3%) than for non-Hispanic Whites (29.8%) and much higher for non-Hispanic Blacks (42.9%) during 2005–2008.[5] In contrast, a recent analyses of National Health Interview Survey (NHIS) data for years 1997–2005 examining the prevalence of self-reported hypertension among Hispanic subgroups found that Mexican (12.8%), Central and South American (12.6%), Mexican-American (18.8%), and Dominican (21.3%) adults had lower prevalence of self-reported hypertension than Puerto Rican (23.1%) and Cuban (24.2%) adults.[6] These differences in self-reported hypertension between Hispanic subgroups were even more striking than differences between non-Hispanic Whites (24.4%) and non-Hispanic Blacks (30.6%).[6] Thus, investigation of the prevalence of hypertension beyond the standard ethnic category of Hispanic or Latino[7] is crucial to understand health disparities in the US population.

Data from the NYC Community Health Survey (CHS) for pooled years 2006, 2007 and 2008 offer the opportunity to investigate: 1) differences in self-reported hypertension among Hispanic subgroups (Puerto Rican, Mexican American, Cuban, Dominican, Central and South American and other Hispanic), Asian and non-Hispanic Black groups compared to the non-Hispanic White group, and 2) whether

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these differences depend on nativity status.

METHODS

The NYC CHS, modeled after the Behavioral Risk Factor Surveillance Survey, is an annual random-digit dialed telephone survey conducted since 2002 by the NYC Department of Health and Mental Hygiene; the survey provides neighborhood-specific and citywide estimates on a broad range of chronic diseases and behavioral risk factors of NYC residents.[8] Interviews are administered to a stratified random sample of non-institutionalized adults, aged ≥18 years from all five boroughs of NYC – Manhattan, Brooklyn, Queens, the Bronx and Staten Island – living in a household with a landline telephone. Computer-assisted telephone interview (CATI) technology is used to collect the survey data; interviews are pre-translated in English, Spanish, Russian and Mandarin Chinese, and conducted in more than 20 languages. The strata are based upon the 42 United Hospital Fund's (UHF) neighborhood designations in NYC, defined by several adjoining zip codes. Post-stratified sampling weights are constructed to adjust for differential non-response treating the pooled data as a single survey collected over three years. For this study, data were extracted from the files for years 2006, 2007 and 2008, yielding a sample of 26,757 with cooperation rates of 90.7%, 90.4% and 80.7%, respectively.

The outcome for this study, self-reported hypertension (hereafter, hypertension), was collected using the question: "Have you ever been told by a doctor, nurse or other health professional that you had high blood pressure?" (yes/no) The main independent variables were race/ethnicity and nativity status. Race/ethnicity was defined using information on ethnicity, country of origin or ancestry and race. For these analyses, race/ethnicity was defined as Puerto Rican, Mexican American, Cuban, Dominican, Central and South American, other Hispanic, Asian/Pacific Islander, non-Hispanic Black, non-Hispanic White and other Non-Hispanic (hereafter, Asian/Pacific Islander, non-Hispanic Black and non-Hispanic White will be referred to as Asian, Black and White). Nativity status was collected through the question "Where were you born?" For this analysis, nativity status was specified as US-born for those responding that they were born in the 50 states of the US or the District of Columbia (DC). Respondents born in Puerto Rico were defined as island-born, and all others born outside the 50 US states, DC and US territories were classified as foreign-born. For island/foreign-born participants, the following question was asked "How long have you lived in this country?" with choices of <5 years, 5–9 years and ≥10 years. Length of residence in the United States was specified as <10 and ≥10 years. For analysis purposes, a variable combining nativity status and length of residence in the United States was created and coded as island/foreign-born with <10 years in the US, island/foreign-born with ≥10 years in the United States, and US-born.

Characteristics considered to be risk factors or potential confounders[9] and other relevant variables were included in these analyses. These variables were included: age (categorized as 18–24, 25–44, 45–64, and 65 years and older); sex (male, female); marital status (married, divorced, widow, single); language spoken at home (English, Spanish and other); education (less than high school, high school graduate/GED, some college/technical school, and college graduate); income-to-poverty ratio (<200%, ≥200%, and missing); health insurance coverage (yes/no); BMI (<25kg/m^2, 25.0 to <30.0, and ≥30.0); smoking status (current, former, never); and diabetes (yes/no). Additionally, because neighborhood racial/ethnic composition and percentage of foreign-born have been associated with social support and health advantages among Hispanics,[10–14] tertiles for the proportion of minority, Hispanics and foreign-born individuals residing in each UHF or neighborhood (hereafter, neighborhood) were calculated using US 2000 Census[15] data. Neighborhoods were categorized into low (percentage of minority <40.82%, Hispanics <13.32% and foreign-born <31.02%), medium (minority 40.82% to 75.97%; Hispanics 13.32% to 28.03%; foreign-born 31.02% to 40.5%) and high (minority ≥75.97%; Hispanics ≥ 28.03% and foreign-born ≥40.5%).

Out of 26,757 survey participants, records were excluded if they were missing information on BMI (n=1675), marital status (n=191), health insurance (n=187), smoking (n=144), education (n=128), race/ethnicity (n=93), language spoken at home (n=66), diabetes (n=46), age (n=30), nativity status (n=13) and hypertension (n=59). These exclusions yielded a final sample of 24,125 records distributed across 42 neighborhoods in NYC.

Statistical Analysis

Prevalence estimates for self-reported hypertension were calculated according to race/ethnicity. To determine significant differences between groups, chi-square statistics (categorical vari-

ables) and *t* tests for multiple comparisons (continuous variables) were used. Log-binomial regression was used to estimate the strength of the association between race/ethnicity and hypertension among NYC adults (Puerto Rican, Mexican American, Cuban, Dominican, Central and South American, other Hispanic, Asian, Black, and other non-Hispanic vs White) before and after adjusting for selected covariates. In addition to the crude prevalence ratio (PR), the following models were fitted: 1) PRs adjusted for age, sex, marital status, nativity status/length of residence in the United States and language spoken at home (Model 1); 2) PRs additionally adjusted for BMI, smoking and diabetes (Model 2); and 3) Model 2 additionally adjusted for health insurance, education and poverty-to-income ratio (Model 3). In addition, Model 3 was adjusted for a) proportion of minority and foreign-born in the UHF; and b) proportion of Hispanics and foreign-born in the UHF. Interaction terms of nativity status/length of residence in the United States, education, poverty-to-income ratio and proportion of minority with race/ethnicity were tested. Finally, for Hispanics, interaction terms were tested of language spoken at home and proportion of Hispanics in the UHF with race/ethnicity. A *P* value of .10 was used to assess the interaction terms.

Data management procedures were carried out using SAS (SAS Institute, Cary, NC), and statistical analyses were conducted with SUDAAN (RTI, Research Triangle Park, NC), which takes into account the complex sampling design yielding unbiased standard error estimates. In addition, due to the hierarchical nature of the sample (individuals within UHF) and consistent with previous studies,[16,17] SUDAAN allowed to fit marginal models using a generalized estimating equation (GEE) approach to account for possible residual intra-neighborhood correlations in outcomes.[18,19]

RESULTS

The overall unadjusted prevalence of hypertension in NYC adults was 29.9% (SE: 0.34). However, there was a great deal of variation across Hispanic subgroups with unadjusted prevalence estimates ranging from 10.7% for Mexican Americans to 30.4% for Puerto Ricans (Table 1). The pattern, although attenuated, continued after age-adjustment. Regardless of their race/ethnicity, the prevalence of hypertension was generally associated with age, sex, marital status, nativity status, education, poverty status, health insurance, BMI, smoking status and diabetes. Moreover, the prevalence of hypertension was associated with language spoken at home among Puerto Ricans, Cubans, Dominicans, Asians and Whites.

Table 2 shows unadjusted and adjusted prevalence ratios (PR) with corresponding 95% CI for hypertension according to race/ethnicity. In the unadjusted analysis, compared to Whites, Mexican Americans, Central and South Americans and Asians had lower probability of reporting hypertension while Puerto Ricans and Blacks had higher probability of reporting hypertension. After adjusting for all sociodemographic and health-related characteristics (Model 3), Puerto Ricans, Dominicans and Blacks had 17% (95%CI:1.06–1.29), 28% (95%CI: 1.11–1.47) and 34% (95% CI:1.1.26–1.42) greater probability, respectively, of reporting hypertension than Whites. NYC adults who identified their race as ''other'' regardless of ethnicity were at least 20% more likely to report hypertension than Whites. The additional adjustment for proportion of non-Hispanics, Hispanics and foreign-born residing in the neighborhood did not change these estimates (data not shown).

The association between race/ethnicity and hypertension differs with nativity status/length of residence in the United States only ($P=.08$; Table 3). When compared to Whites, island/foreign-born Cubans with <10 years living in the United States had a 131% (95% CI:1.00–5.37) greater probability of reporting hypertension after controlling for all covariates. Island/foreign-born Puerto Ricans and Dominicans living in the United States for ≥ 10 years had 27% (95% CI:1.09–1.49) and 43% (95% CI:1.19–1.71) greater probability of reporting hypertension than Whites after controlling for all covariates. Blacks reporting being US- or Island/foreign-born with ≥ 10 years in the United States had at least a 31% greater probability of reporting hypertension than Whites.

DISCUSSION

Our study shows that the probability of reporting hypertension was higher for Puerto Ricans and Dominicans when compared to Whites. Moreover, the association between race/ethnicity and hypertension appears to vary with nativity status/length of residence in the U.S.: the probability of reporting hypertension was greater for island/foreign-born Cubans living in the U.S. for <10 years and for island/foreign-born Puerto Ricans and Dominicans living the US for ≥ 10 years than for Whites. Finally, Blacks reporting being US- or Island/foreign-born with ≥ 10 years in the U.S. were more likely to report hypertension than Whites.

Previous studies suggest that non-Hispanic Blacks had higher prevalence of hypertension and Mexican Americans had prevalence of hypertension lower than or similar to prevalence of hypertension in non-Hispanic Whites.[20–26] For instance, Cutler et al, using data from NHANES 1999–2004, found that Mexican Americans (27.1%) exhibited prevalence of hypertension similar to non-Hispanic Whites (27.4%) and much lower than non-Hispanic Blacks (40.8%).[26] This pattern persists regardless of sex. However, a recent study using NHIS data for years 1997–2005 suggests

Table 1. Prevalence of hypertension[a,b,c] for selected characteristics among Hispanic subgroups, Asians, non-Hispanic Blacks and non-Hispanic Whites: The NYC CHS 2006–2008

Characteristics	Puerto Rican (*n*=2,085)	Mexican American (*n* =406)	Cuban (*n* =148)	Dominican (*n*=1,430)	Central & South American (*n*=1,119)	Other Hispanic (*n*=364)	Asian (*n*=1,698)	Non-Hispanic White (*n*=10,196)	Non-Hispanic Black (*n*=6,072)	Other non-Hispanic (*n*=607)
Unadjusted	30.4 (1.27)	10.7 (1.89)	26.7 (1.43)	26.8 (1.43)	17.6 (1.32)	26.6 (3.20)	19.3 (1.11)	25.3 (0.50)	32.1 (0.75)	26.2 (2.21)
Age-adjusted	32.1 (1.17)	22.3 (2.90)	25.0 (3.75)	32.1 (1.34)	22.3 (1.37)	29.9 (3.34)	23.7 (1.14)	20.9 (0.45)	33.5 (0.70)	27.9 (2.07)
Socio-demographic										
Age group										
18–24	9.1 (3.11)	4.3 (3.25)[d]	-	5.6 (2.15)	7.4 (2.91)	16.8 (11.2)[d]	5.2 (2.03)	5.4 (1.51)	7.1 (1.46)	10.1 (5.44)
25–44	17.1 (1.77)	10.9 (2.38)	12.0 (5.99)[d]	14.9 (1.97)	10.6 (1.64)	14.7 (3.85)	10.3 (1.40)	9.4 (0.66)	18.3 (1.07)	10.4 (2.63)
45–64	46.4 (2.09)	29.1 (7.12)	45.0 (8.80)	51.0 (2.61)	28.5 (2.71)	37.5 (5.69)	31.8 (2.25)	31.4 (0.87)	48.9 (1.28)	42.6 (4.13)
65+	63.1 (3.04)	10.0 (10.2)[d]	53.4 (9.48)	63.7 (4.36)	48.7 (4.87)	61.7 (7.13)	57.5 (3.84)	53.0 (1.05)	69.4 (1.61)	61.1 (6.09)
Sex										
Male	27.6 (2.00)	10.2 (2.65)	32.0 (8.08)[d]	23.5 (2.42)	16.0 (1.92)	25.3 (5.08)	20.8 (1.67)	26.1 (0.77)	28.1 (1.18)	20.0 (3.05)
Female	32.5 (1.63)	11.2 (2.66)	22.1 (5.13)	29.2 (1.74)	19.3 (1.80)	28.1 (3.69)	17.7 (1.44)	24.6 (0.65)	35.0 (0.96)	31.0 (3.04)
Marital status										
Married	31.9 (1.27)	11.2 (2.45)	28.3 (7.70)	27.9 (2.10)	16.9 (1.83)	23.2 (4.04)	21.2 (1.42)	23.5 (0.66)	32.0 (1.25)	24.9 (3.26)
Divorced	40.6 (2.86)	16.4 (6.35)[d]	47.6 (10.2)	41.5 (3.21)	27.5 (3.63)	30.3 (6.80)	28.9 (4.86)	32.6 (1.53)	44.9 (1.77)	41.5 (6.00)
Widow	59.6 (3.92)	-	38.9 (14.1)	48.2 (6.89)	46.0 (7.41)	71.5 (7.38)	60.1 (6.77)	52.7 (1.53)	71.4 (2.09)	37.9 (7.26)
Single	16.9 (1.77)	6.6 (2.38)	13.5 (6.17)	12.9 (2.17)	9.4 (1.91)	20.1 (7.45)	10.2 (1.74)	16.6 (0.95)	19.4 (1.06)	17.8 (3.56)
Nativity status										
US-born	20.7 (1.54)	12.2 (5.44)[d]	9.3 (3.75)	6.0 (1.51)	12.2 (3.77)	27.6 (6.04)	11.5 (2.51)	24.0 (0.56)	32.7 (0.97)	27.0 (2.76)
Island/Foreign Born	45.1 (2.03)	10.5 (2.00)	42.5 (7.17)	32.2 (1.67)	18.6 (1.40)	25.9 (3.46)	20.9 (1.23)	29.2 (1.10)	31.1 (1.17)	25.3 (3.50)
< 10 years	30.9 (7.89)	5.9 (2.21)	43.6 (20.1)[d]	17.5 (3.51)	9.0 (2.37)	10.8 (4.61)[d]	11.8 (2.06)	14.5 (1.83)	11.8 (1.84)	20.8 (7.43)
≥ 10 years	45.9 (2.10)	15.2 (3.30)	42.1 (7.19)	36.1 (1.89)	21.8 (1.67)	32.6 (4.29)	24.4 (1.49)	33.3 (1.28)	35.5 (1.33)	27.0 (2.76)
Language										
English	22.7 (1.42)	9.5 (4.36)	14.7 (4.18)	18.0 (2.88)	15.7 (2.55)	26.9 (4.54)	16.1 (1.55)	24.2 (0.53)	32.1 (0.76)	26.3 (2.25)
Spanish	46.1 (2.42)	10.7 (2.07)	43.4 (8.14)	29.3 (1.64)	18.4 (1.55)	25.1 (4.84)	37.8 (31.3)[d]	11.5 (6.94)[d]	18.2 (12.9)[d]	-
Other	32.7 (11.1)	18.8 (16.9)[d]	-	16.2 (15.1)	18.7 (11.8)[d]	35.3 (11.0)	21.3 (1.53)	31.6 (1.47)	31.1 (3.47)	27.5 (9.61)[d]
Education										
< High school	43.1 (2.40)	12.8 (2.87)	34.5 (12.3)	35.2 (2.49)	23.5 (2.82)	26.5 (5.09)	33.5 (3.66)	40.4 (2.55)	40.4 (2.01)	33.8 (7.01)
High school/GED	25.3 (2.22)	7.7 (2.63)	29.1 (8.16)	24.9 (2.91)	19.1 (2.87)	37.4 (7.42)	19.7 (2.30)	32.1 (1.19)	32.4 (1.37)	27.5 (4.25)
Some college	26.6 (2.59)	9.8 (6.46)[d]	31.0 (11.2)[d]	19.6 (3.00)	14.2 (2.49)	18.8 (7.05)	13.4 (2.41)	26.2 (1.18)	31.1 (1.42)	22.3 (3.71)
≥Complete college	23.0 (2.80)	7.4 (4.58)[d]	16.7 (6.11)[d]	21.2 (2.87)	12.5 (2.00)	22.2 (5.38)	17.3 (1.53)	21.0 (0.64)	28.2 (1.39)	25.0 (3.81)
Poverty-to-income ratio										
<200%	37.9 (1.94)	10.4 (2.28)	33.2 (7.99)	30.5 (1.86)	19.2 (1.84)	17.4 (3.20)	22.7 (1.88)	37.3 (1.30)	35.9 (1.26)	31.9 (4.11)
≥200%	23.2 (1.81)	13.4 (4.43)[d]	21.5 (5.70)	17.8 (2.31)	16.5 (2.22)	34.1 (5.76)	15.8 (1.41)	21.6 (0.57)	29.9 (1.02)	22.8 (2.75)
Missing	26.5 (3.55)	9.7 (4.21)[d]	18.0 (9.29)[d]	26.3 (4.49)	13.1 (3.23)	41.0 (10.5)	20.6 (3.46)	27.4 (1.51)	28.7 (2.17)	26.0 (7.26)
Health Insurance										
Yes	31.1 (1.36)	12.7 (3.14)	30.7 (5.40)	29.4 (1.63)	21.0 (1.75)	30.1 (4.01)	20.0 (1.23)	26.2 (0.53)	34.4 (0.83)	28.9 (2.55)
No	26.9 (3.74)	10.2 (2.37)	8.2 (5.12)[d]	17.2 (3.05)	11.7 (1.89)	18.2 (4.81)	15.7 (2.77)	15.6 (1.59)	20.9 (1.61)	13.3 (3.73)

Table 1. Continued

Characteristics	Puerto Rican (*n*=2,085)	Mexican American (*n* =406)	Cuban (*n* =148)	Dominican (*n*=1,430)	Central & South American (*n*=1,119)	Other Hispanic (*n*=364)	Asian (*n*=1,698)	Non-Hispanic White (*n*=10,196)	Non-Hispanic Black (*n*=6,072)	Other non-Hispanic (*n*=607)
Health-related										
BMI										
< 25.0	19.1 (2.07)	10.4 (2.99)	17.6 (7.54)[d]	17.4 (1.94)	9.9 (1.55)	25.4 (5.83)	13.3 (1.12)	15.2 (0.60)	18.8 (1.01)	15.3 (2.59)
25.0–<30	28.2 (1.96)	8.0 (2.34)	27.1 (6.79)	27.9 (2.34)	16.5 (1.93)	22.7 (3.86)	28.1 (2.59)	29.1 (0.89)	32.2 (1.22)	29.2 (4.23)
> 30	43.1 (2.38)	14.8 (4.76)[d]	42.8 (11.3)	40.9 (3.48)	34.5 (3.75)	36.6 (7.61)	41.8 (5.24)	45.2 (1.42)	46.5 (1.51)	46.5 (5.22)
Smoking Status										
Current	26.2 (2.42)	17.5 (7.02)[d]	27.0 (13.3)	23.6 (3.75)	12.3 (3.09)	24.1 (7.19)	19.8 (3.59)	22.2 (1.20)	32.9 (1.89)	23.0 (4.36)
Former	38.7 (2.86)	9.9 (3.31)[d]	37.8 (9.38)	39.8 (5.18)	18.7 (2.99)	38.2 (9.17)	27.5 (3.49)	30.2 (0.89)	49.0 (2.07)	39.9 (5.68)
Never	29.5 (1.74)	9.2 (2.08)	23.0 (4.99)	25.6 (1.59)	18.4 (1.64)	24.7 (3.80)	17.8 (1.21)	23.5 (0.71)	28.1 (0.86)	23.5 (2.74)
Diabetes										
Yes	65.7 (3.28)	56.7 (12.0)	88.0 (8.12)	69.0 (4.46)	46.7 (5.94)	65.7 (9.51)	54.9 (4.60)	64.4 (2.01)	73.3 (1.89)	61.8 (6.35)
No	24.1 (1.29)	7.5 (1.54)	20.8 (4.11)	22.8 (1.42)	15.3 (1.31)	22.2 (3.16)	16.2 (1.08)	22.4 (0.50)	27.1 (0.76)	21.2 (2.19)
Contextual (UHF-level)										
% of non-Hispanics										
Low	32.8 (2.86)	11.1 (4.73)[d]	33.7 (14.2)[d]	20.0 (3.33)	19.7 (3.53)	28.9 (7.48)	16.3 (1.81)	22.9 (0.70)	29.3 (1.64)	29.5 (4.43)
Middle	30.3 (2.53)	12.7 (3.21)	26.0 (6.07)	24.1 (2.77)	16.6 (1.76)	24.2 (4.84)	21.4 (1.68)	28.1 (0.90)	31.6 (1.33)	23.7 (3.61)
High	29.5 (1.69)	8.0 (2.29)	23.7 (6.40)	28.9 (1.85)	18.2 (2.27)	24.5 (4.79)	17.6 (2.21)	26.4 (1.18)	33.6 (1.08)	27.6 (3.29)
% of Hispanics										
Low	29.0 (2.79)	6.4 (2.18)[d]	35.3 (12.9)[d]	23.4 (4.00)	21.4 (3.20)	27.4 (6.44)	19.0 (1.91)	26.7 (0.81)	29.0 (1.20)	26.7 (3.97)
Middle	29.7 (2.80)	22.1 (8.48)[d]	23.5 (9.28)[d]	21.5 (2.90)	16.5 (3.02)	29.2 (7.70)	20.2 (1.88)	23.6 (0.92)	33.8 (1.19)	28.1 (3.44)
High	31.0 (1.65)	9.8 (2.10)	24.2 (5.34)	28.4 (1.74)	17.0 (1.63)	25.0 (3.87)	18.7 (1.92)	25.1 (0.90)	33.3 (1.54)	24.6 (3.79)
% of Foreign Born										
Low	28.9 (3.29)	13.8 (7.77)[d]	17.8 (8.64)[d]	27.7 (4.01)	17.7 (4.18)	41.3 (10.6)	15.6 (2.23)	20.1 (0.77)	33.3 (1.32)	26.4 (4.21)
Middle	32.6 (2.10)	10.2 (2.97)	19.7 (6.18)[d]	26.7 (2.68)	15.9 (2.14)	22.1 (4.46)	23.0 (2.07)	28.4 (0.94)	32.5 (1.31)	29.6 (3.57)
High	29.0 (1.79)	10.2 (2.29)	33.9 (7.42)	26.7 (1.86)	18.3 (1.74)	25.9 (4.30)	18.1 (1.56)	29.2 (0.89)	30.8 (1.23)	24.2 (3.53)

a Unadjusted prevalence and standard errors.

b All *P* values for chi-square of independence were <.01 with the exception of % of Hispanics in UHF (.94).

c All *P* values for Cochran-Mantel-Haenszel chi-square within Hispanic subgroups and non-Hispanic (NH) groups were <.05 with the exception of sex for Puerto Ricans, Mexican Americans, Cubans, Dominicans, Central & South (C&S) Americans, other Hispanics, Asians and NH whites; marital status for Mexicans Americans and Cubans; nativity status for Mexican Americans, C&S Americans, Other Hispanics, NH Blacks and other non-Hispanics; length of residence in the United States for Puerto Ricans, Cubans and other non-Hispanics; language spoken at home for Mexican Americans, C&S Americans, other Hispanics, NH Blacks and other non-Hispanics; education for Mexican Americans, Cubans, other Hispanics and other non-Hispanics; poverty for Mexican Americans, Cubans, C&S Americans and other non-Hispanics; health insurance for Puerto Ricans, Mexican Americans, Cubans, other Hispanics and Asians; BMI for Mexican Americans, Cubans and other Hispanics; smoking status for Mexican Americans, Cubans, C&S Americans and other Hispanics; % of Hispanics in UHF for Puerto Ricans, Mexican Americans, Cubans, Dominicans, C&S Americans, other Hispanics, Asians and other non-Hispanics; % of non-Hispanics in UHF all groups but Whites; % of foreign born in UHF for Puerto Ricans, Mexican Americans, Cubans, Dominicans, C&S Americans, other Hispanics, NH blacks and other non-Hispanics.

d Estimates unreliable due to relative standard error ≥30%.

Table 2. Crude and adjusted prevalence ratios (95% CI)[a] for hypertension for Hispanic subgroups, Asians, non-Hispanic Blacks and non-Hispanic Whites: The NYC CHS 2006–2008

	Prevalence Ratios (95%CI)			
	Crude	Model 1	Model 2	Model 3
Puerto Rican	1.20 (1.10–1.31)	1.50 (1.36–1.64)	1.21 (1.10–1.33)	1.17 (1.06–1.29)
Mexican American	0.42 (0.30–0.60)	1.07 (0.81–1.42)	0.89 (0.67–1.17)	0.93 (0.70–1.22)
Cuban	1.06 (0.75–1.50)	1.19 (0.88–1.63)	1.11 (0.84–1.46)	1.07 (0.81–1.42)
Dominican	1.06 (0.95–1.18)	1.48 (1.29–1.70)	1.32 (1.15–1.52)	1.28 (1.11–1.47)
Central and South American	0.70 (0.60–0.81)	1.03 (0.87–1.22)	0.93 (0.79–1.10)	0.93 (0.79–1.10)
Other Hispanic	1.05 (0.83–1.33)	1.40 (1.11–1.76)	1.27 (1.01–1.59)	1.27 (1.01–1.59)
Asian	0.76 (0.68–0.86)	1.04 (0.92–1.17)	1.12 (1.00–1.25)	1.11 (0.99–1.24)
Non-Hispanic White	1.00	1.00	1.00	1.00
Non-Hispanic Black	1.27 (1.19–1.34)	1.60 (1.51–1.70)	1.36 (1.28–1.44)	1.34 (1.26–1.42)
Other non-Hispanic	1.03 (0.87–1.23)	1.35 (1.17–1.57)	1.22 (1.06–1.42)	1.21 (1.04–1.40)

a Crude association between race/ethnicity and self-reported hypertension (Crude); prevalence ratios adjusted for age (continuous), sex, marital status, nativity status/length of residence in the United States and language spoken at home (Model 1); additionally adjusted for BMI, smoking status and diabetes (Model 2); and Model 2 additionally adjusted for health insurance, education and poverty-to-income ratio (Model 3).

that Mexican Americans may not represent the prevalence of hypertension for the Hispanic population.[6] This study showed that while Mexicans, Mexican Americans and Central and South Americans had lower odds of reporting hypertension, Dominicans had greater adjusted odds of reporting hypertension than Whites. Consistent with these findings, our study shows that Puerto Ricans and Dominicans have a greater probability of reporting hypertension than Whites and are more similar to reporting from Blacks. It is worth noting that Puerto Ricans and Dominicans have the stronger African ancestry exposing them to racial discrimination. In fact, several studies have underscored the importance of race or skin color among Puerto Ricans[27,28] and Hispanics as a whole on health outcomes.[29–31]

Previous studies show that foreign-born Hispanics and Asians have better health profiles than their US-born counterparts.[32–35] These paradoxical findings are observed despite their low socioeconomic position and lack of insurance coverage. While this paradox has been examined mostly among Mexican Americans,[36–39] a recent study using NHIS data suggests that US-born Mexicans, Mexican Americans and Cubans had lower odds of reporting hypertension than non-Hispanic Whites.[6] However, the same study found that when length of residence in the United States was accounted for, island/foreign-born Dominicans residing ≥10 years in the United States exhibited a 69% increased odds of reporting hypertension when compared to non-Hispanic Whites. Consistent with this study,[6] our study found that island/foreign-born Cubans with <10 years in the United States as well as Puerto Ricans and Dominicans living in the United States for ≥10 years exhibited higher probability of reporting hypertension than Whites. These findings may suggest that the paradox should not be seen as 'one size fits all' with all Hispanics exhibiting similar or

Table 3. Adjusted prevalence ratios (95% CI)[a] for hypertension for Hispanic subgroups, Asians, non-Hispanic Blacks and non-Hispanic Whites according to nativity status: The NYC CHS 2006–2008

	Nativity Status		
		Island/Foreign-born	
	US-born	<10 years	≥ 10 years
Puerto Rican	1.11 (0.98–1.27)	1.70 (0.69–4.18)	1.27 (1.09–1.49)
Mexican American	1.13 (0.64–1.98)	0.88 (0.36–2.13)	1.03 (0.73–1.43)
Cuban	0.70 (0.38–1.32)	2.31 (1.00–5.37)	1.17 (0.83–1.65)
Dominican	0.80 (0.54–1.19)	1.32 (0.64–2.72)	1.43 (1.19–1.71)
Central and South American	1.18 (0.79–1.75)	0.90 (0.43–1.90)	0.97 (0.80–1.18)
Other Hispanic	1.43 (0.96–2.14)	1.09 (0.48–2.51)	1.24 (0.94–1.62)
Asian	1.21 (0.90–1.64)	1.25 (0.82–1.89)	1.08 (0.95–1.23)
Non-Hispanic White	1.00	1.00	1.00
Non-Hispanic Black	1.31 (1.22–1.42)	1.16 (0.74–1.82)	1.40 (1.24–1.58)
Other non-Hispanic	1.15 (0.96–1.38)	1.78 (0.82–3.84)	1.23 (0.95–1.59)

a Prevalence ratios adjusted for age (continuous), sex, marital status, language spoken at home, BMI, smoking status, diabetes, health insurance, education and poverty-to-income ratio.

Our study shows that the probability of reporting hypertension was higher for Puerto Ricans and Dominicans when compared to Whites.

protective effects relative to Whites. Consistent with studies examining nativity status,[33,40] Blacks reporting being US- or island/foreign-born with ≥10 years have a higher probability of reporting hypertension compared to Whites. While few national[32,33,41] and local[42] studies have reported estimates of hypertension for Asians, our findings are consistent with these studies suggesting that Asians have similar prevalence of hypertension to Whites, regardless of nativity status.

Among the strengths of this study were the use of data from a large representative sample allowing for the ability to control for confounders and examine interactions and having information on a range of risk behaviors and lifestyles available on several Hispanic subgroups in NYC. An important limitation was the self-reported nature of hypertension. However, self-reported data for hypertension have been shown to be highly correlated with physician's records.[43,44] Moreover and consistent with previous studies,[42,45] our prevalence of hypertension (29.9%) was higher than the prevalence found in the NYC Health Nutrition and Examination Survey 2004 (25.6%) using objective measures of systolic and diastolic blood pressure. Thus, it is unlikely that our estimates are biased downward. Another limitation is the use of landline telephone only to reach survey participants. Individuals who are reachable this way might be different from other NYC residents. The latter may have under- or over-estimated our results. Another limitation was the small sample size for Cubans (n=148), Mexican Americans (n=406) and other Hispanics (n=364) and the possibility of sampling weight inflation. However, we repeated the analyses without the weights and the results remained nearly identical to the ones presented in Table 2. Finally, the exclusion of records with missing data (n=2,632) may have biased our results. We compared the records included to those excluded and found that those excluded were more likely to be female and non-White but less likely to be Mexican American. Given the association of sex and race/ethnicity with the prevalence of hypertension (Table 2), these exclusions may have underestimated our results.

CONCLUSION

This study calls attention to the heterogeneity in the prevalence of hypertension in the Hispanic population in NYC. The findings for Puerto Ricans and Dominicans of a higher probability of reporting hypertension underscore the need for data collection of health information beyond the traditional racial/ethnic categories.[7] Moreover, the findings associated with nativity status for Puerto Ricans and Dominicans contradict the Hispanic paradox[36,37, 39] underscoring the diversity of the Hispanic population and the danger of ignoring this diversity when presenting aggregate data for this population. The risk of using the aggregate data on Hispanics is exacerbated when these data are used to extrapolate to geographic areas in which the highest proportion of Hispanics are not represented by the subgroups with the lowest or highest prevalence of hypertension. The aggregation issue is also relevant to NYC Asians and Blacks, which are very heterogeneous populations regarding subgroups and nativity status. Disaggregation within these groups can help our understanding of the causes of health disparities and will help us develop initiatives to address them.

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