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Disparities in Self-reported hypertension in Hispanic subgroups, non-Hispanic blacks and non-Hispanic whites: The National Health Interview Survey

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Abstract

PURPOSE—To investigate the prevalence of self-reported hypertension in Hispanic subgroups and non-Hispanics adults in the National Health Interview Survey for years 1997 to 2005, we examine 279,387 records, including 48,630 records for Hispanics.

METHODS—Self-reported hypertension was ascertained through the question, “Have you ever been told by a doctor or health professional that you have hypertension, also called high blood pressure?” Logistic regression was used to assess the strength of association between race/ethnicity (Puerto Rican, Mexican, Mexican American, Cuban, Dominican, Central & South American, other Hispanic, and non-Hispanic blacks versus non-Hispanic whites) and self-reported hypertension before and after adjusting for selected characteristics.

RESULTS—After adjusting for selected socio-demographic and health-related characteristics, Dominicans and non-Hispanic blacks had 67% (95% CI:1.23–2.27) and 48% (95% CI:1.41–1.56) greater odds of reporting hypertension than non-Hispanics whites. In contrast, Mexicans (OR:0.73; 95% CI:0.65–0.82), Mexican Americans (OR:0.80; 95% CI:0.72–0.88) and Central & South Americans (OR:0.80; 95% CI:0.69–0.93) had lower odds of reporting hypertension than non-Hispanic whites. The association between race/ethnicity and self-reported hypertension differs with sex, nativity status/length of stay in the U.S. and education.

CONCLUSION—This study underscores the need for data disaggregation beyond the existing racial/ethnic categories in the U.S. to reflect the heterogeneity and health disparities masked not only for the population under the Hispanic category but also for populations under other categories considered homogenous.

Keywords

Self-reported hypertension; race/ethnicity; Hispanic subgroups; NHIS

Hypertension affects over 65 million adults 18 years and older,¹ and it is a major risk factor for cardiovascular disease.^{2, 3} In addition, the prevalence of hypertension in the U.S.

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population has 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 Hispanics have a lower prevalence of hypertension while non-Hispanic blacks have a higher prevalence of hypertension than non-Hispanic whites.^{1, 2, 4–7} For instance, NHANES 1999–2004 data show that Mexican Americans exhibited similar age-adjusted hypertension prevalence estimates (28.3%, 24.1% and 27.8 for 1999–2000, 2001–2002 and 2003–2004, respectively) as whites (27.2%, 26.4% and 28.53%).² Although outdated, hypertension data from the Hispanic Health and Nutrition Examination Survey (HHANES, 1982–1984) on Mexican Americans, Cubans and Puerto Ricans indicate that Puerto Ricans (13.6%) had lower prevalence of hypertension than Mexican Americans (15.5%) and Cubans (19.2%).⁸ Despite lower hypertension prevalence, recent hypertension-related mortality data among Hispanic subpopulations show that the age-adjusted mortality rate of Puerto Rican adults aged 25 years and older was higher (154.0 per 100,000 population) than Mexican Americans (134.5) and Cubans (82.5) in 2002.⁹ However, most recent national data on Mexican Americans ignores the heterogeneity of the Hispanic population. Thus, given the diversity as well as rapid and continuous growth of the Hispanic population, studies presenting information on Hispanic subgroups other than Mexican Americans are imperative and may contribute to our understanding of the health of the Hispanic population.

To the best of our knowledge, the National Health Interview Survey (NHIS) is the only national data available with a range of information on socio-demographic, health and health-related factors on several racial/ethnic groups and subgroups, including Hispanic subgroups. Thus, the availability of these data affords the opportunity to ascertain the prevalence of self-reported hypertension in Hispanic subgroups and non-Hispanic adults 18 years and older before and after adjusting for selected characteristics using NHIS data for years 1997 through 2005. Specifically, this paper will present data on self-reported hypertension for Hispanic subgroups including Puerto Rican, Mexican, Mexican American, Cuban, Dominican, Central & South American and other Hispanic, and non-Hispanic blacks and whites.

METHODS

The NHIS is a national survey that uses a three-stage stratified cluster probability sampling design to conduct annual face-to-face household interviews of the U.S. non-institutionalized civilians. A complete description of the survey description, plan and design has been provided elsewhere.^{10, 11} In short, the NHIS contains a core set of questions (repeated yearly) and supplemental questions/modules. For this study, data were extracted from the Public-Use Person and Sample Adult files for years 1997 to 2005 and included the records of adults aged 18 years and older, yielding a sample of 289,707. The Person file includes a wide range of information asked to an adult in the household for all members of the household, while the Adult file includes more specific information including health and health-related information on a random chosen adult 18 years and older in the household. 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.

Self-reported Hypertension, the outcome, was collected using 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 established from the question, “Do any of these groups represent (Person)’s national origin or ancestry?” with Hispanic as a Yes/No choice for the years 1997 and 1998 and “Do you consider yourself Hispanic/Latino?” with choices of Yes/No for the years 1999 to 2005. In addition, for participants who answered “Yes” to the ethnicity question, a follow-up question was asked to query about the number of the group that represents the participants’ country of origin or ancestry. The following choices were offered: multiple Hispanic, Puerto Rican, Mexican-

Mexicano, Mexican-American (Including Chicano), Cuban/Cuban-American, other Latin American, other Spanish, Hispanic/Spanish non-specific type, Hispanic/Spanish type refused, Hispanic/Spanish type not ascertained, Hispanic/Spanish type don't know and not Hispanic/Spanish origin. In 1999, the following choices were added: Dominican (Republic) and Central and South American. Race was determined from two 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 one race to the first question, where the choices were White, Black/African American, Asian, American Indian and Alaska Native, Native Hawaiian and Pacific Islander, and Other. For these analyses, race/ethnicity was defined as Puerto Rican, Mexican, Mexican American, Cuban, Dominican, Central & South American, other Hispanic, non-Hispanic black and non-Hispanic white. Mexicans and Mexican Americans were kept as separate groups in the analyses because their identification as two distinct groups may represent issues associated with identity, acculturation/assimilation and a sense of ownership of their culture regardless of whether they were born in the U.S. or Mexico. The analytical sample size comprised 279,387 records of adults 18 years and older, including 48,630 records for Hispanics.

Variables considered as risk factors or potential confounders in hypertension studies³ were included in these analyses. Sex (male/female) and U.S. region of residence (Northeast, Midwest, South and West) were included in the analysis as collected by NHIS. Age was included in the analysis as continuous and categorical (18–45 and 46 years and older). Marital status was specified as married, divorced, widowed or single. Nativity status was categorized as U.S.-born (individuals born in the 50 U.S. states and the District of Columbia) and island/foreign-born (individuals born in Puerto Rico, Guam, and other outlying territories of the U.S. and persons not born in the U.S.). The island/foreign-born respondents were asked how long they had been in the U.S., with categories ranging from less than one year to 15 years or more. For analytic purposes, a variable combining nativity status and length of stay in the U.S. was created and coded as island/foreign-born with less than five years in the U.S., island/foreign-born with 5 to 9 years in the U.S., island/foreign-born with ten or more years in the U.S., and U.S.-born. To adjust for any potential differences in hypertension prevalence or awareness over the nine years of the aggregated data, a variable for survey year was created and included in the analysis.

Health insurance was collected using a detailed question regarding multiple sources of insurance and coded as private, public and non-coverage. Education was collected as a continuous variable, and based on its distribution in the study population, was categorized as less than high school, high school graduate or general equivalency diploma (GED), some college and college graduate and higher. Income was collected by asking each participant to select his/her total annual income from 12 categories (ranging from \$0 to \$75,000 and over as well as a refusal category) and was adjusted to the year 1997 income using the inflation calculator developed by the Consumer Price Index.¹² Specifically, the incomes in NHIS 1997–2005 were adjusted to the equivalent dollar amount in NHIS 1997, with income categorized as <\$20,000; \$20,000 to \$34,999; \$35,000 to \$54,999; and ≥\$55,000. Due to the large number of missing values for this variable, NHIS multiple imputation income files were used for these analyses.¹³ Occupation was recoded into six categories using the U.S. Census^{14, 15} 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 was collected 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 (BMI), calculated using self-reported weight and height (kg/m²), was

categorized as less than 25.0 kg/m² (underweight and healthy weight) and greater than 25.0 kg/m² (overweight including obese).^{16, 17} Leisure-time physical activity, defined as vigorous activities for at least ten minutes that cause heavy sweating or large increases in breathing or heart rate, was categorized at least five times a week; six or more times a week; 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 the NHIS.

Statistical Analysis

Descriptive statistics for the characteristics of the population and prevalence of hypertension were calculated by race/ethnicity. Significant differences were determined by using chi-square statistics (categorical variables) and t-tests for multiple comparisons (continuous variables).

Logistic regression was used to assess the strength of association between race/ethnicity and self-reported hypertension before and after adjusting for selected characteristics. Specifically, we were interested in examining the contribution of demographic characteristics, health-related factors as well as socioeconomic indicators and access to care to the association of interest. Thus, the following models were fitted: 1) crude odds ratios (Crude ORs); 2) ORs adjusted for age, sex, marital status, survey year, U.S. region of residence and nativity status/length of stay in the U.S. (Model 1); 3) ORs additionally adjusted for BMI (continuous), physical activity, smoking, alcohol consumption and diabetes (Model 2); and 4) ORs additionally adjusted for health insurance, education, income and occupation (Model 3). To determine whether the strength of the association observed between race/ethnicity and self-reported hypertension differed according to sex, education and income, interaction terms were tested in separate fully-adjusted model to avoid issues of multicollinearity. In addition, an interaction term between race/ethnicity and nativity status/length of stay in the U.S. was tested. The number of records available for the multivariable logistic regression varied according to the covariates included in the model.

All data management procedures were carried out with SAS.¹⁸ Statistical analyses were conducted using SUDAAN¹⁹ because of its ability to take into account 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 analyses, data from the nine survey years were first combined and then a new weight variable was created to average the population size across the nine years. (Personal communication, Zakia Coriaty Nelson, Epidemiologist, Centers for Disease Control and Prevention, National Center for Health Statistics, 2006 May 18.). Sample sizes presented in Table 1 were unweighted, but all other estimates (means, proportions, standard errors, and ORs with their 95 percent (%) confidence intervals, CI) were weighted.

RESULTS

Hispanic subgroups and non-Hispanic blacks were more likely to report having less than a high school education, earn less than \$20,000 annually, be uninsured and be physically inactive than non-Hispanic whites (Table 1). With the exception of Cubans, Hispanic subgroups and non-Hispanic blacks were younger than non-Hispanic whites. Moreover, Hispanic subgroups and non-Hispanic blacks were less likely to report being employed in managerial and professional jobs and have private insurance. Among Hispanic subgroups, Mexicans were more likely to report being male, married, live in the West, hold less than a high school degree, earn less than \$20,000 annually, be uninsured and least likely to have a managerial or professional job. Over three quarter of Mexicans, Cubans, Dominicans and Central & South Americans reported being island/foreign-born. Puerto Ricans were more likely to report currently smoking and having

diabetes while Mexican Americans were more likely to have higher mean BMI and least likely to report being foreign-born.

The overall unadjusted prevalence of hypertension was 24.4% (data not shown), where non-Hispanic blacks (30.1%) and Cubans (24.2%) exhibited the highest prevalence (Table 2). Regardless of their race/ethnicity, persons who were older, female, widowed, had less than high school education, public insurance, BMI \geq 25, former smoker and diabetic had higher prevalence of self-reported hypertension. This pattern also was observed for persons who were former drinker and physically inactive (analyses not shown). Furthermore, island-born Puerto Ricans, along with foreign-born Cubans, Dominicans and Central & South Americans reported a higher prevalence of hypertension than their U.S.-born counterparts. The opposite was true for Mexican, Mexican Americans, other Hispanics and non-Hispanic blacks.

In the unadjusted analysis, compared to non-Hispanic whites, Mexicans (OR:0.4595% CI:0.43–0.48), Mexican Americans (OR:0.71; 95% CI:0.67–0.76), Dominicans (OR:0.84; 95% CI:0.71–0.98), Central and South Americans (OR:0.45; 95% CI:0.40–0.50) and Other Hispanics (OR:0.67; 95% CI:0.60–0.75) had lower odds of reporting hypertension (Table 3). The opposite was true for non-Hispanic blacks (OR:1.36; 95% CI:1.31–1.42). After adjusting for all socio-demographic and health-related characteristics, Dominicans and non-Hispanic blacks had 67% (95% CI:1.23–2.27) and 48% (95% CI:1.41–1.56) greater odds of reporting hypertension than non-Hispanic whites. In contrast, Mexicans (OR:0.73; 95% CI:0.65–0.82), Mexican Americans (OR:0.80; 95% CI:0.72–0.88) and Central & South Americans (OR:0.80; 95% CI:0.69–0.93) had odds of reporting hypertension at least 20% lower than non-Hispanic whites.

The association between race/ethnicity and self-reported hypertension differs with sex ($P<0.0001$; data not shown) and nativity status/length of stay in the U.S. ($P=0.02$). When compared to non-Hispanic whites, Mexican (OR:0.63; 95% CI:0.54–0.74), Mexican American (OR:0.74; 95% CI:0.64–0.86) and Central & South American (OR:0.79; 95% CI:0.64–0.98) men exhibited lower odds of reporting hypertension after controlling for all covariates. Although the odds of reporting hypertension was greater in non-Hispanic black men and women than non-Hispanic whites, the odds was stronger in women (OR:1.69; 95% CI:1.58–1.80) than in men (OR:1.33; 95% CI:1.23–1.44). These estimates were nearly identical for Dominican men (OR:1.63; 95% CI:1.05–2.53) and women (OR:1.67; 95% CI:1.13–2.48). Finally, when compared to non-Hispanic whites, Dominicans and non-Hispanic blacks who were island/foreign-born with 10 years or more in the U.S. had 69% (95% CI:1.12–2.56) and 57% (95% CI:1.28–1.93) greater odds of reporting hypertension after controlling for all covariates (Table 4). The odds of reporting hypertension was lower in U.S.-born Mexicans (OR:0.76; 95% CI:0.62–0.92), Mexican Americans (OR:0.83; 95% CI:0.75–0.93) and Cubans (OR:0.53; 95% CI:0.30–0.92) than in non-Hispanic whites. The opposite was true for U.S.-born non-Hispanic blacks (OR:1.48; 95% CI:1.41–1.56).

There was evidence of a multiplicative interaction between race/ethnicity and education ($P<0.0001$): Mexicans, Mexican Americans and Central & South Americans with at least a high school diploma/GED had odds of reporting hypertension at least 39% lower than non-Hispanic whites (Table 5). In contrast, Dominicans with less than a high school education and a college degree or higher education had 69% and 216% greater odds of reporting hypertension than non-Hispanic whites. The odds of reporting hypertension was greater in non-Hispanic blacks than in non-Hispanic whites at each level of education. However, the odds was stronger in non-Hispanic blacks with less than a high school education (OR:1.52) and with a college degree or more education (OR:1.60).

DISCUSSION

To the best of our knowledge, no studies have reported national prevalence of hypertension for Hispanic subgroup other than Mexican Americans since the HHANES (1982–1984).⁸ Our study shows that there is a great deal of variability on the prevalence of self-reported hypertension across Hispanic subgroups as they relate to non-Hispanic whites. Mexicans, Mexican Americans and Central & South Americans had lower odds of reporting hypertension while Dominicans had greater odds of reporting hypertension than non-Hispanic whites. Moreover, these associations were patterned by sex, nativity status/length of stay in the U.S. and education. When compared to non-Hispanic whites, Mexican, Mexican-American and Central & South American men; U.S.-born persons who identified as Mexican, Mexican-American and Cuban; and Mexican, Mexican American and Central & South Americans with at least a high school/GED education had lower odds of reporting hypertension. In contrast, the odds of reporting hypertension was greater for Dominicans who were island/foreign-born with 10 years or more in the U.S. and had less than a high school education or more than a college education.

Previous studies suggest that non-Hispanic blacks had higher prevalence of hypertension and Hispanics had lower prevalence of hypertension than non-Hispanic whites.^{1, 2, 4–7} However, these studies have presented aggregate estimates for Hispanics ignoring the heterogeneity within this population or using data for Mexican Americans (the largest subgroup and most likely to be studied) to extrapolate to the entire Hispanic population. Data from the HHANES (1982–1984), suggest that that Puerto Ricans had lower prevalence of hypertension than Mexican Americans and Cubans.⁸ Moreover, recent hypertension-related mortality data among Hispanic subpopulations show that there is variation in mortality rates among Hispanic subgroups with Puerto Ricans exhibiting higher rate than Mexican Americans and Cubans.⁹ Our study concurs with previous studies suggesting that Mexican Americans represented by those identified as Mexicans and Mexican Americans had lower odds of reporting hypertension than non-Hispanic whites. These two groups may have different levels of acculturation/assimilation to the U.S. society through identity, country of birth and Mexican culture ownership or attachment. These issues may be related to health and may explain the differences in the odds of reporting hypertension observed for these two groups. In addition, this study shows that Central & South Americans also had lower odds of hypertension while Dominicans had greater odds of hypertension than non-Hispanic whites, and in fact, similar to non-Hispanic blacks. Central & South Americans are the youngest and the subgroup with the highest proportion of island/foreign-born persons among Hispanics. The latter may suggest a healthy migrant effect and may explain their lower odds of reporting hypertension. On the hand, Dominicans together with Puerto Ricans are more likely to identify and be identified by others as black when compared to other Hispanic subgroups.^{20–22} The latter has been associated with increased experiences of racial discrimination,²³ which in turn, may affect their social mobility and health status as it does for non-Hispanic blacks.^{22, 24–26}

Although previous studies have found that women had higher prevalence of hypertension than men, regardless of their race/ethnicity,^{1–3, 27} studies also have found similar prevalence of hypertension between Mexican-American men and women.^{1, 28} Women are more likely to access the medical system and live longer than men. It is possible that women are more likely to know that they have hypertension because of their contact with physicians. Because women are living longer than men, it is also possible that the burden of hypertension in women presents itself in the sixth decade of life during postmenopause,^{3, 29} a state that increases the risk of cardiovascular disease. Our study found that Mexican, Mexican-American, Central & South American and non-Hispanic black women had greater odds than their male counterparts.

Previous studies show that foreign-born Hispanics and Asians, in general, have better health profiles than their U.S.-born counterparts despite their low socioeconomic position and lower insurance coverage.^{30–33} These studies suggest that this paradox could possibly be attributed to a healthy migrant effect, healthy behaviors and/or cultural traditions.³⁴ However, in the case of Hispanics, this paradox has been examined mostly among Mexican Americans.^{35–37} Our study found that nativity status combined with length of stay in the U.S. modified the association between race/ethnicity and self-reported hypertension. With the exception of Dominicans, our study found that while island/foreign-born Hispanics, regardless of their length of stay in the U.S., exhibited similar odds of reporting hypertension with non-Hispanic whites, U.S.-born Mexicans, Mexican Americans and Cubans had lower odds of reporting hypertension than non-Hispanic whites. The opposite was found for island/foreign-born Dominicans with 10 years or more in the U.S., who had an increased odds of reporting hypertension. This finding is not surprising as most Dominicans were island/foreign-born in our data and at the national level.³⁸ The inconsistency of our findings with previous studies reporting a health advantage for foreign-born^{30–33} may be the result of the use of 1) aggregate data for Hispanics rather than Hispanic subgroups as we presented here; and 2) country of birth rather than country of birth combined with length of stay in the U.S. as we examined in this study. For instance, when disaggregating Hispanic subgroups we found that although Mexican Americans and Cubans are the youngest and oldest, respectively, of all Hispanic subgroups U.S.-born persons were younger than their island/foreign-born counterparts. In addition, Cubans, on the other hand, regardless of their country of birth, are the most advantaged socioeconomically of all Hispanic subgroups. Further, among Hispanics, Mexicans, Cubans, Dominicans and Central & South Americans were more likely to report being island/foreign-born with the highest proportion residing in the U.S. for 10 years or more. These variations associated with acculturation^{20, 21} have an important role on health and are usually lost when aggregate estimates for Hispanics are presented.

Previous studies suggest that the prevalence of hypertension decreases as education increases in non-Hispanic black and whites.^{39, 40} However, there was no education effect observed in Mexican Americans.⁴⁰ This study found that when compared to non-Hispanic whites, Dominicans with less than a high school education and a college degree or more education had greater odds of reporting hypertension than non-Hispanic whites. Non-Hispanic blacks at each level of education had greater odds of reporting hypertension than in non-Hispanic whites. However, the odds were stronger in non-Hispanic blacks with less than a high school education and with a college degree or more. These findings underscore that education does not translate into the same health benefits across racial/ethnic groups.⁴¹ Moreover, because Dominicans are among those most likely to identify as blacks within the Hispanic population,^{20, 21} the similarities in the strength of the association for non-Hispanic blacks and Dominicans with less than a high school education and with a college degree or more are not surprising and could indicate psychosocial stress associated with racial discrimination in these groups: Those at the lower end of the ladder may be experiencing the deleterious effects of belonging to two low status groups with relation to hypertension,⁴² (i.e., being a minority with low education), while those with high education may be more aware of the effects of racial discrimination or may be exposed to environments with increased exposure to racial discrimination.

Among the strengths of this study are the use of nine years of a national representative sample using the same sampling and data collection methodology; the range of data on health outcomes, risk behaviors and lifestyles available in the NHIS; the large sample size which allows the ability to control for numerous potential confounders and examine interactions; and the collection of information on several Hispanic subgroups in the U.S. Important limitations are the cross-sectional nature of the data precluding any inferences regarding cause and effect and the self-reported nature of the data collection. However, self-reported data for hypertension have been shown to be highly correlated with physician's records.^{43–45} Moreover, the

unadjusted prevalence reported in this study (24.4%) was very similar to prevalence of hypertension reported by Health, U.S. 2007⁷ for the study period and the NHANES 1991–2004² using measures of systolic and diastolic blood pressures (27.4%). Thus, if there is any underestimation in self-reported hypertension, it may be negligible and non-differential across both non-Hispanics and Hispanics, hence underestimating the study's results. Similarly, because Hispanics, regardless of their subgroups, were less likely to have health insurance, the underreporting of hypertension may have been differential and may have underestimated our results. In addition, we compared our estimates for overweight and obesity and diabetes to those reported by Health, U.S. 2007 obtained from NHANES III (1988–1994) and NHANES 1999–2004 and our estimates were very similar to those reported by Health, U.S. 2007.⁷ Finally, it is possible that individuals who agreed to participate in the NHIS, regardless of their race/ethnicity, are different from those who refused or chose not to participate. The latter may have lead to under- or overestimation of the results depending on whether decision to participate was based on the outcome or the exposure.

This study underscored the heterogeneity of the Hispanic population and the need for national data capturing this heterogeneity. Although the findings on lower odds of reporting hypertension for Mexicans and Mexican Americans concurs with previous studies, the findings for Central & South Americans (lower odds) and Dominicans (greater odds) suggest that national data to address the dearth of health information on the largest subgroup of the U.S. population is imperative. Moreover, the findings associated with nativity status/length of stay in the U.S. and educational attainment underscore once again the diversity of the Hispanic population and the danger of presenting aggregate data for this population. Thus, these findings call for data disaggregation beyond the standard racial/ethnic categories⁴⁶ to capture the heterogeneity masked by the existing categories, and further, a better understanding of health disparities in the U.S. population. This approach will provide us with a new lens to examine the health disparities for populations identified under categories considered as homogenous.

Abbreviations and Acronyms

NHIS, National Health Interview Survey; NHANES, National Health and Nutrition Examination Survey; HHANES, Hispanic Health and Nutrition Examination Survey; BMI, Body mass index; GED, General equivalency diploma; OR, Odds ratios; CI, Confidence intervals.

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Table 1

characteristics^{a,b,c} for Hispanic subgroups, non-Hispanic blacks and non-Hispanic whites: National Health 1997–2005

	Mexican (n=16932)	Mexican American (n=12014)	Cuban (n=2817)	Dominican (n=1098)	Central & South American (n=5394)	Other Hispanic (n=5457)	Non-Hispanic black (n=39793)	Non-Hispanic white (n=190964)
	36.8 (0.20) 53.5 (0.49)	39.2 (0.20) 48.9 (0.62)	48.0 (0.69) 50.6 (0.90)	39.7 (0.59) 44.5 (2.26)	38.8 (0.27) 49.2 (0.81)	40.5 (0.67) 49.2 (0.82)	42.2 (0.18) 44.4 (0.32)	46.7 (0.10) 48.1 (0.14)
	70.5 (0.45) 7.0 (0.21) 2.7 (0.14) 19.8 (0.46)	60.7 (0.57) 10.8 (0.33) 3.8 (0.20) 24.7 (0.55)	64.7 (1.45) 11.5 (0.73) 7.5 (0.92) 16.3 (0.72)	53.4 (2.28) 18.9 (1.04) 2.9 (0.47) 24.7 (1.70)	65.1 (0.70) 10.0 (0.45) 2.8 (0.29) 22.0 (0.65)	60.7 (0.99) 11.5 (0.46) 4.6 (0.54) 23.2 (0.92)	43.7 (0.46) 16.2 (0.26) 7.2 (0.21) 32.9 (0.44)	66.7 (0.22) 9.9 (0.09) 7.1 (0.09) 16.4 (0.21)
	2.9 (0.38) 10.9 (0.96) 29.4 (1.43) 56.8 (1.45) 85.0 (0.44)	0.7 (0.11) 8.2 (0.63) 40.2 (2.12) 50.9 (1.96) 15.7 (0.73)	13.9 (1.30) 2.4 (0.39) 77.2 (1.61) 6.4 (0.66) 78.9 (0.83)	79.1 (1.79) 2.0 (0.51) 17.2 (1.61) 1.6 (0.52) 84.3 (1.50)	27.2 (1.48) 5.1 (0.60) 39.2 (1.50) 28.6 (1.39) 89.3 (0.58)	19.3 (1.57) 6.4 (0.60) 30.4 (2.30) 43.8 (3.89) 42.0 (2.98)	17.0 (0.55) 18.7 (0.70) 57.1 (1.04) 7.3 (0.31) 9.2 (0.41)	20.3 (0.30) 28.9 (0.37) 33.9 (0.40) 16.8 (0.31) 4.5 (0.09)
	64.6 (0.67) 18.8 (0.44) 8.8 (0.35) 7.7 (0.31)	32.4 (0.64) 31.3 (0.53) 20.3 (0.56) 16.0 (0.50)	32.3 (1.44) 24.2 (1.77) 15.3 (0.77) 28.1 (1.30)	37.6 (1.83) 26.0 (1.40) 18.0 (1.39) 18.4 (1.39)	34.3 (0.96) 24.1 (0.82) 17.7 (0.68) 23.9 (0.85)	29.4 (0.92) 28.2 (0.90) 20.5 (0.74) 21.9 (0.82)	23.3 (0.49) 31.6 (0.37) 21.8 (0.44) 23.3 (0.42)	12.8 (0.19) 31.0 (0.24) 20.1 (0.16) 36.2 (0.29)
	72.2 (0.67) 19.9 (0.55) 5.1 (0.28) 2.8 (0.22) 7.2 (0.30)	56.3 (0.89) 26.3 (0.64) 11.1 (0.49) 6.2 (0.40) 18.4 (0.61)	51.2 (2.14) 24.2 (1.44) 13.8 (1.04) 10.8 (0.94) 26.4 (1.11)	65.8 (2.33) 23.4 (2.26) 7.4 (1.26) 3.4 (0.87) 16.1 (1.79)	60.1 (1.09) 24.6 (0.82) 9.0 (0.61) 6.2 (0.60) 17.0 (0.79)	57.5 (1.20) 25.5 (0.96) 11.2 (0.77) 5.8 (0.59) 21.9 (0.97)	53.6 (0.69) 28.0 (0.42) 12.1 (0.33) 6.3 (0.30) 21.5 (0.43)	41.8 (0.26) 27.6 (0.18) 16.5 (0.14) 14.1 (0.19) 33.2 (0.25)
	34.2 (0.71) 12.6 (0.38) 53.2 (0.67)	52.5 (0.71) 19.1 (0.55) 28.4 (0.65)	49.6 (1.24) 29.9 (1.44) 20.5 (0.93)	39.6 (2.18) 26.9 (1.98) 33.5 (1.42)	45.3 (1.01) 12.0 (0.56) 42.7 (1.13)	51.7 (1.00) 19.2 (1.47) 29.1 (1.17)	52.9 (0.51) 26.1 (0.40) 21.0 (0.35)	64.8 (0.24) 23.4 (0.20) 11.8 (0.13)
	27.2 (0.05) 15.0 (0.37) 48.5 (0.51) 74.1 (0.48) 5.9 (0.24)	28.1 (0.08) 18.6 (0.42) 59.0 (0.59) 63.4 (0.58) 9.5 (0.32)	26.6 (0.15) 19.1 (1.04) 56.8 (1.76) 75.5 (1.09) 8.5 (0.52)	26.5 (0.17) 12.8 (1.17) 50.9 (2.20) 76.8 (1.77) 4.9 (0.60)	26.4 (0.08) 12.9 (0.57) 50.5 (0.85) 68.0 (0.76) 3.9 (0.33)	26.6 (0.09) 20.7 (0.80) 59.3 (0.86) 63.2 (1.26) 7.5 (0.52)	28.3 (0.04) 23.0 (0.36) 48.6 (0.46) 66.9 (0.51) 9.7 (0.21)	26.5 (0.02) 23.7 (0.18) 66.2 (0.31) 57.9 (0.30) 6.8 (0.08)

age and BMI (mean and standard error).

at <0.001 with the few exceptions. For age: Mexican Americans were not different from Dominicans and Central & South Americans; Dominicans and other Hispanics; and Puerto Ricans were not different from other Hispanics and non-Hispanic blacks. For BMI: Cubans were not different from Hispanics and non-Hispanic whites; Mexican Americans were not different from non-Hispanic blacks; Central & South Americans were not different

n-specific associations were <0.001.

Table 2

Prevalence of Hypertension^a for selected characteristics among Hispanic subgroups, non-Hispanic blacks and non-Hispanic whites: NHIS 1997–2005

Characteristics	Puerto Rican	Mexican	Mexican American	Cuban	Dominican	Central & South American	Other Hispanic	Non-Hispanic black	Non-Hispanic white ^b
Overall	23.1 (0.68)	12.8 (0.34)	18.8 (0.52)	24.2 (0.71)	21.3 (1.35)	12.6 (0.57)	17.8 (0.81)	30.6 (0.38)	24.4 (0.16)
Socio-demographic									
Age group									
18–45	11.3 (0.65)	6.7 (0.28)	8.8 (0.40)	7.3 (0.62)	10.2 (1.31)	5.8 (0.40)	9.3 (0.59)	15.3 (0.30)	9.9 (0.13)
46–85	43.3 (1.49)	33.5 (0.91)	40.7 (1.08)	39.9 (0.93)	45.2 (3.18)	30.1 (1.51)	35.1 (1.44)	55.6 (0.56)	39.6 (0.21)
Sex									
Male	21.0 (1.09)	9.8 (0.45)	17.3 (0.65)	21.2 (1.25)	18.3 (2.17)	10.9 (0.81)	16.0 (1.01)	27.5 (0.46)	24.1 (0.20)
Female	24.9 (1.01)	16.1 (0.50)	20.1 (0.64)	27.3 (1.01)	23.6 (1.76)	14.2 (0.75)	19.6 (1.07)	33.0 (0.46)	24.7 (0.19)
Marital status									
Married	23.3 (0.99)	12.9 (0.42)	20.5 (0.70)	23.0 (1.04)	21.8 (2.64)	12.9 (0.74)	17.9 (1.01)	31.8 (0.57)	24.5 (0.17)
Divorced	26.9 (1.90)	18.5 (1.31)	25.8 (1.18)	28.2 (2.10)	25.6 (3.13)	16.3 (1.69)	22.2 (1.73)	39.6 (0.61)	26.9 (0.30)
Widow	59.7 (3.57)	44.0 (2.60)	48.3 (1.98)	51.8 (3.76)	76.1 (6.20)	42.7 (4.79)	49.0 (4.24)	66.9 (0.85)	53.0 (0.39)
Single	13.1 (1.12)	6.0 (0.55)	7.1 (0.54)	13.6 (1.83)	10.5 (2.63)	6.2 (0.81)	9.2 (0.76)	16.8 (0.41)	10.2 (0.21)
Region									
Northeast	24.5 (0.78)	8.3 (1.84)	16.0 (4.66)	26.1 (2.22)	21.5 (1.42)	12.4 (1.08)	14.2 (1.18)	27.2 (0.75)	23.9 (0.28)
Midwest	24.8 (2.32)	12.2 (0.92)	14.3 (1.48)	22.7 (5.55)	0	16.2 (3.38)	13.7 (2.61)	30.9 (0.89)	23.7 (0.29)
South	20.0 (1.58)	13.3 (0.63)	21.5 (0.98)	24.3 (0.75)	21.5 (3.92)	10.6 (0.94)	16.4 (1.28)	31.7 (0.54)	26.1 (0.30)
West	20.8 (2.60)	12.8 (0.47)	17.3 (0.59)	20.3 (3.56)	34.5 (15.4)	15.1 (0.87)	21.0 (1.21)	28.3 (0.83)	22.7 (0.35)
Nativity status									
US-born	21.1 (0.83)	17.0 (0.90)	19.5 (0.55)	9.1 (1.30)	9.2 (3.39)	9.6 (1.65)	20.2 (1.08)	31.6 (0.40)	24.5 (0.16)
Island/Foreign Born	28.1 (1.44)	12.0 (0.37)	14.8 (0.99)	28.3 (0.76)	23.6 (1.47)	13.1 (0.61)	14.5 (0.88)	20.4 (0.90)	22.7 (0.55)
Education									
Less than high school	32.9 (1.28)	13.7 (0.45)	24.7 (0.99)	33.8 (1.77)	28.7 (1.98)	15.2 (1.07)	22.7 (1.53)	42.4 (0.79)	35.6 (0.37)
High school/GED	20.1 (1.24)	10.3 (0.68)	16.0 (0.70)	24.3 (2.02)	15.4 (2.71)	10.9 (0.99)	17.8 (1.32)	29.3 (0.56)	27.5 (0.23)
Some college	16.4 (1.74)	11.4 (1.02)	14.6 (0.92)	14.3 (1.49)	12.4 (2.48)	9.7 (0.97)	14.2 (1.25)	24.2 (0.54)	21.3 (0.29)
Complete college or higher	17.1 (1.76)	12.9 (1.04)	16.9 (1.05)	18.5 (1.70)	22.2 (3.65)	12.9 (1.20)	14.9 (1.33)	26.4 (0.59)	19.6 (0.18)
Income									
<\$20,000	14.1 (1.12)	9.4 (0.48)	12.3 (0.60)	16.6 (1.42)	15.1 (1.69)	9.1 (0.65)	11.7 (0.87)	22.8 (0.34)	16.9 (0.24)
\$20,000–\$34,999	15.5 (1.63)	8.4 (0.82)	14.0 (1.03)	14.5 (1.84)	21.3 (4.49)	9.9 (1.10)	14.1 (1.56)	22.9 (0.61)	17.1 (0.28)
\$35,000–\$54,999	16.9 (2.48)	12.5 (1.69)	18.3 (1.68)	11.9 (3.28)	7.2 (4.15)	14.4 (3.13)	13.4 (2.47)	24.5 (0.91)	18.6 (0.33)
≥\$55,000	15.7 (3.31)	16.7 (3.10)	14.9 (2.35)	15.6 (4.55)	31.3 (12.2)	16.6 (3.30)	17.6 (3.97)	25.7 (1.42)	18.7 (0.37)
Health Insurance									
Private	16.4 (0.85)	12.1 (0.58)	15.4 (0.56)	15.4 (1.42)	15.8 (2.42)	10.6 (0.72)	14.5 (0.92)	24.9 (0.40)	17.8 (0.15)
Public	37.9 (1.51)	31.5 (1.25)	38.6 (1.26)	44.9 (1.75)	34.3 (2.46)	33.6 (2.49)	35.6 (1.90)	50.5 (0.71)	47.5 (0.27)
None	16.3 (1.47)	8.8 (0.36)	11.8 (0.68)	15.9 (1.86)	17.6 (2.28)	8.9 (0.73)	12.4 (0.97)	20.7 (0.59)	15.1 (0.29)
Health-related									
BMI									
< 25.0	12.9 (1.08)	7.2 (0.41)	11.0 (0.68)	17.3 (1.27)	15.0 (1.88)	6.8 (0.54)	11.3 (0.84)	18.5 (0.43)	15.4 (0.17)
≥ 25.0	29.0 (1.01)	15.8 (0.44)	22.5 (0.61)	29.5 (1.06)	26.9 (2.34)	17.0 (0.93)	22.6 (1.10)	36.7 (0.46)	31.4 (0.20)
Smoking Status									
Current	19.3 (1.23)	11.2 (0.67)	16.0 (0.86)	20.6 (2.10)	17.5 (3.31)	10.1 (1.39)	16.4 (1.14)	30.2 (0.53)	19.3 (0.22)
Former	30.0 (1.95)	20.3 (1.06)	30.9 (1.20)	35.5 (2.38)	39.5 (6.77)	20.4 (2.09)	27.1 (1.76)	47.9 (0.77)	33.6 (0.27)
Never	23.0 (0.92)	11.9 (0.38)	16.8 (0.60)	22.8 (0.82)	19.7 (1.40)	17.7 (0.66)	15.7 (0.99)	26.9 (0.43)	22.3 (0.19)
Diabetes									
Yes	62.9 (2.27)	50.3 (2.16)	57.6 (1.57)	58.1 (4.10)	68.2 (7.08)	50.0 (3.95)	52.9 (3.35)	71.2 (0.90)	61.9 (0.48)
No	18.4 (0.65)	10.4 (0.31)	14.6 (0.49)	21.1 (0.76)	18.8 (1.41)	11.1 (0.53)	15.0 (0.74)	26.2 (0.35)	21.7 (0.15)

^a Unadjusted prevalence and standard errors.

^b All *P* values for stratum adjusted chi-square tests were <0.01. All *P* values for stratum specific chi-square within Hispanic subgroups and non-Hispanic groups were <0.05 with the exception of sex for Dominicans (0.07); region for Puerto Ricans (0.06) and Cubans (0.58); and income for Puerto Ricans (0.71), Cubans (0.43), Dominicans (0.12), Central & South Americans (0.13) and other Hispanics (0.41).

Table 3

Crude and adjusted Odds Ratios (95% CI)^a for hypertension for Hispanic subgroups, non-Hispanic blacks and non-Hispanic whites: NHIS 1997–2005

	Crude	Model 1	Hypertension Model 2	Model 3
Puerto Rican	0.93 (0.86, 1.00)	1.44 (1.32, 1.56)	1.17 (1.06, 1.30)	1.01 (0.87, 1.18)
Mexican	0.45 (0.43, 0.48)	1.02 (0.95, 1.10)	0.80 (0.80, 0.86)	0.73 (0.65, 0.82)
Mexican American	0.71 (0.67, 0.76)	1.13 (1.05, 1.21)	0.86 (0.80, 0.93)	0.80 (0.72, 0.88)
Cuban	0.99 (0.92, 1.07)	0.99 (0.90, 1.09)	0.92 (0.83, 1.01)	0.86 (0.70, 1.05)
Dominican	0.84 (0.71, 0.98)	1.66 (1.36, 2.02)	1.65 (1.32, 2.06)	1.67 (1.23, 2.27)
Central & South American	0.45 (0.40, 0.50)	0.91 (0.81, 1.01)	0.81 (0.72, 0.91)	0.80 (0.69, 0.93)
Other Hispanic	0.67 (0.60, 0.75)	1.12 (1.00, 1.25)	0.97 (0.86, 1.10)	0.91 (0.76, 1.09)
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, 1.56)
Non-Hispanic white	1.00	1.00	1.00	1.00

^aCrude association between race/ethnicity and self-reported hypertension (Crude); ORs adjusted for age, sex, marital status, survey year, U.S. region and nativity status/length in the U.S. (Model 1); additionally adjusted for BMI, physical activity, smoking, alcohol consumption and diabetes (Model 2); and Model 2 additionally adjusted for health insurance, education, income and occupation (Model 3).

Table 4

Adjusted Odds Ratios (95% CI)^a for hypertension for Hispanic subgroups, and non-Hispanic whites according to nativity status and length of stay in the U.S.: NHIS 1997–2005

	Nativity Status			
	< 5years	Island/Foreign-born 5– 9 years	≥10 years	U.S.-born
Puerto Rican	1.67 (0.63, 4.39)	2.75 (0.78, 9.73)	0.92 (0.67, 1.26)	1.02 (0.85, 1.23)
Mexican	0.48 (0.20, 1.16)	0.70 (0.37, 1.32)	0.88 (0.72, 1.08)	0.76 (0.62, 0.92)
Mexican American	2.09 (0.48, 9.12)	0.69 (0.21, 2.32)	0.63 (0.47, 0.85)	0.83 (0.75, 0.93)
Cuban	1.46 (0.56, 3.85)	0.58 (0.29, 1.15)	1.05 (0.82, 1.35)	0.53 (0.30, 0.92)
Dominican	0.83 (0.14, 5.11)	1.82 (0.82, 4.04)	1.69 (1.12, 2.56)	1.62 (0.60, 4.36)
Central & South American	0.78 (0.39, 1.56)	0.85 (0.48, 1.52)	0.83 (0.67, 1.03)	0.94 (0.59, 1.48)
Other Hispanic	1.33 (0.44, 4.02)	2.05 (0.99, 4.25)	0.91 (0.66, 1.25)	0.87 (0.69, 1.11)
Non-Hispanic Black	0.98 (0.53, 1.82)	1.08 (0.55, 2.12)	1.57 (1.28, 1.93)	1.48 (1.41, 1.56)
Non-Hispanic white	1.00	1.00	1.00	1.00

^aORs adjusted for age, sex, marital status, survey year, U.S. region, BMI, physical activity, smoking, alcohol consumption, diabetes, health insurance, education income and occupation.

Table 5

Adjusted Odds Ratios (95% CI)^a for hypertension for Hispanic subgroups, non-Hispanic blacks and non-Hispanic whites according to educational attainment: NHIS 1997–2005

	Education			
	< High School	High School/GED	Some College	Complete College or higher
Puerto Rican	0.90 (0.66, 1.21)	0.90 (0.68, 1.19)	1.14 (0.80, 1.63)	1.17 (0.86, 1.58)
Mexican	0.67 (0.54, 0.83)	0.76 (0.60, 0.96)	0.82 (0.60, 1.12)	0.84 (0.63, 1.12)
Mexican American	0.65 (0.53, 0.80)	0.73 (0.62, 0.87)	0.88 (0.70, 1.10)	0.98 (0.80, 1.21)
Cuban	0.77 (0.49, 1.21)	1.10 (0.79, 1.54)	0.67 (0.45, 1.00)	0.91 (0.61, 1.35)
Dominican	1.69 (1.01, 2.83)	1.17 (0.73, 1.88)	0.87 (0.42, 1.83)	3.16 (1.86, 5.37)
Central & South American	0.72 (0.53, 0.98)	0.58 (0.45, 0.75)	0.84 (0.60, 1.19)	1.07 (0.81, 1.41)
Other Hispanic	0.97 (0.70, 1.35)	1.01 (0.74, 1.39)	1.02 (0.75, 1.39)	0.66 (0.44, 0.98)
Non-Hispanic black	1.52 (1.35, 1.71)	1.43 (1.30, 1.57)	1.37 (1.23, 1.51)	1.60 (1.46, 1.75)
Non-Hispanic white	1.00	1.00	1.00	1.00

^aORs adjusted for age, sex, marital status, survey year, U.S. region, nativity status/length in the U.S., BMI, physical activity, smoking, alcohol consumption, diabetes, health insurance, income and occupation.