Hypertension Prevalence in New York City Adults: Unmasking Undetected Racial/Ethnic Variation, NYC HANES 2004

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Objective: Using 2004 New York City Health and Nutrition Examination Survey (NYC HANES) data, we sought to examine variation in hypertension (HTN) prevalence across eight Asian and Hispanic subgroups.

Design: Cross-sectional

Setting: New York City, 2004

Main Outcome Measures: Logistic regression was performed to identify differences in HTN prevalence between ethnic subgroups controlling for age, sex, education and BMI.

Results: Overall HTN prevalence among NYC adults was 25.5% (95% CI: 23.4-27.8), with 21.1% (95% CI: 18.2-24.3) among Whites, 32.8% (95% CI: 28.7-37.2) Black, 26.4% (95% CI: 22.3-31.0) Hispanics, and 24.7% (95% CI: 19.9-30.3) Asians. Among Hispanic subgroups, Dominicans had the highest HTN prevalence (32.2%), followed by Puerto Ricans (27.7%), while Mexicans had the lowest prevalence (8.1%). Among Asian subgroups, HTN prevalence was slightly higher among South Asians (29.9%) than among Chinese (21.3%). Adjusting for age, Dominican adults were nearly twice as likely to have HTN as non-Hispanic (NH) Whites (OR=1.96, 95% CI: 1.24-3.12), but this was attenuated after adjusting for sex and education (OR=1.27, 95% CI: .76 – 2.12). When comparing South Asians with NH Whites, results were also non-significant after adjustment (OR=2.00, 95% CI: .90-4.43).

Conclusion: When analyzing racial/ethnic subgroups, NH Black and Hispanic adults from Dominican Republic had the highest HTN prevalence followed by South Asian and Puerto Rican adults. Mexican adults had the lowest prevalence of all groups. These findings highlight that ethnic subgroup differences go undetected when stratified by broader racial/ethnic categories. To our knowledge, this is the first population-based study using objective measures to highlight these differences. *Ethn Dis.* 2016;26(3):339-344; doi:10.18865/ed.26.3.339

Keywords: Hypertension; Race/Ethnicity; Hispanic Subgroups; Asian Subgroups; New York City

Introduction

Hypertension (HTN), a modifiable risk factor for cardiovascular disease,[1] is a leading cause of death worldwide.[2] In the United States, federal initiatives such as Healthy People 2010 and the US Million Hearts Campaign have targeted efforts toward reducing HTN prevalence. Yet, efforts have had little effect; the prevalence of HTN has remained at approximately 33% between 2009 and 2012.[3] Healthy People 2020 has again included prevention and control of HTN as one of the most critical public health goals.[4–6] Although this initiative lacks a focus on reducing racial/ethnic differences, numerous population-based studies have identified disparities in the prevalence of HTN, with non-Hispanic Blacks having the highest prevalence of HTN (32.8%-42.1%)[1,2,7,8], while other racial/ethnic groups have a fairly similar range of prevalence estimates: non-Hispanic Whites (21.1%-29.8%),[1,2,7–9] Hispanics (24.7%-29.3%),[1,7–9] and non-Hispanic Asians (24.7%-25.6%).[8,10]

To date, many of the population-based studies examining racial/ethnic differences in HTN prevalence have focused on differences between broad minority groups; few have examined differences in Asian and Hispanic sub-populations.[1,5,8] Even fewer have used population-based samples or examined differences between Asian or Hispanic subgroups.[11–14] This paucity of evidence has led to a lack of specific recommendations of HTN guidelines for specific minority subgroups and potential oversight of subgroups with elevated HTN rates dissimilar to the ethnic group average.

We utilized the 2004 New York City Health and Nutrition Examination Survey (NYC HANES) to characterize racial/ethnic differences among

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minority subgroups, with the hypothesis that Asian and Hispanic subgroups are heterogeneous and differences in HTN exist among these groups.

Methods

Database

NYC HANES 2004, modeled after the National Health and Nutrition Examination Survey (NHANES),[15] was a population-based, cross-sectional examination survey of all non-institutionalized New York City residents aged ≥20 years. This survey included non-English speakers, non-literate individuals, pregnant woman, and the mentally or developmentally disabled. NYC HANES used a comparable three-stage probability sampling to select a representative sample of adult New York City residents from June to December 2004. Survey components consisted of a physical examination, clinical and laboratory tests, a face-to-face computer-assisted personal interview, and an audio computer-assisted self-interview. Interviews were pre-translated into English and Spanish, and a translator was used for interviews conducted in other languages. Detailed information on data collection protocols, response rate and study design has been published in detail previously.[16]

Study Population

Our current study utilized NYC HANES data for all participants who answered a blood pressure screening interview questionnaire and had valid blood pressure measurements through clinical and laboratory tests. Study participants who had an invalid answer to country of birth/origin question were excluded (n=10). For each participant, 3 to 4 systolic/diastolic blood pressure measurements were taken with standardized NHANES protocols and equipment.[1] For the purposes of our study, the first blood pressure measurement was excluded and the average of the remaining measurements was utilized. If only one valid measurement was available, it was used. A total of 24 participants were excluded for not having valid hypertension interview data or blood pressure examination values for a final sample size of 1,965.

This paucity of evidence has led to a lack of specific recommendations of HTN guidelines for specific minority subgroups and potential oversight of subgroups with elevated HTN rates dissimilar to the ethnic group average.

Measures

Hypertension was defined as: 1) an average systolic blood pressure ≥ 140 mm Hg; 2) an average diastolic blood pressure ≥ 90 mm Hg; or 3) self-reported current use of prescribed antihypertensive medication.[17] Hypertension prevalence was estimated across racial/ethnic subgroups based on socio-demographic characteristics and hypertension risk factors.

We re-categorized self-reported race and Hispanic origin and then combined with country of birth/origin to identify Hispanic and Asian subgroups of interest. Hispanic subgroups included Puerto Rican, Dominican, Mexican, Other Central/South American, and other Hispanic adults. Asian subgroups included Chinese, South Asian, and other Asian adults. Participants whose answers did not correspond to one category were categorized as "Other." Estimates for this group were not shown because of the small sample size (n=28). For insurance coverage, participants reporting any private health insurance were classified as having private insurance. Otherwise, persons aged ≥65 years who reported having Medicare were classified as having Medicare, and other government coverage included all remaining participants who reported having Medicaid, Medicare, or another government program.

Statistical Analyses

Analyses were weighted to adjust for the complex sampling design and non-response; weights were post-stratified to represent the NYC adult population on age, sex, race/ethnicity, and borough of residence, then further adjusted to address component- and item-level non-response. Demographic and behavioral characteristics including age, sex, education, income, insurance coverage, and health status (smoking, alcohol use, BMI) were stratified by ethnic subgroup. Age-standardized prevalence estimates of hypertension were calculated for major and subgroup race/ethnicity. Prevalence estimates were age adjusted to the year 2000 US standard population aged ≥20 years. Statistical signifi-

cance for differences in bivariate comparisons was determined at the α=.05 level. Relative standard errors and 95% confidence intervals were calculated for means and percentages. Estimates with relative standard errors of ≥30% were noted as unreliable. Multiple logistic regression was used to assess factors associated with hypertension prevalence, including age, sex, education and BMI. SUDAAN version 9.0 (Research Triangle Institute, Research Triangle Park, Cary, NC) was used to apply sample weights and to obtain standard error estimates by Taylor series linearization.

Results

Demographic data are presented in Tables 1 and 2. Race/ethnic differences were found in age, education, insurance coverage, alcohol use and BMI *(*P<.05). Overall, Hispanics were more likely to be uninsured (32.8%) and obese (31.5%) compared with non-Hispanic Whites (NH) (11.2% and 22.9%, respectively). Among Hispanic subgroups, Mexican adults were found to have the highest proportion of uninsured (79.6%). When analyzing BMI, adults from Puerto Rico had the highest prevalence of obesity (41.6%). NH Asians were found to have the lowest prevalence of obesity among all race/ethnic groups (8.9%), and ranged from .7% to 15.2% when analyzing NH Asian subgroups.

Overall hypertension prevalence among NYC adults was 25.5%, with 21.1% among NH Whites, 32.8% NH Blacks, 26.4% Hispanics, and 24.7% NH Asians (Figure 1). Among Hispanic subgroups, Dominicans were found to have the highest hypertension prevalence (32.2%), followed by Puerto Ricans (27.7%), while Mexicans had the lowest prevalence (8.1%). However, 96.3% of respondents in the Mexican subgroup were aged <50 years, potentially distorting the results. In a sensitivity analysis excluding pregnant women (n=29), results did not meaningfully change (data not shown). Adjusting for age, Dominican adults were nearly twice as likely to have hypertension as NH Whites (OR = 1.96, 95% CI: 1.24-3.12), but this increased risk was attenuated after also adjusting for sex and education (OR=1.27, 95% CI: .76 – 2.12) (Table 3).

Table 1. Demographic and behavioral characteristics by ethnic subgroup among NYC adults, NYC HANES 2004

		Major race/ethnic group			
	All NYC Adults, (N=1965)	**Non-Hispanic White, (n=611)**	**Non-Hispanic Black, (n=426)**	**Hispanic, (n=642)**	**Non-Hispanic Asian, (n=258)**
Age group [c,d]					
<50	1380 (62.7)	387 (56.2)	292 (60.8)	490 (70.3)	190 (71.3)
≥50	585 (37.3)	224 (43.9)	134 (39.2)	152 (29.7)	68 (28.7)
Sex [c]					
Male	816 (46.1)	290 (51.1)	159 (42.2)	241 (41.2)	113 (47.6)
Female	1149 (54.0)	321 (48.9)	267 (57.8)	401 (58.8)	145 (52.4)
Education [c,d,e]					
< High school	564 (27.1)	60 (11.2)	136 (31.9)	248 (46.0)	78 (29.4)
High school	384 (19.4)	96 (16.8)	92 (21.6)	140 (21.4)	49 (18.3)
> High school	1014 (53.6)	454 (72.0)	198 (46.5)	217 (32.7)	130 (52.3)
Income [c,d,e]					
< $20,000	645 (31.5)	103 (18.0)	139 (32.1)	307 (49.1)	88 (36.5)
≥ $20,000	1272 (68.5)	496 (82.0)	278 (67.9)	321 (50.9)	157 (63.5)
Insurance coverage [c,d,e]					
Private	967 (52.9)	444 (73.2)	210 (51.0)	214 (33.1)	91 (35.0)
Medicare/government	528 (26.2)	86 (15.6)	131 (29.7)	211 (34.2)	86 (34.0))
Uninsured	461 (20.9)	79 (11.2)	84 (19.3)	214 (32.8)	78 (30.9)
Health Status					
Smoker [d]	469 (23.1)	150 (23.0)	103 (23.0)	151 (23.1)	55 (21.7)
Alcohol use, heavy [c,d,e]	152 (7.2)	59 (8.7)	31 (6.3)	46 (6.7)	9 (3.2)
BMI, obese [c,d,e]	506 (26.1)	133 (22.9)	145 (33.8)	199 (31.5)	24 (8.9)

Data are n (%).

a. Other Hispanic includes Cuban, Cuban American, Other Latin American, and Other Hispanic.

b. Other Asian includes Canada, Ghana, Guyana, Japan, Kazakhstan, Kyrgyzstan, Macau, Myanmar, North Korea, Philippines, South Korea, Trinidad and Tobago, Thailand, and Viet Nam.

c. P<.05 across all major race/ethnic groups.

d. P<.05 across Hispanic subgroups.

e. P<.05 across Asian subgroups.

Table 2. Demographic and behavioral characteristics by ethnic subgroup among NYC adults, NYC HANES 2004

	Hispanic subgroups					Asian subgroups		
	Puerto Rican, (n=178)	Dominican, (n= 168)	Central/ South American, (n= 146)	Mexican, (n= 79)	Other Hispanic[a], (n=71)	Chinese, (n=101)	South Asian, (n=60)	Other Asian[b], (n=97)
Age group [c,d]								
<50	129 (65.8)	126 (68.2)	111 (71.1)	76 (96.3)	48 (59.2)	67 (66.7)	50 (79.7)	73 (73.0)
≥50	49 (34.2)	42 (31.8)	35 (28.9)	3 (3.8)	23 (40.8)	34 (36.3)	10 (20.3)	24 (27.0)
Sex [c]								
Male	65 (40.5)	61 (39.1)	50 (36.8)	37 (52.8)	28 (44.7)	45 (47.3)	30 (54.7)	38 (43.5)
Female	113 (59.5)	107 (60.9)	96 (63.2)	42 (47.2)	43 (55.3)	56 (52.7)	30 (45.4)	59 (56.5)
Education [c,d,e]								
< High school	70 (42.6)	77 (48.5)	64 (44.6)	51 (61.7)	22 (36.1)	46 (45.6)	20 (32.6)	12 (12.8)
High school	38 (21.3)	33 (18.1)	31 (21.0)	20 (27.9)	18 (23.2)	25 (25.2)	9 (13.9)	15 (14.8)
> High school	69 (36.1)	58 (33.4)	51 (34.4)	8 (10.5)	31 (40.7)	30 (29.2)	31 (53.6)	69 (72.4)
Income[c,d,e]								
< $20,000	69 (39.4)	86 (53.8)	70 (48.5)	58 (76.2)	24 (36.5)	46 (51.2)	21 (35.9)	21 (24.1)
≥ $20,000	105 (60.6)	78 (46.2)	75 (51.5)	19 (23.8)	44 (63.5)	48 (48.8)	37 (64.1)	72 (75.9)
Insurance coverage [c,d,e]								
Private	82 (47.2)	53 (30.4)	47 (32.2)	9 (11.4)	23 (30.1)	30 (30.0)	17 (28.2)	44 (43.8)
Medicare/government	66 (38.4)	79 (47.3)	38 (28.5)	8 (9.0)	20 (32.3)	41 (40.8)	27 (44.3)	18 (21.6)
Uninsured	27 (14.4)	36 (22.3)	61 (39.3)	62 (79.6)	28 (37.6)	29 (29.2)	16 (27.5)	33 (34.6)
Health Status								
Smoker [d]	70 (38.3)	25 (15.9)	25 (15.9)	11 (13.5)	20 (28.0)	22 (22.6)	9 (15.5)	24 (24.6)
Alcohol use, heavy [c,d,e]	22 (11.4)	10 (5.7)	5 (3.1)	6 (7.8)	3 (4.5)	5 (4.8)	0 (0)	4 (3.8)
BMI, obese [c,d,e]	72 (41.6)	54 (35.0)	41 (27.1)	18 (22.2)	14 (19.3)	1 (0.7)	8 (15.2)	15 (12.5)

Data are n (%).

a. Other Hispanic includes Cuban, Cuban American, Other Latin American, and Other Hispanic.

b. Other Asian includes Canada, Ghana, Guyana, Japan, Kazakhstan, Kyrgyzstan, Macau, Myanmar, North Korea, Philippines, South Korea, Trinidad and Tobago, Thailand, and Viet Nam.

c. P<.05 across all major race/ethnic groups.

d. P<.05 across Hispanic subgroups.

e. P<.05 across Asian subgroups.

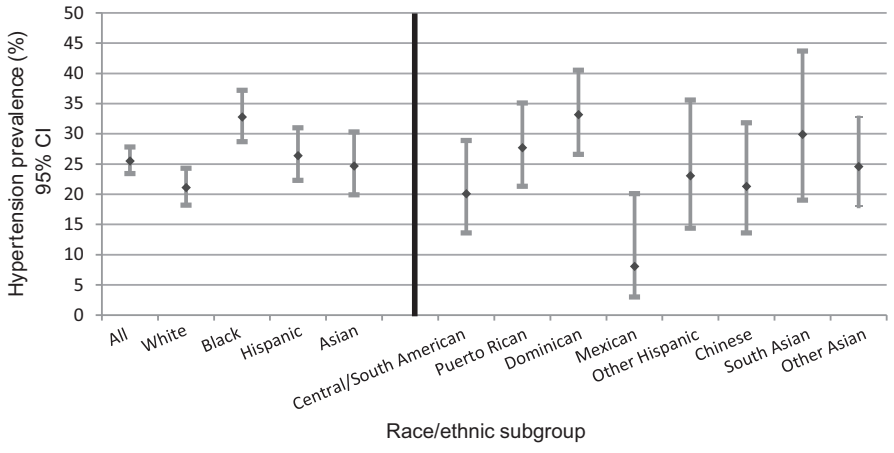

Figure 1. Age standardized prevalence estimates of hypertension by major and subgroup race/ethnicity among NYC adults ≥20 years of age, NYC HANES, 2004

Among Asian subgroups, South Asians had the highest hypertension prevalence (29.9%) and Chinese the lowest (21.3%). Differences between South Asians and NH Whites were still elevated, but non-significant after adjusting for age, and also age, sex, education and BMI (OR=2.00, 95% CI: .90-4.43) (Table 3).

Discussion

These findings demonstrate that sizable differences in HTN prevalence exist among ethnic subgroups that may go undetected when analyzing larger racial and ethnic groups; thus, subgroup-specific analyses should be undertaken

Table 3. Logistic regression with race as a predictor for hypertension

Race/Ethnic group	Unadjusted OR (95% CI)	Adjusted[a] OR (95% CI)	Adjusted[b] OR (95% CI)
Non-Hispanic White	REF	REF	REF
Non-Hispanic Black	1.47 (1.07-2.00)	1.91 (1.33-2.76)	1.51 (1.03-2.21)
Central/South American	.65 (.38-1.13)	.92 (.51-1.67)	.67 (.35-1.26)
Puerto Rican	1.12 (.72-1.72)	1.55 (.92-2.61)	1.02 (.57-1.81)
Dominican Republic	1.25 (.81-1.93)	1.96 (1.24-3.12)	1.27 (.76-2.12)
Mexican	.29 (.12-.72)	1.06 (.40-2.83)	.64 (.23-1.76)
Other Hispanic	.89 (.45-1.77)	.94 (.46-1.95)	.73 (.34-1.57)
Chinese	.73 (.41-1.29)	.83 (.42-1.66)	.87 (.42-1.81)
South Asian	.94 (.47-1.85)	2.02 (.90-4.51)	2.00 (.90-4.43)
Other Asian	.70 (.38-1.32)	1.08 (.58-2.03)	1.21 (.60-2.42)

a. Adjusted for age.
b. Adjusted for age, sex, education, and BMI.

when possible. When Hispanics and Asians were stratified by subgroups, Dominicans were found to have prevalence rates comparable to NH Blacks, with South Asians and Puerto Ricans having the next highest hypertension prevalance, respectively. In contrast, Mexicans were found to have the lowest prevalance compared with all groups, in part due to the young average age of this subgroup. Furthermore, when conducting age-adjusted analyses, Dominican and South Asian groups showed significant elevations in the odds of hypertension, attenuated only when adjusting further for sex and education. These findings suggest that Dominican and South Asian populations are at greater risk for HTN, potentially leading to cardiovascular disease. The excess risk for hypertension among South Asians has been reported previously;[18] however, results have not been consistent.[19] It should be noted that South Asians are a heterogeneous group with large variations in lifestyle patterns including diet and physical activity.[20] Additionally, previous studies have identified that South Asians have an increased prevalence of diabetes, increasing the risk of cardiovascular disease.[21] The lower average education level of these groups suggests greater focus must be placed on the creation of culturally sensative, low literacy educational approaches to improve HTN and cardiovascular diesease awareness.

The overall prevalence of HTN among NYC adults was 25.5%, which is lower than the national average (29.1%).[8] However, the prevalence among ethnic subgroups was comparable to recent national health surveys,[8] corroborating demonstrated disparities in disease distributions. Although factors related to these disparities were not identified here, previous analyses of African Americans and Hispanic populations noted the influence of several potential factors: hypercholesterolemia,[22,23] obesity,[1,22,23] smoking,[22,23] low early-life socioeconomic status,[24] low birth weight,[25] salt sensitivity, and perceived discrimination.[26] These factors have been shown to be further compounded by greater socioeconomic adversity, lower health literacy and the lack of health insurance.[23] One could hypothesize that the impact of these factors could have a disproportional effect on ethnic subgroups when compared with the larger category. This may explain some of the differences noted between Dominicans and South Asians when compared with the larger racial group.

Our study has some limitations. The study population analyzed has a relatively small sample size resulting in potentially imprecise results, especially in the Mexican subgroup. The data for this study come from a single geographic area affecting the generalizability of our findings. However, NYC contains a diverse population including a high population of the studied minority subgroups, thus minimizing the potential for geographic bias. Finally, with the cross-sectional data available, we were unable to identify reasons for differences in racial subgroups, thus highlighting the need for further research.

HTN remains a global health challenge for all racial and ethnic subgroups; however, the findings presented here demonstrate that HTN prevalence varies within ethnic groups. Therefore, public health services should use this information to assist in the appropriate targeting of services to focus on high prevalence subgroups. Further research is needed to expand our knowledge related to disparities in HTN prevalence by ethnic subgroup and to identify underlying risk factors for these disparities.

Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Giambrone, Thorpe, Gerber; Acquisition of data: Thorpe; Data analysis and interpretation: Giambrone, Thorpe, Gerber, lslam, Rodriguez-Lopez, Trinh-Shevrin; Manuscript draft: Giambrone, Thorpe, Gerber, Rodriguez-Lopez, Trinh-Shevrin, lslam; Statistical expertise: Giambrone, Gerber, Rodriguez-Lopez; Administrative: Giambrone, Gerber, Trinh-Shevrin, Islam; Supervision: Thorpe, Gerber, lslam

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