REGIONAL DIFFERENCES IN THE PREVALENCE, TREATMENT AND CONTROL OF HYPERTENSION AND DYSLIPIDEMIA IN US URBAN HISPANIC POPULATIONS PARTICIPATING IN HEALTH SCREENING EVENTS

EunMee Lee, PharmD; Sean D. Candrilli, MS; Craig S. Roberts, PharmD, MPA; Simon S.K. Tang, MPH; Stanley Bassin, EdD; Nathan D. Wong, PhD

Objective: We examine the prevalence, treatment, and control of hypertension, dyslipidemia, and concomitant hypertension and dyslipidemia among Hispanics in four US communities.

Methods: This was a cross-sectional study of Hispanics who participated in health screening programs from 2004 to 2006. We enrolled 5288 Hispanics in Miami ($n=372$), New York ($n=254$), Los Angeles ($n=4037$), and Houston ($n=625$). The main outcome measures were prevalence, treatment and control rates of hypertension, dyslipidemia, and concomitant hypertension and dyslipidemia.

Results: Overall prevalence rates of hypertension, dyslipidemia, and concomitant hypertension and dyslipidemia were 37.5%, 26.6%, and 15.3%, respectively. Hypertension treatment rates ranged from 30.9% (Houston) to 68.2% (Miami) ($P<.05$); control was achieved in 34.7% (Los Angeles) to 47.8% (New York, $P<.05$). Dyslipidemia treatment rates were lowest in Houston (36.5%) and highest in New York (75.3%, $P<.05$); control rates were 62.3% (Houston) to 75.1% (Los Angeles $P<.05$). Dual treatment of hypertension/dyslipidemia ranged from 24.4% (Houston) to 69.4% (New York, $P<.05$), dual control was achieved in 4.5% (Houston) to 35.3% (New York, $P<.05$). Multivariable logistic regression analyses showed the odds of having each condition did not to differ by region, but regional differences existed for treatment and control.

Conclusions: A high prevalence of hypertension, dyslipidemia, and combined hypertension and dyslipidemia and low control rates for hypertension and concomitant hypertension and dyslipidemia exist among US Hispanic adults in different communities. (*Ethn Dis*. 2008;18:409–414)

Key Words: Hypertension, Dyslipidemia, Hispanics

From Pfizer Inc, New York, New York (EL, CSR, SSKT); RTI Health Solutions, Research Triangle Park, North Carolina (SDC); Heart Disease Prevention Program, Department of Medicine, University of California, Irvine, California (SB, NDW).

Reprints will not be available. Address correspondence to: EunMee Lee, PharmD, BCPS; Pfizer Inc; 261 Courtney Lane, Orinda, CA 94563; 925-386-0678; Leee@pfizer.com

INTRODUCTION

Hispanics are the fastest-growing minority group in the United States; they make up 14.8% of the population.[1–3] Certain US geographic settings have attracted Hispanic communities of similar ancestry. Cubans are predominant in Miami-Dade County (Florida), Puerto Rican Americans are predominant in New York County (New York), and Mexican Americans are predominant in Los Angeles (California) and Harris (Houston, Texas) Counties.[4]

Hypertension and dyslipidemia are major risk factors for cardiovascular disease (CVD).[5–7] Data from the National Health and Nutrition Examination Survey (NHANES) showed no difference in the prevalence of hypertension between Mexican Americans and non-Hispanic Whites.[8,9] Low awareness of hypertension and dyslipidemia, as well as poor treatment and control rates, are noted among certain Hispanic subpopulations.[8,10–13]

NHANES does not permit the prevalence of cardiovascular risk among the Hispanic population to be ascertained at a regional level.[8,9] Other studies have focused on Hispanic cardiovascular health in a given community or health system.[13] The cardiovascular risk profile of Hispanic communities living in distinct urban settings has not been carefully examined or compared between different US regions. In this study, we examined the prevalence, awareness, treatment, and control of hypertension and dyslipidemia among volunteer and free-living Hispanics participating in health screening events in four distinct areas in the United States. Specifically, this study examined whether geography, demographics, and clinical variables are associated with patients having hypertension or dyslipidemia, being treated, or achieving recommended treatment goals.

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METHODS

More than 200 health screening events with 19,501 participants were conducted from 2004 to 2006 in four US communities with high concentrations of Hispanics: Miami, New York,

Los Angeles, and Houston. Of these, 5288 participants from 27 health screening events had all of the required data examined by cross-sectional analysis for this report. Participants were recruited through advertisements in the media, websites, community calendars, and local flyers. Screening events were held at two types of venues: ''community'' (churches, community centers, retail/grocery stores, and festivals) and ''healthcare facility'' (outside areas of outpatient hospitals/clinics and physician offices). Participation was voluntary, and screening was provided at no cost. Participants received a report of their measurements, general lifestyle counseling, and recommendation to seek physician advice, as appropriate, based on their results.

Medical history and demographics were self-reported on a questionnaire administered in both English and Spanish. Blood pressure was measured by the OMRON Automatic Monitor (Omron Healthcare, Inc, Bannockburn, Ill), and total cholesterol and glucose levels were measured with the Cholestech LDX instrument (Cholestech, Hayward, Calif).

Classification of hypertension, dyslipidemia, and diabetes mellitus were based on the Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, the National Cholesterol Education Program Adult Treatment Panel III, and the American Diabetes Association guidelines, respectively.[5,6,14] Hypertension was defined as blood pressure (BP) ≥140/90 mm Hg (or ≥130/80 mm Hg in patients with diabetes) or on antihypertensive medication. Dyslipidemia was defined as total cholesterol level ≥240 mg/dL (or ≥200 mg/dL in patients with diabetes or history of heart disease) or on lipid-lowering medication. Diabetes was defined as glucose level ≥126 mg/dL (fasting) or ≥200 mg/dL (random) or on diabetes medication. Control of hypertension was defined as having blood pressure <140/90 mm Hg (or <130/80 mm Hg if diabetic) and control of dyslipidemia was defined as having total cholesterol <240 mg/dL (for those without diabetes or heart disease) or total cholesterol <200 mg/dL (for those with heart disease or diabetes).

Additionally, we assessed participants' self-awareness of dyslipidemia and hypertension on the basis of responses to questions provided during the screening event. We classified a participant as aware of his or her condition (hypertension or dyslipidemia) if he or she responded affirmatively to the questions ''Have you ever been told by a doctor that you have high blood pressure?'' (hypertension) and ''Have you ever been told by a doctor that you have high cholesterol?'' (dyslipidemia) or reported currently taking medication for high blood pressure or high cholesterol. These measures were subsequently compared to our classification of disease for each study subject.

CVD risk factors included age and sex (men ≥45 years or women ≥55 years), current smoker, hypertension, dyslipidemia, high-density lipoprotein (HDL) cholesterol <40 mg/dL, family history of early heart disease (heart attack in father or brother before age 55 or before age 65 in mother or sister).

Continuous variables were compared across communities by using analysis of variance, and categorical variables were compared by using the χ^2 test. Logistic regression was used to identify predictors of prevalence of hypertension, dyslipidemia, and concomitant hypertension and dyslipidemia as well as treatment and control of blood pressure, lipid levels, or both in the overall study sample. All analyses were conducted by using SAS version 9.1 (SAS Institute, Inc, Cary, North Carolina).

RESULTS

Data from 5288 participants from Miami (n=372), New York (n=254), Los Angeles (n=4037), and Houston (n=625) were included in this analysis. The mean age for the overall population was 47.8 years, 61.6% were female, 11.1% had diabetes or heart disease, and 62.6% had low HDL cholesterol levels (Table 1).

A total of 37.5% of participants had hypertension, and of these, 39.8% reported treatment, and 37.4% of those receiving treatment were controlled (Table 2). The prevalence of hypertension ranged from 35.7% in Houston to 42.1% in New York, although differences between the communities were not significant. Logistic regression also showed the likelihood of having hypertension did not differ between communities compared with Los Angeles (Table 3). Treatment rates ranged from 30.9% in Houston to 68.2% in Miami, and the likelihood of receiving therapy among participants with hypertension was significantly higher in Miami and New York than in Los Angeles (Table 4). The likelihood of controlling hypertension was higher in New York than in Los Angeles (Table 5).

A total of 26.6% of participants had dyslipidemia; 43.4% with dyslipidemia reported treatment, and 73.1% of those treated were controlled (Table 2). No difference was seen between the communities in the likelihood of having dyslipidemia (Table 3). Treatment rates were significantly higher in New York than in Miami, Los Angeles, or Houston, and New York participants were more likely to receive lipid-lowering medication than were Los Angeles participants (Table 4). The likelihood of control for dyslipidemia was significantly less in Houston than in Los Angeles (Table 5).

A total of 15.3% of participants had concomitant hypertension and dyslipidemia; 37.1% with concomitant conditions were treated for both and 24.6% of those treated had both conditions controlled. Logistic regression showed that the likelihood of having combined hypertension and dyslipidemia was not significantly different between the communities (Table 3). The likelihood of

Table 1. Baseline demographics by geographic community

	Overall (*N*=5288)	Miami (*n*=372)	New York (*n*=254)	LA (*n*=4037)	Houston (*n*=625)
Mean age (SD), years	47.8 (13.9)	55.7 (11.5)[c,e,f]	49.7 (15.3)[a,b,c]	47.3 (13.7)[b,d,f]	45.4 (14.4)[a,d,e]
Female, %	61.6	65.1[c]	75.2[a,b,c]	60.0[b,d]	65.0[a,d]
With health insurance, %	21.8	19.4[c]	78.0[a,b,c]	18.8[b]	19.8[a]
Community screening venue, %	70.8	43.0[c,e,f]	100.0[a,b,c]	68.1[b,d,f]	92.6[a,d,e]
Mean systolic BP (SD), mm Hg	129.0 (19.6)	123.0 (16.4)[e,f]	125.3 (19.3)[a,b]	129.6 (19.7)[b,f]	130.5 (19.4)[a,e]
Mean diastolic BP (SD), mm Hg	77.8 (11.2)	77.4 (10.2)[c,e]	74.5 (10.2)[a,b,c]	77.8 (11.4)[b,d]	78.9 (10.9)[a,d,e]
Mean TC (SD), mg/dL	197.2 (42.9)	201.7 (41.7)[c,f]	182.7 (40.6)[a,b,c]	196.8 (43.0)[b,d,f]	202.7 (42.7)[a,d]
Mean HDL-C (SD), mg/dL	43.3 (12.9)	43.7 (13.8)	44.4 (13.3)	43.0 (12.7)[d]	44.4 (13.6)[d]
Low HDL-C, %*	62.6	63.2	61.4	63.2	59.2
Smokers,%	9.8	13.4[f]	18.5[a,b]	8.8[b,f]	10.9[a]
0–1 Risk Factor, %†	46.4	32.0[c,e,f]	39.8[a,b,c]	47.6[b,f]	49.8[a,e]
2–3 Risk Factors,%†	36.0	38.2[c]	27.6[a,b,c]	36.1[b]	37.1[a]
≥4 Risk Factors, %†	6.5	10.8[e,f]	6.7	6.2[f]	5.6[e]
DM or CHD, %	11.1	19.1[c,e,f]	26.0[a,b,c]	10.0[b,d,f]	7.5[a,d,e]
DM, %	9.3	11.0[c,e]	19.7[a,b,c]	9.1[b,d]	5.0[a,d,e]
CHD, %	2.5	10.8[e,f]	10.6[a,b]	1.1[b,d,f]	2.7[a,d,e]

Statistically significant differences ($P<.05$) are indicated for comparisons between (a) NY and Houston, (b) NY and LA, (c) NY and Miami, (d) Houston and LA, (e) Houston and Miami and (f) LA and Miami.

* Females HDL-cholesterol <50 mg/dL; males HDL-cholesterol <40 mg/dL.

† Risk factors (in those without DM or CHD): age and sex (men ≥45 years of age or women ≥55 years of age), current smoker, HTN, DYS, HDL-C <40 mg/dL, family history of early CHD (heart attack in father or brother before 55 years of age, or before 65 years of age in mother or sister).

BP=blood pressure; CHD=coronary heart disease; DM=diabetes mellitus; HDL=high-density lipoprotein; LA=Los Angeles; NY=New York; SD=standard deviation; TC=total cholesterol.

receiving concomitant antihypertensive and lipid-lowering therapy was significantly higher in New York and lower in Houston than in Los Angeles (Table 4). Joint control of hypertension and dyslipidemia was particularly low in Houston (4.5%) compared with Miami (24.4%), New York (35.3%), or Los Angeles (25.0%), but logistic regression analysis showed no differences between the communities when other variables were taken into account (Table 5).

Logistic regression analyses examining factors associated with the likelihood of having hypertension, dyslipidemia, or both showed no differences between participants screened at community venues and those screened at

Table 2. Prevalence, treatment and control of hypertension (HTN) and/or dyslipidemia (DYS)

	Overall (*N*=5288)	Miami (*n*=372)	NY (*n*=254)	LA (*n*=4037)	Houston (*n*=625)
HTN, % (n/N)	37.5 (1982/5288)	41.4 (154/372)	42.1 (107/254)	37.1 (1498/4037)	35.7 (223/625)
HTN treated, % (n/N)	39.8 (788/1982)	68.2[e,f] (105/154)	64.5[a,b] (69/107)	36.4[b,f] (545/1498)	30.9[a,e] (69/223)
HTN controlled among prevalent, % (n/N)	14.9 (295/1982)	31.8[e,f] (49/154)	30.8[a,b] (33/107)	12.6[b,f] (189/1498)	10.8[a,e] (24/223)
HTN controlled among treated, % (n/N)	37.4 (295/788)	46.7[f] (49/105)	47.8[b] (33/69)	34.7[b,f] (189/545)	34.8 (24/69)
DYS, % (n/N)	26.6 (1404/5288)	37.9[e,f] (141/372)	31.9[b] (81/254)	25.1[b,f] (1015/4037)	26.7[e] (167/625)
DYS treated, % (n/N)	43.4 (610/1404)	53.2[c,e,f] (75/141)	75.3[a,b,c] (61/81)	40.7[b,f] (413/1015)	36.5[a,e] (61/167)
DYS controlled among prevalent, % (n/N)	31.8 (446/1404)	39.0[c,e,f] (55/141)	53.1[a,b,c] (43/81)	30.5[b,d,f] (310/1015)	22.8[a,d,e] (38/167)
DYS controlled among treated, % (n/N)	73.1 (446/610)	73.3 (55/75)	70.5 (43/61)	75.1[d] (310/413)	62.3[d] (38/61)
HTN+DYS, % (n/N)	15.3 (811/5288)	20.4[e,f] (76/372)	19.3 (49/254)	14.8[f] (596/4037)	14.4[e] (90/625)
HTN+DYS dually treated, % (n/N)	37.1 (301/811)	59.2[e,f] (45/76)	69.4[a,b] (34/49)	33.6[b,f] (200/596)	24.4[a,e] (22/90)
HTN+DYS dually controlled among prevalent, % (n/N)	9.1 (74/811)	14.5[e] (11/76)	24.5[a,b] (12/49)	8.4[b,d] (50/596)	1.1[a,d,e] (1/90)
HTN+DYS dually controlled among treated, % (n/N)	24.6 (74/301)	24.4[e] (11/45)	35.3[a] (12/34)	25.0[d] (50/200)	4.5[a,d,e] (1/22)

Statistically significant differences ($P<.05$) are indicated for comparisons between: (a) NY and Houston, (b) NY and LA, (c) NY and Miami, (d) Houston and LA, (e) Houston and Miami and (f) LA and Miami. HTN=blood pressure ≥140/90 mm Hg (≥130/80 mm Hg in participants with diabetes mellitus) or on medication; DYS=total cholesterol ≥240 mg/dL (≥200 mg/dL if with diabetes mellitus or prior coronary heart disease) or on medication.

LA=Los Angeles; NY=New York.

Table 3. Likelihood of having hypertension, dyslipidemia, or both among Hispanics seen at health-screening programs in Los Angeles, Miami, New York, and Houston (*n*=4175)*

Parameter	Hypertension OR (95% CI)	Dyslipidemia OR (95% CI)	Both OR (95% CI)
Community (referent: Los Angeles)			
Miami	1.00 (.75–1.33)	1.08 (.81–1.43)	.95 (.67–1.36)
New York	.85 (.61–1.19)	.93 (.66–1.31)	.67 (.44–1.03)
Houston	1.19 (.96–1.46)	1.23 (.99–1.53)	1.07 (.81–1.42)
Female sex (referent: male)	.62 (.54–.72)†	.73 (.63–.85)†	.76 (.63–.92)†
Age (continuous)	1.07 (1.06–1.07)†	1.05 (1.04–1.05)†	1.06 (1.05–1.07)†
Heart disease (referent: no heart disease)	3.80 (2.12–6.82)†	5.21 (3.00–9.06)†	7.40 (4.32–12.67)†
Diabetes (referent: no diabetes)	5.41 (4.14–7.07)†	4.12 (3.27–5.19)†	5.38 (4.24–6.82)†
Health insurance (referent: no health insurance)	2.46 (1.87–3.23)†	1.00 (.77–1.30)	1.84 (1.30–2.60)†
Community venue (referent: healthcare venue)	1.00 (.75–1.33)	1.08 (.81–1.43)	.95 (.67–1.36)

OR, odds ratio; CI, confidence interval.
* Logistic regression analyses included all participants with complete data on the covariates.
Significance levels: † $P<.005$

healthcare facility venues; women were significantly less likely than men to have each condition; increasing age or having heart disease or diabetes were associated with a greater likelihood of having hypertension or dyslipidemia (Table 3). The likelihood of receiving treatment for hypertension or for both hypertension and dyslipidemia was higher for women than for men, but no difference between the sexes was observed for dyslipidemia treatment (Table 4). Increasing age or presence of heart disease were associated with increased likelihood of receiving therapy for all conditions, while having diabetes was not. Although the likelihood of treatment for all conditions was higher with increasing age (Table 4), being at goal for hypertension was less likely (Table 5). Participants with diabetes were less likely to attain control of dyslipidemia than were those without diabetes (Table 5).

A large proportion of participants (46.2%) were unaware that they had hypertension; only 8.3% of participants with dyslipidemia reported being unaware of their condition. Awareness varied regionally; in New York and Miami, only approximately one-fourth of participants reported being unaware that they had hypertension. In Houston, 55.2% of participants reported being unaware that they had hypertension, and in Los Angeles, 48.3% reported being unaware. Unawareness of dyslipidemia was highest (9.1%) in Los Angeles, compared with 6.0% to 6.4% in other communities.

DISCUSSION

Our analysis suggests CVD risk factors are highly prevalent in Hispanics who were assessed in voluntary health-screening programs in the United States, regardless of region. More than half of participants had two or more CVD risk factors, diabetes, or heart

Table 4. Likelihood of receiving treatment for hypertension, dyslipidemia, or both among Hispanics seen at health-screening programs in Los Angeles, Miami, New York, and Houston

Parameter	Hypertension OR (95% CI) (*n*=1585*)	Dyslipidemia OR (95% CI) (*n*=1167*)	Both OR (95% CI) (*n*=670*)
Community (referent: Los Angeles)			
Miami	1.93 (1.26–2.95)‡	1.16 (.74–1.80)	1.35 (.72–2.51)
New York	2.44 (1.47–4.05)‡	2.08 (1.13–3.84)†	2.55 (1.16–5.60)†
Houston	.76 (.53–1.08)	.87 (.58–1.29)	.50 (.27–.93)†
Female sex (referent: male)	1.65 (1.31–2.09)‡	1.13 (.87–1.47)	1.88 (1.28–2.77)‡
Age (continuous)	1.07 (1.06–1.08)‡	1.05 (1.04–1.06)‡	1.06 (1.04–1.08)‡
Heart disease (referent: no heart disease)	4.59 (2.12–9.90)‡	3.14 (1.54–6.37)‡	3.45 (1.55–7.69)‡
Diabetes (referent: no diabetes)	.84 (.63–1.12)	1.10 (.81–1.51)	.67 (.45–1.01)
Health insurance (referent: no health insurance)	.41 (.27–.64)‡	.94 (.62–1.42)	.44 (.24–.81)†
Community venue (referent: healthcare venue)	1.93 (1.26–2.95)‡	1.16 (.74–1.80)	1.35 (.72–2.51)

OR, odds ratio; CI, confidence interval.
* Logistic regression analyses included only participants who had the condition of interest noted in the respective columns with complete data on the covariates
Significance levels: † $P<.05$; ‡ $P<.005$

Table 5. Likelihood of controlling hypertension, dyslipidemia, or both among Hispanics seen at health-screening programs in Los Angeles, Miami, New York, and Houston

Parameter	Hypertension OR (95% CI) (*n*=642*)	Dyslipidemia OR (95% CI) (*n*=320*)	Both OR (95% CI) (*n*=250*)
Community (referent: Los Angeles)			
Miami	1.54 (.93–2.53)	.90 (.43–1.85)	.91 (.38–2.18)
New York	2.80 (1.53–5.15)‡	.71 (.29–1.74)	2.33 (.92–5.89)
Houston	1.17 (.67–2.07)	.36 (.16–.82)†	.25 (.05–1.20)
Female sex (referent: male)	.85 (.61–1.20)	1.13 (.68–1.89)	.76 (.41–1.40)
Age (continuous)	.96 (.95–.98) ‡	1.01 (.98–1.03)	.99 (.96–1.02)
Heart disease (referent: no heart disease)	.59 (.31–1.13)	1.15 (.52–2.54)	1.04 (.40–2.70)
Diabetes (referent: no diabetes)	.88 (.59–1.32)	.48 (.29–.81)†	.74 (.37–1.42)
Health insurance (referent: no health insurance)	.43 (.26–.70)‡	1.19 (.59–2.40)	.60 (.26–1.36)
Community venue (referent: healthcare venue)	1.54 (.93–2.53)	.90 (.43–1.85)	.91 (.38–2.18)

OR, odds ratio; CI, confidence interval.

* Logistic regression analyses included only those participants with complete venue information who had the conditions of interest and who were treated for the conditions.

Significance levels: † $P<.05$, ‡ $P<.005$.

disease. More than one-third had hypertension alone, more than one-quarter had dyslipidemia alone, and up to one-fifth had concomitant hypertension and dyslipidemia. While the prevalence of these CVD risk factors did not significantly differ between the communities after adjusting for venue, health insurance, age, sex, and presence of heart disease or diabetes, regional differences were observed in the treatment and control of hypertension and dyslipidemia. A higher proportion of Hispanics in New York received treatment compared with those in Los Angeles, and participants in Houston consistently had the lowest rates of control for hypertension, dyslipidemia, and combined hypertension and dyslipidemia.

Our findings are supported by the Multi-Ethnic Study of Atherosclerosis, which reported similar prevalences of hypertension and dyslipidemia in Hispanics.[15,16] Control rates for hypertension and dyslipidemia among Hispanics receiving treatment were also similar.

The prevalence, treatment, and control of combined hypertension and dyslipidemia in US Hispanics in the NHANES 2001–2002 dataset were lower (9.8%, 12.4%, and 0%, respectively)[12] than observed in our study (15.3%, 37.1%, 9.1%, respectively). Dyslipidemia was classified by total cholesterol levels in our study versus low-density lipoprotein cholesterol levels in NHANES, which may partly explain the difference.[12]

Less access to medical services may contribute to lower treatment and control rates of CVD risk factors in Hispanics.[13] According to the US Census Bureau, 32.7% of Hispanics lacked health insurance in 2005, but 78.2% of participants recruited at our health screening events lacked insurance. In a large-scale clinical trial in which participants had equal access to medical care and medication, Hispanics controlled their hypertension as well as or better than non-Hispanic participants.[17]

A higher proportion of Hispanics in New York received treatment compared with those in Los Angeles, and participants in Houston consistently had the lowest rates of control for hypertension, dyslipidemia, and combined hypertension and dyslipidemia.

Our study demonstrated that, relative to Hispanic men, Hispanic women are less likely to have hypertension, dyslipidemia, or concomitant hypertension and dyslipidemia. Hispanic women have lower hypertension-related mortality than Hispanic men across all Hispanic subpopulations, as well as lower prevalence of dyslipidemia.[10,18]

The findings of this study are limited to a convenience sample of patients who voluntarily attended screenings in urban areas and may not be generalizable to other Hispanic populations. Because this study relied on voluntary participation, it may have attracted a disproportionate number of participants with concerns about their health. Other limitations of this study include the following: low-density lipoprotein cholesterol levels were not analyzed because they were available for only a small subset of participants; triglyceride levels were not analyzed because some samples were taken in a nonfasting state, and data on body mass index and lifestyle factors were not captured. Prevalence and treatment rates may not be precisely estimated in this study because participants' medical histories, including medication use, were based on self-report. All participants in this analysis were of Hispanic

origin, but their specific ancestry was not recorded. Birthplace information would have allowed examination of potential differences between first- and second-generation individuals.

Conducting community health-screening programs is well accepted in the Hispanic population, and is helpful in identifying subjects with CVD risk and providing education to this often underserved population. Our study has highlighted variation in the treatment and control of hypertension and dyslipidemia in US urban Hispanic communities. Further research on Hispanic subpopulations of different ancestry, intergenerational differences, environmental and cultural factors affecting clinical management and the implications on CVD risk detection and treatment in Hispanic individuals are warranted.

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AUTHOR CONTRIBUTIONS

Design concept of study: Lee, Tang
Data analysis and interpretation: Lee, Candrilli, Roberts, Tang, Bassin, Wong
Manuscript draft: Lee, Candrilli, Roberts, Bassin, Wong
Statistical expertise: Candrilli, Bassin, Wong
Acquisition of funding: Lee, Tang
Administrative, technical, or material assistance: Lee, Roberts
Supervision: Lee, Tang, Wong