HHS Public Access

Author manuscript

J Community Health. Author manuscript; available in PMC 2015 March 31.

Published in final edited form as:

J Community Health. 2013 August ; 38(4): 634–641. doi:10.1007/s10900-013-9658-0.

Cardiovascular Health Status Among Caribbean Hispanics Living in Northern Manhattan and Ecuadorian Natives/Mestizos in Rural Coastal Ecuador: A Comparative Study

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Abstract

Knowledge of cardiovascular health (CVH) status of a given population is mandatory to reduce the burden of vascular diseases in the region. We compared CVH of two distinct populations having similar ethnic backgrounds to understand the role of lifestyle and environment on their CVH, and to provide insights in the planning of cost-effective health strategies. CVH status was compared in two Hispanic populations living in Northern Manhattan and Atahualpa (rural coastal Ecuador) using the health metrics proposed by the American Heart Association. Both studies used similar definitions of CVH and similar inclusion criteria for participating subjects (age ≥40 years, cardiovascular disease-free status, and living at their respective localities for ≥3 months). The

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studied populations consisted of 1,617 Caribbean Hispanics living in Northern Manhattan (mean age 66 ± 9 years), and 616 Atahualpa residents (mean age 59 ± 13 years). Atahualpa residents had significantly better metrics than Caribbean Hispanics, with the exception of fasting glucose levels. Likewise, the odds for having 5–7 ideal metrics were also better in Atahualpa residents, irrespective of age. CVH is better in Atahualpa residents than in Caribbean Hispanics living in Northern Manhattan. These differences are likely related to a healthier lifestyle in a rural setting and provide insights for setting cardiovascular prevention priorities.

Keywords

Cardiovascular health; Arterial hypertension; Diabetes mellitus; Atahualpa; Northern Manhattan

Introduction

Stroke and ischemic heart disease are leading causes of death and adult disability in the world. While rates of cardiovascular diseases have declined in developed countries, non-communicable diseases are increasing in the developing world, to the point that these conditions have been considered as the next epidemics in many middle- and low-income countries [1, 2]. The burden of stroke and cardiovascular diseases in a given population is directly related to its cardiovascular health (CVH) status [3]. The American Heart Association (AHA) has defined the metrics for ideal CVH, including a number of health behaviors and health factors, which if achieved could have a major impact on reducing the incidence of stroke and ischemic heart disease [4]. The AHA has set a goal of improving cardiovascular health by 20% and reducing deaths from stroke and cardiovascular diseases by 20% by 2020 in the US. The World Health Organization has set a global goal of reducing deaths from non-communicable diseases—including stroke and cardiovascular diseases—by 25% by 2025 [5]. Such goals will require implementation of effective strategies to improve metrics for CVH.

Implementation of public health strategies directed to improve the CVH status of a given population should be based on local studies evaluating specific regional risk factors, rather than extrapolation of data from studies performed in other regions. For example, measures directed to control blood pressure, instead of obesity, could be a priority in some countries but not in others [6]. Both individual and environmental risk factors need to be improved in developing societies as well as disadvantaged populations living within a developed society [7]. Regional epidemiologic surveys or comparative studies among different populations may prove highly cost-effective for developing strategies directed to improve the CVH status of a given population or ethnic group. Regional data regarding the prevalence of ideal CVH will lead to more informed decisions on the prioritization of existing resources which, in most of the world, are already limited.

In this context, differences by race and ethnicity in the prevalence of ideal CVH were found in Northern Manhattan among a multi-ethnic urban population. Whites scored better than Caribbean Hispanics and Blacks for most of the CVH metrics [8]. However, as this multi-ethnic population lived in the same geographic area, the specific contribution of

environmental factors from an urban versus rural lifestyle was more difficult to assess. The Atahualpa Project evaluated the CVH status of a mostly Ecuadorian native and mestizo population living in a rural village of coastal Ecuador, where lifestyles and access to medical care are completely different than in Northern Manhattan [9]. Our aim was to evaluate the differences in lifestyle factors in CVH status in two distinct Hispanic populations living in very different cultural and socioeconomic communities in order to provide insights in the planning of collaborative preventive health priorities.

Methods

Demographic characteristics of the two populations included in this comparative study have been described elsewhere [8, 9]. In brief, Caribbean Hispanics living in Northern Manhattan were recruited in NOMAS through community random-digit dialing from 1993 through 2001, and Atahualpa residents were identified during a door-to-door community survey performed from June to October, 2012. To be enrolled, subjects had to be aged ≥40 years, had to be free of stroke, and had to be living in their respective localities for at least 3 months. For this analysis, any subjects with baseline ischemic heart disease were also excluded. Northern Manhattan is an urban densely populated community north of 155th Street on the island of Manhattan with a large number of Hispanic residents mainly from the Dominican Republic, but also including Puerto Rico, Cuba, and other Latin American countries. Atahualpa is a rural village located in coastal Ecuador, 10 miles west of the Pacific Ocean (2°18′S, 80°46′W). More than 95% of Atahualpa residents are Ecuadorian natives or mestizos (a racial admixture of Spaniards and Natives); most people do not migrate, and a sizable proportion of them have never visited large urban centers.

Both studies used similar definitions of vascular health. The seven metrics proposed by the AHA were used for evaluating the CVH status of the persons [4]. In accordance with the AHA, metrics were classified into “ideal”, “intermediate”, or “poor” as the following: (1) smoking: ideal (never or quit >1 year), intermediate (quit ≤1 year) and poor (current); (2) body mass index (BMI): ideal (<25kg/m^2), intermediate (25 to <30 kg/m^2) and poor (≥30kg/m^2); (3) physical activity: ideal (≥150 min/week moderate intensity or ≥75 min/week vigorous intensity or equivalent combination), intermediate (1–149 min/week moderate intensity or 1–74 min/week vigorous intensity or equivalent combination) and poor (no moderate or vigorous activity); (4) diet: ideal (4–5 healthy components), intermediate (2–3 healthy components) and poor (0–1 healthy components) based on 5 healthy dietary metrics (≥ 4.5 cups fruits and vegetables/day, ≥two 3.5 oz servings fish/week, ≥three 1-oz equivalent servings fiber-rich whole grains/day, <1,500 mg sodium/day, and ≤450 kcal sugar-sweetened beverages/week); (5) total cholesterol: ideal (untreated and <200 mg/dL), intermediate (treated to <200 mg/dL or 200–239 mg/dL) and poor (≥240 mg/dL); (6) blood pressure: ideal (untreated and <120/<80 mmHg), intermediate (treated to <120/<80 mmHg or 120–139/80–89 mmHg) and poor (≥140/90 mmHg); and (7) fasting plasma glucose: ideal (untreated and <100 mg/dL), intermediate (treated to<100 mg/dL or 100–125 mg/dL0, and poor (≥126 mg/dL). Smoking status and physical activity were mainly based on self-report; BMI (kg/m^2) was calculated after obtaining the person's height and weight; diet was assessed by self-reported questionnaires and direct interviews with the aid of validated food frequency instruments; blood pressure was measured using well-

defined protocols; and fasting glucose and total cholesterol levels were determined using standards methods as previously described [8, 9].

Descriptive statistics were presented as means with standard deviations for continuous variables and as percentages for categorical variables. Generalized linear regression models were used to compare the means and proportions across the populations. Variables were adjusted for sex, education, and alcohol intake when needed after adjustment for age. Logistic regression models were used to compare the odds of having five or more ideal CVH metrics across the populations after controlling for age, sex, education attainment and alcohol intake. For the purposes of this comparative study, the Caribbean Hispanic population of NOMAS was classified into four sub-groups according to their country of origin (Dominican Republic, Puerto Rico, Cuba, and other Latin American countries). All data analyses were carried out using SAS version 9.3 (SAS Institute Inc., Cary, NC, USA). All *p* values were 2-sided and a *p* value of less than 0.05 is considered statistically significant.

Results

The Caribbean Hispanic NOMAS population consisted of 1,617 persons (36.7% men) with a mean age of 66 ± 9 years (age range 40–107 years). Of these, 995 were of Dominican, 234 of Puerto Rican, and 187 of Cuban origin; the remaining 201 persons were from other Latin American countries. Atahualpa residents included 616 individuals (40.6% men) with a mean age of 59 ± 13 years (age range 40–99 years); more than 95% of them were Ecuadorian natives or belonged to the mestizo ethnic group.

We found significant differences between the two populations regarding education, alcohol intake, mean values of diastolic (but not systolic) blood pressure, BMI, fasting glucose and total cholesterol levels, and in the use of anti-hypertensive, lipid-lowering and hypoglycemic drugs. In general terms, Atahualpa residents scored better than the Caribbean Hispanic NOMAS population in all of these variables, except for education and mean fasting glucose levels. In addition, the percentage of persons receiving medications was lower in Atahualpa when compared with the NOMAS population (Table 1). When Hispanics in NOMAS were classified according to their country of origin, most of the above described differences persisted, with the exception that education was worse in Atahualpa residents when compared with Dominicans but not with other nationalities, that mean values of systolic blood pressure were better in Atahualpa residents than in Dominicans, and that the percentage of Atahualpa residents taking hypoglycemic drugs was similar to that of Cubans and people included in the sub-group of “other nationalities”.

Cardiovascular health metrics of included individuals, stratified according to their age, are detailed in Table 2. Overall, Atahualpa residents had significantly better CVH metrics than the Caribbean Hispanic NOMAS population, with the notable exception of fasting glucose levels. Although the population differed by baseline age, most of the differences in ideal CVH persisted in the age-stratified analysis; however, the percentage of persons with ideal BMI and total cholesterol levels was similar when only people aged 40–59 years were considered. Likewise, the odds for having 5–7 ideal metrics were better in Atahualpa

residents than in the Caribbean Hispanic NOMAS population, irrespective of age (Table 3). When NOMAS Caribbean Hispanics were classified according to their geographic origin, the only change was that the percentage of persons with ideal blood pressure remained significantly better in Atahualpa residents than in Dominicans but not in the other sub-groups (Tables 4, 5).

Since ideal/intermediate diet was the single CVH metric showing the greatest difference in both populations (97.2 vs. 25.3%), the five health components of the diet were individually analyzed. We found that the high prevalence of consumption of fish, fruits and vegetables by Atahualpa residents was the main factor accounting for these differences. Ideal or intermediate amounts of fruits/vegetables and fish were consumed by 86 and 97% of Atahualpa residents versus 9 and 11% of the Caribbean Hispanic NOMAS population, respectively. Consumption of ideal/intermediate amounts of fiber-rich whole grains was also better in Atahualpa residents than in the Caribbean Hispanic NOMAS population (37 vs. 17%). The other two healthy components of the diet (<1,500 mg sodium/day and ≤450 kcal sugar-sweetened beverages/week) showed rather similar poor values in both populations (95 vs. 87 and 60 vs. 48%, respectively).

Discussion

This comparative study shows significant differences in the percentage of persons with 5–7 ideal CVH metrics between Atahualpa residents and Caribbean Hispanics living in Northern Manhattan even after adjusting for age and education. Atahualpa residents scored better in six of the seven CVH metrics, with the exception of fasting glucose levels. Moreover, comparison of the number of ideal CVH metrics per person pointed to a better CVH status in Atahualpa residents, as 36.4% of them had 4 or more ideal CVH metrics as compared with 14.1% of the Caribbean Hispanic NOMAS population. Only 7.6% of Atahualpa residents versus 20.7% of Caribbean Hispanic NOMAS had 0–1 ideal CVH metrics.

While differences favoring Atahualpa residents were more remarkable among the so-called “health behaviors” (smoking, BMI, physical activity and healthy diet), this population also scored better than the Caribbean Hispanic NOMAS population in 2 of the 3 “health factors”, including blood pressure and total cholesterol blood levels. There are many potential reasons for these differences in ideal health metrics, including the lower prevalence of highly processed foods in Atahualpa (fast-food restaurants are absent in the village) and the fact that most of their residents engage in regular physical activities as part of their routine lifestyle as they work as carpenters, laborers, fishers or farmers. Besides this, most Atahualpa residents do not own a motor vehicle and public transportation is absent in the village, so they must walk or ride a bicycle to travel from home to work. Also, most of them do not smoke and few drink soft drinks on a daily basis. All these factors have been shown to contribute to a poor CVH health in urban centers of developed countries [8, 10, 11]. In this regard, it has previously been shown that people living in rural areas of some developing countries have a better CVH status that their urban counterparts and that such differences are mainly related to a healthier lifestyle in the rural setting [12]. Also, migration from a developing country to an industrialized nation may adversely affect the CVH status

of individuals; such worsening is directly related to the time migrants live in the new industrialized environment [13, 14].

In a given population it may be easier to modify poor “health factors” than “health behaviors”, since the former could be improved by enhancing medical care and by providing medication to people who—in many cases—are unaware of their medical conditions such as arterial hypertension or diabetes mellitus. In contrast, behaviors (or living habits) are more difficult to modify since they are often deep-rooted, and require educational campaigns directed against smoking, physical inactivity and eating. In this context, it is likely that the priorities in the two populations may be different. Expanding access to healthier foods and increasing opportunities to be physically active are of critical importance in urban communities such as Northern Manhattan, while increasing access to essential medications are of greater importance in rural communities such as Atahualpa.

A point that deserves special attention is the low prevalence of ideal fasting glucose levels in Atahualpa residents (30.8%) despite the more ideal BMI. While these numbers could be associated with a diet that is rich in carbohydrates, it is also possible that it may be related to a yet unknown genetic susceptibility in the Ecuadorian native ethnic group to develop type 2 diabetes mellitus. In Atahualpa, four surnames—all of Spaniard origin— accounted for more than 50% of the population. This does not necessarily mean crossbreeding or consanguinity, since it was common for ancient Ecuadorian natives to adopt the surnames of their Spaniard conquerors, and there is evidence that this village already existed (under other name) by the time Spaniards arrived to Ecuador. Further genetic testing is warranted to evaluate the possible existence of common ancestries with other ancient Amerindian populations (such as the Arizona PIMA Indians) where the prevalence of type 2 diabetes mellitus has proven to be high [15, 16].

Besides determining the basal CVH status of the population, in NOMAS we correlated this status with the risk of developing stroke and ischemic heart disease [8]. According to our findings, all ethnic groups had a decreased incidence of vascular outcomes with an increasing number of ideal CVH metrics. Moreover, the vascular risk was slightly lower among Hispanics compared to Whites and Blacks across each of the ideal CVH strata, an observation that may be explained by the so-called “Hispanic paradox”, whereby Hispanics living in the U.S. have a lower rate of vascular deaths than Whites despite their worse vascular profile [17]. Whether this paradox also applies to Hispanic populations living at their countries of origin remains to be determined. In this context, further long-term longitudinal studies in Atahualpa residents will be of value to compare the risk of stroke and other cardiovascular outcomes according to the basal CVH status across the NOMAS and the Atahualpa populations.

In summary, this comparative study shows that the CVH status of a rural population of a developing country in Latin America is better than that of an urban U.S. population for most ideal CVH metrics except for fasting glucose. The major strength of this comparative study is that NOMAS and the Atahualpa Project were comparable as they used similar inclusion criteria and similar definitions of vascular health [8, 9]. A potential weakness is that the two populations were studied in different time periods and protocols were somewhat different,

particularly in the way blood glucose and total cholesterol levels were determined (laboratory determination in NOMAS vs. pinprick tests in Atahualpa). However, the high values in the odds of having ideal CVH metrics between NOMAS Caribbean Hispanics and Atahualpa residents (Table 3) make it unlikely that unmeasured confounders or differences in the protocol accounted for such marked differences. Further large-scale studies using the same CVH metrics, are needed to evaluate and to compare the CVH status of rural and urban regions of Latin America, the U.S., and other developed and developing countries. This data may then help to effectively prioritize cost-effective strategies directed to reduce the burden of stroke and cardiovascular diseases worldwide.

Acknowledgments

The Northern Manhattan Stroke Study was supported by a Grant from the National Institute of Neurological Disorders and Stroke (R37 NS 29993), and the Atahualpa Project by the Universidad de Especialidades Espíritu Santo, Guayaquil, Ecuador.

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Table 1

Characteristics of Atahualpa and NOMAS Caribbean Hispanic populations

Characteristics	Atahualpa (*n* = 616)	NOMAS Caribbean Hispanics				
		Total (*n* = 1,617)	Dominican (*n* = 995)	Puerto Rican (*n* = 234)	Cuban (*n* = 187)	Other (*n* = 201)
Age, years	59 ± 13	66 ± 9	65 ± 9	68 ± 9	72 ± 10	65 ± 9
Male	40.6 %	36.7 %	32.7 %*	41.0 %	47.1 %*	42.3 %
Primary school or less	64.4 %	63.6 %***	74.5 %	41.0 %***	56.2 %***	43.3 %***
No or light alcohol drinking	85.9 %	65.8 %***	67.2 %***	65.0 %***	65.2 %***	60.2 %***
Body mass index, kg/cm^2	27 ± 5	28 ± 5***	28 ± 5***	28 ± 6**	28 ± 5***	29 ± 5***
Systolic blood pressure, mmHg	138 ± 25	144 ± 21	145 ± 21**	142 ± 20	144 ± 21	140 ± 22
Diastolic blood pressure, mmHg	77 ± 12	84 ± 11***	86 ± 11***	81 ± 11***	83 ± 10***	82 ± 10***
Fasting glucose, mg/dL	143 ± 89	108 ± 53***	109 ± 52***	112 ± 65***	102 ± 43***	104 ± 46***
Total cholesterol, mg/dL	197 ± 31	202 ± 41***	201 ± 40*	205 ± 46**	205 ± 40*	201 ± 40
Antihypertensive medication	13.0 %	42.1 %***	47.3 %***	34.2 %***	39.0 %***	28.4 %***
Lipid-lowering medication	1.1 %	12.7 %***	12.4 %***	15.8 %***	13.9 %***	10.0 %***
Hypoglycemic treatment	10.9 %	15.8 %*	16.6 %*	20.5 %**	11.8 %	10.0 %

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$ compared with Atahualpa after adjustment for age

Table 2

Cardiovascular health (CVH) status in Atahualpa and NOMAS Caribbean Hispanic cohorts

CVH metrics	All			Age 40–59			Age ± 60		
	Atahualpa (*n* = 616)	NOMAS Caribbean Hispanics (*n* = 1,617)	*p**	Atahualpa *n* = 339	NOMAS Caribbean Hispanics (*n* = 408)	*p**	Atahualpa *n* = 277	NOMAS Caribbean Hispanics (*n* = 1,209)	*p**
Smoking, %									
Ideal	97.1	81.3	<.0001	95.9	77.4	<.0001	98.5	82.6	<.0001
Intermediate	1.1	2.4		1.8	2.0		0.4	2.6	
Poor	1.8	16.3		2.3	20.6		1.1	14.8	
Body mass index, %									
Ideal	36.0	24.6	<.0001	30.1	22.1	0.141	43.3	25.4	<.0001
Intermediate	38.0	45.7		38.1	45.0		37.9	46.0	
Poor	26.0	29.7		31.8	32.9		18.8	28.6	
Physical activity, %									
Ideal	51.8	26.8	<.0001	64.0	25.7	<.0001	36.8	27.2	0.001
Intermediate	42.4	23.6		33.3	24.8		53.4	23.2	
Poor	5.8	49.6		2.7	49.5		9.8	49.6	
Diet, %									
Ideal	19.8	0.5		19.8	0.3		19.9	0.6	
Intermediate	77.4	24.8	<.0001	78.4	20.3	<.0001	76.2	26.3	<.0001
Poor	2.8	74.7		1.8	79.4		3.9	73.1	
Blood pressure, %									
Ideal	22.2	5.0	<.0001	29.8	7.4	<.0001	13.0	4.2	<.0001
Intermediate	40.0	57.9		42.8	63.1		36.5	56.1	
Poor	37.8	37.1		27.4	29.5		50.5	39.7	
Total cholesterol, %			<.0001			0.090			<.0001
Ideal Intermediate	58.4	43.0		58.7	48.3		58.1	41.1	
Poor	33.0	40.2		33.6	37.0		32.1	41.3	
Plasma glucose, %	8.6	16.8		7.7	14.7		9.8	17.6	
Ideal	30.8	62.3	<.0001	36.0	69.8	<.0001	24.5	59.7	<.0001

CVH metrics	All			Age 40–59			Age ± 60		
	Atahualpa (*n* = 616)	NOMAS Caribbean Hispanics (*n* = 1,617)	*p**	Atahualpa *n* = 339	NOMAS Caribbean Hispanics (*n* = 408)	*p**	Atahualpa *n* = 277	NOMAS Caribbean Hispanics (*n* = 1,209)	*p**
Intermediate	37.5	20.5		36.0	19.4		39.4	20.9	
Poor	31.7	17.2		28.0	10.8		36.1	19.4	
No. of Ideal CVH metrics, %		100.0	<.0001		100.0	<.0001			<.0001
0	0.3	2.2		0.3	1.7		0.4	2.3	
1	7.3	18.5		5.3	15.9		9.7	19.4	
2	25.2	35.2		21.8	35.6		29.2	35.1	
3	30.8	30.0		31.6	31.1		30.0	29.6	
4	23.4	10.9		24.5	12.0		22.0	10.5	
5	8.9	2.8		10.6	2.5		6.9	3.0	
6	2.0	0.4		2.7	1.2		1.1	0.1	
7	2.1	0.0		3.2	0.0		0.7	0.0	

*Age-adjusted p value in the multiple binary logistic regression (ideal vs. other for individual metrics except for diet, which was model as ideal/intermediate vs. poor; 5–6 vs 0–4 for the number of ideal health metrics)

Table 3

Odd ratios (OR) of having ideal cardiovascular health (CVH) factors for Atahualpa versus NOMAS Caribbean Hispanics

Ideal CVH factors	All		Age 40–59		Age ≥60	
	OR (95% CI)	*p**	OR (95% CI)	*p**	OR (95% CI)	*p**
Number of ideal CVH factors (5–7)	3.8 (2.5–5.7)	<.0001	4.1 (2.1–8.0)	<.0001	3.0 (1.7–5.4)	0.0001
Smoking	8.7 (5.2–14.5)	<.0001	8.2 (4.2–16.1)	<.0001	12.9 (4.7–35.2)	<.0001
Body mass index	2.0 (1.6–2.5)	<.0001	1.3 (0.9–2.1)	0.131	2.2 (1.6–2.9)	<.0001
Physical activity	2.8 (2.2–3.5)	<.0001	5.2 (3.5–7.7)	<.0001	1.7 (1.3–2.3)	0.0004
Blood pressure	3.5 (2.5–4.9)	<.0001	2.9 (1.8–4.8)	<.0001	3.7 (2.3–6.0)	<.0001
Total cholesterol	1.7 (1.4–2.1)	<.0001	1.3 (0.9–1.8)	0.197	1.9 (1.4–2.5)	<.0001
Plasma glucose	0.25 (0.20–0.31)	<.0001	0.21 (0.15–0.31)	<.0001	0.24 (0.17–0.32)	<.0001

* Adjusted for age, sex, education and alcohol drinking

J Community Health. Author manuscript; available in PMC 2015 March 31.

Table 4

Cardiovascular health (CVH) status in Atahualpa and NOMAS Caribbean Hispanic subgroups

CVH metrics	Atahualpa (*n* = 616)	NOMAS Caribbean Hispanics			
		Dominican (*n* = 995)	Puerto Rican (*n* = 234)	Cuban (*n* = 187)	Other (*n* = 201)
Smoking, %					
Ideal	97.1	82.4***	76.8***	80.2***	82.1***
Intermediate	1.1	2.0	2.2	4.3	3.0
Poor	1.8	15.6	21	15.5	14.9
Body mass index, %					
Ideal	36.0	23.6***	31.6*	29.9**	16.0***
Intermediate	38.0	46.0	37.6	46.7	53.0
Poor	26.0	30.4	30.8	23.4	31.0
Physical activity, %					
Ideal	51.8	23.2***	33.3**	28.9**	35.3**
Intermediate	42.4	25.1	21.0	20.8	21.4
Poor	5.8	51.7	45.7	50.3	43.3
Diet, %					
Ideal	19.8	0.7***	0.0***	0.0***	0.5***
Intermediate	77.4	26.0	24.9	20.0	22.9
Poor	2.8	73.3	75.1	80.0	76.6
Blood pressure, %					
Ideal	22.2	3.7***	6.8**	5.4*	8.5**
Intermediate	40	56.8	59.4	60.2	59.3
Poor	37.8	39.5	33.8	34.4	32.2
Total cholesterol, %					
Ideal	58.4	44.3***	38.9***	38.8***	45.0**
Intermediate	33.0	39.4	43.6	42.3	38.4
Poor	8.6	16.3	17.5	18.9	16.6
Plasma glucose, %					
Ideal	30.8	60.3***	60.6***	71.8***	65.7***

CVH metrics	Atahualpa (*n* = 616)	NOMAS Caribbean Hispanics			
		Dominican (*n* = 995)	Puerto Rican (*n* = 234)	Cuban (*n* = 187)	Other (*n* = 201)
Intermediate	37.5	21.1	21.7	15.5	21.0
Poor	31.7	18.6	17.7	12.7	13.3
No. of Ideal CVH metrics, %					
0	0.3	2.7	1.7	1.1	1
1	7.3	18.6	19.2	21.4	14.9
2	25.2	36.1	33.3	29.4	38.3
3	30.8	30.5	29.5	28.3	29.4
4	23.4	9.3	11.5	17.1	12.4
5	8.9***	2.6***	3.9***	2.7***	3.0***
6	2	0.2	0.9	0.0	1.0
7	2.1	0.0	0.0	0.0	0.0

Age-adjusted *p* value (

*$p < 0.05$;

**$p < 0.01$;

***$p < 0.001$) in the multiple binary logistic regression (ideal versus other for individual metrics except for diet, which was model as ideal/intermediate versus poor; 5–6 versus 0–4 for the number of ideal health metrics)

Table 5

Odd ratios (OR) of having ideal cardiovascular health (CVH) factors for Atahualpa versus NOMAS Caribbean Hispanic subgroups

Ideal CVH factors	Atahualpa versus NOMAS Dominicans		Atahualpa versus NOMAS Puerto Ricans		Atahualpa versus NOMAS Cubans		Atahualpa versus NOMAS other Caribbean Hispanics	
	OR (95 % CI)	*p**	OR (95 % CI)	*p**	OR (95 % CI)	*p**	OR (95 % CI)	*p**
Number of Ideal CVH factors (5–7)	4.1 (2.5–6.5)	<.0001	2.8 (1.4–5.7)	<.0001	4.6 (1.7–12.1)	<.0001	3.4 (1.6–7.4)	0.004
Smoking	8.2 (4.9–13.9)	<.0001	12.5 (6.8–22.7)	<.0001	10.6 (5.6–20.4)	<.0001	8.1 (4.3–14.9)	<.0001
Body mass index	1.9 (1.5–2.4)	<.0001	1.6 (1.1–2.2)	0.011	1.9 (1.3–2.7)	0.002	3.6 (2.3–5.5)	<.0001
Physical activity	3.2 (2.5–4.0)	<.0001	2.1 (1.5–2.9)	<.0001	2.3 (1.6–3.4)	<.0001	2.0 (1.4–2.9)	0.0001
Blood pressure	4.9 (3.3–7.4)	<.0001	2.2 (1.2–3.9)	0.011	2.2 (1.1–4.5)	0.029	1.9 (1.1–3.4)	0.023
Total cholesterol	1.6 (1.3–2.0)	<.0001	2.1 (1.5–3.0)	<.0001	2.2 (1.5–3.2)	<.0001	1.7 (1.2–2.3)	0.004
Plasma glucose	0.27 (0.21–0.34)	<.0001	0.26 (0.18–0.37)	<.0001	0.14 (0.09–0.21)	<.0001	0.22 (0.15–0.31)	<.0001

* Adjusted for age, sex, education and alcohol drinking