Assessment of Cardiovascular Disease Risk Factors in the Coastal Region of South Carolina

Kevin McElligott, MD; James McElligott, MSCR, MD; Guillermo Rivell, MD; Robert Rolfe, BA; Robert Sharpe, BS; Kelly Lambright, MD; Laurine Charles, PhD

Objective: To assess risk factors for cardiovascular disease, barriers to health care, and desired health care education topics for Hispanics in the coastal region of South Carolina known as the Lowcountry.

Methods: 174 Hispanic adults were surveyed at visits at the Mexican consulate using a novel interview instrument. The prevalence of cardiovascular risk factors was compared to the Behavioral Risk Factor Surveillance System (BRFSS), an annual telephone survey, to evaluate the validity of the survey instrument.

Results: Results are comparable to the BRFSS telephone study of the Hispanics in the same area. However, participants in our study were older (Age >35 = 41.4% vs. 34.9%) and reported fewer years of formal education (higher level education = 12.9% vs. 44.2%). Cost of care (72.8%) and language barriers (46.8%) were the main difficulties reported in obtaining health care access. The main educational topics of interest were diabetes (61.5%), hypertension (43.7%), stress (42.5%), and cardiac disease (40.2%).

Conclusion: Our study supports the evidence that there is a demand and need for cardiovascular disease and diabetes education among Hispanics. Our study also shows that a large proportion of Hispanics experience barriers to health care. and that large telephone studies may underrepresent higher risk Hispanic populations. (*Ethn Dis*. 2014;24[2]: 155–161)

Key Words: Cardiovascular Diseases, Personal Health Services, Hispanic Americans, Mexican Americans, South Carolina, Diabetes Mellitus, Health Services Accessibility, Health Care Disparities, Health Surveys, Health Care Surveys

From Department of Health Studies (KM, GR, RR, RS, KL, LC), and Department of Pediatrics (JM), Medical University of South Carolina, Charleston.

Address correspondence to Kevin McElligott; 45 Courtenay Dr., SW213B; Medical University of South Carolina, Charleston, SC 29425; 843.321.9637; 843.792.0433 (fax); mcellike@gmail.com

Introduction

The ethnic landscape of the United States is rapidly changing. As of 2010, 16% of the population identified itself as Hispanic. This group, up from 13% in 2000, represents the majority of growth in the total population,[1] signifying a major shift in the target population for modern health care efforts in the United States.[2] Several studies using the Hispanic Health and Nutrition Examination Survey (HHANES) and the National Health and Nutrition Examination Study (NHANES) data have concluded that many cardiovascular disease (CVD) risk factors are higher in the US Hispanic population compared to the general population.[3–5] One of the risk factors is a higher prevalence of obesity and diabetes in Hispanics vs non-Hispanic Whites. [2,6–8] Early studies showed that even though Hispanics had lower rates of hypertension compared with non-Hispanic Whites, less than 10% of hypertensive Hispanic men had their blood pressure under proper control.[2,9] Additionally, the latest data from NHANES IV shows that Mexican American men and women actually do have higher rates of hypertension than non-Hispanic Whites.[7]

Cardiovascular disease remains the leading cause of death across all US ethnic groups, and the main risk factors are well studied.[10] These risk factors include elevated LDL, low HDL, smoking, HTN, diabetes, and obesity.[6] Interestingly, several studies show that Hispanics have favorable lipid profiles and smoke less than non-Hispanic whites.[6,11,12] Although HHANES, NHANES, and other large databases have begun to characterize the national profile of Hispanics, the local populations of different regions remain inadequately described. In South Carolina, 5.3% of the population is Hispanic making them the 3rd largest ethnic group.[13] National statistics may not accurately reflect the risk factors of a local area, and interventions to improve the health of a population may have different outcomes in different environments. Community research involving collaboration between academic research institutions and local investigators is necessary to identify and address the cultural differences, funding constraints, language barriers, and other impediments to proper health care of our Hispanic population.[14] To date, only one other study has examined the Hispanic community around the Lowcountry in South Carolina; the study showed that Hispanics considerably underestimate their risk of CVD and diabetes.[15]

The Alliance for Hispanic Health (AHH) is a student-driven organization at the Medical University of South Carolina.[16] Our study reports the results of a survey performed by the AHH. The primary purpose of the survey was to describe the health-related risk factors in the local Hispanic population in the southeastern region of South Carolina commonly known as the Lowcountry, which includes Charleston. The secondary goal of the survey was to assess the self-reported barriers to health care as well as health care topics of interest in the Lowcountry's Hispanic population. The data from this project are anticipated to be used to explore risk factors in relation to positive screening tests for hypertension, diabetes, and high cholesterol for this specific population as the project is continued.

The primary purpose of the survey was to describe the health-related risk factors in the local Hispanic population in the southeastern region of South Carolina commonly known as the Lowcountry, which includes Charleston.

An additional goal of our study was to compare our results with data collected by the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is the world's largest on-going telephone health survey system. The system has tracked health conditions and risk behaviors annually since 1984.[17] Telephone surveys have the benefit of being able to quickly and inexpensively sample populations across large areas, including the Lowcountry in South Carolina. However, telephone surveys have no direct way of covering households that do not have a telephone. While attempts can be made to compensate with weighting algorithms, poorer households will have a smaller representation, thus inaccurately reflecting the population.[18] We hypothesize that our survey will provide a better representation of low income families than data collected from telephone surveys.

METHODS

Data Collection

Alliance for Hispanic Health

Data were collected using IRB-approved surveys and health evaluations of Hispanics attending the Mexican consulate visits between December 2010 and April 2011. Participants answered closed-ended questions about sex, age, level of education, occupation, race, ethnicity, country of origin, preferred language, duration in the United States, tobacco use, exercise habits, stress, alcohol consumption, and medication use. Patients were also asked when was the last time they had their cholesterol, blood pressure, or glucose tested, were seen by a health care professional, and if they had any family history of heart disease, hypertension, or diabetes. Patients were asked if they ever had difficulties seeking medical care due to transportation, cost of care, convenience, language barrier, or lack of services; in addition, patients were asked open-endedly about what other barriers they had encountered in their medical care. Last of all, patients were asked if they were interested in learning about cancer, cardiac disease, diabetes, obesity, stress, sexually transmitted infections, asthma, HIV, women's health, contraception, sudden infant death, and any open-ended topic of interest.

Major variables of interest were responses related to the prevalence of known cardiovascular risk factors. The survey was conducted verbally in Spanish to help eliminate language and literacy barriers while obtaining informed consent and accurate data. The researchers used forms written in English and in Spanish to conduct the interview. Multiple pretest pilot studies were conducted at smaller health fairs prior to the study to improve the clarity and neutrality of the questions; to test that an adequate range of reproducible and valid responses resulted from the instrument; and to allow the researchers to practice their interviews. Students of various health professions evaluated all participants of the study for height, weight, blood pressure, glucose, and cholesterol levels. All blood pressures were taken with the appropriate cuff and the patient sitting with arm at heart level.[19] Glucose and cholesterol levels were measured by trained volunteers using the Alere Cholestech LDX® Total Cholesterol and Glucose Panel Test Cassettes. Data were managed using the secure database system of REDCap hosted at the Medical University of South Carolina (MUSC).[17]

Risk factors and positive screens were determined using accepted guidelines to match comparable publications. Obesity was defined as a measured BMI of $\geq$30 kg/m^2.[20] Stress was a risk factor if the subject reported being stressed at $\geq$3 days a week. Alcohol abuse was defined as a male consuming $\geq$3 drinks/day or a female consuming $\geq$2 drinks/day.[17] A positive screening for hypertension was defined as a systolic blood pressure $\geq$160 mm Hg or a diastolic blood pressure $\geq$90 mm Hg.[21] Positive screen for diabetes was a random blood glucose level $\geq$160 mg/dL.[22] Random blood cholesterol $\geq$200 mg/dL was a positive screen for high cholesterol.[23]

Behavioral Risk Factor Surveillance System

In order to assess for content validity of our survey instrument, our results were compared to data extracted from the database created by the CDC's annual telephone survey. Participants in the BRFSS database were included if they met these criteria: 1) survey was completed in 2011; 2) lived in the county of Beaufort, Berkeley, Charleston, Colleton, Dorchester, Hampton, or Jasper in South Carolina; and 3) Hispanic race/ethnicity.

Data Analysis

Alliance for Hispanic Health

Demographic analysis was conducted using a simple random sample model. The Hispanic population estimate for the Lowcountry is 60,864 based on the 2010 US Census.[13] A χ^2-square analysis was run on all risk factors to positive screenings of blood pressure, cholesterol, and glucose. In addition, a χ^2-square analysis was done

Table 1. Demographic of AHH and BRFSS survey respondents

	AHH				BRFSS				Comparison			
	n	**Mean**	**SE**	**95% CI**	***n***	**Mean**	**SE**	**95% CI**	**% Diff.**	**Mean Diff.**	**95% CI**	***P***
Age, years	174	34.55	.857	32.85, 36.24	72	35.28	1.94	31.41, 39.16	2.1	.74	−3.47, 4.94	.73
Body Mass Index (BMI)	169	29.03	.426	28.19, 29.87	67	27.60	1.27	25.05, 30.15	5.0	−1.43	−4.10, 1.24	.29
Mean Arterial Pressure, mmHg	172	95.60	.828	93.97, 97.24								
Systolic BP, mm HG	172	130.52	1.203	128.15, 132.90								
Diastolic BP, mm HG	172	78.14	.786	76.59, 79.69								
Duration in United States, years	174	8.82	.430	7.97, 9.67								
Random serum glucose	152	119.86	5.453	109.09, 130.64								
Random cholesterol	152	195.45	3.690	188.16, 202.75								
	n	Proportion Mean	SE	95% CI	*n*	Proportion Mean	SE	95% CI	% Diff.	Mean Diff.	95% CI	*P*
Female	79	.454	.038	.379, .529	41	.404	.08	.243, .564	11.7	−.05	−.228, .128	.57
Age												
<18	5	.029	.013	.004, .054								
≥18–<25	29	.167	.028	.111, .223	10	.275	.07	.135, .416	49.2	−.104	−.269, .062	.20
≥25–<35	68	.391	.037	.318, .464	17	.376	.082	.211, .54	4.0	−.027	−.214, .16	.77
≥35–<45	43	.247	.033	.182, .312	14	.128	.048	.031, .225	63.7	−.127	−.248, −.006	.04
≥45–<65	25	.144	.027	.091, .196	20	.179	.056	.067, .292	22.0	.031	−.097, .16	.62
≥65	4	.023	.011	.001, .045	11	.042	.013	.017, .067	58.6	.019	−.019, .057	.31
Duration in US, >5 years	148	.851	.027	.797, .904								
Education												
<High school	79	.462	.038	.387, .537	19	.378	.085	.207, .548	20.1	−.084	−.276, .108	.37
High school diploma or GED	70	.409	.038	.335, .484	17	.181	.054	.073, .289	77.5	−.229	−.363, −.095	<.01
Some college	15	.088	.022	.045, .13	20	.293	.082	.13, .456	107.8	.205	.03, .381	.02
≥College degree	7	.041	.015	.011, .071	16	.149	.049	.05, .247	113.6	.108	−.001, .217	.05
Risk Factors												
Obese	73	.432	.038	.357, .507	18	.219	.067	.085, .354	65.2	−.212	−.37, −.054	.01
+ Screen for diabetes	13	.076	.02	.036, .115								
+ Screen for HTN	26	.151	.027	.097, .205								
+ Screen for high cholesterol	61	.401	.04	.323, .48								
Current smoker	34	.195	.03	.136, .255	13	.217	.075	.068, .366	10.5	.022	−.149, .192	.79
Insufficient exercise	60	.345	.036	.274, .416	34	.484	.088	.309, .66	33.7	.14	−.052, .331	.15
Stress	25	.26	.045	.171, .35	13	.155	.061	.033, 0.276	50.9	−.106	−.261, .05	.17
Alcohol abuse	11	.065	.019	.027, .102	2	.054	.045	.0, 0.144	18.3	−.011	−.344, .322	.85
Barriers												
Transportation	36	.211	.031	.149, .272								
Cost of care	126	.728	.034	.661, .795								
Convenience	61	.361	.037	.288, .434								
Language barrier	80	.468	.038	.392, .543								
Services	60	.359	.037	.286, .433								
Topics interested in learning about												
High blood pressure	76	.437	.038	.362, .511								
Diabetes	107	.615	.037	.542, .688								

Table 1. Continued

	AHH				BRFSS				Comparison			
	n	Mean	SE	95% CI	*n*	Mean	SE	95% CI	% Diff.	Mean Diff.	95% CI	*P*
Obesity	62	.356	.036	.285, .428								
Asthma	31	.178	.029	.121, .236								
Cancer	65	.374	.037	.301, .446								
Stress	74	.425	.038	.351, .499								
Cardiac problems	70	.402	.037	.329, .476								
Women's health	38	.218	.031	.156, .28								
Contraceptives	32	.184	.029	.126, .242								
HIV/AIDS	47	.27	.034	.204, .337								
STIs	50	.287	.034	.22, .355								
Children's health	40	.23	.032	.167, .293								
Other	17	.098	.023	.053, .142								

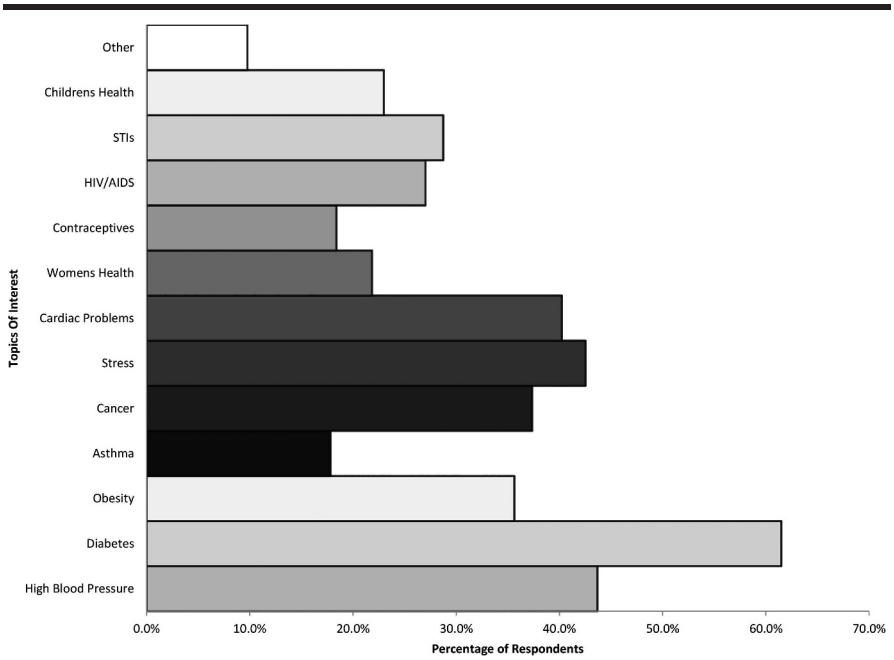

Fig 1. Healthcare topics of interest to Hispanics in the Lowcountry

comparing living in the United States for >5 years to the risk factors and positive screenings.

Behavioral Risk Factor Surveillance System

The data were stratified by county and weighted to account for probability of selection of a telephone number, the number of adults in a household, and the number of telephones in a household. In addition, the data were raked to margins of age group, education, marital status, tenure, sex, and phone ownership to match proportion of segments in the population.[24]

Comparison of AHH and BRFSS

The equality of variances test was utilized to indicate if a significant difference in variances existed in the characteristics. The characteristics were then compared in a two-sample paired *t*-test to detect significant differences in the means of the common characteristics between the AHH and the BRFSS data. To make the age ranges equivalent, any individual aged <18 years was eliminated from the AHH dataset for this comparison. The data analysis for this study was generated using SAS® software, Version 9.3.[25,26]

RESULTS

A total of 174 individuals were sampled at two health fairs held at Mexican consulate visits. Demographic characteristics and estimates for the Hispanic population from the AHH and BRFSS data are shown in Table 1. Comparisons of the two databases are also reported in Table 1. Significant differences between the means were found in the proportion aged 35 to 45, reported high school diploma or GED, reported some college, and those with a measured BMI $\geq$ 30 kg/m^2. The mean percentage of individuals who had at least some college education in the AHH dataset was 12.9% compared to 44.2% in the telephone survey.

Figure 1 shows the breakdown by percentage of health care topics of interest to Hispanics. Diabetes education had the largest interest at 61.5%, followed by high blood pressure, stress,

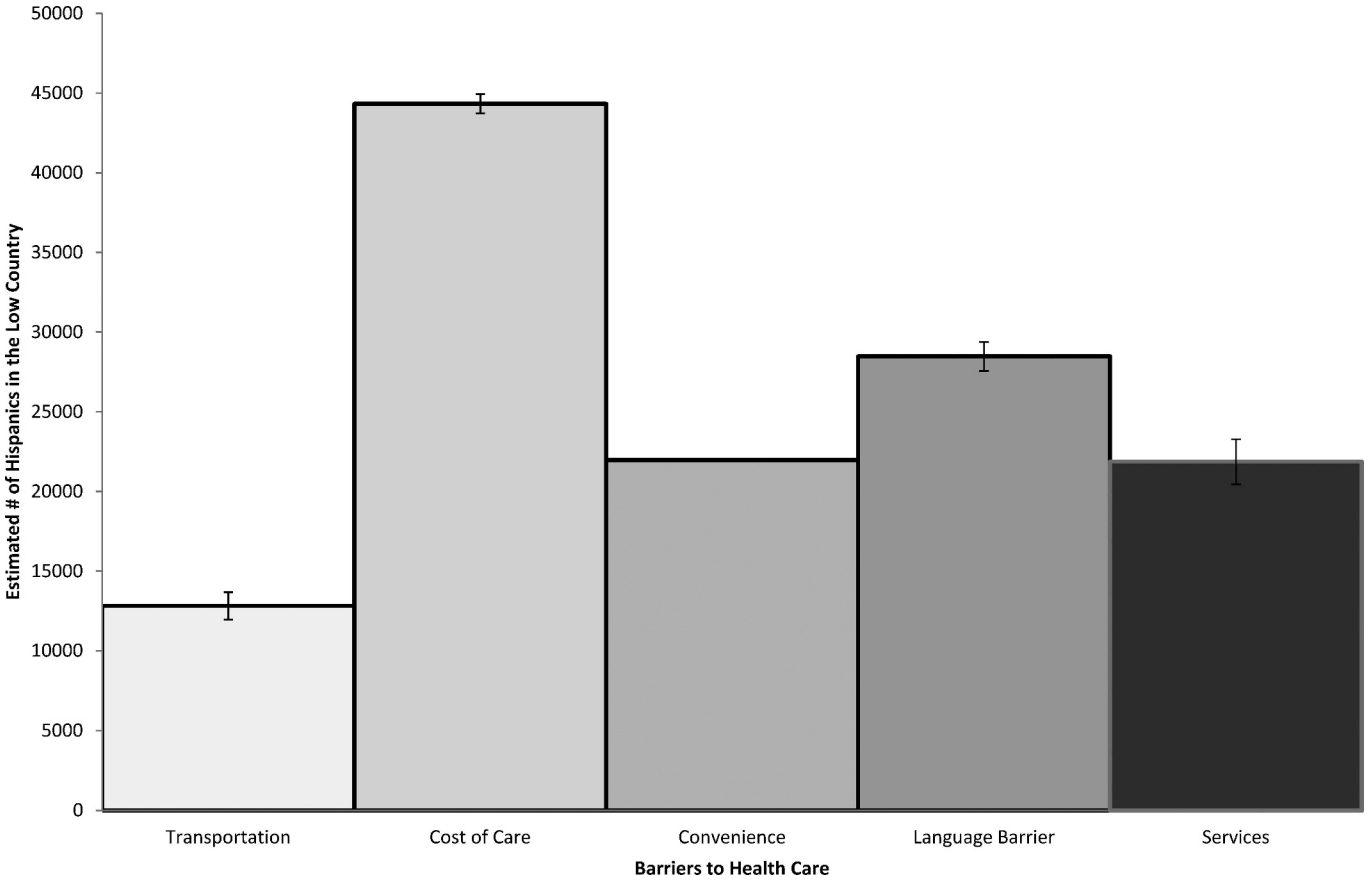

Fig 2. Estimated number of Hispanics in the Lowcountry that experience difficulties receiving medical attention based on survey respondents

and cardiac problems at 43.7%, 42.5%, and 40.2%, respectively.

When asked about difficulties experienced when seeking medical attention, 72.8% responded with cost of care, and 46.8% responded with language barrier. Figure 2 extrapolates these results to the Hispanic population in the Lowcountry, and shows the projected number of Hispanics who have experienced each type of difficulty.

An analysis of risk factors compared to positive screenings from blood pressure measurements and blood analysis is shown below in Table 2. In addition, comparison of duration in the United States >5 years is shown compared to the proportion of risk factors and screenings. Expected significant findings include a relationship between obesity and high cholesterol and the duration of >5 years in the United States and obesity. Unexpected findings include a significant relationship between insufficient exercise and a lower positive screen for diabetes.

Almost three-fourths of those sampled reported cost of care as hindering their access to health care, with approximately half reporting language being a barrier to obtaining health care.

DISCUSSION

Almost three-fourths of those sampled reported cost of care as hindering their access to health care, with approximately half reporting language being a barrier to obtaining health care. Therefore, when considering how to improve access, providers should seek ways of overcoming these obstacles. Consistent with previous reports, our study also showed that Hispanics in the Lowcountry significantly underestimate their risk for diabetes and CVD,[15] demonstrating the need and demand for education in these areas. As reported by the participants themselves, our results indicate a desire for more education about diabetes, hypertension, stress, and cardiac disease. These observations together underscore the impor-

Table 2. Chi-Square analysis of AHH risk factors

Risk Factor	Positive Screening	Positive Screen with Risk Factor, %	Positive Screen without Risk Factor, %	*P*
Obese	+ screen for diabetes	13.3	7.5	.09
	+ screen for HTN	14.3	14.6	.12
	+ screen for high cholesterol	50.0	31.2	.01
Current smoker	+ screen for diabetes	14.3	8.8	.08
	+ screen for HTN	23.3	12.5	.32
	+ screen for high cholesterol	46.4	36.8	.22
Insufficient exercise	+ screen for diabetes	7.0	15.1	.03
	+ screen for HTN	13.1	16.9	.39
	+ screen for high cholesterol	38.0	39.6	.61
Stress	+ screen for diabetes	5.0	10.5	.36
	+ screen for HTN	5.0	15.8	.28
	+ screen for high cholesterol	60.0	35.3	.3
Duration in US, >5 years	Obese	44.5	28.6	<.01
	+ screen for diabetes	11.3	0	.12
	+ screen for HTN	15.9	4.8	.28
	+ screen for high cholesterol	40.6	25.0	.23
	Current smoker	15.9	33.3	.12
	Insufficient exercise	61.4	58.7	.38
	Stress	13.3	4.8	.78
	Alcohol abuse	3.5	10.0	.22

tance of addressing the issues of health care barriers and education, especially for diabetes and CVD, since this population not only is at increased risk[2,6–8] but also may be less knowledgeable of their risk and have increased difficulty obtaining care.

Our study revealed several important relationships between risk factors and positive screens, as demonstrated in Table 2. Evidence that obesity and length of stay in the United States could be associated with significant risk factors in CVD in Hispanics is extremely relevant in the context of potential educational and health care needs for Hispanics in the Lowcountry.

Surveys done at health fairs do not have the non-coverage bias caused by dependence on possession of a telephone, however, significant convenience bias exists in the sample as participating in a health fair is a voluntary choice.[15] Despite these limitations, the AHH and BRFSS dataset are largely similar with insignificant differences in mean BMI, sex, smoking status, exercise, stress, and alcohol abuse. With acknowledgment of the bias inherent in convenience sampling methods, the number of similarities supports an accurate representation of the target population of Lowcountry Hispanics. However, our study provides a larger representation of less educated, older individuals that may be underrepresented in telephone surveys.

The smaller proportion of people aged 25 to 35 in our survey can be explained in that despite younger individuals being generally poorer,[27] young people are generally healthier and less concerned about disease. A possible explanation for our survey's significantly larger proportion with a maximum education level of high school and smaller proportion with college experience is that individuals who engage in free health care opportunities tend to be less educated. These people are often underrepresented in telephone surveys. The final significant difference between the datasets is the percentage of obese individuals (BMI $\geq$ 30 kg/m^2). Possible reasons for this difference are the direct measurement of BMI in the AHH study vs reported in the BRFSS. An additional possible reason is our study had a larger proportion of less educated individuals, which could indicate lower socioeconomic status. Studies have shown a direct relationship between low socioeconomic status and obesity in developed countries.[28]

Major limitations of our study include those inherent to data collected via survey, including convenience sampling bias. However, our study does offer a unique insight as the respondents were visiting a Mexican consulate. The increased risk of associations occurring by random chance given the large number of comparisons performed should also be noted. In addition, the majority of individuals sampled were Mexican immigrants. While Mexicans make up the majority of Hispanics in the Lowcountry, there are significant numbers of Hispanics with different cultural and national backgrounds that may be associated with different cardiovascular risk factors.

The national databases have described the demographics and trends of the Hispanic population in the United States. Our study has attempted to identify and prioritize the health care needs of the Lowcountry Hispanic population for targets of intervention while serving as a foundation for future studies of this community. Our survey instrument and method produced results comparable to the BRFSS, which supports any future investigation results using our technique as reflective of the local Hispanic population. Other possible areas of research could utilize a comparable survey instrument to examine the health care needs of the Gullah Gechee Nation, a unique African-American population and culture in the Lowcountry. In addition, the internal validity of the instrument could be assessed using the Cronbach's alpha measurement to evaluate for overall consistency of similar variables.[14]

CONCLUSION

Health surveys conducted by the AHH provide similar results to telephone surveys of Hispanics in the

Lowcountry yet with a unique emphasis on an older, less educated Mexican population that may be underrepresented in telephone surveys. The effect of insufficient exercise, alcohol abuse, and greater duration in the United States may have negative impacts on the health of Hispanics and warrants further investigation. Cost of care and language are the main barriers to Hispanics access to health care. Diabetes, cardiovascular disease, and stress are potential health care topics for Hispanic educators.

ACKNOWLEDGMENTS

We would like to thank Christian Younts, Marcela Escobar-Gomez, Rosalina Toth, Julia Sachs, RN, and Vanessa Diaz, MD, for their participation in the AHH. This study was supported by the South Carolina Clinical & Translational Research (SCTR) Institute, with an academic home at the Medical University of South Carolina, through NIH Grant Numbers UL1 RR029882 and UL1 TR000062.

REFERENCES

1. US Census Bureau, Ennis S, Rios-Vargas M, Albert N. *The Hispanic Population: 2010*. US Census Bureau; May 2011: 1–16. census.gov/prod/cen2010/briefs/c2010br-04.pdf. Accessed January 22, 2014.
2. Davidson J, Moreno P, Badimon J, et al. Cardiovascular disease prevention and care in Latino and Hispanic subjects. *Endocrine Pract.* 13(1):77–85.
3. Pappas G, Gergen P, Carroll M. Hypertension prevalence and the status of awareness, treatment, and control in the Hispanic Health and Nutrition Examination Survey (HHANES), 1982–84. *Am J Public Health*, 80(12):1431–1436.
4. Crespo C, Loria C, Burt V. Workshop on Hypertension in Selected U.S. Minority Populations. *Public Health Rep*. 1996;111 Suppl2:7–10.
5. Morales L, Leng M, Escarce J. Risk of cardiovascular disease in first and second generation Mexican-Americans. *J Immigr Minor Health*. 2011 Feb;13(1):61–68.
6. Rumbaut R, Escarce J, Morales L. The health status and health behaviors of Hispanics. In: Tienda M, Mitchell F, eds. *Hispanics and the Future of America*. Washington (DC): National Acadamies Press, 2006;362–409.
7. Centers for Disease Control and Prevention. QuickStats: percentage distribution of blood pressure categories among adults aged >18 years, by race/ethnicity. National Health and Nutrition Examination Survey, 1999–2004. *MMWR Morb Mortal Wkly Rep*. 2007;56(24):611.
8. Centers for Disease Control and Prevention. QuickStats: prevalence of obesity among adults aged ≥20 years, by race/ethnicity and sex. National Health and Nutrition Examination Survey, United States, 2003–2006. *MMWR Morb Mortal Wkly Rep*. 2009;58(38):1075.
9. Rewers M, Shetterly S, Hoag S, Baxter J, Marshall J, Hamman R. Is the risk of coronary heart disease lower in Hispanics than in non-Hispanic Whites? The San Luis Valley Diabetes Study. *Ethn Dis*. 1993;3(1):44–54.
10. Mitchell B, Hazuda H, Haffner S, Patterson J, Stern M. Myocardial infarction in Mexican-Americans and non-Hispanic whites. The San Antonio Heart Study. *Circulation*. 1991;83(1): 45–51.
11. Fryar C, Hirsch R, Eberhardt M, Yoon S, Wright J. Hypertension, high serum total cholesterol, and diabetes: Racial and ethnic prevalence differences in U.S. adults, 1999–2006. *NCHS Data Brief*. 2010;36:1–8.
12. Chowdhury P, Balluz L, Okoro C, Strine T. Leading health indicators: A comparison of Hispanics with non-Hispanic Whites and non-Hispanic Blacks, United States 2003. *Ethn Dis*. 2006;16(2):534–541.
13. US Census Bureau. *QuickFacts: State and County*. 2011. quickfacts.census.gov/qfd/states/00000.html. Accessed January 22, 2014.
14. Hulley S, Cummings S, Browner W, Grady D, Newman T. *Designing Clinical Research, 3rd ed*. Philadelphia: Lippincot Williams & Wilkins; 2007.
15. Diaz V, Mainous A 3rd, Williamson D, Johnson S, Knoll M. Cardiovascular and diabetes risk perception in a Hispanic community sample. *Ethn Dis*. 2012;22(1):5–11.
16. Alliance for Hispanic Health (AHH). Medical University of South Carolina. musc.edu/ahh/. Accessed January 22, 2014.
17. Centers for Disease Control and Prevention. *Behavioral Risk Factor Surveillance System Survey Data. 2011*. cdc.gov/brfss/. Accessed January 22, 2014.
18. Thomas R, Purdon S. Telephone methods for social surveys. *Soc Res Update*. 1994;8:1–6.
19. Pickering T, Hall J, Appel L, et al. Recommendations for blood pressure measurement in humans and experimental animals. *Circulation*. 2005;111.5:697–716.
20. World Health Organization. *Fact Sheet N311*. May 2012.
21. U.S. Preventive Services Task Force. Screening for high blood pressure: U.S. Preventive Services Task Force reaffirmation recommendation statement. *Ann Intern Med*. 2007;147; 783.
22. Patel P, Macerollo A. Diabetes mellitus: diagnosis and screening. *Am Fam Physician*. 2010;81(7):863–870.
23. United States Preventive Services Task Force. *Guide to Clinical Preventive Services, 2nd ed*. Baltimore: Williams and Wilkins, 1996;15.
24. Battaglia M, Izrael D, Hoaglin D, Frankel M. *Tips and Tricks for Raking Survey Data (A.K.A. Sample Balancing)*. Abt Associates; Cambridge, Mass: 2004.
25. Paul H, Taylor R, Thielke R, Payne J, Gonzalez N, Conde J. Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42(2):377–81.
26. SAS Institute Inc. *SAS/STAT® 9 User's Guide, Volumes 1,2, and 3*. Cary, NC: SAS Institute Inc; 2002.
27. US Census Bureau, DeNavas-Walt C, Proctor B, Smith J. *Income, Poverty, and Health Insurance Coverage in the United States: 2010.* US Census Bureau, 2011;60–239. census.gov/prod/2011pubs/p60-239.pdf. Accessed January 22, 2014.
28. Ball K, Crawford D. Socioeconomic status and weight change in adults: a review. *Soc Sci Med*. 2005;60(9):1987–2010.

AUTHOR CONTRIBUTIONS

Design and concept of study: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles

Acquisition of data: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles

Data analysis and interpretation: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles

Manuscript draft: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles

Statistical expertise: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles

Acquisition of funding: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles

Administrative: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles

Supervision: K McElligott, J McElligott, Rivell, Rolfe, Sharpe, Lambright, Charles