



Racial and Ethnic Differences in Cardiovascular Disease Risk Factors in U.S. Older Women:
Findings from Behavioral Risk Factor Surveillance Survey, 2003 & 2004

Journal of Health Disparities Research and Practice

Volume 2 | Issue 3

Article 7

© Center for Health Disparities Research, School of Public Health, University of Nevada, Las Vegas

2008

Racial and Ethnic Differences in Cardiovascular Disease Risk Factors in U.S. Older Women: Findings from Behavioral Risk Factor Surveillance Survey, 2003 & 2004

Anita K. Kurian , *University of North Texas Health Science Center*

Kristine Lykens , *University of North Texas Health Science Center*

Sejong Bae , *University of North Texas Health Science Center*

See next page for additional authors

Follow this and additional works at: <https://digitalscholarship.unlv.edu/jhdrp>



Part of the [Community-Based Research Commons](#), [Demography, Population, and Ecology Commons](#), [Gender and Sexuality Commons](#), [Medicine and Health Commons](#), [Public Health Commons](#), and the [Race and Ethnicity Commons](#)

Recommended Citation

Kurian, Anita K.; Lykens, Kristine; Bae, Sejong; and Singh, Karan P. (2008) "Racial and Ethnic Differences in Cardiovascular Disease Risk Factors in U.S. Older Women: Findings from Behavioral Risk Factor Surveillance Survey, 2003 & 2004," *Journal of Health Disparities Research and Practice*: Vol. 2: Iss. 3, Article 7.

Available at: <https://digitalscholarship.unlv.edu/jhdrp/vol2/iss3/7>

This Article is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Article in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Article has been accepted for inclusion in Journal of Health Disparities Research and Practice by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

Racial and Ethnic Differences in Cardiovascular Disease Risk Factors in U.S. Older Women: Findings from Behavioral Risk Factor Surveillance Survey, 2003 & 2004

Abstract

The purpose of this study was to examine racial and ethnic variations in the modifiable CVD risk factors in older women (65 years and older). The study data was drawn from the merged 2003 and 2004 national Behavioral Risk Factor Surveillance Survey (BRFSS). Multinomial regression analyses for indicator outcome and multiple logistic regression analyses for binary outcomes were performed to determine the relationship between each of the six dependent variable and the independent variables. Compared to older white women, older black women had significantly higher odds of hypertension, diabetes and obesity. No significant association was found between Hispanics and hypertension. However Hispanics were found to be more likely to have diabetes and no leisure-time physical activity compared to whites. Hispanics were also found to have lower odds of smoking compared to whites. American Indian and Alaskan Native (AIAN) s were found to have significantly higher odds of diabetes and obesity compared to whites. No significant association between AIANs and smoking was found. Overall, there are striking racial and ethnic differences in the CVD risk factors among older U.S women after controlling for socio-economic status. It is evident from these findings that in designing interventions to reduce cardiovascular risks for elderly women, clearly "one size does not fit all." These findings highlight the need for development and implementation of appropriate public health programs aimed at these various target communities.

Keywords

Cardiovascular risk factors; Cardiovascular system – Diseases – Risk factors; Diabetes; Diabetes mellitus; Discrimination in medical care; Health disparities; Hypertension; Minorities – Medical care; Older women; Racial/Ethnic disparities; Social status – Health aspects

Authors

Anita K. Kurian, Kristine Lykens, Sejong Bae, and Karan P. Singh

Racial and Ethnic Differences in Cardiovascular Disease Risk Factors in U.S. Older Women: Findings from Behavioral Risk Factor Surveillance Survey, 2003 & 2004

Anita K. Kurian, University of North Texas Health Science Center

Kristine Lykens, University of North Texas Health Science Center

Sejong Bae, University of North Texas Health Science Center

Karan P. Singh, University of North Texas Health Science Center

Abstract

The purpose of this study was to examine racial and ethnic variations in the modifiable CVD risk factors in older women (65 years and older). The study data was drawn from the merged 2003 and 2004 national Behavioral Risk Factor Surveillance Survey (BRFSS). Multinomial regression analyses for indicator outcome and multiple logistic regression analyses for binary outcomes were performed to determine the relationship between each of the six dependent variable and the independent variables. Compared to older white women, older black women had significantly higher odds of hypertension, diabetes and obesity. No significant association was found between Hispanics and hypertension. However Hispanics were found to be more likely to have diabetes and no leisure-time physical activity compared to whites. Hispanics were also found to have lower odds of smoking compared to whites. American Indian and Alaskan Native (AIAN) s were found to have significantly higher odds of diabetes and obesity compared to whites. No significant association between AIANs and smoking was found. Overall, there are striking racial and ethnic differences in the CVD risk factors among older U.S women after controlling for socio-economic status. It is evident from these findings that in designing interventions to reduce cardiovascular risks for elderly women, clearly "one size does not fit all." These findings highlight the need for development and implementation of appropriate public health programs aimed at these various target communities.

Key Words: Racial/Ethnic disparities, Cardiovascular risk factors, Health disparities, Diabetes mellitus, Hypertension

INTRODUCTION

United States is becoming an aging nation with an increasingly racially and ethnically diverse population. ¹ It's been estimated that from 1950 to 2004, the 65 years and older population grew twice as rapidly as the total population.² Since the beginning of the last century, life expectancy at age 65 has increased by five years for men (12 to 17 years) and by eight years for women (12 to 20 years).² However, there has been a dramatic narrowing of the gender gap in the total gain in life expectancy (1.1 year for women compared to 2.7 years for men) in the past decade, which is partly attributed to proportionately greater decline in heart disease mortality among men than in women.^{1,2}

In 2002, heart disease was the leading cause of morbidity and mortality among women 65 years and older.³ Of the 71,300,000 US adults with 1 or more types of cardiovascular disease (CVD), the population aged 65 years and older constitute approximately 38 percent (National Health and Nutrition Examination Survey 1999–2002).⁴ Over 83 percent of cardiovascular disease deaths occur in the population aged 65 and older, with disproportionate racial and ethnic, as well as gender-based, mortality rates.^{1,5,6}

With the rapid growth of the older population, changing racial and ethnic composition and the upward trend in life expectancy, the burden of cardiovascular diseases (CVD) will also continue to grow. Hence, in order to address the health care needs of the aging population, it is critical to identify and modify risk factors for chronic conditions such as cardiovascular diseases.

The purpose of this study was to examine racial and ethnic variations in the modifiable CVD risk factors in older women (65 years and older). The six modifiable CVD risk factors that were chosen were: hypertension, diabetes mellitus, obesity, hypercholesterolemia, smoking, and no leisure-time physical activity.

METHODS

Data Source

The study data was drawn from the merged 2003 and 2004 national Behavioral Risk Factor Surveillance Survey (BRFSS); a cross-sectional telephone survey developed by the Centers for Disease Control and Prevention (CDC). Two consecutive years of national BRFSS data were merged to ensure adequate sample size in all population subgroups. Women age 65 and older were selected from this database for the study.

The BRFSS Survey is an ongoing data collection program of telephone surveys conducted by or for each state and territorial health department according to guidelines established by the CDC. The sample is a

disproportionate stratified sample design within each state, with simple random samples of the territories. Weightings are assigned in this probability sample to enable accurate prevalence estimates. For national estimates the sample size is sufficient to analyze non-Hispanic whites, non-Hispanic blacks, Hispanics, and American Indian and Alaska Natives (AIAN). Details of the BRFSS's survey design and sampling procedures are discussed at length elsewhere.⁷ This study was approved by the University of North Texas Health Science Center Institutional Review Board.

Dependent Variables

Six modifiable CVD risk factors that were chosen as outcome variables for this research study are discussed in detail below. These six risk factors were chosen because of their importance to the CVD morbidity and mortality^{8,9,10} and their availability on the BRFSS survey.

Hypertension: The respondent were asked if he/she had ever been told by a doctor or other health professional that he/she had hypertension, also called high blood pressure. The response to this question was dichotomized (Yes/No) and utilized to assess this outcome variable.

The response options were 1) Yes; 2) Yes, but female told only during pregnancy; 3) No; 7) Do not know/Not sure; and 9) Refused. Females told they have hypertension only during pregnancy were included in the "No" category. Persons with do not know/Not sure and refused responses were excluded from the analyses.

Diabetes: The response to the question "Have you ever been told by a doctor or other health professional that you have diabetes?" was dichotomized (Yes/No) and utilized to assess this outcome variable. The response options were 1) Yes; 2) Yes, but female told only during pregnancy; 3) No; 4) Borderline/prediabetes; 7) Do not know/Not sure; and 9) Refused. Females told they have diabetes only during pregnancy, and borderline/prediabetes individuals were included in the "No" category. Persons with do not know/Not sure and refused responses were excluded from the analyses.

Obesity: Body Mass Index (BMI), calculated from self-reported height in inches and weight in pounds, was used to assess this outcome measure. The three categories of BMI used were 1) Neither overweight nor obese (BMI < 25kg/m²); 2) Overweight (25 kg/m² < BMI < 30 kg/m²); and 3) Obese (BMI >30 kg/m²). Persons with do not know/Not sure and refused responses were excluded from the analyses.

Hypercholesterolemia: The response to the question "Have you ever been told by a doctor or other health professional that your blood cholesterol level was high" was dichotomized (Yes/No) and utilized to assess this outcome

variable. The response options were 1) Yes; 2) No; 7) Do not know/Not sure; and 9) Refused. Persons with do not know/Not sure and refused responses were excluded from the analyses.

Smoking: The CDC calculated variable: "Current smoking status risk factor- smoked at least 100 cigarettes in their lifetime and may or may not currently smoke" was used to assess this outcome variable. The "not at risk (former or non-smoker)" option was categorized as "No" and "at risk (current smoker) option was categorized as "Yes". Persons with do not know/Not sure and refused responses were excluded from the analyses.

No Leisure-time Physical Activity: The four response options to the question "During the past 30 days, other than your regular job, did you participate in any physical activity or exercise such as running, golf, gardening or walking for exercise?" were 1) Yes; 2) No; 7) Do not know/Not sure; and 9) Refused. The dichotomous response (Yes/No) was utilized to assess this particular outcome variable. Persons with do not know/Not sure and refused responses were excluded from the analyses.

Independent Variables

The main explanatory variable in this study was race/ethnicity (white, non-Hispanic; black, non-Hispanic; Hispanic; American Indian and Alaskan Native [AIAN]). Other independent variables included in this study were; age (women 65 years and older; and was assessed as a continuous measure), education (<high school, high school diploma or GED, technical training/ some college, and \geq college degree), annual income (<\$25,000, \$25,000 to \$49,999, and >\$50,000).

Data Analysis

Frequencies of sociodemographic characteristics of the study population were obtained by race/ethnicity. Prevalence estimates of each of the six CVD risk factors were also calculated by race/ethnicity. Bivariate (data not shown), multinomial regression analyses for indicator outcome (BMI) and multiple logistic regression analyses for binary outcomes (hypertension, diabetes mellitus, hypercholesterolemia, smoking, and no-leisure-time activity) were performed to determine the relationship between each of the six dependent variable – hypertension, diabetes mellitus, obesity, hypercholesterolemia, smoking, and no leisure-time activity; and the main explanatory variable- race/ethnicity and other covariates – age, income, and education.

Three models were used for each of the dependent variable: 1) Model 1 (unadjusted) with race/ethnicity as an independent variable and the six CVD risk factors as the dependent measures; 2) Model 2 - adjusted for age, and race/ethnicity; and 3) Model 3 - adjusted for age, race/ethnicity, education,

and income. Statistical significance was established as p -value <0.05 .

All estimates were calculated using the final weights, as calculated by National Center for Health Statistics (NCHS) and included in the BRFSS dataset. Data management was performed using SPSS 14.0. To account for the complex survey design and weighted sampling probabilities, all analyses were conducted with SUDAAN statistical software (Research Triangle Institute, Research Triangle Park, NC).

RESULTS

Descriptives

Of the 77,492 survey respondents (women) included in the study sample, there were 68,251 whites, 4,912 blacks, 3,656 Hispanics and 673 AIANs. The sample characteristics by racial and ethnic groups are displayed in Table 1. The mean age by racial and ethnic group in the study sample ranged from 73.1 years to 75.2 years. The proportion of those with less than a high school education was highest among Hispanic women (47%), followed by blacks (36.7%), AIANs (30.6%) and whites (14.6%). The highest proportion of white women (40.5%) reported having a high school diploma, followed by AIANs (39.1%), blacks (32.4%) and Hispanics (28.7%). Similar results were also seen in case of having college and more education. More than half of the Hispanic women (74.5%), 70.7% of black women, 68.5% of AIAN women and 51.4% white women, aged 65 years and older reported having less than \$25,000 income. The highest proportion of white women reported having \$25,000 to \$49,000 income (32.9%) and \$50,000 plus income (15.7%).

Table 1. Sociodemographic Characteristics by Race/Ethnicity, 65 years and Older Women: BRFSS 2003 & 2004 (N=77,492)

Demographic Characteristics	White (n=68,251)	Black (n=4,912)	Hispanic (n=3,656)	AIAN (n=673)
<i>Age (in years), mean(SE)</i>	75.2(0.045)	73.7(0.184)	73.9(0.247)	73.1(0.608)
<i>Education, %</i>				
Less than High school	14.6	36.7	47	30.6
High school	40.5	32.4	28.7	39.1
Some college	25.6	16.8	13.1	17.9
College degree & above	19.2	14.2	11.2	12.3
<i>Income, %</i>				
Less than \$25,000	51.4	70.7	74.5	68.5
\$25,000 to \$49,999	32.9	22.4	20.7	25.4
\$50,000 plus	15.7	7	4.8	6.1

Note: Percent weighted to population characteristics; Values rounded up to one decimal place; AIAN - American Indian Alaskan Native

The prevalence estimates of all the six CVD risk factors considered in this research study by race/ethnicity are presented in Table 2. The prevalence of hypertension ranged from 50.3% in AIANs to 72% in black women. The AIAN women reported the significantly highest prevalence of diabetes (32.6%), and obesity (36.8%). The prevalence of hypercholesterolemia ranged from 40.6% in AIANs to 49.9% in white women. The prevalence of smoking was highest in black women (11.1%), and lowest in Hispanics (6.4%). The prevalence of no leisure-time physical activity was seen in 45.7% of Hispanic women, followed closely by black women (43%) and AIAN women (42.8%).

Table 2. Prevalence Estimates of Cardiovascular Risk Factors by Race/Ethnicity, 65 years and older Women: BRFSS 2003 & 2004 (N=77,492)

Cardiovascular Disease				
Risk Factor	N	Percent	Chi-sq (DF)	P-value
Hypertension			75.9(3)	0.000
Black	2,027	72		
Hispanic	971	57.2		
AIAN	244	50.3		
White	20,506	55.6		
Diabetes			159.7(3)	0.000
Black	1,423	25.8		
Hispanic	875	23.2		
AIAN	208	32.6		
White	9,226	13.1		
Hypercholesterolemia			11.8(3)	0.008
Black	1,154	46.3		
Hispanic	703	41.2		
AIAN	152	40.6		
White	15,794	49.9		
Smoking			13.6(3)	0.003
Black	478	11.1		
Hispanic	263	6.4		
AIAN	111	9.5		
White	6,550	8.9		
Obesity			191.6(6)	0.000
Black	1,723	36.7		
Hispanic	789	27.1		
AIAN	192	36.8		
White	12,607	18.9		
No Leisure-time Physical Activity			66.0(3)	0.000
Black	2,183	43		
Hispanic	1,719	45.7		
AIAN	292	42.8		
White	23,434	34.5		

Note: AIAN - American Indian Alaskan Native

Findings from the multiple logistic regression and multinomial regression Analyses by Race/Ethnicity

Adjusted odds ratios for each of the six CVD risk factors, from the multiple regression analyses are displayed in Table 3. The results from the logistic regression and multinomial regression analyses using the third model is discussed in this section as this model has the highest predictive value. These analyses revealed that black women were significantly associated with higher odds of hypertension compared to white women (OR: 1.9, 95% CI: 1.53,2.32). Black, Hispanic and AIAN women had significantly higher odds of diabetes compared to white women (Black women: OR: 1.7, 95% CI: 1.48,2.00; Hispanic women: OR: 1.7, 95% CI: 1.34,2.07; AIAN women: OR: 2.1, 95% CI: 1.34,3.39). Similar results were also seen for obesity and no leisure-time physical activity. Compared to white women, significantly higher odds of obesity were found in Black (OR: 2.3, 95% CI: 1.87, 2.80) and AIAN women (OR: 1.8, 95% CI: 1.08,2.87). Only Hispanic women had significantly higher odds of no leisure-time physical activity compared to white women (OR: 1.3, 95% CI: 1.05,1.56). Finally, significantly lower odds of hypercholesterolemia and smoking were reported by Hispanic women compared to white women (OR: 0.7, 95% CI: 0.54,0.95 for hypercholesterolemia and OR: 0.5, 95% CI: 0.37,0.69 for smoking).

Table 3. Odds Ratio and 95% CI of Cardiovascular Risk Factors

Cardiovascular Risk Factor		Model 1 ^a	Model 2 ^b	Model 3 ^c
		OR ^a (95% CI)	OR ^b (95% CI)	OR ^c (95% CI)
Hypertension	Black	2.1*** (1.73, 2.43)	2.1*** (1.77, 2.47)	1.9*** (1.53, 2.32)
	Hispanic	1.1 (0.86, 1.33)	1.1 (0.87, 1.36)	0.9 (0.70, 1.19)
	AIAN	0.8 (0.46, 1.42)	0.8 (0.48, 1.45)	0.7 (0.43, 1.20)
	White	1.0	1.0	1.0
Diabetes	Black	2.3*** (2.03, 2.60)	2.3*** (1.99, 2.55)	1.7*** (1.48, 2.00)
	Hispanic	2.0*** (1.66, 2.39)	2.0*** (1.64, 2.36)	1.7*** (1.34, 2.07)
	AIAN	3.2*** (1.85, 5.51)	3.1*** (1.81, 5.36)	2.1** (1.34, 3.39)
	White	1.0	1.0	1.0
Hypercholesterolemia	Black	0.9 (0.73, 1.03)	0.8 (0.71, 1.00)	0.8 (0.66, 1.00)
	Hispanic	0.7** (0.56, 0.89)	0.7** (0.54, 0.87)	0.7* (0.54, 0.95)
	AIAN	0.7 (0.38, 1.25)	0.6 (0.35, 1.17)	0.7 (0.37, 1.24)
	White	1.0	1.0	1.0
Smoking	Black	1.3* (1.04, 1.55)	1.2 (0.94, 1.41)	1.1 (0.82, 1.34)
	Hispanic	0.7* (0.53, 0.92)	0.6** (0.48, 0.84)	0.5*** (0.37, 0.69)
	AIAN	1.1 (0.70, 1.65)	0.58 (0.6, 1.46)	0.9 (0.54, 1.47)
	White	1.0	1.0	1.0
Obesity	Black	3.1*** (2.65, 3.67)	2.9*** (2.46, 3.43)	2.3*** (1.87, 2.80)
	Hispanic	1.7*** (1.36, 2.12)	1.6*** (1.26, 1.97)	1.3 (0.97, 1.71)
	AIAN	3.0*** (1.70, 5.16)	2.7*** (1.56, 4.57)	1.8* (1.08, 2.87)
	White	1.0	1.0	1.0
No Leisure-time	Black	1.4*** (1.27, 1.61)	1.5*** (1.36, 1.73)	1.1 (0.96, 1.31)
Physical Activity	Hispanic	1.6*** (1.36, 1.87)	1.7*** (1.45, 2.00)	1.3* (1.05, 1.56)
	AIAN	1.4* (1.01, 1.99)	1.6** (1.14, 2.11)	1.4 (0.96, 2.06)
	White	1.0	1.0	1.0

Note: In Table 3 above: a. Model 1 included race/ethnicity and each of the cardiovascular risk factors as dependent variable; b. Model 2 included race/ethnicity and age; c. Model 3 included race/ethnicity, age, education, and income; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; Odds ratios rounded up to one decimal place ; AIAN - American Indian Alaskan Native

DISCUSSION

The population of elderly women in the United States is growing, as are the resources needed to address chronic health conditions of this population such as cardiovascular disease. Furthermore, minority women continue to comprise a growing percentage of this elderly population.^{1,2} Furthermore women are experiencing a smaller decrease in cardiovascular mortality than men. For all the reasons stated above a greater understanding of cardiovascular disease in women of different racial and ethnic groups is important to the public's health. The additional role of socio-economic factors combined with race/ethnicity has also needed further exploration.

In accordance with prior research, this study found race/ethnicity to be significantly associated with the above-mentioned six modifiable CVD risk factors. As evidenced in past studies^{11,12}, compared to older white women, older black women had significantly higher odds of hypertension, diabetes and obesity. No significant association was found between Hispanics and hypertension, although several studies in the past have found significantly higher prevalence of hypertension in Mexican-Americans compared to Whites.^{11,13} However Hispanics were found to be more likely to have diabetes and no leisure-time physical activity compared to whites, as evidenced in the literature.¹⁴ As shown in prior research^{14,15}, Hispanics were also found to have lower odds of smoking compared to whites. The finding of AIANs having significantly higher odds of diabetes and obesity is consistent with several prior empirical research studies.^{14,16,17} However, this study failed to find any significant association between AIANs and smoking as found by Denny, Holtman, Goins et al., 2005¹⁷, and Harwell, Gohdes, Moore et al., 2001.¹⁸

Overall, there were striking racial and ethnic differences in the CVD risk factors among older U.S women even after controlling for socio-economic status. It is important to note that these differences are not concentrated in one or two racial or ethnic groups. For example, black elderly women were found to have the highest prevalence of smoking whereas Hispanic elderly women showed the highest prevalence of no leisure time physical activity, and elderly white women had the greatest prevalence of high cholesterol.

It is evident from these findings that in designing interventions to reduce cardiovascular risks for elderly women, clearly “one size does not fit all.” These findings highlight the need for development and implementation of appropriate public health programs aimed at these various target communities. An emphasis on smoking cessation is suggested for black elderly women and physical activity for Hispanic elderly women. Dietary interventions may make the most sense for elderly white women.

This research study is not without limitations. The foremost limitation of this study mainly pertains to the self-reported data for CVD risk factors in the BRFSS. There is also a potential for non-inclusion of households without a telephone, since BRFSS is a telephone survey. However, the use of post-stratification weights is expected to partially correct for non coverage or non response errors.⁷ Lastly, temporality cannot be established due to the cross-sectional nature of the data. Despite these limitations, the use of a large, nationally representative, population-based survey allowed for the investigation of various CVD risk factors in a representative older population. Furthermore, the yearly conduction of the national BRFSS allows the tracking of the findings to determine the degree to which racial and ethnic differences in CVD risk factors change over time.

Future directions

In this research study, the cardiovascular risk factors of smoking and no leisure time physical activity, which are behavioral in nature, were treated comparably as the biological risk factors- hypertension, diabetes, hypercholesterolemia, and obesity. However, it is plausible that the behavioral risk factors may act as mediators between the demographic characteristics and the biological cardiovascular risk factors. Consequently, the authors intend to address these potential relationships and identify potential mediating factors in a future study using path analysis. Additionally, some questions still remain regarding the role of race/ethnicity and socio-economics factors in cardiovascular risk factors. Greater conceptual precision is needed for race/ethnicity. Questions such as ‘Is the concept of race/ethnicity biologically driven or is it a proxy for culture and social status?’ need to be addressed further. Additional potential factors such as neighborhood conditions, social support, stress due to the social environment and sense of personal control also deserve consideration but were beyond the scope of this study.

REFERENCES

1. Wan H, Sengupta M, Velkoff VA, DeBarros KA. U.S. Census Bureau, Current Population Reports, P23-209, 65+ in the United States: 2005, U.S. Government Printing Office, Washington, DC, 2005.
2. National Center for Health Statistics Health, United States, 2005. With Chartbook on Trends in the Health of Americans Hyattsville, Maryland: 2005.
3. McGuire LC, Ahluwalia IB, Strine TW. Chronic Disease-Related Behaviors in US Older Women: Behavioral Risk Factor Surveillance System, 2003. *J of Women's Health*, 2006, Vol 15, No. 1.
4. Thom T, Haase N, Rosamond W, Howard VJ, Rumsfeld J, Manolio T. et al., Heart disease and stroke statistics--2006 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*. 2006 Feb 14;113(6):e85-151.
5. American Heart Association (2004) Statistical Fact Sheet - Populations: Women and Cardiovascular Diseases Statistics.
6. Hoyert DL, Heron MP, Murphy SL, Kung H. Deaths: Final Data for 2003. *National vital statistics reports; vol 54 no 13*. Hyattsville, MD: National Center for Health Statistics. 2006.
7. Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System User's Guide. Atlanta, Georgia: Centers for Disease Control and Prevention, 2006.
8. National Cholesterol Education Program. Executive summary of the third report of the national cholesterol education program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III). *JAMA*, 2001, 285(19):2486-97.
9. Yusuf HR, Giles WH, Croft JB, Anda RF, Casper ML. Impact of multiple risk factor profiles on determining cardiovascular disease risk. *Prev Med*, 1998, 27(1):1-9.
10. National Institutes of Health. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: The evidence report. NIH pub no 98- 4083. September 1998.
11. Sundquist J, Winkleby MA, Pudaric S. Cardiovascular disease risk factors among older black, Mexican-American and white women and men: An analysis of NHANES III, 1988-1994. *Am Geriatrics Society*, 2001, 49:109-116.
12. Wilbur J, Miller AM, Chandler P. Recruitment and cardiovascular risk characteristics of African American and Caucasian midlife women. *J of Cardiovascular Nurs*, 2002, 15(3):88-104.
13. Greenlund KJ, Kiefe CI, Gidding SS, Lewis CE, Srinivasan SR, Williams D et al., Differences in cardiovascular disease risk factors in black and white young adults: comparisons among five communities of the CARDIA and the Bogalusa heart studies. *Coronary Artery Risk Development in Young Adults*. *Ann of Epidemiology*, Jan 1998, 8(1):22-30.
14. Winkleby MA, Kraemer HC, Ahn DK, Varady AN. Ethnic and socioeconomic differences in cardiovascular disease risk factors: findings for women from

- the Third National Health and Nutrition Examination Survey, 1988-1994. JAMA. 1998,Jul, 280(4):356-62.20.
15. Wei M, Mitchell BD, Haffner SM, Stern MP. Effects of cigarette smoking, diabetes, high cholesterol, and hypertension on all-cause mortality and cardiovascular disease mortality in Mexican Americans. The San Antonio Heart Study. Am J of Epidemiology, 1996 Dec, 44(11):1058-65.
 16. Appel SJ, Harrel JS, Deng S. Racial and socioeconomic differences in risk factors for cardiovascular disease among southern rural women. Nurs Res. 2002;51(3):140-147.
 17. Denny CH, Holtman D, Goins T, Croft JB. Disparities in chronic disease risk factors and health status between American Indian/Alaskan Native and White elders: Findings from a telephone survey, 2001 and 2002. Am J of Public health. 2005 May, Vol 95, No.5: 825-827.
 18. Harwell TS, Gohdes D. Cardiovascular disease and risk factors in Montana American Indians and non-Indians. Am J of Preventive Medicine. 2001, April, 20(3):196-291.

Anita K. Kurian, MBBS, DrPH; University of North Texas Health Science Center, Fort Worth, Texas; Tarrant County Public Health, Fort Worth, Texas

Kristine Lykens AB, MPA, PhD; University of North Texas Health Science Center, Fort Worth, Texas

Sejong Bae, PhD; University of North Texas Health Science Center, Fort Worth, Texas

Karan P. Singh PhD; University of North Texas Health Science Center, Fort Worth, Texas

