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Tanyanika Douglas-Holland

Date

AWARENESS OF HEART DISEASE AND THE RED DRESS AMONG WOMEN IN GEORGIA

By

Tanyanika Douglas-Holland
Degree to be Awarded: Masters of Public Health
CMPH Healthcare Outcomes

Approved by:

Daniel VanderEnde, MD, MPH, Committee Chair

Zhou Yang, PhD, MPH, Field Advisor

Melissa Alperin, MPH, MCHES, Chair, Career MPH Program

Nanette Wenger, MD, Field Advisor

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By

Tanyanika Douglas-Holland, MD
MPH, Emory University, 2014
MD, Tulane University School of Medicine, 2004
B.S. Xavier University of Louisiana, 1997

Thesis Committee Chair: Dr. Daniel VanderEnde MD, MPH

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ABSTRACT

Background: Heart disease remains the leading cause of mortality among women in the United States. The National Heart, Lung, and Blood Institute (NHLBI) and the American Heart Association (AHA) have launched national RED DRESS brand campaigns aimed at increasing awareness among women about their risk of heart disease. The impact of the Red Dress brand in states with historically higher heart disease death rates is unknown. This study examined the association of RED DRESS symbol recognition and heart disease awareness among women in Georgia. A secondary aim explored the relationship between heart disease awareness and behavioral risks of heart disease.

Methods: A web-based survey was administered to a convenience sample of women between the ages of 30 to 60 residing in the state of Georgia (N=447). A cross-sectional analysis of data inclusive of demographics, Red Dress symbol recognition, and related health behaviors was performed. Descriptive statistics were reported. Bivariate test including Pearson's Correlations, ANOVA and Chi-Square were performed to test for the association between of Red Dress symbol recognition, heart disease awareness and demographics. The significance level was held constant at $\alpha=.05$ for all statistical tests.

Results: Georgian women (60.2%) were less likely to correctly identify the AHA *Go Red Dress* (GRFW) symbol as a heart health campaign compared to non-Georgia residents (75%), however this difference did not reach statistical significance ($X^2=3.37$, $P=.088$). Conversely, 75% of non-Georgia residents correctly identified the NHLBI *Heart Truth*® Red Dress compared to 83.3% of Georgia residents ($X^2=1.172$, $P=.193$). Georgia residents (57.25%) were also less likely to list heart disease as the leading cause of death (LCOD) compared to non-Georgia residents (70%) ($X^2=2.44$, $P=.132$). Awareness of heart disease as the LCOD in women was significantly associated with GRFW [$R=.312$, $P=.000$] and NHLBI *Heart Truth*® symbol [$R=.113$, $P=.017$] identification. Having had exposure in the past year to the GRFW symbol ($R=.234$, $P=.000$), and the NHLBI *Heart Truth*® symbol ($R=.167$, $P=.000$) were also significantly correlated to identification of heart disease as the LCOD. Heart disease awareness was associated with risk behaviors including smoking ($R=-.108$, $P=.05$) and blood sugar screening ($R=.160$, $P=.00$). While no significant racial/ethnic differences were found in awareness of heart disease, behavioral risk patterns were not consistent between racial/ethnic groups. While the average BMI in African-American (AA) women was 2% points higher ($M=32.24$ (SD 8.120) than other racial groups, AA women were more likely to report having their cholesterol checked (84%) compared to Non-Hispanic White (NHW) (66%) and Hispanic (54%) women. ($X^2 = 20.34$, $P=.000$). African American women were also significantly less likely to be current smokers (9.8%) compared to NHW women (24.3%) ($X^2=17.99$, $P=.000$). Finally, significant racial/ethnic variations were noted in the GRFW symbol identification with 55.7% of AA women, 67.8 % of NHW, 72.7% of Hispanic, and 25% other racial/ethnic women recognizing the symbol ($X^2=14.01$, $p=.003$). Further analysis confirmed that AA women were less likely to recognize the GRFW symbol [$OR = .596$] compared to NHW, but this difference was not statistically significance ($p=.101$).

Conclusions: Overall, over half of the sample women who participated in this online study were able to recognize the Red Dress as a heart health campaign symbol, and 60% correctly listed heart disease as the LCOD in women. While risk behaviors associated with heart disease varied between groups, findings suggest no statistically significant difference in heart disease awareness or symbol recognition between the four broad ethnic/racial categories of women studied. Finally, awareness was found to be modest among Georgia residents versus non-Georgia residents. Further study of regional and ethnic variations in heart disease awareness and risk behaviors is warranted.

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INTRODUCTION

In the United States, cardiovascular disease (CVD) accounts for more deaths than any other major cause of mortality. While CVD death rates have declined by 31% over the past decade, in 2010, death rates attributable to CVD still accounted for one-third of all deaths in the United States, and CVD remains the single leading killer of women.¹ Experts estimate that one in three women will die of heart disease or stroke, compared with one in 25 women who will die of breast cancer.^{1,2} In 2002, and 2004, the NHLBI *The Heart Truth*® and the AHA *Go Red for Women*® (*GRFW*) campaigns were launched to a) increase awareness among women that heart disease is the leading killer of women and b) encourage women to assess and minimize their risk for heart disease.^{3,4} An integral component of both campaigns was the introduction of the Red Dress as the national symbol of women and heart disease; the official adoption of the Red Dress symbol created synergy among organizations committed to fighting the disease.⁴ While women's awareness of heart disease as the leading cause of mortality has nearly doubled in the past 15 years, data from the three most recent survey cycles suggests a plateau in awareness. In 2012, the most recent study from the American Heart Association (AHA) found the rate of CVD awareness among women to be 56% compared to 30% in 1997 ($p < 0.001$).⁵ However, rates of awareness were not significantly different from previous years (54% in 2009 and 57% in 2006).^{6,7} Additionally, prior literature has suggested that racial/ethnic disparities in awareness of heart disease exist.^{8,9} While African-American and Hispanic women have disproportionately higher death rates from heart disease, data from a pooled analysis of two recent AHA national surveys found that even after adjustment for significant confounders, Black and Hispanic women had lower rates of heart disease awareness compared to White women.¹⁰ Furthermore, little information is available regarding the level of heart disease awareness among women in specific states or regions with historically high rates of CVD (e.g. Georgia, Southeast). According to the Centers for Disease Control (CDC), the age-adjusted annual death rates from CVD

in the state of Georgia are higher than the national average (353.7 vs. 325.6)¹¹. Between 2000 to 2006, the rate of heart disease among women over 35 years in Georgia was 387 per 100,000 compared to the national average of 351 per 100,000.¹²

The primary purpose of this study was to assess the current level of Red Dress symbol recognition and awareness of heart disease as the leading cause of death among female residents of the state of Georgia. The secondary objective was to explore variations in awareness and risk behaviors between four broad racial/ethnic groups.

METHODS

Design and Subjects

Using a cross-sectional design, a web-based survey was administered to a convenience sample of 447 women between the ages of 30 to 60 residing in the state of Georgia; non-Georgia residents were not excluded from completing the survey. Participants were required to speak, read, and understand English and be willing to provide electronic consent to complete the survey questionnaire. Data collection began late November 2013 and was completed early January 2014. To maximize overall response rates in a 2 ½ month timeframe, two different recruiting methods were used. Women were recruited using direct email offered through Survey Distribution services via two major online survey software companies, *SurveyMonkey*® (N=104) and *SurveyGizmo* (N=297). To target and maximize response from the desired population, the following filters were specified as part of the distribution service: a) Gender: female; b) Age: 30 to 65; c) Location: Georgia; d) Country: United States. Additionally, in order to ensure a sufficient sample of at least one racial/ethnic minority group, additional filters were also incorporated to include: a) Race: Black/African-American. A small number of women (N=46) were also recruited online directly through posts on two major social media platforms (i.e. Facebook, Twitter).

Survey Methods and Outcome Measures

The 29-item survey developed for this study was based on the AHA national telephone survey on awareness and perception of heart disease and stroke among women.^{6,9,13} Questions were adapted for online feasibility, and surveys were voluntarily self-administered. Standardized demographic information was collected from participants, including age, educational level, marital status, racial/ethnic background, insurance and employment status. To evaluate knowledge and awareness of heart disease, participants were asked the following open-ended question: What is the leading cause of death among women? Responses were tabulated by grouping into the following 7 categories based on frequency of response: 1) Breast Cancer; 2) Cancer (unspecified); 3) Heart Disease; 4) Stroke/HBP; 5) Other (e.g. Obesity); 6) HIV/AIDS; 7) No Answer. Using a multiple-choice question format, participants were queried about risk factors for CVD as well as on general knowledge of healthy levels (i.e. What is considered a healthy blood pressure? What is considered a healthy cholesterol level? What is considered a healthy blood sugar?). Subjects were also asked closed-ended questions related to preventive health actions taken in accordance with recommended screening intervals; questions included: a) In the past 5 years, have you had your cholesterol checked? b) In the past 3 years, have you had your blood sugar checked? c) In the past 2 years, have you had your blood pressure checked? d) In the past 12 months, have you had a routine check-up with a healthcare provider? and e) In a typical week, how many days do you exercise (i.e I do not exercise, once a week, 2 to 4 days/week, 5 to 7 days/week)? Additionally, to assess recognition of the Red Dress as the national symbol for heart disease, participants were provided with images of the Red Dress symbols associated with AHA *Go Red for Women*® and the NHLBI *Heart Truth*® campaigns; using an open-ended format, participants were asked to provide the name of the health condition the symbol promoted (i.e. The above symbol is designed to increase awareness of what health condition?). The women were also asked questions related to whether they could identify two other national symbols

for commonly used public health campaigns, including the pink ribbon used to increase awareness of breast cancer and the red ribbon used to promote HIV/AIDS awareness.

Statistical Methods

Survey data was collected between November 2013 and January 2014. Data was collected using two online survey tools *SurveyMonkey*® and *SurveyGizmo*®. The data was saved as an Excel database files and exported into SPSS 21 for analysis. Descriptive statistics were reported for Demographics, Health Campaign symbol identification, awareness of heart disease as the leading cause of death, and behavioral risks of heart disease (i.e. BMI, smoking, exercise, monitoring blood pressure, cholesterol, and blood sugar). Statistical tests including Pearson's Correlations, Chi-Square, and ANOVA were conducted to test all hypothesis and bivariate relationships between variables of interest. A Logistic Regression analysis was conducted to further determine the comparative likelihood of Red Dress symbol recognition by race and ethnicity. The critical value was held at $P < 0.05$ for all tests.

RESULTS

Characteristics of Respondents

The demographic characteristics of the 447 participants in the survey are listed in Table 1. Approximately 88% of the women were between 30 and 60 years of age with an equal proportion of younger women (i.e. < 45) compared to those over the age of 45. Over half (57.4%) of the participants reported being married and 55% indicated they worked full-time or part-time.

TABLE 1.
DEMOGRAPHICS OF STUDY RESPONDENTS (N=447)

	N	%
Gender		
Male	-	-
Female	447	100.0
Age		
30- 44	189	42.3
45-60	206	46.1
60 +	10	2.2
No Response	42	9.4
Marital Status		
Married	256	57.4
Single (Never Married)	84	18.8
Separated/Divorced	88	19.7
Widowed	18	4.0
Ethnicity/Race		
African American	194	43.4
Caucasian	230	51.5
Hispanic/Latino	11	2.5
Other	12	2.7
Highest Degree Completed		
Less Than High School	13	2.9
High School Diploma	66	14.8
Some College	120	26.8
College Degree	135	30.2
Post-Graduate Degree	71	15.9
No Response	42	9.4
Employment		
Full Time	136	30.4
Part Time	115	25.7
Unemployed	42	9.4
Retired	31	6.9
Disabled	47	10.5
Homemaker/NA	46	10.3
No Response	30	6.7
Georgia Resident		
Yes	407	91.1
No	40	8.9

A majority of the women (72.9%) reported having either some college, a college degree or a postgraduate degree, and over 90% of respondents resided in the state of Georgia. Most respondents identified as White (51.5 %) followed by African American (43.4%). A small percent of the sample self-identified as, Hispanic (2.5%), or Other (2.7%).

Awareness of Heart Disease as the Leading Cause of Death

Among the entire study sample (N=447), nearly 3 in 5 respondents correctly identified heart disease as the leading cause of death among women. Other leading causes of mortality were listed as unspecified Cancer (19.5%), Breast Cancer (15.7%), obesity (2%), stroke (1.1%) and HIV/AIDS (.2%). Seven respondents (1.6%) did not offer an answer. When residency was considered, Georgia residents were less likely to list heart disease as the leading killer (57.25%) compared to non-Georgia residents at (70%). However, this difference was not statistically significant ($X^2=2.44, P=.132$). This was likely a Type II error due to the comparatively small sample size of non-Georgia residents (N=40) (See Table 2).

TABLE 2.
COMPARATIVE REPORTING HEART DISEASE OR OTHER CONDITIONS AS THE LEADING CAUSE OF MORTALITY AMONG WOMEN: BY RESIDENCY (N=447)

Residency	Heart Disease		Other Conditions		X^2	P
	N	%	N	%		
All	261	58.39	186	41.61	2.44	.132
Georgia	233	57.25	174	42.75		
Non-Georgia*	28	70.0	12	30.00		

*Respondents reported residency in the following states: AL, AZ, FL, LA, MD, MI, NY, PA, SC, WI, TN, TX, & Puerto Rico

Other demographic variables (e.g. age, race/ethnicity, marital status, employment status, educational status) examined in this study were not found to be significantly associated with awareness of heart disease as the leading cause of death among women. Additionally, no significant racial/ethnic

differences in rates of heart disease awareness as the LCOB were found (i.e. African-American 53%, Hispanic 55%, Non-Hispanic/White 63%, other 58%, $X^2=5.216$, $P=.157$).

Red Dress Campaign Symbol Identification

The majority of respondents (82.3%) correctly identified the NHLBI *Heart Truth*® Red Dress campaign symbol, and the AHA *GRFW* Red Dress campaign symbol was properly identified by 62% of respondents. The Pink Ribbon breast cancer campaign symbol was identified by the highest proportion of respondents (88.6%). By contrast, only a quarter (27.5%) correctly identified the Red Ribbon as the campaign symbol for HIV/AIDS awareness (See Table 3.)

TABLE 3.
CORRECT IDENTIFICATION OF DISEASE CAMPAIGN SYMBOLS: BY PERCENT (N=447)

	<u>YES</u>	<u>NO</u>
Symbol I: (AHA <i>Go Red For Women</i>) Heart Disease	61.5	38.5
Symbol II: (Pink Ribbon) Breast Cancer	88.6	11.4
Symbol III: (NHLBI <i>Heart Truth</i>®) Heart Disease	82.3	17.4
Symbol IV: (Red Ribbon) HIV/AIDS	27.5	72.5

Georgian women (60.2%) were less likely to correctly identify the AHA *GRFW* Red Dress symbol as a heart health campaign compared to non-Georgia residents (75%), however this difference did not reach statistical significance ($X^2=3.37$, $P=.088$). Conversely, 75% of non-Georgia residents correctly identified the NHLBI *Heart Truth*® Red Dress as a heart health campaign symbol compared to 83.3% of Georgia residents ($X^2=1.172$, $P=.193$) (See Table 4).

TABLE 4.
IDENTIFICATION OF THE RED DRESS CAMPAIGN SYMBOL (AHA *GRFW* & NHLBI *HEART TRUTH*®) BY GEORGIA RESIDENCE (N=447)

<i>AHA GRFW</i>						
	Heart Disease		Other		X^2	P
	N	%	N	%		
Residency						
All	275	61.52	172	38.48	3.37	.088
Georgia	245	60.20	162	39.8		
Non-Georgia*	30	75.0	10	25.0		
<i>NHLBI Heart Truth</i> ®						
	Heart Disease		Other		X^2	P
	N	%	N	%		
Residency						
All	368	82.5	78	17.5	1.172	.193
Georgia	338	83.3	68	16.7		
Non-Georgia*	30	75.0	10	25.0		

*Respondents reported residency in the following states: AL, AZ, FL, LA, MD, MI, NY, PA, SC, WI, TN, TX, & Puerto Rico; *GRFW* = Go Red for Women; AHA=American Heart Association; NHLBI=National Heart, Lung, & Blood Institute

Statistically significant associations were found between the ability to list heart disease as the leading cause of death in women and identification of the AHA *GRFW* Red Dress Campaign ($R=.312$, $P=.000$) as well as NHLBI *Heart Truth*® Campaign ($R=.113$, $P=.017$). The relationship between knowledge of heart disease and symbol identification appeared stronger for the *GRFW* Red Dress Campaign. Having had exposure in the past year to the *GRFW* Red Dress symbol ($R=.234$, $P=.000$), and the NHLBI *Heart Truth* symbol ($R=.167$, $P=.000$) were also significantly correlated to awareness of heart disease as LCOD.

Among respondents who identified the AHA *GRFW* and NHLBI *Heart Truth*® Red Dress Campaign symbols, 72.4% and 62.5%, respectively, listed heart disease as the leading cause of death among women. The proportion of women who were aware that heart disease is the LCOD was

significantly higher among women who recognized the Red Dress campaign symbols [*GRFW*, $X^2=50.09$, $P=.000$; NHLBI *Heart Truth*® ($X^2=12.66$, $P=.049$)] compared to those who did not (see Table 5).

TABLE 5.
CORRECT IDENTIFICATION OF HEART DISEASE AS LEADING CAUSE OF DEATH IN WOMEN BY RED DRESS CAMPAIGN SYMBOL (N=447)

	Heart Disease		Other		X^2	P
	N	%	N	%		
Red Dress Campaign						
AHA <i>GRFW</i>	199	72.4	69	40.1	50.09	.000
NHLBI <i>Heart Truth</i> ®	230	62.5	138	47.4	12.66	.049

GRFW = Go Red for Women; AHA=American Heart Association; NHLBI=National Heart, Lung, & Blood Institute

Significant racial/ethnic variations were found in identification of the AHA *GRFW* Red Dress Campaign symbol with 55.7% of African-American women, 67.8% of Non-Hispanic White Women, 72.7% of Hispanic, and 25% other racial/ethnic women recognizing the AHA *GRFW* Red Dress symbol ($X^2=14.01$, $p=.003$). Further analysis by logistic regression also showed that the *GRFW* Red Dress Campaign symbol was less likely to be recognized by African-American women [OR =.596, 95% CI .401-.885] and other minorities [OR=.435, 95% CI .183-1.031] compared to Non-Hispanic White women, however these differences did not reach statistical significance (see Table 6). No significant racial/ethnic differences were noted in recognition of the NHLBI *Heart Truth*® Red Dress campaign symbol; 80.3% of African-American women, 83.9% of Non-Hispanic White women, 100% of Hispanic women, and 75% of other racial/ethnic women correctly identified the NHLBI *Heart Truth*® Red Dress symbol ($X^2=3.76$, $p=.288$).

TABLE 6:
LOGISTIC REGRESSION ANALYSIS OF HEALTH CAMPAIGN RECOGNITION BY RACE CATEGORY

	Exp (B)	95% Confidence		Significance
	Odds Ratio	High	Low	P-value
AHA GRFW (Heart Disease)				
African American/Black	.596	.401	.885	.101 (NS)
Other Minority	.435	.183	1.031	.059 (NS)
White/Non-Hispanic (Reference)	1.0			
NHLBI Heart Truth® (Heart Disease)				
African American/Black	.762	.464	1.252	.284 (NS)
Other Minority	1.278	.361	4.521	.703 (NS)
White/Non-Hispanic (Reference)	1.0			
Pink Ribbon (Breast Cancer)				
African American/Black	.953	.519	1.751	.878 (NS)
Other Minority	.579	.182	1.839	.354 (NS)
White/Non-Hispanic (Reference)	1.0			
Red Ribbon (HIV/AIDS)				
African American/Black	1.722	1.123	2.639	.013 *
Other Minority	.703	.229	2.157	.538
White/Non-Hispanic (Reference)	1.0			

Note: Other minority includes respondents who identified as Asian, Hispanic/Latino, Native American, and other were collapsed due to small sub-sample sizes. Category Samples are Minority (N=23); African American (n=194); White/Non Hispanic (n=230); GRFW = Go Red for Women; AHA=American Heart Association; NHLBI=National Heart, Lung, & Blood Institute

Awareness of Heart Disease, Red Dress Symbol Identification, and Behavioral Risk

Table 7 shows the reported prevalence of heart disease risk reduction behaviors among the 447 participants. The majority of the women (82.8%) were non-smokers, and a large proportion of the women (76.5%) reported having had a routine check-up with a health care provider in the past 12 months. Over 95% of the women reported having had their blood pressure checked in the past two years, and over half of the respondents (51.5%) reported having their blood sugar checked in the past three years. Nearly 3 in 4 of the women reported having had their cholesterol checked in the past five years. Approximately 47% of the women were obese with the mean BMI of 31.04.

TABLE 7.
RESPONDENTS SELF-REPORTED HEART DISEASE RISK REDUCTION BEHAVIORS (N=447)

	N	%
Current Smoker		
Yes	77	17.2
No	370	82.8
Annual Physical		
Yes	342	76.5
No	105	23.5
Blood Pressure Screening		
Yes	428	95.7
No	19	4.3
Blood Sugar Screening		
Yes	339	51.5
No	108	24.2
Cholesterol Screening		
Yes	331	74
No	116	26
BMI		
Normal (<25)	135	30.2
Overweight (25-30)	98	22.1
Obese (>30)	211	47.5
No Response	3	0.7
Exercise Frequency		
Never	159	35.6
Once a week	78	17.4
2-4 days	170	38
5-7 days	40	8.9

Significant associations were uncovered between identifying heart disease as the LCO and smoking ($R=-.108$, $P=.05$) as well as having had blood sugar checked by a health care provider (i.e. every 3 years per the American Diabetic Association) ($R=.160$, $P=.00$). Thirty-six of the 77 (46.7%)

women who reported being current smokers were aware of heart disease as the LCOD of women compared to 60.8% of non-smokers ($X^2=5.18, p=.016$). Additionally, women who indicated that they had recommended screening (i.e. every 3 years per American Diabetic Association) of their blood sugar by a health care provider (62.8%) were more likely to be aware of heart disease as the LCOD of women compared to those who did not (44.4%) ($X^2=11.39, P=.001$) (see Table 8).

TABLE 8.
DIFFERENCE IN AWARENESS OF HEART DISEASE AS THE LEADING CAUSE OF DEATH IN WOMEN BY
BEHAVIORAL RISK FACTOR: CHI SQUARE ANALYSIS (N=447)

	<u>Smokers (77)</u>		<u>Non-Smokers (370)</u>		X^2	P
	N	%	N	%		
Smoking	36	46.7	225	60.8	5.18	.016
	<u>Not-Tested (108)</u>		<u>Tested (339)</u>			
	N	%	N	%		
Blood Sugar	60	44.4	213	62.8	11.39	.001

When red dress campaign symbol identification was considered, statistically significant differences were found among women who identified the AHA *GRFW* Red Dress campaign symbol and reported having their blood pressure checked as well as among those who reported having their blood sugar checked. Approximately 97.8% of women who identified the AHA *GRFW* Red Dress campaign symbol reported having their blood pressure checked in the past 12 months compared to 92.4% who did not identify the campaign symbol ($X^2=7.51, P=.008$). Similarly, 80.7% of the women identified the AHA *GRFW* Red Dress campaign symbol reported having their blood sugar checked within the past 3 years compared to 68% of the women who did not recognize the symbol ($X^2=9.32, P=.003$). No statistically significant differences in heart disease risk reduction behaviors were noted

among those who recognized the NHLBI *Heart Truth*® Red Dress campaign symbol compared to those who did not.

Racial/ethnic variations in behavioral risk for heart disease included significant differences in BMI, smoking status, and having had cholesterol checked in the past 5 years. Overall BMI was higher among African-American women (M=32.24 (SD 8.120) compared to Non-Hispanic/White women (M= 30.25, SD 8.886), Hispanic/Latino women (M=28.15, SD 3.924), and other minority women (M=28.15, SD 5.872) (F=3.104, P=.026). However, African-American women were more likely to report having their cholesterol checked in the past 5 years (84%) compared to Non-Hispanic/White (66%), Hispanic/Latino (54%), and other racial/ethnic women (83%) ($X^2 = 20.34$, P=.000). Additionally, minority women were less likely to be current smokers compared to Non-Hispanic/White women (African-American 9.8%, Hispanic 0%, other 17%, and Non/Hispanic White 24.3 %) ($X^2=17.989$, P=.000).

DISCUSSION

Heart Disease is disproportionately high among women in Georgia. This is one of the first studies to examine awareness of heart disease specifically among Georgia residents. Findings suggest a moderately high level of awareness of heart disease as the leading killer of women among Georgia residents. Overall, approximately 60% of the women in this study identified heart disease as the leading cause of death for women, which is consistent with national survey data previously reported by the American Heart Association.⁵⁻⁷ Approximately 57% of Georgia women were aware that heart disease is the LCOD among women and is consistent with national data. This seems to imply that lack of heart disease awareness may not be a major driver as it relates to the higher disease rates among women in Georgia. Furthermore, although previous data has suggested that racial/ethnic minorities are less likely to be aware that heart disease is the LCOD among women,^{5,10} this study did

not find any significant differences in level of heart disease awareness as the LCOB among African-American and Hispanic women compared to Non-Hispanic/White women. In this study, rates of awareness of heart disease as the LCOB among racial/ethnic minorities were consistent with overall nationally reported data. However, the utilization of online survey methodology may be an important factor to consider when evaluating results. Similar to this study, in the recent study by Mosca et al, the racial/ethnic disparity for awareness of heart disease as the leading killer of women was less pronounced (69% of white, 52% of black, 51% of Hispanic women) among online respondents in the sample. Conversely, significant racial/ethnic disparities in awareness were noted by Mosca et al among telephone respondents who completed the survey. When designing future studies, particularly those seeking to look at racial/ethnic differences and disparities, consideration should be given to utilizing and comparing the outcomes of multiple survey methodological approaches. Additionally, more research is needed to better characterize study participants who participate in health research online versus those who participate via other methodologies (e.g. mail, telephone, face-to-face).

Ongoing national public awareness campaigns, including AHA's *Go Red for Women* and NHLBI's *Heart Truth*®, are aimed at increasing awareness about heart disease in women; both of these campaigns have adopted the Red Dress as the national symbol for women and heart disease. The most recent published report from NHLBI in 2008 found that 61% of women (in a national survey) recognized the NHLBI *Heart Truth* Red Dress symbol as the national symbol for women and heart disease (up from 25% in 2005).³ To the authors' knowledge, this is also the first study that has evaluated the ability of women in the state of Georgia to identify the Red Dress (both AHA *GRFW* and NHLBI *Heart Truth*®) as the national symbol for women and heart disease. Findings from this study are encouraging and suggest that, among women in Georgia, the level of awareness of the Red Dress as the national symbol for women and heart disease is comparable with overall national

reported data. Additionally, this study further supports the notion that women who recognize the Red Dress campaign symbol are more likely to be aware that heart disease is the #1 killer of women. However, our findings imply there may be differences among the two national heart health campaigns with regards to the ability to associate the red dress symbol and awareness of heart disease as the LCOD in women. While overall more women in the study sample were able to identify the NHLBI *Heart Truth*® red dress symbol as relating to heart disease, actual awareness that heart disease is the LCOD in women was greater among women who identified the AHA *GRFW* red dress campaign symbol. Variations by race/ethnicity further support potential differences among the two campaigns. More minority women in this study correctly identified the NHLBI *Heart Truth*® red dress campaign symbol, however there did not appear to be any significant racial/ethnic differences in awareness of heart disease as the LCOD in women among the overall sample population. It is plausible that women may confuse the two red dress campaign symbols; however this study supports the rationale to further evaluate and compare the true impact of the two heart health campaigns, particularly among racial/ethnic minorities.

This study also unexpectedly showed that many women in Georgia are engaging in important preventative behaviors that can reduce the risk of heart disease, including not smoking as well as getting appropriate health screenings (e.g. annual physical, cholesterol screening, blood sugar screening, blood pressure screening). Exercise frequency, however, was not optimal among study participants, and the prevalence of obesity was high. These results provide additional evidence that more aggressive targeted efforts to reduce rates of obesity among women (particularly minority women) in Georgia are needed. Furthermore, the results seem to suggest that awareness of heart disease being the #1 killer of women and recognition of the Red Dress campaign symbol may not necessarily translate into consistent action among Georgia women to potentially lower heart disease risk. In this study, only certain behaviors were strongly associated with heart disease awareness (i.e.

smoking, blood sugar screening). Similarly recognition of the red dress campaign symbols (AHA *GRFW* and NHLBI *Heart Truth*®) failed to show consistent patterns as it relates to heart disease risk reducing behaviors; no significant differences in heart disease risk reduction behaviors were found among those who recognized the NHLBI *Heart Truth*® Red Dress campaign symbol compared to those who did not, and only two behaviors emerged (i.e. blood pressure screening, blood sugar screening) as being significantly different among women identifying versus not identifying the AHA *GRFW* Red Dress campaign symbol.

There are several important limitations of this study that should be taken into consideration when the findings are interpreted and used to inform educational efforts. First, this was a cross-sectional design, thus cause and effect cannot be determined. Second, the data is based on self-report, and as such information may be inaccurate. Third, as stated previously, this study used online survey methodology which limits the generalizability among women who do not utilize this type of technology. Fourth, the survey was offered only in English and was not completed by non-native English speakers. Furthermore, the sample size for non-Georgia, and racial/ethnic groups other than African-American and White were very small. Therefore, type II errors of no significance were more likely. Future studies should include a broader and greater representation of different minority groups (i.e. Hispanic/Latino, Asian, Native American). Finally, a non-randomized convenience sampling method can allow for bias in sampling. Results therefore may not be generalizable to all women. Future studies should consider all these limitations.

CONCLUSIONS

Results of this study provide evidence of moderate levels of heart disease awareness among women in a state with disproportionately high rates of CVD among its female residents. Data suggest that heart disease awareness and Red Dress symbol recognition among female Georgia residents is comparable to national levels. However variations in familiarity of the two national heart health Red

Dress campaigns (i.e. AHA *GRFW* versus NHLBI *Heart Truth*®) merit further study. The small sample of Non-White, Non-Black ethnic groups did not allow for an inferential analysis or conclusions of gaps in heart disease awareness by other broad racial/ethnic groups. Patterns of high risk behaviors (e.g. smoking, lack of health screening, and obesity) were found to be common among respondents across races and suggest that ongoing, more aggressive and targeted outreach efforts that focus on specific preventative behaviors are warranted as a part of the movement to decrease the incidence and prevalence of heart disease among women.

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