

National Study of Women's Awareness, Preventive Action, and Barriers to Cardiovascular Health

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Background—There is growing awareness of cardiovascular disease (CVD) as the leading cause of death in women, but whether this greater awareness is associated with increased action by women to lower their personal or family's risk is unknown.

Methods and Results—A nationally representative sample of 1008 women selected through random-digit dialing were given a standardized questionnaire about history of CVD/risk factors, awareness of leading cause of death, knowledge of healthy and personal levels of CVD risk factors, self-reported actions taken to reduce risk, and barriers to heart health. The rate of awareness of CVD as the leading cause of death has nearly doubled since 1997 (55% versus 30%) and was significantly greater for whites compared with blacks and Hispanics (62% versus 38% and 34%, respectively) and was independently correlated with increased physical activity (odds ratio, 1.35; 95% CI, 1.00 to 1.83) and weight loss (odds ratio, 1.47; 95% CI, 1.14 to 2.02) in the previous year in logistic regression models. Fewer than half of the respondents were aware of healthy levels of risk factors. Awareness that personal level was not healthy was positively associated with action. Most women took steps to lower risk in family members and themselves. The most frequently cited barriers for heart health were confusion in the media (49%), the belief that health is determined by a higher power (44%), and caretaking responsibilities (36%).

Conclusions—General awareness of CVD risk among women is associated with preventive action. Educational interventions need to be targeted at racial/ethnic minority women. (*Circulation*. 2006;113:525-534.)

Key Words: cardiovascular diseases ■ prevention ■ risk factors ■ women

Recent research has documented a growing understanding of the magnitude of the problem of cardiovascular disease (CVD) in women.¹ Between 1997 and 2003, the percentage of women recognizing that heart disease was their leading cause of death rose significantly from 30% to 46%.¹ This improvement was greater in white women compared with racial and ethnic minorities.¹ Despite the gain in awareness of the public health problem of CVD among women, it is not known whether this greater awareness has led to greater personalization of risk, improved lifestyles, or enhancement of other preventive behaviors that might lower their risk. General knowledge and awareness of a potential health hazard may be a necessary first step in taking action to reduce the threat of disease but may not be sufficient. Perceived personal susceptibility has been shown to increase prevention-seeking behaviors.² Few data, however, have evaluated whether perceived personal risk for CVD is associated with action to lower risk. Moreover, systematic research examining barriers to optimal cardiovascular health among a nationally representative and diverse population of women is limited.

The purpose of this study was to assess the current level of awareness of CVD as the leading cause of death in women and to evaluate whether greater awareness is associated with increased action to lower risk as defined by the American Heart Association Evidence-Based Guidelines for the Prevention of CVD in Women.³ To test this hypothesis, a survey was conducted among a randomly selected sample of >1000 women in the United States. A secondary objective of the study was to estimate the potential impact of women's awareness and perceived personal CVD risk on action taken to lower risk for themselves and others living in the same household or whom they help with healthcare decisions. In addition, we evaluated factors associated with, as well as motivators for and barriers to, a heart-healthy lifestyle in women.

Methods

Design and Subjects

A survey of 1485 women ≥ 25 years of age selected through random-digit dialing in July 2005 was completed to evaluate

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awareness of the leading cause of death for men and women. From these respondents, women who had at least 1 family member or spouse living in the household or at least one family member not living in the household for whom they made healthcare decisions were asked to complete a more extensive survey ($n=1008$). The rationale for requiring participants to have a family member whom they help with healthcare decisions was to test the hypothesis that the awareness level of a woman is associated with preventive behaviors of her family and for herself. Calls were placed by a professional market survey company (The Segmentation Company/Yankelovich) between 5:30 PM and 9 PM (respondent time) on weekdays and from noon to 6 PM on Saturdays and Sundays. All interviews were conducted in English by trained interviewers and lasted ≈ 20 minutes for the complete survey. Only 1 female respondent was interviewed per household.

A total of 18 905 numbers were called. Of these calls, 5583 (30%) were nonworking or government numbers, 471 (2%) were unable to be completed because of privacy management equipment, and an additional 6005 calls were unresolved because of the inability to talk directly with a person. Of the remaining 6846 calls, 2507 were answered by individuals who declined to participate (initial response rate, 63%). An additional 298 calls (4% of eligible, 2% of total) were not completed because of language barriers, and 2920 (43% of eligible, 15% of total) asked to be called back for an interview (88% of whom scheduled a specific call-back time). Screening interviews were completed in 1121 calls (16% of eligible, 6% of total). Of these, 408 (36% of screened individuals) were not eligible to participate because there was no woman ≥ 25 years of age in the household (196, 48% of screened individuals), because of refusal to allow contact with a woman ≥ 25 years of age in the household (16, 4% of screened individuals), and because there was no family member or spouse living in the household or no family member not living in the household for whom the respondents made healthcare decisions (196, 48% of screened individuals). Of the 713 respondents who did meet the criteria for participation in the entire survey, 19 (3%) did not complete the interview.

To ensure an adequate sample of Hispanics and blacks, a random-digit dial of a compiled database list of presumed Hispanic or black women was conducted to supplement the core sample. The final sample comprised 1008 women (210 blacks, 171 Hispanics, 565 whites, 53 classified as other, and 9 who declined to disclose their ethnicity). Responses were weighted to represent the estimated 2005 US ethnicity distribution.

Survey Methods and Definitions

Participants were given a standardized interviewer-assisted questionnaire. The interviewer stated that they were conducting the call on behalf of a nonprofit health foundation with regard to health practices. All 1485 female respondents were asked an open-ended question about the leading cause of death in men and women that replicated methods and sampling in previous AHA surveys of women's awareness of leading cause of death. Standardized demographic and personal health information was collected from participants who were eligible to complete the full survey. Participants were queried about recent evaluation and knowledge of personal risk factors for CVD and on general knowledge of healthy levels. Participants were asked closed-ended questions related to preventive actions taken during the past year and factors that may have prompted action for self or family. Reasons why a participant had not spoken with a healthcare professional about methods to reduce heart disease were evaluated with closed-ended questions.

Personal history of CVD and/or risk factors was defined as the total number of the following conditions that a respondent had been told she had by a healthcare professional: heart disease, stroke/transient ischemic attack (TIA), diabetes, high blood pressure, abnormal cholesterol, and obesity/concerns of being overweight. Likewise, family history was defined as the total number of the same conditions that a respondent's family members had been told they had by a healthcare professional. Perceived risk was based on respondents' self-assessment of their risk for heart disease (high, moderate, low). Reasons why a participant did not discuss methods

to reduce heart disease risk with a healthcare provider were classified as major or minor.

Defined CVD risk was determined from the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III criteria.⁴ If a respondent said that a healthcare professional had ever told her that she had heart disease, a stroke/TIA, or diabetes, her defined risk was classified as high. A respondent was classified as low risk if she reported that she had never been told by a healthcare professional that she had heart disease, a stroke/TIA, or diabetes and if she had only 1 or none of the following conditions or attributes: a health professional had ever told her that she had high blood pressure or abnormal cholesterol, a family member had been told by a healthcare professional that he or she had heart disease or stroke/TIA, she was a smoker, or she was ≥ 55 years of age. All other respondents were designated as having a moderate defined CVD risk.

Self-efficacy was based on whether a respondent agreed with the statement "I'm not confident that I can successfully change my behavior." Participants who agreed with the statement were classified as low in self-efficacy; participants who disagreed with the statement were classified as high in self-efficacy. Factors that might facilitate or be an impediment to a heart-healthy lifestyle were evaluated with closed-ended questions based on a scale of strongly agree, somewhat agree, somewhat disagree, or strongly disagree.

Statistical Analysis

Descriptive statistics of respondent characteristics, awareness/knowledge level, and preventive behaviors are presented as proportions. Differences in the percent of respondents aware of or knowledgeable about CVD risk factors were evaluated with z tests of proportion.

Logistic regression models were used to determine factors associated with awareness and knowledge of the leading cause of death and risk indicators. SPSS Logistic Regression (version 12.0.1) was used to fit this model, with awareness of the leading cause of death (yes, no) as the response variable and whether the respondent had seen or heard information about CVD (yes, no) and respondent characteristics (age, race/ethnicity, personal history of CVD, family history of CVD, education, marital status, employment status, US region, has children <18 years of age in the household, has health insurance) as explanatory variables.

Logistic regression was used to fit knowledge of healthy levels of blood pressure, HDL cholesterol, LDL cholesterol, and fasting blood glucose (correct, not correct) as the response variable and whether the respondent had seen or heard information about CVD in the past 12 months (yes, no), whether she was aware of heart disease as the leading cause of death of women (yes, no), and respondent characteristics (age, race/ethnicity, personal history of CVD, family history of CVD, education, marital status, employment status, US region, has children <18 years of age in household, has health insurance) as explanatory variables. Logistic regression models were also used to determine factors associated with respondent CVD risk-reducing behaviors and practices. Models were fit with respondent behaviors/practices (engaged in practice, did not engage in practice) as the response variable and awareness of heart disease as the leading cause of death in women; had seen, read, or heard heart disease information; perceived CVD risk; knowledge of healthy levels of blood pressure, HDL cholesterol, LDL cholesterol, and fasting blood glucose; and self-efficacy (high, low) as explanatory variables while accounting for respondent characteristics (age, race/ethnicity, personal history of CVD, family history of CVD, education, marital status, employment status, has children <18 years of age in the household, has insurance).

We used χ^2 analyses to determine the association between perceived risk and defined risk for CVD. Statistical significance was set at $P<0.05$. No adjustments were made for multiple comparisons and statistical tests.

We had full access to the data and take responsibility for its integrity. All authors have read and agree to the manuscript as written.

TABLE 1. Characteristics of Female Respondents Completing the Survey

Characteristic	Racial/Ethnic Groups, %				
	All (n=1008), %	White (n=565) (a)	Black (n=210) (b)	Hispanic (n=171) (c)	Other (n=53) (d)
Age, y					
24–34	14	13	13	18	23 ^a
35–44	21	21	17	30 ^{ab}	23
45–54	27	28	25	23	19
55–64	19	20	21	14	25
≥65	19	20	24 ^{cd}	15	11
Marital status					
Single, never married	10	7	20 ^a	13 ^a	17 ^a
Married/cohabitating	74	79 ^{bc}	49	69 ^b	71 ^b
Separated/divorced	9	8	16 ^a	10	10
Widowed	8	7	15 ^{acd}	8	2
Education					
Some high school or less	10	7	17 ^a	18 ^a	8
High school graduate	27	26	29	36 ^{ad}	20
Some college	20	21	20	16	18
2-y College graduate	11	11	11	8	12
4-y College graduate	20	21 ^{c*}	15	13	22
Postgraduate study	13	14 ^b	8	9	18 ^b
Employment					
Employed full-time	39	36	43	52 ^a	47
Employed part-time	11	12	8	10	12
Not employed, not looking for work	14	15 ^{c*}	10	9	8
Not employed, looking for work	5	4	5	7	4
Self-employed	5	5 ^{b*}	2	3	2
Full-time student	1	1	1	1	1
Retired	24	24	28 ^c	18	22
Other	2	2	2	1	2
Region of United States					
East	12	14 ^{bc*}	7	8	6
Midwest	26	33 ^{bcd*}	5	5	19 ^{bc}
South	42	34	85 ^{acd}	50 ^{ad}	34
West	20	19 ^b	3	37 ^{ab}	42 ^{ab}
Smoker	37	39 ^c	33	30	38
Personal history of					
Heart disease	5	5	7 ^c	2	· ..
Stroke/TIA	4	3 [*]	10 ^{bc}	5	· ..
Diabetes	12	11	16	13	11
High blood pressure	32	31	53 ^{acd}	26	19
Abnormal cholesterol	26	27	25	25	23
Obesity/overweight	29	29	36	32	25
Has children <18 y of age living in household	36	36	31	46 ^{ab}	38
Has any insurance coverage	89	90	87	86	88

Superscript letters denote statistically significant ($P<0.05$) between group differences per column labels.

* $P<0.05$, white vs nonwhite.

Results

Characteristics of Respondents

The demographic characteristics of the women who participated in the full survey are listed in Table 1 overall and by ethnic group. The mean age of respondents was 51.3 years. There were significantly more Hispanic women 35 to 44 years of age compared with other racial/ethnic groups, and they were less

likely to be married/cohabitating and less likely to have completed a 4-year college compared with whites. Black women were less likely to be married/cohabitating, more likely to be separated/divorced than whites, and more likely to have a history of stroke compared with whites or Hispanics.

Overall, ≈36% of the respondents had children <18 years living in their household, and ≈90% had insurance coverage.

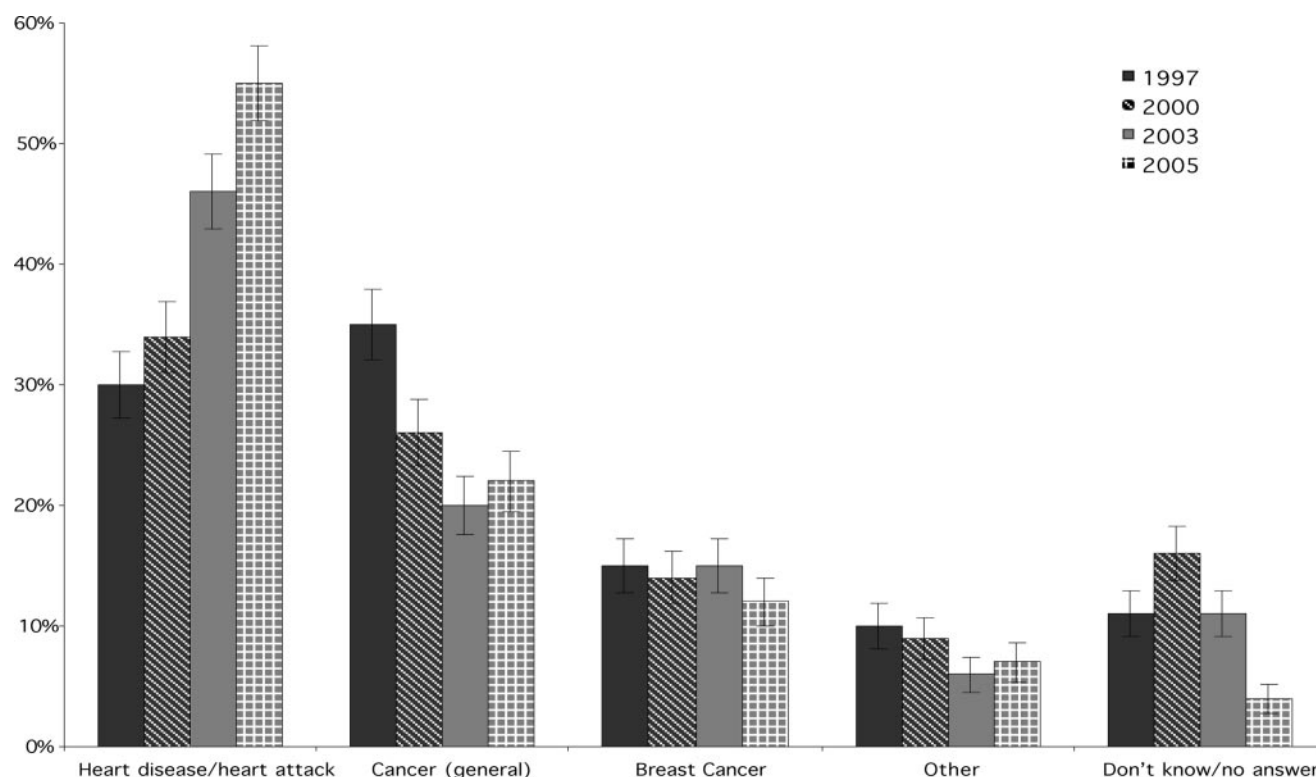


Figure 1. Trends in perceived leading cause of death among women. Numbers are percentages. Shown are the 1997 survey (n=1000), 2000 survey (n=1004), 2003 survey (n=1024), and 2005 survey (n=1008).

Approximately 88% of respondents stated that they see a healthcare professional regularly, and the majority (74%) stated that they regularly see a general medicine/family practitioner. One of 4 women said they had a family history of CVD, 5% reported a personal history of CVD, and 12% reported having diabetes.

Trends in Awareness and Knowledge

Figure 1 illustrates the trends in awareness of the leading causes of death among women. Among the women who completed the full survey, 55% correctly answered that heart disease/heart attack is the leading cause of death compared with 30% in 1997 ($P<0.05$). For the 1485 women with similar inclusion criteria compared with previous survey years, the results were not materially different (53% responded correctly). Table 2 highlights that awareness was

significantly greater among whites than racial and ethnic minorities. Awareness was also significantly greater among women who perceived themselves to be at high or moderate risk of heart disease compared with those who classified themselves as low risk (59.4% versus 60.9% versus 49.0%). Of note is that 63.1% of women cited heart disease as the leading cause of death in men.

In logistic regression models, positive factors associated with awareness of heart disease as the leading cause of death among women were having seen, heard, or read information on heart disease versus not in the past 12 months (odds ratio [OR], 1.53; 95% CI, 1.15 to 2.04), having a personal history of CVD or risk factors versus none (OR, 1.23; 95% CI, 1.08 to 1.40), and having a family history of CVD or risk factors versus not (OR, 1.10; 95% CI, 1.02 to 1.18). Racial and ethnic minorities were less likely than whites to be aware

TABLE 2. Awareness of Leading Cause of Death Among Women by Race/Ethnic Group

Response (unaided), n	Racial/Ethnic Groups				
	All (n=1008)	White (n=565) (a)	Black (n=210) (b)	Hispanic (n=171) (c)	Other (n=53) (d)
Breast cancer, %	12	10	19 ^a	14	23 ^a
Cancer (general), %	22	19	26 ^a	33 ^a	23 ^a
Heart disease/heart attack, %	55	62 ^{bcd*}	38	34	43
Other, %	7	5	14 ^{ad}	12 ^{ad}	4
Don't know/no answer, %	4	4	3	8 ^{ab}	8

Superscript letters denote statistically significant ($P<0.05$) between group differences within rows.

* $P<0.05$, white vs nonwhite.

TABLE 3. Percentage of Women Correctly Identifying Healthy CVD Risk Factor Levels by Race/Ethnic Group

	Racial/Ethnic Groups			
	All (n=1008)	White (n=565)	Black (n=210)	Hispanic (n=171)
Blood pressure	48	52*	40	37
HDL cholesterol	37	42*	27	26
LDL cholesterol	21	24*	12	14
Blood sugar	31	32	29	27

Values are percentages that provided a number in a range that is considered healthy. These ranges were as follows: blood pressure, <120/80 mm Hg; HDL cholesterol, >50 mg/dL; LDL cholesterol, <100 mg/dL; blood sugar, <100 mg/dL.

* $P<0.05$ vs blacks and Hispanics.

(OR, 0.40; 95% CI, 0.29 to 0.56) as were those with an education less than a college degree compared with those who had completed at least some college (OR, 0.45; 95% CI, 0.33 to 0.61). Age, marital status, employment status, US region, having children <18 years of age, and having health insurance were also included in the models and were not significant.

The majority of women (81%) reported they had seen, heard, or read information about heart disease in the past 12 months. When asked if they had seen, heard, or read any information about the “red dress” symbol, 23% responded affirmatively. These women were more likely to be aware of heart disease as the leading cause of death than those who had not seen, heard, or read anything about the red dress symbol (68.9% versus 51.2%; $P<0.0001$).

Knowledge rates about healthy levels of CVD risk factors as defined by the AHA Evidence-Based Guidelines for CVD Prevention in Women are shown in Table 3.³ Nearly half of women knew what a healthy level of blood pressure is, and white women were significantly more knowledgeable about these levels than were either blacks or Hispanics (52% versus 40% versus 37%; $P<0.05$). Likewise, white women were significantly more knowledgeable about healthy cholesterol levels than either blacks or Hispanics ($P<0.05$). Thirty-seven percent of all women could correctly identify the healthy level for HDL cholesterol (“good cholesterol”). Forty-two percent of white women were aware of this healthy level compared with 27% of blacks and 26% of Hispanics. About one fifth of all women were aware of the healthy level for LDL cholesterol (“bad cholesterol”). Twenty-four percent of white women correctly identified the healthy level compared with 12% of blacks and 14% of Hispanics. About one third of women were knowledgeable about healthy levels of blood sugar, and this was consistent across ethnic groups.

Results of logistic regression models for predicting knowledge of healthy levels of CVD risk factors revealed that having a college degree was positively related to knowledge of a healthy blood pressure level ($P<0.05$). Women who were aware that CVD was the leading cause of death for women and women who had a college degree were significantly more likely to correctly identify a healthy HDL cholesterol level. In contrast, racial and ethnic minorities and unemployed women were less likely to know optimal HDL

TABLE 4. Defined CVD Risk Status Versus Perceived Risk Among White Women

Perceived CVD Susceptibility	Defined CVD Risk Status		
	High	Moderate	Low
High	7	9	3
Moderate	6	21	14
Low	5	18	17

χ^2 (4, n=565)=59.79; $P<0.001$.

cholesterol levels. Similarly, whites were 50% more likely to be knowledgeable than nonwhites about healthy LDL cholesterol levels, and women with a personal history of CVD/risk factors were also significantly more likely to be knowledgeable than those not at risk. Increased age was inversely related to knowledge about healthy blood glucose levels, and personal and family histories of CVD were also positive multivariable factors associated with knowledge of healthy blood glucose levels.

Preventive Care and Personalization of Risk

The overwhelming majority of women (88%) said they had an annual checkup with a healthcare provider. Approximately 54% of women who see a healthcare professional on a regular basis said they had discussed their risk of heart disease within the past 6 months, and the rate was significantly higher among women who perceived themselves as high versus moderate risk versus low risk (70.6% versus 56.9% versus 43.2%, respectively). The most frequently cited major reason why women have not spoken to a healthcare professional in the last year about their risk of heart disease was that the healthcare professional does not bring it up (38%).

Preventive health screening was common among participants, with 96% reporting that they had blood pressure checks within the last 2 years; 93% said their doctor or healthcare provider told them their numbers. Of those who were told their blood pressure, 59% say they remember it. There were no significant differences for any of these parameters across racial/ethnic groups and according to whether they perceived themselves to be at risk of heart disease. Trends were consistent for cholesterol screening, with 80% of respondents stating their levels had been checked within 5 years; 84% said their doctors told them their numbers, but only 46% remember them. Whites were more likely than blacks to remember their cholesterol level, and there were no differences according to perceived personal risk. Overall, only $\approx 31\%$ of women in the study say they knew their total cholesterol numbers. Among respondents, 77% said they had their blood sugar

TABLE 5. Defined CVD Risk Status Versus Perceived Risk Among Nonwhite Women

Perceived CVD Susceptibility	Defined CVD Risk Status, %		
	High	Moderate	Low
High	7	9	2
Moderate	8	14	12
Low	5	20	24

χ^2 (4, n=283)=28.76; $P<0.001$.

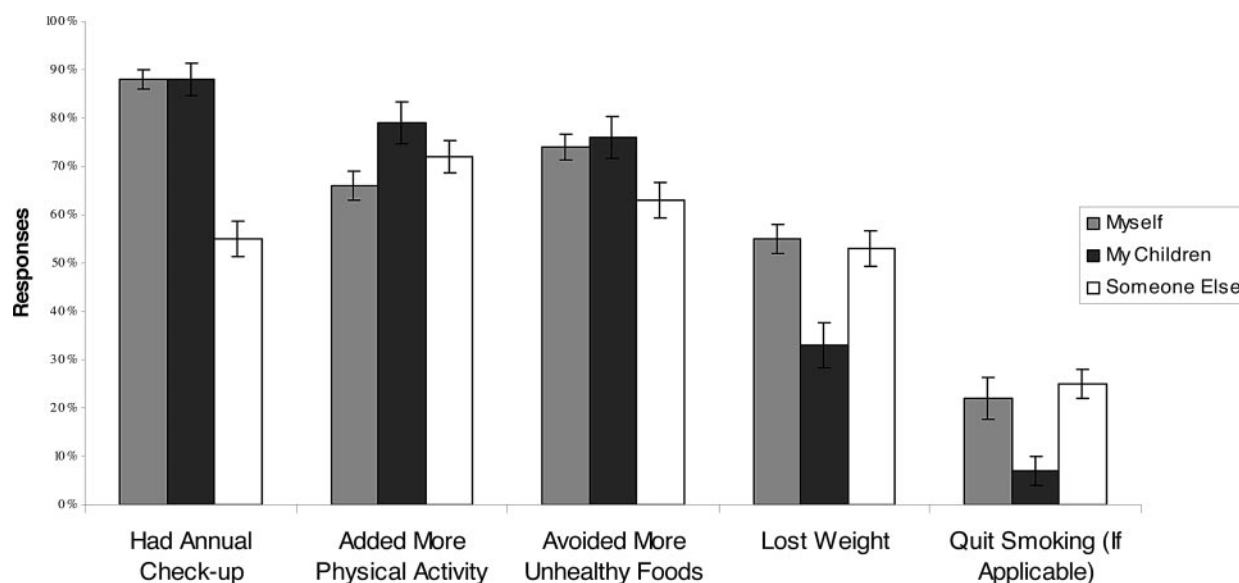


Figure 2. Actions taken to lower personal and family members' risk of heart disease in the previous year.

checked within the last 3 years, 81% were told their level, and 48% said they knew it.

Having cholesterol checked within last 5 years was significantly correlated with high perceived risk compared with moderate or low risk (88.4% versus 80.8 versus 75.8%, respectively). Specific knowledge that personal HDL cholesterol was at a healthy level was associated with low perceived personal risk versus moderate and high (92.3%, 84%, and 74.5%, respectively). Similarly, participants who perceived themselves to be at high risk of heart disease were significantly less likely to state that they had a healthy blood sugar level compared with those who perceived to be at moderate or low risk (82.6% versus 90.8% versus 93.5%, respectively).

Having a healthcare provider diagnose the participant as having heart disease, stroke, TIA, diabetes, high blood pressure, abnormal cholesterol, or being overweight or obese correlated with either high or moderate perceived risk level compared with low risk. Trends were similar for having a family member diagnosed with any of the above conditions (data not shown). Receiving specific instructions from a healthcare professional was associated with perceived level of risk. Participants who perceived they were high or moderate risk were significantly more likely to report having received recommendations than those who perceived themselves to be at low risk (64.1 versus 54.4% versus 41.7%, respectively).

Tables 4 and 5 shows the relation between perceived CVD risk levels and defined risk status according to racial/ethnic status. Overall, 45% of women correctly classified their risk based on NCEP ATP III criteria.⁴ Among women who misclassified their risk, 30% underestimated it and 25% overestimated it. Paradoxically, racial and ethnic minorities were more likely to underestimate their risk compared with whites (33% versus 29%). Significant factors associated with perceived high or moderate risk of heart disease were having a personal history of CVD or risk factors for or family history of heart disease ($P<0.0001$).

Preventive Action

Figure 2 shows the prevalence of preventive actions taken to lower personal and family risk of heart disease over the preceding 12 months. Women were more likely to add physical activity to their children's lives than to their own lives, and Hispanic women were more likely to do so than blacks or whites (90% versus 75% versus 78%; $P<0.05$).

Women who perceived themselves to be at high risk of heart disease were significantly more likely to see a health-care provider in the past year compared with those who perceived themselves to be at moderate or low risk (93.4% versus 89.5% versus 85.5%, respectively). They were also more likely to take someone else living with them or a family member other than a child to a health professional compared with low-risk women (48.8% versus 31.8%; $P<0.05$). Self-classified high-risk and moderate-risk women were more likely than low-risk women to take someone else to get a diagnostic test for heart disease and more likely to take someone else to have their cholesterol checked than women who did not perceive themselves to be at risk (data not shown).

Multivariable factors associated with self-reported actions to lower personal risk of heart disease are listed in Table 6. Women who had seen, heard, or read information about heart disease in the last 12 months were significantly more likely to increase their physical activity, decrease their intake of unhealthy food, and lose weight. Similarly, women who were aware that heart disease is the leading cause of death for women were more likely to increase physical activity and lose weight. Awareness of healthy blood pressure levels was significantly correlated with improvements in diet.

Increased age was inversely related to positive lifestyle changes. Personal history of CVD or risk factors was associated with several positive lifestyle changes related to heart disease, including better diet, weight management, and smoking cessation. In addition, women who expressed self-efficacy (that they believed their actions could impact their

TABLE 6. Correlates of Self-Reported Actions Taken to Lower Personal Risk of Heart Disease

	Added More Physical Activity			Avoided More Unhealthy Foods			Quit Smoking (If Applicable)			Lost Weight		
	OR (95% CI)			OR (95% CI)			OR (95% CI)			OR (95% CI)		
	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
Seen/heard/read about heart disease	1.57	1.16	2.12	1.44	1.04	1.98	1.52	0.83	2.78	1.52	1.14	2.02
Aware of LCOD for women	1.35	1.00	1.83	1.17	0.84	1.63	1.25	0.67	2.30	1.47	1.10	1.97
Age	0.89	0.82	0.96	0.91	0.84	0.99	0.77	0.65	0.90	0.89	0.83	0.96
Race/ethnicity (nonwhite)	1.12	0.79	1.59	1.18	0.81	1.72	0.57	0.27	1.20	1.17	0.84	1.63
Personal history*	1.05	0.92	1.20	1.33	1.13	1.57	1.63	1.25	2.12	1.36	1.18	1.56
Family history*	1.04	0.96	1.13	1.01	0.93	1.10	1.01	0.86	1.18	1.02	0.95	1.10
Education less than college degree	1.01	0.73	1.40	1.04	0.73	1.47	1.32	0.65	2.68	1.08	0.80	1.47
Married/living together	0.91	0.65	1.28	1.18	0.82	1.68	1.87	0.96	3.66	0.77	0.56	1.06
Unemployed	1.15	0.84	1.59	0.86	0.61	1.21	1.80	0.98	3.33	1.12	0.83	1.51
Children <18 y	1.30	0.89	1.90	0.81	0.54	1.22	0.75	0.36	1.59	1.12	0.79	1.60
Uninsured	0.70	0.44	1.11	0.71	0.44	1.15	0.98	0.42	2.32	0.64	0.41	1.00
Aware of healthy BP levels	0.98	0.73	1.31	1.47	1.07	2.02	1.20	0.67	2.14	1.07	0.81	1.41
Aware of healthy HDL levels	1.07	0.78	1.47	1.39	0.98	1.97	0.79	0.42	1.49	1.12	0.83	1.51
Aware of healthy LDL levels	1.14	0.78	1.66	1.13	0.74	1.74	0.68	0.31	1.51	1.24	0.87	1.77
Aware of healthy blood sugar levels	1.59	1.14	2.21	1.32	0.92	1.90	1.06	0.58	1.94	1.12	0.83	1.53
Perceived risk level (high)	0.86	0.59	1.27	0.94	0.61	1.45	0.66	0.33	1.34	1.01	0.69	1.47
Low self-efficacy	0.45	0.33	0.63	0.79	0.55	1.13	0.52	0.26	1.03	0.65	0.48	0.90

LCOD indicates leading cause of death.

*Number of the following conditions: heart disease, stroke/TIA, diabetes, high blood pressure, abnormal cholesterol, or obesity/concerns of being overweight.

risk of CVD) were more likely to have reported increased physical activity and to have lost weight in the previous year. Finally, women who were aware of healthy blood sugar levels were more likely to have increased their physical activity, whereas women who were aware of healthy blood pressure levels were more likely to have decreased consumption of unhealthy food.

Motivators and Barriers to CVD Prevention

The 5 most common reasons women gave for taking action to lower CVD risk (listed in Table 7) were (1) wanted to improve health (95%), (2) wanted to feel better (92%), (3) wanted to live longer (90%), (4) wanted to avoid taking medications (69%), and (5) did it for their family (67%). There were several significant differences in responses based on race/ethnicity, with healthcare providers and other persons (friends/relatives) being significantly more influential in motivating preventive action in nonwhites than whites.

No single barrier to CVD risk-lowering behavior was cited by the majority of female respondents, as outlined in Table 8. The most commonly reported challenge was too much confusion in the media (49%). The second most common reason for not taking action to lower risk was the feeling that God or a higher power determines health (44%), which was significantly more pronounced among nonwhites than whites (53% versus 41%). Family obligations and other people to take care of were 1 of the 3 most commonly cited impediments to heart health (42%). When asked whose health is most important to them, 56% of women stated someone else's (children, 30%; spouse/partner, 17%; parents, 7%; other, 2%).

Discussion

There are several key findings from this national study of >1000 randomly selected women in the United States. First, the rate of awareness of heart disease as the leading cause of death among women has nearly doubled since 1997, although

TABLE 7. Reasons for Taking Actions to Lower CVD Risk

	Race/Ethnic Group		
	Overall (n=1002)	White (n=563)	Nonwhite (n=439)
I wanted to improve my health	95	95	96
I want to feel better	92	91	95*
I wanted to live longer	90	89	93*
I want to avoid taking medications	69	67	74*
I did it for my family	67	67	66
Saw/heard/read information related to heart disease	63	63	66
My healthcare provider told me to	46	42	55*
A relative developed heart disease	34	34	34
A relative encouraged me to	31	30	36*
I experienced symptoms related to heart disease	24	23	28
A friend encouraged me to	20	18	28*
A friend developed heart disease	15	14	17

Numbers are percentages of women who responded yes. Six participants were excluded because they indicated that they did not do anything to lower their CVD risk.

* $P<0.05$.

TABLE 8. Self-Reported Barriers to Cardiovascular Health

	Overall (n=1008)	Ethnicity	
		White (n=565)	Nonwhite (n=443)
There was too much confusion in the media	49	48	50
I felt that God or some other higher power ultimately determines my health	44	41	53*
I had family obligations and people to take care of	42	42	44
I didn't perceive myself to be at risk	36	36	38
I didn't want to change my lifestyle	27	28	23
I didn't have the money/insurance coverage	27	25	32
I was too stressed	25	26	23
My HCP didn't say it was important	25	25	24
I was not that confident that I can successfully change	24	26*	20
My family told me I didn't need to change	21	21	19
I didn't have the time	21	23*	15
My HCP didn't explain clearly how to change	19	18	22
I was fearful of change	18	17	22
I felt it was too complicated	18	17	20
I didn't know what I should do	18	16	21
I didn't think changing would reduce my risk	17	16	18
I was confused by what to do	16	16	17
I was too depressed	14	13	16
My HCP didn't speak my language	12	11	13
I was too ill	9	9	10

HCP indicates healthcare provider. Numbers are percentages of women who responded strongly agree or agree somewhat.

* $P<0.05$.

a substantial gap in awareness remains for racial and ethnic minorities, and women still perceive a greater threat for men than for themselves. Second, the majority of women are not aware of healthy levels of risk factors, and personal awareness that their level was not healthy was correlated with recent preventive action. Third, approximately one third of women underestimate their personal risk of CVD based on national standards. Fourth, awareness of heart disease as the leading cause of death for women was a significant predictor of taking personal action to lower risk of heart disease, and the majority of women also encouraged action for someone in their family. The most frequently reported barriers to heart health were outside the control of the women themselves and included confusion in the media, the belief that health is determined by a higher power, and caretaking responsibilities.

Our data showing that awareness of the problem of heart disease in women is improving are consistent with a previous national survey conducted in 2003 that showed the percentage of women who correctly cite that heart disease had risen from 30% in 1997 to 34% in 2000% to 46% in 2003 (Figure 1).¹ The demographics of women in our study were similar to those of previous studies, suggesting a strong upward trend in awareness. Improvement in awareness has followed national efforts by the AHA and other organizations that have initiated campaigns to educate the public of the threat of heart disease

in women. Although a direct causal effect cannot be determined, it can be inferred from the finding that awareness was greater among those women who reported seeing or having read information on the red dress symbol, a national representation of heart disease in women. Our data show support for the continued effort to target educational efforts to raise awareness among racial and ethnic minorities who are paradoxically at highest risk for CVD.⁵

Our findings that most women are not aware of healthy levels of risk factors and that most do not know their own numbers are consistent with recent reports.^{6,7} Nash et al⁶ showed 51% of participants (56% female) in a national probability sample did not know their own level of cholesterol, although 78% knew that it was important to have a healthy one. Approximately 42% of the subjects in that study stated that they did not know what a healthy level of cholesterol should be compared with the 37% and 21% who correctly identified HDL cholesterol and LDL cholesterol levels in our study. The lower knowledge level in our study may reflect that less is known about specific subfractions of cholesterol than total cholesterol in the general public. Moreover, our study included only women, who have been shown to be less knowledgeable about cholesterol targets than men.⁷ In a study of patients hospitalized with CHD, Cheng et al⁷ showed that 43% recalled their total cholesterol levels and only 8% knew the

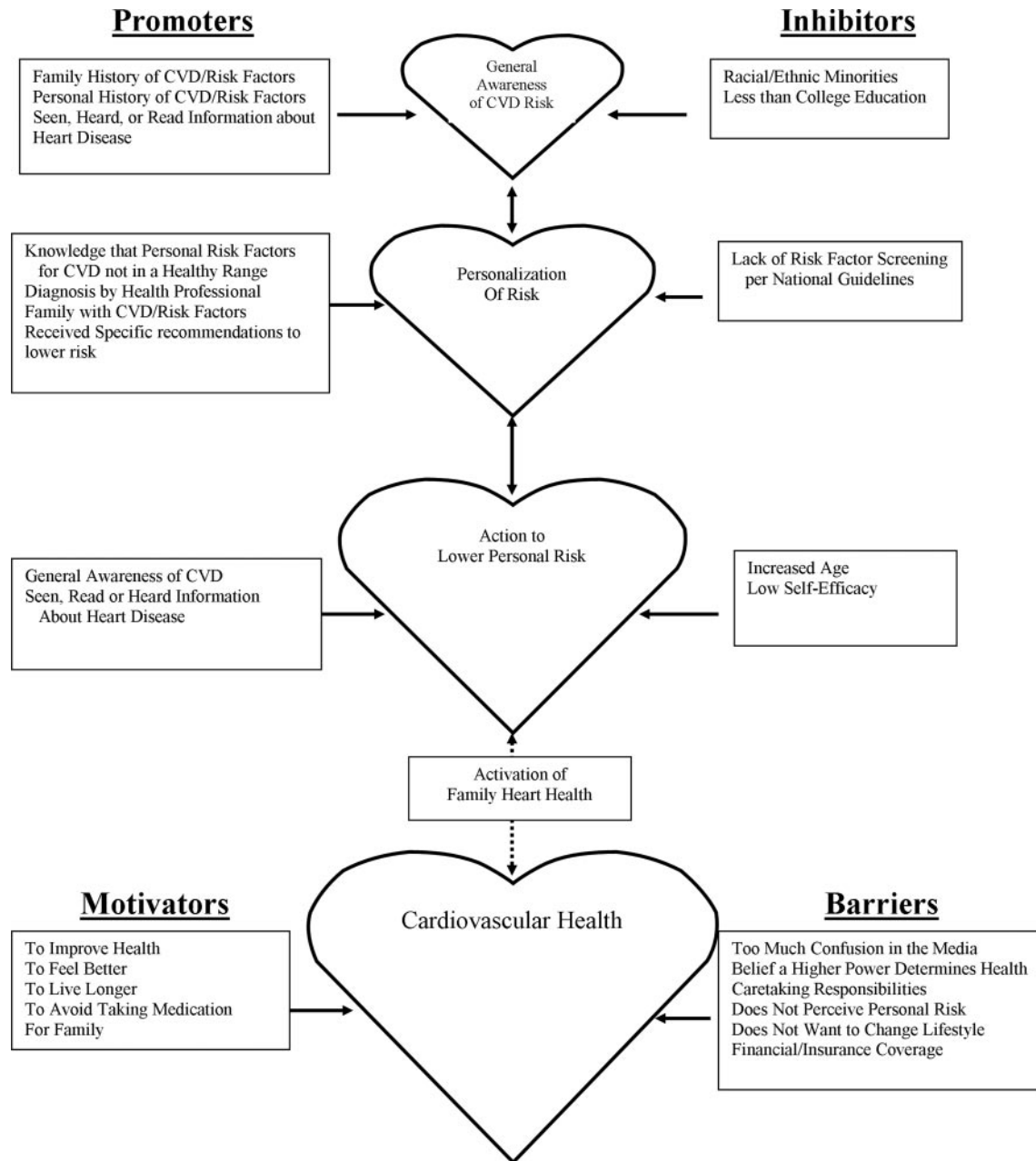


Figure 3. Cardiovascular health: from awareness to action.

subfractions. About half of the subjects knew the target total cholesterol level, and knowledge was less for women, nonwhites, and those without a college education, which were similar to our findings.

Figure 3 provides a schematic representation of a potential pathway from general awareness to personalization of risk to action to lower personal and family risk that is supported by our data. Although we cannot directly link lifestyle improvements and seeking preventive health care to improved cardiovascular outcomes, it is well documented in the literature and is the foundation of the AHA Evidence-Based Guidelines for the Prevention of CVD in Women.³

Our data suggest that targeted efforts to raise awareness among women about heart disease may have a positive

impact on family members and others for whom they provide care. In our study, general awareness of CVD risk in women was associated with taking preventive actions for family members and personal action. This finding lends support for women as “heart keepers” of families and suggests that campaigns to educate them should lead to improved health for their children and others for whom they provide care and make healthcare decisions.

A number of barriers to take action to lower CVD risk were reported by our study population that may provide insight for scientists, policy makers, and healthcare providers to develop interventions to improve cardiovascular health. Interestingly, the 3 most frequently cited obstacles can be considered outside the realm of control of the patient. The roles of the

media and religion in facilitating or hindering optimal cardiovascular health deserve further research.

Our study has several important limitations that should be taken into consideration when the findings are interpreted and extrapolated. First, this was a cross-sectional design; cause and effect cannot be determined. Hence, in Figure 3, where we synthesize the results and propose a pathway from awareness to action, we have 2-sided arrows. Future research should include prospective studies to determine whether the relation is causal. Second, our data are based on self-report, and health information may be inaccurate. This could be differential and overestimate the relation between personal history, family history, and awareness of and action with regard to heart disease risk. Third, we conducted numerous analyses and did not adjust for multiple statistical testing; therefore, some of the findings may be due to chance. A fourth limitation is that the results may not be generalizable to all women, especially those without family members for whom they must make healthcare decisions. Although the sample was random and the initial response rate was high for a study of this type, the women in this study are mostly educated and insured and may be more health conscious than women who would not answer a telephone survey from a nonprofit health foundation. However, given the low rates of awareness of specific risk factors and the substantial proportion of women who underestimate their risk, this may represent a best-case scenario.

In conclusion, we have documented a significant increase in the rate of awareness of heart disease among women, suggesting that recent efforts to educate women about the topic have been highly successful. From our data, improved general awareness is associated with greater personal awareness and increased actions to lower CVD risk. Future prospective studies should be conducted to confirm these findings and further evaluate the impact of women on the health of others. Stronger efforts are needed to heighten

knowledge and awareness among racial and ethnic minorities. Healthcare providers and policymakers should address the identified barriers to optimal heart health for women.

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Disclosures

None.

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