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## Preconception Care: The Perfect Opportunity for Health Care Providers to Advise Lifestyle Changes for Hypertensive Women

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### Abstract

**Purpose**—To provide estimates for prevalence of health care provider advice offered to reproductive-aged women and to assess their association with behavior change.

**Design**—Cross-sectional study using the 2009 Behavioral Risk Factor Surveillance System.

**Setting**—Nineteen states/areas.

**Subjects**—Women aged 18 to 44 years with a self-reported history of hypertension or current antihypertensive medication use (n = 2063).

**Measures**—Self-reported hypertension; sociodemographic and health care access indicators; and provider advice and corresponding self-reported behavior change to improve diet, limit salt intake, exercise, and reduce alcohol use.

**Analysis**—We estimated prevalence and prevalence ratios for receipt of provider advice and action to change habits. We calculated 95% confidence interval (CI) and used  $\chi^2$  tests to assess associations.

**Results**—Overall, 9.8% of reproductive-aged women had self-reported hypertension; most reported receiving advice to change eating habits (72.9%), reduce salt intake (74.6%), and exercise (82.1%), and most reported making these changes. Only 44.7% reported receiving advice to reduce alcohol intake. Women who received provider advice were more likely to report

corresponding behavior change compared to those who did not (prevalence ratios ranged from 1.3 [95% CI, 1.2–1.5,  $p < .05$ ] for exercise to 1.6 [95% CI, 1.4–1.8,  $p < .05$ ] for reducing alcohol use.

**Conclusion**—Health care providers should routinely advise hypertensive reproductive-aged women about lifestyle changes to reduce blood pressure and improve pregnancy outcomes.

### Keywords

Female; Young Adult; Hypertension; Directive Counseling; Risk Reduction Behavior; Prevention Research. Manuscript format: research; Research purpose: descriptive; Study design: nonexperimental; Outcome measure: behavioral; Setting: state/national; Health focus: medical self-care; Strategy: skill building/behavior change; Target population age: adults; Target population circumstances: education/income level; race/ethnicity

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## PURPOSE

A key component of preconception care involves intervening when risks that can adversely affect women's health and birth outcomes are identified.<sup>1</sup> Hypertension is one such risk, and it affects 8% of women of reproductive age<sup>2</sup> and more than 39 million adult women in the United States.<sup>3</sup> Hypertension increases the risk for cardiovascular disease, which is the leading cause of death among all women<sup>3</sup> and increases risk of pregnancy complications (e.g., preeclampsia, placental abruption, and gestational diabetes) and poor infant outcomes including prematurity, fetal growth restriction, and infant death.<sup>4–11</sup> Moreover, national guidelines universally recommend lifestyle interventions to lower blood pressure and control hypertension.<sup>12–14</sup> Provider advice to make lifestyle changes during the reproductive years is an important preconception care strategy.

Preconception care should include clinical efforts to modify risks, such as lifestyle modifications and antihypertensive medications for blood pressure reduction. During the reproductive years, lifestyle modification is often the first line of treatment for hypertension, particularly if it is not severe or if the woman is either trying to get pregnant or at risk of unintended pregnancy.<sup>12</sup> Provider advice alone may promote awareness and prompt women to implement lifestyle modifications such as improving diet, restricting sodium intake, exercising, or limiting alcohol intake. A recent systematic review of 38 trials comparing dietary advice with no advice among 17,871 healthy adults found that dietary advice led to a 2.07-mm Hg (95% confidence interval [CI], .95–3.19) reduction in systolic blood pressure, a 1.15-mm Hg (95% CI, .48–1.85) reduction in diastolic blood pressure, and a 44.2-mmol (95% CI, 33.6–54.7) reduction in 24-hour urinary sodium excretion after 3 to 36 months.<sup>15</sup> Therefore, provider advice on lifestyle modification can have a beneficial influence on women's efforts to control their high blood pressure.

A few studies have examined the prevalence of provider advice to adopt lifestyle changes and resulting behavior changes intended to reduce blood pressure among adults with self-reported hypertension; however, no studies have specifically focused on reproductive-aged women. The results of studies that included both men and women were mixed. A consumer survey of U.S. adults with self-reported hypertension found a low percentage of women of all ages reporting the receipt of such advice from health care professionals.<sup>16</sup> Approximately one in five reported that they were advised to change their diet or to cut down on salt and

24% reported that they were advised to exercise to lower blood pressure.<sup>16</sup> The same researchers found women were less likely than men, and reproductive-aged adults were less likely than those aged ≥ 65 years, to report that they received provider advice to adopt lifestyle modifications.<sup>16</sup> A different study that analyzed 2007 Oklahoma state Behavioral Risk Factor Surveillance System (BRFSS) data reported no sex differences in receipt of provider advice about diet, salt, or alcohol reduction among adults aged ≥ 18 years with self-reported hypertension.<sup>17</sup> According to that study, 61% of women were advised to modify their diet, 71% were advised to reduce salt intake, 71% were advised to exercise, and 28% were advised to reduce alcohol intake. Four recent studies that analyzed reproductive-aged men and women with self-reported hypertension as one group found that a large percentage indicated they were changing their eating habits (47%–76%), reducing salt intake (68%–87%), exercising (61%–71%), or limiting alcohol consumption (58%–80%).<sup>16–19</sup> Overall, the prevalence of self-reported action was generally higher for women than men in all ages combined.<sup>16–19</sup>

To our knowledge, no published studies have reported prevalence estimates of provider advice to adopt lifestyle modifications and corresponding behavior change among hypertensive women of reproductive age. Given that lifestyle modifications are integral to preconception care for hypertensive women of reproductive age and that previous studies suggest that receipt of provider advice varies by age and sex, we conducted a study restricted to women aged 18 to 44 years. The purpose of this study was to estimate the prevalence of self-reported receipt of health care provider advice among women of reproductive age with hypertension, and to assess whether receipt of advice to make lifestyle modifications was associated with self-reported behavior change.

## METHODS

### Design and Sample

We conducted a cross-sectional study with data from the BRFSS. The BRFSS is an ongoing, state-based, random-digit-dialed telephone survey that collects self-reported behavioral and health information from a representative sample of the civilian, noninstitutionalized U.S. population aged ≥ 18 years. The BRFSS has institutional review board approval from the Centers for Disease Control and Prevention and includes both core questions that are administered by all states and optional modules that states may choose to administer. In 2009, 18 states (Alabama, Arizona, Arkansas, Connecticut, Georgia, Iowa, Kentucky, Louisiana, Minnesota, Missouri, Montana, North Carolina, North Dakota, Ohio, South Carolina, Tennessee, West Virginia, and Wisconsin) and the District of Columbia administered an optional module of questions on advice and actions taken to control high blood pressure. The median response rate (eligible percentage for whom an interview was completed) was 57%. Of 432,607 BRFSS respondents in 2009, there were 128,040 respondents from the 19 states/areas that used the optional survey module on advice and actions to control high blood pressure. Of the 128,040 respondents, 18,930 (14.8%) were nonpregnant women 18 to 44 years of age. Of 18,930 women, we excluded 16,711 (88.3%) respondents who were normotensive and an additional 156 (.8%) respondents who did not report their hypertensive status. Therefore, our final sample included 2063 (10.9%)

nonpregnant women 18 to 44 years of age who reported a history of hypertension or current antihypertensive medication use.

## Measures

Women were categorized as hypertensive if they reported currently taking antihypertensive medication and/or a doctor, nurse, or other health professional had told them that they had high blood pressure on two or more occasions. Women who indicated they had pregnancy-related hypertension only or borderline hypertension only were not considered hypertensive.

We examined receipt of provider advice to make lifestyle changes and reported action. Respondents were asked if a doctor or other health professional had ever advised them to do any of the following to help lower or control high blood pressure: change eating habits, cut down on salt, exercise, or reduce alcohol use. Four advice measures were created to correspond with each recommended lifestyle modification (yes/no). Additionally, respondents were asked if they were currently taking any of those actions to lower blood pressure. Based on responses, four behavior change outcomes were created to reflect corresponding action (yes/no). When respondents were asked whether they were changing behavior or had received provider advice related to salt or alcohol, women could report that they did not use salt or drink alcohol. These women ( $n = 178$  for salt and  $n = 1053$  for alcohol) were excluded from analyses addressing behavior change and clinician advice related to salt and alcohol.

Demographic variables and health care access variables were assessed and considered as potential confounders. Demographic variables included age in years (18–34, 35–44), race/ethnicity (white non-Hispanic, black non-Hispanic, Hispanic/other), education in years (<12, 12 or general equivalency diploma, >12), and marital status (married, not married). Health care access indicators included health plan coverage (insured, uninsured) and years since last routine checkup (<2, 2 or never).

## Analysis

We estimated the weighted prevalence and 95% CI of demographic characteristics and health care access indicators by receipt of provider advice and action to change habits (e.g., cut down on salt, exercise, or reduce alcohol use). Pearson  $\chi^2$  tests were conducted to assess differences in the distributions ( $p < .05$ ). Using prevalence ratios, we examined the associations between receiving provider advice and respective lifestyle modifications. Demographic characteristics and health care indicators were identified as potential confounders based on findings from previous studies.<sup>19–21</sup> We considered inclusion of potential confounders in regression models if they changed the association between receiving provider advice and self-reported lifestyle modification by >10%. Data were analyzed using SAS version 9.2 (SAS Institute Inc., Cary, North Carolina) and SUDAAN version 10.0 (Research Triangle Park Institute, Research Triangle Park, North Carolina) to adjust for the complex sampling design of BRFSS and were weighted to allow for generalization of findings to the entire population.

## RESULTS

### Description of Sample

Overall, 9.8% of reproductive-aged women reported that they had histories of hypertension. Most of these women were 35 to 44 years of age (63.2%), were married (59.8%), were non-Hispanic white (65.2%), and had 12 or more years of education (59.6%). Almost all of these women (88.8%) had a routine checkup within the last 2 years and 19.0% reported that they did not have any health insurance (data not shown).

### Provider Advice

Large majorities of women with self-reported hypertension reported that a provider had advised them to change their eating habits (72.9%), reduce their salt intake (74.6%), or exercise (82.1%); conversely, only 44.7% reported that their provider had told them to reduce their alcohol use (Table 1). Reported receipt of provider advice for any of the above was not associated with race/ethnicity, marital status, health plan coverage, or timing of last checkup. However, women with 12 or more years of education compared with those having less education and women who were married compared with unmarried women were more likely to report receipt of provider advice to exercise. Women whose last routine checkup was 2 or more years ago were less likely to report receiving advice to change their eating habits when compared with those who had a checkup less than 2 years ago (Table 1).

### Self-Reported Behavior Change

Overall, most women of reproductive age with self-reported hypertension indicated that they changed their eating habits (75.5%), reduced their salt intake (80.4%), exercised (70.1%), and reduced their alcohol use (67.8%) to decrease their blood pressure (Table 2). The self-reported behavior change by demographic characteristics and health care access indicators did not follow any particular pattern. It varied by age only for changing eating habits, with women aged 35 to 44 years being more likely to report a change than women aged 18 to 34 years. Compared with non-Hispanic whites and Hispanics, non-Hispanic blacks were more likely to report changing eating habits and reducing salt. Having 12 or more years of education was associated only with exercising, health plan coverage was associated only with reducing alcohol use, and receipt of a routine checkup was associated only with exercising. Overall, women who received provider advice were more likely to report behavior change related to the advice ( $p < .05$ ) (Figure). The unadjusted prevalence ratios of receiving advice and self-reported behavior change ranged from 1.3 (95% CI, 1.2–1.5) for exercise to 1.6 (95% CI, 1.4–1.8) for reducing alcohol use (Table 3). No demographic or health care access indicators confounded any of these associations.

## DISCUSSION

Our study found that a majority of women with self-reported hypertension received and heeded advice from health care providers to change eating habits, reduce salt intake, and exercise. Though most women reduced their intake of alcohol (67.8%), less than half reported receiving advice to reduce alcohol consumption (44.7%). Although it appears that many hypertensive women had received and heeded such advice from their health care

providers, receipt was not universally reported, suggesting missed opportunities, particularly related to addressing alcohol use.

Our prevalence estimates of receipt of advice were higher than those reported in previous studies that were not restricted to women of reproductive age. For example, estimates of provider advice to women (all ages) documented in previous reports were 19%–61% for change in eating habits, 21% to 71% for reduction in salt intake, and 21% to 71% for performing exercise.<sup>16,17</sup> One study reported 28% of hypertensive women aged 18 years or older received advice to reduce alcohol intake.<sup>17</sup> Likewise, our estimates of provider advice (all types) were higher than those reported in other studies of reproductive-aged adults (men and women).<sup>16,17</sup> The high prevalence of advice that we found was unexpected given that one study found younger people and women in general reported lower rates of receiving advice than older adults and men, respectively.<sup>16</sup> However, our estimates of self-reported behavior change fell within ranges reported by other studies—among men and women of reproductive age and among women of all ages—that examined actions to modify diet (47%–76%), reduce salt intake (68%–89%), exercise (61%–71%), and reduce alcohol intake (58%–83%).<sup>16–19</sup>

Hypertension, which can cause serious complications during pregnancy,<sup>4–11</sup> is controllable through lifestyle modification.<sup>12</sup> Lifestyle modification can be facilitated through health promotion and provider advice given at preconception clinical visits.<sup>1,22</sup> Our finding that women who received provider advice were more likely to report corresponding behavior changes suggests that health care professionals wield influence on this population. Naturally, behavior changes are dependent on both patient and provider factors. According to the Health Belief Model framework, action requires that patients feel confident they can make a behavior change, understand the threat of illness, and believe that taking action will yield benefits.<sup>23</sup> Although the benefits of diet, exercise, and even salt reduction for controlling hypertension are commonly understood,<sup>24</sup> the effectiveness of alcohol reduction for blood pressure control may be less well known. Likewise, advice to reduce alcohol intake was the least prevalent type of provider advice reported, suggesting either that prevalence of harmful drinking was low and advice therefore was not indicated or, possibly, that providers missed opportunities to address it. Addressing alcohol use is an important strategy for both preconception care<sup>1</sup> and hypertension.<sup>12</sup> Although interventions such as the 5 As counseling framework have been shown to be effective interventions for harmful drinking,<sup>25</sup> physicians may shy away from screening or from providing brief counseling about alcohol use because they do not see this as a priority, find it awkward to discuss, or fear losing patients.<sup>26</sup> Provider education may be needed to improve health promotion related to alcohol reduction for hypertensive patients.

Several limitations may have influenced our findings. As data are self-reported, they are subject to recall bias. For example, respondents may not recall details about all provider advice ever received. As a result, receipt of provider advice to adopt lifestyle modifications may be underestimated. It is also possible that advice and behavior change may be overestimated because of social desirability bias. Because data were cross-sectional, we do not know the temporal association between receipt of advice and behavior change, so we cannot make causal inferences about the associations. Finally, the median response rate was

57%, and the results from these 19 states/areas are not generalizable to the entire United States.

A key component of preconception care involves preventive clinical care visits during which women receive risk assessment, education, and referrals to services to assist with behavior change. Health care providers should routinely assess and advise all hypertensive reproductive-aged women about lifestyle changes that they can adopt to reduce blood pressure, which may improve pregnancy outcomes as well as control hypertension. Preconception care visits are the perfect opportunity to advise such lifestyle changes for hypertensive women.<sup>1</sup>

## Acknowledgments

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**SO WHAT? Implications for Health Promotion Practitioners and Researchers**

**What is already known on this topic?**

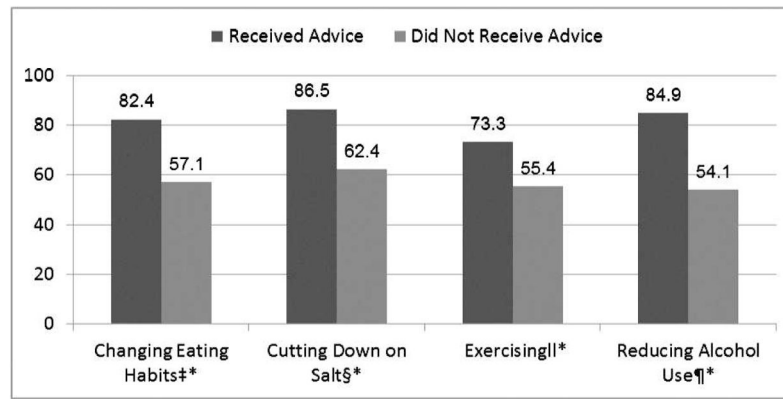
Lifestyle modifications are integral to preconception care for reproductive-aged hypertensive women. Receipt of provider advice to adopt lifestyle modifications varies by age and sex.

**What does this article add?**

This is the first report of provider advice and corresponding behavior change prevalence among reproductive-aged women with self-reported hypertension. One in five women did not receive advice regarding changing eating habits, reducing salt, and increasing exercise, and three in five did not receive advice about reducing alcohol use. Women who received lifestyle modification advice were more likely to report corresponding behavior change for all types of advice.

**What are the implications for health promotion practice or research?**

Health care providers should routinely assess and advise all hypertensive reproductive-aged women about lifestyle changes to reduce blood pressure and improve pregnancy outcomes. Reduction in alcohol use also should be included in provider advice.



**Figure. Prevalence of Lifestyle Modifications by Receipt of Diet, Salt Reduction, Exercise, or Alcohol Reduction Advice Among Women Aged 18–44 Years With Self-Reported Hypertension, BRFSS 2009, 19 States/Areas<sup>†</sup>**

<sup>†</sup>Hypertension is defined as currently taking antihypertensive medication and/or patient was told by a doctor, nurse, or other health professional that she had high blood pressure on two or more occasions. BRFSS indicates Behavioral Risk Factor Surveillance System.

<sup>‡</sup>Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of diet advice and subsequent diet modification.

<sup>§</sup> Sample (n = 1874) restricted to women with a valid response (yes/no) to both questions on receipt of salt reduction advice and subsequent salt reduction. Women indicating they did not use salt as a response are excluded.

<sup>||</sup> Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of exercise advice and subsequent exercise modification.

<sup>¶</sup> Sample (n = 1002) restricted to women with a valid response (yes/no) to both questions on receipt of alcohol reduction advice and subsequent alcohol reduction. Women indicating they did not drink as a response are excluded.

\*  $\chi^2 p < .05$

**Table 1**

Prevalence of Receipt of Provider Advice Among Women Aged 18–44 Years With Self-Reported Hypertension by Demographic and Health Care Access Characteristics, BRFSS 2009, 19 States/Areas (N = 2063)<sup>†</sup>

	Change Eating Habits, % <sup>‡</sup>	Cut Down on Salt, % <sup>§</sup>	Exercise, % <sup>//</sup>	Reduce Alcohol Use, %
All	72.9	74.6	82.1	44.7
Characteristics				
Age				
18–34	70.7	72.4	82.1	45.0
35–44	74.2	76.0	82.2	44.5
<i>p</i>	0.34	0.28	0.97	0.93
Race				
White-NH	71.5	72.4	81.7	44.5
Black-NH	77.2	78.6	82.2	41.3
Hispanic/other	68.3	78.9	85.4	55.0
<i>p</i>	0.17	0.13	0.62	0.37
Education, y				
<12	73.0	80.8	77.6	49.9
12 or GED	68.5	72.8	76.7	44.8
>12	75.0	74.2	85.6	43.9
<i>p</i>	0.23	0.22	0.01*	0.78
Marital status				
Married	73.3	76.0	84.4	44.4
Not married	72.2	72.7	78.8	45.3
<i>p</i>	0.74	0.30	0.04*	0.85
Health plan coverage				
Insured	73.8	74.0	82.8	43.5
Uninsured	69.6	78.2	79.7	51.4
<i>p</i>	0.39	0.28	0.39	0.22
Time since last checkup, y				
<2	74.6	75.3	82.9	44.6
2 or never	59.3	68.2	76.5	45.8
<i>p</i>	0.04*	0.19	0.18	0.88

<sup>†</sup>Hypertension is defined as currently taking antihypertensive medication and/or patient was told by a doctor, nurse, or other health professional that she had high blood pressure on two or more occasions. BRFSS indicates Behavioral Risk Factor Surveillance System; NH, non-Hispanic; and GED, general equivalency diploma.

<sup>‡</sup>Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of diet advice and subsequent diet modification.

<sup>§</sup>Sample (n = 1874) restricted to women with a valid response (yes/no) to both questions on receipt of salt reduction advice and subsequent salt reduction. Women indicating they did not use salt as a response are excluded.

<sup>//</sup>Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of exercise advice and subsequent exercise modification.

<sup>¶</sup>Sample (n = 1002) restricted to women with a valid response (yes/no) to both questions on receipt of alcohol reduction advice and subsequent alcohol reduction. Women indicating they did not drink as a response are excluded.

\* Significant,  $p < 0.05$ .

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**Table 2**

Prevalence of Current Self-Reported Lifestyle Modifications Among Women Aged 18–44 Years With Self-Reported Hypertension by Demographic and Health Care Access Characteristics, BRFSS 2009, 19 States/ Areas (N = 2063)<sup>†</sup>

	Changing Eating Habits, % <sup>‡</sup>	Cutting Down on Salt, % <sup>§</sup>	Exercising, % <sup>  </sup>	Reducing Alcohol Use, % <sup>¶</sup>
All	75.5	80.4	70.1	67.8
Characteristics				
Age				
18–34	70.3	77.1	71.0	68.4
35–44	78.6	82.3	69.5	67.4
<i>p</i>	0.02*	0.09	0.65	0.84
Race				
White-NH	72.5	77.5	69.4	64.5
Black-NH	82.3	87.0	70.3	73.6
Hispanic/other	76.5	80.4	74.1	77.5
<i>p</i>	0.01*	0.01*	0.67	0.06
Education, y				
<12	68.7	75.2	64.2	78.0
12 or GED	72.0	82.0	65.5	68.1
12+	78.5	80.6	73.4	66.2
<i>p</i>	0.06	0.50	0.03*	0.24
Marital status				
Married	78.2	80.6	70.8	68.5
Not married	71.6	80.0	69.0	66.7
<i>p</i>	0.05	0.84	0.57	0.69
Health plan coverage				
Insured	75.6	79.4	70.8	66.0
Uninsured	75.7	85.2	67.4	77.8
<i>p</i>	0.97	0.07	0.40	0.03*
Time since last checkup, y				
<2	77.2	79.9	71.7	68.7
2 or never	65.2	84.8	58.8	62.0
<i>p</i>	0.09	0.16	0.03*	0.41

<sup>†</sup>Hypertension is defined as currently taking antihypertensive medication and/or patient was told by a doctor, nurse, or other health professional that they had high blood pressure on two or more occasions. BRFSS indicates Behavioral Risk Factor Surveillance System; NH, non-Hispanic; and GED, general equivalency diploma.

<sup>‡</sup>Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of diet advice and subsequent diet modification.

<sup>§</sup>Sample (n = 1874) restricted to women with a valid response (yes/no) to both questions on receipt of salt reduction advice and subsequent salt reduction. Women indicating they did not use salt as a response are excluded.

// Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of exercise advice and subsequent exercise modification.

// Sample (n = 1002) restricted to women with a valid response (yes/no) to both questions on receipt of alcohol reduction advice and subsequent alcohol reduction. Women indicating they did not drink as a response are excluded.

\* Significant,  $p < 0.05$ .

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**Table 3**

Unadjusted Prevalence Ratios for Receipt of Provider Advice and Current Lifestyle Modifications Among Women Aged 18–44 Years with Self-Reported Hypertension (N = 2063), BRFSS 2009, 19 States/Areas<sup>†</sup>

Provider Advice	Point Estimate <sup>‡</sup>	95% CI	<i>p</i>
Change eating habits <sup>§</sup>			
Yes	1.4	1.3–1.6	0.0000*
No	Ref		
Cut down on salt <sup>//</sup>			
Yes	1.4	1.3–1.5	0.0000*
No	Ref		
Exercise <sup>¶</sup>			
Yes	1.3	1.2–1.5	0.0000*
No	Ref		
Reduce alcohol use <sup>#</sup>			
Yes	1.6	1.4–1.8	0.0000*
No	Ref		

<sup>†</sup>Hypertension is defined as currently taking antihypertensive medication and/or patient was told by a doctor, nurse, or other health professional that they had high blood pressure on two or more occasions. BRFSS indicates Behavioral Risk Factor Surveillance System; CI, confidence interval; and Ref, reference.

<sup>‡</sup>No demographic or health care access indicators confounded any of these associations.

<sup>§</sup>Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of diet advice and subsequent diet modification.

<sup>//</sup>Sample (n = 1874) restricted to women with a valid response (yes/no) to both questions on receipt of salt reduction advice and subsequent salt reduction. Women indicating they did not use salt as a response are excluded.

<sup>¶</sup>Sample (n = 2054) restricted to women with a valid response (yes/no) to both questions on receipt of exercise advice and subsequent exercise modification.

<sup>#</sup>Sample (n = 1002) restricted to women with a valid response (yes/no) to both questions on receipt of alcohol reduction advice and subsequent alcohol reduction. Women indicating they did not drink as a response are excluded.

\* Significant,  $p < 0.05$ .