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Change in US Adult Consumer Knowledge, Attitudes, and Behaviors Related to Sodium Intake and Reduction: SummerStyles 2012 and 2015

Katherine A. John, MPH[1], **Mary E. Cogswell, DrPH**[1], **Lixia Zhao, PhD**[1,2], **Xin Tong, MPH**[1], **Erika C. Odom, PhD**[1], **Carma Ayala, PhD**[1], and **Robert Merritt, MPH**[1]

[1]Epidemiology and Surveillance Branch, Division for Heart Disease and Stroke Prevention, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA

[2]IHRC, Inc, Atlanta, GA, USA

Abstract

Purpose—To describe changes in consumer knowledge, attitudes, and behaviors related to sodium reduction from 2012 to 2015.

Design—A cross-sectional analysis using 2 online, national research panel surveys.

Setting—United States.

Participants—A total of 7796 adults (18+ years).

Measures—Sodium-related knowledge, attitudes, and behaviors.

Analysis—Data were weighted to match the US population survey proportions using 9 factors. Wald χ^2 tests were used to examine differences by survey year and hypertensive status.

Results—Despite the lack of temporal changes observed in respondent characteristics (mean age: 46 years, 67% were non-Hispanic white, and 26% reported hypertension), some changes were found in the prevalence of sodium-related knowledge, attitudes, and behaviors. The percentage of respondents who recognized processed foods as the major source of sodium increased from 54% in 2012 to 57% in 2015 ($P = .04$), as did the percentage of respondents who buy or choose low/reduced sodium foods, from 33% in 2012 to 37% in 2015 ($P = .016$). In contrast, the percentage of

Corresponding Author: Katherine A. John, Epidemiology and Surveillance Branch, Division for Heart Disease and Stroke Prevention, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA 30341, USA. yfr6@cdc.gov.

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Declaration of Conflicting Interests

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self-reported receipt of health professional advice among persons with hypertension decreased from 59% in 2012 to 45% in 2015 ($P < .0001$). Other sodium-related knowledge, attitudes, and behaviors did not change significantly during 2012 to 2015.

Conclusion—In recent years, some positive changes were observed in sodium-related knowledge and behaviors; however, the decrease in reported health professional advice to reduce sodium among respondents with hypertension is a concern.

Keywords

sodium; knowledge; attitudes; behaviors; heart disease; nutrition

Purpose

Current average sodium consumption among the US population far exceeds the Healthy People 2020 objective of 2300 mg/d.[1,2] The *2015–2020 Dietary Guidelines* recommend Americans reduce sodium intake because overconsumption is common and can pose health risks.[3] Although nearly everyone benefits from sodium reduction, its blood pressure lowering effect is greater among prehypertensive and hypertensive individuals, independent of age, race, sex, or weight.[4,5] These individuals may benefit from further lowering sodium intake to 1500 mg/d.[3–5] Given that commercially packaged and restaurant foods are estimated to contribute more than 75% of the dietary sodium consumed; in 2010, the Institute of Medicine (IOM) recommended gradual sodium reductions in these foods as the most effective approach.[6,7] While an overall coordinated reduction of sodium in the food supply is recommended by the IOM as central to achieving meaningful reductions of sodium in the US diet, consumer-based initiatives such as consistent and coordinated messaging for educating and motivating consumers are also recommended by the IOM in supporting reduction.[7] Activities to increase consumer readiness (ie, attitudes, perceptions, and understanding) to reduce sodium intake can be the important starting points for changing consumer demand for low sodium foods.[7] As recommended by the IOM, monitoring consumer's knowledge, attitudes, and behaviors (KAB) related to sodium can support strategies aimed at sodium reduction in the food supply.[7]

Although consumer education related to sodium has been ongoing for more than 40 years, recently, policy strategies to reduce sodium intake were implemented at national, state, and local levels. The basis for federal nutrition policies is the *US Dietary Guidelines*. For instance, in 2012, the National School Lunch and School Breakfast programs (as part of the Healthy-Hunger Free Kids Act-2010) implemented a plan to reduce sodium in meals during a 10-year period to meet the *Dietary Guidelines*.[8] In 2013, the Centers for Disease Control and Prevention (CDC) funded the "State Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health," which required all 50 states to promote and adopt healthy food service guidelines, including sodium goals, across a variety of venues (ie, early childcare education, schools, work sites, hospitals, and community settings).[9] Furthermore, the Sodium Reduction in Communities Program (SRCP) was implemented in several geographic locations to increase access to and accessibility of lower sodium food options, reduce sodium intake, and continue to build practice-based evidence around effective population-based strategies to reduce sodium

consumption at the community level.[10,11] These activities aim to reduce population sodium intake by targeting the food environment and building support for better food choices by the consumer.[7]

Several recent surveys have examined consumer readiness (KAB) related to sodium reduction, but few have examined changes in consumer readiness associated with the implementation of sodium reduction policies and programs. Patel and colleagues, using a national market panel sample survey of US adults in 2012, reported the prevalence of KAB related to sodium intake and reduction as well as tactics to reduce sodium intake.[12] Data from Behavioral Risk Factor Surveillance System (BRFSS) questions, collected from participants in 26 states and 2 territories in 2013, suggested individuals with or at risk of hypertension may be more likely to receive advice and take action to reduce sodium.[13,14] The International Food Information Council (IFIC) examined consumer sodium reduction behaviors, specifically if individuals compared sodium levels in foods and avoided foods with sodium, in 2014 and again in 2015 in a weighted online sample of 1000 adults; however, no significant differences were observed during these 2 years.[15] We hypothesize that because individuals with hypertension are more likely to receive professional advice and take action to reduce sodium intake, they may also be more likely to change their knowledge, attitudes, and beliefs with implementation of sodium reduction policies and programs.

In 2015, questions related to sodium reduction were repeated from the 2012 national market panel survey described above. Our objectives are to describe temporal changes in adult consumer KAB related to sodium intake and reduction overall and by hypertensive status, and the relationship between reported consumer action and use of specific sodium reduction tactics in 2015.

Methods

Design

This study was a cross-sectional analysis of 2012 and 2015 HealthStyles survey data—a consumer market panel survey examining consumer knowledge, attitudes, and beliefs related to health among adults aged 18 years or older. Styles surveys are a series of Web-based consumer surveys developed by Porter Novelli Public Services and conducted via GfK's KnowledgePanel.[16] These Web-based surveys are built to gather information from US consumers toward various health topics, and questions may differ between surveys and years. GfK's KnowledgePanel is an online national panel of US non-institutionalized participants.[16] Panelists (members) are randomly recruited by probability-based sampling (using random digit dial and address-based sampling methods) to reach respondents regardless of landline phone or Internet access and are continuously refreshed to maintain approximately 55 000 panelists. If needed, households are provided with a laptop computer and access to the Internet. Panelists are not required to answer any of the questions and can exit the survey at any time.[16] The initial spring wave of the survey (SpringStyles) is fielded to a random sample of panelists aged ≥18 years, whereas the second summer wave of the survey (Summer-Styles) is sent to a random sample of adults who completed the spring wave. The CDC suggested potential questions to include and licensed the results (responses

to the questions) from Porter Novelli. Licensed data provided did not include individual identifiers, making it exempt from IRB approval.

Sample

In 2012, the SummerStyles survey was sent to a random sample of 4754 panelists aged ≥18 years who completed the initial spring survey (SpringStyles 2012). A total of 4170 individuals completed SummerStyles 2012 with a response rate of 65%. In 2015, the SummerStyles survey was sent to a random sample of 4554 panelists aged ≥18 years who completed the initial spring survey (SpringStyles 2015). A total of 4127 individuals completed the SummerStyles 2015 survey with a response rate of 67%.

In this study, we excluded 251 participants (2012: n = 111 and 2015: n = 140) who had missing information on demographic and health characteristics, and subsequently 250 participants (2012: n = 160 and 2015: n = 90) who had missing responses on sodium-related questions. The final sample included 7796 respondents- 3899 in 2012 and 3897 in 2015, respectively. Compared to nonrespondents (n = 501), a higher proportion of respondents were male (49% vs 36%); however, respondents and nonrespondents did not differ by survey year, age, race or ethnicity, household income, education, or region (Supplemental Table S1). Given this sample size, we have adequate statistical power (>80%) to detect a significant 5% point or greater difference in the prevalence of participant's sodium-related knowledge, attitude, and behaviors from 2012 to 2015 and by hypertensive status.[17]

Measures

We analyzed responses to 10 questions about sodium knowledge, attitude, and behavior that were asked in 2012 and repeated in 2015 (Supplemental Figure S1). Questions on sodium KAB were developed based on subject matter expertise and have been used in previous studies, with 2 questions subject to cognitive testing.[12–14] Prevalence of respondents who reported receiving health professional advice and taking action to reduce sodium was assessed using responses to 2 previously cognitively tested BRFSS questions—"Has a doctor or other health professional ever advised you to reduce your sodium/salt intake?" and "Are you currently watching or reducing your sodium intake?" Respondent's attitudes toward the harmfulness of excess sodium intake were assessed by the question, "In your opinion, how harmful to your health is eating too much salt/sodium?" Agreement was examined by combining *strongly agree* and *somewhat agree* into *agree* as compared to *neutral/disagree* (combined *strongly disagree, somewhat disagree*, and *neither agree nor disagree*). Harmfulness was examined by combining *very harmful* and *somewhat harmful* versus combined *not at all harmful* and *a little harmful*. Related answer categories were combined to increase sample size in specific subgroups, simplify the analysis, and for ease of interpretation. The distribution of answers to the 4 questions that utilized scaled responses can be found in the Supplemental Table S2. We also examined differences in sodium-related responses by survey period and hypertensive status.

The surveys also included questions about participant characteristics and health-related behavior. All data were self-reported. Sociodemographic characteristics included age, sex, race or ethnicity, level of education, household income, and region of residence. Health

characteristics included body mass index (BMI) and hypertensive status. Height and weight were used to determine BMI, which was categorized as combined underweight and normal weight (<25 kg/m^2), overweight (25–29.9 kg/m^2) and obese (≥30 kg/m^2). Participants categorized as hypertensive were designated by an affirmative response to the question, "During the past year, have you had or do you currently have any of these health conditions: high blood pressure?"

Analysis

Data were weighted to match the US Current Population Survey (CPS) proportions, 2011 and 2014, using 9 factors—sex, age, household income, race or ethnicity, household size, education, census region, metro status, and prior Internet access. Differences in hypertension status and sodium-related responses between 2012 and 2015 were examined using Wald χ^2 tests. In addition, we used relative percentage change (RPC = (2015−2012)/2012) to examine temporal differences between 2012 and 2015 percentages.

A post hoc subanalysis of 2015 respondents (n = 3897) was conducted to examine whether reported action was associated with the use of specific sodium reduction tactics. Wald χ^2 tests were used to compare sodium reduction tactics by reported action. Two-tailed *P* values <.05 were considered significant. All analyses were conducted using SAS version 9.3 (SAS Institute Inc, Cary, North Carolina).

Results

SummerStyles 2012 and 2015 respondents did not differ by sociodemographic and health characteristics (Table 1). Thus, in further analyses, we did not adjust for differences in the distributions of these characteristics over time. Within each survey year, the majority (>50%) of respondents were aged ≥45 years, non-Hispanic white, had a household income ≥US$60 000, or had some college or higher education (Table 1). About 25% of respondents reported hypertension, and more than 60% were overweight or obese (Table 1).

Comparing 2012 and 2015, some changes were seen in the prevalence of knowledge and behaviors related to sodium intake and reduction; however, no significant changes were seen among attitudes toward sodium reduction. Compared to respondents in 2012, a higher percentage of respondents in 2015 agreed that most sodium comes from processed or restaurant foods (56.9% vs 54.0%; *P* = .04; Table 2). The prevalence of respondent attitudes toward sodium intake and reduction did not significantly differ between survey years; during both years, approximately 72% of respondents believed sodium is *very or somewhat* harmful to health, and 59% wanted to eat a low-sodium diet (Table 2). The percentage of reported health professional advice to lower sodium intake had a significant RPC decrease of 20% from 2012 to 2015 (*P* = .0002). Significant increases in percentages from 2012 to 2015 were observed for those who reported buying labeled low-sodium products (*P* = .016) and choosing low-sodium foods as a tactic to lower sodium (*P* = .003; Table 2). The percentage of respondents in 2015 who reported action to reduce sodium intake (43%) and use of sodium reduction tactics (except for choosing low-sodium foods; range: 8%–40%) did not significantly differ from 2012 (Table 2).

Of the changes in sodium KAB examined, few differences were observed by hypertensive status. Compared to 2012, the percentage of hypertensive respondents who agreed that sodium is *very or somewhat* harmful to their health was significantly less in 2015 (86% vs 79%; $P < .01$; Table 3). The percentage of hypertensive individuals who reported health professional advice to lower sodium intake significantly decreased from 59% in 2012 to 45% in 2015 (RPC: 20%; $P < .0001$; Table 3). In addition, hypertensive respondents who agreed to using other spices than added salt as a tactic to reduce sodium decreased from 54% in 2012 to 47% in 2015 ($P = .03$; Table 3). Between 2012 and 2015, significant increases were seen in the percentage of nonhypertensive respondents who wanted to eat a low-sodium diet (52% to 56%; $P = .02$) and who bought low-sodium labeled products (29% to 33%; $P = .008$; Table 3). In contrast, the percentage of nonhypertensive respondents choosing low-sodium products as a tactic to reduce sodium significantly decreased from 35% in 2012 to 30% in 2015 ($P = .001$). The prevalence of respondent's knowledge that most sodium comes from processed or restaurant foods, reported action to reduce sodium, and use of other tactics to reduce sodium intake (ie, requesting low-sodium options, checking nutrition labels, and eating more fruits and vegetables) did not change among individuals with or without hypertension between 2012 and 2015 (Table 3).

In a post hoc subanalysis of SummerStyles 2015 respondents, the use of all sodium reduction tactics was significantly higher among respondents who reported taking action to reduce their sodium compared to those who did not ($P < .001$; Figure 1). Among those who reported taking action, the most common tactics were choosing low-sodium foods and snacks (63%) and checking nutrition labels for sodium content (61%; Figure 1). Whereas among those who reported not taking action, the most common tactics to reduce sodium were to use more/other spices than salt (28%) and to eat more fruits and vegetables with no added salt (22%; Figure 1).

Discussion

The results suggest respondent's knowledge and some behaviors related to sodium intake and reduction changed between 2012 and 2015, despite a lack of temporal change in respondent demographic and health characteristics. In 2015, a slightly higher percentage of respondents understood that the majority of sodium intake is from consumption of processed or restaurant foods. Significantly fewer hypertensive individuals believed that sodium is *very or somewhat* harmful to their health and received health professional advice to decrease sodium intake. On the other hand, a higher percentage of non-hypertensive individuals wanted to eat a low-sodium diet and bought low-sodium labeled food. Individuals who were taking action reported choosing low-sodium foods and snacks and checking nutrition labels as tactics to facilitate sodium reduction, and although other tactics were also reported, they were less common. These findings suggest that sodium reduction efforts, expanded to incorporate the general population in addition to high-risk subgroups, recently have gained greater attention. However, these efforts may not be reaching hypertensive individuals who could benefit the most from sodium reduction efforts.

To our knowledge, this is the first study to examine recent temporal changes (during 3 years) in US consumers' responses to a variety of questions related to sodium reduction. The

results presented here about consumer desire and behaviors to reduce sodium are consistent with other recent surveys.[12–15] For example, results from IFIC's Food & Health Survey estimated that 53% of consumers were trying to avoid sodium in 2015, which did not significantly differ from consumer's responses when asked the same question in 2014.[15] Similarly, we found that 58% of respondents wanted to eat a low-sodium diet. Consistent with other recent reports, roughly 2 of 10 individuals reported receiving health professional advice to reduce sodium intake.[12–14] However, our results on respondent's actions differed from a representative multistate 2013 survey of US adults.[13] Jackson and colleagues found that 53% of surveyed US adults reported watching or reducing their sodium intake in 2013, noticeably higher than the 43% in the present study.[13] Although questions were identical, some of this dissimilarity may be from differences in survey sampling, timing of the survey, placement of questions and types of other questions in the survey, and mode of administration.

The reason for the significant decrease in receipt of health professional advice reported by hypertensive adults is unclear. According to the IOM's report, *Strategies to Reduce Sodium Intake in the United States*, there is evidence that health professionals and their associations (eg, the American Medical Association) support sodium reduction initiatives; however, there is less evidence that clinicians actively incorporate sodium reduction into primary care.[7] In a 2012 study, the majority of primary health-care providers agreed that their patients should reduce sodium intake.[18] Nonetheless, health professionals report that frequent barriers encountered when advising patients to reduce dietary sodium include the following—uncertainty over compliance or effectiveness, lack of time, and patients have other immediate health needs.[18,19] "Health care professionals need to counsel patients about the health risks associated with high sodium intake and how to reduce sodium intake. Therefore, it is necessary to incorporate sodium reduction strategies (ie, simple messages or heart healthy recipes) and their importance to reducing the risk of chronic disease into health professional training curricula and standards of care."[7(p267),20,21] In addition, the American Heart Association (AHA)/American College of Cardiology recommends clinicians to be familiar with dietary recommendations (*Dietary Guidelines*, AHA Lifestyle recommendations, and DASH Eating Plan) so that they can advise their patients to adopt appropriate eating patterns and provide easy access to information.[5,21,22]

The slight increase in choosing or buying low-sodium foods over the past few years may suggest that simple, positive consumer messages, such as choose products with less sodium and buy low-sodium, reduced sodium, or no-added salt versions of products when available, may have slightly increased consumer awareness and motivation to select lower sodium options.[23,24] In contrast, reported use of other sodium reduction tactics, such as use of other spices instead of salt, increase fruit and vegetable intake, and request lower sodium options at restaurants, has not changed since 2012, overall. Nonetheless, opportunities exist across several settings (eg, at work, home, or school) to enable consumers to make healthy choices at each eating occasion.[3]

The majority of consumers continue to believe sodium is harmful to their health and want to eat less sodium; however, without modification of sodium in the overall food supply, much of the dietary sodium intake comes from sources outside the consumers' control.[7] Small

gradual reductions in sodium in the food supply by about 5% a year over the next 10 years are estimated to save 280 000 to 500 000 deaths and more than US$100 billion in health-care costs.[25] Modification of sodium in the overall food supply in tandem with informed consumer choices could help meet the Healthy People 2020 objective and Million Hearts™ initiative to improve overall US health.[7]

Our results may be subject to several limitations. Questions related to sodium were only examined at 2 points in time spanning 3 years and observed differences require further investigation with additional time points to confirm the observed temporal trends as they may be caused by chance. Although weighted to current population proportions, the sample used in this analysis was from a convenience research panel and may not be nationally representative. The majority of respondents were non-Hispanic white, had a household income ≥US$60 000, and had some college education or higher. Many sodium-related questions were examined across survey years, and it is possible that significant estimates could be from random chance. With the exception of 2 questions (health professional advice and consumer action) included on a previous BRFSS survey, Styles questions have not been cognitively tested; therefore, interpretations may not be reliable or valid. The 2 questions included previously on BRFSS went through 3 rounds of cognitive testing, which indicated that a positive response captured a range of behavior (eg, heighted awareness, selection of low-sodium products, and use of less salt while cooking); however, with the BRFSS questions, it is unclear which specific actions were taken among those who reported action.[13,14] Finally, women who were diagnosed with preeclampsia or gestational hypertension during pregnancy in the years prior to both studies may have been classified as hypertensive in this study. In SummerStyles 2012, 1% of self-reported female hypertensives were identified as hypertensive due to pregnancy; however, we could not conduct a sensitivity analysis because there was no similar question on the 2015 survey.

These findings support the continued monitoring of consumer KAB to gauge consumer readiness to lower sodium intake and demand for lower sodium products. Further research examining a longer span of time and with more time points, for example using a prospective cohort, may help identify if changes in KAB related to sodium intake and reduction seen in this study are sustained. Continued coordinated and comprehensive sodium reduction activities targeting both the food industry and the consumer, with specific health communication emphasis toward disparate populations (ie, people with and without hypertension), may enhance US consumers' readiness to reduce sodium intake.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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SO WHAT?

What is already known on this topic?

In 2012, about 1 in 4 adults reported health professional advice and about 45% reported action to reduce sodium intake. Monitoring temporal changes in consumer knowledge, attitudes, and behaviors (KAB) can help evaluate messaging and support sodium reduction activities.

What does this article add?

To our knowledge, this is the first study to examine recent temporal changes (during 3 years) in US consumers' responses, both overall and by hypertensive status, to a variety of questions about sodium reduction attitudes and behaviors. While more adults may understand the harm of sodium and make better food choices, health professional advice to reduce sodium has decreased slightly from 2012 to 2015, particularly among hypertensives.

What are the implications for health promotion practice or research?

Health professionals can help educate and motivate individuals, particularly with hypertension, by counseling patients about dietary patterns, such as the Dietary Approaches to Stop Hypertension (DASH), and sodium reduction tactics, such as checking the Nutrition Facts labels and choosing lower sodium products.

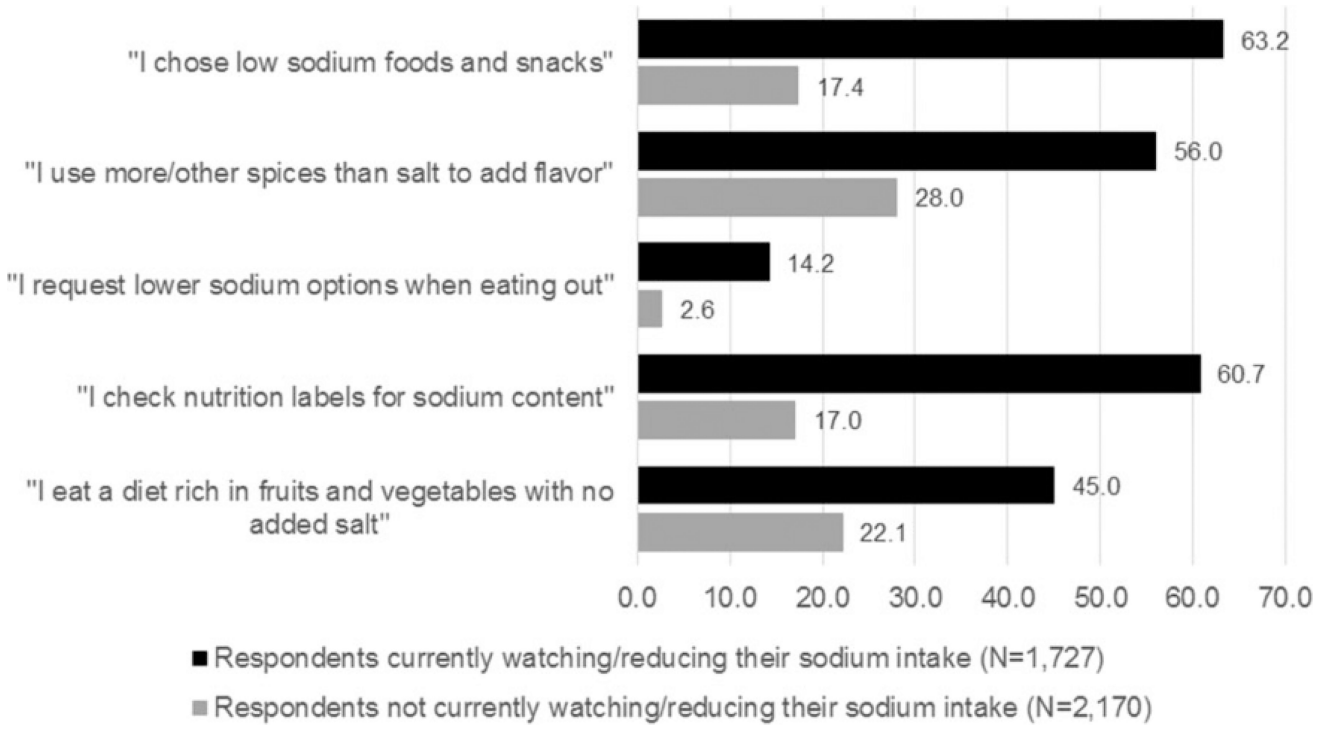

Figure 1.
Proportion of respondents using sodium reduction tactics by those taking or not taking action, SummerStyles 2015.

Table 1

Sociodemographic and Health Characteristics of Survey Respondents, SummerStyles 2012 and 2015.

	Year 2012, n = 3899		Year 2015, n = 3897		
Characteristics	**N**	**% (SE)**	**N**	**% (SE)**	***P* Value**
Sex					
Males	1827	49.3 (1.09)	1826	48.8 (0.94)	
Females	2072	50.7 (1.09)	2071	51.2 (0.94)	.76
Age, years					
18–34	823	31.2 (1.09)	781	29.8 (0.94)	
35–44	699	16.8 (0.80)	594	16.4 (0.72)	
45–64	1616	34.3 (1.00)	1705	34.9 (0.85)	
≥65	761	17.7 (0.78)	817	18.9 (0.68)	.61
Race/ethnicity					
Non-Hispanic white	2921	67.7 (1.10)	2924	66.1 (0.96)	
Non-Hispanic black	367	11.2 (0.75)	368	11.2 (0.62)	
Hispanic	390	14.0 (0.86)	416	15.0 (0.76)	
Other, non-Hispanic	127	5.6 (0.62)	125	6.4 (0.60)	
≥2 race/ethnicity, non-Hispanic	94	1.4 (0.19)	64	1.3 (0.19)	.72
Household income					
<US$25 000	623	18.6 (0.91)	700	18.1 (0.73)	
US$25 000–US$39 999	557	14.4 (0.77)	658	13.6 (0.59)	
US$40 000–US$59 999	675	17.1 (0.81)	695	16.7 (0.68)	
≥US$60 000	2044	50.0 (1.09)	1844	51.7 (0.94)	.67
Education					
Less than high school	245	12.6 (0.88)	267	11.8 (0.74)	
High school graduate	989	29.7 (1.02)	1164	29.8 (0.85)	
Some college	1258	29.3 (0.95)	1184	28.8 (0.84)	
College graduate or higher	1407	28.4 (0.93)	1282	29.6 (0.83)	.74
Region of residence					
Northeast	718	17.9 (0.82)	696	18.6 (0.74)	
Midwest	994	22.2 (0.87)	986	21.3 (0.72)	

Characteristics	Year 2012, n = 3899		Year 2015, n = 3897		P Value
	N	% (SE)	N	% (SE)	
South	1328	36.8 (1.06)	1364	36.8 (0.91)	
West	859	23.1 (0.95)	851	23.3 (0.82)	.81
Hypertension					
Yes	1081	26.8 (0.96)	1055	24.7 (0.77)	
No	2818	73.2 (0.96)	2842	75.3 (0.77)	.09
Body mass index					
Normal or underweight	1423	38.7 (1.07)	1325	37.0 (0.92)	
Overweight	1328	32.6 (1.02)	1314	32.0 (0.86)	
Obese	1148	28.8 (0.99)	1258	31.1 (0.87)	.19

Abbreviations: SE, standard error.

[a]For the purpose of this analysis, a $P < 0.05$ was considered statistically significant.

Table 2

Distribution of Responses to Knowledge, Attitude, and Behavior Related to Sodium Intake/Reduction by Survey Year.

Questions	Answers	2012 % (95% CI)	2015 % (95% CI)	*P* Value[a]
Knowledge				
Sodium from processed/restaurant foods	Agree	54.0 (51.9–56.1)	56.9 (55.1–58.8)	.04[b]
Attitudes				
Harmfulness of sodium	Very or somewhat harmful	72.8 (70.8–74.7)	72.0 (70.4–73.7)	.57
Want low-sodium diet	Agree	56.6 (54.4–58.7)	58.7 (56.9–60.5)	.13
Behaviors				
Health professional advice	Yes	22.4 (20.6–24.2)	18.0 (16.6–19.4)	.0002[b]
Action to reduce sodium	Yes	44.4 (42.2–46.5)	43.1 (41.3–44.9)	.39
Buy low-sodium labeled food	Agree	33.2 (31.2–35.2)	36.5 (34.7–38.2)	.016[b]
Tactic, choose low-sodium foods	Yes	33.1 (31.2–35.1)	37.2 (35.4–38.9)	.003[b]
Tactic, other spices	Yes	42.2 (40.1–44.3)	40.1 (38.3–41.9)	.13
Tactic, request low-sodium options	Yes	6.7 (5.7–7.8)	7.6 (6.6–8.7)	.25
Tactic, check nutrition labels	Yes	35.7 (33.7–37.7)	35.8 (34.1–37.6)	.91
Tactic, eat fruits/vegetables	Yes	31.6 (29.6–33.5)	31.9 (30.3–33.6)	.76

Abbreviation: CI, confidence interval.

[a] *P*-value for difference between 2012 and 2015.

[b] $P < .05$ considered statistically significant.

Table 3

Prevalence of Sodium Knowledge, Attitudes, and Behaviors by Hypertensive Status, SummerStyles 2012 and 2015.[a]

	Hypertensive			Nonhypertensive		
Questions	**2012**	**2015**	***P* Value**	**2012**	**2015**	***P* Value**
Knowledge						
Sodium from processed/restaurant foods	58.8	62.2	.21	52.2	55.2	.08
Attitudes						
Harmfulness of sodium	85.7	79.3	.0013[b]	68.1	69.7	.32
Want low-sodium diet	70.1	68.1	.42	51.6	55.7	.02[b]
Behaviors						
Health-professional advice	59.0	45.0	<.0001[b]	9.0	9.2	.89
Action reduce sodium	69.6	65.5	.11	35.1	35.8	.68
Buy low-sodium labeled food	43.8	45.8	.46	29.4	33.4	.008[b]
Tactic, choose low-sodium foods	42.9	44.7	.49	34.7	29.6	.001[b]
Tactic, other spices	53.5	47.4	.03[b]	38.1	37.7	.81
Tactic, request low-sodium options	9.0	11.4	.14	5.9	6.4	.59
Tactic, check nutrition labels	47.0	46.4	.85	31.6	32.4	.61
Tactic, eat fruits/vegetables	33.7	33.0	.78	30.8	31.6	.58

[a]The above percentages are those individuals who agreed with each of the above statements (Table 2 for responses).

[b]$P < .05$ considered statistically significant.