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Receiving Advice from a Health Professional and Action Taken to Reduce Dietary Sodium Intake among Adults

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Abstract

Objective: Population reductions in sodium intake could prevent hypertension, and current guidelines recommend that clinicians advise patients to reduce intake. This study aimed to estimate the prevalence of taking action and receiving advice from a health professional to reduce sodium intake in 10 US jurisdictions, including the first-ever data in New York state and Guam.

Design: weighted prevalence and 95% confidence intervals (CI) overall and by location, demographic group, health status, and receipt of provider advice using self-reported data from the 2017 Behavioral Risk Factor Surveillance System optional sodium module

Setting: seven states, the District of Columbia, Puerto Rico, and Guam

Participants: adults aged 18 years

Results: Overall, 53.6% (CI: 52.7, 54.5) of adults reported taking action to reduce sodium intake, including 54.8% (CI: 52.8, 56.7) in New York and 61.2% (CI: 57.6, 64.7) in Guam. Prevalence varied by demographic and health characteristics and was higher among adults who reported having hypertension (72.5%; CI: 71.2, 73.7) vs. those who did not report having hypertension (43.9%; CI: 42.7, 45.0). Among those who reported receiving sodium reduction advice from a health professional, 82.6% (CI: 81.3, 83.9) reported action vs. 44.4% (CI: 43.4, 45.5) among those who did not receive advice. However, only 24.0% (CI: 23.3, 24.7) of adults reported receiving advice from a health professional to reduce sodium intake.

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Ethical Standards Disclosure

This study was conducted according to the guidelines laid down in the Declaration of Helsinki. This is a secondary analysis of publicly available surveillance data, and human subjects review was not required.

Conflicts of Interest: The authors declare no conflict of interest.

Conclusions: The majority of adults report taking action to reduce sodium intake. Results highlight an opportunity to increase sodium reduction advice from health professionals during clinical visits to better align with existing guidelines.

Keywords

Adults; Behavioral Risk Factor Surveillance System; Diet; Epidemiology; Humans; Hypertension; Physician-Patient Relations; Prevalence; Sodium; United States

Introduction

In 2019, the National Academy of Medicine indicated that lowering dietary sodium intake for people who consume more than 2,300 mg/day could reduce blood pressure and cardiovascular disease risk.⁽¹⁾ However, mean intake in the United States (US) population exceeds this level.⁽²⁾ A 10-year graduated reduction in sodium in the US food supply to achieve a mean population intake of 2,300 mg/day could prevent 252,500 cardiovascular disease deaths and save \$37 billion in health care costs.⁽³⁾

Health care providers have an important role to play in educating and supporting patients to reduce dietary sodium intake.⁽⁴⁾ Current guidelines recommend that health care providers counsel their patients who have or are at risk for hypertension on lifestyle modification, including dietary sodium reduction, to reduce their cardiovascular disease risk.⁽⁵⁾ Although the extent to which receiving advice from a health care provider to reduce sodium intake results in reductions in actual sodium intake is unknown,⁽⁶⁾ receiving advice from a health care provider has been shown to be associated with increased likelihood of reporting taking action to reduce sodium intake,^(7, 8) improvements in dietary behaviors linked to cardiovascular disease risk (e.g., fruit and vegetable intake, dietary fiber intake, dietary fat intake),⁽⁶⁾ and reduced blood pressure.⁽⁶⁾ Documenting consumer action to reduce sodium intake and the prevalence of receiving advice from a health professional to reduce sodium intake can help inform the development and implementation of sodium reduction interventions. However, the prevalence of consumers who report receiving advice from a health professional to reduce sodium intake and the prevalence of trying to reduce sodium intake have not been estimated in all US states, territories, and jurisdictions.

The Behavioral Risk Factor Surveillance System (BRFSS) optional sodium module allows US states, territories and other jurisdictions to monitor receiving advice and taking action to reduce sodium intake. This analysis uses 2017 BRFSS data to update prevalence estimates in seven states, two territories, and the District of Columbia (DC), including the first-ever estimates in New York state and the US territory of Guam, which have implemented several initiatives to reduce dietary sodium intake.⁽⁹⁻¹¹⁾

Materials and Methods

The Behavioral Risk Factor Surveillance System is a cross-sectional state-based telephone survey among a representative sample of non-institutionalized adults aged 18 years (median response rates: 45.2% landlines, 44.3% cell phones). In 2017, Iowa, Maine, New York, North Carolina, Ohio, Oregon, West Virginia, DC, Guam, and Puerto Rico opted

to use the two-item sodium module, which assesses whether respondents are currently watching or reducing their sodium or salt intake or have received advice from a doctor or other health professional to reduce sodium or salt intake. All BRFSS respondents residing in these jurisdictions were asked the sodium module items. Among the 49,536 module participants, 85.3% were included in this analysis. Participants were excluded if they had missing data on module items (11.8%); hypertension status or medication use (0.3%); age, sex, or race or Hispanic ethnic group (1.2%); or comorbidities (1.8%). Excluded participants differed from included participants on all measured characteristics except for total number of comorbid conditions and were more likely to be male or younger and less likely to be in the Hispanic ethnic group or report having hypertension as compared to included participants.

We estimated the weighted prevalence of receiving advice from a healthcare professional and taking action to reduce sodium intake among adults overall and by jurisdiction, select demographic characteristics, hypertension status, and number of cardiovascular disease comorbidities linked to high blood pressure (i.e., diabetes, kidney disease, stroke, myocardial infarction, and coronary heart disease) using SAS-callable SUDAAN (version 11). We also estimated the prevalence of taking action to reduce sodium intake by receipt of advice from a health care professional among adults overall and by subgroup, as well as the prevalence difference (PD). Respondents were coded as having hypertension if they self-reported the condition; those who reported hypertension only during pregnancy, borderline hypertension, or no hypertension were classified as not having hypertension. All prevalence estimates were weighted to account for the complex sampling design and non-response, and Chi-square tests were used to assess the uniformity of the prevalence distribution within each subgroup using a type I error rate of 5%.

Results

Overall, 53.6% (95% CI: 52.7, 54.5) of respondents reported taking action to reduce sodium intake (Table 1). The prevalence ranged from 43.0% (95% CI: 41.1, 44.8) in Oregon to 69.6% (95% CI: 67.6, 71.5) in Puerto Rico and was 54.8% (95% CI: 52.8, 56.7) in New York and 61.2% (95% CI: 57.6, 64.7) in Guam. Overall, the prevalence was highest among adults with self-reported hypertension (72.5%; 95% CI: 71.2, 73.7), females (55.3%; 95% CI: 54.1, 56.5), adults aged ≥ 65 years (69.2%; 95% CI: 67.9, 70.6), non-Hispanic blacks (69.6%; 95% CI: 66.7, 72.4), and those with ≥ 2 comorbidities (80.5%; 95% CI: 77.7, 83.0). The prevalence was lowest among adults with no self-reported hypertension (43.9%; 95% CI: 42.7, 45.0), males (51.8%; 95% CI: 50.5, 53.1), adults aged 18–44 years (40.8%; 95% CI: 39.3, 42.3), non-Hispanic whites (48.6%, 95% CI: 47.5, 49.6), and those with no comorbidities (48.9%; 95% CI: 47.9, 49.9). Among adults with hypertension, the prevalence of taking action was higher among those who report taking medication (76.4%; 95% CI: 75.2, 77.6) as compared to those not taking medication (59.0%; 95% CI: 55.7, 62.2; $p < 0.0001$).

Overall, 24.0% (95% CI: 23.3, 24.7) of adults reported receiving advice from a health professional to reduce sodium intake (Table 1). The prevalence ranged from 14.9% (95% CI: 13.6, 16.3) in Iowa to 42.7% (95% CI: 40.8, 44.7) in Puerto Rico and was 21.5% (95% CI: 20.1, 23.0) in New York and 33.4% (95% CI: 30.1, 36.8) in Guam. Across all locations, the

prevalence was highest among adults with self-reported hypertension (51.6%; 95% CI: 50.2, 52.9), adults aged ≥ 65 years (37.5%; 95% CI: 36.1, 38.9), non-Hispanic blacks (34.0%; 95% CI: 31.3, 36.9), and those with ≥ 2 comorbidities (63%; 95% CI: 59.8, 66.1). The prevalence was lowest among adults with no self-reported hypertension (9.9%; 95% CI: 9.2, 10.4), adults aged 18–44 years (13.7%; 95% CI: 12.8, 14.8), non-Hispanic whites (20.1%; 95% CI: 19.4, 20.9), and those with no comorbidities (17.9%; 95% CI: 17.2, 18.6). Among adults with hypertension, the prevalence of receiving advice was higher among those who reported taking medication (55.7%; 95% CI: 54.2, 57.1) as compared to those not taking medication (37.5%; 95% CI: 34.4, 40.7; $p < 0.0001$).

Overall, the prevalence of taking action to reduce sodium intake was significantly higher among those who received advice from a health professional (82.6%; 95% CI: 81.3, 83.9) as compared to those who did not receive advice (44.4%; 95% CI: 43.4, 45.5; $p < 0.0001$; Table 2). This pattern of results was consistent across subgroups, though the magnitude of the difference in prevalence varied. The largest difference between the prevalence of taking action among adults who reported receiving advice compared to those who did not report receiving advice was among residents of the District of Columbia (PD: 52.5%), Ohio (PD: 48.4%), and Oregon (PD: 41.3%), and non-Hispanic Whites (PD: 40.7%). The smallest prevalence differences were among residents of Guam (PD: 18.9%), adults with hypertension who were not taking medication (PD: 23.7%), and adults with ≥ 2 comorbidities (PD: 25.0%).

Discussion

The majority of adults in seven US states, the District of Columbia, and two territories, and nearly three-quarters of adults with hypertension, reported taking action to reduce sodium intake. Consistent with prior results,^(7, 8, 12) the prevalence of taking action was highest among adults who reported receiving advice from a health professional to reduce sodium intake. However, only one-quarter of adults overall and one-half of adults with hypertension reported receiving such advice in 2017. These results highlight a potential missed opportunity for health professionals to provide sodium reduction advice during clinical visits, especially among adults with hypertension.

The American College of Cardiology/American Heart Association hypertension guidelines recommend that all adults with hypertension and those who are at risk of developing hypertension be counseled on lifestyle modification.⁽⁵⁾ However, this study and others have found that not all patients with hypertension recall receiving advice to reduce sodium intake,^(7, 8) nor do all health care providers report advising their patients with hypertension to reduce sodium intake.^(13, 14) Barriers that health care providers report prevent them from advising patients to reduce dietary sodium intake include perceptions that patients are unlikely to comply, lack of resources for patient education, and insufficient scientific evidence.^(13, 14) Epidemiologists, health promotion specialists, and public health and healthcare organizations can use data from the BRFSS optional sodium module along with the strong scientific evidence supporting scientific sodium reduction⁽¹⁾ to document the need to train health care professionals about the benefits of sodium reduction. Increasing understanding about the importance of sodium reduction can augment public health

strategies to reduce sodium in the food supply and support patients in lowering their intake, as recommended by the Institute of Medicine.⁽⁴⁾ The need for clinical counseling on dietary sodium reduction is likely to become increasingly important given that 52 million US adults have been newly classified as having elevated blood pressure or Stage I hypertension under the expanded blood pressure cutoffs used in the American College of Cardiology/American Heart Association hypertension guidelines released in 2017.^(5, 15)

According to a systematic review, although evidence suggests that receiving advice from a health care provider is associated with reductions in blood pressure and improvements in other dietary behaviors, evidence for the association between provider advice and reduced sodium intake is mixed.⁽⁶⁾ Reducing actual sodium intake may be difficult for even highly motivated consumers to achieve, given the ubiquity of added sodium in the US food supply.⁽¹⁶⁾ For this reason, reducing sodium added to the food supply and expanding access to lower-sodium food options are needed to assist consumers in lowering their sodium intake.^(4, 17) Public health professionals and food industry partners can use data from the BRFSS optional sodium module to demonstrate that the majority of adults report taking action to reduce sodium intake, demonstrating potential demand for policies, interventions, and products that facilitate sodium reduction efforts.

Multiple sodium reduction initiatives are currently being implemented throughout the US. For example, the Centers for Disease Control and Prevention and other federal partners support sodium reduction efforts through multiple initiatives, including the Sodium Reduction in Communities Program,⁽⁹⁾ the State Physical Activity and Nutrition Program,⁽¹⁸⁾ and the Million Hearts Initiative.⁽¹⁹⁾ Additionally, many jurisdictions that participated in the BRFSS optional sodium module have ongoing sodium reduction initiatives, including New York State and Guam, which participated in the module for the first time in 2017. New York has implemented food service guidelines and offered lower-sodium food options in corrections, education, and healthcare settings; conducted consumer sensory testing of lower-sodium products; and required chain restaurants with 15 or more locations nationwide to post warning icons next to menu items that contain 2,300 mg of sodium to assist consumers in lowering their intake.^(9, 10) In Guam, sodium reduction was included a component of the territorial noncommunicable disease strategic plan and the Department of Health launched an initiative in collaboration with the restaurant industry to remove salt shakers from tables at local restaurants.⁽¹¹⁾ Educating health care providers about current sodium reduction initiatives may increase uptake of these interventions among their patient populations.

A strength of this analysis is that it represents the first-ever prevalence estimates for New York and Guam. Limitations of this study include that responses are self-reported and median response rates of <50%, indicating possible recall, social desirability, or response biases. Additionally, self-reported action to reduce sodium intake may not necessarily equate to lower mean daily sodium intake.⁽²⁰⁾ Finally, results are limited to jurisdictions that opted to participate in the sodium module and may not generalize to the US adult population overall.

Conclusions

These results document that a majority of US adults in participating jurisdictions report taking action to reduce sodium intake and highlight an opportunity to increase sodium reduction advice during clinical visits to encourage all adults, and especially those with hypertension, to take action to reduce sodium intake to prevent and control cardiovascular disease.

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Table 1.

Prevalence of adults aged 18 years who reported taking action to reduce sodium intake or receiving advice from a doctor or health professional to reduce sodium intake overall and by subgroup – Behavioral Risk Factor Surveillance System, seven states, the District of Columbia, Puerto Rico, and Guam, 2017

	Taking action to reduce sodium intake			Receiving advice from a health professional to reduce sodium intake		
	n	% (95% CI)	p	n	% (95% CI)	p
Total	24,583	53.6 (52.7, 54.5)		12,055	24.0 (23.3, 24.7)	
Jurisdiction			<0.0001			<0.0001
Iowa	1,522	44.1 (42.1, 46.1)		553	14.9 (13.6, 16.3)	
Maine	3,031	52.4 (50.3, 54.5)		1,180	20.2 (18.7, 21.9)	
New York	2,751	54.8 (52.8, 56.7)		1,173	21.5 (20.1, 23.0)	
North Carolina	2,266	56.5 (54.4, 58.7)		997	24.5 (22.7, 26.3)	
Ohio	4,068	51.0 (49.2, 52.8)		2,305	26.8 (25.4, 28.3)	
Oregon	1,875	43.0 (41.1, 44.8)		665	15.1 (13.9, 16.4)	
West Virginia	2,647	49.3 (47.6, 51.1)		1,315	23.4 (22.1, 24.8)	
District of Columbia	2,310	49.4 (47.3, 51.6)		1,439	27.7 (26.0, 29.5)	
Guam	837	61.2 (57.6, 64.7)		445	33.4 (30.1, 36.8)	
Puerto Rico	3,276	69.6 (67.6, 71.5)		1,983	42.7 (40.8, 44.7)	
Sex			0.0001			0.96
Female	14,581	55.3 (54.1, 56.5)		6,887	24.0 (23.1, 25.0)	
Male	10,002	51.8 (50.5, 53.1)		5,168	24.0 (23.0, 25.0)	
Age (years)			<0.0001			<0.0001
18–44	4,867	40.8 (39.3, 42.3)		1,799	13.7 (12.8, 14.8)	
45–64	9,591	60.0 (58.7, 61.4)		4,738	28.5 (27.3, 29.8)	
65+	10,125	69.2 (67.9, 70.6)		5,518	37.5 (36.1, 38.9)	
Race and Hispanic ethnic group			<0.0001			<0.0001
Black, non-Hispanic	3,048	69.6 (66.7, 72.4)		1,850	34.0 (31.3, 36.9)	
Hispanic	4,238	64.2 (62.1, 66.2)		2,431	33.9 (32.0, 35.8)	
White, non-Hispanic	15,688	48.6 (47.5, 49.6)		6,963	20.1 (19.4, 20.9)	
Other, non-Hispanic	1,609	50.7 (46.5, 54.9)		811	21.8 (18.7, 25.3)	
Hypertension Status			<0.0001			<0.0001
Hypertension	13,217	72.5 (71.2, 73.7)		9,282	51.6 (50.2, 52.9)	
Taking medication	11,377	76.4 (75.2, 77.6)	<0.0001	8,178	55.7 (54.2, 57.1)	<0.0001
Not taking medication	1,840	59.0 (55.7, 62.2)		1,104	37.5 (34.4, 40.7)	
No hypertension	11,366	43.9 (42.7, 45.0)		2,773	9.8 (9.2, 10.4)	
Number of comorbidities ^a			<0.0001			<0.0001
0	17,049	48.9 (47.9, 49.9)		6,769	17.9 (17.2, 18.6)	
1	5,048	70.5 (68.5, 72.4)		3,270	44.4 (42.3, 46.5)	

	Taking action to reduce sodium intake			Receiving advice from a health professional to reduce sodium intake		
	n	% (95% CI)	<i>p</i>	n	% (95% CI)	<i>p</i>
Total	24,583	53.6 (52.7, 54.5)		12,055	24.0 (23.3, 24.7)	
2	2,486	80.5 (77.7, 83.0)		2,016	63.0 (59.8, 66.1)	

Note. This table reports the unweighted number of respondents and weighted prevalence and 95% confidence interval, which accounts for the complex sampling design. Wald Chi-Square tests were used to generate *p*-values testing the uniformity of the prevalence distributions for within each subgroup.

^a – diabetes, kidney disease, stroke, myocardial infarction, coronary heart disease

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Prevalence of adults aged 18 years who reported taking action to reduce sodium intake by receipt of advice from a doctor or health professional to reduce sodium intake – Behavioral Risk Factor Surveillance System, seven states, the District of Columbia, Puerto Rico, and Guam, 2017

Table 2.

	Taking action to reduce sodium intake			n	% (95% CI)	Did not receive advice from a health professional to reduce sodium intake	n	% (95% CI)	Prevalence Difference	p
	Received advice from a health professional to reduce sodium intake	Did not receive advice from a health professional to reduce sodium intake	% (95% CI)							
Total	10,222	82.6 (81.3, 83.9)	14,361	44.4 (43.4, 45.5)	38.2	<.0001				
Jurisdiction										
Iowa	453	79.9 (75.5, 83.7)	1,069	37.8 (35.7, 40.0)	42.1	<.0001				
Maine	1,006	84.1 (80.5, 87.1)	2,025	44.4 (42.0, 46.7)	39.7	<.0001				
New York	974	81.0 (77.8, 83.8)	1,777	47.6 (45.4, 49.8)	33.4	<.0001				
North Carolina	834	81.6 (77.9, 84.8)	1,432	48.4 (45.9, 50.9)	33.2	<.0001				
Ohio	2,025	86.4 (84.0, 88.5)	2,043	38.0 (36.1, 40.1)	48.4	<.0001				
Oregon	524	78.0 (74.1, 81.4)	1,351	36.7 (34.8, 38.7)	41.3	<.0001				
West Virginia	1,032	76.1 (73.1, 78.8)	1,615	41.2 (39.2, 43.2)	34.9	<.0001				
District of Columbia	1,301	87.4 (84.5, 89.7)	1,009	34.9 (32.5, 37.3)	52.5	<.0001				
Guam	340	73.8 (67.9, 79.0)	497	54.9 (50.5, 59.2)	18.9	<.0001				
Puerto Rico	1,733	84.3 (82.0, 86.4)	1,543	58.6 (55.8, 61.4)	25.7	<.0001				
Sex										
Female	5,940	84.6 (82.8, 86.2)	8,641	46.0 (44.6, 47.4)	38.6	<.0001				
Male	4,282	80.5 (78.5, 82.4)	5,720	42.7 (41.2, 44.3)	37.8	<.0001				
Age (years)										
18–44	1,322	72.2 (68.6, 75.6)	3,545	35.7 (34.2, 37.4)	36.5	<.0001				
45–64	4,038	85.3 (83.4, 87.0)	5,553	50.0 (48.4, 51.6)	35.3	<.0001				
65+	4,862	87.1 (85.4, 88.6)	5,263	58.6 (56.7, 60.4)	28.5	<.0001				
Race and Hispanic ethnic group										
Black, non-Hispanic	1,673	88.1 (84.7, 90.9)	1,375	60.1 (56.2, 63.8)	28.0	<.0001				
Hispanic	2,096	83.1 (80.5, 85.4)	2,142	54.5 (51.8, 57.2)	28.6	<.0001				
White, non-Hispanic	5,810	81.1 (79.3, 82.7)	9,878	40.4 (39.2, 41.5)	40.7	<.0001				

	Taking action to reduce sodium intake		Did not receive advice from a health professional to reduce sodium intake		Prevalence Difference	P
	Received advice from a health professional to reduce sodium intake	% (95% CI)	n	% (95% CI)		
Total	10,222	82.6 (81.3, 83.9)	14,361	44.4 (43.4, 45.5)	38.2	<.0001
Other, non-Hispanic	643	80.0 (72.8, 85.7)	966	42.5 (37.8, 47.4)	37.5	<.0001
Hypertension status						
Hypertension	8,082	85.5 (84.1, 86.8)	5,135	58.6 (56.6, 60.5)	26.9	<.0001
Taking medication	7,201	86.9 (85.5, 88.2)	4,176	63.2 (61.1, 65.2)	23.7	<.0001
Not taking medication	881	78.2 (73.5, 82.3)	959	47.4 (43.3, 51.5)	30.8	<.0001
No Hypertension	2,140	74.8 (71.7, 77.7)	9,226	40.5 (39.3, 41.7)	34.3	<.0001
Number of comorbidities^a						
0	5,571	79.2 (77.4, 81.0)	11,478	42.3 (41.2, 43.4)	36.9	<.0001
1	2,850	86.6 (84.4, 88.5)	2,198	57.7 (54.8, 60.5)	28.9	<.0001
2	1,801	89.7 (87.2, 91.8)	685	64.7 (59.1, 69.9)	25.0	<.0001

Note. This table reports the unweighted number of respondents and weighted prevalence and 95% confidence interval, which accounts for the complex sampling design.

Abbreviations. DC, District of Columbia; HTN, hypertension; NH, non-Hispanic.

^a – diabetes, kidney disease, stroke, myocardial infarction, coronary heart disease