

Dietary Sodium Intake and Sodium Density in the United States: Estimates From NHANES 2005–2006 and 2015–2016

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BACKGROUND

In the United States, current guidelines recommend a total sodium intake <2,300 mg/day, a guideline which does not consider kilocalorie intake. However, kilocalorie intake varies substantially by age and sex. We hypothesized that compared with sodium density, total sodium intake overestimates adherence to sodium recommendations, especially in adults consuming fewer kilocalories.

METHODS

In the National Health and Nutrition Examination Survey (NHANES), we estimated the prevalence of adherence to sodium intake recommendations (<2,300 mg/day) and corresponding sodium density intake (<1.1 mg/kcal = 2,300 mg at 2,100 kcal) by sex, age, race/ethnicity, and kilocalorie level. Adherence estimates were compared between the 2005–2006 ($n = 5,060$) and 2015–2016 ($n = 5,266$) survey periods.

RESULTS

In 2005–2006, 23.1% (95% confidence interval [CI]: 21.5, 24.9) of the US population consumed <2,300 mg of sodium/day, but only 8.5%

(CI: 7.6, 9.4) consumed <1.1 mg/kcal in sodium density. In 2015–2016, these figures were 20.9% (CI: 18.8, 23.2) and 5.1% (CI: 4.4, 6.0), respectively. In 2015–2016, compared with 2005–2006, adherence by sodium density decreased more substantially (odds ratio = 0.59; CI: 0.48, 0.72; $P < 0.001$) than adherence by total sodium consumption (odds ratio = 0.85; CI: 0.73, 0.98; $P = 0.03$). The difference in adherence between total sodium and sodium density goals was greater among those with lower kilocalorie intake, namely, older adults, women, and Hispanic adults.

CONCLUSIONS

Adherence estimated by sodium density is substantially less than adherence estimated by total sodium intake, especially among persons with lower kilocalorie intake. Further efforts to achieve population-wide reduction in sodium density intake are urgently needed.

Keywords: blood pressure; health disparities; hypertension; NHANES; sodium consumption; sodium density

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Reduction of dietary sodium lowers blood pressure^{1,2} and is an important strategy for cardiovascular risk prevention.³ The Dietary Guidelines for Americans 2015–2020 recommends that adults in the United States limit sodium intake to <2,300 mg a day,⁴ an initiative that has encountered resistance.⁵ However, the evidence for this target was based on trials of sodium density, i.e., sodium intake/kcal consumed,⁶ including the DASH-Sodium trial. Sodium density is a more direct measure of food quality,⁷ accounts for variation in kilocalorie consumption, and is more strongly associated with blood pressure than total intake.⁸

To date, the proportion of adults consuming a sodium density that corresponds to recommendations for absolute intake has not been reported. In this Brief Communication, we (i) determine the proportion of adults with recommended sodium intake based on total intake and by sodium density across demographic groups, and (ii) compare trends over ~10 years. We hypothesized that among adults in the United States, adherence to density-based recommendations would be lower than adherence to recommendations based on total sodium intake, especially in adults consuming fewer kilocalories.

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METHODS

We examined the National Health and Nutrition Examination Survey (NHANES), a nationally representative survey of health and nutritional status in the United States, in 2 survey periods: 2005–2006 and 2015–2016. NHANES includes a face-to-face visit with two 24-hour dietary recalls performed 3–10 days apart by telephone. The 24-hour recall queries all foods/beverages consumed from midnight-to-midnight on the day before the interview.⁹ Nutrient data were obtained from the USDA's Food and Nutrient Database for Dietary Studies.¹⁰

Mean intake of sodium (mg/day) and kilocalories (kcal/day) was estimated as an average of participants' 2 dietary recalls in each survey period. Sodium density was calculated as the milligrams of sodium per 1,000 kilocalories consumed. Sodium adherence, by absolute intake, was defined as sodium consumption <2,300 mg/day based on the 2015–2020 Dietary Guidelines for Americans⁴ and subsequently confirmed by the American Heart Association/American College of Cardiology.¹¹ Sodium adherence by sodium density was defined as <1.1 mg/kcal, which corresponds to 2,300 mg among persons who consume 2,100 kcal, and was the density targeted for the medium sodium level in the DASH-Sodium trial; the sodium density of 1.1 mg/kcal was identical across the 5 kilocalorie levels used in that trial.^{6,12} It should be noted that while the sodium density of 1.1 mg/kcal was effective in the DASH-Sodium trial, it has not necessarily been established as *the* “ideal” sodium density for blood pressure reduction, although this density does correspond to the 2,300 mg used in guidelines at an average level of US consumption (2,100 kcal).⁴ The race/ethnicity categories available in NHANES were Mexican-American, Other Hispanic, Non-Hispanic (NH) White, Non-Hispanic Black, Non-Hispanic Asian, and Other (including multiple categories). In NHANES, the term “Other Hispanic” refers to the Hispanic subpopulation that does not identify as Mexican-American.

Sodium density was calculated as the ratio of self-reported sodium intake divided by self-reported kilocalorie intake. After excluding persons aged ≤17 years ($n = 8,764$) and adults who did not complete at least 1 dietary recall ($n = 1,229$), there were 5,266 participants for analysis in 2015–2016 and 5,060 participants for analysis in 2005–2006. Of these, 8,934 provided both dietary recalls, while 1,932 provided only the first dietary recall.

First, we reported the prevalence of individuals exceeding the recommended thresholds in the total US population in 2005–2006 and 2015–2016. The prevalence was further enumerated by self-reported sex, age group (by decade), self-reported race/ethnicity, and kilocalorie consumption (<2,100 or ≥2,100 kcal/day), based on dietary recalls. Second, we compared adherence prevalence estimates between 2005–2006 and 2015–2016 survey periods, using logistic regression adjusted for sex, age, and race/ethnicity. All analyses were performed in accordance with the NHANES complex sampling design, employing the sample weights, primary sampling units, and strata that accompanied each survey via the Taylor series (linearization) method. All analyses were age-adjusted according to the 2000 Census

population. All analyses were performed in Stata 15.1. A $P < 0.05$ was considered significant.

RESULTS

In 2005–2006, mean intake of the US population was 3,480 mg/day (95% confidence interval [CI]: 3,409, 3,550) of sodium, 2,150 kcal/day (CI: 2,108, 2,193) of kilocalories, and 1.65 mg/kcal (CI: 1.62, 1.68) of sodium density. In 2005–2006, 23.1% (CI: 21.5, 24.9) of US adults consumed <2,300 mg/day of sodium, and only 8.5% (CI: 7.6, 9.4) consumed the corresponding sodium density recommendation of 1.1 mg/kcal (Table 1). In 2015–2016, mean intake of the US population was 3,514 mg/day (CI: 3,431, 3,597) of sodium, 2,084 kcal/day (CI: 2,037, 2,130) of kilocalories, and 1.71 mg/kcal (CI: 1.68, 1.74) of sodium density. In 2015–2016, 20.9% (CI: 18.8, 23.2) of US adults consumed <2,300 mg/day of sodium, and only 5.1% (CI: 4.4, 6.0) consumed the corresponding sodium density recommendation of 1.1 mg/kcal sodium density (Table 2).

Trends in adherence to recommended sodium intake between 2005–2006 and 2015–2016 differed by whether the adherence metric was absolute sodium intake or sodium density (Supplemental Figure S1 online). There was a decrease in adherence by total sodium consumption (odds ratio: 0.85, CI: 0.73–0.98, $P = 0.03$) in 2015–2016 compared with 2005–2006. Similarly, there was a relative decrease in adherence by sodium density from 2005–2006 to 2015–2016 (odds ratio: 0.59, CI: 0.48–0.72, $P < 0.001$).

In subgroup analyses using NHANES data from 2015 to 2016, women had considerably lower mean sodium intake than men (2,995 mg/day [CI: 2,923, 3,067] vs. 4,061 mg/day [CI: 3,938, 4,186]), but also consumed fewer kilocalories than men (1,779 mg/day [CI: 1,744, 1,814] vs. 2,405 mg/day [CI: 2,339, 2,472]); hence, sodium density was similar in women and men (1.71 mg/kcal [CI: 1.68, 1.74] vs. 1.72 mg/kcal [CI: 1.68, 1.76]). However, based on absolute sodium intake, 29.7% (CI: 26.5, 33.0) of women and 11.5% (CI: 9.6, 13.7) of men met the sodium intake recommendation of <2,100 mg/day. In contrast, only 4.9% (CI: 3.9, 6.3) of women and 5.4% (CI: 4.5, 6.5) of men had a corresponding sodium density of <1.1 mg/kcal.

Across age groups, adults aged ≥80 years had the lowest mean sodium intake (2,685 mg/day [CI: 2,552, 2,818]) and the lowest mean kilocalorie intake (1,740 kcal/day [CI: 1,663, 1,816]), whereas adults aged 30–39 years had the highest mean sodium intake (3,811 mg/day [CI: 3,614, 4,007]) and the highest mean kilocalorie intake (2,216 kcal/day [CI: 2,124, 2,309]). This corresponded to a sodium density of 1.57 mg/kcal (CI: 1.51, 1.62) and 1.75 mg/kcal (CI: 1.69, 1.80) in 80+ year olds and 30–39 year olds, respectively. Thirty-seven percent (CI: 30.4, 44.9) of adults aged ≥80 years and 16.5% (CI: 12.2, 22.1) of adults aged 30–39 years adhered to the recommended total sodium intake. In contrast, only 7.9% (CI: 4.7, 13.1) of adults aged ≥80 years and 4.7% (CI: 3.0, 7.2) of adults aged 30–39 years had the corresponding sodium density of <1.1 mg/kcal.

Among race/ethnic groups, sodium intake was lowest in the non-Mexican Hispanic population, at 3,171 mg/

Table 1. Age-standardized weighted mean (95% CI) consumed sodium, kilocalories, and sodium density in the US population in 2005–2006 in NHANES, with prevalence of the population adhering to a recommended sodium intake of <2,300 mg/day and a recommended sodium density of <1.1 mg/kcal (or 2,300 mg/2,100 kcal)^a

	Unweighted, N	Sodium, mg/day	Calories, kcal/day	Sodium density, mg/kcal	% with sodium <2,300 mg/day	% with sodium density <1.1 mg/kcal
Overall	5,060	3,479.3 (3,408.9, 3,549.6)	2,150.1 (2,107.7, 2,192.5)	1.65 (1.62, 1.68)	23.1 (21.5, 24.9)	8.5 (7.6, 9.4)
Age, years						
18–29	1,510	3,676.3 (3,502.5, 3,850.0)	2,329.3 (2,239.1, 2,419.5)	1.60 (1.56, 1.64)	21.2 (17.1, 25.9)	8.7 (6.6, 11.2)
30–39	777	3,859.5 (3,659.8, 4,059.3)	2,362.7 (2,254.0, 2,471.4)	1.66 (1.60, 1.73)	18.9 (15.6, 22.8)	7.7 (5.4, 10.9)
40–49	772	3,590.6 (3,404.4, 3,776.8)	2,189.7 (2,118.1, 2,261.3)	1.68 (1.62, 1.74)	18.2 (14.8, 22.3)	9.1 (6.7, 12.1)
50–59	604	3,393.9 (3,267.5, 3,520.2)	2,109.2 (2,037.9, 2,180.5)	1.64 (1.60, 1.68)	22.0 (17.9, 26.8)	7.5 (5.4, 10.3)
60–69	635	3,131.2 (2,963.3, 3,299.2)	1,868.6 (1,774.6, 1,962.6)	1.72 (1.65, 1.78)	29.8 (23.9, 36.5)	8.9 (6.1, 12.9)
70–79	451	2,782.7 (2,694.8, 2,870.6)	1,737.9 (1,676.5, 1,799.2)	1.62 (1.56, 1.69)	35.7 (30.7, 41.1)	8.9 (6.5, 12.2)
80 and greater	311	2,563.0 (2,450.0, 2,675.9)	1,618.2 (1,548.9, 1,687.6)	1.62 (1.56, 1.67)	41.0 (35.4, 46.9)	9.3 (6.7, 12.9)
Sex						
Men	2,425	4,066.2 (3,958.0, 4,174.4)	2,547.2 (2,488.7, 2,605.8)	1.62 (1.59, 1.65)	13.2 (11.5, 15.1)	9.6 (8.2, 11.2)
Women	2,635	2,921.3 (2,865.3, 2,977.3)	1,772.2 (1,740.5, 1,804.0)	1.68 (1.65, 1.71)	32.2 (29.9, 34.6)	7.4 (6.5, 8.5)
Race/ethnicity						
Mexican-American	1,074	3,063.4 (2,928.4, 3,198.4)	2,066.6 (1,996.7, 2,136.6)	1.50 (1.46, 1.55)	32.4 (29.1, 35.9)	17.3 (14.6, 20.4)
Other Hispanic ^b	158	3,072.2 (2,858.2, 3,286.1)	1,872.2 (1,744.7, 1,999.7)	1.67 (1.55, 1.79)	30.5 (23.2, 39.0)	9.1 (6.1, 13.5)
Non-Hispanic White	2,404	3,579.7 (3,500.8, 3,658.6)	2,202.3 (2,159.5, 2,245.2)	1.66 (1.63, 1.69)	20.9 (19.0, 22.9)	7.4 (6.0, 9.1)
Non-Hispanic Black	1,214	3,262.0 (3,162.4, 3,361.6)	2,055.7 (1,987.8, 2,123.6)	1.60 (1.57, 1.63)	29.5 (26.8, 32.4)	9.1 (7.4, 11.2)
Non-Hispanic Asian ^c	Not available	Not available	Not available	Not available	Not available	Not available
Other race/ethnicity—including multiple	210	3,438.5 (3,196.3, 3,680.7)	1,901.4 (1,786.7, 2,016.1)	1.85 (1.73, 1.96)	27.9 (21.9, 35.0)	6.4 (3.4, 11.9)
Kilocalorie intake						
≥2,100 (higher)	2,225	4,473.5 (4,391.3, 4,555.8)	2,850.8 (2,819.0, 2,882.5)	1.58 (1.56, 1.60)	3.1 (2.5, 3.9)	9.5 (7.8, 11.4)
<2,100 (lower)	2,835	2,581.8 (2,521.5, 2,642.1)	1,527.6 (1,501.4, 1,553.8)	1.71 (1.67, 1.75)	39.9 (37.5, 42.4)	8.0 (7.1, 9.0)

Abbreviations: CI, confidence interval; NHANES, National Health and Nutrition Examination Survey.

^aData are presented as mean (95% CI) or proportion (95% CI).

^bVariance could not be estimated due to few numbers across strata, so variance was estimated using the average of the variances from the strata with multiple sampling units for each stratum with 1 sampling unit.

^cNon-Hispanic Asian was not assessed by NHANES in 2005–2006.

Table 2. Age-standardized weighted mean (95% CI) consumed sodium, kilocalories, and sodium density in the US population in 2015–2016 in NHANES, with prevalence of the population adhering to a recommended sodium intake of <2,300 mg/day and a recommended sodium density of <1.1 mg/kcal (or 2,300 mg/2,100 kcal)^a

	Unweighted, N	Sodium, mg/day	Calories, kcal/day	Sodium density, mg/kcal	% with sodium <2,300 mg/day	% with sodium density <1.1 mg/kcal
Overall	5,266	3,514.2 (3,431.2, 3,597.2)	2,083.5 (2,036.9, 2,130.2)	1.71 (1.68, 1.74)	20.9 (18.8, 23.2)	5.1 (4.4, 6.0)
Age, years						
18–29	1,083	3,666.1 (3,492.0, 3,840.2)	2,153.7 (2,063.5, 2,243.9)	1.73 (1.68, 1.77)	18.7 (16.4, 21.3)	4.6 (2.9, 7.3)
30–39	853	3,810.5 (3,614.0, 4,006.9)	2,216.4 (2,123.9, 2,308.8)	1.75 (1.69, 1.80)	16.5 (12.2, 22.1)	4.7 (3.0, 7.2)
40–49	830	3,534.2 (3,433.9, 3,634.6)	2,115.2 (2,043.7, 2,186.7)	1.70 (1.67, 1.73)	18.4 (14.6, 22.9)	4.7 (3.1, 7.2)
50–59	816	3,495.6 (3,397.5, 3,593.8)	2,089.3 (2,015.2, 2,163.3)	1.71 (1.66, 1.75)	21.9 (18.2, 26.2)	6.3 (4.0, 9.9)
60–69	852	3,315.3 (3,163.9, 3,466.7)	1,976.2 (1,911.5, 2,041.0)	1.72 (1.64, 1.79)	22.6 (18.4, 27.5)	6.1 (3.8, 9.7)
70–79	522	3,035.7 (2,873.8, 3,197.6)	1,784.3 (1,717.1, 1,851.4)	1.72 (1.66, 1.79)	31.3 (24.3, 39.2)	3.8 (2.1, 6.9)
80 and greater	310	2,685.2 (2,552.1, 2,818.3)	1,739.6 (1,663.1, 1,816.0)	1.57 (1.51, 1.62)	37.4 (30.4, 44.9)	7.9 (4.7, 13.1)
Sex						
Men	2,543	4,061.8 (3,937.5, 4,186.1)	2,405.2 (2,338.7, 2,471.6)	1.72 (1.68, 1.76)	11.5 (9.6, 13.7)	5.4 (4.5, 6.5)
Women	2,723	2,995.2 (2,922.9, 3,067.4)	1,778.7 (1,743.5, 1,814.0)	1.71 (1.68, 1.74)	29.7 (26.5, 33.0)	4.9 (3.9, 6.3)
Race/ethnicity						
Mexican-American ^b	939	3,617.3 (3,486.5, 3,748.2)	2,138.7 (2,066.8, 2,210.6)	1.70 (1.66, 1.75)	20.9 (18.9, 23.2)	5.3 (3.9, 7.2)
Other Hispanic ^b	694	3,170.5 (3,059.6, 3,281.4)	1,957.8 (1,885.0, 2,030.6)	1.63 (1.60, 1.66)	31.5 (27.6, 35.7)	7.7 (5.7, 10.4)
Non-Hispanic White	1,757	3,554.0 (3,442.5, 3,665.4)	2,121.3 (2,066.1, 2,176.6)	1.70 (1.67, 1.74)	19.2 (16.4, 22.4)	4.9 (3.8, 6.4)
Non-Hispanic Black ^b	1,125	3,244.2 (3,100.1, 3,388.3)	1,952.7 (1,864.9, 2,040.5)	1.68 (1.65, 1.71)	27.2 (23.7, 30.9)	6.2 (4.7, 8.3)
Non-Hispanic Asian	551	3,736.5 (3,501.8, 3,971.3)	1,869.5 (1,817.1, 1,922.0)	2.07 (1.92, 2.22)	18.2 (14.3, 22.8)	3.1 (1.9, 4.9)
Other race/ethnicity—including multiple	200	3,651.7 (3,285.3, 4,018.1)	2,140.4 (1,912.7, 2,368.1)	1.75 (1.67, 1.82)	17.7 (10.5, 28.3)	4.5 (2.1, 9.4)
Kilocalorie intake						
≥2,100 (higher)	2,047	4,545.2 (4,431.8, 4,658.5)	2,786.0 (2,736.7, 2,835.3)	1.64 (1.61, 1.67)	2.0 (1.4, 2.8)	5.9 (4.7, 7.4)
<2,100 (lower)	3,219	2,714.6 (2,653.9, 2,775.4)	1,538.6 (1,510.4, 1,566.9)	1.77 (1.74, 1.81)	34.7 (31.6, 37.9)	4.5 (3.5, 5.7)

Abbreviations: CI, confidence interval; NHANES, National Health and Nutrition Examination Survey.

^aData are presented as mean (95% CI) or proportion (95% CI).

^bVariance could not be estimated due to few numbers across strata, so variance was estimated using the average of the variances from the strata with multiple sampling units for each stratum with 1 sampling unit.

day (CI: 3,060, 3,281) and highest in the NH Asian population, at 3,737 mg/day (CI: 3,502, 3,971). Meanwhile, their kilocalorie intakes were similar. As a result, sodium density intake was 1.63 mg/kcal (CI: 1.60, 1.66) in non-Mexican Hispanics and 2.07 mg/kcal (CI: 1.92, 2.22) in NH Asians. Adherence to the recommended sodium intake was 31.5% (CI: 27.6, 35.7) in non-Mexican Hispanics and at 18.2% (CI: 14.3, 22.8) in NH Asians. In contrast, only 7.7% (CI: 5.7, 10.4) of non-Mexican Hispanics and 3.1% (CI: 1.9, 4.9) of NH Asians had a sodium density <1.1 mg of sodium/kcal.

Adults with a caloric intake <2,100 kcal/day had a mean sodium intake of 2,715 mg/day (CI: 2,654, 2,775), compared with 4,565 mg/day (CI: 4,432, 4,656) among individuals with caloric intake ≥2,100 kcal/day. However, sodium density was nearly equal, at 1.77 mg/kcal (CI: 1.74, 1.81) and 1.64 mg/kcal (CI: 1.61, 1.67), respectively. Thus, although 34.7% (CI: 31.6, 37.9) of lower-calorie diet consumers adhered to the recommended sodium intake compared with 2.0% (CI: 1.4, 2.8) of higher-calorie diet consumers, the prevalence of adherence to the recommended sodium density was nearly identical, at 5.9% (CI: 4.7, 7.4) and 4.5% (CI: 3.5, 5.7), respectively.

DISCUSSION

In this analysis, we found important differences in the proportion of US adults estimated to meet sodium intake recommendations, after accounting for underlying kilocalorie consumption. In 2015–2016, while ~20% of US adults consumed <2,300 mg of sodium per day, <6% of US adults consumed a sodium density of <1.1 mg of sodium/kcal (i.e., a sodium intake of 2,300 mg of sodium at 2,100 kcal of kilocalorie intake). Trends in adhering to sodium recommendations were worse when accounting for kilocalorie intake vs. simply examining total sodium. Estimates of adherence based on total absolute sodium intake compared with sodium density were especially discordant in groups consuming fewer kilocalories.

Previous studies have focused on low adherence to recommended sodium intakes, with minimal improvement over the past 2 decades.^{13–15} However, kilocalorie intake is the strongest predictor of sodium consumption¹³ and sodium *density* is a stronger predictor of blood pressure⁸ than sodium intake, underscoring the need for prevalence studies of sodium density. In our present study, we found that total sodium not only overestimates sodium adherence, but also misses worsening trends in sodium consumption over time.

Our study illustrates how sodium intake recommendations based on absolute intake might lead to an inaccurate impression of higher adherence, especially in older adults, women, and Other Hispanic adults who, on average, consume fewer kilocalories than younger adults, men, and other race/ethnic groups, respectively. Greater proportions of these populations have a total sodium consumption that meets the recommendation to consume <2,300 mg/day. However, these demographic groups consume an excessively sodium-dense diet, which is strongly

associated with higher blood pressure.⁸ For example, older adults, who are at the highest risk of cardiovascular events,¹⁶ are at risk of being falsely reassured of their sodium intake. Similarly, the discrepancy in perceived adherence among women is concerning as cardiovascular disease is already under-recognized and under-treated in women.¹⁷ Similarly, both Other Hispanic and NH Black groups have higher proportions of adults adherent to total sodium recommendations that is, in fact, substantially lower after accounting for kilocalorie consumption. In contrast, NH Asians, a subgroup which has the highest sodium intake of all NHANES race/ethnic groups, also has the lowest kilocalorie consumption, resulting in a high sodium density, as previously reported.¹⁸

This analysis has several limitations. Dietary data are subject to recall bias. Under- and over-reporting of kilocalories may differ by sex, which could not be assessed. Data collection is subject to response bias, as not all participants responded, although we used weights specific for the dietary component of NHANES. Sodium from alternative sources such as antacids was not included, thus potentially underestimating the sodium intake. Our analysis does not focus on other micronutrients important for blood pressure (e.g., potassium), which should be the focus of further research. While sodium added to foods during processing accounts for 71% of dietary salt intake,¹⁹ whether consumption of processed foods has increased between 2005–2006 and 2015–2016 is beyond the scope of this report. The NHANES population, while broad, does not include individuals in nursing homes, correctional facilities, or the military. These data are cross-sectional and cannot be used to make causal inferences. Trends in sodium intake were significant on the relative scale. However, the absolute difference in prevalence was only 3%, whether the recommendation was examined based on total sodium consumption or density. While 3% may be a sizable proportion of the US population, more concerning is the lack of progress in healthy sodium consumption over the past decade. Dietary recommendations are especially complex in overweight or obese adults, where Calorie reduction may be a more important focus. Nevertheless, our study aims to highlight the importance of sodium per kilocalorie consumed, which is directly relevant to blood pressure control.

On the other hand, our study has several strengths. NHANES enrolled a large, highly generalizable study population, representing the main demographic constituents of the United States. Data assessments were comprehensive, including questionnaires, physical exams, and laboratory measures. Furthermore, the study was executed with standardized, high-quality measures in a manner that can be readily replicated by others.

In conclusion, dietary recommendations based on total absolute sodium overestimate adherence and could falsely reassure older adults, women, and Hispanic adults about their dietary sodium intake. Future dietary guidelines should consider sodium recommendations based on sodium density rather than total absolute sodium intake. Further efforts to achieve population-wide reduction in sodium intake are urgently needed.

SUPPLEMENTARY MATERIAL

Supplementary data are available at *American Journal of Hypertension* online.

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DISCLOSURE

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