Choose and Prepare Foods with Less Salt: Dietary Advice for All Americans

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ABSTRACT The Nutrition and Your Health: Dietary Guidelines for Americans have included dietary guidance on salt and sodium since they were first released in 1980. This paper briefly reviews the impetus for including sodium guidelines, changes in them over time and factors influencing these changes. Although guidance appears to have changed little over the five editions, differences in wording reflect changes in knowledge of the link between sodium and blood pressure, a shift in public health policy toward prevention and increased consumption of processed and prepared foods. We examine methods to monitor sodium intake and assess whether Americans are following these guidelines. Available data indicate that American adolescents and adults are consuming more sodium than recommended and are unable to judge whether the amount of sodium in their diet is appropriate. Although Americans avoid adding salt to food at the table, their efforts may have little effect given that the majority of salt consumed is added during commercial processing and preparation. Thus, changes to the Dietary Guidelines that emphasize the major sources of sodium in U.S. diets and advice to “choose and prepare foods with less salt” may help all Americans meet recommended sodium intake levels in the future. J. Nutr. 131: 536S–551S, 2001.

KEY WORDS: • dietary sodium • dietary sodium chloride • blood pressure • nutrition policy

National dietary recommendations have included advice about salt and sodium since the 1970s. Concern with excessive salt and sodium intake arose because early data from animal studies (1) and observational studies in humans (2–4) suggested a relation between sodium intake and blood pressure. Evidence has accumulated since then that clearly establishes the link, as summarized in recent reviews (5–8). Briefly, observational studies demonstrate that blood pressure is positively related to sodium intake level. Animal and human experimental studies show that decreasing sodium intake reduces blood pressure, and that the response to sodium intake is variable such that age, race, genetic background, and intake of other nutrients and medications can affect the relation. Recent results from a well-controlled intervention study, Dietary Approaches to Stop Hypertension (DASH-Sodium), confirm that blood pressure can be lowered by lowering the amount of sodium in the diet among individuals with and without hypertension (9).

Because high blood pressure or hypertension is an established risk factor for cardiovascular disease (10,11) and is highly prevalent in the U.S. population (12,13), reductions in sodium intake are an essential component of national public health policy. Differences in sodium intake of 100 mmol (2300 mg) have been associated with 5–10 mm Hg lower systolic and 2–5 mm Hg lower diastolic blood pressure, with the larger differences occurring at older ages (14). The estimated effect on stroke and cardiovascular disease risk from the resulting downward shifts in the distribution of blood pressure would be substantial (6,11). Results from clinical trials to lower blood pressure suggest that a decrease of 11–12 mm Hg systolic and 5–6 mm Hg diastolic blood pressure would yield ~38 and 16% reductions in stroke and coronary heart disease, respectively (15).

Since the Nutrition and Your Health: Dietary Guidelines for Americans were first released in 1980, they have included guidance concerning salt and sodium. This paper briefly reviews steps leading to the emergence of national guidelines for salt and sodium intake, changes in them over time and factors influencing these changes. In addition, we describe and evaluate methods for assessing sodium intake that are used in monitoring intake in the U.S. population. Finally, we present data to assess whether Americans are following dietary salt and sodium guidelines.

Emergence of dietary guidance on salt and sodium

During the 1970s, there was a growing recognition of the relation between sodium intake and hypertension by several expert health groups (Table 1). The 1969 White House Conference on Food, Nutrition, and Health recognized that high intakes of dietary salt beginning as early as infancy might be an important factor in the development of hypertension. Resulting recommendations were that persons with or without a family history of hypertension be advised about the desirability of reducing their salt intake, and that food processors be encouraged to minimize the amount of salt in processed foods (16). In 1974, the American Academy of Pediatrics’ Commit-

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One proposal from the White House Conference on Food, Nutrition, and Health was to provide consumers with nutrition "information" about a food product relative to their overall diet (16). In response, the Food and Drug Administration (FDA) initiated a nutrition labeling program, implemented in 1975, which required that a specific format be used whenever a nutrition claim was made in labeling or advertising or when a nutrient was added to a food (22). Better information on the sodium content of foods was an early focus of the FDA’s nutrition labeling program. In 1979, a committee of the National Academy of Sciences, 1989.
commissioned by the FDA, reviewed the health implications of added salt (23). Three major conclusions emerged about salt intake from their review: 1) consumption of salt in the U.S. should be reduced; 2) guidelines should be developed for reducing the amount of sodium in processed foods; and 3) the sodium content of foods should be provided on the food label. In 1981, just after the release of the first Dietary Guidelines, the FDA and the NHLBI jointly sponsored an initiative to educate the public about sodium and to encourage manufacturers to display the sodium content on food labels. By 1984, FDA added sodium to the list of nutrients required on food labels and defined the terms* to be used on labels for sodium content claims, which were subsequently expanded in the Nutrition Labeling and Education Act (22).

U.S. DIETARY GUIDELINES FOR AMERICANS: ADVICE ON SALT INTAKE

The first Dietary Guidelines offered recommendations with two broad objectives, i.e., to ensure dietary adequacies that would prevent or correct specific nutrient deficiencies and to reduce the risk of chronic diseases suspected to be related to dietary factors. The scientific basis was in part the consensus of a Task Force assembled by the American Society of Clinical Nutrition (24). The Task Force evaluated the strength and consistency of evidence linking nutrients with disease; the association between sodium and high blood pressure was among the strongest reported (24). In a subsequent Congressional hearing on the National Academy of Sciences Report on Healthful Diets, there was unanimity among witnesses regarding recommendations for reducing sodium intake in the entire population but considerable disagreement about the benefit of reducing dietary cholesterol and fat intakes (25).

Thus, by 1980, there was strong consensus that sodium guidance was sufficiently important to be included in the Dietary Guidelines.

At first glance, advice on salt and sodium appears to have changed little over the five editions of the Dietary Guidelines. Upon closer review, however, subtle changes are noted in the following three categories of the messages: 1) who should be concerned about sodium and why; 2) which sources of sodium are most important; and 3) how consumers can reduce their sodium intake.

Who should be concerned about sodium and why?

Changes in wording of the Dietary Guidelines coincided with accumulating evidence of a relation between sodium intake and blood pressure and a shift in disease prevention strategies from those targeted at high risk individuals to one that was more population based (Appendix A). The 1980 and 1985 Dietary Guideline, “Avoid too much sodium,” also contained messages targeted at a subset of individuals, i.e., persons with high blood pressure should be concerned about their sodium intake, blood pressure would fall with severe sodium restriction but not always to normal levels, and “low sodium diets” might help certain groups at risk for high blood pressure, if these groups could be identified.

Beginning with the 1990 Dietary Guidelines, the message was reformulated to discourage excessive salt use among Americans with normal blood pressure as well as those with hypertension. INTERSALT, a study of >10,000 adults from 32 countries, reported in 1988 that there was a linear relationship between blood pressure and 24-h urinary sodium excretion levels, and that the increase in blood pressure with age was related to sodium intake (26,27). However, the debate continued in the scientific community concerning whether advice to reduce salt intake was appropriate for all Americans. The 1990 Dietary Guidelines Advisory Committee recommended that most Americans consider reducing sodium intakes, given that sodium intakes were well above safe minimum intakes of 500 mg/d, the lack of a biological marker for identifying salt-sensitive individuals and the lack of known harm from moderate sodium restriction (28). This position was reflected in the 1990 Dietary Guidelines: “Use salt and sodium only in moderation.”

Although the debate continued concerning the appropriateness of sodium intake reduction for normotensives, the message that moderate sodium use be encouraged in all individuals was continued in both the 1995 and 2000 Dietary Guidelines. Additionally in 1995, the prevalence of hypertension was no longer mentioned to avoid misinterpretation that the salt and sodium section of the Dietary Guidelines is appropriate only for persons with hypertension. Further wording changes in 2000 shifted the focus from “diet” to “foods” to emphasize that the salt and sodium Dietary Guidelines do not apply only to persons consuming special diets. These changes were also in keeping with the shift in emphasis toward disease prevention, that is, a vision of “healthy people in healthy communities” with the objectives of encouraging individuals to make healthy eating choices, encouraging clinicians to use prevention into practice, and supporting health-promoting policies in schools, worksites and other settings (29).

The 1995 Dietary Guidelines also mentioned an additional health risk related to sodium intake, i.e., that high salt intake may increase calcium excretion. The 2000 Dietary Guidelines expand and emphasize this new concern; eating more salt may increase calcium loss from bone, which suggests a relation between high sodium intake, loss of bone calcium and subsequent increased risk of osteoporosis and bone fractures.

Most important dietary sources of sodium

In the first (1980) through the third edition (1990), the Dietary Guidelines identified table salt as a source of sodium and chloride but cautioned the reader that both nutrients are essential (Appendix B). In 1980 and 1985, the Dietary Guidelines stated that sodium is present in certain processed foods, condiments, sauces, pickled foods, salty snacks and sandwich meats. The 1990 Dietary Guidelines stated that sodium is present in some "preservatives and flavor enhancers" added to foods. By 1995, the Dietary Guidelines stated that most dietary sodium has been added during processing and manufacturing. With the current edition, the statements are much more direct, i.e., only small amounts of sodium occur naturally in foods, and most sodium has been added to food during commercial processing or preparation either at home or in a restaurant.

The change from “use salt and sodium only in moderation” to “chose a diet moderate in salt and sodium” in 1995 also clarified the source of most sodium in U.S. diets. The word “use” was considered misleading because it implied that advice to reduce sodium concerned salt being added at the table, even though the majority of sodium consumed by Americans is

* Sodium free, <5 mg sodium per serving and per 100 g; very low sodium, ≤35 mg sodium per serving and per 100 g; low sodium, ≤140 mg sodium per serving and per 100 g; and reduced sodium, 25% reduction compared with the reference food; light or lite, 50% reduction compared with the reference food, and used with a low calorie, low fat food; light in sodium, 50% reduction compared with the reference food, and used with a food that is not low fat, low calorie; lightly salted, 50% less than normally added.
added during commercial processing and preparation. Another message emphasized in 1995 was the need to reduce sodium from frequently consumed foods throughout the food groups, not just less frequently consumed high salt foods.

Advice on food selection and preparation

Since the first Dietary Guidelines were released in 1980, they have consistently acknowledged that Americans consume more sodium than needed (Appendix C). However, advice on how to select and prepare foods to accomplish the goal of reducing sodium intake has become more complicated because an increasing proportion of food eaten by Americans is prepared away from home (30,31). In 1980, the message to "avoid too much sodium" was accompanied by the following five simple suggestions: enjoy the unsalted flavors of food; cook with only small amounts of salt; add little or no salt at the table; limit intake of salty foods; and read the food label.

Beginning in 1995, the Dietary Guidelines recommended use of Nutrition Facts on food labels to compare the sodium content of a product with the Daily Value (DV) of 2400 mg, by using the % DV. The 2000 Dietary Guidelines go further, stating that foods with <5% DV are low in salt and sodium. The “Build a Healthy Base” section of the 2000 Dietary Guidelines reinforces the advice to use the % DV, suggesting that to limit a nutrient such as sodium, one should choose a food with a lower %DV.

Additionally, the two most recent editions inform the reader that preference for salt as a taste enhancer may weaken with a gradual decrease in salt use. In 2000, consumers were advised to use “less” salt rather than “in moderation,” to clarify and avoid problems of interpretation about the amount of sodium to be consumed. Although the word “sodium” was dropped from the statement because salt was believed to be the more familiar term, the 2000 Dietary Guidelines include an explanation of the relation between salt and sodium. More specific advice is also included on ways to decrease salt intake when purchasing foods, while cooking and eating at home, or while dining out.

Approaches for Assessing the Sodium Intake of the U.S.

The assessment of sodium intake is complex because of the variety and nature of dietary sodium sources in the U.S. Sodium occurs naturally in some foods and is added to foods during processing, preparation and at the table. Most sodium added during commercial processing is added as sodium chloride, with small amounts contributed by other salts such as sodium bicarbonate (32). Additionally, sodium is found in water and is added in water-softerning agents (32,33). On average, the sodium content of U.S. tap water is 47 mg/L (1.4 mg/oz). On the other hand, amounts vary by geographic region from 0 to 1180.5 mg/L (35 mg/oz) (34), but this information is not readily available by community (32,35). Bottled water generally contains less sodium, ~0.3 mg/oz (36). Water softeners contribute ~120 mg/L (3.6 mg/oz) of sodium to tap water (37) but household use of water-softerning agents is not routinely collected in studies. Moreover, dietary supplements and medications, such as antacids, may contain sodium (32,33), although such nondietary sources are rarely taken into account in calculating total sodium intake.

Monitoring of sodium intake in the U.S. population has measured intake from only a subset of these sources, primarily sodium inherent in foods and added during processing or preparation (35,38,39). Such data are routinely available from national nutrition surveys which rely on self-reported methods. Total sodium intake from all sources can be estimated objectively by measuring urinary sodium excretion level. Both approaches are discussed in more detail below.

Self-reported measures: 24-h recall and food records

National nutrition surveys commonly use dietary recalls or food records to estimate sodium occurring naturally in foods and added during processing and preparation; they do not routinely estimate salt added at the table or sodium intake from water. Thus, survey data intrinsically underestimate average sodium intake because not all sources are captured. Furthermore, neither a single 24-h recall nor food record is representative of an individual’s usual intake, although they can reliably estimate mean intake for groups (40,41). However, both methods have commonly recognized limitations even when used for group estimates. Respondents may distort their intakes to please the interviewer during 24-h recalls, and the process of recording in food records can influence food intakes during the study period (42,43). Research has shown that portion sizes are not well estimated using either method (44–48). Respondents may not be able to remember all foods consumed (42,44), and underreporting on food records is common (49). Indeed, self-reported energy intakes are often underestimated, as demonstrated in studies using the doubly labeled water method (50–52) and in national surveys (53,54). Because sodium intake is highly correlated with energy intake, these methods will also underestimate sodium intake.

In addition, a food’s actual nutrient content may differ from that estimated using national food composition data (44). Ideally, data are based on analytic averages of a representative sample of each food (43). However, such data are often unavailable; instead food composition data are based on very few samples, substituted from a similar food or calculated indirectly using a recipe that may or may not be representative. With the increased consumption of commercially prepared foods, specificity of food composition data bases concerning brand names and preparations is especially crucial for estimating sodium. However, creating and maintaining brand-name specificity in data bases present major challenges because of rapid product development and frequent product reformulation in the food industry. The sodium content for brand-name foods from product labels will be, on average, an overestimate as a result of labeling requirements (39,53). Furthermore, in developing food composition data, validation is needed for the computerized algorithms used to quantify the final sodium content of foods that contain salt added during preparation (56). For example, not all of the salt in marinades is retained and algorithms must reflect actual sodium retention in foods.

If detailed probes are not used during data collection, variability in the amounts of sodium used in cooking and processing will not be captured. The addition of standardized probes can be time consuming, given that probes must be tailored to specific foods or types of foods. For example, probing for salt added to meats, pastas and vegetables during preparation requires simply asking whether salt was used or not. On the other hand, mixed dishes or recipe-mixtures may require more sophisticated probing regarding high sodium ingredients (e.g., marinades and condiments) or additions (e.g., cheese). Probes initially must distinguish commercial vs. home preparation when relevant, and may proceed differently depending upon the response. If the food was commercially prepared, respon-
Biochemical measures: urinary sodium

Sodium is relatively well reflected in biochemical measures, because the main route of sodium disposal is through urine, with only small losses through skin via perspiration either from physical activity or warm climates (43,57). Mean 24-h urinary sodium excretion has been found to closely match mean dietary sodium intake in studies in which dietary sodium is held constant and food intake is carefully monitored, either by being prepared in a research kitchen or weighed by participants with duplicate portions of their foods analyzed chemically (58–61). In these studies, 24-h urinary sodium excretion is 90% or more of measured dietary sodium.

Obtaining 24-h urine collections from free-living individuals is not an easy task because study participants typically find the procedure unappealing and inconvenient. Instructions have to be developed carefully because mistakes in timing of urine collection and uncollected voids will give rise to errors. As a result, agreement between 24-h urine collections and self-reported measures of sodium intake among free-living individuals is much lower than that seen under more controlled conditions (61,62). Correlation coefficients between 24-h urinary excretion and intakes from food records ranged from 0.5 to 0.6 (62,63). In U.S. studies, sodium intake estimates from food records were 15–30% lower than those from 24-h urinary excretion (61,62).

Because of high day-to-day within-person variability in intake, several 24-h urine collections are required to estimate an individual's usual sodium intake. Estimates range from as few as 5 d (64) to as many as 14 (65), when the desired accuracy level is within 10% of true intake. However, a single 24-h urine adequately reflects the previous day's dietary sodium intake and is a good estimate for groups (65). One of the strengths of measuring urinary sodium to assess intake is that it reflects sodium from all sources. At the same time, urinary sodium measures alone cannot be used to distinguish sodium intake from all dietary and nondietary sources. Few recent estimates of the

Improvements needed in monitoring U.S. sodium intake

Studies that simultaneously measure sodium intakes using multiple methods, i.e., 24-h urine collections, self-reported methods, lithium-marked salt or preweighed shakers, and chemical analysis of duplicate portions, could be used to calibrate dietary methods and food composition data bases used in national nutrition surveys. Such studies could determine to what extent probes about brand names and salt use during preparation provide useful information, by identifying where additional probing no longer contributes to data quality. Data from these studies could also be used to validate food composition data bases, including data from food labels and sodium retention factors used in preparation algorithms. An additional aim would be to develop adjustment factors to correct biased estimates of sodium intake from dietary recalls and food records used in national surveys. Adjustment factors might also be developed to quantify amounts of salt used at the table. Salt added at the table is self-reported in national surveys, relying on the participant's ability to estimate the amount and frequency, usually in qualitative terms, because objective methods using preweighed salt shakers or lithium-marked salt are difficult to implement. Containers of salt must be distributed before the study begins, along with informed consent and instructions for use, and collected and weighed afterwards. If lithium-marked salt is used, urine must be collected and processed. Thus, findings from methodological studies investigating how well participants are able to estimate the amount and frequency of salt added at the table could be used to quantify salt added at the table from self-reported national data. Similarly, data from methodological studies might be used to extrapolate sodium intake from water and water-softening agents in national studies.

More importantly, methodological studies could provide better estimates of the relative contributions of sodium from all dietary and nondietary sources. Few recent estimates of the
relative contributions from all sources are available, and older estimates vary considerably (33). Although variable, estimates suggest that the majority of sodium in American diets is added during food processing and preparation (33,76). The most recent study, based on 62 adults who routinely added salt during cooking or at the table, estimated that 77% was added during processing, 12% was inherent in foods, 6% was added at the table, 5% was added in cooking and 0.1% was contributed by tap water (33). Although potentially biased because of the study’s small size and lack of representativeness, these estimates are consistent with those from older studies. Reliable estimates of the relative contributions of sodium sources, which distinguish the proportion added during commercial processing and preparation from more discretionary sources, would directly address whether industry-related environmental changes are warranted to reduce sodium intakes.

Finally, the use of multiple 24-h urinary sodium measures repeated during follow-up examinations in longitudinal cohort studies should be encouraged. Cohort studies would provide more objective estimates of sodium intakes, and repeat measures over time would allow assessment of changes in intake with more certainty than self-reported dietary data. Although such studies are often not representative of the entire U.S. population, the data derived would fill important gaps in monitoring sodium intakes.

**AVAILABLE ESTIMATES OF SODIUM INTAKE IN THE U.S.**

Self-reported dietary sodium intakes since 1970 are available from two national surveys, the National Health and Nutrition Examination Surveys (NHANES) and the Continuing Survey of Food Intake by Individuals (CSFII), which are part of the Federal Government’s National Nutrition Monitoring and Related Research Program (35,38,39). These surveys are periodic, cross-sectional, representative samples of the U.S. noninstitutionalized population.

Although both used a single 24-h recall, methodological differences exist between and within surveys over time. CSFII dietary recalls were conducted in the home, whereas NHANES recalls were collected in a private room at a mobile examination center. CSFII collected recalls from all days of the week, whereas NHANES I and II collected recalls from weekdays only. CSFII participants used rulers, measuring cups and spoons to estimate portion sizes (77), whereas NHANES participants used a much wider array of 3-dimensional models (78). With the exception of the most recent NHANES, food composition data bases differed between the two surveys although both relied on data from the USDA (39). Response rates were lower in CSFII 1985–1986 (57%) and 1989–1991 (58%) than all three NHANES (71–74%).

Both surveys probed for salt used in preparation, although it is unclear whether the extent of probing was similar. Probing was more systematic in NHANES III than earlier NHANES or CSFII because an automated interview and coding system was used with food-specific standardized probes for salt added during preparation, regular vs. lower sodium products, high sodium ingredients and brand names. This detailed probing likely yielded more sensitive sodium intake data in NHANES III. Furthermore, it is unclear whether the surveys differed in how interview data were matched to food composition data bases. For example, one survey could have applied default codes, i.e., the most commonly used preparation for a given food, more frequently than the other.

Exactly how these methodological differences affect sodium intake estimates is difficult to determine. Mean energy intakes tend to be higher in NHANES than CSFII for comparable time periods (79). Ratios of energy intake to estimated basal metabolic rate calculated for CSFII 1989–91 and NHANES III 1988–1991 suggest considerable underreporting in both surveys, and perhaps to a greater extent in CSFII (53,54). Because estimates of energy intake are biased, we expect that sodium intake will also be biased, and more so in CSFII. For this reason, we present mean sodium intakes from NHANES III, even though more recent data are available from CSFII.

**Self-reported sodium intakes**

Dietary sodium intakes were estimated from a single 24-h recall administered during the NHANES III between 1988 and 1994 (80). Salt added at the table was not ascertained during the 24-h recall. Mean sodium intakes during this period were above the recommended maximum intake of 2400 mg/d in almost all age, gender and race-ethnic groups (Table 2). Among adolescents and adults, mean intakes were higher for males than females in every age group by at least 1000 mg/d. However, differences by gender were not significant when adjusted for energy intakes (data not shown). Mean sodium intakes were highest among adolescents, teens and young adults, and were lower among adults ≥60 y, a pattern similar to that observed for energy intakes (data not shown). Mexican Americans had significantly lower mean sodium intakes than non-Hispanic Caucasians and African Americans after adjustment for age and gender ($P<0.05$).

We observed similar patterns by age, gender and race ethnicity in the percentage of participants who consumed less than the recommended maximum intake, 2400 mg/d (Table 3). Data for all participants were adjusted for within-person variation (106), using factors derived from a second 24-h recall administered to a subset of NHANES III participants. Relatively few adolescents and men <60 y (1–13%) met this recommendation, whereas a third or more of women in these same age groups (30–45%) consumed <2400 mg/d. More adults who were ≥60 y consumed <2400 mg/d (20–40% of men and 60–74% of women). One half to three fourths of children 2–5 y and 18% to just over one third of children 6–11 y consumed <2400 mg/d, with more girls than boys meeting the recommended intake levels. As with mean sodium intakes, the percentage meeting recommended sodium intake levels followed patterns of energy consumption.

In addition, NHANES III participants were asked how often they added salt at the table and what kind of salt they used (Table 4). Sodium-reduced salt or salt substitutes were used by <10% of respondents in each age group. The percentage of persons who reported never adding salt varied by age. Most children 2–5 y never added salt (70%), whereas only about half of children 6–11 y (52–53%) did not add salt. Of children whose parents reported that their child used regular salt, most used it only rarely or occasionally. Compared with children, fewer adolescents (34%) never added salt at the table. However, rare or occasional use of salt was more frequently reported (19–26%) than salt added very often (14–19%). Although approximately the same proportion of 20- to 39-y-old men and women (~35%) reported never adding salt, more women 40–59 y (48%) and ≥60 y (56%) than men in these age groups (40 and 41%, respectively) never added salt to their food. Of adults in the oldest two age groups, more men than women added salt to their food very often (22 and 16% vs. 14 and 7%).

As part of the CSFII 1994–96, one adult ≥20 y, who...
completed the first of two possible dietary recalls in eligible households, was recontacted in the Diet and Health Knowledge Survey (DHKS) and interviewed by telephone. Participants were asked to rate their sodium intake as one of the following categories: too low, too high or about right. Three fourths or more of participants ≥60 y felt that their sodium intake was about right, and about two thirds of younger adults perceived their intake this way (Table 5). Slightly more women in each age group than men rated their intake as about right. About one fourth of participants 20 –59 y reported that their intake was too high, whereas fewer participants ≥60 y (13% of women, 18% of men) perceived their intake this way. The mean intake from two nonconsecutive days of dietary recalls was calculated from each of these groups (Table 5).

Mean intakes for participants who perceived their intakes as too high were only ~300 mg/d higher among men 20–39 y and participants ≥60 y but were approximately the same for the other groups. Additionally, the percentages who had mean intakes >2400 mg/d were similar for adults who perceived that their intakes were too high and those who said it was about right.

**Objective measured sodium intakes**

National surveys do not measure urinary sodium excretion level, and thus, more objective estimates of total sodium intake are unavailable for a nationally representative sample. Two smaller studies measured 24-h urinary sodium excretion.

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**TABLE 2**

Mean sodium intakes (mg/d) by race-ethnicity, gender and age, Third National Health and Nutrition Examination Survey, 1988–1994

| Gender and age, y | Non-Hispanic Caucasian | | | Non-Hispanic African American | | | Mexican American | | |
|---|---|---|---|---|---|---|---|---|
| | n | Mean | SEM | n | Mean | SEM | n | Mean | SEM |
| Males | | | | | | | | | |
| 2–5 | 574 | 2543 | 60 | 628 | 2861 | 69 | 716 | 2496 | 66 |
| 6–11 | 419 | 3420 | 161 | 547 | 3454 | 78 | 539 | 3166 | 83 |
| 12–19 | 355 | 4659 | 163 | 524 | 4293 | 125 | 517 | 3801 | 89 |
| 20–39 | 821 | 4774 | 85 | 952 | 4674 | 145 | 1112 | 4103 | 106 |
| 40–69 | 817 | 4183 | 93 | 563 | 3841 | 88 | 543 | 3761 | 111 |
| ≥60 | 1404 | 3421 | 60 | 492 | 2781 | 90 | 496 | 2969 | 116 |
| Females | | | | | | | | | |
| 2–5 | 587 | 2346 | 48 | 626 | 2696 | 60 | 770 | 2171 | 43 |
| 6–11 | 413 | 2902 | 67 | 518 | 3173 | 93 | 569 | 2838 | 69 |
| 12–19 | 453 | 3112 | 124 | 589 | 3428 | 78 | 527 | 2884 | 72 |
| 20–39 | 1072 | 3147 | 67 | 1245 | 3292 | 65 | 1160 | 2887 | 41 |
| 40–69 | 929 | 2844 | 51 | 696 | 2779 | 58 | 552 | 2756 | 74 |
| ≥60 | 1511 | 2497 | 50 | 518 | 2145 | 63 | 472 | 2114 | 81 |

1 Salt added during food consumption was not ascertained during the 24-h recall.

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**TABLE 3**

Percentage of participants in the Third National Health and Nutrition Examination Survey who consumed <2400 mg/d of sodium by race-ethnicity, gender and age, 1988–1994

| Gender and age, y | Non-Hispanic Caucasian | | | Non-Hispanic African American | | | Mexican American | | |
|---|---|---|---|---|---|---|---|---|
| | n | % | SEM | n | % | SEM | n | % | SEM |
| Males | | | | | | | | | |
| 2–5 | 574 | 56.3 | 3.1 | 628 | 45.0 | 2.2 | 716 | 56.0 | 2.6 |
| 6–11 | 419 | 17.8 | 2.3 | 547 | 18.5 | 1.9 | 539 | 18.0 | 2.7 |
| 12–19 | 355 | 4.3 | 1.4 | 524 | 7.1 | 1.3 | 517 | 6.3 | 0.7 |
| 20–39 | 821 | 0.7 | 0.3 | 952 | 2.4 | 0.6 | 1112 | 1.8 | 0.5 |
| 40–69 | 817 | 5.1 | 0.9 | 563 | 12.6 | 1.6 | 543 | 9.9 | 1.3 |
| ≥60 | 1404 | 19.7 | 1.2 | 492 | 40.7 | 2.4 | 496 | 34.3 | 2.6 |
| Females | | | | | | | | | |
| 2–5 | 587 | 67.6 | 2.5 | 626 | 54.4 | 2.6 | 770 | 74.7 | 1.6 |
| 6–11 | 413 | 32.7 | 2.4 | 518 | 26.8 | 2.4 | 569 | 38.5 | 2.9 |
| 12–19 | 453 | 36.2 | 3.0 | 589 | 31.0 | 1.9 | 527 | 42.8 | 1.8 |
| 20–39 | 1072 | 30.1 | 1.7 | 1245 | 30.5 | 1.6 | 1160 | 32.9 | 1.4 |
| 40–69 | 929 | 39.3 | 2.1 | 696 | 43.0 | 2.3 | 552 | 44.9 | 2.8 |
| ≥60 | 1511 | 59.9 | 1.8 | 518 | 70.8 | 2.2 | 472 | 73.3 | 2.9 |

1 Adjusted for intraindividual variation using a second recall on subsample.

2 Salt added as food is eaten was not ascertained during the 24-h recall.
levels, and although not representative of the general population, they complement data from national surveys. The Coronary Artery Risk Development in Young Adults (CARDIA) study recruited 5115 African-American and Caucasian young adults in three geographic areas by community-based sampling methods and in a fourth area through membership in a large prepaid health care plan during 1985–1986 (81). In 1990–1991, three consecutive 24-h urinary sodium levels were collected during the fifth exam from a subsample of the cohort who were 25–37 y (Liu, K., Thomas, R. J., Ruth, K. J. and Flack, J. M., unpublished data). Complete urine collections for all 3 d were available for 920 participants. The international, multicenter INTERSALT study included four centers in the U.S. that measured urinary sodium levels from a single 24-h urine collection during 1985–1987 (82). Each center recruited 200 men and women 20–59 y by random selection from population lists or by cluster sampling of defined populations (82). Body mass index is included in Table 6 because energy intake was not collected in both studies and sodium intake generally increases with increased energy intake.

Urinary sodium excretion levels were 4500 mg/24 h among young men in CARDIA and generally ranged from 3400 to 4000 mg/24 h among men in INTERSALT, which encompassed a wider age group than CARDIA (Table 9). Consistent with self-reported dietary data from national surveys, women in these studies had 1000 mg/24 h lower urinary sodium levels than men, i.e., 3600 mg/24 h in CARDIA and from 2500 to 3000 mg/24 h in INTERSALT. Thus, data from both studies suggest that total sodium intakes in men were well above recommended intake levels, by 1000 mg sodium, and twice as much in younger men. Total sodium intakes among women were also above current recommended levels, although by smaller amounts (100–1200 mg/d) than among men.

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<th>Gender and age, y</th>
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1 Intake does not include salt added at the table.
2 Mean sodium intake from Continuing Survey of Food Intakes by Individuals, 1994–1996.
Urinary sodium data are also available from participants in clinical trials. Although less representative of the U.S. population because they consist of volunteers and are often selected on the bases of blood pressure level and weight, estimates of sodium excretion from these studies are comparable to those from CARDIA and INTERSALT during the same time periods (Table 7).

**Trends in U.S. sodium intake**

Mean sodium intakes were estimated between 1970 and 1996 in both NHANES and CSFII using a 24-h recall (Table 8), but because of methodological differences between surveys, we examined their data separately (Fig. 1). Data from NHANES suggest that mean sodium intakes may be increasing over time. Although variable by age and gender, differences in means are often ≥500 mg. Methodological changes over time may explain some of these differences. In NHANES I and II, food items were recorded on paper and later coded to food composition data. In contrast, the NHANES III automated interview and coding system, with detailed and systematic probes related to sodium, likely yielded improved estimates compared with earlier NHANES. Unlike NHANES I and II, a multiple-pass approach was used in NHANES III, and a list of food items frequently omitted was presented to all participants at the end of each interview. The earlier NHANES collected intake data from weekdays only, whereas NHANES III collected data from all days of the week. Energy intakes were higher Fridays through Sundays than weekdays in NHANES III (53), perhaps contributing to higher mean energy intakes in NHANES III than in NHANES II (83,84). These methodological changes could have resulted in less underreporting of energy intake and, consequently, sodium.
1000 kcal were also higher (almost all age groups (Table 11). Mean sodium intakes per consecutive 3-y periods and using the same data collection protocols, suggest that mean sodium intakes may be increasing. Nevertheless, data from the two phases of NHANES III, both of which are nationally representative samples covering consecutive 3-y periods and using the same data collection protocols, suggest that mean sodium intakes may be increasing. Mean sodium intakes were higher in the second phase in both of which are nationally representative samples covering consecutive 3-y periods and using the same data collection protocols, suggest that mean sodium intakes may be increasing. Mean sodium intakes were higher in the second phase in almost all age groups (Table 11). Mean sodium intakes per 1000 kcal were also higher (Fig. 2), in spite of the fact that mean energy intakes were also higher during the second phase.

### Table 8

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1 NHANES, National Health and Nutrition Examination Survey; CSFII, Continuing Survey of Food Intake by Individuals.

**Dietary Sodium Guidance and Public Health**

A significant change in advice to consume less salt and sodium over the five editions of the Dietary Guidelines is that, since 1990, it has been directed at all Americans, not just those with high blood pressure. This change coincided with emerging evidence of a relation between sodium intake and blood pressure, and that the increase in blood pressure with age was related to sodium intake (26,27). Despite accumulating evidence, the debate continues in the scientific community concerning whether sodium intake affects the risk of developing hypertension, and thus, the nature of the most appropriate advice for all Americans. Yet, the audience for such advice was clear from a changing public health perspective that is increasingly focused on prevention. Sodium intakes were and continue to be well above safe minimum intakes. Although concerns have been raised periodically about potential harms from lowering sodium intake, evidence from sodium reduction trials does not support these concerns (5,88). Finally, even if blood pressure responds to sodium intake only in “salt-sensitive” individuals, a method for identifying such individuals is lacking, and targeted sodium reduction interventions are not feasible.

About one fourth of adults have hypertension and one half of adults have higher than optimal blood pressure (13). About one fourth of adults have hypertension and one half of adults have higher than optimal blood pressure (13). About one fourth of adults have hypertension and one half of adults have higher than optimal blood pressure (13).
longer increased with age but instead remained at levels observed in young adults, hypertension would not be a major public health problem. Evidence from clinical trials among individuals with high normal blood pressure shows that hypertension can be prevented through sodium intake reduction (89). Thus, recommendations to limit sodium intake directed at all Americans comprise an essential component of the primary prevention of hypertension in the U.S. population.

Although advice to consume less salt has been consistent during the last 10 years, estimates from national nutrition surveys over the past 20 years suggest that mean sodium intakes are not decreasing, and if anything, are increasing among Americans. Data from NHANES between 1974 and 1994 suggest that mean sodium intakes, as well as energy intakes, have increased over time, whereas less change was observed in the CSFII surveys over the same period. Although the lack of consistency among surveys, limitations in assessment methods used and methodological changes within surveys make it impossible to determine definitively whether intakes have increased over time, sodium intakes in the U.S. do not appear to have declined. Indeed, comparable data from the two phases of NHANES III suggest a trend toward increased intakes between 1988 and 1994. Increases in sodium intakes are not unexpected, given the increasing consumption of commercially prepared foods and foods eaten away from home (30); the proportion of respondents reporting that they ate away from home on a given day increased from 43% in 1977–1978 to 57% in 1994–1996 in the DHKS (31).

Mean dietary sodium intakes among American adolescents and adults between 1988 and 1994 were well above 2400 mg/d, the maximum recommended intake level, on the basis of data
from NHANES III, which used more sensitive protocols to measure sodium intake than earlier NHANES surveys. Mean dietary intakes were 55–100% higher than 2400 mg/d among males 12–59 y of age, and 15–40% higher among females in the same age range, men ≥60 y and children 6–11 y. Survey data are limited because of the assessment methods commonly used and likely underestimate sodium consumption. Data from smaller albeit less nationally representative studies using urinary excretion level also suggest that intakes are higher than recommended levels.

Thus, it appears that Americans are not heeding advice about salt and sodium provided in the Dietary Guidelines. Even more disturbing is that Americans are unable to judge accurately whether the amount of sodium in their diet is appropriate. In all age–gender groups examined, more than half of respondents to the 1994–1996 DHKS perceived that their intake was about right, and one fourth or less felt that it was too high. Yet, the mean intakes for these groups based on perceived appropriateness were similar, and one half to two thirds of the women and three fourths or more of the men who felt that their intake was about right had mean sodium intakes >2400 mg/d. On the other hand, the proportion who frequently used regular salt was <20% in most age groups between 1988 and 1994, suggesting that Americans are trying to avoid adding salt at the table. However, such efforts by individuals may have little effect on total sodium intakes if estimates of the proportion of salt added during commercial processing and preparation (77%) vs. at the table (6%) are accurate (33).

Some important food contributors to sodium in American diets are essentially hidden sources because they do not taste salty and yet are consumed in such large quantities (e.g., cereals and bread products), that they contribute significant amounts of sodium (90,91). Changes to the Dietary Guidelines to emphasize that most sodium is added to food during commercial processing or in preparation should increase awareness among Americans about all sources of sodium, especially potential hidden sources. Careful wording of the statement in the most recent edition, “To choose and prepare foods with less salt,” reinforces the idea that consumers can select foods that are lower in sodium. Instructions for reading food labels, which were initiated in 1995, are continued and expanded in the current edition. This guidance should help consumers become better informed about the sodium content of individual foods, especially those that are commercially processed or prepared.

Selecting foods with less sodium, however, requires that foods available to Americans contain less sodium. Lower salt and sodium products have been available but total sales have apparently been low, ~3–4% in the early 1990s (92). It is unclear whether sales are low because these products are unacceptable for taste reasons, are more costly than regular sodium products and have limited availability, or because sodium is not an important health concern to American consumers. Salt not only adds its own flavor but enhances other tastes and flavors and suppresses bitterness (93,94). Thus, flavors other than the product’s saltiness may be affected in reduced-sodium products. Unfortunately, no acceptable salt substitute has yet been developed, likely impeded by highly specific sodium channels in human taste receptors (95). However, studies have suggested that salt preference in adults is related to exposure (96,97) and that salt preference in food declines in a relatively short time (within 1–4 mo) when a lower sodium diet is consumed (96,98). Thus, educational messages contained in recent editions of the Dietary Guidelines about the ability to change preference for salt may play a crucial role in helping Americans overcome an important barrier to change. Consumer surveys to investigate reasons for low sales of lower sodium products may help remove other barriers to reducing sodium intake in the U.S.

Renewed efforts may be needed to increase awareness among Americans of the reason for selecting and preparing foods with less salt, i.e., to prevent hypertension even among individuals who do not have high blood pressure. Although progress in this area was made in the late 1980s, the level of awareness of a relation between sodium consumption and hypertension has since declined. In 1978, only 12% of consumers were aware of a relation. Awareness increased to 34% by 1982, peaked at 50% by 1988 and dropped slightly in 1990 (99). Only about one half of adults ≥20 y in the 1994–1996 DHKS perceived that dietary guidance on sodium was very important (100). Increased education of physicians and health care providers about the importance of reminding patients to reduce salt intake as they check blood pressure would aid awareness efforts. Increased awareness may lead to an increased demand for lower sodium products, resulting in food and service industry incentives to expand product availability at comparable cost.

Nevertheless, a strategy to reduce the average salt intake, that relies solely on changing individual behaviors is insufficient. The overwhelming lack of adherence to dietary sodium guidelines in the U.S., particularly among adolescents and men, suggests the need for a multifaceted approach, with coordinated strategies that support and reinforce each other (92). Foremost among these are industry-related environmental changes, given that three fourths of the sodium consumed by Americans is added during commercial processing or preparation and thus may not be discretionary. Consumers cannot make informed choices unless sodium content is provided. With the increased consumption of foods prepared away from home, i.e., in restaurants, fast-food establishments, delicatessens, carry-out counters in supermarkets and other commercial venues, a substantial proportion of foods are unaccompanied by nutrition information. Federal policies requiring or strongly encouraging voluntary use of food labels on such ready-to-eat foods would aid consumers in choosing foods with less salt.

Labeling of this increasing segment of the food supply, although critical, is not enough because it relies on individual behavior. An often suggested environmental change is to gradually reduce the amount of salt added to foods during processing by the food industry and preparation by the food service industry. Such reductions would not rely solely on human behaviors, which are difficult to change, and would have a faster and potentially greater effect than educational efforts aimed at increasing consumption of lower sodium products. However, both environmental changes and increased educational efforts are required for a truly effective approach toward reducing sodium in American diets. If food producers and preparers begin to lower the sodium content of foods, this might help consumers realize that their preference for salt can decrease, thus motivating behavioral change. The increased consumer demand for lower sodium content would then provide industry with additional incentives and reinforce efforts to further reduce the sodium content of foods.

Educational messages contained in the most recent edition of the Dietary Guidelines play an important role in helping Americans meet recommended salt and sodium intake levels. Such messages include major food contributors to sodium, how food labels can be used to identify and to choose lower sodium foods, advice to limit or avoid using table salt and the fact that...
salt preference can change. These messages have evolved over the five editions of the Dietary Guidelines as knowledge of the relation between sodium and blood pressure changed, emphasis shifted to primary prevention of disease, and the U.S. food supply became more complex. Dietary guidance to choose and prepare foods with less salt, as part of a multifaceted approach toward reducing sodium intakes that includes industry-related environmental changes, is critical to reducing the prevalence of hypertension and its associated disease risk in the U.S.

ACKNOWLEDGMENT

The authors would like to acknowledge Dr. Ronette Biegel for her contribution to improved sodium intake data from NHANES III, and for providing us with her computer program for this manuscript.

LITERATURE CITED

88. Whelton, P. K., Hebert, P. R., Cutler, J., Applegate, W. B., Eleanor, K. A.,
APPENDIX

APPENDIX A

Messages contained in the Dietary Guidelines regarding who should be concerned about sodium and why

<table>
<thead>
<tr>
<th>Year</th>
<th>Statement</th>
<th>Message</th>
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</table>
| 1980     | Avoid Too Much Sodium                        | • Major hazard of excess sodium is for those with high blood pressure; not everyone is equally susceptible.  
• 17% of U.S. adults have high blood pressure.  
• Other factors affect high blood pressure (obesity in particular).  
• In populations with low sodium intakes, high blood pressure is rare. In populations with high sodium intakes, high blood pressure is common.  
• If people with high blood pressure severely restrict sodium, blood pressure will usually fall, although not always to normal levels.  
• No way to predict who will develop high blood pressure; certain groups such as African Americans have a higher incidence. Low sodium diets may help some avoid high blood pressure if they could be identified before they develop high blood pressure. |
| 1985     | Avoid Too Much Sodium                        | • Major hazard of excess sodium is for those with high blood pressure. Not everyone is equally susceptible.  
• 1 in 4 U.S. adults has high blood pressure.  
• Other factors affect high blood pressure (several nutrients; obesity in particular).  
• In populations with low salt diets, high blood pressure is rare. In populations with high salt diets, high blood pressure is common.  
• If those with high blood pressure severely restrict their sodium, blood pressure will usually fall, although not always to normal levels.  
• No way to predict who will develop high blood pressure; certain groups such as African Americans have a higher incidence. Low sodium diets may help them avoid high blood pressure if they could be identified before they develop high blood pressure. |
| 1990     | Use Salt and Sodium only in Moderation       | • In populations with low salt diets, high blood pressure is less common than in populations with high salt diets.  
• Other factors are heredity, obesity and excess alcohol.  
• 1 in 3 U.S. persons have high blood pressure. If they restrict their salt and sodium, usually blood pressure will fall.  
• Some people without high blood pressure may reduce their risk by eating a diet with less sodium and salt. We cannot predict who might develop high blood pressure and who will benefit from reducing salt/sodium.  
• It is wise to eat less sodium and salt because we need less than is eaten. Reductions will benefit those whose blood pressure rises with salt intake.  
• A high sodium intake is associated with higher blood pressure.  
• In populations with low salt diets, high blood pressure is common. If those with high blood pressure severely restrict their sodium, blood pressure will usually fall, although not always to normal levels.  
• No way to predict who will develop high blood pressure; certain groups such as African Americans have a higher incidence. Low sodium diets may help them avoid high blood pressure if they could be identified before they develop high blood pressure. |
| 1995     | Choose a Diet Moderate in Salt and Sodium    | • In populations with low salt diets, high blood pressure is less common than in populations with high salt diets.  
• Other factors are heredity, obesity and excess alcohol.  
• 1 in 3 U.S. persons have high blood pressure. If they restrict their salt and sodium, usually blood pressure will fall.  
• Some people without high blood pressure may reduce their risk by eating a diet with less sodium and salt. We cannot predict who might develop high blood pressure and who will benefit from reducing salt/sodium.  
• It is wise to eat less sodium and salt because we need less than is eaten. Reductions will benefit those whose blood pressure rises with salt intake.  
• A high sodium intake is associated with higher blood pressure.  
• Many people at risk for high blood pressure can reduce their chances of developing high blood pressure by consuming less salt.  
• Some questions remain because other factors may interact with sodium to affect blood pressure.  
• Other factors affect blood pressure (body weight management; fruits and vegetables are good sources of potassium; physical activity; alcohol moderation.) Also, high salt intake increases body’s need for calcium. |
| 2000     | Choose and Prepare Foods with Less Sodium    | • Many people can reduce their chances of developing high blood pressure by consuming less salt.  
• Several other steps can also help keep your blood pressure in the healthy range (healthy weight; physical activity; fruits and vegetables; alcohol beverages only in moderation).  
• No way to tell who might develop high blood pressure, but less salt & sodium is not harmful.  
• Eating less salt may decrease loss of calcium from bone & loss of bone calcium increases risk of osteoporosis and bone fractures. |

550SUPPLEMENT


### APPENDIX B

**Messages contained in the Dietary Guidelines regarding the most important dietary sources of sodium**

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<tr>
<th>Year</th>
<th>Statement</th>
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| 1980 | Avoid Too Much Sodium | • Table salt contains sodium and chloride; both are essential.  
• Sodium is present in many beverages and foods, especially certain processed foods, condiments, sauces, pickled foods, salty snacks, and sandwich meats.  
• U.S. adults eat much more sodium than they need.  
• Salt is often required for food preservation.  
• Sodium is present in many beverages and foods, especially in certain processed foods, condiments, sauces, pickled foods, salty snacks, and sandwich meats.  
• U.S. adults eat much more sodium than they need. |
| 1985 | Avoid Too Much Sodium | • Table salt contains sodium and chloride; both are essential.  
• Most Americans eat much more sodium than they need.  
• Food and beverages containing salt provide most of the dietary sodium, much of it added during processing and manufacturing. |
| 1990 | Use Salt and Sodium only in Moderation | • Use salt sparingly, if at all, in cooking and at the table.  
• When planning meals, consider which foods are lower or higher in sodium (examples given).  
• Use salted snacks sparingly.  
• Check labels. Choose lower sodium foods most of the time. |
| 1995 | Choose a Diet Moderate in Salt and Sodium | • Most American consume more sodium than is needed. The Nutrition Facts Label lists a Daily Value of 2400 mg/d for sodium.  
• Fresh foods and vegetables have very little sodium.  
• The Food Guide Pyramid includes some foods that are high in sodium and other foods with little sodium.  
• Read the Label to compare and identify foods lower in sodium.  
• Use herbs and spices to flavor food.  
• Try some frequently consumed foods that are lower in salt and sodium. |
| 2000 | Choose and Prepare Foods with Less Salt | • Most American consume too much salt, so moderate salt intake. Healthy children and adults need only small amounts of salt to meet sodium needs; less than 1 tsp/d. The Nutrition Facts Label lists a Daily Value of 2400 mg/d for sodium, ~1 tsp of salt.  
• Choose sensibly to moderate salt intake.  
• Choose fruits and vegetables often.  
• Read the nutrition Facts Label to compare and identify foods lower in sodium—especially prepared foods.  
• Use herbs, spices, and fruits as flavor, and cut salty seasonings by half.  
• Choose restaurant and fast foods that are prepared with only moderate amounts of salt or salty seasonings.  
• Tips for ways to decrease salt intake while at the store, cooking and eating at home, eating out, and any time. |

### APPENDIX C

**Messages contained in the Dietary Guidelines regarding advice on food selection and preparation**

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| 1980 | Avoid Too Much Sodium | • Learn to enjoy the unsalted flavors of foods.  
• Use little or no salt in cooking and at the table.  
• Limit intake of salty foods.  
• Read food labels to determine the amount of sodium. |
| 1985 | Avoid Too Much Sodium | • Use less table salt, read labels carefully, eat foods with lots of added sodium sparingly; one half of sodium intake may be hidden; sodium occurs naturally or is added as a preservative or flavoring.  
• Learn to enjoy the unsalted flavors of foods.  
• Use little or no salt in cooking and at the table.  
• Limit intake of salty foods.  
• Read food labels to determine amount of sodium.  
• Look for newer lower sodium products to replace higher sodium products. |
| 1990 | Use Salt and Sodium only in Moderation | • Use salt sparingly, if at all, in cooking and at the table.  
• When planning meals, consider which foods are lower or higher in sodium (examples given).  
• Use salted snacks sparingly.  
• Check labels. Choose lower sodium foods most of the time. |
| 1995 | Choose a Diet Moderate in Salt and Sodium | • Most American consume more sodium than is needed. The Nutrition Facts Label lists a Daily Value of 2400 mg/d for sodium.  
• Fresh foods and vegetables have very little sodium.  
• The Food Guide Pyramid includes some foods that are high in sodium and other foods with little sodium.  
• Read the Label to compare and identify foods lower in sodium.  
• Use herbs and spices to flavor food.  
• Try some frequently consumed foods that are lower in salt and sodium. |
| 2000 | Choose and Prepare Foods with Less Salt | • Most American consume too much salt, so moderate salt intake. Healthy children and adults need only small amounts of salt to meet sodium needs; less than 1 tsp/d. The Nutrition Facts Label lists a Daily Value of 2400 mg/d for sodium, ~1 tsp of salt.  
• Choose sensibly to moderate salt intake.  
• Choose fruits and vegetables often.  
• Read the nutrition Facts Label to compare and identify foods lower in sodium—especially prepared foods.  
• Use herbs, spices, and fruits as flavor, and cut salty seasonings by half.  
• Choose restaurant and fast foods that are prepared with only moderate amounts of salt or salty seasonings.  
• Tips for ways to decrease salt intake while at the store, cooking and eating at home, eating out, and any time. |