

1 **B3: Implementing effective strategies to reduce sodium in the food supply**

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9 **B. Proposed policy**

10 1a. Title: Implementing effective strategies to reduce sodium in the food supply

11 1b. Keywords: sodium, hypertension, heart disease, stroke

12 1c. Overriding concern: decreasing high levels of sodium in the food supply to prevent  
13 hypertension and cardiovascular diseases

14 2. Relation of this policy statement to existing APHA policy. This proposed policy would  
15 replace and archive APHA policy 2002-4, Reducing sodium content in the American diet. Since  
16 that policy was adopted, additional scientific evidence and policy developments have  
17 necessitated this replacement.

18 **C. Problem statement.** Cardiovascular diseases are responsible for 31 percent of all deaths in  
19 the United States. Each year, more than 600,000 Americans die of heart disease and more than  
20 135,000 die of stroke.<sup>1</sup> Elevated blood pressure levels are a major cause of these diseases. The  
21 relationship between blood pressure levels and risk of developing cardiovascular diseases is  
22 strong, continuous, graded, consistent, independent, and etiologically significant.<sup>2-3</sup>

23 Almost 60 percent of adults in the U.S. have blood pressure levels which are higher than  
24 normal (defined as < 120 mm Hg systolic and < 80 mm Hg diastolic), thereby putting them at  
25 significantly increased risk of developing these diseases.<sup>4</sup> For example, the estimated 70 million  
26 persons with prehypertension (defined as 120-139 mm Hg systolic and/or 80-89 mm Hg  
27 diastolic) have a 1.5 to 2.5 times greater risk of having a heart attack, a stroke, or heart failure in  
28 10 years than those with normal blood pressure levels.<sup>5</sup> Every 20 mm Hg increase in systolic  
29 blood pressure above the level of 115/75 leads to a doubling of risk of death from coronary heart  
30 disease and stroke.<sup>6</sup>

1 Hypertension, defined as a systolic blood pressure  $\geq$  140 mm Hg and/or a diastolic blood  
2 pressure  $\geq$  90 mm Hg, affects almost 75 million U.S. adults and presents the highest risk.<sup>4</sup> In  
3 2002, the number of hypertensives was 43 million. The prevalence of hypertension rises  
4 dramatically with increasing age; by age 80, more than 70 percent of the population is  
5 hypertensive.<sup>4</sup> Blacks suffer from even higher rates of hypertension than whites, resulting in  
6 higher mortality rates from cardiovascular diseases in blacks compared to whites.<sup>4</sup> The lifetime  
7 probability of developing hypertension in the United States is 90 percent.<sup>7</sup> Controlling high  
8 blood pressure either non-pharmacologically or pharmacologically reduces risk, yet less than 50  
9 percent of hypertension is controlled in the U.S.<sup>8</sup>

10 Hypertension is a largely preventable risk factor.<sup>9</sup> The National Heart, Lung, and Blood  
11 Institute guidelines recommend five nutritional/lifestyle approaches to prevent hypertension: (1)  
12 reduction of sodium intake, (2) weight reduction in the overweight, (3) regular physical activity,  
13 (4) moderation of alcohol intake, and (5) an eating plan that is rich in fruits, vegetables, and low-  
14 fat dairy products and reduced in saturated fat, total fat and cholesterol.<sup>9</sup> These same nutritional  
15 approaches are also highly effective in treating hypertension and can significantly reduce the  
16 amount or even need for medications.<sup>9</sup> Because of the high prevalence of elevated blood  
17 pressure levels and the associated mortality and morbidity in the United States, effective public  
18 health interventions that will lead to population-wide reductions in blood pressure are urgently  
19 needed. Reduction in sodium intake represents the approach most readily amenable to a public  
20 health solution.

21 There is a clear relationship between habitual sodium intake and blood pressure levels.<sup>10</sup> The  
22 large amount of evidence is sufficiently strong to warrant recommendations for the public to  
23 substantially reduce dietary sodium intake. The World Health Organization now characterizes  
24 the evidence linking excess sodium intake to cardiovascular diseases as “conclusive”.<sup>11</sup> Others  
25 refer to the evidence linking excess sodium consumption to hypertension as “overwhelming”  
26 and state that excess sodium is the primary cause of hypertension.<sup>12</sup>

27 A meta-analysis of 32 randomized clinical trials concluded that if a population decreased its  
28 sodium intake by 2,300 mg, this would lower mean blood pressure by 5.8 mm Hg systolic/2.5  
29 mm Hg diastolic in hypertensives, and by 2.3 mm Hg systolic/1.4 mm Hg diastolic in  
30 nonhypertensives.<sup>13</sup> A 5 mm Hg reduction in systolic blood pressure for the general U.S.

1 population would result in 14 percent fewer deaths from strokes, 9 percent fewer deaths from  
2 coronary heart disease, and 7 percent fewer deaths overall.<sup>14</sup>

3 Although a very small number of researchers have disputed the link between sodium intake  
4 and blood pressure,<sup>15</sup> the primary opposition to lowering sodium in the food supply has come  
5 from the food and beverage industries. These industries have indicated that they feel that such  
6 reductions are not needed. Yet, randomized clinical trials have definitively demonstrated that  
7 reducing sodium intake decreases blood pressure in people with and without high blood pressure.  
8 For example, the Dietary Approaches to Stop Hypertension (DASH)-Sodium study showed that  
9 a diet of 1500 mg of sodium/day lowered blood pressure by 8.3/4.4 mm Hg in hypertensives and  
10 by 5.6/2.8 mm Hg in normotensives compared to the usual high-sodium American diet.<sup>16</sup> Blood  
11 pressures declines both in those < 45 years of age and those 45 and older. The steepest decline in  
12 blood pressure occurred when participants went from consuming 2300 mg sodium/day to 1500  
13 mg/day. This finding strongly suggests that a level of 1500 mg/day is safer than a level of 2300  
14 mg/day.

15 Long-term follow-up of participants in two randomized clinical trials with a modest reduction  
16 in sodium intake found a 25 percent decrease in cardiovascular events in those originally  
17 randomized to a reduced sodium diet.<sup>17</sup> Finally, a meta-analysis of trials in children showed that  
18 a reduced sodium intake also lowered blood pressure in infants and children.<sup>18</sup>

19 Higher sodium intake results in adverse effects beyond those of increasing blood pressure.  
20 An intake of sodium higher by 2300 mg per day is associated with a 61 percent increase in  
21 coronary heart disease mortality, an 89 percent increase in stroke mortality, and a 39 percent  
22 increase in all-cause mortality over a 19-year period among adults who are overweight after  
23 adjusting for blood pressure, age, BMI, and other important variables.<sup>19</sup> Higher sodium  
24 consumption is also associated with an increased risk of developing urinary stones, osteoporosis,  
25 and gastric cancer.<sup>20-22</sup>

26 Excess sodium consumption has also been linked to overweight and obesity in both children  
27 and adults; the primary mechanism is increased fluid intake caused by the sodium load, much of  
28 it from either soda, juice, or alcohol.<sup>23-24</sup> It has been estimated that the excess sodium in our  
29 food supply leads to an increase of 278 calories daily in children as a result of an additional  
30 seven billion cans of soda being consumed in the U.S. by children ages 4 to 18.<sup>23</sup> All of these  
31 findings affirm the benefit of recommending that sodium be limited to 1500 mg per day.

1 The average American adult ingests roughly 3600 mg of sodium daily, after accounting for  
2 discretionary salt.<sup>25</sup> This amount far exceeds current recommendations and physiologic need.  
3 The true amount of sodium intake may be even higher since current estimates are based on  
4 dietary recall, but more accurate biochemical assessments via 24 hour urine samples are not  
5 currently available for the population.

6 Between 75 and 80 percent of the daily sodium intake of the U.S. population comes from salt  
7 added to processed and restaurant foods, the remainder coming from salt added while cooking or  
8 at the table.<sup>26-27</sup> Thus, in the U.S. and other western societies, a high dietary salt intake is due to  
9 a large portion of daily calories consisting of processed and restaurant foods. These foods  
10 frequently contain large amounts of sodium. For example, some processed foods and some  
11 restaurant meals contain more than 4000 mg of sodium.<sup>28</sup> The exact amount across food  
12 processors or purveyors is not quantified or tracked in any existing surveillance system.

13 In 2002, APHA adopted a resolution recommending that sodium in processed and restaurant  
14 foods be reduced by 50 percent over the next 10 years. It has been estimated that such a change  
15 would result in a reduction of at least 150,000 premature deaths annually.<sup>28</sup> In 2006, the  
16 American Medical Association adopted a policy recommending a minimum 50 percent reduction  
17 in sodium in processed and restaurant foods over the following ten years. The AMA policy also  
18 recommended that sodium no longer be designated as GRAS (generally recognized as safe) by  
19 the Food and Drug Administration.<sup>29</sup> The rationale for this recommendation was that a  
20 substance that results in more than 400 premature deaths daily should not be categorized as safe.  
21 In fact, for a substance to be classified as GRAS, there must meet the "reasonable certainty of no  
22 harm" safety standard.<sup>30</sup>

23 Removing GRAS status would trigger the FDA to regulate the amount of sodium in  
24 processed foods. Without a change in this status, the FDA is not likely to take action to regulate  
25 the sodium content of foods. The small, inadequate voluntary efforts by the food and restaurant  
26 industries have done little in response to these policies.

27 In 2010, the Institute of Medicine published a report which noted that the voluntary approach  
28 to sodium reduction by the food industry had been totally unsuccessful over the past 40 years.<sup>30</sup>  
29 The IOM report recommended that the GRAS status of sodium be modified and that the FDA  
30 regulate the amount of sodium permitted in foods and progressively ratchet down the amount

1 permitted. To date, the FDA has not taken action on either the AMA's or the IOM's  
2 recommendations.

3 Many countries have been working actively for years to reduce sodium in their food supplies  
4 and are far ahead of the United States in their efforts.<sup>31</sup> For example, Finland began a campaign  
5 to reduce the consumption of sodium that included both public education and regulation in the  
6 1970s. Sodium intake has decreased more than 40 percent since then, resulting in a fall in mean  
7 diastolic blood pressure of greater than 10 mm Hg and a concomitant 80 percent decline in the  
8 mortality rate from heart disease and stroke.<sup>23</sup>

9 In the United Kingdom, the Food Standards agency adopted guidelines in 2006 calling for a  
10 33 percent reduction of sodium in processed foods over a five-year period.<sup>32</sup> Separate guidelines  
11 were created for 85 different categories of processed foods. Most processed foods now carry  
12 front-of-package labels with color identifiers for foods high (red), medium (yellow), or low in  
13 sodium (green). Seeking to avoid a red label, many manufacturers reduced the level of sodium  
14 in their products.

15 In 2010, the American Heart Association (AHA) recommended that all Americans  
16 consume no more than 1500 mg of sodium/day.<sup>33</sup> The AHA subsequently issued a call to action  
17 for population-wide sodium reduction, providing the scientific evidence and rationale for the  
18 1500 mg target for all Americans.<sup>22</sup> In 2010, the U.S. Dietary Guidelines Advisory Committee  
19 unanimously recommended that all Americans consume no more than 1500 mg/day. The  
20 Committee provided extensive evidence supporting their recommendation<sup>34</sup>. However, the  
21 USDA and US DHHS instead recommended in the 2010 Dietary Guidelines that only persons  
22 who are either hypertensive, diabetic, black, > 51 years of age, or have chronic kidney disease  
23 consume no more than 1500 mg daily.<sup>35</sup> For the rest of the population, they recommended that  
24 persons consume less than 2300 mg daily. Yet even young adults are now developing  
25 hypertension; a 2011 report of a large representative sample of U.S. adults aged 24 to 32 found  
26 an alarming 19 percent were hypertensive, much higher than previously found in NHANES.<sup>36</sup>  
27 The CDC has noted that roughly 70 percent of adults fall into the category for which the Dietary  
28 Guidelines recommended no more than 1500 mg daily.<sup>37</sup>

29 Reducing the recommended level for the entire population to no more than 1500 mg daily  
30 represents a prudent public health measure that would substantially reduce the mean blood  
31 pressure of the U.S. population.<sup>22</sup> Healthy adults living in a temperate climate can maintain a

1 normal sodium balance with as little as 115 mg of dietary sodium per day.<sup>38</sup> Animal randomized  
2 controlled trials, observational studies, and randomized clinical trials have found no long-term  
3 adverse effects associated with habitual sodium intake  $\leq$  1500 mg per day.<sup>9, 22, 30</sup> A reduction to  
4 no more than 1500 mg daily necessitates greater reduction of sodium in processed and restaurant  
5 foods than recommended in APHA policy 2002-4. It would also lead to an even greater  
6 reduction in premature mortality and morbidity than APHA's previous policy would have.

7 Healthy People 2010 established an objective to increase the proportion of the population  
8 who consumed less than 2400 mg per day from 21 percent to 65 percent by the year 2010. Based  
9 on data from NHANES 2005-2005, the U.S. did not come close to meeting that objective.<sup>39</sup>  
10 Only 18.8 percent were consuming less than 2300 mg daily, while only 5.5 percent met their  
11 recommended target of no more than 1500 mg daily.

12 RAND published an analysis in 2009 indicating that an average intake of 1500 mg of sodium  
13 daily would lead to health care cost savings in the United States of 26.2 billion dollars annually.  
14 <sup>40</sup> It would also lead to huge decreases in morbidity and mortality from heart disease and stroke.

15 Gradually reducing the amount of sodium added in the manufacturing and commercial  
16 preparation of food is a prudent and safe public health intervention, and the single most effective  
17 means of reducing the sodium intake of Americans. A 2010 analysis estimated that regulatory  
18 action would result in 20 times greater health benefits than voluntary action.<sup>41</sup> There is an  
19 urgent need for rapid, effective actions by the food industry and by the FDA.<sup>42</sup> Such actions are  
20 long overdue. Without a decrease of at least 75 percent in the sodium content of processed and  
21 restaurant foods, it will be exceedingly difficult, if not impossible, for most Americans to  
22 consume no more than 1500 mg sodium daily.

### 23 **Proposed recommendations**

24 Based on the strong scientific data now available, APHA recommends that a uniform upper  
25 level for sodium consumption be advised to the American public and that immediate steps be  
26 taken to protect the public from the harmful effects of mass exposure to the high levels of  
27 sodium currently present in our food supply. Such steps should be taken by both the food and  
28 restaurant industries and by federal and state governmental agencies. These steps would create  
29 an environment that would greatly facilitate dietary sodium reduction by the American public  
30 and would substantially improve the cardiovascular health of the American public.

### 31 **Action steps**

- 1 Therefore the American Public Health Association:
- 2 • urges the Food and Drug Administration within one year 1) to either remove or modify the
  - 3 GRAS status of sodium, 2) to begin regulating the amount of sodium permitted in processed
  - 4 foods, and 3) to establish a schedule for the progressive lowering of sodium in food products
  - 5 over the next ten years consistent with this policy resolution
  - 6 • urges the Food and Drug Administration to require easily understandable front-of-package
  - 7 labels that identify whether products are high, medium, or low in sodium content
  - 8 • urges the FDA to require that 2300 mg be used as the standard for the food industry to use for
  - 9 calculating the DV placed on processed food
  - 10
  - 11 • urges FDA to set the standard for DV for processed foods at 1500 mg by 2017• urges the food
  - 12 and restaurant industries to take immediate steps to reduce and to identify the amount of sodium
  - 13 on a voluntary basis prior to FDA regulations being formulated
  - 14 • urges the USDA to require that all of its food programs comply with standards set forth in the
  - 15 2010 dietary guidelines and this policy resolution
  - 16 • urges collaboration among the Centers for Disease Control and Prevention, state and local
  - 17 health departments, the American Heart Association and other professional organizations, food
  - 18 manufacturers, supermarkets, and the restaurant industry in educating consumers to choose lower
  - 19 sodium foods, especially fresh fruits and vegetables
  - 20 • urges that partnerships be formed with the FDA and the Centers for Disease Control and
  - 21 Prevention and other organizations to work with food manufacturers and preparers to meet a goal
  - 22 of reducing the sodium content of processed and restaurant foods by 75 percent within the next
  - 23 10 years
  - 24 • urges state and local health departments to establish sodium standards in their food
  - 25 procurement consistent with the sodium recommendations in this resolution
  - 26 • urges the Centers for Disease Control and Prevention to broaden surveillance of sodium intake
  - 27 to include biomarkers (e.g., 24 hour urine specimens) as part of NHANES
  - 28 • urges that government and private sponsored research funds be offered to identify simple,
  - 29 reliable measures to track the population's sodium intake
  - 30 • urges the Centers for Disease Control and Prevention to adopt a surveillance system for the
  - 31 levels of sodium in processed and restaurant foods

- 1 • urges the federal government to include sodium reduction in its childhood obesity prevention  
2 initiatives
- 3 • urges collaboration among U.S. public health agencies and public health agencies in other  
4 countries such as the United Kingdom, Canada, Australia, and Ireland which have already made  
5 progress on reducing sodium in their food supplies.
- 6 • urges that the Centers for Disease Control and Prevention, state and local health departments,  
7 and other organizations make hypertension prevention and control a high priority throughout the  
8 United States so that the Healthy People 2020 objectives for improving control of high blood  
9 pressure, reducing sodium consumption, and reducing mortality from heart disease and stroke  
10 can be met
- 11 • urges all Americans with the assistance of lower sodium in processed and restaurant foods  
12 based on the above actions to seek to reduce their sodium intake to no more than 1500 mg daily.

### 13 **F. References.**

- 14 1. Miniño AM, Xu J, Kochanek KD. National Vital Statistics Reports Volume 59, Number 2  
15 Deaths: Preliminary Data for 2008 , available at  
16 [http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59\\_02.pdf](http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_02.pdf)
- 17 2. Stamler J, Stamler R, Neaton JD. Blood pressure, systolic and diastolic, and cardiovascular  
18 risks. US population data. *Arch Intern Med* 1993;153:598–615.
- 19 3. Flack JM, Neaton J, Grimm RG, et al, for the Multiple Risk Factor Intervention Trial Research  
20 Group. Blood pressure and mortality among men with prior myocardial infarction. *Circulation*  
21 1995;92:2437-2445.
- 22 4 Lloyd-Jones D, Adams R, Brown TM, et al. Heart Disease and Stroke Statistics—2010  
23 Update. A Report From the American Heart Association. *Circulation* 2010;121:e1-e170
- 24 5. Vasan RS, Larson MG, Leip EP, et al. Impact of high-normal blood pressure on the risk of  
25 cardiovascular disease. *N Eng J Med* 2001;345:1291-1297.
- 26 6. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R. Age-specific relevance of usual blood  
27 pressure to vascular mortality: A meta-analysis of individual data for one million adults in 61  
28 prospective studies. Prospective Studies Collaboration. *Lancet* 2002;360:1903-1913.
- 29 7. Vasan RS, Beiser A, Seshadri S, et al. Residual lifetime risk for developing hypertension in  
30 middle-aged women and men: The Framingham Heart Study. *JAMA* 2002;287:1003-1010.

- 1 8. Egan B, Zhao, Y, Axon RN. S Trends in Prevalence, Awareness, Treatment, and Control of  
2 Hypertension, 1988-2008 *JAMA* 2010;303:2043-2050
- 3 9. National High Blood Pressure Education Program Working Group. Whelton PK, He J, Appel  
4 LS. Cutler JA, Havas S, Kotchen P et al. Report on Primary Prevention of Hypertension. Clinical  
5 and Public Health Advisory on the Primary Prevention of Hypertension 2002. *JAMA* 2002;  
6 288:1882-1888.
- 7 10. Stamler J, Rose G, Elliott P, et al. Findings of the International Cooperative INTERSALT  
8 Study. *Hypertension* 1991 (Suppl 1):I9-15.
- 9 11. World Health Organization. Reducing salt intake in populations. A report of a WHO forum  
10 and technical meeting. Geneva 2008.
- 11 12. He FJ, MacGregor GA. Reducing population salt intake worldwide: from evidence to  
12 implementation. *Prog Cardiovasc Dis* 2010; 52:363-82.
- 13 13. Cutler JA, Follmann D, Allender PS. Randomized trials of sodium reduction: an overview.  
14 *Am J Clin Nutr* 1997;65(suppl):643S–651S.
- 15 14. Stamler R. Implications of the INTERSALT study. *Hypertension* 1991 (suppl 1):I16–I-20.
- 16 15. Alderman MH. Reducing dietary sodium: the case for caution. *JAMA* 2010;303:448-449
- 17 16. Sacks FM, Svetkey LP, Vollmer WM, et al for DASH-Sodium Collaborative Research  
18 Group. Effects on Blood Pressure of Reduced Dietary Sodium and the Dietary Approaches to  
19 Stop Hypertension (DASH) Diet. *N Eng J Med* 2001; 344:3–10.
- 20 17. Cook NR, Cutler JA, Obarzenel E, et al. Long term effects of dietary sodium reduction on  
21 cardiovascular disease outcomes: observational follow-up of the trials of hypertension prevention  
22 (TOHP). *BMJ* 2007; 334:885-892.
- 23 18. He FJ, MacGregor GA. Importance of salt in determining blood pressure in children: meta-  
24 analysis of controlled trials. *Hypertension* 2006; 48:861-869.
- 25 19. He J, Ogden LG, Vupputuri S, et al. Dietary sodium intake and subsequent risk of  
26 cardiovascular disease in overweight adults. *JAMA* 1999; 282:2027-2034.
- 27 20. Curhan GC, Willett WC, Speizer FE et al. Comparison of dietary calcium with supplemental  
28 calcium and other nutrients as factors affecting the risk for kidney stones in women. *Ann Intern*  
29 *Med* 1997; 126:497-504.
- 30 21. Devine A, Criddle RA, Dick IM, et al. A longitudinal study of the effect of sodium and  
31 calcium intakes on regional bone loss. *Am J Clin Nutr* 1995; 62:740-745.

- 1 22. Appel LJ, Frohlich ED, Hal JE et al The importance of population-wide sodium reduction as  
2 a means to prevent cardiovascular disease and stroke: A call to action from the American Heart  
3 Association. *Circulation* 2011; 1123:1138-1143
- 4 23. Karppanen H, Mervaala E. Sodium intake and hypertension. *Prog Cardiovasc Dis* 2006;  
5 49:59-75.
- 6 24. He FJ, Marrero NM, MacGregor GA. Salt intake is related to soft drink consumption in  
7 children and adolescents: a link to obesity? *Hypertension* 2008; 51:629-34.
- 8 25. Centers for Disease Control and Prevention. MMWR. Sodium Intake Among  
9 Adults --- United States, 2005–2006. June 25, 2010 / 59(24);746-749.
- 10 26. James WP, Ralph A, Sanchez-Castillo CP. The dominance of salt in manufactured food in  
11 the sodium intake of affluent societies. *Lancet* 1987;1:426-9.
- 12 27. Mattes RD, Donnelly D. Relative contributions of dietary sodium sources. *J Am Coll Nutr*  
13 1991; 10:383-393.
- 14 28. Havas S, Roccella E, Lenfant C. Reducing the public health burden caused by elevated  
15 blood pressure levels in the United States. *Am J Public Health* 2004; 94:19-22.
- 16 29. Dickinson B and Havas S. Reducing the population burden of cardiovascular disease by  
17 reducing sodium intake: A Report of the Council on Science and Public Health. *Arch Intern*  
18 *Med* 2007; 167:1460-1468.
- 19 30. Institute of Medicine. Strategies to Reduce Sodium Intake in the United States. National  
20 Academies Press, Washington DC, 2010.
- 21 31. He FJ, MacGregor GA. Reducing population salt intake worldwide: from evidence to  
22 implementation. *Prog Cardiovasc Dis* 2010;52:363-82
- 23 32. <http://www.food.gov.uk/multimedia/pdfs/salttargetsapril06.pdf>
- 24 33. Lloyd-Jones DL, Hong Y, Labarthe D, et al. Defining and setting national goals for  
25 cardiovascular health promotion and disease reduction. The American Heart Association's  
26 strategic impact goal through 2020 and beyond. *Circulation* 2011; 123:1138-1143.
- 27 34. Report of the U.S. Dietary Guidelines Advisory Committee. Part D. Section 6: Sodium,  
28 Potassium, and Water available at  
29 [http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2010/DGAC/Report/D-6-](http://www.cnpp.usda.gov/Publications/DietaryGuidelines/2010/DGAC/Report/D-6-SodiumPotassiumWater.pdf)  
30 SodiumPotassiumWater.pdf Available at

- 1 35. Department of Health and Human Services (HHS) and the Department of Agriculture  
2 (USDA), Dietary Guidelines for Americans,2010. available at  
3 <http://www.health.gov/dietaryguidelines/>
- 4 36. CDC. Application of lower sodium intake recommendations to adults---United States, 1999--  
5 2006. *MMWR* 2009;58:281--3.
- 6 37. Chobanian AV, Hill M. National Heart, Lung, and Blood Institute Workshop on Sodium and  
7 Blood Pressure: a critical review of current scientific evidence. *Hypertension* 2000;35: 858-863.
- 8 38. Nguyen QC, Tabor JW, Entzel PP et al. Discordance in national estimates of hypertension  
9 among young adults. *Epidemiology* 2011;22:532-541..
- 10 39. CDC. Sodium Intake Among Adults --- United States, 2005–2006. *MMWR weekly*.  
11 59:746-749.
- 12 40. Palar K and Sturm R. Potential societal savings from reduced sodium consumption in the  
13 U.S. adult population. *Am J Health Prom* 2009; 24: 49-57.
- 14 41. Cobiac LC, Vos T, Veerman JL. Cost-effectiveness of interventions to reduce dietary salt  
15 intake. *Heart* 2010;96:1920-5.
- 16 42. Havas S, Dickinson B, and Wilson M. The urgent need to reduce sodium in the food supply  
17 in the United States. *JAMA* 2007;298:1439-1441.

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