

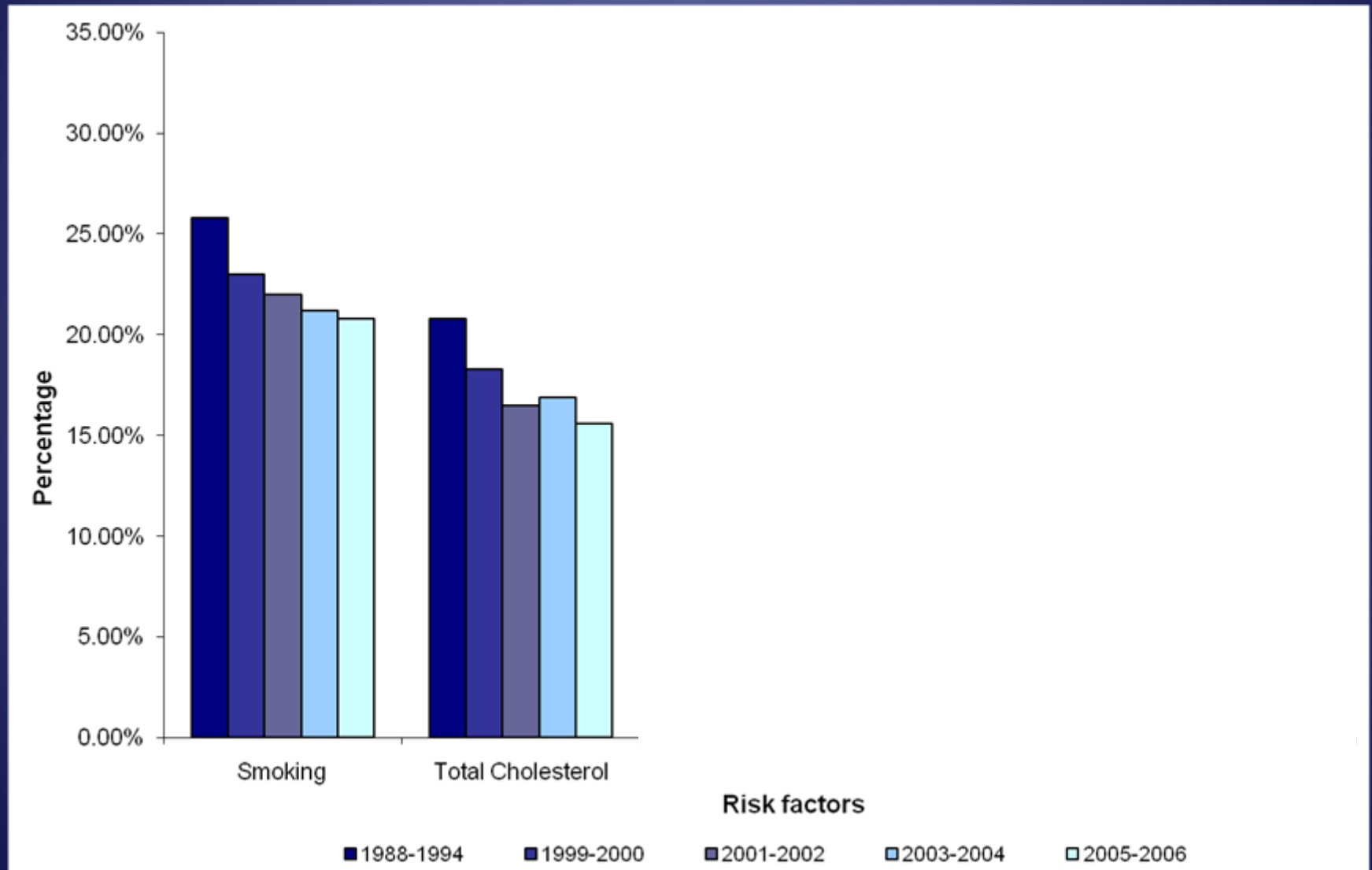
Hypertension in the US: Today's public health challenge

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and of Epidemiology and Biostatistics

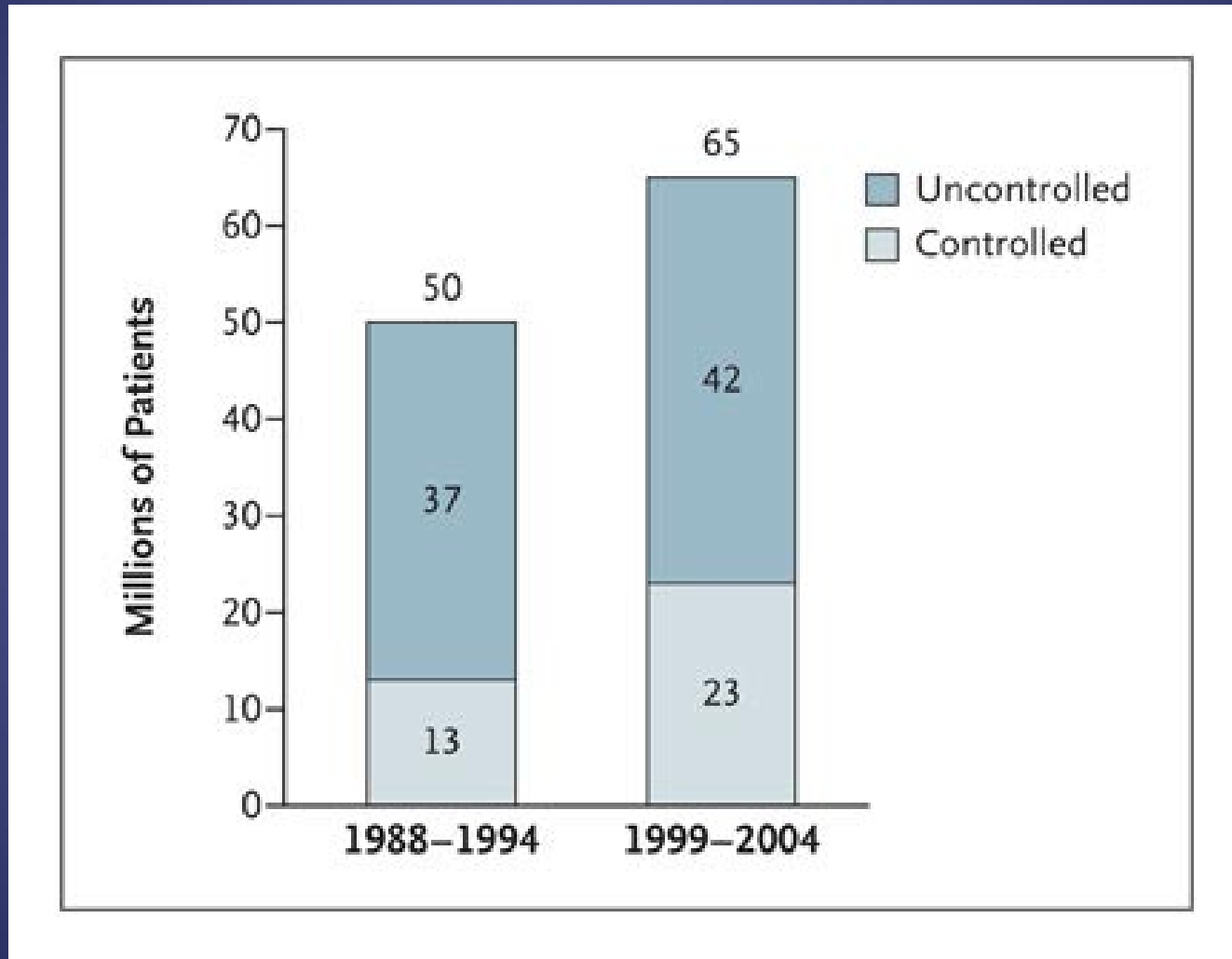
UCSF Center for Vulnerable Populations,
San Francisco General Hospital

Age-adjusted cardiovascular disease risk factor trends in US adults, 1988-2006



Source: National Center for Health Statistics, Health US 2008 (2009).

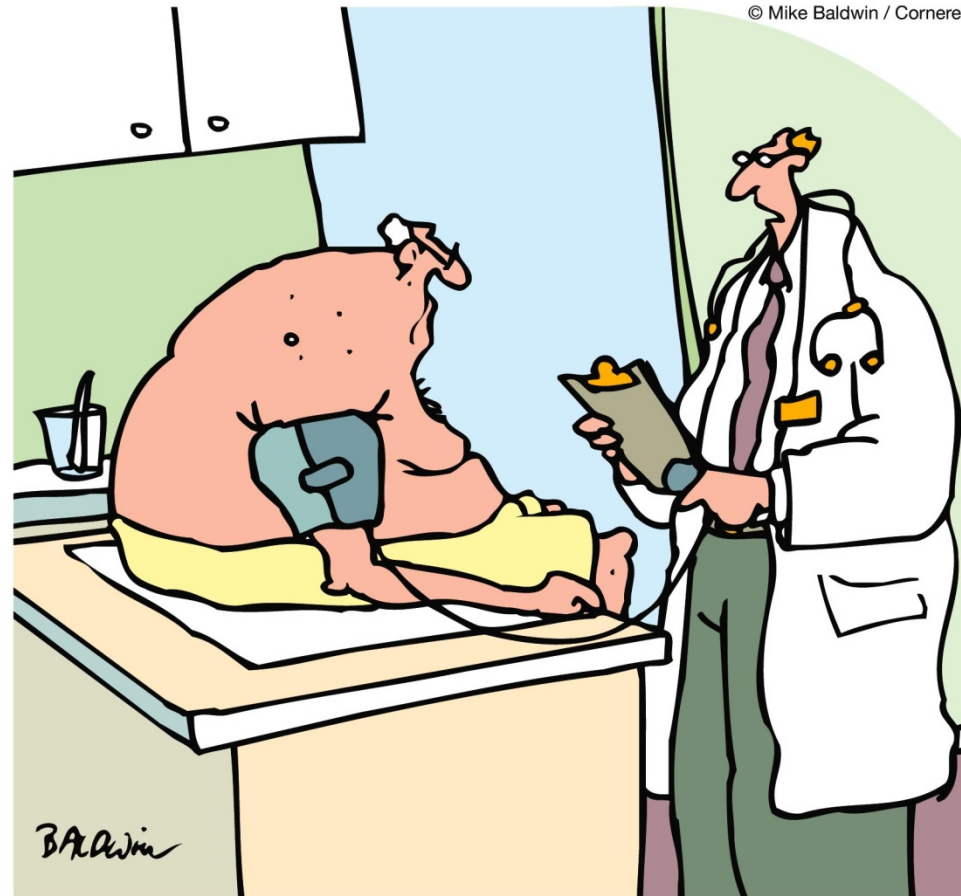
Changes in the prevalence and control of hypertension in the United States (1988-2004)



Source: Chobanian A. N Engl J Med 2009;361:878-887

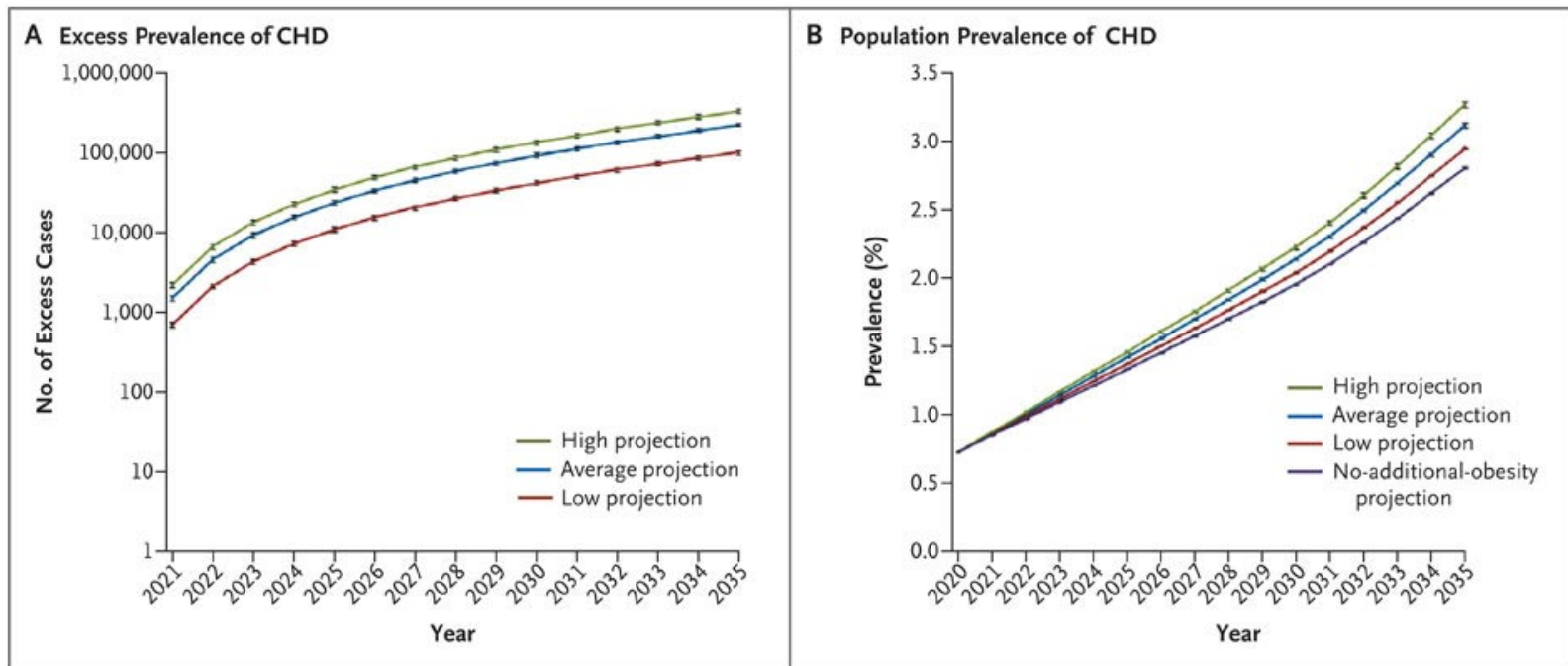


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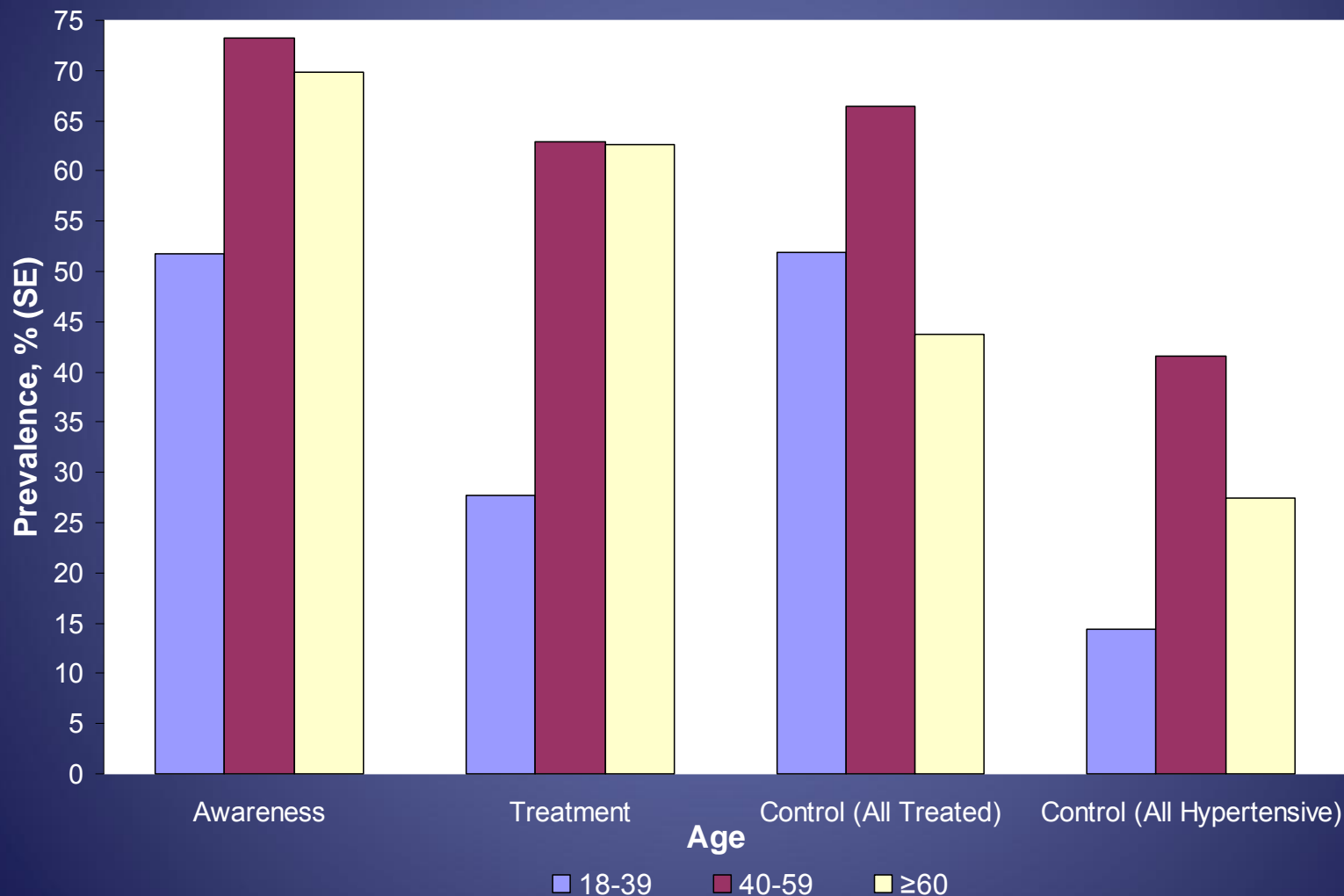


“You’ve got the blood pressure of a teenager – who lives on junk food, TV and the computer.”

Prevalence of CHD Associated with Three Projections of Future Adult Obesity (based on current adolescent overweight)



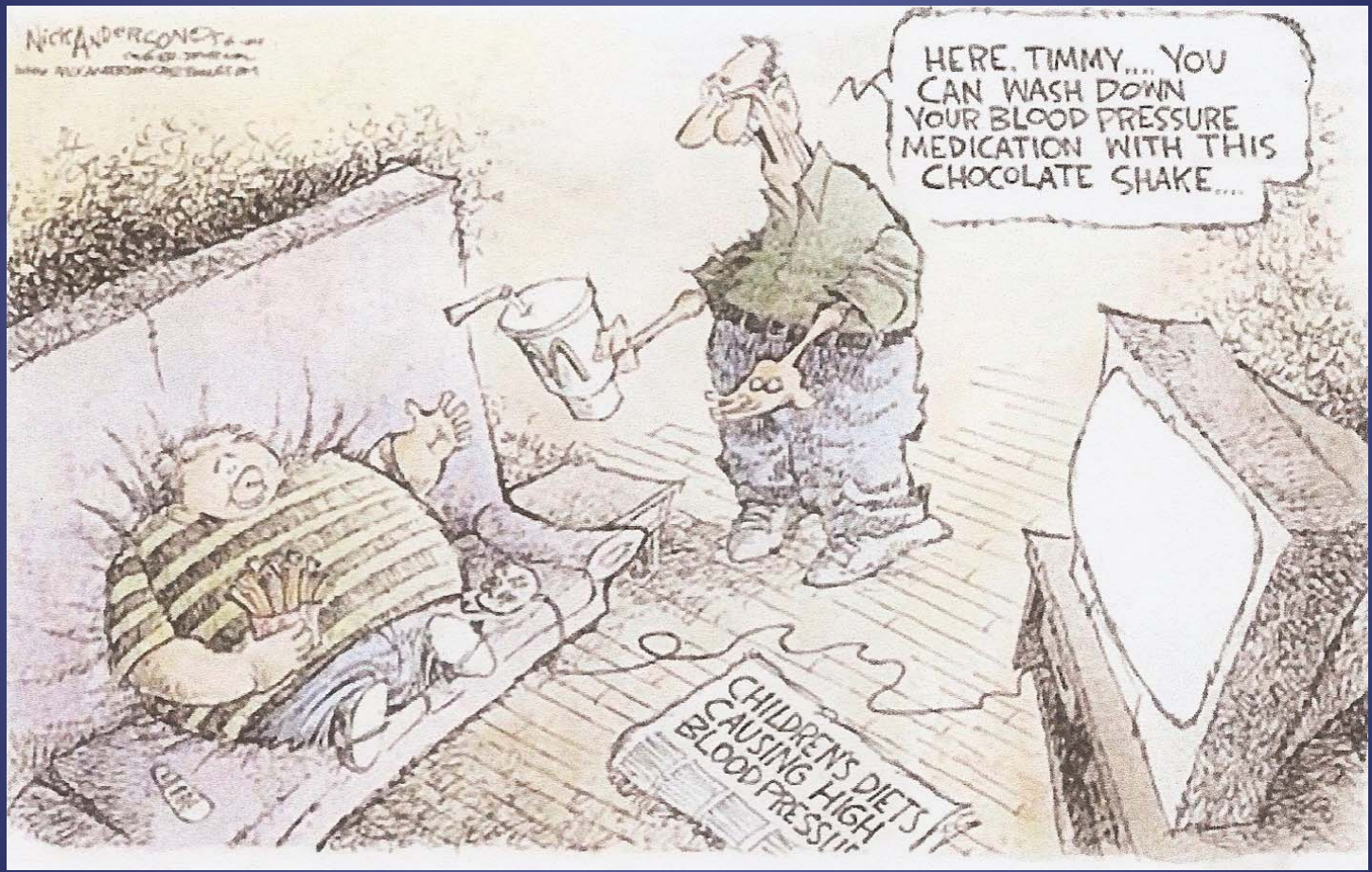
Awareness, treatment, and control of hypertension by age in US, 1999-2000



Summary

- Increasing prevalence of hypertension in US.
- More poorly controlled hypertension.
- Worsening trends in younger adults.

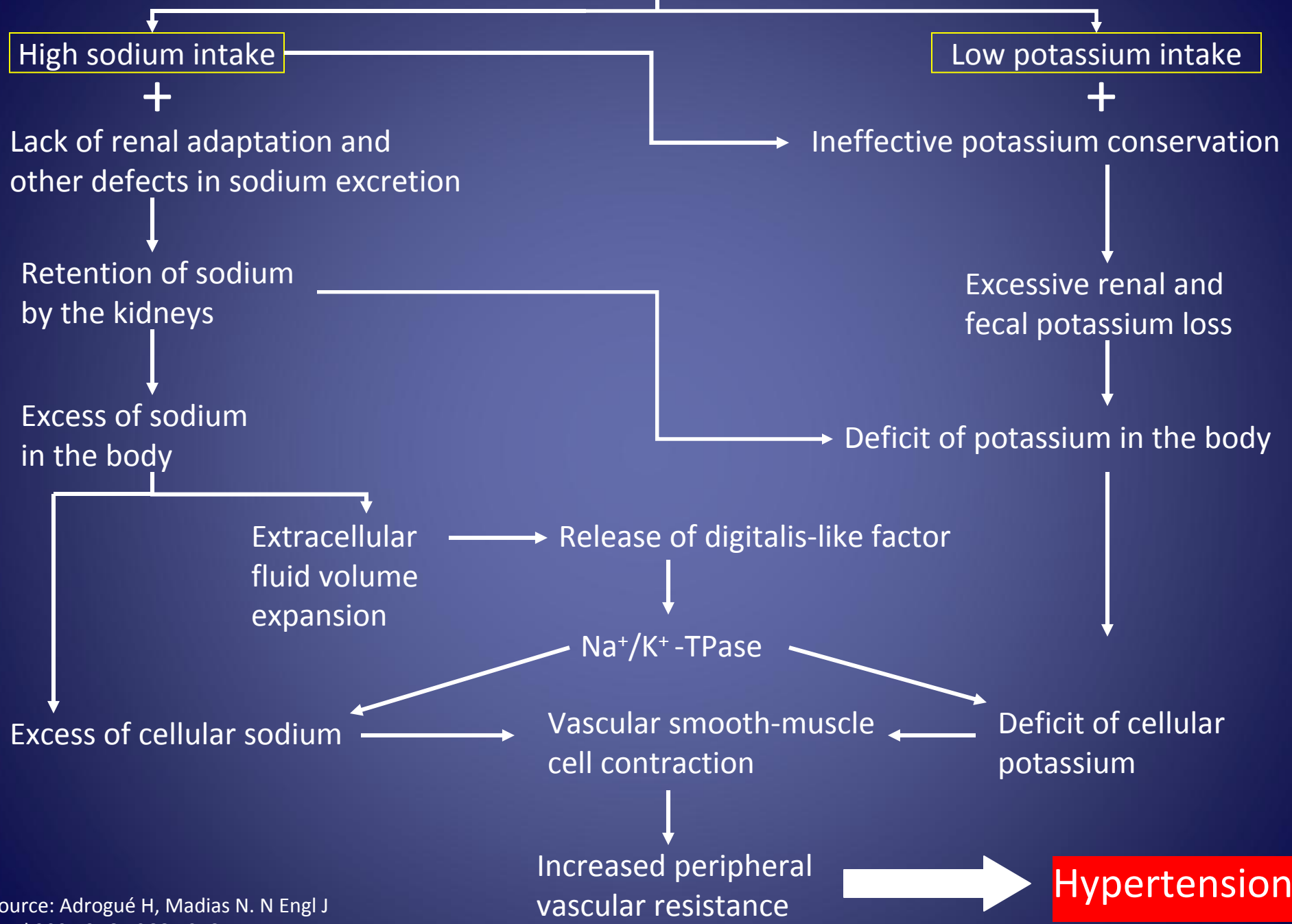
NICK ANDERSON
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HERE, TIMMY... YOU
CAN WASH DOWN
YOUR BLOOD PRESSURE
MEDICATION WITH THIS
CHOCOLATE SHAKE...

CHILDREN'S DIETS
CAUSING HIGH
BLOOD PRESSURE

Modern Western Diet

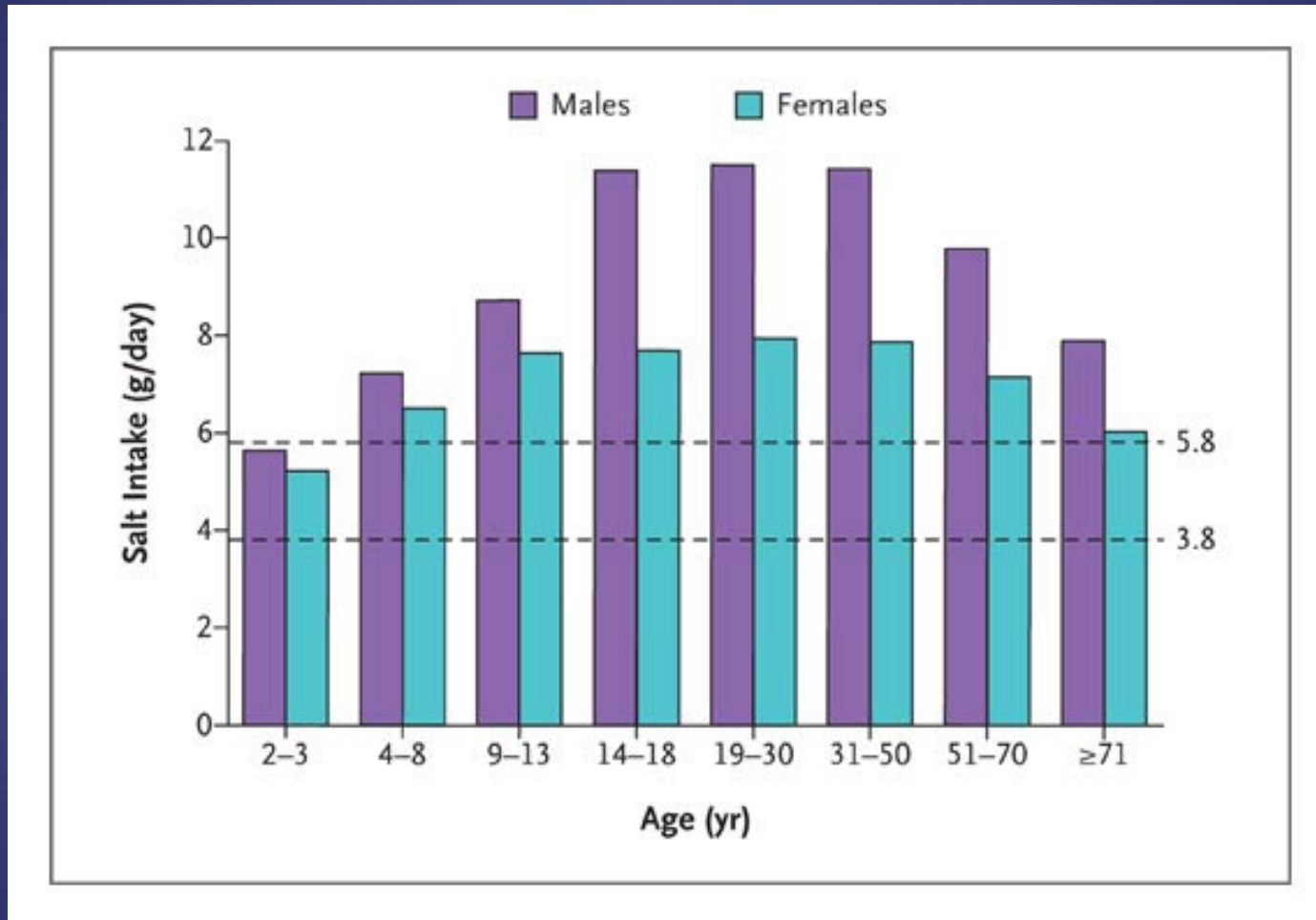


Salt intake in the United States

- Recommended daily salt intake:
 - < **5.8gm/day** (<**2300 mg** of sodium)
 - 1 gm salt = approx 400 mg sodium
 - < **3.8 gm/day** (<**1500 mg**) **FOR MOST ADULTS**
 - (**66%** - those under 18, over 40, those with hypertension, and African Americans)
- Current daily intake in US:
 - 9.4 gm/day (3700 mg sodium)
 - Increased by 50% over the last three decades



Average daily salt intake in male and female Americans, as ascertained from 24-hour dietary recall, 2005-2006



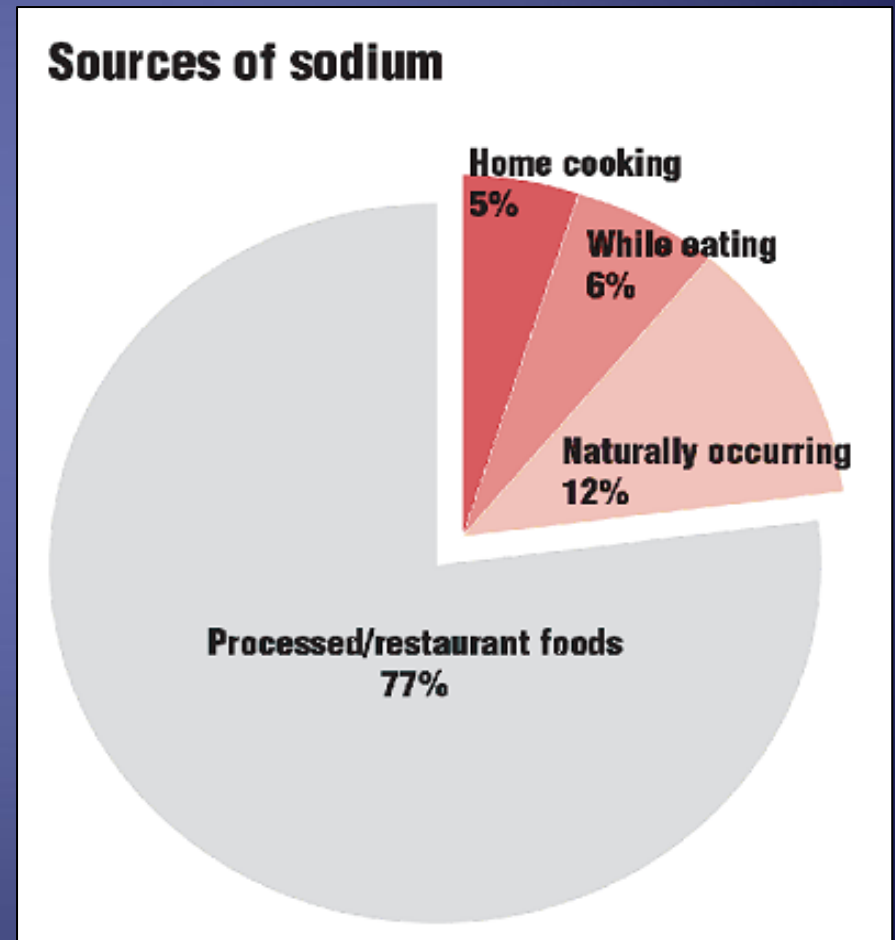
Source: Appel L and Anderson C. N Engl J Med 2010;362:650-652



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Where is the salt?

80% in processed or pre-prepared foods



Risk Factor Monitoring and Methods

Cancer Control and Population Sciences

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[Diet](#)

Diet: [What We've Learned](#) [Studies](#) [Assessing Dietary Intakes](#) [Short Instruments](#) [About](#)

Search:

Table 1a. Mean Intake of Sodium, Mean Intake of Energy, and Percentage Sodium Contribution of Various Foods Among US Population, by Age, NHANES 2005–06

Sources of Sodium among the US Population, 2005–06:

[Introduction](#)

[List of specific foods](#)

Mean Intakes & Percentage Contribution of Foods:

Among US Population, by Age

[Among US Males, by Age](#)

[Among US Females, by Age](#)

[Among US Population, by Race/Ethnicity & Family Income](#)

Mean Intakes & Mean Contribution of Foods:

[Among US Population, by Age](#)

[Among US Males, by Age](#)

[Among US Females, by Age](#)

[Among US Population, by Race/Ethnicity & Family Income](#)

| | All Persons | Age Group (years) | | | | | | | | | | |
|------------------------------|----------------------------------|-------------------|------|------|------|-------|------|-------|-------|-------|------|------|
| | | 2-18 | 2-3 | 4-8 | 9-13 | 14-18 | 19+ | 19-30 | 31-50 | 51-70 | 71+ | |
| Sample Size | 8549 | 3778 | 497 | 899 | 1047 | 1335 | 4771 | 1310 | 1537 | 1224 | 700 | |
| Mean Intake of Sodium (mg) | 3436 | 3129 | 2144 | 2694 | 3227 | 3793 | 3535 | 3814 | 3781 | 3306 | 2686 | |
| Mean Intake of Energy (kcal) | 2157 | 2027 | 1471 | 1802 | 2035 | 2427 | 2199 | 2407 | 2354 | 2020 | 1691 | |
| Rank ¹ | Food Group ^{2,3} | | | | | | | | | | | |
| 1 | Yeast breads | 7.3 | 7.2 | 6.1 | 7.4 | 6.8 | 7.6 | 7.3 | 5.9 | 6.5 | 8.8 | 10.6 |
| 2 | Chicken and chicken mixed dishes | 6.8 | 7.4 | 5.1 | 6.8 | 7.3 | 8.3 | 6.6 | 7.6 | 7.1 | 5.5 | 4.6 |
| 3 | Pizza | 6.3 | 9.4 | 4.7 | 7.6 | 8.7 | 12.1 | 5.4 | 7.5 | 6.4 | 3.3 | 1.9 |
| 4 | Pasta and pasta dishes | 5.1 | 6.7 | 9.8 | 8.3 | 7.0 | 4.8 | 4.6 | 5.3 | 4.3 | 4.7 | 3.9 |
| 5 | Cold cuts | 4.5 | 4.3 | 3.9 | 3.8 | 4.4 | 4.6 | 4.6 | 3.9 | 5.3 | 4.0 | 4.8 |
| 6 | Condiments | 4.4 | 4.1 | 3.4 | 3.4 | 4.4 | 4.5 | 4.4 | 4.4 | 4.9 | 4.1 | 3.0 |
| 7 | Mexican mixed dishes | 4.1 | 3.8 | 2.1 | 2.7 | 4.5 | 4.2 | 4.2 | 6.8 | 4.7 | 2.4 | 0.5 |
| 8 | Sausage, franks, bacon, and ribs | 4.1 | 4.6 | 6.2 | 4.9 | 5.1 | 3.6 | 4.0 | 3.4 | 3.8 | 4.6 | 4.5 |
| 9 | Regular cheese | 3.5 | 3.5 | 4.1 | 3.2 | 3.1 | 3.9 | 3.5 | 3.9 | 3.5 | 3.5 | 3.1 |
| 10 | Grain-based desserts | 3.4 | 3.7 | 2.5 | 4.2 | 3.9 | 3.5 | 3.4 | 2.8 | 3.3 | 3.5 | 4.6 |
| 11 | Soups | 3.3 | 2.4 | 3.2 | 3.0 | 2.4 | 1.9 | 3.6 | 3.1 | 2.7 | 5.1 | 5.1 |
| 12 | Beef and beef mixed dishes | 3.3 | 2.5 | 1.9 | 1.6 | 2.8 | 2.9 | 3.5 | 3.9 | 3.5 | 3.0 | 3.6 |
| 13 | Rice and rice mixed dishes | 2.6 | 1.9 | 2.1 | 1.8 | 2.2 | 1.6 | 2.8 | 3.3 | 3.1 | 2.2 | 1.8 |
| 14 | Eggs and egg mixed dishes | 2.6 | 2.0 | 1.9 | 1.8 | 1.9 | 2.4 | 2.7 | 2.4 | 2.7 | 3.0 | 2.9 |

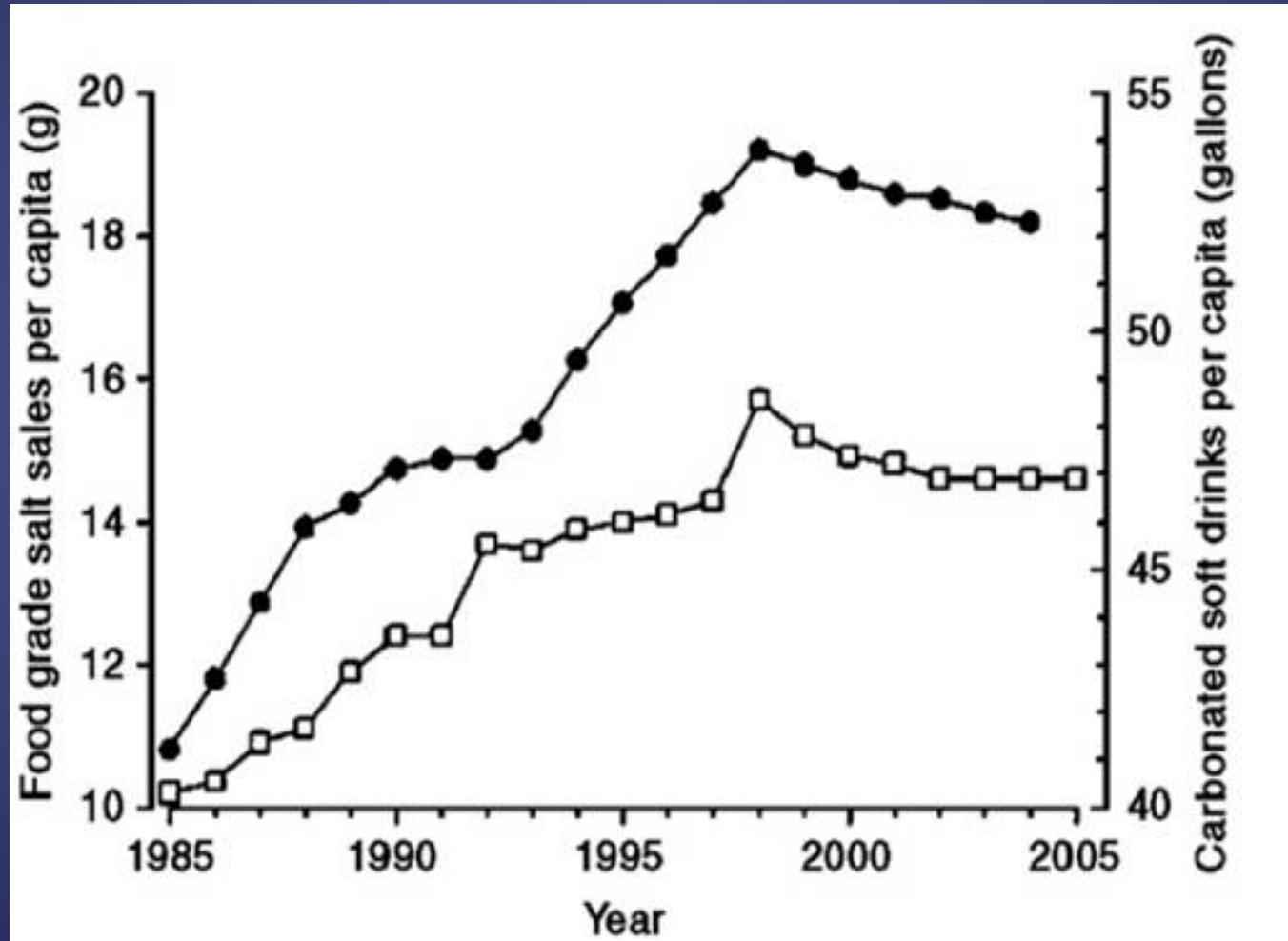
Sources of salt in our grocery bags

- 35% from cereal & cereal products
 - breads, cereals, pastries
- 26% from meat & meat products
- 8% from milk & milk products
 - milk, cheese

Why do food manufacturers use so much salt?

- Preservative
- Taste
 - Inexpensive way to add flavor
 - Habituated to very salty food
 - Can be unlearned (6 wk down regulation of salt receptors)
- Weight of food

Link between salt intake and sugared beverage consumption?



Source: Karppanen H and Mervaala E. *Prog Cardiovasc Dis* 2006; 49:59-75.

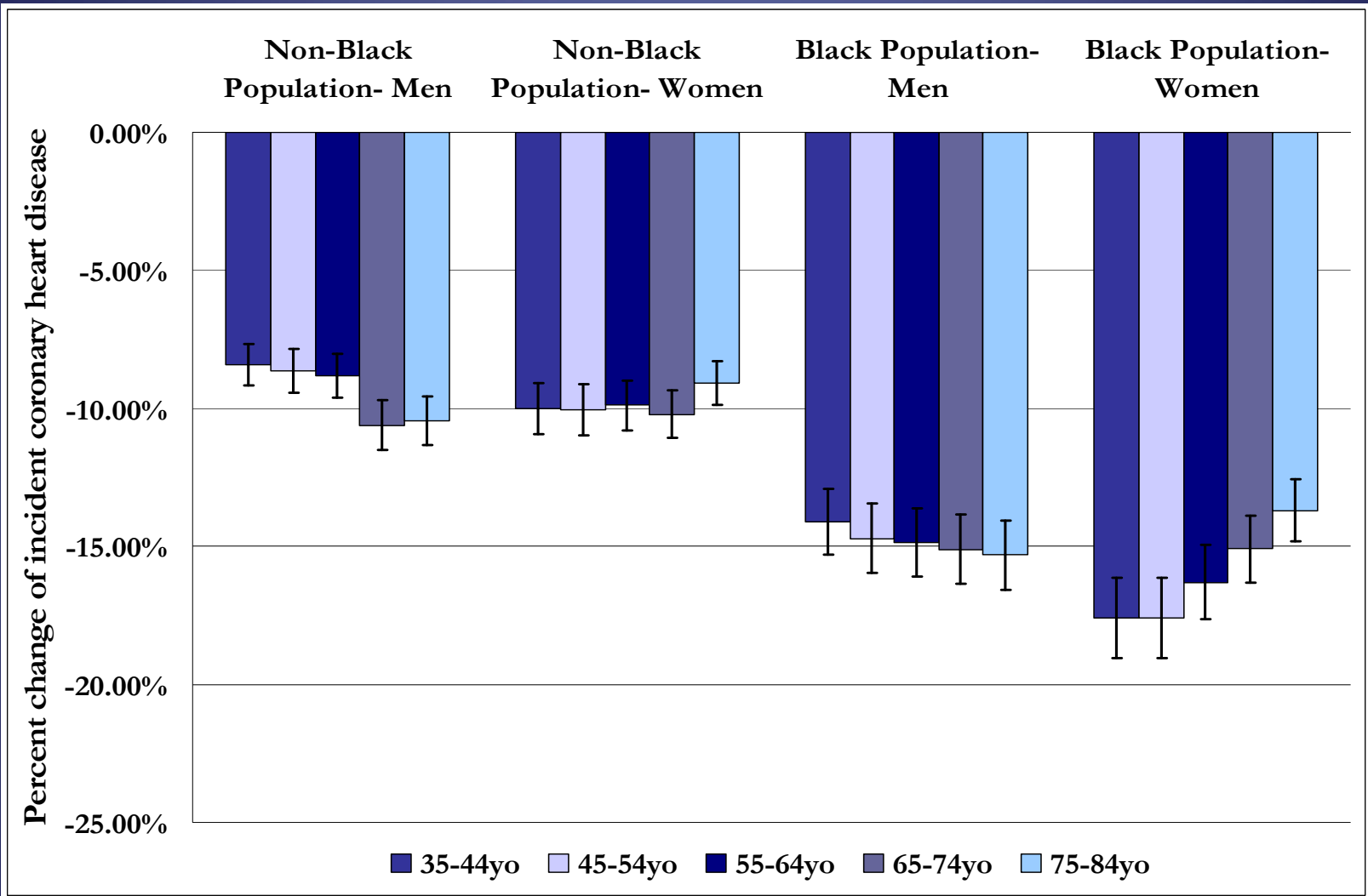
What to do about high salt in the US diet?

- Do nothing and wait for more evidence
- Individual approach to educating about salt reduction
- Public health approach

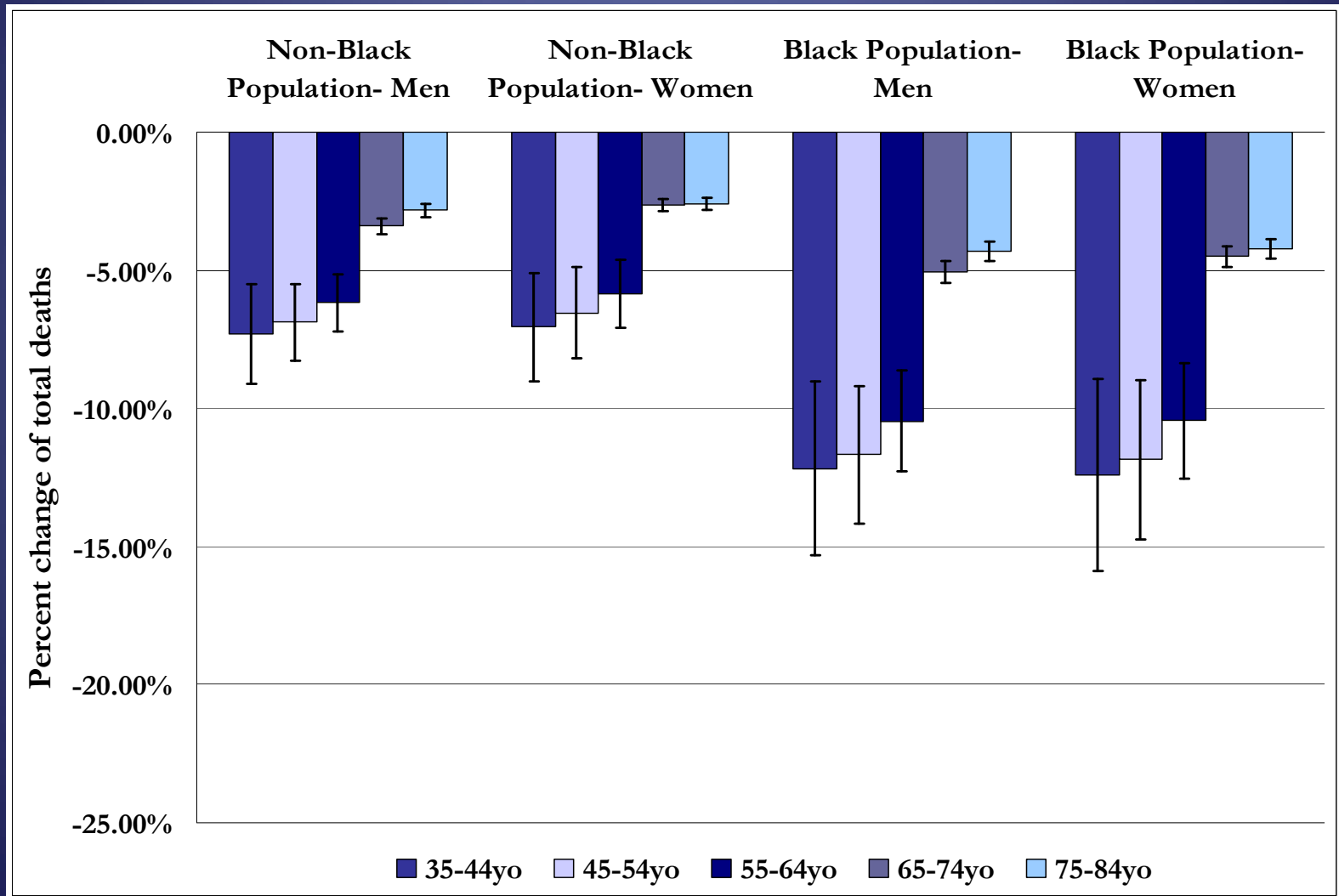
Modeling health benefits of population-wide reductions in salt

- CHD Policy Model
 - Dynamic population-based computer simulation of heart disease in US adults (Markov model)
 - Inputs Census, Vital Statistics, NHANES, Framingham
- Modeled modest reductions in dietary salt
 - 1 and 3 gm/day
 - Salt reduction lowers BP, thereby lowering CVD risk
 - Small effect sizes in normotensives, larger effect sizes in blacks, hypertensives, elderly

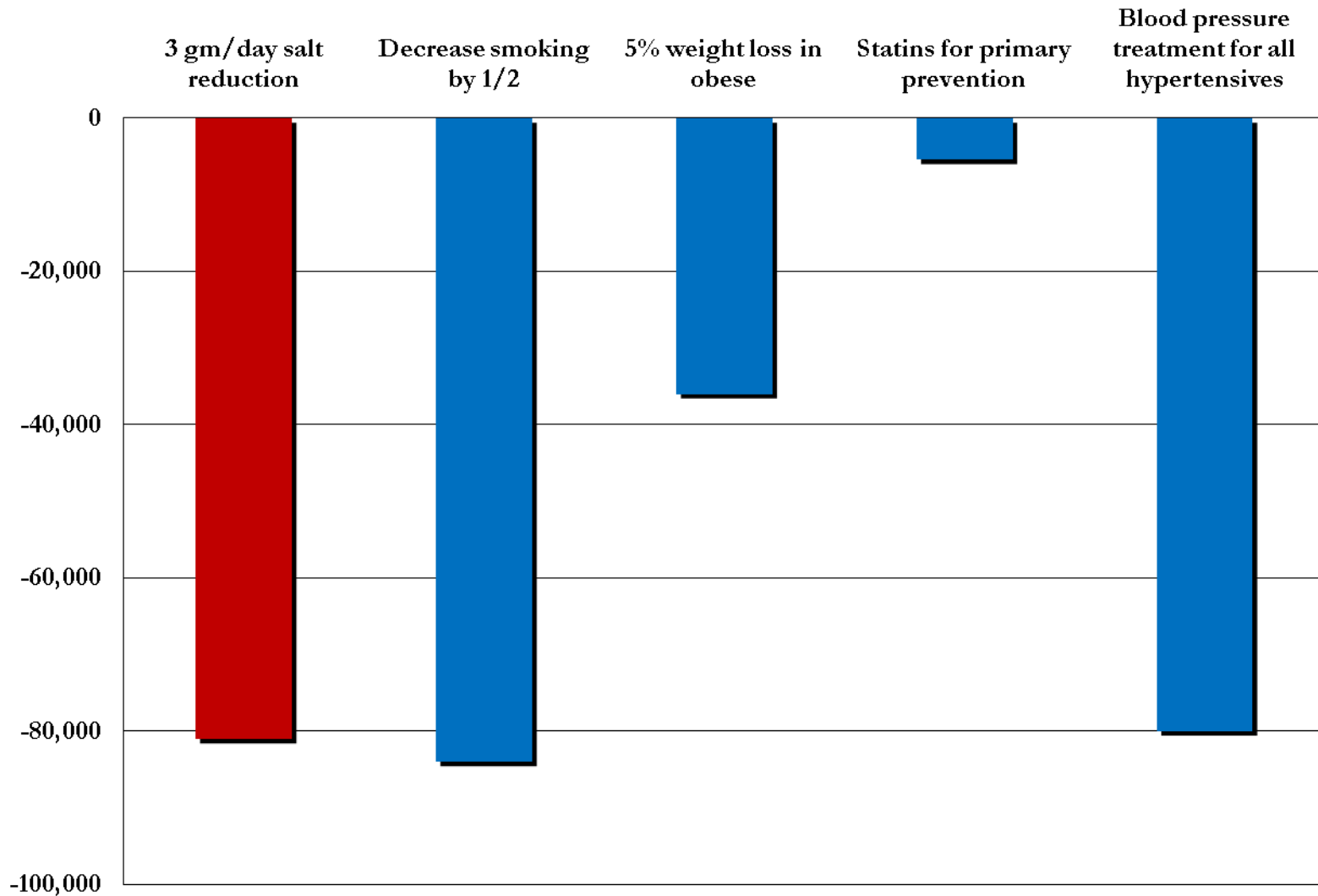
Percent change in incident CHD with 3 gm/day reduction in dietary salt



Percent change in total death events with 3 gm/day reduction in dietary salt by US subpopulations



Comparing salt reduction to other preventive measures (deaths 2010-2019)



Reducing salt → reducing costs

- WHO estimates \$1 per person to reduce salt through regulatory means, public campaigns, monitoring.
 - More cost effective than treating all hypertensives
 - Actually cost savings even if only modest reductions in salt achieved.
 - Gradual reduction over the decade to 1 gm/day reduction -> 7 dollars saved in healthcare for 1 dollar spent.

Salt in the US - 2010

January - New York City announces National Sodium Reduction Initiative modeled on UK efforts.

February-April - NEJM report and two other reports highlighting the health and economic benefits of population-wide sodium reduction.

April - Institute of Medicine releases report recommending that the FDA remove salt from the “Generally Regarded As Safe (GRAS)” categorization.

The Washington Post

FDA plans to limit amount of salt allowed in processed foods for health reasons

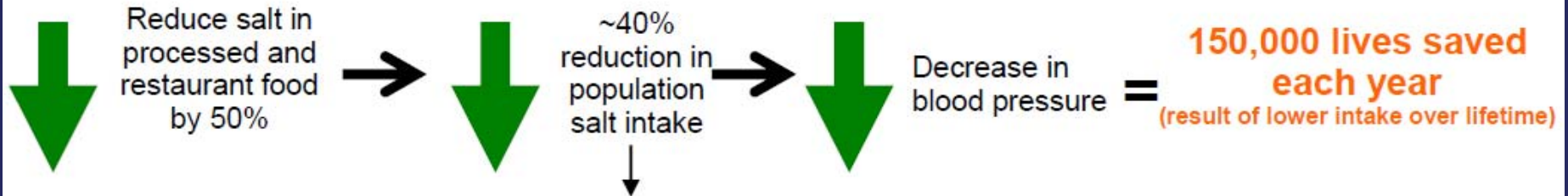
By Lyndsey Layton
Washington Post Staff Writer
Tuesday, April 20, 2010; A01

The Food and Drug Administration is planning an unprecedented effort to gradually reduce the salt consumed each day by Americans, saying that less sodium in everything from soup to nuts would prevent thousands of deaths from hypertension and heart disease. The initiative, to be launched this year, would eventually lead to the first legal limits on the amount of salt allowed in food products.

National Sodium Reduction Initiative (NSRI)

GOAL

National health organizations call for a 50% reduction in the amount of salt in restaurant and processed food in 10 years.



To ensure progress toward the 40% reduction in population salt intake, we commit to an interim goal of a 20% reduction in 5 years.

- Setting targets with manufacturers of packaged foods:
 - 62 categories ranging from breakfast cereal to canned soup
- Setting targets with restaurants:
 - 25 categories ranging from biscuits to burritos

Who has joined the NSRI effort?

Manufacturers

| | |
|----------------|----------------|
| Boar's Head | LiDestri.Foods |
| FreshDirect | Mars Food |
| Goya Foods | McCain Foods |
| Hain Celestial | Red Gold |
| Heinz | Unilever |
| Kraft Foods | White Rose |

Restaurants

| |
|-------------------|
| Au Bon Pain |
| McCain Foods |
| Starbucks |
| SUBWAY |
| Uno Chicago Grill |

Summary and conclusions

- Considerable evidence linking dietary salt to blood pressure elevation and cardiovascular risk.
- Even modest population-wide reductions in dietary salt could yield substantial health benefits in the US.
- The growing burden of hypertension in the US suggests that additional efforts warranted.

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