

uted ubiquitously in the environment; they directly affect only people who consume them. Although it would be impossible to control which foods individuals purchased, cap and trade would probably result in lower “pollutant” consumption overall, through both moderate decreases in salt, sweetener, and fat content of “high-pollutant” items and increased costs passed on to consumers. Unfortunately, if companies selectively increased the price of “pollutant-heavy” items such as sodas and junk food, the policy could be labeled regressive because it would affect low-income people disproportionately. Taxes on sugared beverages have also been criticized for such inequitable effects,<sup>5</sup> but the health benefits of both policies might tip the balance. Poor people may overconsume unhealthful foods because of their wide availability and low cost, and a policy that recouped some downstream health costs of these foods is economically defensible if consumers underestimate the health effects of poor nutrition or affect other peo-

ple through their behavior (e.g., through public insurance programs). Although this policy alone would be insufficient to improve the diets of low-income Americans, it could be an important part of the equation, along with subsidies for healthful foods, elimination of “food deserts,” and other population-level programs.

Finally, although cap and trade would avoid direct consumer taxation, it would require the public to accept the notion of government regulation of their diet — probably a tough sell in the current political environment. However, similar battles have previously been fought in the name of public health. Even such beneficial interventions as seat belts, airbags, and vaccination campaigns initially faced resistance from Americans who saw them as government encroachment on individual liberties.

Reliance on individual incentives and wellness programs, though politically expedient, probably won't overcome the forces behind poor nutrition. Given the alternative approaches, we believe

that capping and trading certain food ingredients is worthy of consideration. Although it's neither a perfect nor a complete solution, it would be a step in the right direction — it would maintain choice, respect the free market, and potentially reduce the health burden imposed by the American diet.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

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1. Forshee RA. Innovative regulatory approaches to reduce sodium consumption: could a cap-and-trade system work? *Nutr Rev* 2008;66:280-5.

2. Tietenberg T. Cap-and-trade: the evolution of an economic idea. *Agricultural Resource Econ Rev* 2010;39:359-67.

3. Chestnut LG, Mills DM. A fresh look at the benefits and costs of the US acid rain program. *J Environ Manage* 2005;77:252-66.

4. Matisoff DC. Making cap-and-trade work: lessons from the European Union experience. *Environment* 2010;52:10-9.

5. Brownell KD, Frieden TR. Ounces of prevention — the public policy case for taxes on sugared beverages. *N Engl J Med* 2009;360:1805-8.

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## The 2010 Dietary Guidelines — The Best Recipe for Health?

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The 2010 U.S. Dietary Guidelines were issued earlier this year, though they received little notice in the press. The lack of attention is troubling in a country in the throes of a nutritional crisis manifested most conspicuously in the form of an obesity epidemic that threatens to reverse recent gains in life expectancy. The current process for revising dietary guidance involves four steps: development by the Institute of Medicine (IOM) of “dietary

reference intakes” (DRIs, formerly “recommended daily allowances”) for use primarily by health care professionals; formulation of recommendations, after review of relevant literature, by an expert committee appointed by the U.S. Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS); creation of the official dietary guidelines in a closed-door process at the USDA with input from the DHHS; and issuance of an

image depicting key messages for the public. Although the guidelines' direct educational influence is modest, they have major impact on Americans' diets, because federal food policies, including standards for schools, and many federal food-assistance programs must comply with them. The guidelines' development was carefully watched by agro-industrial interests that stand to gain or lose from their implementation.

The new guidelines represent a

mix of progress and lost opportunities. The advances include greater use of systematic reviews and increased transparency in early development stages. The guidelines appropriately emphasize eating more vegetables, beans, fruits, whole grains, and nuts and highlight healthful plant-based eating patterns, including vegetarian and vegan diets. They recommend replacing some red meat and poultry with fish, rather than simply including all these foods in the same category as other major protein sources, which vary in many ways, including fatty-acid and cholesterol content. Replacement of trans fats and saturated fats with unsaturated fats receives greater attention. Focus is placed on limiting total calorie intake instead of the proportion of calories from fat, a recommendation that we believe was never based on clear evidence. And the guidelines describe ways that physicians, organizations, and communities can act to improve people's diets and levels of physical activity; for example, physicians can help motivate Americans to prepare and consume healthful foods and advocate for healthier foods in health care facilities.

Unfortunately, several components of the new guidelines lack scientific foundation and hinder progress. The 35% limit on calories from fat, which remains

embedded deep within the document, may inadvertently undermine the quality of federally funded nutrition programs. The guidelines continue to recommend three daily servings of dairy products, despite a lack of evidence that dairy intake protects against bone fractures<sup>1</sup> and probable or possible links to prostate and ovarian cancers.<sup>2</sup> Although eating of whole grains is encouraged, half of recommended grain intake may be in the form of refined carbohydrates, which provide many unneeded calories and cause adverse metabolic consequences. Furthermore, the quality of carbohydrates, as characterized by their glycemic index, is dismissed as unimportant, whereas we believe the evidence strongly suggests the opposite.<sup>3</sup>

The new focus on reducing solid fats and added sugar (collectively referred to as "SOFAS") could be confusing to many consumers. A clearer message would have been that Americans must reduce consumption of red meat, cheese, butter, and sugar, but that message would have offended powerful industries. Deep in the guidelines, diligent readers can find a recommendation to limit sugar-sweetened beverages, but these products deserve front-page attention as the single-greatest source of calories in the U.S. diet and an important con-

tributor to obesity, diabetes, heart disease, gout, and dental caries. This imbalance — foods whose intake should be increased are described clearly, but those whose intake should be reduced are hidden in fine print or obscure acronyms — typifies USDA and DHHS guidelines.

Admittedly, it's difficult to develop clear, scientifically sound guidelines. Only recently have results become available from large, long-term, prospective studies examining specific foods and clinical outcomes, and more research is needed. A focus on foods, rather than individual nutrients, is particularly important because the relationship between diet and chronic disease cannot be adequately predicted from the effects of individual nutrients, and because people choose foods, not nutrients, when deciding what to eat.<sup>4</sup> Moreover, the guidelines represent the assessments of a relatively small group of experts with limited time, who must summarize and interpret a vast, complex, often inconsistent, and rapidly growing body of data. In this context, prior beliefs may weigh heavily.

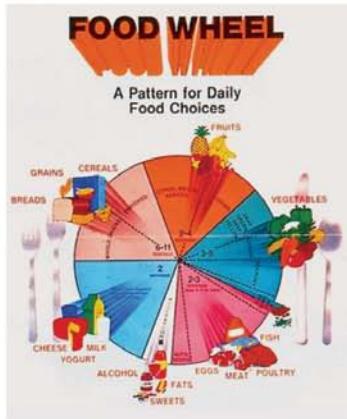
Indeed, there are fundamental flaws in the process underlying guideline development, but these could largely be remedied (see box). Congress mandates that the dietary guidelines be revised every 5 years, a cycle that recognizes the evolving nature of science, public health issues, and the food supply. The revision includes a primary evidence review by an expert committee that is instructed to be consistent with earlier reports on DRIs from the IOM. But the IOM has no mechanism for regular review, and some nutrients haven't been examined for many years. For example, the prevailing limit on total fat consump-

#### Recommendations for Reforming the Process for Revising the U.S. Dietary Guidelines.

- Move primary responsibility for guideline development to the CDC or IOM, to avoid conflicts of interest at the USDA arising from its institutional mission to promote commodities
- Provide the advisory committee with adequate funds to ensure a comprehensive scientific review
- Regularly update nutrient DRIs (used to inform the dietary guidelines)
- Conduct all stages of guideline development in open meetings
- Prepare public recommendations with direct input from advisory committee members
- Base recommendations primarily on foods, not nutrients
- Write guidelines that explicitly state which foods should be consumed less by Americans to reduce risk for chronic disease



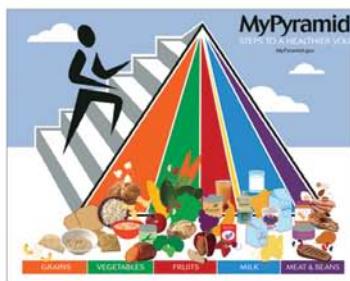
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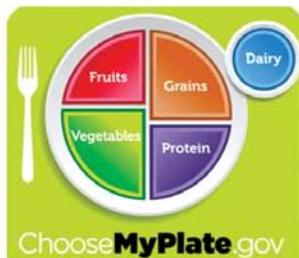
1984



1992



2005



2011

USDA Dietary Icons.

tion to 35% of calories derives from a 2002 report based on evidence purportedly linking the percentage of energy in the diet from fat with obesity. However, this relationship has since been refuted in many well-controlled, prospective, observational studies and clinical trials that show little independent effect of dietary fat on body weight. Nevertheless, the diets of millions of Americans who participate in school-lunch and nutrition-assistance programs remain loaded with refined carbohydrates in an effort to reduce fat as a proportion of total calories, whereas the focus should be on replacing trans and saturated fats with healthier fat. In addition, the recommendation to consume large amounts of dairy products follows from IOM-inspired goals for nutrient intake that may be fundamentally flawed. For example, the calcium DRI is based on measurements of calcium intake and losses in feces and urine over periods of less than 14 days, which probably don't reflect bones' long-term calcium content.<sup>5</sup> Although DRIs warrant consideration (and periodic reassessment), recommendations regarding foods and dietary patterns should be based primarily on evidence about health outcomes, not levels of specific nutrients.<sup>4</sup>

The final step in the guideline-development process is the issuing of a graphic representation summarizing key messages. The original Food Guide Pyramid, which encouraged substituting grain products for dietary fat (irrespective of their nutritional quality), may have inadvertently contributed to epidemics of metabolic syndrome and related chronic diseases by increasing refined-starch consumption. The 2005 version, MyPyramid, conveyed little interpretable guidance about health-

ful food choices. The current administration, motivated by First Lady Michelle Obama's campaign against childhood obesity, has replaced MyPyramid with MyPlate. This image improves on its immediate predecessors, especially with advice to cover half the plate with vegetables and fruits. Curiously, MyPlate closely resembles the original 1940s icon, the Basic Seven — though it omits the category for “butter and fortified margarine” (Group Seven, see graphics). However, as a representation of dietary guidelines, MyPlate is inherently constrained, most notably by failures to distinguish between whole grains and refined grain products and among protein sources, and by continued promotion of high dairy consumption.

Although important progress has been made, Americans will need to rely on multiple sources for information about diet and health until the process of formulating the guidelines is fundamentally improved.

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1. Bischoff-Ferrari HA, Dawson-Hughes B, Baron JA, et al. Milk intake and risk of hip fracture in men and women: a meta-analysis of prospective cohort studies. *J Bone Miner Res* 2011;26:833-9.
2. World Cancer Research Fund. Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Washington, DC: American Institute for Cancer Research, 2007.
3. Barclay AW, Petocz P, McMillan-Price J, et al. Glycemic index, glycemic load, and chronic disease risk — a meta-analysis of observational studies. *Am J Clin Nutr* 2008;87:627-37.
4. Mozaffarian D, Ludwig DS. Dietary guidelines in the 21st century — a time for food. *JAMA* 2010;304:681-2.
5. Institute of Medicine. Dietary reference intakes for calcium and vitamin D. Washington, DC: National Academies Press, 2011.

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