

**AMERICAN JOURNAL OF  
Preventive Medicine**

VOLUME 43(5)      www.ajpmonline.org      NOVEMBER 2012

<p><b>Research Articles</b></p> <p><b>461</b> Racial Disparity in U.S. Diagnoses of Acquired Immune Deficiency Syndrome, 2000–2009 <small>Q An, J Prejean, H Hall</small></p> <p><b>467</b> Social Media–Delivered Sexual Health Intervention: A Cluster Randomized Controlled Trial <small>SS Bull, DK Levine, SR Black, SJ Schmiege, J Santelli</small></p> <p><b>475</b> Promotion of Smoking Cessation with Emotional and/or Graphic Antismoking Advertising <small>MC Farsely, JC Duke, KC Davis, JM Nonnemaker, K Kaniyab, JG Willett, HR Juster</small></p> <p><b>483</b> Health and Health Behavior Differences: U.S. Military, Veteran, and Civilian Men <small>KD Hoerster, K Lehavot, T Simpson, M McFall, G Reiber, KM Nelson</small></p> <p><b>490</b> Energy Content of U.S. Fast-Food Restaurant Offerings: 14-Year Trends <small>KW Bauer, MD Hearst, AA Earnest, SA French, JM Oakes, LJ Harnack</small></p> <p><b>498</b> Energy Intake from Restaurants: Demographics and Socioeconomics, 2003–2008 <small>LM Powell, BT Nguyen, E Han</small></p> <p><b>505</b> Nutrition-Labeling Regulation Impacts on Restaurant Environments <small>BC Saelens, NL Chan, J Krieger, Y Nelson, M Boles, TA Colburn, K Glanz, ML Ta, B Bruemmer</small></p> <p><b>512</b> Longitudinal Cardiorespiratory Fitness Algorithms for Clinical Settings <small>AS Jackson, X Sui, DP O'Connor, TS Church, D-c Lee, EG Artico, SN Blair</small></p> <p><b>520</b> Family Structure and Park Use Among Parents <small>Y Fan, SA French, KV Das</small></p> <p><b>Brief Reports</b></p> <p><b>527</b> A Social Media–Based Physical Activity Intervention: A Randomized Controlled Trial <small>DN Cavallo, DF Tate, AV Riss, JD Brown, RF DeVellis, AS Ammerman</small></p>	<p><b>533</b> Pediatrician Interventions and Thirdhand Smoke Beliefs of Parents <small>JE Drehmer, DJ Ostip, NA Rigotti, E Nabi-Burza, H Woo, RC Wasserman, Y Chang, JP Winickoff</small></p> <p><b>Review and Special Articles</b></p> <p><b>537</b> Melanoma Treatment Costs: A Systematic Review of the Literature, 1990–2011 <small>GP Guy Jr, DU Ekwueme, FK Tangka, LC Richardson</small></p> <p><b>Research and Practice Methods</b></p> <p><b>546</b> Evaluating the Feasibility of Measuring Travel to School Using a Wearable Camera <small>P Kelly, AB Doherty, A Hamilton, A Matthews, AM Batterham, M Nelson, C Foster, G Gombum</small></p> <p><b>Guide to Community Preventive Services</b></p> <p><b>551</b> Stand-Alone Mass Media Campaigns to Increase Physical Activity: A Community Guide Updated Review <small>DR Brown, J Soares, JM Epping, TJ Lankford, JS Wallace, D Hopkins, LR Buchanan, CT Orleans, and the Community Preventive Services Task Force</small></p> <p><b>562</b> Stand-Alone Mass Media Campaigns to Increase Physical Activity: Updated Findings from the Community Preventive Services Task Force <small>Community Preventive Services Task Force</small></p> <p><b>Current Issues</b></p> <p><b>565</b> Reducing Portion Sizes to Prevent Obesity: A Call to Action <small>LR Young, M Nestle</small></p> <p><b>Editorials and Commentary</b></p> <p><b>569</b> The Public Health Implications of Fast-Food Menu Labeling <small>BM Popkin</small></p> <p><b>571</b> Health Behavior Interventions in the Age of Facebook <small>NK Cobb, AL Graham</small></p>
---	---

A Journal of the

 American College of Preventive Medicine	 ASSOCIATION FOR PREVENTION TEACHING AND RESEARCH
---	---

ELSEVIER

This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

<http://www.elsevier.com/copyright>

# Reducing Portion Sizes to Prevent Obesity

## A Call to Action

Lisa R. Young, PhD, RD, Marion Nestle, PhD, MPH

The prevalence of obesity shows no signs of decreasing in the U.S.<sup>1</sup> Because it raises risks for chronic diseases and premature death, the 2010 Dietary Guidelines for Americans<sup>2</sup> state that this condition poses “the single greatest threat to public health in this century.” It seems evident that the current obesity epidemic is caused by an excess of calorie intake over expenditure encouraged by an environment that promotes excessive food intake and discourages physical activity. Restaurant foods, large portion sizes, and ubiquitous food, all heavily marketed, contribute to calorie overconsumption.<sup>3</sup>

The Dietary Guidelines point to the role of this food environment—especially the marketing of large portion sizes—as a critical factor contributing to excessive energy intake.<sup>2</sup> In 2001, the U.S. Surgeon General urged the food industry to produce foods in smaller portions,<sup>4</sup> in recognition that food sizes served outside the home had increased since the 1980s, and had done so in tandem with the rising prevalence of obesity.<sup>5,6</sup> Portion sizes have expanded well beyond federal serving sizes used as standards for dietary guidance and food labels, and demonstrably are confusing to people trying to follow dietary advice.<sup>7</sup> Large food portions contain more calories than smaller portions. They encourage people to consume more food<sup>8</sup> and to underestimate caloric intake.<sup>9</sup>

Body weight is the result of the balance between calories consumed and those expended. Because reported levels of physical activity have changed little since the early 1980s,<sup>10</sup> calorie intake must have increased. Indeed, U.S. Department of Agriculture (USDA) data on the availability of calories in the food supply indicate an average increase of 700 kcal/day per capita since then.<sup>11</sup> Further, dietary intake surveys indicate an average per capita increase of 200–300 kcal/d.<sup>12</sup> Numbers within this range are consistent with estimates of the increase in calorie intake required to account for current levels of weight gain.<sup>13</sup>

Much of the increase in calorie intake can be attributed to foods consumed outside the home in restaurants and fast-food places. Americans spend nearly half their food budget, and consume about one third of their daily calories, from foods prepared outside the home where portion sizes have expanded greatly.<sup>14</sup> Regular fast-food consumption contributes to increased caloric intake, weight gain, and obesity in adults and children.<sup>15</sup> Thus, USDA's MyPlate food guide advises the public to “avoid oversized portions.”<sup>16</sup>

How has the industry responded to such calls? Research in the early 2000s described the sizes of food portions offered in the highest-selling take-out establishments, fast-food, and family-type restaurants. These foods, such as soda, pizza, hamburgers, pasta, and candy, constitute leading contributors of energy as reported in national dietary intake surveys.<sup>5</sup> This paper reports on more-recent observations of the sizes of such foods.<sup>2,17</sup> Information on portion sizes was obtained from company websites and brochures. Promotional materials provided by companies also were reviewed to assess how companies are marketing new larger-sized products. Details about these methods have been described elsewhere.<sup>5,18</sup>

### Recent Changes in Food Portions

As shown in Figure 1, marketplace portions of many foods have continued to increase through the first decade of the 21st century. Recent observations identified 147 new large-size portions introduced from 2000 to 2009, among them hamburgers, pizza, burritos, candy bars, and beverages. The top fast-food chains introduced many new large-sized portions.

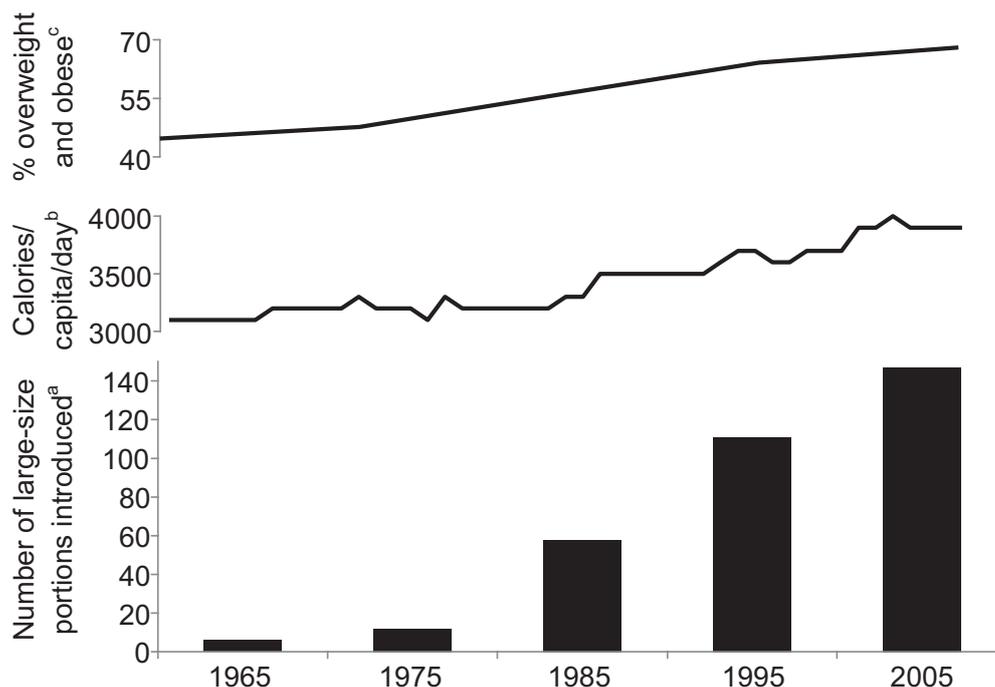
For example, McDonald's introduced an Angus Third Pounder (850 kcal), and Wendy's introduced larger-sized burgers including a Triple Baconator burger (~1300 kcal) and the Classic Triple with Everything (~1000 calories). Burger King introduced a Quad Stacker sandwich (1000 kcal); a King-size 42-oz soda (410 kcal); a Steakhouse Burger (950 kcal); and the Enormous Omelet Sandwich (730 kcal). Its Original Whopper contained 670 kcal, but the more recent Triple Whopper provides 1230 kcal with cheese. Subway introduced “Footlong” recession specials containing nearly 1200 calories each. Hardee's debuted Thickburgers with two thirds of a pound of beef; its Monster Thickburger contains 1420 calories.

From the Department of Nutrition, Food Studies, and Public Health, New York University, New York, New York

Address correspondence to: Lisa R. Young, PhD, RD, Department of Nutrition, Food Studies, and Public Health, New York University, 411 Lafayette Street, 5th Floor, New York NY 10003. E-mail: [lisa.young@nyu.edu](mailto:lisa.young@nyu.edu)

0749-3797/\$36.00

<http://dx.doi.org/10.1016/j.amepre.2012.07.024>



**Figure 1.** Parallel trends in overweight and obesity, calories in the food supply, and large-size portions, U.S., 1960–2009

<sup>a</sup>Large portions introduced by decade; bars display midpoint Year.<sup>5</sup>

<sup>b</sup>U.S. Department of Agriculture food availability series: [www.ers.usda.gov/Data/FoodConsumption/](http://www.ers.usda.gov/Data/FoodConsumption/)

<sup>c</sup>U.S. adults ages 20 years and above, with BMI >25. NHANES surveys, 1960–2008. [www.cdc.gov/nchs/data/hestat/overweight/overweight\\_adult.htm](http://www.cdc.gov/nchs/data/hestat/overweight/overweight_adult.htm); [www.cdc.gov/NCHS/data/hestat/obesity\\_adult\\_07\\_08/obesity\\_adult\\_07\\_08.pdf](http://www.cdc.gov/NCHS/data/hestat/obesity_adult_07_08/obesity_adult_07_08.pdf)

National restaurant chains such as Denny's, Ruby Tuesday, and The Cheesecake Factory also added larger-size menu items. The calorie counts of such items constitute substantial fractions of the 2000–3000 kcal/day required by most Americans to maintain weight. As shown in Figure 1, this trend coincides with both the availability of calories in the U.S. food supply and the increasing prevalence of overweight among U.S. adults.

Although it may seem self-evident that larger portions contain more calories than smaller portions, this relationship is not intuitively obvious as confirmed by published research<sup>9</sup> and preliminary observations. In spring 2010, nearly 100 students in an introductory nutrition class were asked to state the number of calories in an 8-oz soda and in a 64-oz Double Gulp. Nearly 70% of students underestimated the proportional increase in calories, with most multiplying by a factor of 3, not 8. Students explained that they did not believe that a soda could contain as many as 800 calories.

Because the cost of food is low relative to the costs of labor and processing, competition has encouraged the food industry to offer larger-size portions as a way to expand market share. In 2011, Starbucks introduced 31-oz iced beverages, perhaps to compete with McDonald's 32-oz sweet tea drinks. Food companies price larger portions favorably as a means to stimulate sales. At a local

New York City 7-Eleven, the recent cost of a 20-oz soda was \$1.09 (~5¢/oz), but its 64-oz counterpart was \$1.49 (~2¢/oz). Similarly, at a local New York City Kentucky Fried Chicken (KFC), the smallest 20-oz size costs twice as much per ounce as the 64-oz Mega Jug.

Soda companies tend not to sell smaller sizes individually. Coca-Cola's 7.5-oz cans, for example, must be purchased in a pack of 8 (75¢ per can), whereas an 8-pack of the 12-oz size runs 50¢ per can.

Similar pricing strategies apply to 100-calorie packages of snack foods. Food companies are reluctant to eliminate larger-size portions. When offering smaller sizes, they typically introduce new larger-size items concurrently. In 2004, Ruby Tuesday's reduced portion sizes but quickly dropped that idea in response to consumer complaints and losses in sales; the next year, it introduced an 1800-kcal Ultimate Colossal Burger. McDonald's dropped the term Supersize, but continues to sell large portions under different names. In 2007, TGI Friday's introduced a Right Portion Right Price promotion, still available today, but the chain also sells many larger portions, including a 10-oz steak and a full rack of ribs.

Although European portion sizes also have expanded, they are not as large as U.S. portions, perhaps because of lower demand. The largest Coca-Cola served in the British Burger King contains nearly 150 fewer calories than

the largest U.S. size, and its largest french fries provides 200 fewer calories. Similarly, the largest soda in the British McDonald's contains 100 fewer calories than its U.S. counterpart.

### **A Call to Action**

These observations suggest that the food industry has not responded—and, perhaps, is not able to respond—to pleas from health officials to reduce portion sizes. By now, Americans have become conditioned to larger portions and expect them to be served when eating out. Food companies are reluctant to reduce portion sizes and to risk alienating customers who might feel cheated. To address this problem, four approaches should be considered.

### **Education and Public Health Campaigns Aimed at Individuals**

Health professionals should continue to advise patients to eat less by choosing smaller portions and eating only when hungry. The recently released report by the IOM highlights the role of the health professional as an advocate to support healthy lifestyles and improve dietary choices.<sup>19</sup> Physicians and nutritionists should advocate portion-control strategies when advising patients who need to lose weight. Such approaches can be effective. A recent study found obese children to have an easier time following a portion-controlled diet than a reduced-carbohydrate diet, particularly in the long term.<sup>20</sup> Obese adults also are more likely to report achieving meaningful weight loss if they consume smaller portions rather than following fad diets.<sup>21</sup>

When the new calorie labeling law goes into effect, it may help customers better grasp the concept that larger portions have more calories. New York City has required menu labeling since 2008, and also has created subway campaigns to encourage riders to choose smaller portions as a means to reduce risks for obesity and its health consequences.<sup>22</sup> Although this approach seems promising, its degree of effectiveness remains to be established.

### **Uniform and Reality-Based Serving-Size Standards**

Serving-size definitions need to be more consistent and comprehensible. The FDA establishes size standards for food labels whereas the USDA uses a different set of standards for dietary guidance. Both sets are smaller than the amounts people typically eat and can seem confusing, as the standards differ in both size and units of measurement.<sup>7</sup> The USDA's MyPlate food guide uses ounces or cup equivalents to define the amounts that count toward a day's recommended intake: 1 ounce-equivalent from the grain group

is ½ cup cooked pasta, 1 cup cereal, or five crackers; from the protein group it is 1 ounce of meat, ¼ cup cooked beans, or 1 tablespoon nut butter.<sup>16</sup> Further, FDA standards can be twice as large as USDA standards for common foods such as pasta, juice, and peanut butter. Neither agency intends its standards as recommendations for how much food individuals should consume at one time.

Indeed, the standards bear little relationship to typical marketplace portions. The USDA defines a large muffin as 3 ounce-equivalents, whereas a typical bran muffin can be twice that weight (with twice the calories). The USDA defines a pasta serving as 1 cup cooked and 2 ounce-equivalents of grains, but restaurant servings are closer to 3 cups cooked and 6 ounce-equivalents of grains.<sup>7</sup>

One uniform system is needed to advise the public and explain the relationship between portion size, calories, and body weight. Such a system should be based on more-realistic serving sizes to permit comparison to typical marketplace portions. The FDA's recently released strategic plan for 2012 to 2016 includes a promise to provide accurate and useful information for consumers by updating the Nutrition Facts label and information about serving sizes.<sup>23</sup> Such updating would make it easier for health professionals to encourage healthier eating patterns.

### **Price Incentives for Smaller Portions**

Education alone is rarely sufficient to change behavior. The food environment also must support healthier food choices. For years, advocates have asked for price breaks to stimulate sales of smaller portions in restaurants. The quick-service chain Applebee's has taken a step in this direction in offering half-size portions at 80% of the cost of full-size portions in some of its locations—but only for salads. If price points were to be worked out more favorably and extended to other menu items, this strategy could be helpful for all concerned.

Preliminary evidence indicates that voluntary efforts by the food industry to reduce portion sizes may prove useful. One study offered customers the option to order a half-size portion. Although only 1% of diners asked for a smaller portion on their own, one third accepted offers to downsize, consumed fewer calories, and did not compensate by ordering more.<sup>24</sup>

### **Limits on Portion Sizes in Food-Service Establishments**

If voluntary efforts by food companies to reduce portion sizes continue to prove ineffective, policy approaches should be considered. A good starting point might be to insist on clear serving-size definitions and limitations on the amount of food allowed to be marketed as single servings. These could be limited to no more than twice the standard size given on food labels, or 16 ounces for a soda, for example.

Such a policy, conceived by Mayor Bloomberg of New York City and recently approved by the Board of Health, will be implemented for sugar-sweetened beverages in Spring 2013.

Some researchers have suggested placing limits on unhealthful ingredients such as salt and sugar as a way to induce companies to market healthier products and as an approach that could “profoundly affect our diet.”<sup>25</sup> Although such limitations undoubtedly would encounter opposition from food companies and individuals who oppose any involvement of government in personal choice, they might help improve the health of Americans and reduce the impact of obesity on healthcare costs, an impact now estimated at \$190 billion per year. Mandating price structures that favor the purchase of smaller portions is another approach that warrants attention. Health professionals and policymakers should be urged to consider these and other such approaches and work together to alleviate the effects of large food portions on weight gain.

The authors thank Dr. Domingo Piñero and former graduate student Suzanne Natz, MS, RD, both in the Department of Nutrition, Food Studies, and Public Health at NYU, for technical assistance, and Adrienne Forman, MS, RD, for reading a draft of the paper.

No financial disclosures were reported by the authors of this paper.

## References

1. Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among U.S. adults, 1999–2010. *JAMA* 2012;307(5):491–7.
2. U.S. Department of Agriculture (USDA) and DHHS. Dietary Guidelines for Americans, 2010. [www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf](http://www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf).
3. Levitsky DA, Pacanowski CR. Free will and the obesity epidemic. *Public Health Nutr* 2011;15(1):1–16.
4. DHHS. The Surgeon General’s call to action to prevent and decrease overweight and obesity. Rockville MD: DHHS, Public Health Service, Office of the Surgeon General, 2001.
5. Young LR, Nestle M. The contribution of increasing portion sizes to the obesity epidemic. *Am J Public Health* 2002;92(2):246–9.
6. Nielsen SJ, Popkin BM. Patterns and trends in food portion sizes, 1977–1998. *JAMA* 2003;289(4):450–3.
7. Young LR, Nestle M. Expanding portion sizes in the U.S. marketplace: implications for nutrition counseling. *J Am Diet Assoc* 2003;103(2):231–4.
8. Rolls BJ, Roe LS, Meengs JS. Large portion sizes lead to a sustained increase in energy intake over 2 days. *J Am Diet Assoc* 2006;106(4):543–9.
9. Wansink B, Chandon P. Meal size, not body size, explains errors in estimating the calorie content of meals. *Ann Intern Med* 2006;145(5):326–32.
10. CDC. Physical activity trends—U.S., 1990–1998. *MMWR Morb Mortal Wkly Rep* 2001;50:166–9.
11. Hiza HAB, Bente L, Fungwe T. Nutrient content of the US food supply, 2005. Home Economics Research report no. 58. Washington DC: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, 2008.
12. Wright JD, Wang CY. Trends in intake of energy and macronutrients in adults from 1999–2000 through 2007–2008. *NCHS Data Brief* 2010;49:1–8.
13. Katan MB, Ludwig DS. Extra calories cause weight gain—but how much. *JAMA* 2010;303(1):65–6.
14. Economic Research Service. Food marketing system in the U.S.: food service. Washington DC: U.S. Department of Agriculture, 2010. [www.ers.usda.gov/Briefing/FoodMarketingSystem/foodservice.htm](http://www.ers.usda.gov/Briefing/FoodMarketingSystem/foodservice.htm).
15. Rosenheck R. Fast food consumption and increased caloric intake: a systematic review of trajectory towards weight gain and obesity risk. *Obes Rev* 2008;9(6):535–7.
16. U.S. Department of Agriculture. MyPlate. Washington, 2011. [www.choosemyplate.gov/](http://www.choosemyplate.gov/).
17. National Cancer Institute. Food sources of energy among US population, 2005–06. [riskfactor.cancer.gov/diet/foodsources/](http://riskfactor.cancer.gov/diet/foodsources/).
18. Young LR. Portion sizes in the American food supply: issues and implications [dissertation]. New York: New York University, 2000.
19. IOM. Accelerating progress in obesity prevention: solving the weight of the nation. Consensus report. Washington DC: National Academies Press, 2012.
20. Kirk S, Brehm B, Saelens BE, et al. Role of carbohydrate modification in weight management among obese children: a randomized clinical trial. *J Pediatr* 2012;161(2):320–7.
21. Nicklas JM, Huskey KW, Davis RB, Wee CC. Successful weight loss among obese U.S. adults. *Am J Prev Med* 2012;42(5):481–5.
22. New York City Department of Mental Health and Hygiene. New ad campaign spotlighting increasing portion sizes and their devastating consequences. 2012. [www.nyc.gov/html/doh/html/home/home.shtml](http://www.nyc.gov/html/doh/html/home/home.shtml).
23. Food and Drug Administration. FDA foods and veterinary medicine program strategic plan 2012–2016. Silver Spring MD: FDA. April 2012. [www.fda.gov/downloads/AboutFDA/CentersOffices/OfficeofFoods/UCM273732.pdf?source=govdelivery](http://www.fda.gov/downloads/AboutFDA/CentersOffices/OfficeofFoods/UCM273732.pdf?source=govdelivery).
24. Schwatz J, Riis J, Elbel B, Ariely D. Inviting consumers to downsize fast-food portions significantly reduces calorie consumption. *Health Aff* 2012;31(2):399–407.
25. Lewis KH, Rothenthal MB. Individual responsibility or a policy solution—cap and trade for the U.S. diet? *N Engl J Med* 2011;365:1561–3.

### Did you know?

You can sign up for saved search and table of contents email alerts on the *AJPM* website.  
Visit [www.ajpmonline.org](http://www.ajpmonline.org) today!