

The Contribution of Expanding Portion Sizes to the US Obesity Epidemic

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The prevalence of overweight and obesity has increased sharply among US adults and children in recent years.^{1–3} Although multiple factors can account for weight gain, the basic cause is an excess of energy intake over expenditure. If, as has been reported, activity patterns have not changed much in the past decade,^{4,5} the rise in body weights must be caused by increased energy intake. Indeed, dietary intake surveys indicate a per capita increase of 200 kcal/d from 1977–1978⁶ to 1994–1996,⁷ and the US food supply (total food produced, less exports, plus imports) now provides 500 kcal/d per capita more than in the 1970s.⁸ Regardless of how imprecise such figures may be, they appear to confirm that Americans consume more energy than they did in the past.

At issue is the cause of this increase. An obvious suggestion is food consumed outside the home, which accounted for 34% of the food budget in 1970⁹ but 47% by the late 1990s.¹⁰ Another possibility is the size of food portions. Many observations hint that out-of-home portion sizes are increasing.¹¹ Larger portions not only contain more energy but also encourage people to eat more,^{12–14} making it more difficult to balance static levels of physical activity. Although federal dietary advice is to choose “sensible portions,”¹⁵ these portions are not defined except by US Department of Agriculture (USDA) standards given in the food guide pyramid¹⁶ and US Food and Drug Administration (FDA) standards for food labels.¹⁷ Both agencies base standards, in part, on information reported in dietary intake surveys,^{18,19} but the standards appear to be smaller than marketplace portions. Because such discrepancies may confuse people who are attempting to follow dietary advice²⁰ and because little information is available on the current sizes of marketplace portions, we measured and compared food weights with those offered in the past and with USDA and FDA standards.

Objectives. Because larger food portions could be contributing to the increasing prevalence of overweight and obesity, this study was designed to weigh samples of marketplace foods, identify historical changes in the sizes of those foods, and compare current portions with federal standards.

Methods. We obtained information about current portions from manufacturers or from direct weighing; we obtained information about past portions from manufacturers or contemporary publications.

Results. Marketplace food portions have increased in size and now exceed federal standards. Portion sizes began to grow in the 1970s, rose sharply in the 1980s, and have continued in parallel with increasing body weights.

Conclusions. Because energy content increases with portion size, educational and other public health efforts to address obesity should focus on the need for people to consume smaller portions. (*Am J Public Health.* 2002;92:246–249)

METHODS

We sampled foods sold for immediate consumption in the most popular take-out establishments, fast-food outlets, and family-type restaurants; such places account for much of the recent increase in out-of-home food consumption, rank highest in sales, and exhibit the highest growth rates.^{9,21,22} We sampled foods such as white-bread products, cakes, alcoholic beverages, steak, and sodas that represent food categories reported in national surveys as major contributors of energy to US diets and are marketed as single servings.^{23,24} We obtained information about portion weights from package labels or from manufacturers. If such information was unavailable, and to confirm the accuracy of reported information, we weighed at least 2 samples of each food with a calibrated Sysco Digital Portion Scale (Model SDS-10) and recorded average weights. We compared portion weights with standard portions established by USDA for dietary guidance¹⁶ and by FDA for food labels.¹⁹ We obtained information about the sizes of foods offered in past years directly from manufacturers or indirectly from examination of trade publications, professional journals, marketing and advertising materials, menu collections, cookbooks, guides to fast foods, and older

editions of food composition tables. Details about these methods and their validation are described elsewhere.²⁵

RESULTS

With the single exception of sliced white bread, all of the commonly available food portions we measured exceeded—sometimes greatly—USDA and FDA standard portions. Figure 1 displays the percentage difference between measured and standard portion sizes. The largest excess over USDA standards (700%) occurred in the cookie category, but cooked pasta, muffins, steaks, and bagels exceeded USDA standards by 480%, 333%, 224%, and 195%, respectively. Our data indicate that the sizes of current marketplace foods almost universally exceed the sizes of those offered in the past. When foods such as beer and chocolate bars were introduced, they generally appeared in just 1 size, which was smaller than or equal to the smallest size currently available.^{26,27} This observation also holds for french fries, hamburgers, and soda, for which current sizes are 2 to 5 times larger than the originals.²⁵

Our research also reveals indirect indicators of the increasing availability of larger food portions. In contrast to practices that were common just 15 to 25 years ago, food

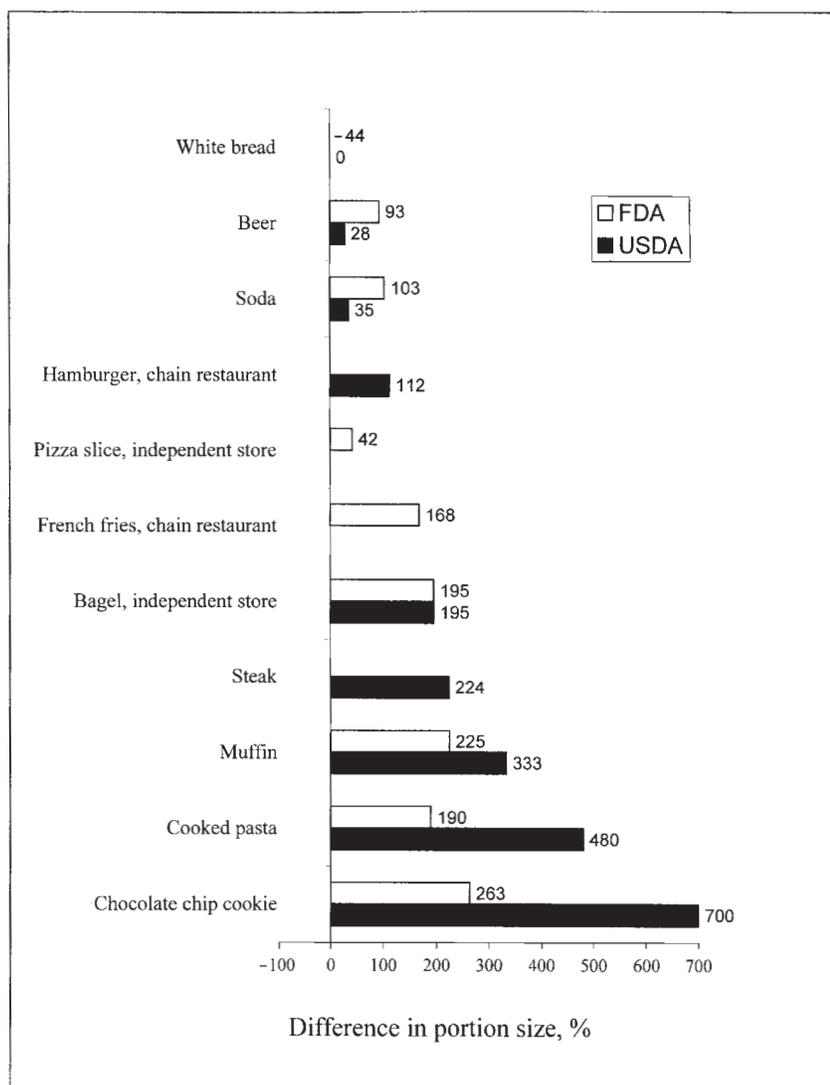


FIGURE 1—Percentage difference between actual portion sizes of ready-to-eat prepared foods and standard US Department of Agriculture (USDA) and US Food and Drug Administration (FDA) portion sizes.

companies now use larger sizes as selling points (e.g., Double Gulp, Supersize); fast-food companies promote larger items with signs, staff pins, and placemats; manufacturers of diet meals such as Lean Cuisine and Weight Watchers frozen dinners advertise larger meal sizes; restaurant reviews refer to large portions;²⁸ and national chain restaurants promote large-size items directly on menus. Restaurants are using larger dinner plates, bakers are selling larger muffin tins, pizzerias are using larger pans, and fast-food companies

are using larger drink and french fry containers.²⁵ Identical recipes for cookies and desserts in old and new editions of classic cookbooks such as *Joy of Cooking* specify fewer servings, meaning that portions are expected to be larger.^{29,30} Another indicator of the trend toward larger portions is that automobile manufacturers have installed larger cup holders in newer models to accommodate the larger sizes of drink cups.³¹ Overall, our observations indicate that the portion sizes of virtually all foods and beverages prepared for

immediate consumption have increased and now appear typical.

Of interest is *when* portion sizes increased. We identified 181 products for which we were able to obtain dates of introduction. As shown in Figure 2, our data suggest that the trend toward larger portion sizes began in the 1970s; portion sizes increased sharply in the 1980s and have continued to increase.

DISCUSSION

Our data indicate that marketplace portions of foods that are major contributors of energy to US diets have increased significantly since the 1970s and exceed federal standards for dietary guidance and food labels. This trend can be attributed to multiple causes, some of them economic. Since the 1970s, the food service industry has grown larger, and people have been eating out more; marketing has become more concentrated, and larger numbers of new products have been introduced.³² Widespread price competition has induced manufacturers to introduce larger items as a means to retain and expand market share; profits for most food items rise consistently when manufacturers increase product size.^{33,34} From a marketing standpoint, oversized packages draw attention to a new product, as research has shown for beer, soft drinks, and fast food.^{35–37} Concern about value also drives the food service industry to offer larger products; many restaurant owners report that customers want more food for their money,³⁸ and consumers increasingly choose restaurants on the basis of the sizes of food portions.³⁹ Large portions often seem like a bargain: 7-Eleven's 16-oz Gulp costs just under 5 cents/oz, but a 32-oz Big Gulp is 2.7 cents/oz.

Obviously, larger portions provide more calories. A 2.1-oz Butterfingers candy bar contains 270 kcal, whereas the 5.0-oz "Beast" supplies 680 kcal. The 7-Eleven Double Gulp, a 64-oz soda, contains nearly 800 kcal—an amount 10 times the size of a Coca-Cola when it was introduced⁴⁰ and calorically equivalent to more than one third of the energy requirement of large segments of the population.⁴¹ Increased consumption of fast foods contributes to increased caloric intake;⁴² this problem could well be made

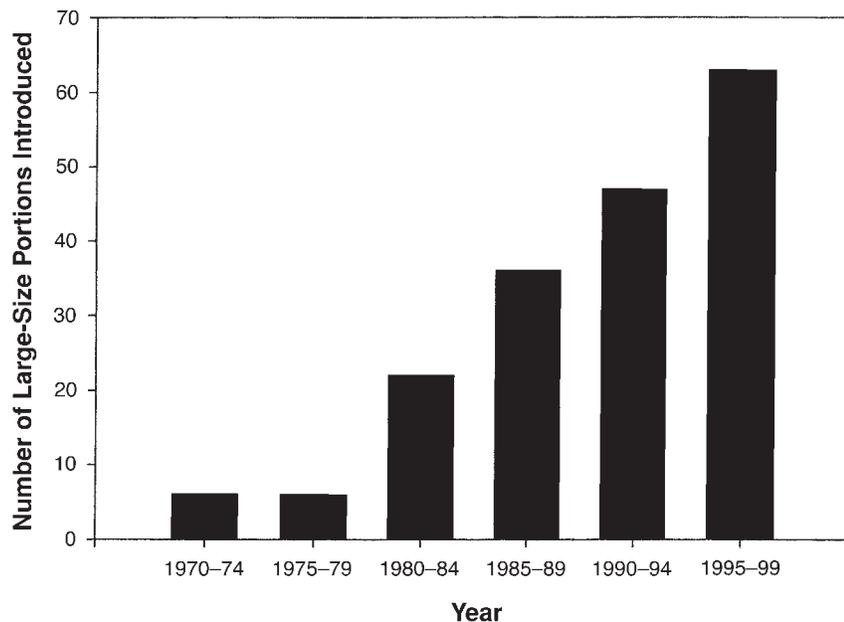


FIGURE 2—Introduction of new, larger portions, 1970–1999.

worse by the “supersizing” of menu items.⁴³ In the mid-1950s, McDonald’s offered only 1 size of french fries; that size is now considered “Small” and is one third the weight of the largest size available in 2001. Today’s “Large” weighs the same as the 1998 “Supersize,” and the 2001 “Supersize” weighs nearly an ounce more. Since 1999, a McDonald’s “Supersize” soda is nearly one third larger than the “Large.” Notably, the sizes of chain fast-food portions in Europe are smaller than those in the United States. McDonald’s “Extra Large” soda portions in London, Rome, and Dublin weigh the same as the US “Large.” In 1998–1999, the largest order of french fries in the United States contained 610 calories,⁴⁴ whereas the largest size in the United Kingdom contained 446 calories.⁴⁵

The trend toward larger portion sizes has occurred in parallel with other increases—in the availability of energy in the US food supply, in dietary intake of energy, and in the prevalence of overweight and obesity. Although parallel trends suggest a causal relationship, they also could reflect some external factor that affects these indicators, such as a decrease in energy expenditure that is too small to be measured by current methods for assessing activity levels.

Overall, our survey found that marketplace food portions are consistently larger than they were in the past as well as considerably larger than federal standard portion sizes. These observations suggest a need for greater attention to food portion size as a factor in energy intake and weight management. A recent survey reports that Americans tend to ignore serving size when they are attempting to maintain body weight.⁴⁶ Health authorities call for reducing the prevalence of overweight among Americans⁴⁷ and for public health approaches for doing so.⁴⁸ Public health efforts to explain the relationship of portion size to caloric intake, weight gain, and health might be helpful, as would efforts by federal agencies to make serving size definitions more consistent and comprehensible. The USDA has issued a statement that recognizes the gap between standard servings and typical portions⁴⁹ and could follow it with guidance materials. Portion size affects caloric balance, and educational and other public health programs are needed to address the effects of current food trends. ■

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This article was accepted June 3, 2001.

Contributors

L.R. Young designed the study; collected, analyzed, and interpreted the data; and drafted and revised the manuscript. M. Nestle supervised the study, participated in its intellectual content, and contributed to the editorial content and manuscript revision.

Acknowledgments

We thank professors Sharon Weinberg and Jeffrey Backstrand for advice on the study and Renato Strauss and David Chesler for technical assistance.

The study was supported in part by a scholarship from New York University’s Department of Nutrition and Food Studies and a Dean’s Grant for Student Research from the New York University School of Education.

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