

# Mitigating the Health Risks of Dining Out: The Need for Standardized Portion Sizes in Restaurants

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Because restaurants routinely serve food with more calories than people need, dining out represents a risk factor for overweight, obesity, and other diet-related chronic diseases.

Most people lack the capacity to judge the caloric content of food and there is limited evidence that people make use of calorie-labeling information when it is available. Standardized portion sizes would not preclude people from eating as much as they want, but would make the amount they are getting fully transparent.

We describe the potential benefits and means of implementing a system of standardized portion sizes that might facilitate a healthier diet among the US population. (*Am J Public Health*. 2014;104:586–590. doi:10.2105/AJPH.2013.301692)

**A ROBUST FINDING IN MULTIPLE** experiments, in both natural and laboratory settings, is that when people are served more food than they need, they eat more than they should.<sup>1</sup> Furthermore, there is considerable evidence that many people cannot recognize when portions are increased and cannot rely on internal satiety signals to indicate when they have eaten enough.<sup>2</sup>

Substantial increases in energy consumption over the past four decades have occurred in both children and adults without compensatory increases in the level of energy expenditures.<sup>3</sup> Food away from home is a major contributor to excess calories consumed, contributing more than one third of all calories, while constituting fewer than one third of all eating occasions.<sup>4,5</sup> Data from the 1999–2000 National Health and Nutrition Examination Survey indicate that the average person eats commercially prepared food 2.8 times per week, and since then the frequency of dining out has continued to grow.<sup>6</sup> Because the calories in the portions of food prepared away from home are substantially higher than what is generally prepared at home, dining out has become a major risk factor for obesity.<sup>7</sup>

One public health effort to reduce the risk of consuming too much food away from home has been to mandate menu calorie labeling. Although menu labeling was intended to help people assess their caloric intake, a review indicated that calorie labels do not consistently influence the choices

of most people, in part because people do not notice them, but also because many do not understand their significance.<sup>8</sup>

To mitigate the risk that dining out contributes to chronic diseases, a more effective approach should make serving size a matter that cannot be ignored. One solution is to create and implement a system of standardized portions for people who are eating out, so that all foods are served in quantities that are appropriate for consumption by one person at a single sitting. In this article, we describe the potential benefits and means of implementing a system of standardized portion sizes that might assist the US population in obtaining a healthier diet.

## CURRENT RESTAURANT PORTION SIZES

A review of the calorie content of foods offered by more than 245 restaurant chains and their 30 923 unique menu items found that entrees averaged 674 calories, appetizers 813 calories, sides 260 calories, salads 496 calories, drinks 419 calories, and desserts 429 calories.<sup>9</sup> Because most people order two or more items when they dine out, most meals away from home contain much more than 640 calories, the amount recommended by the Institute of Medicine for lunch or dinner for the average person needing 2000 calories per day.<sup>9</sup>

What people actually order when they dine out is listed in Table 1. The data are from evaluation studies of menu labeling in

which the receipts of diners were collected and analyzed.<sup>10–13</sup> The amounts ordered per person are consistently greater than the recommended calorie levels for the US population, for both children and adults.

## LARGE PORTIONS AND GLOBAL WARMING

Serving excessively large portions of food creates more than just health problems. The energy input required to grow and process food, and in particular to raise livestock, contributes to global warming.<sup>14</sup> Meat products are estimated to be responsible for 18% of all greenhouse gas emissions, attributable to nitrous oxide, methane, and ammonia emissions, as well as land use change, such as deforestation. Animal protein production requires 11 times as much fossil fuel as vegetable proteins and 100 times more water.<sup>14</sup> The 2010 Dietary Guidelines for Americans recommends no more than 1.8 ounces of red meat per day,<sup>15</sup> but Americans consume 37% more than that.<sup>16</sup> Food is estimated to contribute more than seven tons of carbon emissions per household per year, and about half of that is attributable to meat and dairy consumption. Furthermore, it is estimated that merely eating less (e.g., reducing average consumption from 2500 to 2200 calories per day) could substantially reduce household carbon emissions and save the average household \$850 per year.<sup>17</sup>

About 40% of all food is thrown away<sup>18</sup> and 97% of food

**TABLE 1—Average Calorie Content of Food Ordered in Away-From-Home Settings: Evaluation Studies of Menu Labeling in Which the Receipts of Diners Were Collected and Analyzed, United States**

Study Authors	Site	Restaurant Setting	Average Calories Ordered
Dumanovsky et al. <sup>10</sup>	New York City	McDonald's (after calorie labeling)	785
		KFC (after calorie labeling)	868
		Subway (after calorie labeling)	882
Elbel et al. <sup>11</sup>	New York City	Fast-food restaurants including McDonalds, Burger King, Wendy's, and KFC (after calorie labeling)	846
Roberto et al. <sup>12</sup>	Laboratory, CT	Au Bon Pain	1860
Tandon et al. <sup>13</sup>	Seattle, WA	Varied restaurants (burger, Mexican, sandwich) for children (after calorie labeling)	822
	San Diego, CA	Comparison restaurants	949

waste ends up in landfills,<sup>19</sup> where it decomposes to form methane gas that has a global warming potential 25 times that of carbon dioxide.<sup>20</sup> Therefore, appropriate serving sizes could have environmental benefits, as well as health benefits.

### ESTABLISHING STANDARDS FOR PORTION SIZES

Establishing standards is a time-honored method for developing benchmarks, improving outcomes, reducing waste, increasing efficiency, and ensuring compatibility. Sizes for screws, nuts, bolts, railroad tracks, and pipes are standardized, allowing for replicability and consistency. Standardized portion sizes have been used in alcohol beverage control. In the United States, the standard drink poured—whether beer, wine, or spirits—has 0.6 ounces ethanol, providing benchmarks to both servers and consumers. Servers can control the amount of alcohol they sell, and thus have the ability to gauge inventory and profits; consumers can gauge

their risk of inebriation on the basis of the number of drinks they consume. Indeed, a standard component of driver training includes a discussion of the correlation between the number of drinks consumed and blood alcohol levels so people can assess the risk of driving illegally after drinking.<sup>21</sup>

By contrast, although each restaurant might have its own serving standards, there are no standard serving sizes across eating establishments, making it extraordinarily difficult for most consumers to gauge how much they are eating. Moreover, the standardized portion size is a concept that can provide benefits even when people lack basic mathematical skills or knowledge of caloric needs. Although individual caloric needs vary by gender, age, height, physical activity, and metabolic rates, standards should be anchored to 2000 calories per day, the reference amount used by the US Department of Agriculture (USDA) and Department of Health and Human Services (DHHS) Dietary Guidelines for Americans.<sup>15</sup>

### EXISTING SYSTEMS THAT STANDARDIZE PORTIONS

There are already two well-developed systems that define standard portion sizes, the USDA/DHHS Dietary Guidelines for Americans<sup>15</sup> and the US Food and Drug Administration's (FDA's) Reference Amounts Customarily Consumed.<sup>22</sup> The FDA portion sizes are used for packaged foods and were designed to help consumers make comparisons with other foods.<sup>23</sup> The USDA serving sizes are based upon the Food Pyramid (now renamed "MyPlate") and were designed to help people meet daily nutrient recommendations. Both systems use familiar household measures such as cups and tablespoons and are similar, but differ on items including beverages, pasta, and bread.<sup>24</sup> Both standards were initially developed based upon the reported median amounts consumed from the 1977–1978 National Food Consumption Survey,<sup>25</sup> a time before the acceleration of the obesity epidemic. However, the FDA revised its standards based upon

consumption of foods reported on two surveys fielded between 1985 and 1988, resulting in some portions being larger than those of the USDA.<sup>23</sup>

Although the USDA standards may be more appropriate for adoption by restaurants because of their emphasis on nutrition, the FDA standards are more comprehensive, and include portion standards for entrées and mixed dishes. For example, an entrée without sauce should be 85 grams (three ounces) and entrées with sauce no more than 140 grams (five ounces). Thus, both systems could contribute to a standardized portion system to be applied to foods prepared away from home.

Serving sizes of many popular combination meals would change dramatically if the default of a single serving was used for each of the meal components. For example, if McDonald's 1140-calorie Big Mac combo meal with a burger, medium fries, and a 21-ounce soft drink were standardized to USDA portions, it would have half as many calories, with the biggest percentage decrease associated with a smaller beverage.

Until now, the approach to moderating food and beverage intake has largely relied on educating and training consumers, rather than providers, to measure portion sizes. Using the palm of one's hand to estimate size may be helpful, but for foods that are amorphous, and take the shape of their containers, it is particularly difficult for people to estimate volume accurately.<sup>26</sup> In general, the larger a portion, the greater the degree of underestimation.<sup>26</sup> Portion size training has significant limitations and many people never attain the capacity to estimate food volume, even after intensive training.<sup>27</sup>

Another approach to reducing portion sizes has been to promote the use of smaller plates and taller, narrow glasses, but this lacks the precision of actually standardizing the portion sizes. One study that examined how individuals would fill plates of various sizes failed to show that smaller plates resulted in smaller portions.<sup>28</sup> Because reducing portion size is a key requirement for moderating food intake, having standardized portions built into food service infrastructures could help the millions of people who are concerned—or not—about their weight. Ultimately, if demand is reduced, production can decrease, and carbon emissions could be diminished.

### STANDARDIZED PORTIONS AWAY FROM HOME

Usually, when new standards are introduced, there is a transitional period in which arrangements are made to prepare for changing the standards, including training staff and obtaining any necessary materials and supplies needed to implement the changes. In this case, the major tools required will be measuring cups and kitchen scales, and the training would cover how to measure portion sizes for different types of foods. Training in which servers would need to demonstrate their ability to accurately measure and weigh standard amounts typically served in a single portion may take no more than a day of lecture and observed practice. However, implementation among restaurants and fast-food chains that rely on already-prepared meal components may take longer, as they may need to update their assembly lines and packaging with the new standards.

Server training programs have been successfully implemented in

multiple states for alcohol beverage service. Training programs on sanitary standards, which are considerably more complicated than mastering weights and measures, are routinely successfully offered to restaurant workers.<sup>29</sup>

### LABELING, PRICING, AND ENFORCEMENT

In contrast to the complexities of calorie counts, a system of labeling serving sizes in the single digits is relatively simple and easily comprehended. The primary requirement of a standardized portion system would mean that all prepared foods served by any outlet must be available in single portions.

To be practical, there are some foods that cannot be reduced to a single portion without destroying the item's integrity, such as a whole fish. Pricing items that contain multiple portions proportionally is one logical solution that should be considered, and has been found to discourage the purchase of larger sizes among overweight and obese individuals, but not among normal-weight individuals.<sup>30</sup> Nevertheless, even if portions that are meant for more than one person are offered, all foods must also be available in single-portion servings. Currently, offering a deep discount for larger quantities is an incentive for the customer to overconsume.

Requiring the availability of single servings should not preclude restaurants from also offering dishes in sizes larger than one portion. Items that cannot be easily divided and where customers want to consume more than one portion would simply need to be presented based upon the number of serving units they contain and proportionally priced. For example, many restaurants

that offer “family-size portions” would need to clearly state that the serving contained three or four portions, or however many servings it has, with the price commensurately increased, three- or four-fold. Because a single serving of meat is three ounces, a 12-ounce steak would have to be described and priced as containing four portions. (A single-serving size [three ounces] must also be available for purchase.) The intent of a standardized portion system is not to interfere with customer choice, but to make clear the quantity being served. Table 2 provides examples of standardized portions of common foods, including how they are measured and estimated calories.

Ideally, a system of standardized portions would be national in scope, but enforcement would be left to localities that already conduct inspections of food outlets to ensure adherence to sanitary standards. Spot-checking portions

served should be sufficient to monitor compliance.

### ACCEPTABILITY OF STANDARDIZED PORTIONS

No doubt consumers will have a mixed response to a system that standardizes portion sizes. Those who are concerned about their weight and food intake may appreciate the fact that they can be confident about benchmarking their consumption based upon a single portion. This would make it much simpler to adhere to diets and monitor food consumption. People are subject to what has been called a “unit bias,” and typically consume an amount based upon how the food is served.<sup>31</sup> When served a single unit, individuals are usually as satisfied as those served the larger quantity.<sup>2</sup>

The adoption of standardized portions will not prohibit or prevent consumers from ordering and

**TABLE 2—Standard Portions of Common Foods: US Department of Agriculture and Department of Health and Human Services Dietary Guidelines for Americans and the US Food and Drug Administration's Reference Amounts Customarily Consumed**

Food Item	Weight or Volume	Standard Portion	Estimated Calories per Portion
Hamburger patty	Weight	3 oz <sup>a</sup>	192
Raw leafy salad (no dressing)	Volume	1 cup <sup>a</sup>	6
Macaroni and cheese <sup>b</sup>	Volume	1 cup <sup>c</sup>	390
Potatoes	Volume	1/2 cup <sup>a</sup>	52
Pizza <sup>b</sup>	Weight	5 oz <sup>c</sup>	391
French fries	Weight	3 oz <sup>c</sup>	276
Soda	Volume	8 oz <sup>a,c</sup>	100
Chicken chow mein <sup>b</sup>	Weight	7 oz <sup>c</sup>	248
Spaghetti (no sauce)	Volume	1 cup <sup>a</sup>	221
Roast chicken	Weight	2–3 oz <sup>a</sup>	128
Orange juice	Volume	8 oz <sup>c</sup>	110
Burrito with sauce <sup>b</sup>	Weight	7 oz <sup>c</sup>	379

<sup>a</sup>US Department of Agriculture and Department of Health and Human Services Dietary Guidelines for Americans.<sup>15</sup>

<sup>b</sup>Calories highly dependent on ingredient variations.

<sup>c</sup>US Food and Drug Administration's Reference Amounts Customarily Consumed.<sup>22</sup>

eating as much as they want, but it will make it transparently clear how much they are consuming. An athlete may routinely require double portions, whereas a short, sedentary woman might need only a half portion to maintain her weight. Today, in most states that prohibit “all you can drink” sales of alcohol for a single price, customers have to order a second, third, or fourth beer or glass of wine, an important aid to judge one’s risk of inebriation. Likewise, standardized portions are not intended to interfere with individual freedom of choice, but are simply a mechanism to help individuals more accurately gauge their consumption and eliminate unknowing, automatic overconsumption in response to excess food.

Moreover, if implementation were accompanied by an education program that emphasizes that a major goal is to reduce waste and global warming, a standardized portion system may be better accepted, because it is a program developed for the greater common good, rather than as an individual punitive measure.

### POTENTIAL FOOD INDUSTRY RESPONSE

Again, a negative response can be predicted from restaurants, because businesses, in general, do not want to be forced to adhere to more regulations. Such a system would need to be implemented in spite of the food industry’s anticipated objections. Many will claim that they will lose money, as restaurant owners claimed before the enactment of clean indoor air laws. Yet a study of bar and restaurant earnings in New York City showed an increase in profits after indoor smoking was banned, as those who previously disliked being exposed to cigarette smoke

may have decided it was now safe to dine out.<sup>32</sup> In a similar way, food that is served in too large a quantity represents an unsafe eating condition, because of our hardwired “unit bias.” For this reason, many people do not eat out now because they know the quantity of food served will interfere with their diets, but they may feel more comfortable dining out after standard portions are implemented.

Logically, the standardized portion may actually help the bottom line, because reducing portion sizes will reduce costs, and the amount of food served, as well as the amounts wasted. Standardized portions could create a level playing field with other restaurants. Increasing portion size has been a popular means of competition; undoubtedly, restaurants that have successfully used this as a competitive strategy will then be at a disadvantage. Over time, being able to levy extra charges for the “seconds” may be very attractive to restaurants, and more tolerable to consumers as their expectations of portion size adjust to the new system.

The potential environmental benefits of standardized portions to reducing global warming is a feature that may be welcomed by both business and the general population, just as recycling gained broad acceptance across the United States. Every food outlet will be able to do its part.

Although the government has many standards related to sizes and weights, whether such standards can legally be applied to food service has been hotly debated, with at least some scholars considering it a theoretically acceptable, feasible, and warranted public health application.<sup>33</sup> The New York City proposal to ban serving sizes of soda larger than 16 ounces was overturned, in part because it was deemed “arbitrary

and capricious,” as it applied only to sodas, rather than all high-calorie drinks, and covered only a subset of food outlets, excluding convenience stores, such as 7–11, known for serving the Big Gulp. A comprehensive system of standardized portions would overcome these legal concerns, because it would apply to all dining establishments and all food products prepared for immediate consumption.

### LIMITATIONS

Although standardizing portion sizes alone may not achieve the ideal calorie levels for many types of foods, because they may be prepared with high-fat ingredients such as butter, cream, or oils, standardized portion sizes would still be a significant advance in helping individuals curb their consumption, compared with current conditions with no comparability between portion sizes across food outlets. The Institute of Medicine meal guidelines for the USDA Child and Adult Care Food Program rely only on portion sizes and simple guidance about food preparation to achieve nutrient profiles that are largely adherent to the Dietary Guidelines for Americans.<sup>34</sup> The exact calories and nutrients are not specified for each meal, yet the simple use of standardized portions was deemed sufficient and feasible for food preparers without advanced training in nutrition to follow.

The standards for grain-based snacks and desserts are particularly problematic, as the FDA portion sizes range from 40 grams for a brownie (about 162 calories) to 125 grams for a slice of cheesecake (about 376 calories). Calories caps for snacks and desserts should be considered, possibly at a maximum of 200 calories per serving with portions also

available in 50 and 100 calories, if possible. This could be feasible in the future with advances in nutrient recipe analysis software. Future advances in portion standard regulation could also address preparation methods, to make the caloric content of portion sizes more uniform across food outlets.

Sophisticated electronic point-of-sale systems will likely make possible refinements that will enable restaurants to customize portions by adding or reducing the amount served to individual customers, just as clothiers tailor dresses or shirts by size, so long as alterations match individual needs. Point-of-sale systems already collect data about customer orders, making it feasible for restaurants to provide a summary of each diner’s food order with information as to how it compared with the Dietary Guidelines for Americans, stating which food groups were above or below the recommended daily amounts and offering recommendations as to how the consumer could compensate at future meals. Because few people track what and how much they consume, this type of guidance would be highly valuable, especially for those who already suffer from or want to prevent chronic diseases.

Although crafting regulations that will cover all potential situations relating to portion sizes may be challenging, it is critical to start this process and to be prepared to make tweaks and improvements as experience with portion standards accumulates. Public health practitioners recognize that the “perfect” should not be the enemy of the good.

### CONCLUSIONS

A fundamental question is whether the server or the

purchaser is responsible for how products are consumed. In our view, the responsibility has to be shared, with the sellers doing everything they can, accounting for the average consumer's limits and capacities, to make sure their products are consumed in such a way that no harm results. And consumers need to have all the necessary information at the point of purchase so they can choose and consume products safely.

Maintaining the current situation in which most restaurants serve foods in quantities that clearly put patrons at risk for chronic diseases is untenable and needs to be addressed as soon as possible. Another solution to reduce the consumption of low-nutrient foods has been the call for increasing taxes on foods that supply calories with little nutritional value. But junk food taxes are not popular and have yet to be adopted in any meaningful way, and would not address excess portion sizes. A simulation of simply changing portion sizes suggested that most consumers would find such a change acceptable, and that restaurateurs would not experience any substantial loss of profits.<sup>35</sup>

Because most individuals lack the capacity to distinguish appropriate portion sizes and a sizable percentage of the population is trying to control its intake, it is incumbent upon eating establishments to serve quantities that will not undermine individual health goals. Moreover, as the consequences of global warming become more of a threat to our everyday lives and well-being, every sector will need to make changes that reduce carbon emissions and slow the climate changes that are putting us all at risk. The food service industry has a significant role to play in the health of all people and the health of the planet. ■

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### Contributors

Both authors contributed to the commentary, literature review, and discussion.

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