

Weighing In on Obesity

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Eating sustains life and satisfies our desires like few other activities, but striking the balance between energy intake and expenditure is a delicate equilibrium. All too often, and with increasing regularity, the scale tips in the wrong direction. The prevalence of obesity in the U.S. population has nearly doubled in the last 10 years, and today, an estimated 64 percent of Americans are classified as overweight or obese. Even more troubling is the jump in overweight children and adolescents. Fifteen percent of children and teens age 6-19 are overweight, up from 5 percent in 1980.

Being overweight or obese does more than harm one's self-esteem; it has serious health consequences, such as increased risk of Type 2 diabetes, heart disease, and osteoarthritis. These chronic diseases limit the quality of a person's life and carry high societal costs in terms of medical treatment and lost productivity. But the question remains: Why are we as a Nation becoming more overweight and obese? While genetic predisposition and metabolism play a role, so do our choices about exercise and diet. Data from the Centers for Disease Control and Prevention indicate that few Americans exercise regularly or strenuously. Increased eating away from home and larger portion sizes may be contributors to the additional calories many of us are consuming. Food supply estimates by USDA's Economic Research Service (ERS) indicate that Americans' average daily calorie consumption in 2000 was 12 percent, or roughly 300 calories, higher than in 1985. Eating is one of the great pleasures of life and Americans are notorious for minimizing future harm when it conflicts with current pleasure. It's hard to pass up the pleasure today of eating a piece of cake for the marginal increase in the likelihood of contracting heart disease in the future. However complex, understanding the multifaceted world of food choices is one key to unlocking a future of healthier, better-nourished Americans.

Economists have a keen interest in behavioral decisions and how people allocate their incomes and time to various goods and services and activities. As readers of *FoodReview* know, ERS has led the way in analyzing how people make food choices. Previous articles dealt with eating away from home, mothers' diet and health knowledge and the quality of their children's diets, and individuals' perceptions of the quality of their diets. The obesity articles in this issue are an extension of this earlier work and make use of national data on what people eat, their knowledge of diet and health relationships, their socioeconomic and demographic characteristics, and their weight status.

For example, one article looks at the relationship between caloric intake and obesity. When individuals are placed in one of three groups based on their caloric intake—heavy, moderate, and light eaters—not all heavy eaters are obese and the relationship varies for men and women and by ethnicity and race. In another article, researchers examine individuals' misperceptions about weight status and find that men are more likely to "doubt" that obesity warnings are meant for them, while women are more likely to "anxiously" and falsely classify themselves as overweight. ERS researchers are also looking at the effects of eating habits on body weight, in particular, consumption of fruits and vegetables. They find that people who eat more servings of fruit each day have lower body mass indices, but the relationship between vegetable consumption and body weight is not as strong or consistent.

The link between obesity and health is firmly established. Progress toward a healthier America will require understanding the behavioral underpinnings of food choice and exercise levels. Reversing our energy imbalance will be slow and erratic, but the rewards are tremendous and the time to start is now.

Betsey Kuhn

Director, Food and Rural Economics Division

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ERS to launch NEW MAGAZINE
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U.S. Per Capita Food Supply Trends: More Calories, Refined Carbohydrates, and Fats

Judy Putnam, Jane Allshouse, and Linda Scott Kantor

The average American dietary style at the beginning of the 21st century resembles an hour glass rather than the Federal Government's Food Guide Pyramid. We gobble huge amounts of added fats and sugars from the top tier of the Pyramid (marked "Use sparingly") and heaping plates of pasta and other refined grains from the bottom tier, but we are sorely lacking in the vegetables, fruits, low-fat milk products, and other nutritious foods in the middle of the Pyramid.

A big jump in average calorie intake between 1985 and 2000 without a corresponding increase in the level of physical activity (calorie expenditure) is the prime factor behind America's soaring rates of obesity and Type 2 diabetes. ERS's loss-adjusted annual per capita food supply series (adjusted for spoilage, cooking losses, plate waste, and other food losses accumulated throughout the marketing system and the home) suggests that average daily calorie consumption in 2000 was 12 percent, or roughly 300 calories, above the 1985 level (fig. 1). Of that 300-calorie increase, grains (mainly refined grains) accounted for 46 percent; added fats, 24 percent; added sugars, 23 percent; fruits and vegetables, 8 percent; and the meat



According to a recent survey, the number of American adults who say they are eating "pretty much whatever they want" is at an all-time high.

Credit: PhotoDisc.

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and dairy groups together, declined by 1 percent.

In 2000, the American diet did an about-face with respect to total dietary fat. Preliminary data on the nutrient content of the U.S. food supply (calculated by USDA's Center for Nutrition Policy and Promotion and not adjusted for spoilage, cooking losses, and plate waste) indicate that per capita availability of total dietary fat jumped 6 percent between 1999 and 2000, reaching an all-time high level and pushing per capita calorie availability to a new high of 3,900 calories per person per day. Per capita availability of total carbohydrate declined 2 percent in 2000; protein was unchanged.

In contrast, between 1985 and 1999, per capita consumption of total dietary fat remained steady, even declining slightly in some intervening years. Moreover, fat's share of total calories declined between 1985 and 1999, as total calorie consumption increased. Mean-

while, per capita consumption of total carbohydrate and protein jumped 21 percent and 12 percent between 1985 and 1999.

Several trends helped to moderate fat consumption during this period, such as the closer trimming of outside fat on retail cuts of meat (beginning in 1986), the marketing of a host of lower fat ground and processed meat products, and consumer substitution of poultry for red meat. An overall decrease in per capita consumption of milks and growing consumer preference for lower fat milks also stemmed fat consumption. Mandatory nutrition labeling on packaged foods, beginning in early 1994, prompted food manufacturers to market lower fat versions of regular high-fat foods, which likely spawned the modest decline in consumption of added fats between 1993 and 1997. Meanwhile, counteracting increases in fat consumption came from hikes in consumption of total meats (red meat, poultry, and fish),

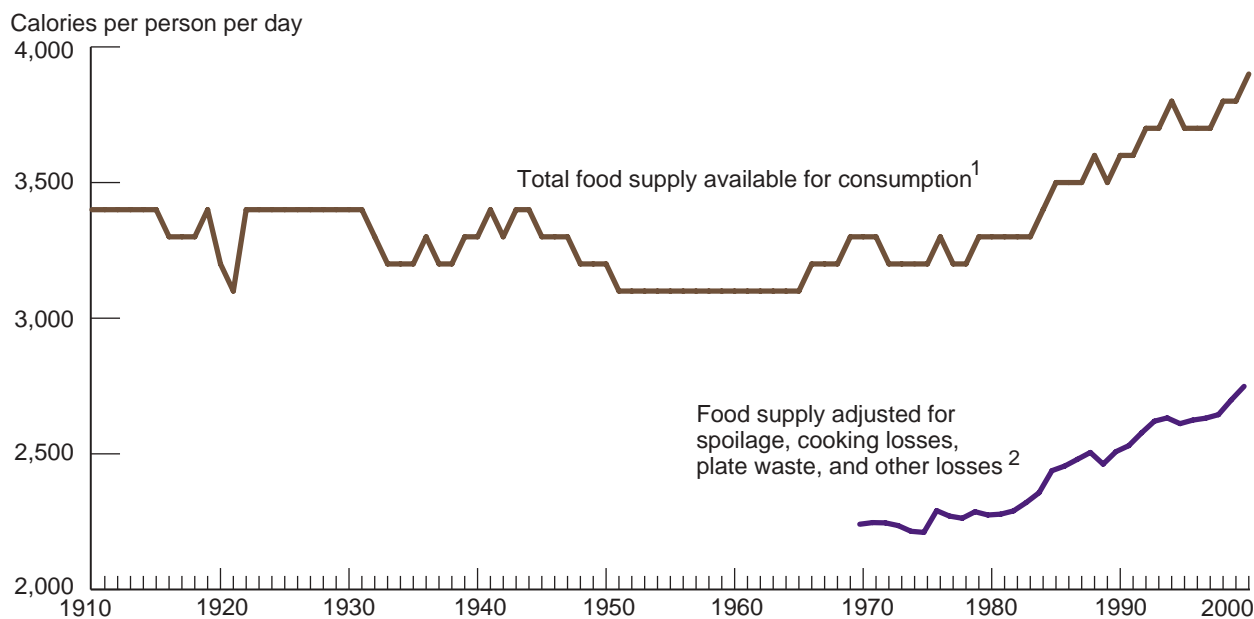
salad dressings, cheeses, salty snack foods, baked goods, commercially prepared foods, and foods eaten away from home.

Interestingly, as total fat consumption surged in 2000, availability of caloric sweeteners declined, from 151.3 pounds per person in 1999 (not adjusted for losses) to 148.9 pounds in 2000—the first decline in consumption of added sugars since 1986. And, in 2001, consumption of added sugars declined again. Average daily consumption of added sugars (adjusted for plate waste and other losses) was 31.1 teaspoons in 2001, 31.9 teaspoons in 1999, and 27.1 teaspoons in 1985.

Americans Eat Too Much Refined Grain, Fall Far Short on Whole Grains

Americans consumed, on average, 200 pounds of flour and cereal products in 2000 (unadjusted for spoilage, plate waste, and other losses), compared with 147 pounds

Figure 1—Calories From the U.S. Per Capita Food Supply, Adjusted for Losses, Increased 20 Percent Between 1982 and 2000



¹ Rounded to the nearest hundred.

² Not calculated for years before 1970.

Source: USDA's Center for Nutrition Policy and Promotion; USDA's Economic Research Service.

annually in the early 1980s and 135 pounds annually in the early 1970s (table 1). The food supply series excludes popcorn and other whole grain foods for which only scant availability data exist, such as wheat bran, wheat germ, wheat berries, amaranth, buckwheat, millet, kamut, quinoa, spelt, and triticale.

ERS estimates that 60 pounds of the 200 pounds per capita of flour and cereal products available for domestic human food consumption in 2000 were lost to spoilage, plate waste, and other losses. The remaining 140 pounds convert to 10 Food Guide Pyramid servings per capita per day. (A serving is equivalent to 1 slice of bread, 1 ounce of ready-to-eat cereal, or ½ cup of cooked cereal, rice, or pasta.) The actual number of per capita

daily servings from the grains group likely would total about 10.6 servings in 2000 if missing whole grain foods were included, suggesting that many consumers exceeded the 9-serving Pyramid recommendation for a 2,200-calorie diet (fig. 2).

Based on the data available, total daily Pyramid grain servings increased 33 percent between the early 1980s and 2000, from 7.5 servings per person per day to 10 servings. Increased consumption of white and whole wheat flour accounted for nearly half of the increase. Twofold increases in per capita consumption of durum flour (used for pasta), corn products (used for some snack foods and Mexican-style foods, such as tortillas), and rice accounted for additional increases in grain group servings.

The data suggest that the average American not only eats more grain servings than recommended—most of it refined grain—in relation to calorie expenditure level but also may need to change the types of foods consumed from the grain group to meet dietary recommendations for whole grains, fiber, fat, cholesterol, and added sugars. A high-carbohydrate diet can raise the risk of heart disease for the estimated 25 percent of Americans who have Metabolic Syndrome, also called Syndrome X, or insulin resistance. For these people, too much carbohydrate will raise levels of triglycerides and lower levels of HDL (good) cholesterol. A high-carbohydrate diet can also pose a health threat for overweight, underexercised people and for people from ethnic groups—Latino, Asian,

Table 1—Per Capita Grain Consumption Has Jumped Nearly 50 Percent Since the Early 1970s¹

Item	Per capita annual averages						2000	Change, 1970-74 to 2000	2000 food supply, Pyramid-based servings per capita per day ²
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99			
	Pounds ³						Percent	Number	
Total flour and cereal products ³	135.1	141.2	147.0	167.8	185.7	195.3	200.0	48	9.97
Total wheat flour	111.0	116.1	117.3	128.3	139.1	144.4	146.3	32	7.69
White and whole wheat flour	103.9	109.0	110.8	119.1	126.4	132.0	133.4	28	7.30
Durum wheat flour ⁴	7.1	7.1	6.5	9.2	12.7	12.4	12.9	82	.39
Rye flour	1.2	.8	.7	.6	.6	.6	.5	-58	.03
Rice (milled)	7.2	7.4	10.1	12.6	16.6	18.4	19.7	174	.54
Total corn products	10.2	11.8	14.1	20.4	22.5	26.5	28.4	178	1.56
Corn flour and meal	6.3	6.5	8.2	13.0	15.2	16.8	17.5	178	.96
Hominy and grits	2.0	3.0	2.9	3.3	3.0	4.9	6.2	210	.27
Corn starch	2.0	2.4	3.1	4.1	4.2	4.8	4.7	135	.33
Oat products	4.7	4.1	3.8	5.0	6.2	4.8	4.3	-9	.14
Barley products	.9	1.0	1.0	.9	.7	.7	.7	-22	.02
	Servings per capita per day ²								
Total flour and cereal products ²	6.90	7.23	7.51	8.5	9.26	9.77	9.97	44	9.97

The Food Guide Pyramid recommends nine servings of grain products a day for a 2,200-calorie diet, including several servings of whole grains.

Note: Totals may not add due to rounding.

¹Excludes quantities used in alcoholic beverages and fuel. Excludes popcorn and some other whole grain foods, for which production data are scanty and whose consumption likely totaled at least three-fifths of a grain serving per capita per day in 2000.

²Adjusted for spoilage, plate waste, and other losses. Servings are calculated based on a grain equivalent. The amount of flour in 1 slice of bread; 1 ounce of ready-to-eat cereal; or 1/2 cup of cooked cereal, rice, or pasta count as 1 serving.

³Aggregate data, unadjusted for spoilage, plate waste, and other losses.

⁴Includes flour equivalent of imported pasta products.

Source: USDA's Economic Research Service.

Indian—in which a higher proportion have a genetic predisposition to Type 2 diabetes.

Most Americans are missing out on whole grains, often consuming less than one serving a day. The health benefits of whole-grain foods include not only fiber, but important vitamins, minerals, and phytochemicals that may work synergistically to reduce risk for some chronic diseases. Because whole grains take longer to digest, especially when they are coarsely ground or intact, they have a slow, low, and steady effect on blood sugar and insulin levels, which protects the body against heart disease and diabetes. The high fiber content of many whole grains may help a person feel full longer while consuming fewer calories.

The 2000 edition of *Nutrition and Your Health: Dietary Guidelines for Americans*, for the first time, included a specific guideline for grain foods, separate from fruits

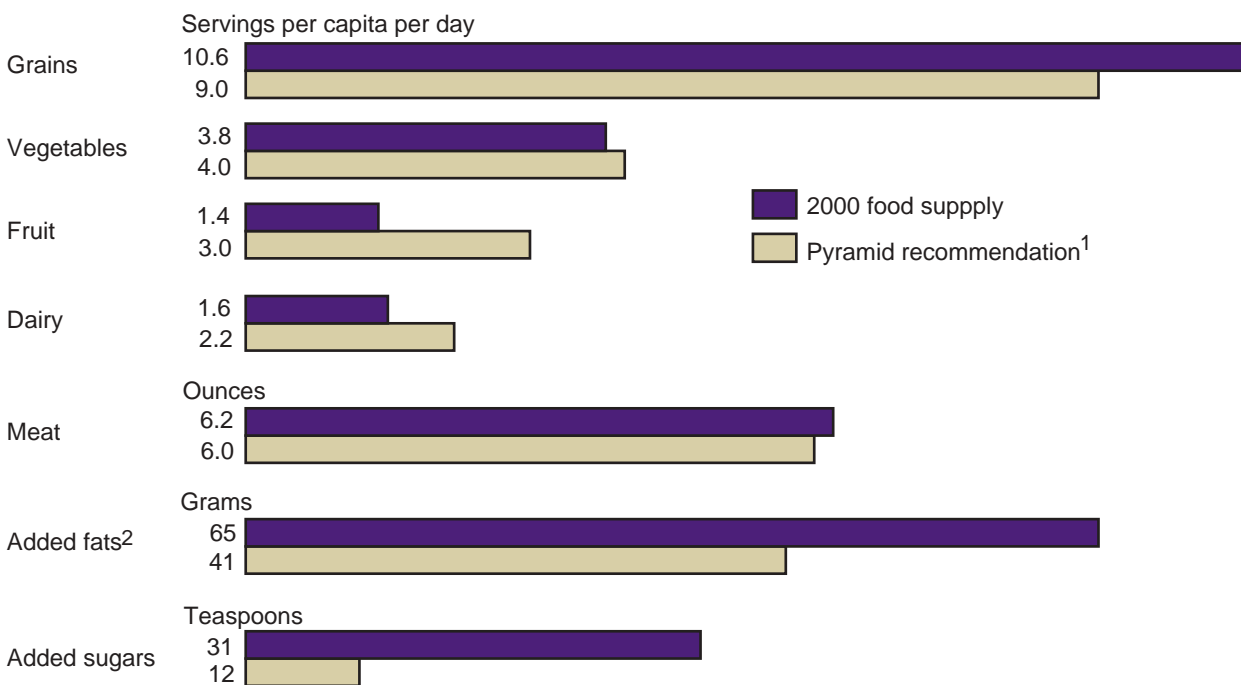
and vegetables, and recognized the unique health benefits of whole grains. But neither the guideline nor its accompanying text specify the number of whole grain servings that consumers should eat each day. However, a number of public and private organizations, including the U.S. Department of Health and Human Services and the American Dietetic Association, recommend that at least three daily grain servings should come from whole grains.

According to USDA's Continuing Survey of Food Intakes by Individuals (CSFII), in 1994-96, two-thirds of the population age 2 or older consumed less than one serving of whole grains a day, whereas just 10 percent of Americans consumed three or more servings. Low-income individuals and those with less than a high school education had whole grain intakes 40 percent below those in the highest income and education groups.

Whole grain consumption among Hispanics and non-Hispanic Blacks was about half that of non-Hispanic Whites.

Given the many health benefits of eating whole grains, why do two-thirds of Americans eat less than one serving a day? First, Americans are simply not used to eating whole grains. Thus, many U.S. consumers are not aware of the health benefits of whole grains, have difficulty identifying whole grains in the marketplace, perceive whole grains to be inferior in taste and palatability, and lack familiarity with preparation methods for whole grains. Second, whole grains have not been that easy to buy. Until recently, such products as whole grain pasta, whole grain couscous, or bulgur were available only in health food stores, co-ops, or through mail order. Getting whole grain foods in restaurants was even harder. Third, many whole grains take longer to cook than

Figure 2—2000 Food Supply Servings Compared With Food Guide Pyramid Recommendations



¹Pyramid recommendation based on a sample diet of 2,200 calories.

²The Food Guide Pyramid does not make a recommendation for added fats and oils. This recommendation is implied by the 56-percent share of total fats accounted for by added fats and oils in the food supply in 2000 and an upper limit on total fat consumption of 73 grams for a 2,200-calorie diet.

Source: USDA's Economic Research Service.

their refined counterparts, thus failing to meet current consumer demands for convenience. Brown rice, for example, takes twice as long to cook as white rice. Finally, whole grain foods have been more expensive relative to their refined counterparts. On average, prices were one-third higher for whole-grain versions of the same product in 1999, according to supermarket scanner data. For most consumers, meeting the whole grain guideline may require substantial shifts in shopping and consumption habits.

The food industry, always on the lookout for new markets and using the health claim approved by the U.S. Food and Drug Administration (FDA) in 1999 for use on whole grain products to gain a competitive edge, has begun to offer more whole grain products. Many mainstream grocery stores now carry a selection of whole grain products, including quick-cooking brown rice. Several large companies have introduced pasta made from half whole wheat flour and half white flour. Pre-cooked

whole wheat pizza shells are showing up in grocery stores. But to garner the health benefits of whole grain foods, consumers must not only purchase these products for at-home consumption but ask for them in the away-from-home sector.

Consumption of Added Fats Dipped in Mid-1990s, Surged From 1998 to 2000

After adjusting for losses and the nonfat portion of composite products, such as margarine, the

Table 2—Americans Consumed an Average of 65 Grams, or 600 Calories' Worth, of Added Fats Per Person Per Day in 2000

Item	Per capita annual averages						2000	Change, 1970-74 to 2000	2000 food supply, added fats per capita per day ¹
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99			
	<i>Pounds, product weight²</i>							<i>Percent</i>	<i>Grams</i>
Fats and oils	55.7	57.4	61.7	66.1	69.1	67.5	77.1	38	63.0
Salad and cooking oils	16.7	19.5	22.2	24.8	26.2	27.2	33.7	102	29.8
Shortening	17.2	17.6	19.0	21.9	23.1	21.2	23.1	34	19.2
Margarine	11.0	11.4	10.8	10.6	10.6	8.5	8.2	-25	4.8
Butter	5.0	4.4	4.6	4.6	4.5	4.4	4.6	-8	3.6
Lard (direct use) ³	3.6	2.5	2.1	1.5	1.4	1.8	1.9	-47	1.2
Edible beef tallow (direct use) ³	na	.4	1.4	1.2	1.8	2.9	4.0	na	2.5
Other edible fats and oils ⁴	2.2	1.9	1.6	1.4	1.4	1.4	1.5	-32	1.8
Very high-fat dairy foods that are included in total added fat:									
Cream cheese	.6	.8	1.1	1.4	2.0	2.2	2.4	300	.7
	<i>Half pints, product weight²</i>								
Heavy cream	1.0	1.1	1.5	2.2	2.5	3.4	3.7	270	.6
Light cream	.7	.6	.5	.8	.6	.9	1.1	57	.1
Sour cream	2.4	3.1	3.7	4.5	5.0	5.5	6.2	158	.5
Half and half	5.0	4.5	4.8	5.8	5.8	6.1	6.9	38	.3
Eggnog	.7	.8	.8	.9	.8	.7	.6	-14	--
	<i>Grams per capita per day, fat content basis¹</i>								
Total added fat (excludes naturally occurring fat in such foods as meats, beverage milks, nuts, and avocados) ¹	47.9	49.3	52.5	56.4	58.6	57.2	65.3	36	65.3
	<i>Tablespoons per capita per day, fat content basis¹</i>								
	3.5	3.6	3.9	4.1	4.3	4.2	4.8	37	na

The *Dietary Guidelines* recommend that people limit their total fat consumption to no more than 30 percent of daily energy intake—about 73 grams of added and naturally occurring fat for a 2,200-calorie diet. In 2000, added fats alone accounted for 97 percent of this suggested upper limit.

Notes: na = not applicable or not available. -- = less than 0.05 grams. Totals may not add due to rounding.

¹Adjusted for cooking losses, plate waste, and other losses. Includes only the cream portions of half and half and eggnog; the milk portions are included in the dairy group. Fat content of butter and margarine calculated at 80 percent. One gram of fat equals 9 calories. One tablespoon of fat equals approximately 13.6 grams of fat.

²Aggregate data, unadjusted for cooking losses, plate waste, and other losses.

³Excludes use in margarine and shortening.

⁴Specialty fats used mainly in confections and nondairy creamers.

Source: USDA's Economic Research Service.

per capita food supply provided 65 grams a day of added fats and oils in 2000, a 24-percent increase from the 53 grams available for consumption in the early 1980s (table 2). Fats are added in cooking and at the table and in many processed food products, including baked goods, french fries, and snack foods. Added fat in processed foods may not be visible to consumers, who are typically not aware of the fat content, particularly for foods eaten away from home. These added fats are consumed in addition to those that occur naturally in meats, nuts, eggs, dairy products, avocados, and other foods.

Americans' mid-1990s push to cut dietary fat is apparent in recent food supply data, which show a modest (8 percent) decline between 1993 and 1997 in per capita daily consumption of added fats, from 61 grams to 56 grams. As a result of consumer concerns about fat and mandatory nutrition labeling (beginning in April 1994), food processors introduced over 5,400 lower fat versions of foods in U.S. supermarkets in 1995-97, according to the Global New Products Database, a product of Mintel International Group Ltd.

But the decline in consumption of added fats was short lived. Between 1997 and 2000, per capita daily consumption of added fats jumped 16 percent, from 56 grams to 65 grams. Consumer backlash against the spate of fat-free and low-fat (3 grams of fat or less per serving) versions of high-fat processed foods introduced in the mid-1990s and consumer relaxation of dietary fat restrictions to include more healthful oils in the diet likely fueled the rise.

Many consumers found the taste of the new low-fat and fat-free versions of foods unacceptable. Accordingly, many companies reformulated their low-fat and fat-free products in the late 1990s, adding some fat to improve taste. Some consumers, who rejected the low-fat and fat-free versions, have ac-

Food Supply Data Adjusted for Spoilage and Waste

Two primary data sets are available to measure compliance with the *Dietary Guidelines*—USDA's Continuing Survey of Food Intakes by Individuals (CSFII) and the U.S. Food Supply Series. Both data sets provide Food Guide Pyramid servings data for analyzing how American diets stack up to Pyramid recommendations.

The CSFII records what people say they have eaten over a specific time period and collects demographic information about respondents, such as household size, income, race, age, and sex. The demographic information is particularly valuable because it can be used to identify the type of persons most likely to meet dietary recommendations on the basis of social and demographic characteristics and can help researchers to assess dietary status among population subgroups. The CSFII 1994-96 Pyramid Servings Data provide national probability estimates for the U.S. population based on food intakes reported by individuals age 2 and older on 2 nonconsecutive days (14,256 individuals).

Numerous studies suggest that food intake surveys, like the CSFII, which collect food consumption data through recollections of foods eaten or food diaries over short periods, are subject to under-reporting of consumption when measured in terms of energy intake. Under-reporting of consumption is a particular concern of researchers studying the underlying causes of the steep rise in the prevalence of obesity in recent years in the United States.

Food supply data are collected directly from producers and distributors using techniques that vary by commodity. Food supply data are not collected from individual consumers, which allows examination of food consumption changes independent of consumer survey data. If waste and other losses in the system are relatively constant from year to year, food supply data provide an independent measure of changes in food consumption patterns over time.

ERS annually calculates the amount of food available for human consumption in the United States. For most commodity categories, this available food supply is measured as the sum of annual production, beginning inventories, and imports minus exports, industrial nonfood uses, farm uses (seed and feed), and end-of-year inventories. Per capita consumption is calculated by dividing the available food supply by the total U.S. population as of July 1 each year. Since food supplies are measured on an aggregate level as they move through marketing channels for domestic consumption, the data typically overstate the amount of food that people actually ingest by capturing substantial quantities of nonedible food parts (like peach pits) and food lost through spoilage and waste in the home and marketing systems.

ERS has developed new methods to adjust the food supply data for losses and express the data in terms of Food Guide Pyramid-based servings. Researchers can gain a more complete understanding of U.S. dietary patterns by comparing food supply servings at the national level with estimates generated at the individual level by food intake surveys. Loss-adjusted servings calculated from the food supply data can be compared with the servings recommended by the Food Guide Pyramid to gauge America's progress in following the *Dietary Guidelines*.

ERS uses the recommended Pyramid servings for a sample diet of 2,200 calories in this article. This calorie level approximates the daily Recommended Energy Allowance (REA) of 2,247 calories for the United States, derived from a 1998 population-weighted average of REA's for different cohorts of the U.S. population.

cepted reduced-fat products (one-third less fat than full-fat versions). Many other consumers have resumed eating full-fat versions (see “Are Americans Turning Away From Lower Fat Salty Snacks?” elsewhere in this issue). According to a 2000 Roper Reports’ survey of a nationally representative sample of 2,000 Americans age 18 or older, the share of American adults who say they are eating “pretty much whatever they want” was at an all-time high of 70 percent in 2000, up from 58 percent in 1997.

Although a healthful diet requires some dietary fat, excessive fat intake is associated with increased blood cholesterol, heart disease, and some cancers. The 2000 *Dietary Guidelines* recommend that people limit total fat consumption to no more than 30 percent of daily energy intake—about 73

grams of added and naturally occurring fat for a 2,200-calorie diet.

The food supply data suggest that most consumers do not meet this recommendation. In 2000, added fats alone accounted for 89 percent of the recommended upper daily limit for total fat intake—or about 21 percent of total calories for a 2,200-calorie diet. Per capita consumption of salad and cooking oils, which has doubled since the early 1970s, accounted for 46 percent of total added fats in 2000. These oils, which are largely unsaturated, are used mainly in mayonnaise and salad dressings. Animal fats—including lard, edible beef tallow, butter, and other dairy fats—which are major sources of saturated fats, accounted for 15 percent of added fats in 2000. Shortening and margarine, which are major sources of trans fatty

acids, accounted for more than a third of added fats in 2000.

According to food supply nutrient data for 2000, added fats accounted for 56 percent of the total fat provided by the food supply. Assuming that added fats continue to account for about 56 percent of the total fat provided by the food supply, Americans must, on average, consume roughly a third less added fat to bring total fat (added fat and naturally occurring fat) consumption close to the recommended upper limit of 30 percent of calories.

Added Sugars Consumption Is Nearly Triple Dietary Targets

Although our body cannot distinguish between naturally occurring and added sugars, dietary guides focus on added sugars because foods high in added sugars

Table 3—Average Consumption of Added Sugars Increased 22 Percent From 1980-84 to 2000

Item	Per capita annual averages						2000 food supply, added sugars per capita per day ¹	Change, 1970-74 to 2000	2000 food supply, added sugars per capita per day ¹
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99			
	<i>Pounds, dry-weight equivalent²</i>							<i>Percent³</i>	<i>Teaspoons</i>
Total caloric sweeteners	123.7	123.8	122.4	130.5	140.7	148.4	148.9	20	31.4
Refined cane and beet sugar	100.5	91.5	74.7	62.0	64.1	65.4	65.6	-35	13.8
Corn sweeteners	21.7	30.9	46.4	67.3	75.3	81.7	81.9	277	17.3
High fructose corn syrup	1.5	9.4	27.4	47.1	52.5	60.3	62.7	4,080	13.2
Glucose	15.7	17.5	15.6	16.5	19.0	17.6	15.8	1	3.3
Dextrose	4.6	3.9	3.4	3.6	3.9	3.8	3.4	-26	.7
Edible syrups	.5	.4	.4	.4	.4	.4	.4	-20	.1
Honey	.9	1.0	.9	.9	.9	1.0	1.1	22	.2
	<i>Teaspoons per capita per day³</i>								
Total caloric sweeteners supply									
Not adjusted for loss and waste	38.4	38.5	38.0	40.6	43.7	46.1	46.3	20	46.3
Adjusted for loss and waste ¹	26.1	26.1	25.8	27.5	29.6	31.3	31.4	20	31.4

The Food Guide Pyramid bulletin recommends that people limit their consumption of added sugars to no more than 12 teaspoons daily for a 2,200-calorie diet. In 2000, average consumption of added sugars was nearly three times this suggested upper limit.

Note: Totals may not add due to rounding.

¹Adjusted for spoilage, plate waste, and other losses. ERS makes a tentative assumption that approximately 29-30 percent of the total domestic human food supply of caloric sweeteners is wasted or otherwise lost and not ingested.

²Aggregate data, unadjusted for spoilage, plate waste, and other losses.

³One teaspoon of sugar equals 16 calories.

Source: USDA's Economic Research Service.

often supply calories but few nutrients, the so-called empty calories. High intake of sugary snack foods and desserts—colas, candy, cookies—and reduced intake of nutrient-rich foods—fruits, vegetables, whole grains—cuts needed nutrients.

To maintain nutritious diets and healthy weights, the Food Guide Pyramid advises consumers to limit added sugars to 12 teaspoons a day for a 2,200-calorie diet. After adjusting for losses at the processor, retail, foodservice, and consumer levels totaling roughly 29 percent of the available supply, the food supply provided 31 teaspoons of added sugars (refined cane and beet sugar, corn sweeten-

ers, edible syrups, and honey) per person per day in 2000—about the amount in three and three-quarters regular 12-ounce colas (table 3). Average annual consumption of caloric sweeteners grew by 22 percent between 1980-84 and 2000.

The ability of consumers to moderate their consumption of added sugars is complicated by the fact that caloric sweeteners are likely to be “hidden” in prepared foods. Although the 1990 Nutrition Labeling and Education Act requires manufacturers to disclose the total sugar content of food on food labels, the Act does not require labels to distinguish total sugars from added sugars, making

it difficult for consumers to determine how much added sugar they actually consume. A coalition of leading health experts and organizations, concerned about the climbing rates of obesity and the rising level of added sugars in Americans’ diets, has asked FDA to require that food labels state the amount of added sugars. FDA has said it would await final release of the Institute of Medicine’s report on dietary reference values for macronutrients.

Red Meat Dominates the Meat Group

In 2000, total U.S. meat consumption (red meat, poultry, fish,

Table 4—Americans Are Eating Less Red Meat, Fewer Eggs, and More Poultry and Fish

Item	Per capita annual averages				Change, 1970-74 to 2000	2000 food supply, Pyramid-based servings per capita per day ¹
	1970-79	1980-89	1990-99	2000		
	<i>Pounds, edible weight²</i>				<i>Percent</i>	<i>Ounces of cooked meat equivalents</i>
Total meat, poultry, and fish	177.2	182.2	188.9	195.8	10	5.2
Red meat	129.5	121.8	112.4	113.7	-12	3.0
Beef	80.9	71.7	63.1	64.6	-20	1.8
Pork	45.0	47.7	47.6	47.8	6	1.2
Veal, lamb, and mutton	3.5	2.4	1.7	1.4	-60	--
Poultry	35.2	46.2	61.8	66.9	90	1.7
Chicken	28.4	36.3	47.9	53.2	87	1.3
Turkey	6.8	9.9	13.9	13.7	101	.4
Fish and shellfish	12.5	14.2	14.7	15.2	22	.5
Dry beans, peas, and lentils (legumes) ³	7.0	6.5	8.1	8.6	23	.2
Nuts (including peanut butter)	8.0	8.8	8.6	8.9	11	.2
	<i>Number²</i>					
Eggs	285	257	236	250	-12	.5
In-shell	252	218	177	177	-30	.4
Processed	34	38	59	73	116	.1
	<i>— Ounces of cooked meat equivalents daily¹ —</i>					
Total meat group supply ^{1, 3}	5.8	5.8	5.9	6.2	7	6.2

The Food Guide Pyramid bulletin recommends that average meat group consumption should total the equivalent of 6 ounces of cooked lean meat per person per day for a 2,200-calorie diet, and that legumes should be selected often as choices from the meat group.

Note: -- = less than 0.05. Totals may not add due to rounding.

¹Adjusted for cooking losses, plate waste, and other losses. According to the *Food Guide Bulletin*, consumers should count meat, poultry, and fish in total ounces. Other foods in this group—1 egg, 1/2 cup dry beans, 2 tablespoons of peanut butter, and 1/3 cup of nuts—are counted as the equivalent of 1 ounce of cooked lean meat.

²Aggregate data, unadjusted for cooking losses, plate waste, and other losses.

³Includes all legumes consumed, including those that may have been selected as vegetable group servings.

Source: USDA’s Economic Research Service.

and shellfish) amounted to 196 pounds (boneless, trimmed-weight equivalent, unadjusted for cooking losses, plate waste, and other losses) per person, 19 pounds above the annual average in the 1970s (table 4). Each American consumed an average of 16 pounds less red meat (mostly beef), 32 pounds more poultry, and 3 pounds more fish and shellfish, compared with average annual consumption in the 1970s.

The *Dietary Guidelines* and the Food Guide Pyramid recommend two to three servings (totaling the equivalent of 5-7 ounces of cooked lean meat) of fish, shellfish, lean poultry, other lean meats, eggs, beans, or nuts daily. The *Dietary Guidelines* suggest choosing beans often, trimming fat from meat, skinning poultry, and limiting intake of organ meats, egg yolks, and high-fat processed meats, such as bacon, sausages, and cold cuts, to keep saturated fat intake and blood cholesterol in check. The *Dietary Guidelines* also advise eating moderate amounts of foods high in unsaturated fats—some fish, such as salmon, tuna, and mackerel, and many kinds of nuts—taking care to avoid excess calories.

For a 2,200-calorie diet, the recommended amount from the meat group is the equivalent of 6 ounces of cooked lean meat per person per day. Meat, poultry, and fish are counted in total ounces. Other foods in this group—1 egg, ½ cup of dry beans, ½ cup of tofu, a 2 ½-ounce soyburger, 2 tablespoons of peanut butter, or 1/3 cup of nuts—are counted as the equivalent of 1 ounce of cooked lean meat. Legumes (dry beans, peas, or lentils) count either as servings in the meat or the vegetable group.

After adjusting for waste and cooking losses, the food supply provided the equivalent of 6.2 ounces of cooked meat (lean and fat portion) per person per day in 2000—a modest 9-percent increase from the 1970s. Because food supply estimates for meat and poultry include both lean and fat, the estimates

likely overstate lean meat consumption and are not directly comparable with the Food Guide Pyramid recommendation.

Although poultry meat consumption nearly doubled since the 1970s, red meat accounted for 48 percent of total meat-group servings per capita per day in 2000, nearly double the 27-percent poultry share. Red meat contributed 20 percent of the total saturated fat in the American diet in 2000; poultry, 6 percent; eggs, 2 percent; legumes, nuts, and soy, 2 percent; and fish and shellfish, 0.2 percent. The data suggest that, on average, Americans consume large quantities of foods that, relative to others in the meat group, are naturally high in saturated fat and cholesterol. Many consumers need to adjust the mix of foods they eat in this group.

Too Few Fruits and Vegetables, Too Little Variety

The loss-adjusted food supply provided 5.2 servings of fruits and vegetables, including legumes, per person per day in 2000, slightly higher than the minimum recommendation shown in the Food Guide Pyramid but well below the 7 daily servings suggested for a 2,200-calorie diet. According to the 1994-96 CSFII, intakes of fruits and vegetables rose with age, income, and education and seem to be higher among Asian/Pacific Islanders and Native Americans than among other racial/ethnic groups, although small subsample sizes preclude assessing this with confidence.

U.S. per capita fruit consumption was woefully low. The food supply provided 1.4 servings per person per day of fresh and processed fruit and fruit juices in 2000, less than half the 3 fruit servings a day recommended by the Pyramid for a 2,200-calorie diet (table 5). Half of all Americans age 2 or over consumed less than 1 serving of fruit a day in 1994-96, according to the CSFII, and less than a quarter consumed the num-

ber of fruit servings recommended based on calorie intake. This shortfall is particularly troublesome given scientific evidence linking frequent consumption of fruits and vegetables with substantially reduced risk of many chronic diseases, including certain cancers. When measured in Pyramid servings, average fruit consumption has inched up 0.3 servings a day since the early 1970s—the equivalent of a third of a medium banana or apple or 1.75 ounces of fruit juice.

Dietary recommendations call for total fruit servings to be fairly evenly divided between two fruit subgroups—citrus, melons, and berries, which are good sources of vitamin C, and other fruit. In 2000, on a per-person-per-day basis, the food supply provided 0.6 servings of citrus, melons, and berries and 0.8 servings of other fruit.

The data suggest that many consumers do not incorporate adequate variety into their daily diet. Six foods, out of more than 60 fruit products included in the food supply data, accounted for half (51 percent) of total fruit servings in 2000—orange juice (17 percent), bananas (9 percent), apple juice (8 percent), fresh apples (7 percent), fresh grapes (5 percent), and watermelon (4 percent).

Vegetable consumption tells the same story—consumers tend to eat a limited variety of vegetables. While food supply servings were close to recommendations, consumption was concentrated in a small number of foods. The food supply provided a daily average of 3.8 servings of fresh, frozen, canned, and dehydrated vegetables (including dry beans, peas, and lentils) in 2000, close to the minimum 4 daily servings recommended for a 2,200-calorie diet (table 6). Per capita servings grew 30 percent, or nearly one vegetable serving, between the early 1970s and 2000.

Five foods—iceberg lettuce, frozen potatoes, fresh potatoes, potato chips, and canned tomatoes—

accounted for 48 percent of total vegetable servings in 2000. Legumes made up 6 percent of total consumption. Another 19 percent of total vegetable servings came from dehydrated potatoes (mainly instant potatoes), garlic, fresh carrots, fresh tomatoes, and fresh onions. No other single food, out of more than 70 vegetable foods in the food supply data, accounted

for more than 3 percent of total vegetable consumption, or 0.1 serving. (Note: fresh, frozen, or canned vegetables are counted as three different foods.)

Dietary guidance suggests that consumers divide their total vegetable servings into three subgroups—dark-green leafy and deep-yellow vegetables; starchy vegetables, including potatoes, dry

beans, peas, and lentils; and other vegetables. Thus, for a 2,200-calorie diet with a minimum serving recommendation of 4 servings daily, consumption would be expected to be evenly divided at about 1.3 servings from each subgroup. Within these groups, dark-green leafy vegetables and dry beans, peas, and lentils should account for 0.6 servings, or about three-sevenths of

Table 5—Three Fruits—Oranges, Apples, and Bananas—Contributed One-Half of Total Daily Fruit Servings in 2000

Item	Per capita annual averages						Change, 1970-74 to 2000	2000 food supply Pyramid-based servings per capita per day ¹		
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99			2000	
	<i>Pounds, fresh-weight equivalent²</i>						<i>Percent</i>	<i>Number</i>		
Total fruit ³	239.9	257.5	266.0	272.0	275.2	284.8	280.0	17	1.36	
Fresh fruit	97.6	101.3	107.6	118.6	120.0	127.3	126.9	30	.64	
Processed fruit	142.3	156.3	158.4	153.4	155.2	157.5	153.2	8	.73	
Citrus, melons, and berries ³	141.4	151.4	148.0	140.2	139.3	150.7	146.2	3	.55	
Fresh citrus ⁴	27.9	26.6	24.7	23.7	23.0	24.3	23.4	-16	.10	
Oranges	15.0	13.8	13.0	12.8	12.1	12.3	11.7	-22	.05	
Grapefruits	8.4	8.2	7.0	6.3	5.7	5.9	5.1	-39	.01	
Melons ⁴	20.0	19.1	20.5	24.7	24.6	28.0	26.7	34	.10	
Watermelon	12.6	12.0	12.1	13.3	14.0	15.4	13.7	9	.06	
Cantaloup	6.5	5.8	6.8	9.1	8.7	10.4	10.6	63	.04	
Berries ⁴	3.4	3.4	3.9	5.0	6.0	6.5	7.1	109	.08	
Fresh and frozen strawberries	2.9	3.0	3.5	4.3	4.8	5.4	5.9	103	.06	
Kiwifruit	na	na	.1	.2	.5	.5	.6	na	.01	
Juices ⁴	90.1	101.9	98.9	86.8	85.8	91.8	89.0	-1	.27	
Orange juice	72.2	83.7	81.5	72.5	72.0	76.4	73.7	2	.23	
Other fruit ⁴	98.5	106.1	118.0	131.8	135.9	134.1	133.8	36	.81	
Fresh bananas	18.0	19.5	21.6	24.7	26.2	28.1	28.5	58	.12	
Fresh apples	16.3	17.6	18.0	19.4	19.0	18.6	17.5	7	.10	
Apple juice	5.9	8.2	14.7	18.5	20.0	20.1	21.7	268	.11	
Fresh grapes	2.8	3.4	5.1	7.3	7.3	7.5	7.3	161	.07	
Canned olives	.9	1.2	1.1	1.3	1.2	1.2	.9	0	.06	
Canned applesauce	5.5	5.1	5.0	5.3	5.4	4.9	4.2	-24	.03	
Canned peaches	6.4	5.8	4.4	4.0	4.0	3.6	3.8	-41	.04	
Raisins	5.8	6.8	8.0	9.1	8.1	7.6	7.1	22	.04	
Fresh peaches and nectarines	4.8	5.6	6.3	6.0	5.8	5.1	5.4	13	.02	
Canned pears	3.7	4.2	4.0	3.6	3.6	3.2	2.8	-24	.02	
	<i>Servings per capita per day¹</i>									
Total fruit ¹	1.11	1.17	1.24	1.34	1.36	1.40	1.36	23	1.36	

The Food Guide Pyramid bulletin recommends three servings of fruit a day for a 2,200-calorie diet.

Note: na = not available.

¹Inedible portions removed and adjustments made for spoilage, plate waste, and other losses. One medium apple, banana, or orange; 1/2 cup of chopped, cooked, or canned fruit; 1/4 cup of dried fruit; or 3/4 cup of fruit juice count as 1 serving.

²Includes inedible portions, spoilage, plate waste, and other losses.

³Totals may not add due to rounding.

⁴Includes food item(s) not shown separately.

Source: USDA's Economic Research Service.

Table 6—Iceberg Lettuce, Frozen Potatoes (Mainly French Fries), and Potato Chips Constituted a Third of Total Daily Vegetable Servings in 2000

Item	Per capita annual averages						2000	Change, 1970-74 to 2000	2000 food supply Pyramid-based servings per capita per day ¹
	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99			
	Pounds, fresh-weight equivalent ²						Percent	Number	
Total vegetables	336.4	341.2	340.4	365.9	400.7	415.1	428.5	27	3.83
Fresh vegetables	149.0	146.8	150.0	164.4	176.6	187.0	201.8	35	2.03
Processed vegetables	187.3	194.4	190.4	201.5	224.1	228.1	226.7	21	1.80
Canned	102.1	100.0	98.8	99.1	112.0	106.6	104.7	3	.54
Frozen	47.3	56.9	56.5	65.5	72.5	81.0	79.7	68	.58
Dehydrated (includes dry beans)	21.3	21.4	17.8	19.4	22.6	24.6	26.3	23	.45
Potato chips	16.6	16.1	17.2	17.6	17.0	15.9	16.0	-4	.23
Dark-green leafy vegetables	4.9	5.6	6.8	11.8	16.2	19.8	23.4	378	.17
Escarole, romaine, and leaf lettuces	.6	.5	.4	3.3	4.9	6.8	8.4	1,300	.09
Broccoli	1.7	2.3	3.5	5.3	5.8	7.4	7.9	365	.05
Spinach	1.8	1.7	1.6	1.5	1.6	1.8	2.7	50	.03
Squash	.9	1.1	1.4	1.6	3.9	3.8	4.4	389	.02
Deep-yellow vegetables	15.2	14.5	14.5	14.8	17.6	20.8	19.5	28	.20
Carrots	10.2	9.4	9.7	10.4	13.4	16.5	15.2	49	.17
Sweet potatoes	5.0	5.1	4.8	4.5	4.3	4.3	4.3	-14	.03
Dry beans, peas, and lentils (legumes) ³	7.2	6.7	6.2	6.9	7.8	8.3	8.6	19	.24
Other starchy vegetables	152.7	153.6	146.7	154.2	163.6	172.0	170.2	11	1.33
Total potatoes	118.9	121.3	117.4	124.7	132.3	139.6	138.7	17	1.23
Fresh potatoes	55.5	49.5	48.4	48.5	49.0	48.5	47.2	-15	.33
Frozen potatoes	31.7	40.4	39.7	45.9	51.3	58.5	57.8	82	.46
Other forms of potatoes	31.7	31.4	29.3	30.3	32.0	32.6	33.7	6	.44
Corn	27.8	26.9	24.6	25.2	27.1	28.4	27.3	-2	.08
Peas	5.1	4.7	4.3	3.9	3.9	3.5	3.7	-27	.02
Lima beans	.9	.7	.5	.4	.4	.6	.6	-33	--
Other vegetables	156.4	160.8	166.2	178.2	195.5	194.2	206.8	32	1.89
Iceberg lettuce	22.8	24.8	24.6	25.4	25.8	22.6	24.3	7	.57
Canned tomatoes	63.0	62.7	62.5	64.5	75.6	73.1	69.9	11	.25
Garlic	.5	.7	.8	1.0	1.6	2.4	2.8	460	.18
Fresh tomatoes	12.0	12.4	13.1	16.0	15.8	17.3	17.3	44	.13
Fresh onions	10.6	11.0	11.9	14.0	16.2	18.3	18.4	74	.10
Cucumbers	8.5	9.4	9.5	10.2	9.7	10.8	11.5	35	.10
Bell peppers	2.4	2.7	3.1	4.2	5.5	6.6	7.9	229	.08
Cabbage	11.1	10.7	10.3	10.4	10.2	9.7	10.6	-5	.08
Celery	7.3	7.1	7.2	6.9	7.1	6.7	6.2	-15	.07
	Servings per capita per day ^{1, 3}								
Total vegetables ^{1, 3}	2.94	3.02	3.03	3.27	3.57	3.71	3.83	30	3.83
Cruciferous vegetables ⁴	.10	.11	.11	.13	.13	.13	.14	40	.14

The Food Guide Pyramid bulletin recommends four servings of vegetables a day for a 2,200-calorie diet.

Notes: -- = less than 0.005. Totals may not add due to rounding.

¹Excludes inedible portions and adjusts for spoilage, plate waste, and other losses. One cup of raw leafy greens, 1/2 cup of other vegetables—cooked or chopped raw—or 3/4 cup of vegetable juice count as 1 serving.

²Includes inedible portions, spoilage, plate waste, and other losses.

³Includes all legumes consumed, including those that may have been selected as meat group servings.

⁴Cruciferous vegetables (members of the cabbage family) are not mentioned per se in the *Dietary Guidelines for Americans*. However, the Committee on Diet, Nutrition, and Cancer of the National Research Council advised the public in 1982 to eat more carotene-rich (dark-green and deep-yellow) vegetables and cruciferous vegetables (cabbage, broccoli, cauliflower, and brussels sprouts) to lower the risk of certain cancers.

Source: USDA's Economic Research Service.

total subgroup consumption, and deep-yellow and other starchy vegetables should account for 0.8 servings, or four-sevenths of their subgroups.

Average vegetable consumption in 2000, however, tilted to starchy vegetables, especially white potatoes (fig. 3). Frozen potatoes (mostly french fries) and potato chips together accounted for 39 percent of

starchy vegetables servings and 18 percent of total vegetable servings. Consumption of dark-green leafy vegetables and deep yellow vegetables combined totaled 0.4 servings per capita per day, well below the

Table 7—Americans Are Drinking Less Milk and Eating More Cheese

Item	Per capita annual averages				Change, 1970-74 to 2000	2000 food supply Pyramid-based servings per capita per day ¹
	1970-79	1980-89	1990-99	2000		
	<i>Gallons²</i>				<i>Percent</i>	<i>Number</i>
Beverage milk	29.8	26.5	24.3	22.6	-24	.70
Plain						
Whole	20.9	13.9	8.7	7.7	-63	.24
2-percent fat	4.7	7.7	8.3	7.1	51	.22
1-percent fat	1.0	1.8	2.5	2.6	160	.08
Skim	1.4	1.5	3.4	3.5	150	.11
Flavored	1.2	1.1	1.2	1.4	17	.04
Buttermilk	.6	.5	.3	.3	-50	.01
	<i>Half pints²</i>					
Yogurt	3.2	6.5	8.5	9.9	209	.03
Half and half	4.7	5.3	6.0	6.9	47	--
Eggnog	.7	.9	.8	.6	-14	
	<i>Pounds²</i>					
Total cheese (excluding cream cheese) ³	18.6	24.3	27.4	30.0	61	.62
Cheese other than cottage types ^{3, 4}	13.7	20.2	24.6	27.3	99	.61
Cheddar	6.3	9.0	9.2	9.7	54	.22
Mozzarella	2.0	4.5	7.9	9.3	365	.21
Cottage cheese	4.9	4.1	2.9	2.6	-47	.01
Frozen dairy products ⁵	27.8	27.4	28.8	27.8	0	.12
Ice cream	17.7	17.7	16.0	16.5	-7	.07
Low-fat ice cream	7.6	7.2	7.5	7.3	-4	.03
Sherbet	1.5	1.3	1.3	1.2	-20	.01
Frozen yogurt	na	na	2.8	1.8	na	.01
Condensed and evaporated milks	9.4	7.5	7.3	5.8	-38	.04
Dry milk	4.5	3.0	3.7	3.1	-31	.09
	<i>Number of daily servings¹</i>					
Total dairy group supply ¹	1.62	1.56	1.53	1.61	-1	1.61

The Food Guide Pyramid bulletin suggests three servings—the equivalent of three 8-ounce glasses of milk per day—for teenagers, young adults up to age 24, and pregnant and lactating women. Two daily servings of dairy foods are recommended for children and most other adults. In this study, average servings were compared with a daily recommended intake of 2.2 servings. This target was based on a weighted average of recommended servings for different age groups of the U.S. population (excluding the higher needs of pregnant and lactating women).

Notes: na = not available. -- = less than 0.005. Totals may not add due to rounding.

¹Adjusted for spoilage, plate waste, and other losses. One cup of milk or yogurt, 1-1/2 ounces of natural cheese, 2 ounces of processed cheese, 2 cups of cottage cheese, 1 1/2-cups of ice cream, 1/2 cup of canned evaporated milk, or 1/4 cup of dry milk or buttermilk count as 1 serving. Only the milk portion of half and half and eggnog are included in daily dairy servings; the cream portion is included in added fats.

²Aggregate data, unadjusted for spoilage, plate waste, and other losses.

³Cream cheese is counted in added fats.

⁴Excludes full-skim American, cottage, pot, and baker's cheese.

⁵Includes items not shown separately, such as mellorine (from 1970-90).

Source: USDA's Economic Research Service.

1.3 daily servings suggested for a 2,200-calorie diet. Likewise, average consumption of dry beans, peas, and lentils was low.

Nationwide, the market for fruits and vegetables has expanded in recent years, with many consumers benefiting from an ever-widening array of fruit and vegetable choices in their local supermarkets. Supermarket produce departments typically carry more than 400 produce items today, up from 250 in the late 1980s and 150 a decade earlier. Fresh-cut fruits and vegetables, such as short-cut carrots, prepackaged salads, restaurant and supermarket salad bars, locally grown items, and exotic and specialty produce, as well as hundreds of new varieties and processed fruit and vegetable products have been introduced or expanded since the early 1980s. Sharp increases in off-season imports of fruits from Chile and other Southern Hemisphere countries mean that consumers now have, virtually year-round, a choice of

fruits that were once available only in summer months.

Even if aggregate supplies are adequate, the successful adoption of Federal dietary recommendations will require that individual consumers have sufficient access to quantities of fruits and vegetables at affordable prices and in forms that meet their standards for quality, taste, and convenience. Between 1985 and 2000, fruits and vegetables led all other food categories in retail price increases, with price increases for fresh fruits and vegetables much higher than those for processed products (fig. 4).

Too Few Dairy Servings

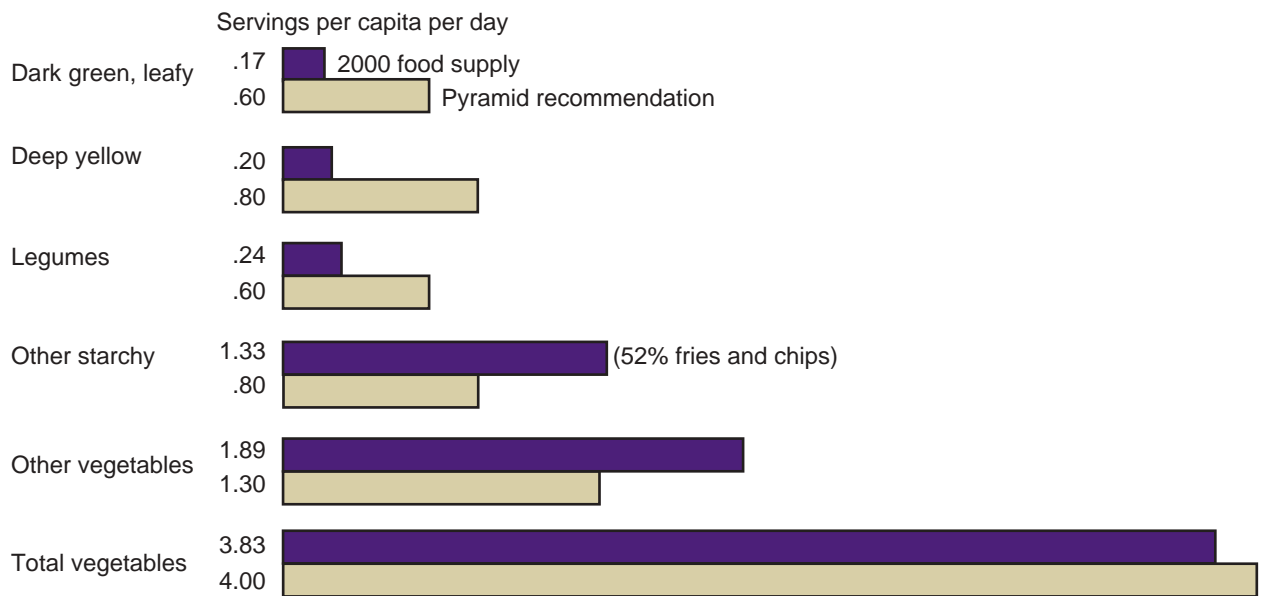
Dairy products accounted for 72 percent of the calcium available in the U.S. food supply in 2000. Calcium is essential to form strong bones and teeth, and requirements increase significantly during adolescence, early adulthood, pregnancy, and lactation. Therefore, the *Dietary Guidelines* base milk serving recommendations on age and phys-

iology rather than energy requirements. Three daily servings—the equivalent of three 8-ounce glasses of milk per day—are suggested for teenagers, young adults up to age 24, and pregnant and lactating women. All others should have two daily servings.

In this study, food supply servings were measured against a daily recommended intake of 2.2 servings. This target was based on a weighted average of recommended servings for different age groups of the U.S. population (excluding the higher needs of pregnant and lactating women). The food supply provided 1.61 daily servings of dairy products in 2000, about 73 percent of the 2.2 servings target, which is essentially unchanged since 1970 (table 7).

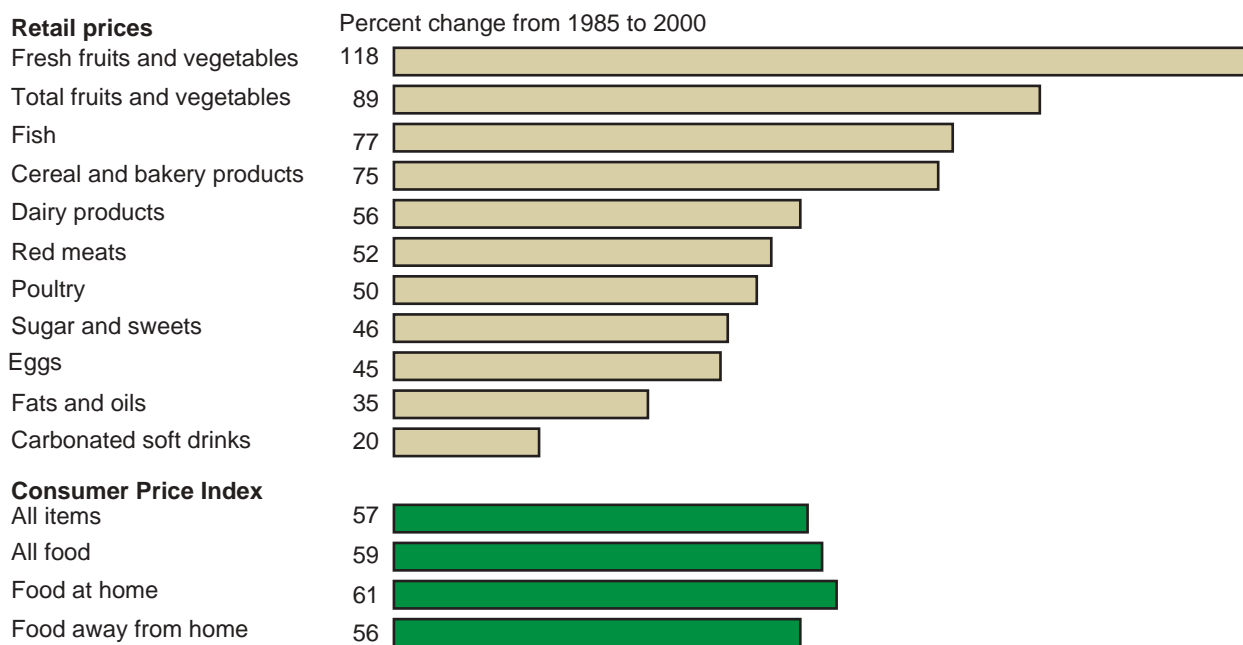
A modest increase in consumption, equal to about one-half cup of milk per person per day would bring per capita servings up to Pyramid recommendations. Because many dairy foods are naturally high in fat, consumers may

Figure 3—Average Consumption of Dark-Green Leafy and Deep-Yellow Vegetables and Legumes Is Woefully Low



Source: USDA's Economic Research Service.

Figure 4—Fruits and Vegetables Have Led Retail Food-Price Increases



Source: Calculated by USDA's Economic Research Service from the Consumer Price Index.

need to weigh their increased consumption of dairy products against overall fat intake. In 2000, for example, more than half the dairy servings provided by the food supply came from two dairy products naturally high in fat—cheese and whole milk. The dairy group contributed 22 percent of the saturated fat in the American diet in 2000; cheese accounted for nearly half of that contribution.

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Patterns of Caloric Intake and Body Mass Index Among U.S. Adults

Jayachandran N. Variyam

Thirty-one percent of U.S. adults between age 20 and 74 are now obese. Based on data from the National Health and Nutrition Examination Surveys, this level represents a 100-percent increase over the prevalence of adult obesity during 1976-80. Increases in obesity have occurred in both men and women, in all age groups, and in all racial and ethnic groups. The reason for this increase is clear—an excess of dietary energy intake over energy expenditure. The causes behind this growing energy, or caloric, imbalance are complex, involving metabolic, behavioral, environmental, cultural, and socioeconomic components.

The rising trend of obesity concerns health authorities, as does the disparity in the prevalence of obesity and overweight across sociodemographic segments of the U.S. population. Differences related to gender, race, ethnicity, income, and educational attainment are major sources of health disparities in the United States. Reducing such health disparities, and disparities in related risk factors, such as obesity, is a goal of the Federal Government's *Healthy People 2010* initiative. With better knowledge of the dietary differences and potential excessive energy intakes among population subgroups, public health professionals can devise more effective strategies for correcting the caloric imbalance among vulnerable subgroups.

Data from USDA's Continuing Survey of Food Intakes by Individuals (CSFII) are helpful in examining the energy intake side of the obesity equation. This survey provides 2 nonconsecutive days of 24-hour self-reported dietary intake information for a representative sample of the U.S. population. Because a person's day-to-day intake is highly variable, the 2-day average of his or her intake is unlikely to represent his or her longrun, or "usual," intake. However, with at least 2 days of intake data, the usual intakes for subpopulations can be estimated by special statistical procedures. To obtain the usual intakes reported in this study, we used Software for Intake Distribution Estimation, a statistical tool developed by Iowa State University. The estimates are weighted so as to be representative of the U.S. population.

It is tempting to examine the relationship between disparities in obesity and differences in energy intake directly by relating the energy intake among subpopulations with the prevalence of obesity. One would expect to find a strong positive association between caloric intake and a measure of body fatness, such as the body mass index (BMI). However, nutrition studies using self-reported food intake data, such as the CSFII data, have failed to find such an association, primarily because overweight persons tend to underreport intakes to a greater degree than healthy-weight persons. Also, at any given time, overweight persons may be on weight-loss diets.

Therefore, we attempt to infer implications for obesity due to ex-



Among women, higher levels of income and education might be associated with higher levels of physical activity and energy expenditure.

Credit: PhotoDisc.

cessive energy intake indirectly by looking at variations in self-reported energy intake across subpopulations and comparing the patterns with variations in BMI across the same groups. For example, if a certain demographic group has a pattern of lower caloric intakes at all intake levels (low, moderate, and high) than another demographic group, then, assuming energy expenditures remain the same, a similar pattern of lower BMI at all levels of the BMI distribution must be evident for the first group, compared with the second. How closely do the distributions of self-reported caloric intake and BMI match? For men, there is a fair level of agreement; for women, there is disagreement.

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Revealing Differences: A Look Beyond the “Average” Required

Comparisons of nutrient intakes among subpopulations require looking beyond differences in average, or mean intakes. For many nutrients, the likelihood that intakes exceed or fall below the requirements (that is, the risk of dietary excess or inadequacy) is greater at the upper or lower parts of the intake distributions than at the means. This effect is illustrated by the estimated distributions of self-reported caloric intakes among U.S. men and women, age 20 or older, excluding pregnant or lactating women (table 1).

For men and women of both age groups, the average usual caloric intakes are below the recommended levels. The percentiles of usual intakes show that a majority of adults have caloric intakes below the recommended levels. However, at the 90th percentile (that is, the intake level at which 90 percent consume below that level and 10 percent consume above that level), the caloric intakes of all groups exceed the recommended levels. For example, for men over age 50, the 90th percentile of estimated usual daily intake is 2,865 calories, compared with the recommended intake of 2,300 calories. Since caloric intakes that exceed requirements are one cause of obesity, comparing subpopulations at the 90th per-



Perhaps because they expend more energy performing physically demanding work, lower income men have only a slightly higher prevalence of obesity than men at the highest income level, despite higher calorie intakes.

Credit: Ken Hammond, USDA.

centile would be of greater interest than comparing subpopulations at the mean.

In general, comparing mean nutrient intakes alone would be satisfactory if the intakes of the comparison groups have identical distributions (that is, similar shapes and spreads). However, as a practical matter, nutrient intakes of subpopulations rarely have identical distributions. When the intake distributions of subgroups are dissimilar, comparison of dietary intakes based solely on means can mask deeper differences at other parts of the distribution of intakes. In such instances, comparison of intakes at various percentiles can be more meaningful.

For example, there is little difference between the usual energy intake of men with less than a high school education and men who completed high school. Compared with these two groups, however, men with more than a high school education appear to consume considerably more calories on average (table 2). Does this mean that men with more than a high school education consume more calories than men with lesser education at all parts of the distribu-

Table 1—Mean Usual Caloric Intakes Are Below Recommended Levels

Sex/Age	Recommended daily intake ¹	Daily usual intake					
		Mean	10	25	50	75	90
Calories/day							
Men:							
Age 20-50	2,900	2,650	1,728	2,091	2,557	3,103	3,676
Over age 50	2,300	2,072	1,351	1,647	2,013	2,431	2,865
Women:							
Age 20-50	2,200	1,729	1,191	1,419	1,693	1,998	2,310
Over age 50	1,900	1,486	1,028	1,223	1,458	1,717	1,978

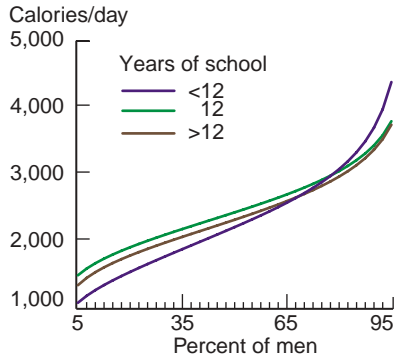
¹From National Research Council's Recommended Dietary Allowances, 1989. Source: Estimated by USDA's Economic Research Service from 1994-96 CSFII.

Table 2—Mean Usual Energy Intakes Vary Widely by Education and Income

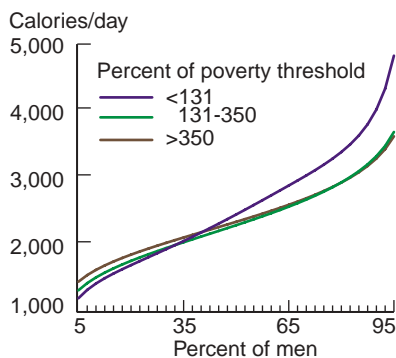
Group	Men	Women
	Calories/day	
Education:		
Less than 12 years	2,399	1,453
12 years	2,411	1,624
Over 12 years	2,516	1,719
Income:¹		
Less than 131 percent	2,689	1,554
131-350 percent	2,407	1,629
Over 350 percent	2,452	1,689
Race/Ethnicity:		
White, non-Hispanic	2,456	1,642
Black, non-Hispanic	2,562	1,644
Hispanic	2,452	1,564

¹Annual gross household income expressed as a percentage of the poverty threshold. Source: Estimated by USDA's Economic Research Service from 1994-96 CSFII.

Figure 1—Many Men With Less Than a High School Education Have Either Very Low or Very High Usual Energy Intake...



...And a Greater Share of Low-Income Men Consume Excessive Calories



Source: USDA's Economic Research Service.

tion of calorie intake? In other words, among light eaters, moderate eaters, and heavy eaters, do men with more than a high school education consume more calories than men with lesser education? Or is it that among heavy eaters, men with more education eat considerably more calories than men with lesser education?

In fact, neither of these scenarios is correct. Among light and moderate eaters, those with more than a high school education consume more calories than the other groups, whereas among the heaviest of eaters, men with less than a high school education consume the most calories. Until about the 80th percentile of caloric intake, men with less than 12 years of education consume a lower amount of calories than men with more than 12 years of education (fig. 1). However, beyond the 80th percentile—

that is, among the top 20 percent of the calorie consumers—the relationship reverses, and men with less than a high school education consume more calories than others.

An almost similar relationship is observed between the level of household income and calorie intake of men. Although men with household incomes below 131 percent of the poverty threshold have a higher mean usual energy intake (2,689 calories) than men between 131 and 350 percent of the poverty threshold (2,407 calories) and men above 350 percent of the poverty threshold (2,452 calories), this is not due to uniformly higher intake at all parts of the intake distribution. Rather, the higher mean intake of low-income men is due to their predominance among those consuming large amounts of calories, especially above the 2,900-calorie level (fig. 1). About 22.5 percent of men with incomes above 350 percent of the poverty threshold have usual calorie intakes above the 2,900-calorie level, compared with 35 percent of men with incomes below 131 percent of the poverty threshold.

Does Men's Body Fatness Show a Similar Pattern?

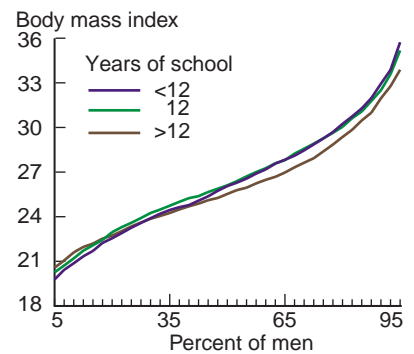
If the effects of education and income on caloric intake are fundamental, one might expect to see similar effects of these variables on the distribution of body fatness. Persistent differences in caloric intakes between two groups accumulated over time could result in a similar disparity in their weight distributions. We examined this possibility by charting the percentiles of BMI for adults age 20 and older (excluding pregnant or lactating women). The data are from the Third National Health and Nutrition Examination Survey (NHANES III), conducted over 1988-94, and are adjusted with sampling weights to make the estimates representative of the U.S. population.

The results for men are rather striking, especially with regard to

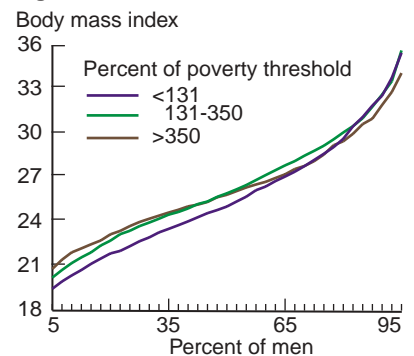
educational attainment. Just as for energy intake, men with more than a high school education are less prevalent among those with low BMI as well as those with high BMI (fig. 2). For example, for men with less than a high school education, the 10th percentile of BMI is 20.9; for men with more than a high school education, the 10th percentile of BMI is 21.6. At the other end of the BMI distribution, about 22 percent of men with less than a high school education are obese (defined as BMI at or above 30), compared with only 17 percent of men with more than a high school education.

The picture is less clear with respect to income (fig. 2). The prevalence of obesity is slightly higher among men in the lowest income group (19.4 percent) than among men in the highest income group (18.2 percent), but the differ-

Figure 2—Difference in Body Fatness by Education Level is Wider Among Heavier Men...



...While Differences in Body Fatness by Income Level Is Greater Among Lighter Men

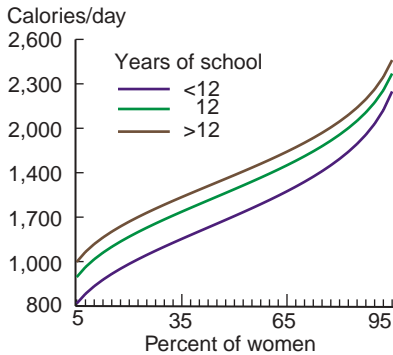


Source: USDA's Economic Research Service.

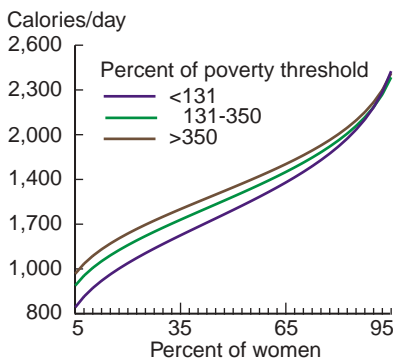
ence between lowest and highest income groups in the upper end of the BMI distribution is less than suggested by their caloric intake distributions. This effect may result from lower income men consuming larger amount of calories but also expending more energy through more physically demanding work or leisure-time activities.

An implication of these findings is that higher levels of educational attainment and household income influence men toward moderating their energy intakes, especially excessive intakes. This implication is bolstered by the finding that greater education and income tend to shift the upper end of the BMI distributions downward. Health economists have found a strong correlation between education and a variety of desirable health behaviors, including more healthful diets. They attribute this correlation to

Figure 3—Women's Usual Energy Intake Increases With Education...



...And Income, Except for the Top Decile



Source: USDA's Economic Research Service.

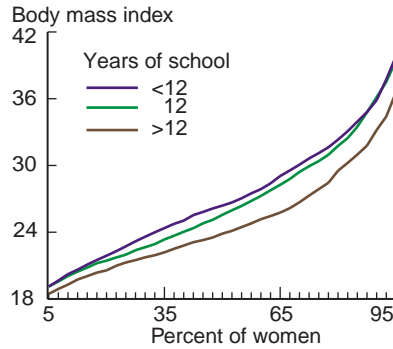
the increased ability of those with more education to acquire and use information on healthful lifestyles. At the same time, the link between income and health is well documented in public health research. Higher incomes may provide individuals with greater access to health care and enable them to adopt more healthful behaviors. Our analysis found further evidence of the positive effects of income and education on health behaviors through moderation in caloric intake.

Reported Caloric Intakes and BMIs Do Not Always Match

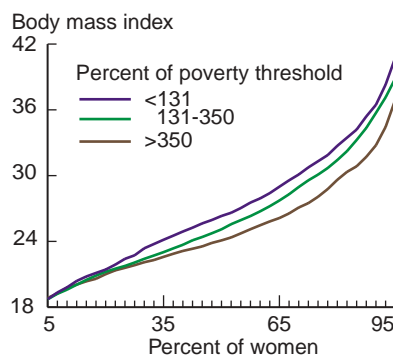
One has to be cautious with this interpretation of the effects of income and education on caloric intakes and body fatness because similar results—that is, the tendency toward moderation with higher education and income—are not found for women. Men and women arguably face similar environmental and social factors that influence their caloric intakes and body fatness. However, the patterns of self-reported caloric intake and BMI distributions among subpopulations of women are completely different than patterns among men.

Among women, lower income and lower educational attainment are associated with lower usual energy intakes at the mean (table 2), as well as at other parts of the energy intake distribution (fig. 3). Meanwhile, women's BMI distributions across educational and income groups show an opposing pattern—lower income and lower educational attainment are associated with higher BMI (fig. 4). For example, the median BMI for women with more than a high school education is 23.9 while that for women with less than a high school education is 26.4. And while 18.7 percent of women in the top income category are obese, 31.1 percent of women in the bottom income category are obese.

Figure 4—Body Fatness Varies Inversely With Education Among Healthy Weight, Overweight, and Obese Women...



...While the Share of Overweight and Obese Women Varies Inversely with Income



Source: USDA's Economic Research Service.

Clearly, the caloric intake pattern does not match the pattern of body fatness among women categorized by education and income. One explanation could be that among women, higher income and education might be associated with greater physical activity and energy expenditure. Alternatively, women with lower household incomes and lower education may be underreporting energy intake to a greater degree, compared with women of higher income and education. Resolving this puzzle requires better data on both caloric intakes and physical activity levels.

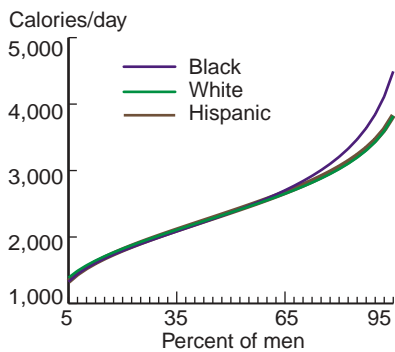
Racial and Ethnic Variations in Reported Caloric Intake and BMI Patterns

Among men, non-Hispanic Blacks have higher mean usual caloric intakes (2,562 calories) than

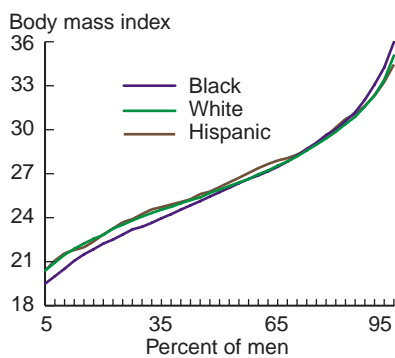
non-Hispanic Whites (2,456 calories) or Hispanics (2,452). The distribution of caloric intake among these groups shows that most of this difference occurs among those men consuming more than 2,900 calories daily (fig. 5). The bottom 65 percent of all three groups has nearly identical energy intake levels. Consistent with the disparity in caloric distributions, the BMI distributions show a slightly higher level of BMI among the top quintile of Blacks, compared with the top quintiles of Whites and Hispanics. On the other hand, among those with healthy weights (BMI < 25), Blacks have slightly lower BMI than Whites and Hispanics.

Among women, Hispanics have lower usual caloric intakes than non-Hispanic Whites and Blacks

Figure 5—A Greater Share of Non-Hispanic Black Men Have Excessive Caloric Intakes...



...And BMIs in the Healthy or Obese Range

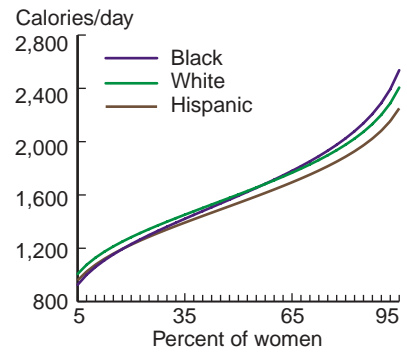


Source: USDA's Economic Research Service.

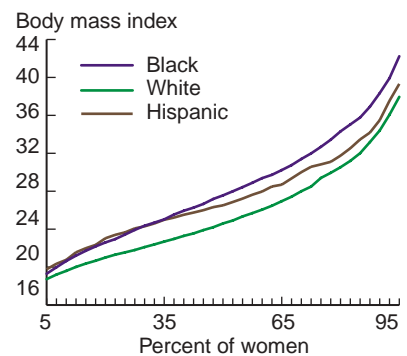
(fig. 6). Although Black and White women have almost the same caloric intake on average, Black women consume a slightly lower amount of calories than White women among the bottom half. However, this effect is offset by the upper respective halves among which Black women have a higher caloric intake. Just as with income and education subgroups, the BMI patterns among racial/ethnic subgroups of women fail to match the pattern implied by caloric intakes. At any given percentile, non-Hispanic Black women have higher BMI than non-Hispanic White women (fig. 6). BMI of Hispanic women fall between non-Hispanic White and Black women. While about 23 percent of White women are obese, 31 percent of Hispanic women and 37 percent of Black women are obese.

Several trends, including increasing consumption of soft drinks and snacks, greater proportion of food expenditures spent on food away from home, the growing portion size of restaurant meals, and our increasingly sedentary lifestyles, have been mentioned as possible causes of the growth in obesity in the United States. But disparities in obesity prevalence across subpopulations are equally worrisome. Aside from genetic differences, such inequalities could only result from differences in caloric intakes or physical activity levels. It appears that differences in caloric intakes among men may be associated with some of the disparities in obesity. Among women, there is dissonance between the distribution of usual caloric intake and the distribution of BMI. Whether this dissonance occurs because of differences in physical activity levels or underreporting of caloric intakes is an issue that needs to be resolved for a better understanding of the causes of disparities in overweight and obesity among women.

Figure 6—Hispanic Women Report Lower Usual Caloric Intakes Than Non-Hispanic Women...



...But Non-Hispanic White Women Have Lower BMIs



Source: USDA's Economic Research Service.

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Misperceptions in Self-Assessed Weight Status Vary Along Demographic Lines

Fred Kuchler and Jayachandran N. Variyam

Body mass index (BMI) describes relative weight for height and is significantly correlated with total body fat content. Differences between adults' weight status (as measured by BMI) and their perceptions of their weight status show how many and which individuals are mistaken about their weight status. A recent analysis by USDA's Economic Research Service found that women tend to make more accurate self-assessments, and men and women often make different types of mistakes in perceiving weight status. Mistakes have a systematic component, and are associated with demographics, socioeconomic status, and knowledge and attitudes toward diet and health.

The extent of misperception about weight status has important implications for health information

programs that might be used to reduce the prevalence of obesity. For example, the 2001 Surgeon General's report on overweight and obesity draws the connection between weight status and health risks. Upon receiving this information, a rational individual might make diet and lifestyle changes to lose weight, hoping to reduce the health risks. However, public information programs might fail to induce this type of behavior if many overweight individuals do not believe they are overweight. These individuals will assume the message is intended for someone else. In this case, the people most in need of changing their diet and lifestyle will not do so. An entirely different strategy would be necessary to induce desired diet and lifestyle changes.

To examine the agreement between adults' weight status and



Men are about three times more likely than women to underestimate their weight status. Many overweight or obese men say their weight is about right.

Credit: Eyewire.

perceptions of such, we compare two variables drawn from the 1994-96 Continuing Survey of Food Intakes by Individuals (CSFII) and the Diet and Health Knowledge Survey (DHKS), a followup survey. For almost every individual who completed both surveys, we have a measure of BMI, based on self-reported height and weight, and the individual's self-assessed weight status.

We used BMI to classify each individual as obese, overweight, healthy weight, or underweight. BMI is calculated as weight in kilograms divided by height in meters squared. Adults with BMI at or above 30.0 are classified as obese and those with BMI at or above



Women tend to make more accurate self-assessments of their weight status than men, but they are also more likely to err on the side of overestimating, that is, they think they are overweight but they are not.

Credit: Digital Stock.

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Table 1—Some Who Are Obese Say Their Weight Is About Right

Item	Individuals who are obese ¹			Individuals who are overweight but not obese ²			Individuals who are not overweight or obese ³		
	All	Men	Women	All	Men	Women	All	Men	Women
People who say they are overweight	87.0	83.2	90.2	59.4	47.8	77.1	17.4	8.5	23.9
People who say they are about right or underweight	13.0	16.8	9.8	40.6	52.2	22.9	82.6	91.5	76.1

¹Body mass index greater than or equal to 30.

²Body mass index greater than or equal to 25 but less than 30.

³Body mass index less than 25.

Source: USDA's Economic Research Service.

25.0, but less than 30.0 are classified as overweight. BMI of 18.5 or greater, but less than 25.0, is defined as healthy weight. BMI less than 18.5 is defined as underweight.

The individual perspectives were provided by responses to a separate question in DHKS: “Do you consider yourself to be overweight, underweight, or about right?” We compared these responses with each individual’s BMI classification. As the BMI classes are not intended to give guidance to women who are pregnant, we deleted from our sample all women who were pregnant and/or lactating. We used sampling weights to make our estimates representative of the U.S. population.

Differences Between Self-Assessed Weight Status and BMI Are Large

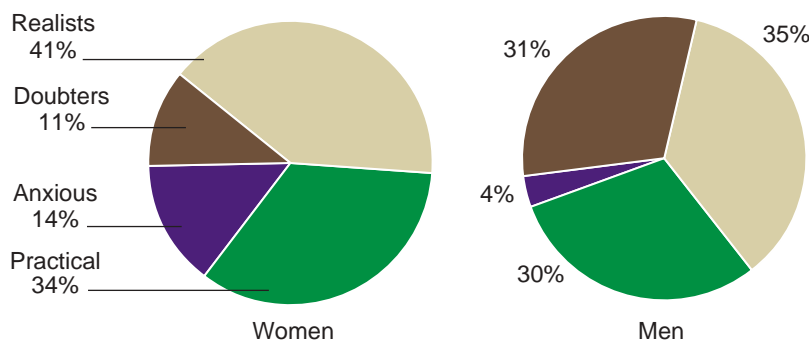
According to CSFII data and classifications based on BMI cutpoints, 55.1 percent of the U.S. population is overweight or obese, with 19.5 percent obese. The survey showed more men (61.6 percent) than women (48.8 percent) are overweight or obese. On the basis of self-assessed weight status, 40.8 percent of men and 59.3 percent of women believe they are overweight. Clearly, misperceptions are commonplace. And, the misperceptions are not all at the margin, that is, individuals slightly over the overweight cutpoint say their weight is about right. Instead, many of the mistakes are much larger.

Among those who are overweight but not obese, 40.6 percent do not agree that they are overweight (table 1). Instead, they say their weight is about right or that they are underweight. The error rate for this type of mistake is lower among the obese subpopulation, with 13 percent saying their weight is about right or that they are underweight. Therefore, being a little above the cutpoint for overweight makes a person more likely to say his or her weight is about right than a person who is obese. However, with 13 percent of the obese subpopulation misjudging their weight status by two or three

weight classes, it is clear that misperception admits a wide variety of possibilities.

While misperceptions about weight status are commonplace, the mix of misperceptions is entirely different for men and women. Women who are obese or overweight are more likely to correctly assess their weight status than men. However, women are also more likely to believe they are overweight when they are not overweight. Only 8.5 percent of men who are healthy weight or underweight believe they are overweight. The share for women is 23.9 percent.

Figure 1—Women Are More Accurate Than Men at Assessing Weight Status



Note: Realists are those who are overweight or obese and say they are overweight. Practical are those who are healthy weight and say their weight is about right. Practical also include those who are underweight and say they are underweight. Doubters are those who are obese or overweight and say their weight is about right, as well as those who are obese, overweight, or healthy weight and say they are underweight. Anxious include those who are healthy weight and say they are overweight, as well as those who are underweight and say they are healthy or overweight.

Source: USDA's Economic Research Service.

Two Ways To Be Right and Two Ways To Be Wrong

The four weight classes based on BMI provide a public health view of each individual's weight status. The three self-assessed weight classes provide the individual's view. We used a two-way classification to divide the respondents into four groups—two that accurately assess their weight status and two that do not.

We refer to the groups that accurately assess weight status as Realists or Practical. Realists are those who are overweight or obese and say they are overweight. Practical are those who are healthy weight and say their weight is about right. Practical also include a relatively small group whose members are underweight and say they are underweight.

We refer to those who under-assess their weight status as Doubters. Doubters include those who are obese or overweight and say their weight is about right, as well as those who are obese, overweight, or healthy weight and say they are underweight. Anxious are those who overassess their weight status. Anxious include those who are healthy weight and say they are overweight, as well as those who are underweight and say they are healthy or overweight.

Characterizing the population in terms of weight perception accuracy is useful for forecasting the impacts of an information program that explains the health risks of being overweight. Realists will recognize the message is intended for them and may or may not make diet and lifestyle changes. Doubters are unlikely to believe the message pertains to them. The message will not be relevant to Practical and, by unnecessarily generating health concerns, it could be harmful to Anxious.

Realists and Practical are more numerous among women, indicating fewer misperceptions overall among women than among men (fig. 1). As 14 percent of women but

only 4 percent of men fall into the Anxious class, we can unsurprisingly conclude women are more likely to err on the side of overestimating their weight than men. Men, on the other hand, are more likely to underestimate their weight—31 percent of men but only 11 percent of women are Doubters.

Accuracy of Assessments Varies Along Demographic and Socioeconomic Lines...

Researchers analyzing health surveys, such as the National Health and Nutrition Examination Survey and the Behavioral Risk Factor Surveillance Survey, have found that the prevalence of overweight and obesity has a systematic component, varying along demographic and socioeconomic lines. The prevalence of overweight and obesity in the United States is gen-

erally higher for men and women in racial/ethnic minority populations than for Whites, with the exception of Asian-Americans, for whom overweight and obesity prevalence is lower than in the general population. Women with low incomes or low education are more likely to be obese than women of higher socioeconomic status.

That demographic and socioeconomic factors are associated with the prevalence of overweight and obesity suggests that those same factors might be associated with perceptions about overweight and obesity. Here, we refine the characterization of Doubters, Realists, Practical, and Anxious by showing that population shares in these groups vary along demographic and socioeconomic lines. While gender is clearly associated with shares, education, race/ethnicity,

Table 2—There Are Fewer Doubters But More Anxious at Higher Education Levels

Characteristic	Doubters	Population shares		
		Realists	Practical	Anxious
<i>Percent</i>				
Education:				
Less than high school	28.4	39.2	27.1	5.3
High school	21.5	41.5	28.0	9.0
Some college	18.1	37.6	33.6	10.7
4 or more years of college	17.6	33.9	38.9	9.7
Race/Ethnicity:				
Non-Hispanic White	18.6	38.8	32.3	10.3
Non-Hispanic Black	30.4	44.8	22.9	1.9
Asian	22.6	6.4	62.4	8.6
Hispanic	26.0	33.2	33.2	7.6
Age (years):				
Less than 30	23.2	23.9	42.9	10.0
30-49	19.5	40.7	30.7	9.2
50-69	18.3	48.1	24.8	8.8
70 and older	27.1	29.8	35.9	7.2
Percent of poverty level:				
Less than 130%	23.2	37.6	31.5	7.8
131-350%	22.9	36.0	32.3	8.9
Over 350%	17.8	40.3	32.3	9.6

Note: Numbers may not add to 100 percent due to rounding. Realists are those who are overweight or obese and say they are overweight. Practical are those who are healthy weight and say their weight is about right. Practical also include those who are underweight and say they are underweight. Doubters are those who are obese or overweight and say their weight is about right, as well as those who are obese, overweight, or healthy weight and say they are underweight. Anxious include those who are healthy weight and say they are overweight, as well as those who are underweight and say they are healthy or overweight.
Source: USDA's Economic Research Service.

age, and income also demonstrate their influence.

We classified each surveyed individual into one of four educational attainment classes—less than high school, high school, some college, or college and advanced degrees. Increasing educational attainment is associated with several effects on the accuracy of self-assessed weight status: Doubters decrease in share and Anxious increase, changing the mix of perceptions (table 2). In total, accuracy increases because the combined shares of Realists and Practical increase.

When the sample is divided along racial/ethnic lines, the population shares among the four categories vary enormously. Asians are unique in having a majority share of Practical. Among the other three racial/ethnic groups, the mix of misperceptions is striking. Among non-Hispanic Whites and Blacks, non-Hispanic Blacks include relatively more Doubters but fewer Anxious. Hispanics fall between Blacks and Whites in shares of Doubters and Anxious.

Age has a substantial influence on the distribution of classes. The shares of Practical display a U-shaped relation, taking on larger values during their twenties and old age and smaller values during middle age. The shares of Realists move in opposition to the Practical and display an inverted U-shape, with the largest share in the 50-69 age class.

We defined three broad income classes, relative to the poverty level. The three income classes show relatively small differences in shares of weight assessment accuracy, which suggests that the association between weight assessment and income is weak. In many studies, the effects of education and income are difficult to disentangle. Here, however, the changing shares associated with educational attainment may be largely attributed to education and not to income.

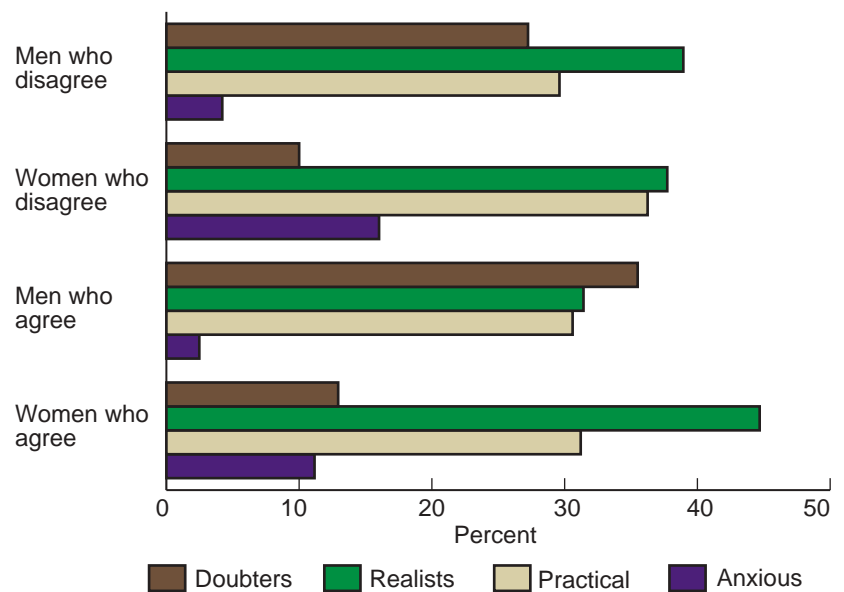
...And by Knowledge and Attitudes Toward Diet and Health

With misperception of weight status widespread, designing an information program to combat overweight is difficult. It is not enough to establish the linkage between weight status and health; many people have to be informed that they are or are not overweight. Like all advertising, information programs can be designed to appeal to specific demographic and socioeconomic groups. The demographic and socioeconomic patterns of weight status misperceptions suggest a target audience for an information program designed to overcome the misperception problem.

Before designing a program to communicate with a particular group, it would be beneficial to determine if those who are misjudg-

ing their weight are amenable to change. If they are ill informed about relations between diet and health or if their attitudes toward diet and health are open to change, information programs may yield behavioral changes and reduced health risks. To some extent, understanding how individuals' attitudes and knowledge influence overweight and obesity is more important and useful from a policy perspective than understanding demographics and socioeconomics of obesity or patterns of inaccuracy in judging weight. Socioeconomic variables, such as average household income or education patterns, are difficult to manipulate. In contrast, attitudes and opinions admit the possibility of a policy lever. Demonstrating which types of attitudes are most influential in determining BMI suggests a direction for information to yield its biggest impact.

Figure 2—Realists Make Up the Largest Share of Women Who Agree That a Person's Weight Status Is Predetermined



Note: Realists are those who are overweight or obese and say they are overweight. Practical are those who are healthy weight and say their weight is about right. Practical also include those who are underweight and say they are underweight. Doubters are those who are obese or overweight and say their weight is about right, as well as those who are obese, overweight, or healthy weight and say they are underweight. Anxious include those who are healthy weight and say they are overweight, as well as those who are underweight and say they are healthy or overweight.

Source: USDA's Economic Research Service.

A unique feature of DHKS is that it allows us to further refine the picture of the four classification groups, showing how attitudes and knowledge toward diet and health influence perceptions of weight status. Several questions from DHKS address respondents' beliefs in their ability to control their weight, the importance they assign to maintaining a healthy weight, their awareness of health problems associated with being overweight, and their overall knowledge of relations between diet and health.

Scientists differ on the relative importance of the factors that determine weight status, whether people's weight status results from their genetic makeups or their diet and exercise choices. DHKS asked survey respondents their opinions on weight control: "Please tell me if you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the state-

ment: Some people are born to be fat and some thin; there is not much you can do to change this."

As the statement alludes to genetics, we refer to the statement as the gene theory. Thirty-nine percent of the population are adherents to the gene theory and do not believe they can change their weight status. There are proportionately more Realists among women who adhere to the gene theory than among women who disagree (fig. 2). Among women who adhere to the gene theory, the largest share is Realists. In effect, there is a relatively large group of women whose members correctly assesses their overweight status and reject the notion that weight status is controllable.

Among the majority of respondents who disagree with the gene theory, Realists constitute the largest shares of both men and women. Thus, among those who be-

lieve they can adjust their weight status, many recognize they are overweight. It is not known whether this group is not attempting to lose weight or whether it has not yet been successful at weight loss.

DHKS also asked respondents to rate the importance of maintaining a healthy weight: "To you personally, is it very important, somewhat important, not too important, or not at all important to maintain a healthy weight?"

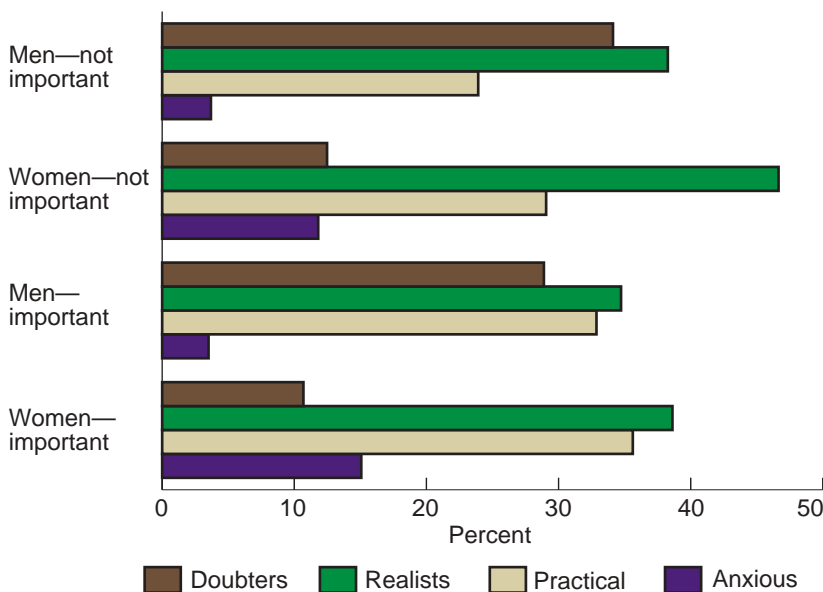
We split the respondents into two groups: those who said maintaining a healthy weight is very important and all others. Differences exist between the groups that believe it is important to maintain a healthy weight and those who do not (fig. 3). Realists are the largest proportion of each group. The largest share of Realists appears among women for whom maintaining a healthy weight is unimportant. Members of this group recognize their overweight status and would know that an information program identifying the linkage between weight and health risk was intended for them. If the program's message were convincing, we could expect this group to make different diet and lifestyle choices.

Seventy-three percent of the respondents said that maintaining a healthy weight was important. Only 5.1 percent of respondents indicated that they believed maintaining a healthy weight was unimportant; 21.9 percent were ambivalent, saying weight is somewhat important. Therefore, the group whose behavior might be changed may be relatively small.

The survey also asked respondents if they were aware of linkages between being overweight and any other health problems: "Have you heard about any health problems caused by being overweight?"

Responses revealed that many individuals may be making diet and lifestyle decisions because they understand the linkage between weight status and health risks.

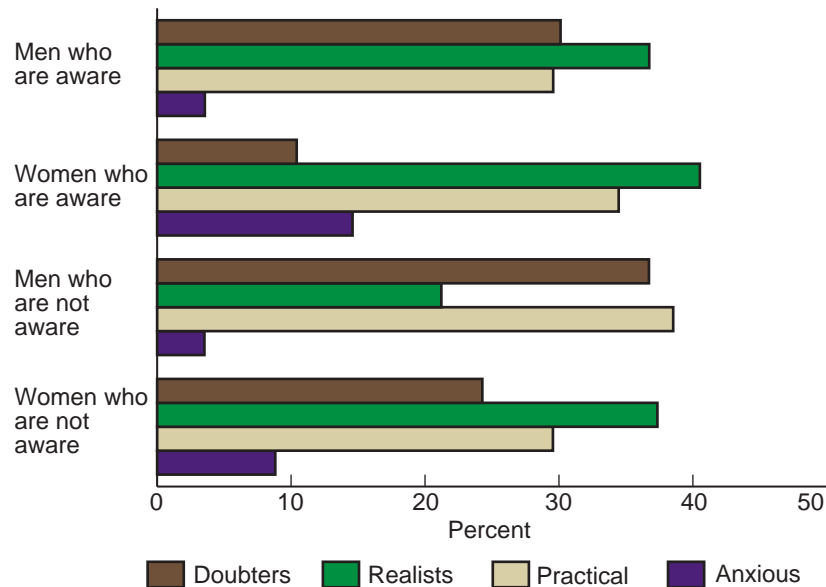
Figure 3—Realists Are Numerous Among the Group That Does Not Believe It Is Important To Maintain a Healthy Weight



Note: Realists are those who are overweight or obese and say they are overweight. Practical are those who are healthy weight and say their weight is about right. Practical also include those who are underweight and say they are underweight. Doubters are those who are obese or overweight and say their weight is about right, as well as those who are obese, overweight, or healthy weight and say they are underweight. Anxious include those who are healthy weight and say they are overweight, as well as those who are underweight and say they are healthy or overweight.

Source: USDA's Economic Research Service.

Figure 4—Women Who Are Aware of Health Problems From Overweight Assess Their Weight More Accurately Than Women Who Are Not Aware



Note: Realists are those who are overweight or obese and say they are overweight. Practical are those who are healthy weight and say their weight is about right. Practical also include those who are underweight and say they are underweight. Doubters are those who are obese or overweight and say their weight is about right, as well as those who are obese, overweight, or healthy weight and say they are underweight. Anxious include those who are healthy weight and say they are overweight, as well as those who are underweight and say they are healthy or overweight.

Source: USDA's Economic Research Service.

Among women, those who are aware of health problems from overweight make more accurate weight assessments than those who are unaware—the shares of Realists and Practical are larger (fig. 4). The mix of misperceptions about weight status changes with awareness. While there are fewer Doubters among women who are aware, there are relatively more Anxious. Many women are aware of the links between diet and health. Thus, an information program might have only a small effect on women's diet and lifestyle choices.

For men, the shares among the aware and unaware differ. The share of Realists is dramatically larger among aware men than among unaware men. There are a couple of possible explanations. Information programs that have successfully communicated to some men that they are overweight and that there are adverse health con-

sequences to being overweight may have failed to communicate the severity of those consequences. That is, some overweight men may assume that the risks of overweight are relatively inconsequential. Alternatively, those men with the greatest difficulty losing weight may be those most interested in learning about the adverse consequences of being overweight. Among men, it may be typical to seek health information to help mitigate existing adverse health consequences rather than to prevent the causes.

Lastly, DHKS surveyed respondents about their knowledge of the relations between diet and health. The survey included questions on the appropriate number of servings of different food groups and on the nutrient content of foods, asking respondents to identify foods highest in fat and in saturated fat, characteristics of fats, and relations between fat and cholesterol,

and to define food label information on fat and cholesterol. Respondents were asked to identify health problems associated with being overweight. Respondents were quizzed about their awareness of problems associated with overconsumption of fat, sodium, cholesterol, and sugar, and underconsumption of fiber and calcium.

We treated the 27 questions as a test of diet and health knowledge. We calculated the number of correct answers for each respondent and used the scores to divide respondents into four groups, from most to least knowledgeable. (Each group was approximately one-quarter of the respondents.) For each knowledge group, we segmented the group into four weight assessment accuracy classes. While levels differ for men and women, the overall patterns are similar, so we present combined information. As knowledge, as monitored by the quiz, increases, the mix of errors changes, with Doubters decreasing in share and Anxious increasing (fig. 5). Additionally, the share of Realists increases with knowledge. In this case, the Realists show up most frequently in the most knowledgeable group. The group most likely to make use of information linking weight status and health risks is already familiar with the information. Again, the fact that many Americans are fairly knowledgeable about diet and health limits the impacts of a new information program.

One Information Program Is Not the Answer

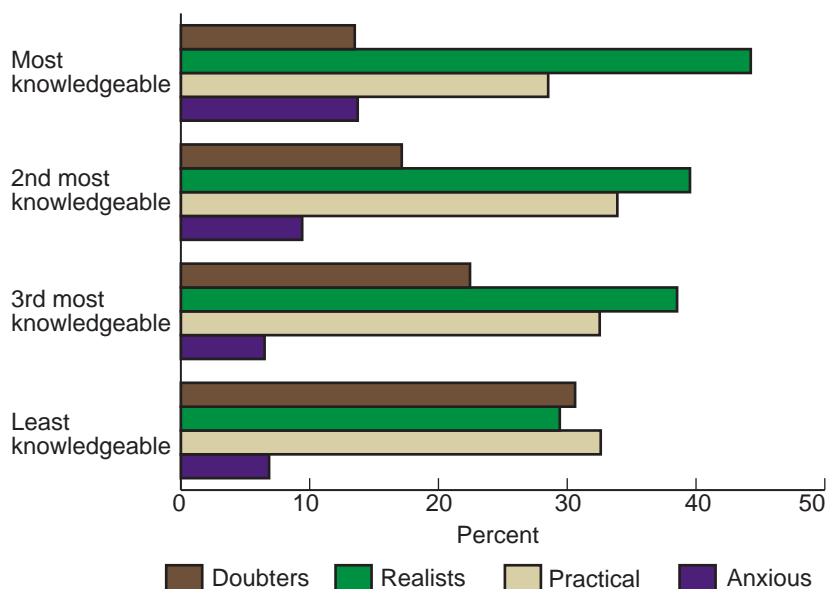
While publicly provided information programs are often promoted as a means of addressing the obesity problem, such programs may not be instantly successful. Even if received, the information may not be able to overturn attitudes that develop over a lifetime. People may have already incorporated health recommendations into their diet and lifestyle choices and may have little room for additional changes. Some individuals may not

be troubled by extra pounds and may not be concerned if the medical and public health community calls them obese or overweight. Others will make diet and lifestyle choices to maintain weight in ranges identified as healthy. The systematic differences in the prevalence of overweight and obesity among subpopulations may reflect that individuals' ideas about thresholds for obesity and overweight vary along demographic lines. However, the association between socioeconomic status and obesity suggests that some may not yet understand they are overweight and may not understand the risks they run by being obese.

This analysis suggests that Federal information programs toward obesity will be more likely to influence diet and lifestyle choices if the programs issue distinct types of messages to different subpopulations. Until Doubters, who are relatively more concentrated among men, middle-aged adults, and those with lower education levels, agree they are overweight, they are unlikely to act on a message linking overweight and health risks.

Designing a message for Realists that induces diet and lifestyle changes may be even more challenging. Realists tend to have a variety of qualities that suggest they are unlikely to change. Many Realists are knowledgeable about diet and health. In fact, they make up a large share of those who are aware of health risks associated with being overweight, despite being overweight themselves. Some qualities appear to conflict with awareness and knowledge but add to the

Figure 5—Realists Increase in Share With the Number of Correct Diet Knowledge Answers



Note: Realists are those who are overweight or obese and say they are overweight. Practical are those who are healthy weight and say their weight is about right. Practical also include those who are underweight and say they are underweight. Doubters are those who are obese or overweight and say their weight is about right, as well as those who are obese, overweight, or healthy weight and say they are underweight. Anxious include those who are healthy weight and say they are overweight, as well as those who are underweight and say they are healthy or overweight.

Source: USDA's Economic Research Service.

reluctance to change. For example, Realists form a large share of women who agree with the gene theory, and they are highly concentrated among women who discount the importance of maintaining a healthy weight. Realists are relatively more numerous in non-Hispanic Black, female, and middle-aged subpopulations. But the ability to identify Realists along demographic lines may be inconsequential to designing a program until the public health community can construct a message that resonates

with a group that is both fairly well informed and discounts the possibility and importance of change.

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Higher Fruit Consumption Linked With Lower Body Mass Index

Biing-Hwan Lin and Rosanna Mentzer Morrison

Healthy weight children, both girls and boys, consumed significantly more fruits than overweight children.

Credit: PhotoDisc.



The growing obesity epidemic in the United States has raised questions among many health professionals: Do the overweight eat differently from thinner people? Do the obese and overweight choose different foods, or consume larger quantities, or both? Is obesity a result of metabolism and activity level?

One of the major nutrition campaigns in the last decade has been to urge Americans to eat more fruits and vegetables in terms of quantity and variety. As a starting point in exploring the effects of eating habits on body weight, researchers with USDA's Economic Research Service examined the relationship between consumption of fruits and vegetables and obesity. We wondered if people who eat more fruits and vegetables are thinner than those who eat lesser amounts. We hypothesized that people who work to incorporate nutrient-dense, low-fat fruits and vegetables in their diets will work to keep their weights at healthy levels. We found a negative relation-

ship, or inverse association, between fruit consumption and body mass index: people who eat more servings of fruit each day have lower body mass indices. Surprisingly, we found no consistent relationship between vegetable consumption and body mass index, especially among children.

Analysis Includes School-Age Children and Adults

USDA's 1994-96 Continuing Survey of Food Intakes by Individuals (CSFII) was the source of our food consumption data. This survey asked respondents to recall what, when, where, and how much they ate over 2 nonconsecutive days. Parents or guardians of children

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younger than age 13 completed the survey for their children. We also incorporated data from the 1998 CSFII, which is a supplemental survey of 5,559 children from birth through age 9. Our analysis includes responses from 4,709 men and 4,408 women age 19 and older, 883 adolescents age 13-18, and 2,181 children between age 5 and 12.

Survey respondents were also asked their or their children's height and weight. Self-reporting of weight and height can be subject to misreporting or wishful thinking, but face-to-face interviews, such as the CSFII, tend to lessen misreporting. These two measures were used to calculate a respondent's body mass index (BMI). BMI is calculated as a person's weight in kilograms divided by his or her height in meters squared. Health authorities have established specific ranges of BMI values to define a

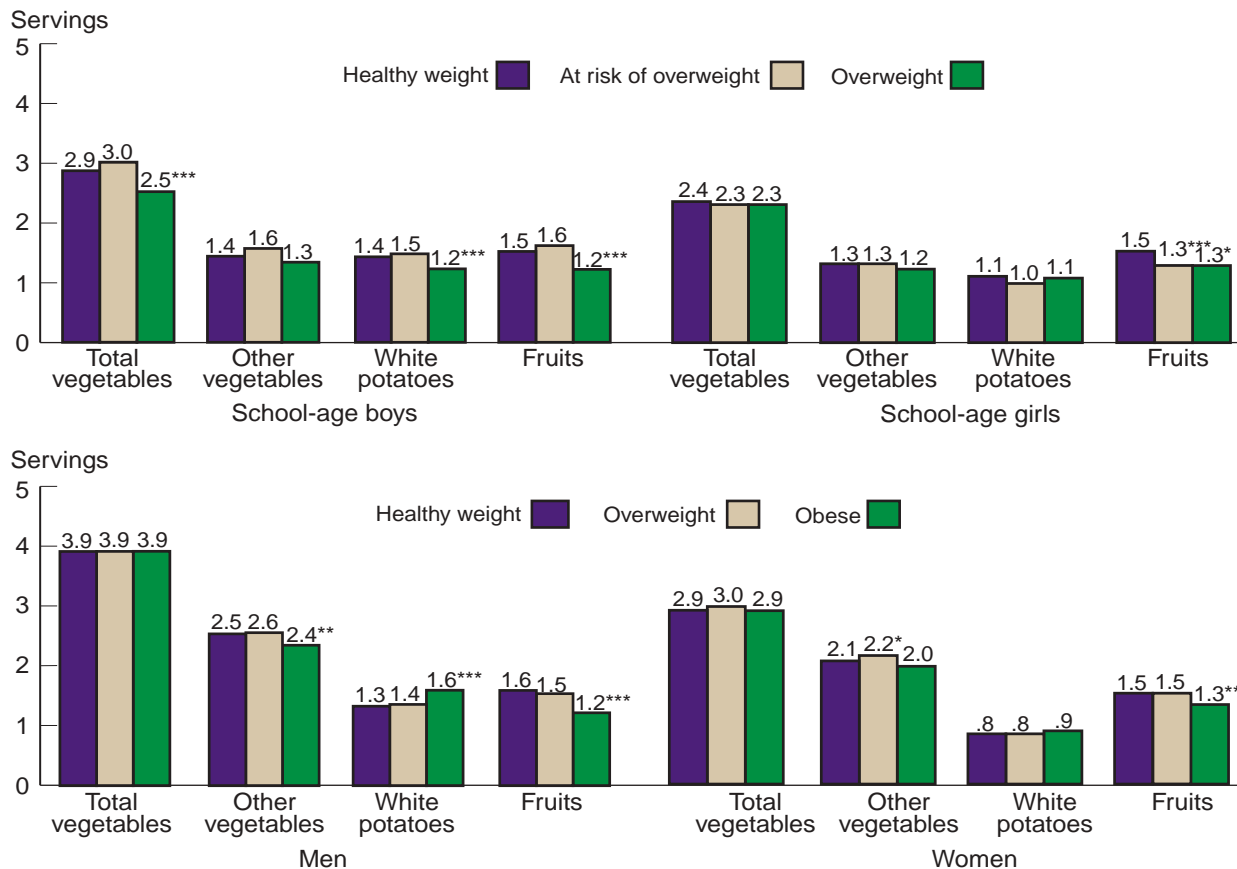
person as underweight, healthy weight, overweight, or obese. These values apply to both men and women. Children and adolescents are classified as overweight or at risk of becoming overweight if their BMI values exceed age and sex-specific BMI values established by the Centers for Disease Control and Prevention (CDC).

In the sample, 43 percent of men and 28 percent of women were overweight, as defined by a BMI between 25 and 29.9. Another 17 percent of men and 19 percent of women were obese (BMI of 30 or above). Results of the 1999 National Health and Nutrition Examination Survey indicate an estimated 35 percent of adults are overweight and an estimated 27 percent are obese. The 1994-98 CSFII data show that 14 percent of boys and girls age 5-18 were overweight (BMI above the 95th percentile of

the CDC pediatric growth charts). Another 18 percent of boys and 13 percent of girls were at risk of becoming overweight (BMI between the 85th and 95th percentiles). National figures from CDC show about 13 percent of children and adolescents are overweight.

USDA's Agricultural Research Service (ARS) maintains a pyramid servings database that expresses food consumption, both single food items and combination dishes, in terms of the number of servings. The database makes it possible to compare intake data with dietary recommendations in USDA's Food Guide Pyramid by converting grams of food into servings of 30 different food groups, including fruits and vegetables. Thus, we are able to total all vegetables and fruits eaten, whether as a single item or as a component in a vegetable stir fry or a fruit tart. We

Figure 1—Overweight Children and Obese Adults Eat Less Fruit Than Their Healthy-Weight Counterparts



Note: ***, **, and * indicates difference from healthy weight is statistically significant at 1-percent, 5-percent, and 10-percent probability. Source: Calculated by USDA's Economic Research Service using 1994-96 and 1998 CSFII data.

conducted two analyses of fruit and vegetable consumption, as expressed in servings consumed per day. First, we compared the average consumption by weight status. Then we examined the effect of fruit and vegetable consumption on BMI, controlling for the effects of age, gender, and race.

Fruit Consumption Varies by Weight Status, But Not Vegetable Consumption

In the analyses, we looked at four produce categories: total fruit, including fruit juices; total vegetables, including vegetable juices; white potatoes; and vegetables excluding white potatoes (other vegetables). Much of the white potatoes eaten in the United States are in the form of french fries—not exactly a low-fat vegetable option in the same company as kale, spinach, and sweet potatoes.

We analyzed CSFII data to examine whether healthy-weight individuals consume different amounts of fruits and vegetables than overweight or obese individuals. The CSFII respondents were grouped according to their age and gender. Children not yet attending school were excluded from the analysis. To preserve sufficient observations in the analysis, we divided the sample into four groups—school-age boys, school-age

girls, men, and women. Children were classified into three weight classes—healthy weight, at risk of overweight, and overweight. Adults were divided into three weight classes—healthy weight, overweight, and obese. About 2 percent of the adult CSFII respondents were underweight, and they were excluded from the analysis.

We found differences between the amounts of fruits eaten by healthy-weight people, overweight people, and the obese, but we found weak correlation between body weight status and vegetable consumption (fig. 1). Healthy-weight and at-risk-of-overweight boys consumed, statistically speaking, the same amount of total vegetables—about 3 servings. Overweight boys consumed less total vegetables (2.5 servings) as well as less white potatoes (1.2 servings) than other boys. Among men, there were no significant differences in the consumption of total vegetables among the three body-weight statuses. Obese men, however, consumed 1.6 servings of white potatoes, more than the 1.3 servings consumed by healthy-weight men and the 1.4 servings consumed by overweight men. For school-age girls and women, there were no significant differences in the consumption of total vegetables or white potatoes across the three weight statuses. However, overweight women did consume more other vegetables than obese or healthy-weight women.

Overweight children and obese adults of both genders consumed significantly less fruit than their healthy-weight counterparts. For example, overweight girls consumed 1.3 servings of fruit, compared with 1.5 servings of fruit eaten by healthy-weight girls. In addition, at-risk-of-overweight girls also consumed less fruit than healthy-weight girls. It appears that fruit consumption is a more accurate predictor of body weight status than vegetable consumption.

The Food Guide Pyramid recommends daily consumption of two

to four servings of fruits and three to five servings of vegetables. The recommended number of servings depends on the individual's caloric need, which in turn depends on the individual's age, sex, size, and activity level. For each subgroup in the sample, we compared average consumption as a share of the recommended servings. The recommended servings were derived from the individual's reported caloric intake. The comparison is useful especially when caloric needs of individuals in one body weight status vary greatly from the needs of individuals in other statuses.

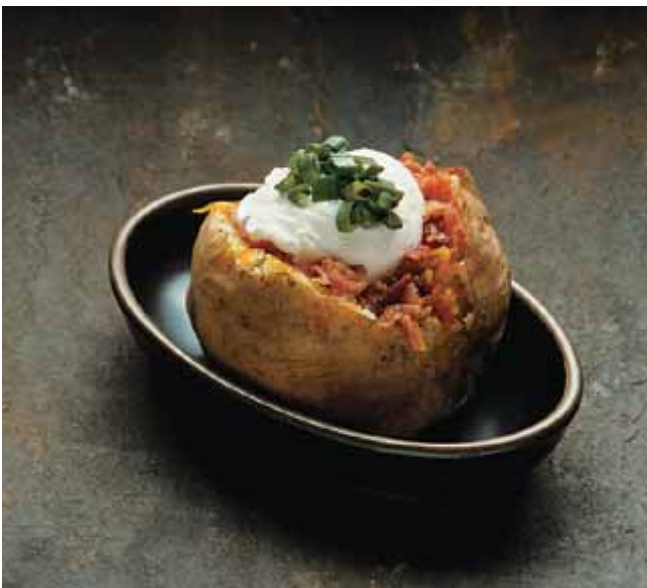
Similar to the results for average servings consumed, healthy-weight children and adults do not necessarily consume different amounts of total vegetables than their overweight or obese counterparts (fig. 2). However, healthy-weight boys and men consumed significantly more fruit than either overweight or obese individuals. For example, obese men ate just 39 percent of the recommended servings of fruit, compared with healthy-weight men who ate 51 percent of recommended fruit servings. Girls at risk of becoming overweight consumed 53 percent of the recommended servings of fruit, significantly lower than the 64 percent of the recommended servings of fruit consumed by healthy-weight girls. Obese women consumed 51 percent of the recommended servings of fruit, significantly lower than the 57 percent consumed by other women.

Fruit Consumption Better Predictor of BMI Than Veggies

As part of our analysis, we have compared the average consumption of fruits and vegetables, as servings or the share of recommended servings, among the three body-weight statuses. We examined the consumption of one food group, for example, fruits, independently of the other group. A more accurate assessment of the relationship between body weight and food con-

The weak correlation between vegetable consumption and body mass index might be explained by the way many Americans eat vegetables: deep fried, topped with high-fat dressings or sour cream, or included in high-fat mixtures.

Credit: PhotoDisc.



sumption requires studying the effects of fruit and vegetable consumption simultaneously.

One technique economists use to analyze multiple factors simultaneously is regression analysis. Regression analysis generates coefficients that indicate how closely the included factors correlate with the dependent variable—BMI in this case. Our regression model analyzed the effect of consumption of fruit, white potatoes, and other vegetables on BMI when the consumption is changed. The regression results, or estimated coefficients, indicate whether fruit and vegetable consumption are related to BMI. Statistical tests can be performed to check whether the estimated coefficients are statistically different from zero. A negative coefficient in our model for the consumption of fruits or vegetables means that an increase in consumption is linked with a lower BMI.

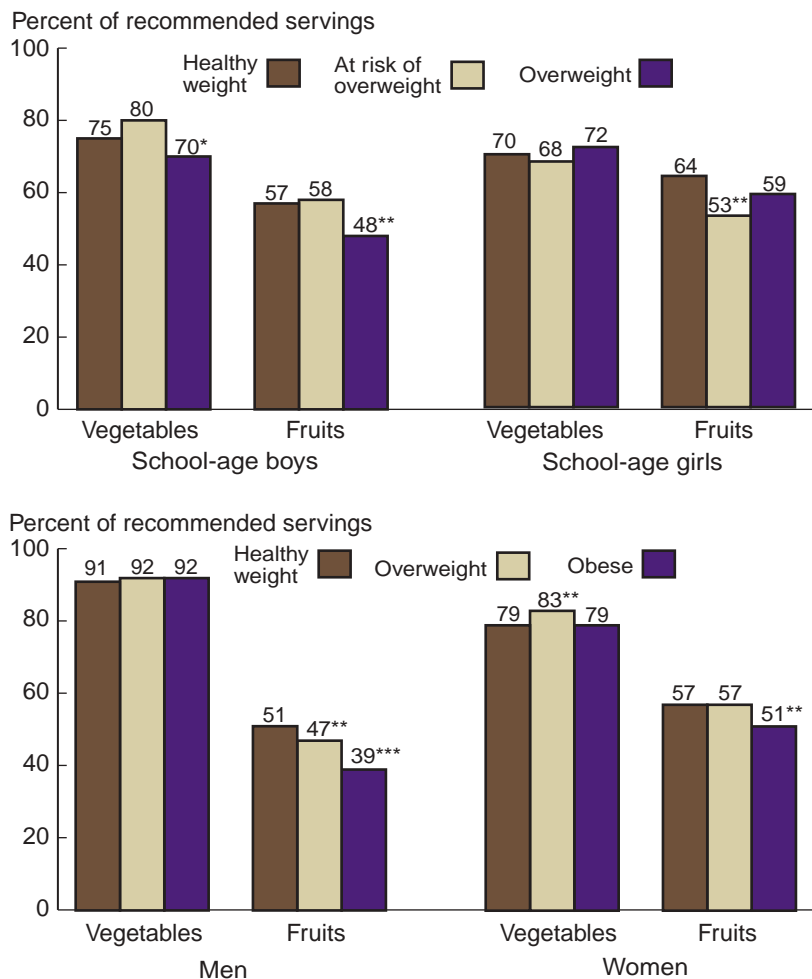
In addition to the variables representing consumption as a share of the recommended servings, we also control for the effects of age, gender, and race/ethnicity, which means that we also consider the fact that body weight is also affected by these variables. By isolating the effects of these factors, we can be more certain about the relationship between BMI and fruit/vegetable consumption. Because children's BMI can change greatly over time, especially among girls during puberty, children are separated into three age classes—5-9, 10-12, and 13 and older. With males and females separated, the analysis

comprises eight subpopulation groups: six groups of children and two groups of adults. Also, it was found that BMI increases among young adults and declines among seniors so that a quadratic term

for age (age squared) is included for men and women, but not for children.

The regression results corroborate the previous results that fruit consumption more accurately pre-

Figure 2—Little Correlation Exists Between Vegetable Consumption and Weight Status



Note: ***, **, and * indicates difference from healthy weight is statistically significant at 1-percent, 5-percent, and 10-percent probability. Source: Calculated by USDA's Economic Research Service using 1994-96 and 1998 CSFII data.

Table 1—Consumption of White Potatoes Positively Correlated With BMI for Adults

	Boys			Girls			Adults	
	Age 5-9	Age 10-12	Age 13 and older	Age 5-9	Age 10-12	Age 13 and older	Men	Women
White potatoes	NS	NS	NS	1.64 ¹	NS	-1.09 ¹	.63 ³	.72 ¹
Other vegetables	NS	NS	NS	NS	NS	NS	NS	-.38 ¹
Fruits	NS	-1.09 ²	-1.13 ³	NS	NS	-.99 ³	-.43 ²	-.56 ³

Note: NS = not statistically significant. ¹, ², and ³ denote statistical significance at 10-percent, 5-percent, and 1-percent probability. Source: Calculated by USDA's Economic Research Service using 1994-96 and 1998 CSFII data.

dicts BMI than vegetable consumption (table 1). Among the six groups of children, the consumption of white potatoes was found to statistically correlate with the BMI for two groups of girls—positive correlation among girls age 5-9 but negative among girls 13 and older. The consumption of other vegetables had no correlation to the BMI among children.

The correlation between vegetable consumption and BMI was found to be more significant among adults. Potato consumption is positively correlated with BMI for both men and women, and the consumption of other vegetables has a significant, negative relationship with BMI for women. Therefore, adults whose diets include more white potatoes have higher BMIs. Women whose diets are higher in other vegetables have lower BMIs.

Among the eight subpopulation groups, fruit consumption was found to have a significant, negative relationship with BMI in five groups—boys age 10-12, boys and girls age 13 and older, men, and women. Thus, teenagers, boys age 10-12, and adults whose diets include larger amounts of fruit have lower BMIs.

How Vegetables Are Eaten Could Be a Key

Recently, the Produce for Better Health Foundation conducted a review of scientific research on the health benefits of eating more fruits and vegetables. The foundation's review found evidence to support a significant association between fruit and vegetable intake and health, but more convincing data is needed for a relationship between fruit and vegetable consumption and disease prevention. We know that the development of overweight and obesity is a long-

term imbalance between energy intake and expenditure. The *Journal of Nutrition* reported that obesity is associated with consumption of foods high in energy density. Therefore, adding low-calorie fruits and vegetables to the diet has been explored as a weight-loss strategy.

Our analysis confirms but also raises some questions about the relationship between fruit/vegetable intake and BMI. We found a negative relationship between fruit consumption and BMI among older children and adults, but the correlation between vegetable consumption and BMI was found to be not as strong. We found no consistent correlation between BMI and vegetable consumption among children. Adults who consume more white potatoes are found to have higher BMIs. Women, but not men, who consume more vegetables other than white potatoes have lower BMIs. Both fruits and vegetables are low-fat, if not no-fat, foods when consumed straight from the orchard or garden. Americans may be eating most of their fruits raw or in juices, unadorned with sauces or fried coatings or baked in pies. On the other hand, Americans may be deep-fat frying their vegetables, topping them with high-fat dressings or sour cream, or including them in high-fat mixtures. Future research on the link between fruit and vegetable consumption and BMI should explore how these foods are eaten by separating the fruits and vegetables by preparation: fresh, baked, or fried; in mixtures; or with other accompaniments.

Another explanation for the link between higher fruit consumption and lower BMI could be that some people are eating fruit as a snack or dessert, rather than a higher calorie candy bar or piece of

cake. If fruits are eaten as a substitute for higher calorie items, this substitution is likely to result in lower BMIs. Americans may not regard vegetables as having the same snack potential as fruits. Future research on how fruits and vegetables are incorporated in our diets should further explore this food substitution issue.

According to Elizabeth Pivonka, president of the Produce for Better Health Foundation, "A colorful variety of all fruits and vegetables, healthfully prepared, makes a significant contribution to a diet that promotes good health." When urging Americans to "eat 5 a day," perhaps nutrition educators need to remind us to watch how we are preparing those fruits and vegetables and how we are incorporating them in our diets.

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Societal Costs of Obesity: How Can We Assess When Federal Interventions Will Pay?

Fred Kuchler and Nicole Ballenger

The 2001 report *The Surgeon General's Call To Action To Prevent and Decrease Overweight and Obesity* identified overweight and obesity as major public health problems costing U.S. society as much as \$117 billion a year and posing as large a threat of morbidity as poverty, smoking, or problem drinking. This striking conclusion is leading public health officials to search for new ideas to increase the effectiveness of programs designed to influence diet, exercise, and other weight-reducing lifestyle choices.

Proposed government programs that might reduce the incidence of

overweight and obesity can be assessed from a variety of perspectives. Economists can project the financial benefits and costs of a program. When net benefits (benefits minus costs) are positive, programs are said to be an efficient use of public resources. Programs with negative net benefits are said to be inefficient use of taxpayer funds.

Estimates of net benefits of public health programs are useful for guiding policy decisions because there are limits to the financial resources the public and private sectors can commit to public health. Armed with net benefit estimates, policymakers can more easily iden-

tify programs that are likely to prevent many illnesses and premature deaths at little cost, as well as those that are likely to add little to public health at great expense. Guiding expenditures toward low-cost, high-return programs and away from the opposite will likely enable public health programs to generate the biggest possible improvements in public health.

As obesity is a relatively new area for economic inquiry, notions of program costs and benefits are not yet fully formed. As a first step, we identify issues in estimating costs and benefits of programs intended to reduce the incidence of obesity and overweight. We note that costs, even when large, should not be the only consideration in selecting policies that contribute to health and well-being.

Cost-of-Illness Estimates Suggest Obesity Is a Major Public Health Problem...

The Surgeon General's report leaves no doubt that excess weight is a major public health problem in the United States. Overweight and obesity are associated with an increased risk of many diseases, including coronary heart disease; Type 2 diabetes; endometrial, colon, postmenopausal breast, and other cancers; and musculoskeletal disorders, such as knee osteoarthritis.

A ban on ice cream might make people thinner but in restricting choice and limiting satisfaction, such an action could actually make people worse off.

Credit: Comstock.



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The estimated \$117-billion societal cost of overweight and obesity is composed of \$61 billion in direct costs and \$56 billion in indirect costs. Direct costs include medical expenditures for preventative, diagnostic, and treatment services. Indirect costs include lost wages resulting from people being unable to work because of illness, disability, or premature death. The direct costs alone equal 4.7 percent of total (public and private sector) U.S. health care expenditures in 2000, estimated by the Health Care Financing Administration to be \$1.3 trillion. The Centers for Disease Control and Prevention (CDC) estimated annual direct and indirect costs of tobacco use at \$100 billion.

Estimates of premature mortality also portray obesity as a public health problem comparable to tobacco use. The Surgeon General's report notes that annual deaths linked to obesity total 300,000, a number roughly equal to the populations of several large U.S. cities, including Anaheim, Toledo, and Buffalo. The 2000 Surgeon General's report on reducing tobacco use attributed 400,000 deaths a year to tobacco-related diseases.

...And That Costs Are Likely To Rise

While current costs of obesity are troubling, likely future costs also raise concerns. The CDC has reported that smoking and cigarette use has, in general, been in a long-term decline. Obesity rates, on the other hand, have been growing. In fact, rates have increased across all ages, races and ethnic groups, both genders, and every State.

Indeed, obesity rates could continue to increase for many years if the trends in childhood obesity provide a reliable guide to adult obesity rates. The Surgeon General's report indicates the share of children who are overweight nearly doubled from the late 1970s (7 percent) to 1999 (13 percent), and the share of adolescents who are overweight al-

most tripled (from 5 percent to 14 percent) in the same period.

The adverse health consequences of obesity are typically realized among the middle aged and older. As overweight children are more likely than healthy-weight children to become overweight adults, and overweight adults are likely to remain overweight, the continual increase in obesity rates is likely. Given the wide range of diseases resulting from obesity, it seems likely that the costs associated with obesity will also continue to rise.

Cost-of-Illness Estimates Do Not Fully Capture Effects on Societal Well-Being

The estimates of direct and indirect costs of illness due to overweight and obesity confirm that these conditions have a major effect on consumers' expenditures. Cost-of-illness estimates, however, are not the most appropriate measures to use in analyzing the costs and benefits of public sector programs intended to reduce the incidence of obesity. Estimates of direct and indirect costs of illness account for the shift in consumer expenditures from general consumption goods, and from savings and investment, to medical goods and services. The estimates also account for the drop in productivity resulting from illness or premature death. The estimates, however, suffer from two important problems: they do not measure changes in income for the economy as a whole, and estimates of change in economic activity—no matter how thorough or accurate—are not ideal measures of changes in societal well-being.

Direct costs for medical services indicate a redirection of economic activity but do not correspond to a drop in income for the economy as a whole. The estimates do not account for potential growth or contraction in other sectors of the economy that might be triggered by obesity-related health problems. For example, some medical services

industries might expand due to increasing obesity rates while an array of consumer product industries might contract as consumers have less disposable income. The net change could be positive or negative. Further, direct cost estimates do not include defensive expenditures, such as expenditures on weight-loss programs.

Cost-of-illness estimates also fail to account for social well-being, as economic activity and social well-being are not equivalent concepts. Cost-of-illness estimates include only marketed goods and services, that is, those with an observed market price. Thus, cost-of-illness estimates do not include the considerable value of pain and suffering associated with disease.

The usual cost-of-illness estimates include direct costs incurred across the entire U.S. population. Indirect cost estimates, however, leave out the well-being of people outside the paid labor force, including housewives, the retired elderly, and the infirm. Since these groups have no earnings that might be compromised by their inability to work, changes in their health status have no impact on the indirect component of cost-of-illness estimates. As workforce status and earnings vary systematically with race and gender, estimates of indirect costs will also vary along these lines, potentially leading to the untenable conclusion that obesity is more costly for some subpopulations than others.

Benefits Are Measured by Their Worth to Affected Individuals

To more accurately assess the benefits and costs of public health policy options, economists have adopted an approach that focuses on preferences rather than on costs. In other words, economists determine the worth of a program's health benefits to those whose health risks might be reduced. This approach recognizes that Government programs can sometimes reduce health risks, but no Govern-

ment program can promise longer life or complete freedom from certain diseases, such as cancer.

As individuals routinely make decisions that trade off money for health risk, economists can estimate the value individuals place on risk reduction. Economists preparing cost-benefit analyses of Federal programs intended to reduce health and safety risks often value reductions in fatal risks at \$5 million per fatality (in December 1990 dollars), adjusting the value upward for inflation and sometimes adjusting for the age of the at-risk population.

The \$5-million estimate comes largely from studies of labor markets, in which economists have related wage rates to risk choices and calculated the risk-dollar tradeoff workers make. Clearly, no one exchanges his or her life for \$5 million. Rather, economists have observed that a \$500 per year wage premium is required to induce workers to accept a 1-in-10,000 risk of a fatal on-the-job injury. In other words, one fatal injury could be expected among 10,000 workers accepting the wage premium. In total, employers may pay a \$5-million wage premium to 10,000 workers accepting such risks.

Using this approach, benefits to individuals of eliminating just the mortality risks associated with obesity would be significantly larger than the cost-of-illness estimate (including deaths and chronic illnesses). However, obesity raises unique cost issues. Even with obviously large estimates of benefits, public health intervention may not be an efficient use of resources, as the cost of an obesity-reduction program is likely to include more than just the tax revenues required to pay for the program. For example, there would not be any benefits from Government-subsidized exercise equipment unless consumers incurred the costs of using the equipment. This issue raises the question, Would weight-reducing programs that emanate from the Government (even those offer-

ing enormous benefits) involve costs to individuals that are larger than the risk-reducing benefits they would bestow?

Intervening To Reduce Obesity Can Carry High Costs to Individuals

Weight depends on energy (calorie) intake and energy expenditure. When energy intake exceeds energy expenditure over extended periods, weight increases. Genetic predisposition enables some individuals to use energy faster than others, such that some people have more difficulty managing weight. In other words, the cost of weight management—the time spent exercising or being generally active or the care with which food choices must be made—varies significantly among individuals.

Diet and lifestyle choices yield many outcomes other than weight status, and most people consciously or subconsciously choose among alternative outcomes every day. For example, the choice between going to the gym to exercise or spending an extra hour in the office may be a choice between weight reduction and high job performance. The fact that many people make diet and lifestyle choices cognizant of the adverse consequences for their weight suggests that keeping weight off or losing weight involves difficult and costly sacrifices for many individuals.

This effect poses a difficulty for public health strategies designed to reduce the incidence of obesity and overweight: by intervening in a manner that reduces individual choices, Government actions can actually make people worse off rather than better off even if it makes them slim. By definition, peoples' preferences are most likely to be satisfied when allowed to make their own choices. For example, a public ban on ice cream and riding lawnmowers might make people thinner, but the restrictions on choice and leisure time may ultimately leave people less satisfied.



Because some bodies burn energy faster than others, the cost of weight management—the time spent exercising or the care with which food choices must be made—varies significantly among individuals.

Credit: Eyewire.

Of course, interventions to reduce obesity need not be so severe as to restrict technologies or ban foods. Interventions could be constructed to create incentives to reduce energy intake or to increase energy expenditure. For example, some health researchers and consumer activists have suggested reducing energy intake by taxing fatty foods, soft drinks, or high-fat snacks and subsidizing consumption of fruit and vegetables. Similarly, people might increase energy expenditures if exercise equipment or exercise programs were subsidized. However, even these less coercive interventions would impose high costs on many individuals. For example, people who consume fatty foods in moderation and do not need to lose weight are not likely to welcome proposals for new taxes. Those who are overweight may not find a tax at the checkout counter a sufficient incentive to reduce consumption of foods that give them enjoyment, leaving many individuals to foot the tax bill but few to enjoy the weight-reduction benefits. Economists have not yet determined the levels of taxes and subsidies necessary to change health outcomes or the costs those changes would impose.

A Role for the Government Rests on the Existence of External Costs

In a market economy, economists frequently argue that Government intervention should be justified by the existence of a market failure. If markets are working well, they argue, then any Government intervention would likely reduce rather than improve economic efficiency. Reflecting this concept, the U.S. Office of Management and Budget requires Government regulatory impact analyses to identify market failures to be solved by proposed regulations even before cost-benefit assessments are conducted. A typical form of market failure is an externality, an external cost imposed (without compensation) on some individuals by the economic activity of others. For example, water pollution generated by a manufacturing plant that reduces the productivity of other downstream plants that rely on a supply of pure water is an externality.

We can extend this concept of market failure and external costs to health. One reason for consider-

ing public sector interventions in health choices is finding that individual health behaviors impose external costs on others. For example, individuals who choose not to be vaccinated against contagious diseases may contribute to the spread of disease. Vaccination requirements can offer benefits to many by reducing disease risks. The key feature of health market failure is observability—one cannot tell by looking at a person whether he or she is carrying a contagious disease. Obesity, however, is easily observable, and that makes it difficult to associate its prevalence with market failure.

Some individuals' lifestyle and diet choices can impose external costs on others when those choices are difficult to observe and monitor. For example, life insurance companies would like to sell policies to people who make diet and lifestyle choices that minimize risks of chronic illnesses. These individuals are likely to pay premiums for many years without filing claims. If insurance companies tried to distinguish between people who truthfully follow a healthy

regime and those who merely claim to do so, they would have to be vigilant in monitoring individuals' diet and lifestyle choices (and that would be expensive), or they would pay many unexpected claims. The individuals who falsely claim to follow a healthy lifestyle impose external costs on those who do. The external cost is the loss of mutually beneficial exchange.

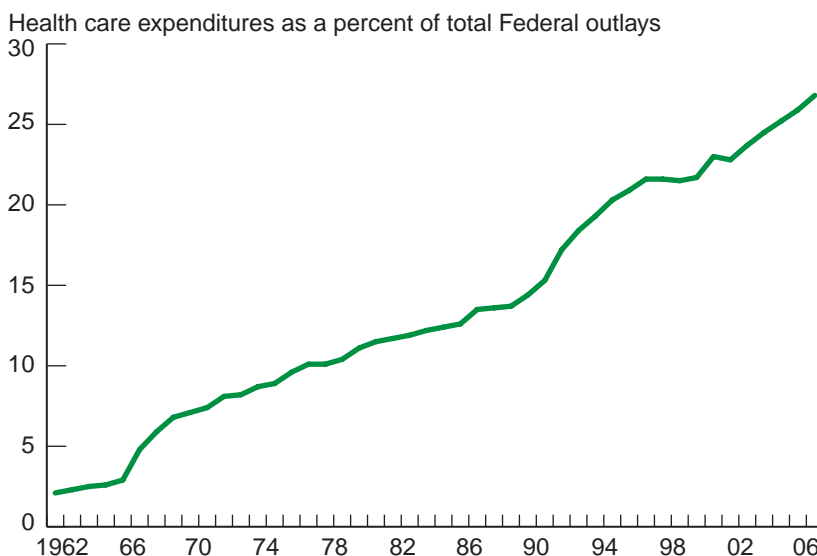
Unlike diet and lifestyle choices, weight status is easily and inexpensively observable. The public health community, in developing and promoting the use of body mass index (BMI), has made identifying overweight and obesity a fairly simple task. Not surprisingly, the private sector takes advantage of this information, such that life insurance rates often rise with weight status. In fact, insurance companies developed the first height and weight table in 1908. Its original purpose was to determine insurance rates based on life expectancy studies.

Through life insurance markets, then, there are financial rewards for behavior that avoids obesity-related health problems. These financial incentives help limit the external costs associated with obesity. Insurance markets, by themselves, cannot solve the obesity problem because life insurance coverage is not universal and health insurance rarely varies with weight status. The absence of risk-based health insurance may not indicate market failure. Instead, its absence may reflect that it is administratively complex to set varying rates when the product is sold at group rates and offered by employers to employees.

Federal Health Care Costs Underscore Need To Manage the Costs of Obesity

Weight status involves personal choices, and these personal choices tend to impose fewer external costs than some other major public health concerns. Together, these factors suggest that finding cost-ef-

Figure 1—Outlays for Health Programs May Soon Exceed 25 Percent of Federal Budget



Note: 2002-06 outlays are estimates.
Source: Budget of the U.S. Government, Fiscal Year 2003, Historical Tables.

fective Government interventions will be challenging. However, the existence of Government health care programs financed by U.S. taxpayers raises potentially large external costs from obesity.

The Federal Government, through the U.S. taxpayer, financially supports a large share of the personal health care in the United States. Since 1966, the Government has supported hospital, physician, and related expenses for the elderly through the Medicare program. Since 1973, the Government has also supported health care for the disabled and for persons with end-stage renal disease. Government-supported health expenses for some low-income individuals and families are provided through the Medicaid program.

These programs compose the largest share of Federal health care expenses. The share of health care expenditures in the Federal budget has grown over the last 40 years and is forecast at approximately one-fourth of all Federal program expenditures over the next 6 years (fig. 1). In 2001, Federal outlays for health programs, at \$429.6 billion, were larger than military expenditures or interest on the national debt.

Because obesity is associated with a wide range of diseases, it represents a large target for those interested in reducing Federal health care expenditures. Assuming the costs of obesity will grow, a program that reduces the incidence of obesity may offer large rewards in the future.

Individual taxpayers may have different preferences regarding the extent of Federal support for health expenditures for the elderly and those classified as low-income, but they are all certain to agree that paying less to achieve a certain level of health is preferable. Thus, it is important to entertain and assess public policy options intended to reduce the incidence of

obesity. Given that we are a nation committed to supporting personal health care expenses for many of our citizens, are there cost-effective programs that are likely to reduce the incidence of obesity? Which type of program offers the greatest reductions in health care spending related to obesity?

The Federal Government has experience with information programs intended to combat obesity. The National Heart, Lung, and Blood Institute (part of the National Institutes of Health) began the Obesity Education Initiative in 1991. The program promotes new medical research to educate health professionals and the public on the links between overweight, physical inactivity, and health risks. Various States are conducting education programs to encourage healthy eating patterns and regular physical exercise. Whether the education programs have or will cut into the rising obesity rates is unknown. Recommendations to maintain a healthy weight may have no effect if overweight individuals do not perceive themselves as overweight (see "Misperceptions in Self-Assessed Weight Status Vary Along Demographic Lines" elsewhere in this issue). Many may already be aware of recommended behavior and have chosen otherwise.

The Surgeon General's comparison of obesity and overweight to smoking may be appropriate for thinking about the difficulty involved in changing human behavior. The public sector has engaged in anti-smoking efforts for four decades. These efforts include Federal, State, and some municipal excise taxes on cigarettes. Many States have imposed restrictions on where smokers may smoke. Numerous education efforts have been tried. Constructing analogous programs for obesity will involve the public sector in numerous diet and lifestyle choices.

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Are Americans Turning Away From Lower Fat Salty Snacks?

Jane Allshouse, Betsy Frazao, and John Turpening

Americans love their salty snacks, but not especially the lower fat versions. In 1999, Americans purchased more than 1.6 billion pounds of potato chips, pretzels, and microwave popcorn from supermarkets, drug stores, and mass merchandising outlets. Sales of these salty snacks increased 6 percent from 1995 to 1999. Sales of regular versions increased 11 percent between 1995 and 1999, while sales of lower fat versions decreased 6 percent in the same period.

Food manufacturers, hoping to capitalize on consumers' concerns about fat, introduced 1,914 new reduced/low-fat products in 1995 and 2,076 in 1996. The market for these products, however, never grew as anticipated, as food processors dramatically cut their new product introductions of lower fat products after 1996, introducing only 481 new products in 1999.

These findings seem to contradict consumers' claims that they are concerned about fat, especially since the 11-percent increase in volume sales of regular versions of salty snacks is almost double the U.S. population growth since 1995. In *Trends—Consumer Attitudes in the Supermarket 2000*, a recent national survey conducted by the Food Marketing Institute, most



Popcorn's status as a favored snack goes back hundreds of years. When Columbus arrived in the West Indies, the natives tried to sell popcorn to his crew. And as a gesture of goodwill, Indians brought popcorn to snack on during peace negotiations with American settlers.

Credit: PhotoDisc.

shoppers (96 percent) said nutrition was an important factor in their food purchasing decisions. Shoppers also said they were eating healthier by buying products labeled "low fat" (79 percent) and by consuming less snack or "junk" food (18 percent). Another national survey conducted in 2000 by Booth Research Services for the Calorie Control Council also revealed that 79 percent of respondents (representing 163 million U.S. adults) re-

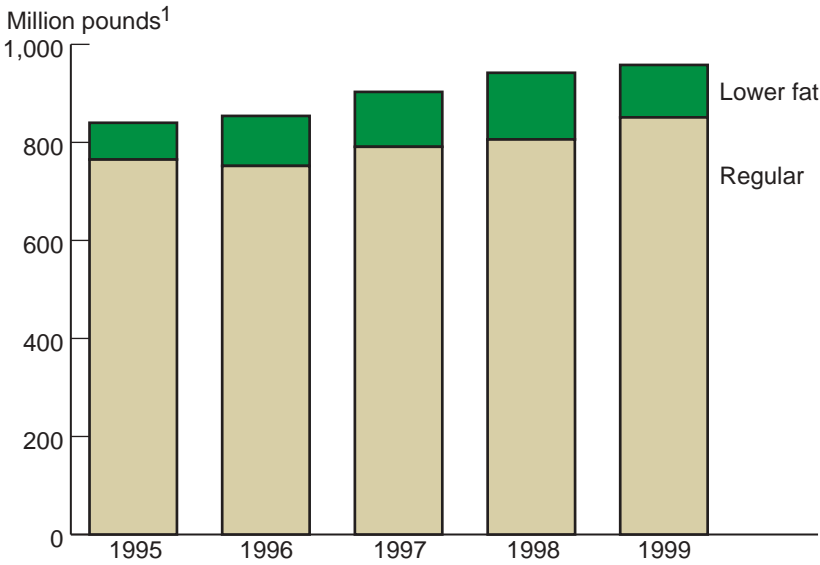
ported consuming low- or reduced-fat foods and beverages.

Although nutrition is important to consumers, taste usually wins out. In 1998, Nabisco, a subsidiary of Kraft Foods, Inc., reformulated its SnackWell's line of low-fat and fat-free products to create virtually the same products with more fat, claiming that "our consumers are willing to accept up to an additional gram and a half of fat because they want great taste first."

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Figure 1—Lower Fat Potato Chips Accounted for 11 Percent of Total Potato Chip Sales Quantity in 1999, Compared With 9 Percent in 1995



¹In supermarkets, drug stores, and mass merchandising outlets.
Source: Compiled by USDA's Economic Research Service, using Infoscan retail scanner data.

This research uses 1995-99 retail checkout scanner data to evaluate the size and growth of the market for lower fat potato chips (including crisps), pretzels, and microwave popcorn, relative to their full-fat counterparts. The data consist of weekly records of retail scanner information from samples of supermarkets, drug stores, and mass merchandising outlets across the United States. The data are scaled up to represent supermarket sales in all stores with sales of at least \$2 million annually, all non-prescription drug store sales, and mass merchandiser sales in stores belonging to chains that sell at least \$200 million annually.

The database contains information on dollar sales and physical volume of food products at the brand and UPC (universal product code) or shelf item level. A potato chip, pretzel, or microwave popcorn product was classified as "lower fat" if its label made a claim that met the definition of reduced fat, low fat, or nonfat as established by the U.S. Food and Drug Administration (FDA) (see box). If the product made no such claim, it was classified as a traditional, or "regular," version.

This analysis excludes any potato chips, pretzels, and microwave popcorn purchased at the wholesale level by restaurants, theaters, sports arenas, and other away-from-home eating sites. Other types of salty snacks, such as other popcorn, corn snacks, and salted nuts, are not included because lower fat information was not available.

Potato Chips Top List of Favorite Snack Foods

Potato chips are the top choice for between-meal munching for both American adults (79 percent) and children (73 percent), according to *What America Eats 2001*, a nationally representative survey of 2,093 men and women conducted for *Parade* magazine. Scanner data show that in 1999, Americans spent \$3 billion on 958 million pounds of potato chips purchased in supermarkets, drug stores, and mass merchandising outlets. Lower fat potato chips accounted for 16 percent of total potato chip dollar sales in 1999 and 11 percent of total volume sales (fig. 1).

Both the average price and volume sales of potato chips in supermarkets, drug stores, and mass

Nutrient Descriptors for Fat

In January 1993, the U.S. Food and Drug Administration (FDA) and USDA's Food Safety and Inspection Service published new food labeling regulations. The regulations spell out which nutrient content claims are allowed and under what circumstances they can be used. The regulations permit food labels to use 11 core terms: low, free, lean, extra lean, high, good source, reduced, less, light, fewer, and more. Five of these terms apply to the fat content of salty snacks.

Low—A food meets the definition for "low" if a person can eat a large amount of the food without exceeding the "Daily Value" for the nutrient. As a general rule, a food meets the definition for "low" if it contains less than 5 percent of the Daily Value for that nutrient. Daily Values are not recommended intakes, they are reference points on overall daily dietary needs. The Daily Value for fat, based on a 2,000-calorie diet, is 65 grams. A food that has 13 grams of fat per serving would be labeled as containing 20 percent of the Daily Value for fat. Low-fat products must contain 3 grams or less of fat per serving. If the serving size is 30 grams or less or 2 tablespoons or less, the food product must contain 3 grams or less of fat per 50 grams of the product.

Free—Because it is impossible to measure fat below a certain level, the regulations allow a fat-free claim on foods with less than 0.5 grams of fat per serving, an amount that is dietetically trivial and physiologically insignificant.

Reduced, Less, and Light—Products that are nutritionally altered and want to compare themselves with a regular version of the product may make a relative claim like "reduced," "less," or "light." The regular products, or reference foods, may be either an individual food or a group of foods representative of the type of food. For a product to bear a reduced-fat claim, it must have at least 25 percent less fat per serving than the reference food. A relative claim ("16 percent less fat than...") must include the percent difference and the identity of the reference food. A product bearing a light/lite claim must contain half the fat of the reference food.

Source: Stehlin, Dori. "A Little "Lite" Reading," *FDA Consumer Special Report, Focus on Food Labeling*, May 1993, pp. 29-33.



Aided by national advertising campaigns, sales of WOW! brand snacks and other fat-free products made with Olean soared in 1998. In years since, however, both advertising and sales of the products have dropped.

merchandising outlets increased 14 percent between 1995 and 1999. The average price of lower fat potato chips increased 27 percent, from \$3.56 to \$4.51 per pound (table 1). Over the same period, the average price of regular potato chips increased 11 percent, from \$2.63 to \$2.91 per pound. The price premium (the amount above the regular price) associated with lower fat potato chips increased from \$0.93 per pound (a 35-percent differential) in 1995 to \$1.60 (a 55-percent differential) in 1999.

Despite the steeper increase in the average price of lower fat potato chips compared with regular potato chips, sales volume of lower fat potato chips rose 43 percent between 1995 and 1999, compared with an 11-percent rise in sales volume of regular potato chips. As a result, lower fat potato chips increased their share of total potato chip sales from 9 to 11 percent.

Sales of Lower Fat Chips Jumped in 1998, But Fell in 1999

The introduction of fat-free Olean products accounts for the increase in volume sales of lower fat potato chips between 1995 and 1999. Olean is the brand name for Procter & Gamble's fat- and calorie-free cooking oil, olestra, which was approved by FDA in January 1996 for use in salty snacks. Frito-Lay opened the test market for Olean products in April 1996 with its fat-free Lay's, Ruffles, Doritos, and Tostitos brands. In September 1996, Procter & Gamble introduced Fat Free Pringles with Olean to the market. Procter & Gamble began national advertising of Olean in February 1998, during the Winter Olympics, and announced that Olean products would be available nationwide by summer 1998. Advertising for Olean prod-

Table 1—Sales of Potato Chips and Microwave Popcorn Increased Every Year Between 1995 and 1999, While Pretzel Sales Declined

Item	1995		1996		1997		1998		1999		Change, 1995 to 1999	
	Average price per pound	Sales	Average price per pound	Sales	Average price per pound	Sales	Average price per pound	Sales	Average price per pound	Sales	Price	Sales
	Dollars	Million pounds	Dollars	Million pounds	Dollars	Million pounds	Dollars	Million pounds	Dollars	Million pounds	Percent	
Potato chips and crisps	2.71	839.6	2.91	854.1	2.94	902.4	3.09	942.0	3.09	957.8	14.1	14.1
Regular	2.63	764.8	2.74	751.9	2.77	790.8	2.85	805.7	2.91	850.8	10.8	11.3
Lower fat	3.56	74.8	4.20	102.2	4.13	111.6	4.53	136.3	4.51	107.0	26.6	43.0
Made with Olean ¹	na	na	4.85	0.1	5.00	1.1	5.39	55.1	5.29	45.3	na	na
Other	3.56	74.8	4.20	102.0	4.12	110.6	3.94	81.2	3.93	61.7	10.5	-17.5
Lower fat share of category sales	na	9%	na	12%	na	12%	na	14%	na	11%	na	25.4
Pretzels	1.92	348.0	1.93	321.1	1.96	315.0	1.95	301.5	1.98	290.4	3.1	-16.5
Regular	1.69	142.8	1.67	106.7	1.74	87.0	1.80	89.1	2.01	115.8	18.9	-18.9
Lower fat	2.07	205.2	2.06	214.3	2.04	228.0	2.01	212.4	1.95	174.6	-5.8	-14.9
Fat free	2.07	136.1	2.04	151.6	2.00	155.3	1.96	150.1	1.89	120.2	-8.7	-11.7
Other	2.08	69.1	2.10	62.7	2.12	72.7	2.12	62.3	2.08	54.3	0.0	-21.3
Lower fat share of category sales	na	59%	na	67%	na	72%	na	70%	na	60%	na	1.9
Microwave popcorn	2.13	278.7	2.24	279.7	2.27	283.1	2.24	297.2	2.18	312.0	2.3	11.9
Regular	2.09	197.6	2.19	200.2	2.21	212.6	2.20	232.5	2.15	254.2	2.9	28.6
Lower fat	2.22	81.1	2.35	79.5	2.45	70.4	2.40	64.7	2.32	57.8	4.5	-28.7
Light	2.22	80.1	2.23	70.9	2.36	64.1	2.32	59.8	2.25	54.4	1.4	-32.1
Other	2.33	1.0	3.28	8.6	3.33	6.3	3.38	4.8	3.44	3.4	47.6	234.6
Lower fat share of category sales	na	29%	na	28%	na	25%	na	22%	na	19%	na	-36.3

Note: na = not applicable.

¹Olean is the brand name for the fat substitute olestra, which was approved by the U.S. Food and Drug Administration in January 1996 for use in the production of salty snacks and crackers.

Source: Compiled by USDA's Economic Research Service, using Infoscanner retail scanner data.

ucts accounted for almost half of all potato chip advertising that year.

In 1998, Frito-Lay introduced its WOW! brand snack products. These products included fat-free versions of Doritos, Ruffles, Lay's, and Tostitos chips made with Olean. Sales of WOW! were a major contributor to the 5-percent increase in volume sales for Frito-Lay during the brand's first year marketed nationally, but sales declined for Frito-Lay's other low-fat and no-fat products during the same period. Sales of Olean products soared in 1998, grabbing 40 percent of the lower fat market and 6 percent of the total potato chip sales volume. In 1999, advertising for Olean chips dropped to one-fifth of 1998's level, and volume sales dropped 18 percent. Although the scanner data used for this study end in 1999, Frito-Lay's 2000 annual report states that sales of WOW! brand products continued to decline in 2000.

Excluding Olean products, volume sales of lower fat potato chips declined 17 percent between 1995 and 1999 (fig. 2). Volume sales increased 36 percent in 1996 and 8 percent in 1997 but fell 27 percent in 1998, the year WOW! brand potato chips were introduced nationally, and another 24 percent in 1999. In 1999, lower fat chips, excluding Olean products, accounted for 6 percent of the total potato chip market.

Fat-free chips were on the verge of becoming nonexistent before the launch of Olean chips in 1998. Low-fat chips sales volume increased in 1996 and 1997 with the introduction of baked potato chips but declined in 1998 and 1999. Reduced-fat chips accounted for 77 percent of lower fat chip sales in 1995. Volume sales increased for the next 2 years, but reduced-fat chips lost market share to low-fat baked chips and then to fat-free Olean products. In 1999, reduced-fat chips volume sales declined, but because of greater decreases in fat-free and low-fat sales, reduced-fat

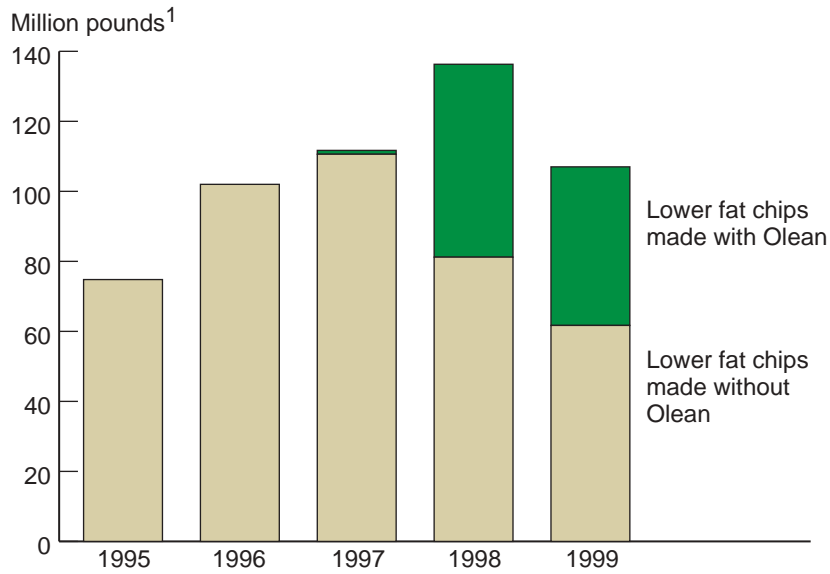
chips increased their market share of lower fat sales.

Pretzel Sales Dropped Off During the Second Half of the 1990s

In the early 1990s pretzel manufacturers promoted their products

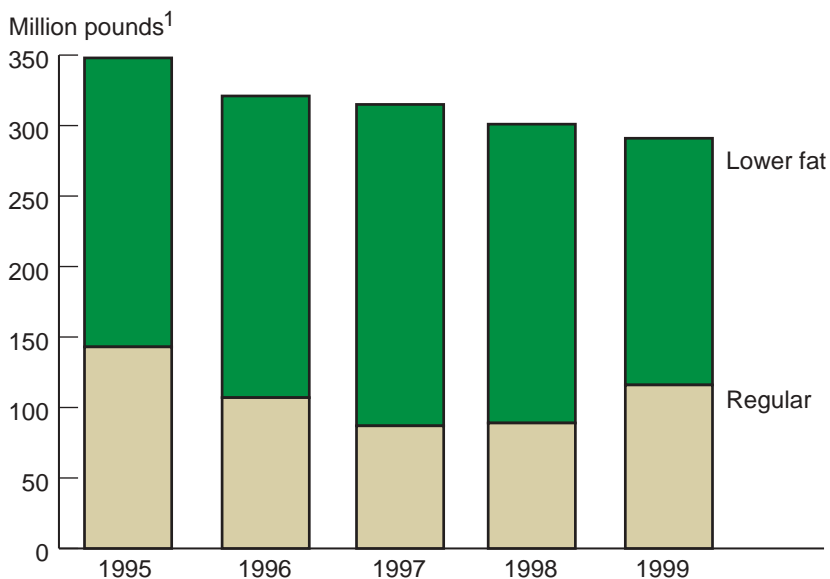
as a low-fat alternative to potato chips. Even though, historically, pretzels have typically contained only 1 gram of fat per serving, this advertising seems to have worked because pretzels showed a 63-percent increase in sales volume between 1989 and 1993. However,

Figure 2—Chips Made With Olean Accounted for the Increase in Sales of Lower Fat Chips in 1998 and 1999



¹In supermarkets, drug stores, and mass merchandising outlets. Source: Compiled by USDA's Economic Research Service, using Infoscan retail scanner data.

Figure 3—Sales of Lower Fat and Regular Pretzels Decreased Between 1995 and 1999



¹In supermarkets, drug stores, and mass merchandising outlets. Source: Compiled by USDA's Economic Research Service, using Infoscan retail scanner data.

pretzels' popularity declined during the second half of the 1990s. Pretzel sales dropped every year between 1995 and 1999, with an overall decline of 17 percent. It is possible that when consumers became disenchanted with low-fat products they also turned away from pretzels.

Sales volume declines for regular pretzels between 1995 and 1997 were partially offset by increased sales volume for lower fat pretzels (fig. 3). The increase in lower fat pretzels likely resulted from the huge advertising campaign by Frito-Lay's Rold Gold brand fat-free pretzels, which began in 1994 and continued into 1996. After 1996, advertising for lower fat pretzels tapered off. Between 1997 and 1999, a 23-percent decline in sales volume of lower fat pretzels was accompanied by a 33-percent increase in sales volume of regular pretzels. Although the market share for lower fat pretzels fluctuated between 1995 and 1999, rising to a high of 72 percent in 1997, by 1999 it had returned to its 1995 level, accounting for 60 percent of overall pretzel sales volume.

Pretzels Versus Potato Chips

Because pretzels are often promoted as a lower fat alternative to potato chips, we decided to compare the two categories. In 1995, pretzels accounted for nearly a third of the potato chip/pretzel market, a huge increase over 1989, when pretzels accounted for only 18 percent of that market. However, as a result of yearly increases in sales volume for potato chips and yearly declines for pretzels between 1995 and 1999, pretzels' market share dropped to 23 percent of the potato chip/pretzel market in 1999.

A comparison of sales volume of lower fat versions of potato chips and pretzels shows that consumers looking for healthier (lower fat) snacks were more likely to eat lower fat pretzels than lower fat potato chips. In 1995, lower fat pretzels accounted for 73 percent of



Credit: PhotoDisc

the lower fat potato chip/pretzel market. Although pretzels' share has since declined, they still accounted for 62 percent of that market in 1999. Most of this downward trend is associated with the introduction of baked and Olean potato chips. Considering that both baked and fat-free potato chips suffered declines in sales volume in the latter part of the 1990s, and that Rold Gold pretzels no longer carry a low-fat claim (even though the pretzels are still a low-fat food), it is unclear how demand for lower fat versions of potato chips and pretzels will play out over the next several years.

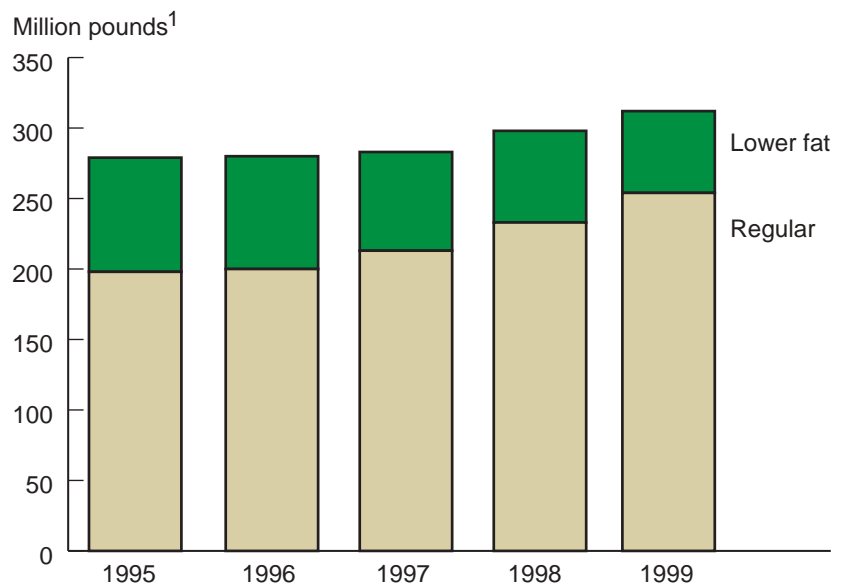
Pretzels are the least expensive salty snack we studied. In 1995, the price of lower fat pretzels averaged \$2.07 per pound, compared

with \$1.69 per pound for the regular versions. Unlike potato chips, where the price premium associated with lower fat versions increased between 1995 and 1999, by 1999, the price of lower fat pretzels dropped 6 percent and the price of regular versions increased 19 percent, making lower fat pretzels, at \$1.95 per pound, less costly than regular pretzels at \$2.01 per pound.

Sales of Regular and Lower Fat Microwave Popcorn Offset Each Other

Microwave popcorn accounted for 65 percent of all popcorn sales volume in supermarkets, drug stores, and mass merchandising outlets in 1995, and that share increased to 72 percent by 1999. Volume sales of microwave popcorn increased 12 percent from 1995 to 1999, with 10 percent of the increase occurring between 1997 and 1999. A 29-percent decrease in sales volume of lower fat microwave popcorn in the same period was more than offset by a 29-percent increase in regular versions (fig. 4).

Figure 4—Lower Fat Microwave Popcorn's Share of Total Sales Dropped From 29 Percent in 1995 to 19 Percent in 1999



¹In supermarkets, drug stores, and mass merchandising outlets. Source: Compiled by USDA's Economic Research Service, using Infoscan retail scanner data.

The average price of microwave popcorn increased 3 percent for regular versions and 5 percent for lower fat products between 1995 and 1999. Regular microwave popcorn increased from \$2.09 to \$2.15 per pound, while light popcorn's average price increased only 1 percent between 1995 and 1999, going from \$2.22 to \$2.25 per pound. The big increase in price for microwave popcorn has been in lower fat products other than light popcorn. From 1995 to 1999, the average price for lower fat popcorn, except the light versions, increased 48 percent, from \$2.33 and \$3.44.

Lower fat popcorn accounted for 29 percent of all microwave popcorn volume sales in 1995 but fell to 19 percent in 1999. In 1994, a *Washington Post* staff writer predicted that the increasing availability of nutritionally improved snack foods, such as low-fat potato chips and non-fat pretzels, would raise the level of competition faced by microwave popcorn in the years ahead. Since volume sales of all these products had declined by 1999, it seems the true measure of competition was not about which product grew the most but rather which product declined the least.

The only real market for lower fat microwave popcorn is for the light versions. Even though sales volume of light microwave popcorn declined each year from 1995 to 1999, light popcorn accounted for

at least 89 percent of all lower fat popcorn sales every year in the period. Fat-free and reduced-fat popcorn sales accounted for less than 1 percent of lower fat popcorn sales, and in 1999, fat-free popcorn was no longer being sold. Sales of low-fat popcorn increased between 1995 and 1996 to capture 10 percent of the lower fat market but declined every year thereafter.

Consumers Are Still Waiting for Lower Fat Versions They Can Love To Eat

Our analysis suggests that consumers are willing to try lower fat salty snacks, but they keep returning to high-fat snacks. They tried baked potato chips, and initial increases in sales volume were shortly followed by declining sales volume. They tried Olean products, and again, initial increases in sales volume were shortly followed by declining sales volume. They tried substituting pretzels for potato chips, and increases in pretzels' share in the potato chip/pretzel market were eventually followed by declines. Although this analysis was unable to include other salty snacks, it seems that when it comes to salty snacks, consumers are still waiting for a lower fat product with enough flavor to satisfy them. *New Product News* reported that 1,057 new food products bearing reduced- or low-fat claims were introduced to the mar-

ketplace in 2000. Maybe one of these will be a salty snack that will win over consumers.

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Use of Food Pantries by Households With Children Rose During the Late 1990s

Laura Tiehen

Federal food assistance programs provided over \$34 billion in benefits to low-income households in 2001. At the same time, many households turned to emergency food providers in their community during times of need. A recent study of emergency food providers, funded by USDA's Economic Research Service (ERS), estimates almost 33,000 food pantries and over 5,000 emergency kitchens operate in the United States. These organizations provided an estimated 2.4 billion meals in 2000.

In 1996, Congress passed legislation that redesigned the cash welfare system. The legislation, commonly known as welfare reform, gave States more flexibility in the design of their welfare programs but imposed work requirements on cash welfare recipients and time limits on the receipt of Federal cash assistance. These changes may have affected participation in the Food Stamp Program. In addition, the 1996 welfare reform legislation restricted the eligibility of some groups to receive food stamps (see box).

Both cash assistance and Food Stamp Program caseloads have declined since the mid-1990s. The number of people using food stamps decreased 37 percent between 1994 and 2000, from an average of 27.5 million people per month in 1994 to 17.2 million people per month in 2000 (table 1).

The number of Food Stamp Program participants increased slightly in 2001 to an average of 17.3 million per month. A strong economy certainly contributed to much of the decline, but many observers express concerns that some of those who have left the programs have not achieved self-sufficiency. These households may have instead come to depend on emergency food providers for assistance in meeting their food needs. Increased use of emergency food assistance in the midst of falling cash assistance and Food Stamp Program caseloads may signal a shift to greater reliance on private versus public sources of assistance. Information on the population subgroups who use food pantries, and how that use has changed over time, can suggest ways to ensure that the Federal food assistance programs can provide a strong food safety net and work most effective-

ly with private food assistance efforts.

Emergency Food Providers Have Distinct Roles in Providing Food for the Poor

Food pantries and emergency kitchens (often called soup kitchens) are referred to as the "retailers" of emergency food providers because they provide food directly to households and individuals. At food pantries, households receive bags of food that they use to prepare meals at home. Emergency kitchens provide prepared meals that are eaten at the site.

Most food pantries and emergency kitchens are connected to a "wholesaler," which is most commonly a food bank or a food rescue organization. Food banks obtain mostly nonperishable food in bulk from private and government sources. Food rescue organizations

Table 1—Food Stamp Program Caseload Declined From 1994 to 2000

Category	1994	2000
	<i>Millions</i>	
Individuals in all households	26.2	16.7
Individuals in single-parent families	13.3	8.5
Individuals in married-couple families	5.5	2.5
Children	13.5	8.5
Nonelderly adults	10.8	6.5
Elderly individuals	1.9	1.7
Noncitizens	1.8	.6

Note: The participant count in this table is based on estimates from the Food Stamp Program Quality Control Sample, which contains demographic information on participating households. The participant numbers cited in the text are from USDA's Food and Nutrition Service administrative records. The categories do not add up to the total because categories reported are neither mutually exclusive nor exhaustive. Categories are displayed that most closely coincide with the types of households that are studied in this analysis. For a more complete description of the demographic characteristics of Food Stamp Program participants, see Cunyningham (2002).

Source: Cunyningham (2002)

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Food banks and other “wholesalers” obtain mostly nonperishable foods in bulk from private and government sources, including USDA’s Emergency Food Assistance Program (TEFAP). The foods are then distributed to food pantries and emergency kitchens.

Credit: Ken Hammond, USDA.

seek out sources of perishable food, such as foodservice operations, food retailers and wholesalers, and farmers. For example, ProFish, the largest seafood distributor in the Washington, DC, area has donated fish and seafood to DC Central Kitchen, a food rescue organization. DC Central Kitchen uses the seafood and other rescued food to prepare meals for children and adults at social service agencies in the area.

Many food banks, food pantries, and emergency kitchens also receive and distribute USDA commodities through The Emergency Food Assistance Program (TEFAP), which began in 1981. Originally, the foods distributed through TEFAP were surplus commodities that had been purchased by the Federal Government to support agricultural prices. Since 1988, USDA has been authorized to purchase food specifically for TEFAP and provide administrative support to the agencies that distribute the commodities. In addition, some community action agencies or local government agencies act as whole-

salers to receive and distribute USDA commodities, although food distribution is not their primary focus.

Survey Asks Households About Their Use of Emergency Food

The data used for this study are from the Current Population Survey (CPS) Food Security Supplements, which have been collected each year since 1995. The CPS Food Security Supplements are administered to approximately 50,000 households each year. The food security data are primarily used to document the prevalence of food insecurity and hunger among U.S. households, but they also contain information on the use of food pantries and emergency kitchens. The use of emergency food assistance is likely to vary across different seasons of the year. Therefore, to ensure comparability across survey years, this analysis uses data from 1996, 1998, and 2000—years in which information on the use of emergency food assistance was collected in August or September.

The 1996 Welfare Reform Legislation

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 was designed to replace the system of cash entitlement with a system that promotes work. The legislation instituted a block grant to fund State welfare programs and gave States considerable flexibility in how they designed and implemented those programs. However, the legislation imposed time limits on the receipt of cash welfare benefits and imposed work requirements on cash welfare recipients.

The welfare reform legislation also imposed restrictions on eligibility for the Food Stamp Program. To receive food stamps, able-bodied adults without dependents must engage in work or a work-related activity at least 20 hours per week. Otherwise, their use of food stamps is limited to 3 months in any 36-month period, unless they reside in an area where the work requirement is waived due to a high unemployment rate. The legislation also eliminated the eligibility of most legal immigrants to receive food stamps, although it did make exceptions based on a legal immigrant’s refugee status, work history, or U.S. veteran status. Subsequent legislation in 1997 allowed legal immigrants who were disabled, elderly, or children living in the United States in August 1996 to regain eligibility for the Food Stamp Program. More recently, the 2002 farm bill restored food stamp eligibility to legal noncitizens who have lived in the United States continuously since August 1996.

This study focuses on the use of food pantries, since it is more accurately measured in the CPS Food Security Supplements than the use of emergency kitchens. The CPS sample does not include those who are homeless at the time of the survey and it may also miss those who are in tenuous housing situations. Previous studies have shown that a large portion of emergency kitchen users are homeless or tenuously housed. Food pantry users are unlikely to be homeless, since they generally must have access to cooking facilities. Indeed, past research has shown that very few food pantry users are homeless. To determine food pantry use, households were asked, “In the last 12 months, did you or other adults in your household ever get emergency food from a church, a food pantry, or food bank?” A separate question asked survey respondents whether anyone in the household had eaten at a soup kitchen in the previous 12 months.

This analysis separates respondents to the Food Security Supplements into five mutually exclusive categories of households that were distinctly affected by provisions of the 1996 welfare reform legislation. The first four groups consist of households whose head is a U.S. citizen: (1) single-parent families with children, (2) two-parent families with children, (3) adults between age 18 and 59, without children, and (4) adults age 60 and older, without children. The fifth group consists of households in which the household head is a noncitizen, regardless of household structure.

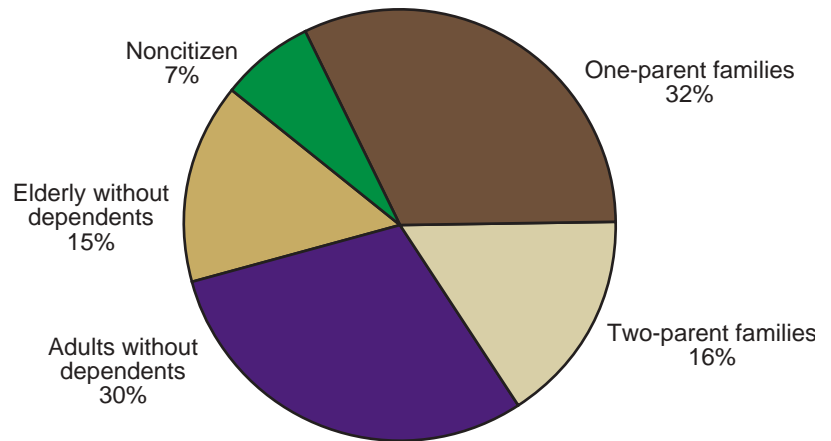
Single-parent families are the primary recipients of Federal cash assistance and comprise a majority of food stamp users. Therefore, most of the households affected by the changes to cash assistance will be from this group. In addition, changes in single-parent families’ use of cash assistance may indirectly affect their use of food stamps. Receiving cash assistance historically qualified individuals

Table 2—More Than 2.5 Million Households Used Food Pantries in 2000

Category	Number of pantry users	Share of category that used food pantry
	Thousands	Percent
All households	2,524	2.4
Single-parent families	844	6.4
Two-parent families	396	1.4
Adults without dependents	748	1.8
Elderly without dependents	370	1.2
Noncitizens	167	2.3

Note: Households with a noncitizen head are included only in the noncitizens category, regardless of the structure of the household.
 Source: Calculated by USDA’s Economic Research Service using data from the September 2000 Current Population Survey Food Security Supplement.

Figure 1—Households That Use Food Pantries Are Surprisingly Diverse, 2000



Source: Calculated by USDA’s Economic Research Service using data from the September 2000 Current Population Food Security Supplement.

for receipt of food stamps. Although many people who stopped receiving cash welfare were still eligible for food stamps, they stopped receiving them. They may have not realized that they were still eligible for the Food Stamp Program or they may have felt that it was not worth it to try to establish or maintain eligibility for food stamps if they were not going to receive cash assistance as well.

The welfare reform legislation placed direct limitations on the use of food stamps among two of the other types of households. The legislation instituted a work requirement for able-bodied adults, age 18 to 50, without dependents. The legislation also eliminated the eligibil-

ity of most legal immigrants to receive food stamps, although subsequent legislation has restored benefits to many legal immigrants.

The CPS data do not identify whether an individual is disabled, so some of the individuals categorized as able-bodied adults for this analysis may not be considered “able-bodied” for the purposes of determining their Food Stamp Program eligibility. In addition, the data do not identify if an individual lives in an area where the work requirement was waived. Therefore, some individuals in the category of able-bodied adults without dependents may have been able to maintain their eligibility to receive food stamps, which we would ex-

pect to reduce their need for emergency food assistance.

According to the CPS Food Security Supplement, more than 2.5 million households got food from a food pantry in 2000 (table 2). In contrast, an ERS-funded nationwide survey of emergency food users estimates that 4.3 million households used food pantries per month in 2001. This discrepancy in estimated number of users is likely a result of the different survey methods used. The CPS is known to undercount the use of Federal assistance programs, so it may also undercount the use of private food assistance from food pantries. The ERS-funded survey was conducted on a sample of users at selected food pantries over a 4-month period. Thus, the estimated number of users relies on assumptions about how representative the sample is of all food pantry users and about the patterns of food pantry use outside of the survey period to create an estimate of overall monthly use of food pantries.

Households Were Less Likely To Use Food Pantries in 2000 Than in 1996...

Although the two surveys estimate different total numbers of households that use food pantries, they largely agree on the demographic composition of food pantry households. For example, both surveys find that households with children comprise about one-half of food pantry users. Nonetheless, households that use food pantries are diverse in terms of their family structure and the age and citizenship status of the household head (fig. 1).

Not surprisingly, the group that is most likely to be poor—single-parent families with children—is also most likely to use food pantries. One in sixteen single-parent families living in the United States received food from a food pantry in 2000, and these households accounted for about one-third of households that use food pantries. Households with children

accounted for about half of all households that used a food pantry. Households headed by a working-age adult without dependents also comprised a large percentage—almost 30 percent—of food pantry users. Households with an elderly head without dependents make up 15 percent of food pantry users.

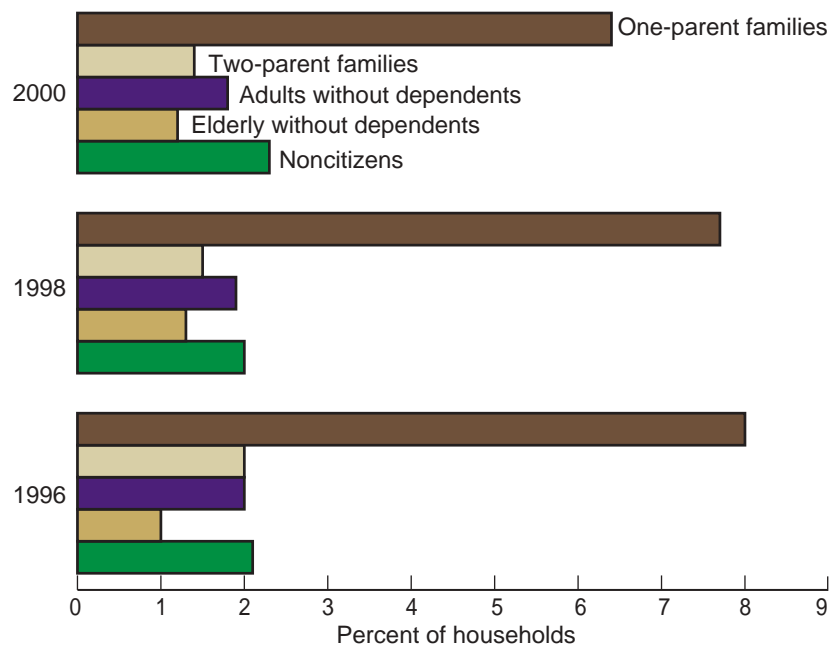
According to the CPS Food Security Supplements, the percentage of households using food pantries declined by roughly 10 percent from 1996 to 2000. Two of the three population subgroups most likely to be affected by the welfare reform legislation—single-parent families and able-bodied adults without dependents—were less likely to use food pantries in 2000 than in 1996 (fig. 2). Among households headed by a noncitizen, the slight increase shown in the likelihood of using a food pantry was not statistically significant. Therefore, it appears that, overall, the population subgroups targeted by the welfare reform legislation were not more likely to turn to food pantries

in 2000 than they had been in 1996. However, it is possible that within each subgroup, households that stopped receiving cash assistance or food stamps increased their use of food pantries between 1996 and 2000. The possibility of a shift from use of food stamps to use of food pantries within each subgroup is not addressed in this analysis.

...But the Number of Visits Made to Food Pantries Increased

Despite a decrease in the percentage of households that used a food pantry from 1996 to 2000, an increased frequency of visits to food pantries and population growth resulted in a modest increase in the total number of visits made to food pantries. Households in the CPS Food Security Supplement who reported that they got food from a church, food pantry, or food bank were asked, “How often did this happen—almost every month, some months but not every

Figure 2—Percentage of Households Using Food Pantries Dropped 10 Percent from 1996 to 2000



Note: These statistics are adjusted for the different screening methods used in each year, so that they are comparable across years.

Source: Calculated by USDA's Economic Research Service using data from the September 1996, August 1998, and September 2000 Current Population Food Security Supplements.

month, or in only 1 or 2 months?" We used the response to this question, which was not asked in 1996, to estimate the number of visits that households made to food pantries in 1998 and 2000.

Our estimates of the number of visits to food pantries are based on two assumptions. First, households are assumed to have visited a food pantry for the average number of months in the reported range. Households who reported going to a food pantry "almost every month" were assumed to have made 11 visits in the prior year, while those who reported going to a food pantry in "some months but not every month" were assumed to have made 6.5 visits in the prior year. Those that reported going to a food pantry in "only 1 or 2 months" were assumed to have made 1.5 visits in the prior year. Second, households are assumed to make only one visit to a food pantry per month. While the ERS-funded study of emergency food providers reports that almost half of food pantries limit households to one visit per month, some households could be making more than one visit per month. This analysis will not capture the extent to which households increased or decreased their frequency of visits per month.

Taking these assumptions into account, the number of visits made to food pantries is estimated to have increased by about 2 percent from 1998 to 2000, from 12.7 million visits in 1998 to 12.9 million visits in 2000. Other data sources indicate larger increases in the use of food pantries. For example, emergency food providers in the ERS-funded study believed demand at food pantries, as measured by number of households served, increased 16.5 percent overall between 1997 and 2000. America's Second Harvest, a national network of food banks that represents almost 80 percent of food banks in the country, reported an increase of almost 10 percent in the number of people using food pantries between 1997 and 2001.

Food Pantry Visits Increase Only Among Households With Children

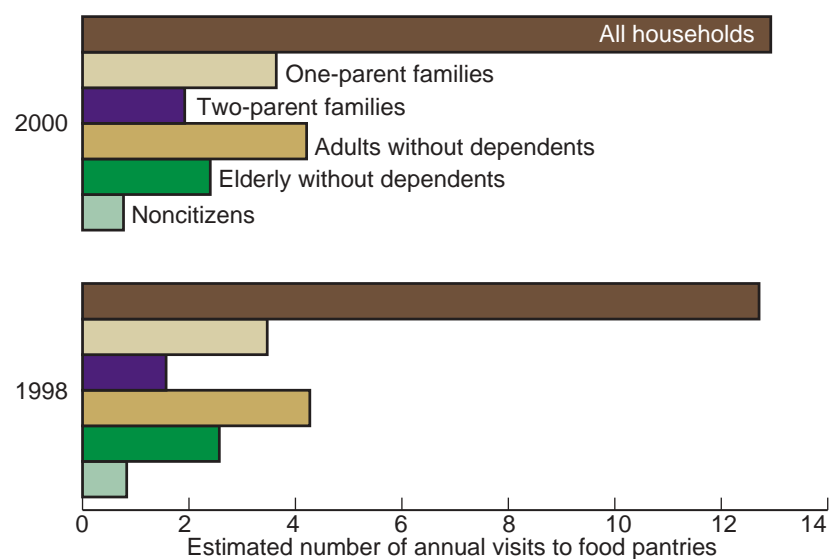
The strong economy in the mid-1990s would be expected to have led to a decline in the use of both public food assistance programs and emergency food assistance, as households became more able to provide food for themselves. On the other hand, while many households had members who became employed during the 1990s, their employment did not always raise their incomes above the poverty line. Census Bureau figures show that, in 2000, 7.6 percent of people in families with at least one worker had incomes below the poverty line. In fact, the share of poor families with at least one worker rose from 36 percent in 1993 to 44.5 percent in 2000.

The participation of low-income working families in the Food Stamp Program has historically been quite low. During the 1990s, only about half of eligible households with earnings used food stamps, while almost all eligible households that received cash

assistance used food stamps. Low-income working households may choose not to participate in the Food Stamp Program, even though they are eligible, for a variety of reasons. For instance, they may believe that their income will rise in the future and they will not need food stamps, or they may find the paperwork requirements too onerous for the amount of benefits they would receive. In either case, households may decide instead to turn to a food pantry if they need assistance.

The welfare reform legislation may also have affected the use of emergency food assistance. The eligibility restrictions on food stamp receipt by noncitizens and able-bodied adults without dependents might lead to an increase in food pantry use if these groups shifted from reliance on public food assistance to reliance on private assistance. In addition, the stricter work requirements and the imposition of time limits in the cash assistance system may have prompted single-parent families to leave the public assistance rolls before achieving full self-sufficiency and increased

Figure 3—Households With Children Drive Increase in Food Pantry Visits, 1998-2000



Note: These statistics are adjusted for the different screening methods used in each year, so that they are comparable across years.

Source: Calculated by USDA's Economic Research Service using data from the August 1998 and September 2000 Current Population Food Security Supplements.

their reliance on private food assistance from food pantries.

Households with children accounted for the entire increase in the estimated number of visits made to food pantries (fig. 3). Two-parent families with children, who made over 20 percent more visits to food pantries in 2000 than in 1998, experienced the largest increase in visits. While single-parent families did not experience as large an increase in food pantry visits as two-parent families, they, too, turned to food banks more often in 2000 than in 1998—3.6 million visits in 2000, up from 3.5 million visits in 1998. The increase in food pantry visits among households with children occurred when Food Stamp Program participation among this group was on the decline. This increase suggests that at least some of these households continued to need food assistance, despite their decreased use of Federal food assistance programs.

Noncitizen households and able-bodied adults without dependents, as well as elderly adults without dependents, experienced a decrease in their visits to food pantries from 1998 to 2000. The participation of noncitizens and able-bodied adults without dependents in the Food Stamp Program decreased over this time period. Although able-bodied adults without dependents made fewer visits to food pantries in 2000 than in 1998, they made the greatest number of visits to food pantries of any of the population subgroups in both 1998 and 2000.

While the strong economic conditions of the mid-1990s are likely to have contributed to the decline in food pantry use by noncitizen households and working-age adults without dependents, this analysis does not estimate whether their use of food pantries would have fallen even more in the absence of the restrictions imposed on their Food Stamp Program eligibility. However, the evidence does indicate that the restrictions on their

eligibility to receive food stamps did not lead to an increased reliance on food pantries. The restoration of benefits to a number of legal immigrants, as mandated in the 2002 farm bill, is expected to increase their participation in the Food Stamp Program, which may further decrease their reliance on food pantries.

The CPS data show that households were less likely to use food pantries in 2000 than in 1996. However, households with children made 10 percent more visits to food pantries in 2000 than in 1998. This increase suggests the need to continue to monitor the food assistance needs of this population. The data also show that able-bodied adults without dependents account for the largest proportion of visits to food pantries. Their heavy reliance on food pantries warrants further attention. It may be that these households, even those whose members are employed, are not able to earn enough to make ends meet. Further analysis of the relationship between employment status and the use of Federal and emergency food assistance can suggest ways in which these programs can best serve this population.

In addition, it is important to note that households may have increased their reliance on other forms of emergency food assistance, such as emergency kitchens, which are not measured in this study. Understanding patterns of use of food pantries and other emergency food assistance can help shape Federal food assistance programs and Federal support to emergency food providers. Federal policies that are based on information about the use of both private and Federal food assistance will be most effective in coordinating food assistance for those in need.

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Farewell to *FoodReview*

In February 2003, USDA's Economic Research Service (ERS) will launch a new magazine to showcase ERS's research findings and data on food, agriculture, natural resources, and rural America. The new magazine is designed to better serve our clients by linking with the many reports, data series, and other features of our Web site. In this last issue of *FoodReview*, we thought our readers would enjoy a look back at the magazine's 63-year history.

FoodReview traces its roots to a 9-page mimeographed report, *The National Food Situation*, released on September 9, 1939. Prompted by concerns about the United States' ability to offset possible European food shortages caused by the outbreak of war in Europe, economists with USDA's Bureau of Agricultural Economics projected supplies of food products available for domestic consumption for the 1939-40 marketing year and compared these supplies with previous years. Total supplies of 18 commodities were adjusted for end-of-year carryovers, farm uses (seed and feed), and exports.

These supplies were divided by the U.S. population to derive per capita food quantities—much the same as ERS does today.

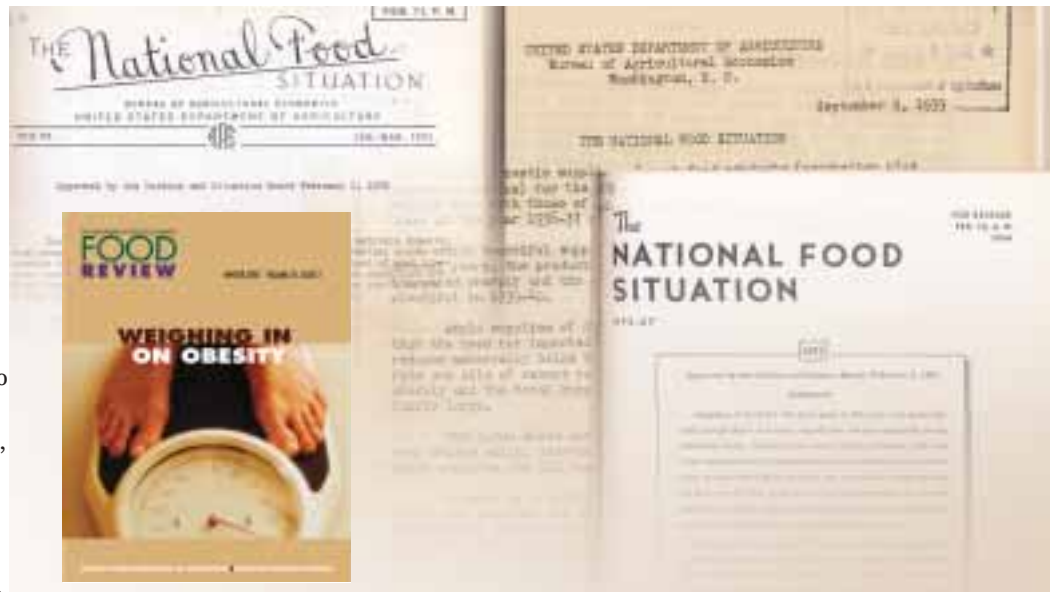
The Bureau of Agricultural Economics continued to release periodic reports in 1940 and 1941. In a December 18, 1941, press release, Secretary of Agriculture Claude R. Wickard stated, "As the President pointed out in his radio address the night of Pearl Harbor, the United States enters this war period with one asset no other nation has—plenty of food.... We have plenty for our own people, including the armed forces, and enough more to help feed

our Allies. The attached current issue of *The National Food Situation*, released today, should assure all our citizens and our Allies that our farmers will produce the food needed to win the war."

The National Food Situation became a formal publication in July 1942 and continued to report on the Nation's food supplies, demand for food, and food prices. Topics addressed over the next few years reflected the country's entry into World War II: decreased civilian supplies of canned foods, sugar, meats, and other foods; Government-imposed price ceilings on foods sold by retail stores; and restrictions on use of tin containers for food. The Bureau of Agricultural Economics continued publishing *The National Food Situation* until 1953, when the Agricultural Marketing Service took over the series. In 1961, ERS became the publisher of the quarterly report.

By 1961, the original 18 commodities had expanded to 53, including information on supplies of fish and seafood contributed by colleagues at the Department of the Interior. In addition, the publication began to feature special articles on such topics as food spending trends, marketing costs, Government food donation and food assistance programs, and longer term trends in U.S. eating patterns—issues that *FoodReview* still covered in 2002.

In 1978, *The National Food Situation* took on a new direction and a new name, *National Food Review*. Without abandoning its core areas of interest, the publication stepped up its coverage of the increasingly complex food marketing system. The publication became more magazine-like with by-lined individual articles, a contents page, art work, and sections reporting on food-related legislation and USDA regulatory actions. Special articles examined developments in food retailing and manufacturing, along with the away-from-home food sector. ERS research on consumer topics—relating health concerns to food choices,





alternative menus for schools, nutrient labeling changes—became a regular feature in the magazine.

Analysts shared their insights about new processing and packaging technologies and other changes brought about by advances in science, such as ultra-high temperature milk (1982), food irradiation (1983), and recombinant DNA (1984). Insights on food safety issues were offered, too, beginning with the consumer and regulatory issues raised by animal drug and pesticide residues, to ERS's more recent work in the area of microbial foodborne pathogens responsible for illnesses and food recalls.

In 1991, the magazine acquired its current name, *FoodReview*, to reflect the expanded international scope of its contents. Five years later, the magazine reached a new milestone, when it became available to Internet surfers. *FoodReview* continues to be one of the most frequently visited sites on the ERS Web site.

Over the course of the magazine's history, many issues important to the country in the early years remained important. Nutrition issues and the nutritive value of the food supply have been regularly highlighted in *The National Food Situation* and its successors. In the 1940s, the emphasis was on trying to increase or maintain consumption of important nutrients in times of war-induced food shortages. Today, ERS researchers continue to study the food choices that can lead to diets low in some nutrients (fiber, calcium, and iron),

while too high in others (saturated fat, cholesterol, and calories).

Trends in retail food prices and food spending have always been a focus of the publication. In April 1942, *The National Food Situation* reported that "retail prices of foods continued to rise ... but were still below pre-Depression levels." Later, ERS researchers analyzed the rapid food price inflation of the mid-1970s, the time lag between when changes in farm prices or other input costs show up on retail shelves, and the accuracy of the Consumer Price Index in capturing changing food prices. USDA economists have remained interested in aggregate U.S. food spending and food spending patterns of different demographic groups—the elderly, single mothers, Hispanics, high- and low-income consumers, and others.

And, it was not only domestic issues that were covered. From its start, the publication looked abroad—examining the effects of World War II on our ability to feed ourselves and our Allies. Throughout the years, analysts have assessed the dynamics of foreign markets for our farmers and food processors, as well as the growing presence of imported foods and investments by foreign food firms in the United States. Articles have discussed the implications of international trade agreements for producers and consumers, international licensing of foods and beverages, and U.S. food aid programs.

In the last few years, *FoodReview* has continued its evolution. Recognizing that much of ERS's data series are accessible through our Web site, the magazine has become more topical with special issues devoted to the restructuring occurring across the food and agricultural sectors, the impacts of welfare reform on food assistance programs, children's well-being, and the global food market. The new ERS magazine will continue *FoodReview's* tradition of objective, thorough analyses of the critical issues facing agriculture, consumers, rural America, and the environment. **FR**

Rosanna Mentzer Morrison
Economics Editor, *FoodReview*



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Questions? Comments?

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