

## ENHANCING NUTRITION CONSUMPTION IN THE AMERICAN DIET

# The State of the American Diet

## How Can We Cope?

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The American diet is reportedly too high in calories, total fat, saturated fat, added sugar, sodium, and refined grains but too low in omega-3 fats, fiber, and whole grains, fruits, vegetables and phytonutrients. Taste, health considerations, and economics are primary factors affecting food choices with convenience driving food intake as more meals are eaten away from home. The American food supply can support optimal dietary health and the array of healthy food choices available can accommodate almost all dietary preferences, needs, and resource constraints (time, energy, skill). The key to a dietary pattern that nurtures good health is learning to choose nutritious foods that also accommodate personal preferences like convenience and taste appeal. **Key words:** *Americans, dietary advice, dietary choices, Nutrition Facts, nutrient intake*

**A**LMOST DAILY, headlines report that American diets are on the fast track to poor health and decreased longevity.<sup>1-7</sup> Fat and sugar intake is too high. Fruit and vegetable consumption is inadequate. To promote good health, it is imperative that health-care professionals know what the populace is eating. Recent cross-sectional surveys (ie, National Health and Nutrition Examination Survey [NHANES], Continuing Survey for Food Intake by Individuals [CSFII], Growing Up Today Study [GUTS]) provide useful data about the nutritional quality of the current American diet. Although these studies are the focus of numerous journal articles, most articles focus on 1 or 2 aspects of the diet,<sup>1,7-19</sup> making it hard to get “the full picture” of nutrient intake. Nutrient intake can be seen as a culmination of many other factors seldom considered in articles reporting on dietary surveys. No articles could be located that extended the discussion of what Ameri-

cans eat to elucidate a comprehensive view of the American diet that examines why we eat what we do, when we eat it, and where.

The purpose of this article is to paint a detailed picture of the American diet by bringing together results from national nutrition surveys conducted since 1994 and summarizing the findings in a familiar graphic format—Nutrition Fact labels. These labels provide a succinct and unique comparison of the current American diet to recommendations. Part I of this article explores why Americans eat the way they do, when they choose to eat, where they eat, and who is doing the cooking. In Part II, recommendations compiled from nutrition professionals are summarized into advice to help American families improve their dietary intake and health status.

### WHAT ARE AMERICANS EATING?

MEDLINE and Google Scholar search engines were used to identify published peer-reviewed research reporting on and evaluating the dietary intake of Americans. Keywords included the following: dietary intake, nutrition survey, dietary survey, macronutrient intake (including carbohydrate, protein, and fat individually), micronutrient intake

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<b>Nutrition Facts</b>	
Serving Size: Average Daily Intake <sup>b</sup>	
Servings: 1 Day	
Amount Per Serving	
<b>Calories</b> <sup>1</sup> 2146	Calories from Fat 711
	% Nutrient Reference Value <sup>a</sup>
<b>Total Fat</b> <sup>1</sup> 79g	122%
Saturated Fat <sup>1</sup> 26g	130%
Monounsaturated Fat <sup>1</sup> 30g	125%
Polyunsaturated Fat <sup>1</sup> 16g	80%
Trans Fat <sup>5</sup> 5.3g	n/a
<b>Cholesterol</b> <sup>1</sup> 265mg	88%
<b>Sodium</b> <sup>2</sup> 3334mg	139%
<b>Total Carbohydrate</b> <sup>2</sup> 276g	92%
Dietary Fiber <sup>3</sup> 15g	60%
Added sugar <sup>4</sup> 82g	256%
<b>Protein</b> <sup>1</sup> 78g	156%
Vitamin A <sup>2</sup> 77%	• Vitamin C <sup>2</sup> 157%
Calcium <sup>2</sup> 88%	• Iron <sup>2</sup> 85%
Folate <sup>2</sup> 115%	• Vitamin E <sup>2</sup> 40%

<sup>a</sup> Nutrient intake is from food alone, not including supplements. Nutrient Reference Values are Daily Values (DV) based on a 2000 Calorie diet for all nutrients except added sugar, monounsaturated fat, and polyunsaturated fat for which the Dietary Guidelines for Americans for a 2000 Calorie diet were used.<sup>20,21</sup> (See Table 1.)

<sup>b</sup> Average daily nutrient intake is based upon nationally representative dietary surveys; N varies for nutrient intake as indicated below.

<sup>1</sup>N=8,604; NHANES 1999-2000<sup>19</sup>

<sup>2</sup>N=17,544; NHANES, 1999-2000, NHANES 2001-2002 for these nutrients values are available for >1 year old<sup>18,19</sup>

<sup>3</sup>N=8,940 NHANES 2001-2002 for these nutrients values are available for >1 year old<sup>18</sup>

<sup>4</sup>N=15,010 CSFII 1994-1996<sup>3</sup>

<sup>5</sup>N=11,258 CSFII 1989-1991<sup>22</sup>

**Figure 1.** Daily average nutrient intake for Americans older than 2 years compared to the nutrient reference values.<sup>a</sup>

(including vitamin A, vitamin C, vitamin E, folate, calcium, iron, and sodium individually), food habits, Americans, and United States. All articles were published between 1994 and 2006 and used dietary survey data from nationwide or nationally representative multistate samples conducted in 1994 or later (including those articles that compared recent data with those of years prior to 1994). In addition, the reference list of each article located was reviewed to identify other pertinent articles.

A summary of the nutrient intakes of Americans is presented as Nutrition Facts labels in Figures 1 to 5. These labels display the mean dietary intake of all Americans aged 2 years and older, males and females 2 to 19

years old, and males and females older than 19 years. Means were calculated using data from recent national surveys evaluating the dietary intake of Americans (ie NHANES 1971-2000, NHANES 1999-2000, NHANES 2001-2002, CSFII 1994-1996, GUTS 1996-1999). NHANES 1971-2000 data were used because they represent the largest collection of mean nutrient intakes over several years and serve as a useful comparison to more current (ie, 1994 and beyond) dietary intake data. Each figure identifies the surveys and sample sizes used to calculate mean calorie and nutrient intakes.

When intake means were reported by percentile or other grouping, a single mean was calculated for a nutrient by multiplying the

<b>Nutrition Facts</b>	
Serving Size: Average Daily Intake <sup>b</sup>	
Servings: 1 Day	
Amount Per Serving	
<b>Calories<sup>1</sup> 2280</b>	<b>Calories from Fat 729</b>
	% Nutrient Reference Value <sup>a</sup>
<b>Total Fat<sup>2</sup> 81g</b>	125%
Saturated Fat <sup>2</sup> 27g	135%
Monounsaturated Fat <sup>2</sup> 31g	129%
Polyunsaturated Fat <sup>2</sup> 15g	75%
Trans Fat <sup>5</sup> 7.1	n/a
<b>Cholesterol<sup>2</sup> 244mg</b>	81%
<b>Sodium<sup>3</sup> 3597mg</b>	150%
<b>Total Carbohydrate<sup>3</sup> 319g</b>	106%
Dietary Fiber <sup>4</sup> 15g	60%
Added sugar <sup>5</sup> 142g	444%
<b>Protein<sup>2</sup> 76g</b>	152%
Vitamin A <sup>4</sup> 78%	• Vitamin C <sup>3</sup> 160%
Calcium <sup>3</sup> 105%	• Iron <sup>3</sup> 94%
Folate <sup>3</sup> 119%	• Vitamin E <sup>3</sup> 45%

<sup>a</sup> Nutrient intake is from food alone, not including supplements. Nutrient Reference Values are Daily Values (DV) based on a 2000 Calorie diet for all nutrients except added sugar, monounsaturated fat, and polyunsaturated fat for which the Dietary Guidelines for Americans for a 2000 Calorie diet were used.<sup>20,21</sup> (See Table 1.)

<sup>b</sup> Average daily nutrient intake is based upon nationally representative dietary surveys; N varies for nutrient intake as indicated below.

<sup>1</sup>N=18,830; NHANES 1971-2000<sup>9</sup>

<sup>2</sup>N=1,979; NHANES 1999-2000<sup>14,19</sup>

<sup>3</sup>N=4,359; NHANES 1999-2000, NHANES 2001-2002<sup>12,18</sup>

<sup>4</sup>N=2,380; NHANES 2001-2002<sup>3</sup>

<sup>5</sup>N=2,955 CSFII 1989-1991<sup>22</sup>

**Figure 2.** Daily average nutrient intake for men older than 19 years compared to thenutrient reference values.<sup>a</sup>

mean by the number of subjects within each percentile or group, summing the products, and dividing by the total number of subjects in all percentiles or groups combined. The daily values (DV) (Table 1) served as the nutrient reference values for all nutrients reported in the figures except monounsaturated fat, polyunsaturated fat, and added sugars, for which the 2005 Dietary Guidelines for Americans were used because no DV exist for these nutrients.<sup>20,24</sup> The DV provide useful nutrient reference values because they represent the amount of nutrients estimated to meet the needs of almost all Americans aged 4 and older.<sup>25</sup>

A 2000 Calorie diet was used as the basis for all nutrient values in the figures because most Americans are sedentary<sup>21</sup> and

2000 is the mean value of the lowest calorie intake for sedentary women (ie, 1800 calories) and sedentary men (ie, 2200) recommended, in general, by the Dietary Guidelines for Americans.<sup>20</sup> Plus, keeping calorie levels the same across the figures facilitates comparisons across ages and genders.

**Energy**

The self-reported daily energy intakes of adult men (ie, 20 and 59 years old) range from 2347 to 2825 calories, or around 150 to 600 more calories each day than general recommendations.<sup>5,9,11,19</sup> On the other hand, women report daily energy intakes ranging from 1751 to 2028 calories, levels that fall within the range recommended for this group.<sup>5,9,19,23</sup>

<b>Nutrition Facts</b>	
Serving Size: Average Daily Intake <sup>b</sup>	
Servings: 1 Day	
Amount Per Serving	
<b>Calories</b> <sup>1</sup> 2538	Calories from Fat 819
	% Nutrient Reference Value <sup>a</sup>
<b>Total Fat</b> <sup>2</sup> 91g	140%
Saturated Fat <sup>2</sup> 31g	155%
Monounsaturated Fat <sup>2</sup> 35g	146%
Polyunsaturated Fat <sup>2</sup> 18g	90%
Trans Fat <sup>6</sup> 6.2g	n/a
<b>Cholesterol</b> <sup>2</sup> 325mg	108%
<b>Sodium</b> <sup>3</sup> 3948mg	165%
<b>Total Carbohydrate</b> <sup>1</sup> 286g	95%
Dietary Fiber <sup>4</sup> 18g	72%
Added sugar <sup>4</sup> 84g	263%
<b>Protein</b> <sup>1</sup> 101g	202%
Vitamin A <sup>3</sup> 83%	• Vitamin C <sup>3</sup> 177%
Calcium <sup>3</sup> 95%	• Iron <sup>3</sup> 100%
Folate <sup>3</sup> 134%	• Vitamin E <sup>3</sup> 40%

<sup>a</sup> Nutrient intake is from food alone, not including supplements. Nutrient Reference Values are Daily Values (DV) based on a 2000 Calorie diet for all nutrients except added sugar, monounsaturated fat, and polyunsaturated fat for which the Dietary Guidelines for Americans for a 2000 Calorie diet were used.<sup>20,21</sup> (See Table 1.)

<sup>b</sup> Average daily nutrient intake is based upon nationally representative dietary surveys; N varies for nutrient intake as indicated below.

<sup>1</sup>N=8,942; NHANES 1999-2000, GUTS 1996-1999 (ages 9-14)<sup>19,23</sup>

<sup>2</sup>N=2,227; NHANES 1999-2000<sup>14,19</sup>

<sup>3</sup>N=3,528 NHANES 1999-2000, NHANES 2001-2002 for these nutrients values are available for >1 year old<sup>12,13,18,19</sup>

<sup>4</sup>N=1,301; NHANES 2001-2002 -for these nutrients values are available for >1 year old<sup>18</sup>

<sup>5</sup>N=595; CSFII 1994-1996 (ages 12-17)<sup>3</sup>

<sup>6</sup>N=618 CSFII 1989-1991<sup>22</sup>

**Figure 3.** Daily average nutrient intake for males aged 2 to 19 years compared to the nutrient reference values.<sup>a</sup>

Comparing self-reported to recommended intake levels is complicated by the issue of energy underreporting. Underreporting energy occurs in as little as 2% to as high as 82% of populations, with frequencies higher in females and those with a higher body mass.<sup>26</sup> This is an important consideration when comparing self-reported energy intake, particularly of women, to recommended levels. Given the fact that more than 20% of women 20 years and older were obese as of the first part of 2006,<sup>27</sup> estimated energy intakes showing that women closely meet recommendations likely underestimate actual intake.

One surrogate measure of energy intake is body weight. A trend in increased energy intake is seen in data from NHANES I (1971-1974), NHANES II (1976-1980), NHANES III

(1988-1994), and NHANES (1999-2000).<sup>9</sup> For example, overall energy intake of adults aged 18 years and older increased 25% to 29% from 1987-1992 to 1999-2000.<sup>17</sup> Although mean energy intake rose for adults across all age groups from 1971-1974 to 1999-2000, the rise was more acute in some groups. The largest energy increase (376 calories) among women occurred in the 20- to 39-year age group, whereas among men the largest energy increase (287 calories) was found in those aged 40 to 59 years.<sup>9</sup> Among women, the smallest increase (271 calories), while still large, occurred in the oldest age group (60-74 years old). The smallest energy intake increase (44 calories) for men was noted in the younger age group (20 to 30 years old). The recent rise in overweight and obesity prevalence rates (15%-31%) among

<b>Nutrition Facts</b>	
Serving Size: Average Daily Intake <sup>b</sup>	
Servings: 1 Day	
Amount Per Serving	
<b>Calories</b> <sup>1</sup> 1646	Calories from Fat 576
	% Nutrient Reference Value <sup>a</sup>
<b>Total Fat</b> <sup>1</sup> 64g	98%
Saturated Fat <sup>1</sup> 22g	110%
Monounsaturated Fat <sup>2</sup> 25g	104%
Polyunsaturated Fat <sup>2</sup> 15g	75%
Trans Fat <sup>6</sup> 4.4g	n/a
<b>Cholesterol</b> <sup>2</sup> 237mg	79%
<b>Sodium</b> <sup>3</sup> 2874mg	120%
<b>Total Carbohydrate</b> <sup>4</sup> 229g	76%
Dietary Fiber <sup>4</sup> 14g	56%
Added Sugar <sup>5</sup> 53g	166%
<b>Protein</b> <sup>1</sup> 66g	132%
Vitamin A <sup>3</sup> 77%	• Vitamin C <sup>3</sup> 147%
Calcium <sup>3</sup> 74%	• Iron <sup>3</sup> 74%
Folate <sup>3</sup> 101%	• Vitamin E <sup>3</sup> 35%

<sup>a</sup> Nutrient intake is from food alone, not including supplements. Nutrient Reference Values are Daily Values (DV) based on a 2000 Calorie diet for all nutrients except added sugar, monounsaturated fat, and polyunsaturated fat for which the Dietary Guidelines for Americans for a 2000 Calorie diet were used.<sup>20, 21</sup> (See Table 1.)

<sup>b</sup> Average daily nutrient intake is based upon nationally representative dietary surveys; N varies for nutrient intake as indicated below.

<sup>1</sup>N=23,751; NHANES 1971-2000<sup>9</sup>

<sup>2</sup>N=2,260; NHANES 1999-2000<sup>14</sup>

<sup>3</sup>N=4,527; NHANES 1999-2000, NHANES 2001-2002<sup>18</sup>

<sup>4</sup>N=2,267; NHANES 2001-2002<sup>9, 18</sup>

<sup>5</sup>N=3,673; CSFII 1994-1996,<sup>3</sup>

<sup>6</sup>N=4,013 CSFII 1989-1991<sup>22</sup>

**Figure 4.** Daily average nutrient intake for women older than 19 years compared to the nutrient reference values.<sup>a</sup>

children,<sup>22</sup> adolescents,<sup>22</sup> and adults<sup>28</sup> lends support to the validity of dietary intake data indicating that the overall energy intake of Americans surpasses their needs to maintain a healthy weight.

**Protein**

Only 3% of Americans 1 year and older do not meet the estimated average requirement (EAR, or average daily requirements) for protein.<sup>18</sup> For most, protein intake far exceeds the DV as well as the current recommended dietary allowance<sup>29</sup> (see figures). In recent years, protein intake has been on the upswing—between 1985 and 1999, intake increased 12%.<sup>30</sup> Interestingly, protein’s contribution to overall energy intake decreased about 1% for adults from 1971-

1974 to 1999-2000<sup>9</sup> likely because of the disproportionate increase in percentage of total calories supplied by carbohydrates.

The majority of Americans’ protein intake comes from meat, poultry, and fish. CSFII 1994-1996 data show that 97% of the population ate meat and/or poultry on the 2 days their diets were assessed, with an estimated mean intake of 4.8 oz daily by Americans older than 2 years.<sup>15</sup> In 2000, Americans consumed 5.2 oz of meat, poultry, and fish (3.0 oz from red meat alone) daily.<sup>30</sup> Compared with those in the 1970s, Americans today are consuming less red meat and nearly twice as much fish and poultry. Overall, protein intake from animal flesh almost meets the MyPyramid recommendation of 5.5 oz of total protein per 2000 Calorie diet without including consumption

Nutrition Facts	
Serving Size: Average Daily Intake <sup>b</sup>	
Servings: 1 Day	
Amount Per Serving	
<b>Calories</b> <sup>1</sup> 2001	Calories from Fat 459
	% Nutrient Reference Value <sup>a</sup>
<b>Total Fat</b> <sup>2</sup> 51g	78%
Saturated Fat <sup>2</sup> 23g	115%
Monounsaturated Fat <sup>2</sup> 19g	79%
Polyunsaturated Fat <sup>2</sup> 10g	50%
Trans Fat <sup>6</sup> 5.1	n/a
<b>Cholesterol</b> <sup>2</sup> 145mg	48%
<b>Sodium</b> <sup>3</sup> 2771mg	115%
<b>Total Carbohydrate</b> <sup>4</sup> 255g	85%
Dietary Fiber <sup>5</sup> 13g	52%
Added Sugar <sup>6</sup> 98g	306%
<b>Protein</b> <sup>2</sup> 60g	120%
Vitamin A <sup>4</sup> 69%	• Vitamin C <sup>3</sup> 145%
Calcium <sup>3</sup> 82%	• Iron <sup>3</sup> 73%
Folate <sup>3</sup> 94%	• Vitamin E <sup>3</sup> 30%

<sup>a</sup> Nutrient intake is from food alone, not including supplements. Nutrient Reference Values are Daily Values (DV) based on a 2000 Calorie diet for all nutrients except added sugar, monounsaturated fat, and polyunsaturated fat for which the Dietary Guidelines for Americans for a 2000 Calorie diet were used.<sup>20,21</sup> (See Table 1.)

<sup>b</sup> Average daily nutrient intake is based upon nationally representative dietary surveys; N varies for nutrient intake as indicated below.

<sup>1</sup>N=10,341; NHANES 1999-00, GUTS 1996-1999 (ages 9-14)<sup>19,23</sup>

<sup>2</sup>N=2,138; NHANES 1999-2000<sup>14,19</sup>

<sup>3</sup>N=3,412; NHANES 1999-2000, NHANES 2001-2002 for these nutrients values are available for >1 year old<sup>12,13,18</sup>

<sup>4</sup>N=5,960; NHANES 1999-2000, NHANES 2001-2002 for these nutrients values are available for >1 year old<sup>18</sup>

<sup>5</sup>N=1,274; NHANES 2001-2002 for these nutrients values are available for >1 year old<sup>18</sup>

<sup>6</sup>N=672 CSFII 1989-1991<sup>22</sup>

**Figure 5.** Daily average nutrient intake for females aged 2 to 19 years compared to the nutrient reference values.<sup>a</sup>

of any other protein-rich foods (ie, dry beans, peas, lentils, dairy, eggs, grains).

### Carbohydrates

Overall, Americans meet the dietary reference intake (DRI) guidelines for contribution of carbohydrate to total energy intake (approximately 45% to 60%).<sup>29</sup> Carbohydrates account for nearly half of total energy intake, ranging from 43% to 56% for females and 48% to 55% in males.<sup>5,6,9,19,23,31</sup> On average, Americans obtain 51% of the total calories consumed from carbohydrates (Fig 1). A comparison of average total carbohydrate intake with the DV of 300 g recommended for a 2000 Calorie diet indicates that Americans achieve 92% of this goal (Fig 1). Males, regardless of

age, do a better job of meeting this recommendation (see Figs 2 to 5).

### Fiber

While the proportion of total energy provided by carbohydrate is in line with recommendations, the types of carbohydrate consumed are not. Dietary fiber intake falls well below the 14 g per 1000 calories recommended by the Dietary Guidelines for Americans and the DV of 25 g.<sup>20,25</sup> NHANES 2001-2002 data indicate that Americans aged 1 year and older consume an average of 15.1 g of fiber daily,<sup>18</sup> or just over half of the DV for a 2000 Calorie diet (see Fig 1). Examining this fiber intake data by age group and gender reveals that throughout the lifecycle, males

**Table 1.** Reference nutrient values used to construct figures 1 to 5<sup>a</sup>

Nutrient	Reference nutrient value
Calories	2000
Total fat, g	<65
Saturated fat, g	<20
Monounsaturated fat, g	24 <sup>b</sup>
Polyunsaturated fat, g	20 <sup>b</sup>
Trans fat, g	As low as possible <sup>b</sup>
Cholesterol, mg	<300
Sodium, mg	<2400
Total carbohydrate, g	300
Dietary fiber, g	25
Added sugar, g	32 <sup>b</sup>
Protein, g	50
Vitamin A, g	1000
Vitamin C, mg	60
Calcium, mg	1000
Folate, g	400
Iron, mg	18
Vitamin E	30 IU

<sup>a</sup>Reference nutrient values are based on daily values for all nutrients except added sugar, monounsaturated fat, and poly unsaturated fat for which the 2005 Dietary Guidelines for Americans for a 2000 Calorie diet were used.

<sup>b</sup>Values derived from the 2005 Dietary Guidelines for Americans for a 2000 Calories.

underconsume fiber by about 28% to 40% and females underconsume it by 44% to 48% (see Figs 2 to 5). While males come closer than females to meeting recommended intakes, this simply could be a result of higher overall total energy intake by males. Regardless, both males and females fail to meet fiber recommendations throughout life.

The lack of concordance between actual and recommended intakes of dietary fiber is likely due to low intakes of fruits and vegetables<sup>32</sup> and high consumption levels of refined grains. For instance, half of all Americans age 2 and over eat only one fruit serving daily. School-aged children consume a daily average of just 1.4 servings of fruit and 2.6 servings of vegetables.<sup>33,34</sup> The most com-

monly eaten grain-based foods are pasta, corn chips, white rice, and white bread—all refined grains.<sup>2</sup> CSFII 1994–1996 data for adults aged 20 years and older revealed a mean daily consumption of 6.8 servings of grains, with just one of these servings being whole grain.<sup>35</sup> Neither gender nor age group influences whole grain intake, with mean intakes for everyone being just a single serving daily.<sup>35</sup> Only about 10% of all adults met the current Dietary Guidelines for Americans recommendation of 3 or more servings daily of whole grains.<sup>2,20,35</sup> Most of these servings of whole grains Americans are eating come in the form of breakfast cereals and yeast breads (30% and 32%, respectively).<sup>2</sup>

### Sugar

In contrast to low fiber intake, sugar intake exceeds recommendations. The average intake of added sugars has risen about 13% in the last 2 decades and now accounts for about one third of the contribution carbohydrates make to total energy intake.<sup>3</sup> CSFII 1994–1996 data reveal that added sugars account for almost 16% of total energy intake of Americans aged 2 years and older, nearly triple the approximately 6% of total energy intake for a 2000 Calorie diet recommended by the current Dietary Guidelines for Americans (see Fig 1),<sup>20</sup> but less than the 25% of total energy intake limit suggested by the DRI.<sup>29</sup> Young males (aged 2 to 19 years) have the highest added sugar intake, consuming more than 4 times the Dietary Guidelines for Americans recommendation (see Fig 3). Young females are not too far behind, consuming triple the recommended intake level daily (see Fig 5).

High sugar intakes are, in part, due to the popularity of sweetened beverages. The primary caloric sweetener added to beverages is high-fructose corn syrup.<sup>36</sup> Intake of high-fructose corn syrup increased more than 1000% between its introduction in 1967 and 1990 and now adds an average of more than 300 calories daily to the diets of Americans aged 2 years and older.<sup>36</sup> By age 5 among Americans, soft drink intake exceeds consumption of 100% fruit juice and by age 13, soft drinks exceed intake of milk, 100% fruit

juice, fruit drinks, and ades.<sup>37</sup> Intake of fruit drinks and fruit-flavored drinks (ie, beverages that contain little or no real fruit juice) has risen from 0.5 to 0.8 servings per day between 1989–1991 and 1994–1996.<sup>38,39</sup> In the past 2 decades, soft drink consumption rose 70% to 110% in the diets of Americans aged 2 to 60.<sup>40,41</sup> Furthermore, data show that the contribution of sugar-sweetened soft drinks to total energy intake is highest among Americans aged 19 to 39 years old, followed by those aged 2 to 18 years, 40 to 59 years, and lastly the oldest group of Americans, 60 years or older.<sup>41</sup> Interestingly, energy from desserts (another major contributor to added sugar intake) accounts for less of the total energy consumed by Americans aged 19 to 39 than by those aged 40 to 59.<sup>41</sup>

## Fat

Figure 1 shows that average daily total dietary fat intake is 79 g. As a percentage of total calories (33% of the average total calories eaten), total fat intake by Americans of all age and gender groups falls near the upper end of the recommended range of 20% to 35% of total calories.<sup>42</sup> Figures 2, 3, and 4 illustrate that males (regardless of age group) and females in the older age group are near or at the extreme upper end of the range for fat intake as a percentage of total calories (ie, 32% to 35% of total calorie intake).<sup>20</sup> Females in the younger age group report the lowest contribution of dietary fat to total caloric intake, with 23% of their total calories being derived from fat.

While daily energy intake significantly increased between 1971 and 2000, percentage of energy intake from total fat decreased approximately 1% for both genders (ages 20–74 years).<sup>9</sup> This decrease likely resulted from an increase in total energy while absolute fat intake remained unchanged. Despite a decreased contribution of dietary fat to total energy intake, consumption of added fats (eg, mayonnaise, butter, oils) rose 32% from 1970–1974 to 1999. In 1999, added fats accounted for 87% of total fat intake.<sup>30</sup> Two major sources of added fats in the American diet are vegetable oils (contributing about 29 g of

fat daily) and shortening (contributing 17 g of fat daily).<sup>43</sup>

## *Saturated, monounsaturated, and polyunsaturated fat*

An analysis of the type of fat consumed reveals that the average grams of saturated, monounsaturated, and polyunsaturated fat ingested daily are 26, 30, and 16 for Americans equaling 11%, 13%, and 7% of total average calories consumed, respectively (Fig 1). Although most dietary fat (36 g) is in the form recommended (ie, monounsaturated and polyunsaturated), the intake of saturated fat (11% of total calories) by both genders at all life stages (childhood/adolescence and adult) exceeds the current Dietary Guideline for Americans recommendation of less than 10% of total calories from saturated fat.<sup>42</sup> Cheese, beef, and milk together, all good sources of saturated fat, contribute about one third of the total saturated fat consumed in the United States.<sup>20</sup>

While saturated fat intake is high, since the early 1970s, the percentage of calories from saturated fat has declined about 3% for Americans of both genders aged 20 years and older. Compared with data from the CSFII 1994–1996, data from NHANES 1999–2000 show that for all Americans, saturated fat intake decreased slightly (about 1.5 g) whereas monounsaturated and polyunsaturated fat intakes (grams) increased about 1.5 g/d.<sup>14,44</sup>

## *Trans fats*

Trans fatty acids, primarily from partially hydrogenated vegetable oils, infiltrated the American food market during the past few decades. However, with the emergence of evidence that trans fatty acids are harmful to heart health,<sup>45,46</sup> concern over intake of these fats has grown. The most recent estimate of trans fatty acid intake is 5.3 g/d or about 7% of total fat calories (Fig 1).<sup>20,47</sup> The current Dietary Guidelines encourage limiting trans fatty intake to as low as possible.<sup>42</sup> About 40% of the trans fat Americans consume comes from baked products like cakes, cookies, crackers, and pies.<sup>20</sup> The recent addition of trans

fats to Nutrition Facts labels has compelled many manufacturers to reformulate products to lower their trans fat content.<sup>48</sup> Thus, the amount of trans fat consumed from packaged food has likely decreased in the past year. However, the amount of trans fat in food prepared away from home may not have changed significantly because restaurants and bakeries, which often use these fats in deep frying foods and baking, are not required to put Nutrition Facts labels on their products.

### ***Cholesterol***

Cholesterol intake by Americans generally falls within the Dietary Guideline to consume less than 300 mg a day (Figs 1-5)<sup>20</sup>; however, adult men (older than 19 years) do exceed this upper intake level (Fig 2). A major contributor of dietary cholesterol is high-fat animal flesh, which is naturally high in cholesterol.<sup>30</sup>

### ***Omega-3 fatty acid***

Recommendations for omega-3 fatty acid intake promote obtaining this fat from a combination of marine- and plant-derived sources.<sup>49</sup> The average daily intake of omega-3 fatty acids is approximately 1.6 g (0.7% of total energy),<sup>49</sup> which is slightly less than the Dietary Guidelines for Americans recommended intake of 1.7 g/d and at the lower end of the American Heart Association's (AHA's) recommended range of 1.5 to 3.0 g/d.<sup>20,50</sup> Most of the daily omega-3 intake (ie, 1.4 g) comes from plant-derived sources with the remainder coming from marine sources.<sup>49</sup> The AHA currently recommends that Americans consume fish, particularly fatty fish like salmon, at least twice weekly, and vegetable oils like olive and canola to obtain enough omega-3 fatty acids to promote heart health.<sup>51</sup> As of the year 2000, Americans on average consumed about a half an ounce (or half a serving) of fish daily, far below the AHA recommendations.<sup>30</sup>

### ***Micronutrients***

There are 26 vitamins and minerals for which recommended intake levels (DRI) have been created. This section will focus on micronutrients required on Nutrition Facts pan-

els (ie, vitamin A, vitamin C, iron, calcium, sodium) as well as 2 others that are of concern because they have been shown to be consistently low in subgroups or even the population as a whole (ie, folic acid and vitamin E).

### ***Vitamin A***

Mean vitamin A intake for all Americans aged 1 year and older ranges from 487 to 699 retinol activity equivalents ( $\mu\text{g}$ ) per day,<sup>18</sup> indicating a failure to meet the DV (see Figs 1 to 5) as well as the DRI by almost all age groups. In fact, the diets of more than 95% of young children (1 to 8 years old) do not supply enough vitamin A to even meet the EAR.<sup>18</sup> In addition, approximately half of those 19 years and older also do not meet the EAR for vitamin A.<sup>18</sup> This low intake of vitamin A likely is related to the limited intake of milk and milk products as well as vitamin A-rich fruits and vegetables.<sup>16</sup> For example, Americans do not drink the 3 cups of milk or milk products recommended daily for a 2000 Calorie diet,<sup>30</sup> thereby underutilizing milk as a source of vitamin A. In addition, CSFII 1994-1996 data indicate that American adults currently consume just one fifth of a serving of dark green vegetables daily.<sup>16</sup> Intake of vitamin A-rich fruits and vegetable may be climbing—between 1994-1996 and 1999-2000 preformed vitamin A (retinol) intake among Americans aged 1 and older remained virtually unchanged, whereas intakes of pro-vitamin A carotenoids from produce increased.<sup>13,44</sup>

The most frequently consumed sources of preformed vitamin A are milk, ready-to-eat cereals, margarine, and cereal bars.<sup>52</sup> Most of the vitamin A in the diets of Americans is in the form of retinol with a quarter to a third in the form of carotenoids.<sup>53</sup> The large proportion of vitamin A as preformed may increase the risk of birth defects in pregnant women as well as hip fracture in older adults.<sup>54,55</sup>

### ***Vitamin C***

The American diet typically provides adequate quantities of vitamin C (see Figs 1-5), so the incidence of deficiency of this vitamin in the United States is low.<sup>56</sup> The current

average intake for Americans 1 year and older, mean dietary vitamin C intake is around 92 mg a day, or 153% of the DV.<sup>18</sup> Given that the DRI for vitamin C is substantially higher than the DV (ie, 90 mg vs 60 mg), it is important to note that the average intake of this vitamin also meets the DRI. Despite the overall high mean vitamin C intake, about 40% of adults 19 years and older do not meet recommended intake levels.<sup>18</sup> In contrast, only about 10% of children aged 18 years and younger fail to consume enough vitamin C from food. This difference in vitamin C intake from food between children and adults could be attributed, at least in part, to the higher intake of vitamin C-rich fruit juices by children.<sup>57</sup> A group at risk for suboptimal intake of vitamin C is Americans who smoke. The recommended intake of vitamin C is higher (35 mg/d higher, or 110 mg to 125 mg for adult women and men, respectively) for smokers due to their higher rates of oxidative stress.<sup>56</sup> Vitamin C intakes have remained consistent since the mid-1990s, with estimates from CSFII 1994–1996 just slightly higher than the most recently published estimates from NHANES 2001–2002 data<sup>18,44</sup> and both exceeding the DV.<sup>56</sup> Frequently consumed vitamin C-rich foods include tomatoes and citrus fruit and juices.<sup>3,30,44</sup>

### **Folate**

The mean folate intake of all Americans 2 years and older is at or near the DV of 400  $\mu\text{g}$ <sup>18,58</sup> (Figs 1–5). In general, less than 10% do not meet the folate EAR.<sup>18</sup> Of particular concern is females of childbearing age who are more likely than their male counterparts not to meet folate intake recommendations.<sup>18,59,60</sup>

A comparison of 1988–1994 NHANES data with 1999–2000 NHANES data reveals that since folic acid fortification of grains and cereals began in 1998,<sup>61</sup> intake of this B-vitamin has increased from 190  $\mu\text{g}$  daily to nearly 400  $\mu\text{g}$ .<sup>60,62,63</sup> Serum folate concentrations (a surrogate of folate intake) increased more than 2-fold between 1988–1995 and 1999–2000.<sup>61</sup> Concomitantly, while it is difficult to detect a reduction in neural tube defect prevalence secondary to folic acid fortification, a 17% de-

cline in this type of birth defect has been noted in countries such as the United States that have governmental policies on folic acid supplementation.<sup>64</sup>

Foods rich in folate are abundantly available in the American food supply.<sup>30</sup> Fortified grains and cereals are the single largest contributor of folate to the American diet, providing about 200  $\mu\text{g}/\text{d}$ .<sup>65</sup> The other half of folate intake is provided mostly by foods rich in folate like orange juice.<sup>30</sup> Although dark green vegetables and legumes are excellent sources, they contribute little folate to American diets because they are infrequently consumed.<sup>16</sup> For example, only 10% of the participants in CSFII 1994–1996 reported eating dark green vegetables and just 13% ate legumes.<sup>44</sup>

### **Iron**

As shown in Figure 1, overall Americans consume about 15% less iron daily than the DV of 18 mg/d. This intake level remained stable between 1994–1996 and 2001–2002<sup>18,44</sup> and meets the DRI for all gender and age groups except women of childbearing years. According to data from NHANES 1999–2000, males of all ages meet the DRI for dietary iron; however, many females, particularly those 19 to 50 years old, do not.<sup>19</sup> While most males and females (65% and 58%, respectively) believe that they consume adequate dietary iron, more females than males believe that their intake is too low (35% vs 23%, respectively).<sup>44</sup>

The most bioavailable sources of dietary iron come from animal products such as red meats. In 2000, average US consumption equaled 3 oz of red meat daily, making it the dominant food consumed from the meat food group (accounting for 48% of total meat servings).<sup>30</sup> Males tend to consume more servings of red meat than females (males approximately 13 servings per month vs females approximately 9 servings per month); however, females are more likely to take iron supplements (approximately 22% of adult females) than males (approximately 17% of adult males).<sup>66</sup> Another important source of iron in the American diet is bread and cereal enriched with iron. Per capita consumption

of flour and cereal products (most of which are fortified with iron) was about 10 servings daily in 2000.<sup>30</sup>

### **Calcium**

Calcium is abundant in the food supply,<sup>67</sup> with dairy products accounting for almost three quarters of the calcium available.<sup>30,68</sup> Consumption of dairy foods, as well as calcium-rich green leafy vegetables, is below recommended levels.<sup>30</sup> According to the Dietary Guidelines for American,<sup>20</sup> most should strive to consume 3 servings daily from the milk and milk products group; however, dairy intake averages only 1.6 servings daily.<sup>30</sup> The shortfall in calcium intake from dairy is not being made up by other calcium sources such as green leafy vegetables, grains, or fish bones.<sup>69</sup> Calcium-fortified foods, such as juices, are useful in helping meet calcium needs<sup>70</sup>; however, estimates of the contribution made by these foods to the American diet could not be located.<sup>71</sup>

Figures 1 to 5, which combine estimated calcium intakes of Americans from both the NHANES 1999–2000 and NHANES 2001–2002, show that overall Americans meet only 88% of the DV, with males doing a better job of approaching goal intake levels. While most men (62%) and women (52%) believe that they are consuming adequate quantities of calcium, more females than males think they may be consuming too little calcium (44% vs 26%). Given that the DV for calcium is 1000 mg and DRIs for several age groups are substantially higher (ie, 1300 mg for age 9 to 18 years and 1200 mg for those aged 51 years and older), it makes sense to also examine this nutrient in terms of DRI. Overall intake estimates for calcium show that many Americans do not meet the DRI for calcium, regardless of gender. Males 9 to 18 years old fall short of the DRI by about 160 mg, while those 19 to 50 years old meet the DRI and males 51 years and older have the largest shortfall of all males, about 360 mg less than the recommended 1200 mg.<sup>18</sup> Females do far worse than males at meeting intake DRI with young children (aged 1 to 8 years) being the only portion of the fe-

male population that meets this intake level. Females 9 to 18 years old are nearly 500 mg shy of their 1300 mg DRI and females aged 19 years and older consume almost 250 to 500 mg less than their DRI.<sup>18</sup>

### **Sodium**

According to recent estimates, more than 97% of Americans exceed the adequate intake (AI) for sodium.<sup>18</sup> Figures 1 to 5 show that regardless of gender or age group, sodium intake exceeds the DV. Females, in general, report lower consumption of sodium than males.<sup>18,19</sup> Sodium intake appears to be highest in males in the older than 19 years age group (Fig 2). Despite high sodium intakes, 68% of females and 63% of males believe that their sodium intake is about right and only between 10% and 22%, respectively, think their sodium intake may be too high.<sup>44</sup>

Sodium is quite abundant in the American food supply, particularly in processed foods, including snack foods and ready-to-eat meals. Between 1977 and 1996, sodium intake rose as consumption of salty snacks increased, particularly in those aged 2 to 59 years old.<sup>41</sup> Looking back over nutrient availability per capita per day during the twentieth century in America, sodium availability is higher now than all other years since record keeping began in 1909.<sup>67</sup> This increase in sodium intake goes hand in hand with a decrease in meals eaten at home and an increase in meals eaten away from home (restaurant/fast food), as well as an increase in energy intake from snack foods, many of which are high in salt.<sup>41</sup> Of the 10 most popular foods ordered from restaurants, the top 3 are high sodium foods: hamburgers, french fries, and pizza.<sup>72</sup> In addition, the vegetable accounting for almost half of total vegetable servings in 2000 was potato chips, a high sodium food.<sup>30</sup>

### **Vitamin E**

Intake of vitamin E by Americans is below recommendations, with Americans 2 years and older consuming only about 40% of the DV. Greater than 90% of all Americans consume less than the EAR for  $\alpha$ -tocopherol,

the most active form of vitamin E.<sup>18,73</sup> Major sources of vitamin E include vegetable oils (soybean, corn, safflower, and cottonseed), wheat germ, nuts, and green leafy vegetables. Seventy-two percent of the vitamin E Americans consume comes from fats and oils, and this is up 5% since 1970.<sup>71</sup> Other important contributors of this nutrient include ready-to-eat cereal, baked goods, beef, salad dressing, and green leafy vegetables.<sup>71,73</sup> Vitamin E availability in the food supply in 1909 was only about 36% of the current DV, whereas, in 2004, the US food supply provides over 100% of the DV for vitamin E per capita per day.<sup>70</sup>

### Supplements

No discussion of nutrition is complete without mention of nutrient supplements. Approximately 40% of Americans take at least 1 vitamin or mineral supplement.<sup>74</sup> Most commercially available multi-vitamin supplements provide more than the DRI for any age group in a single dose, making it easy to reach and exceed DRI levels. Given the rarity of frank vitamin and mineral deficiencies in the United States, intakes of key vitamins and minerals are likely higher than shown in the figures, which are based on food alone.

### Phytonutrients from fruits and vegetables

Americans of all ages eat too few fruit and vegetable servings.<sup>32,33,75,76</sup> In fact, only about 40% of Americans consume at least the recommended minimum of 5 servings a day.<sup>73</sup> A review of dietary intake of American adults from 1994 to 2000 revealed that there was a slight decrease in mean fruit and vegetable intake from 3.44 to 3.37 servings per day.<sup>32</sup> Aside from not eating enough of these foods, variety is lacking.<sup>16,30</sup> Six fruits (ie, orange juice, bananas, apple juice, fresh apples, fresh grapes, and watermelon) from the more than 60 fruits widely available in the United States and 5 of the more than 70 vegetables commonly sold in this country (ie, iceberg lettuce, frozen potatoes, fresh potatoes, potato chips, and canned tomatoes) are the most frequently

eaten.<sup>30</sup> Of the 6 fruits most commonly consumed, just 3 (ie, apples, orange juice, and bananas) along with the top 5 vegetables account for almost half of total daily servings.<sup>30</sup>

Fruits and vegetables contain phytonutrients, which are emerging as potentially strong dietary health promoters. The beneficial effects of phytonutrients may be greater when these compounds are obtained in the form of food versus supplements<sup>77</sup> and when the food has been heated. Heat treatment, such as when foods are cooked, blanched for freezing, or canned, has been found to increase the bioavailability of phytonutrients (eg, anthocyanin, lycopene, lutein, and beta carotene) in many commonly consumed foods such as tomatoes, corn, pumpkin, and blueberries.<sup>78-84</sup>

Evaluation of dietary intake of phytonutrients is still in its infancy. Complicating this evaluation is the fact that food composition tables currently include only limited information on phytonutrient content and recommended intake levels for phytonutrients are not yet set. Although it is not currently possible to assess phytonutrients intake with the precision possible for traditional nutrients, it is feasible to examine them from a food source perspective. Thus, this section will examine key phytonutrients in terms of overall intake of fruits and vegetables.

Table 2 provides a list of phytonutrients of current interest and examples of fruits and vegetables (classified by color) where they are commonly found. As can be seen from the table, the variety and amount of fruits and vegetables consumed are limited, which indicates that the intake of phytonutrients is limited, too. This low intake is of concern because phytonutrients research has noted a positive correlation between phytonutrient intake (eg, alpha and beta carotene, lutein, and lycopene) and better adherence to Dietary Guidelines for Americans.<sup>85</sup>

### *Phenolics (flavonoids and proanthocyanidins)*

Oranges, followed by apples and potatoes, are the major sources of phenols in the

**Table 2.** Phytonutrients and main sources consumed in the American diet, 2004

Food color	Phytonutrients	Foods most commonly consumed	Average servings/day
Red	Proanthocyanins	Fresh watermelon	0.03
	Lycopene	Fresh/canned tomatoes	0.07
		Fresh/frozen strawberries	0.02
Yellow	Beta carotene	Fresh/juiced oranges	0.16
Orange	Flavonoids	Fresh/frozen/canned carrots	0.06
		Fresh/canned peaches	0.02
Green	Lutein	Fresh/frozen broccoli	0.04
	Zeaxanthin	Fresh/frozen spinach	0.02
	Indoles	Fresh kiwi	0.06
Fresh head lettuce		0.30	
Blue-purple	Proanthocyanins	Fresh/juiced grapes	0.01
	Phenolics	Raisins	0.02
		Fresh/dried/juiced plums	0.025
White-tan	Allicin	Fresh/canned/frozen potatoes	0.20
	Flavonoids	Canned pears	0.01
		Proanthocyanins	Canned mushrooms
		Fresh banana	0.09
		Fresh/canned/juiced apples	0.25
		Garlic	0.01
	Onion	0.06	

American diet.<sup>86</sup> Flavonoids are powerful antioxidants that help promote heart health and lower the risk of certain cancers. Proanthocyanidins account for the largest proportion of total flavonoids in American diets. Mean consumption of proanthocyanidins intake is about 58 mg daily per person, with 50% being supplied by apples and grapes.<sup>87,88</sup> Intake of proanthocyanidins is greatest in groups with the highest fruit consumption, specifically children aged 2 to 5 years and men older than 60.<sup>88</sup>

### **Carotenes**

Carrots, winter squash, mangos, peaches, cantaloupe, apricots, and dark green produce are rich sources of beta carotene (a carotenoid). This phytonutrient helps prevent damage from free radicals that can lead to cataracts, heart disease, and cancer. The majority of carotenes consumed by Americans come from carrots (about 30%), followed by dark leafy greens and sweet potatoes.<sup>89</sup> Estimates of daily fruit and vegetable intake during 1994–2000 reveal, however, that adults

have limited intake of carotene-rich foods (ie, approximately 0.09 servings of carrots and 0.29 servings of green salad daily).<sup>32</sup>

### **Lycopene**

Lycopene (a carotenoid) intake is associated with a reduced risk for cardiovascular disease and prostate and bladder cancer.<sup>90–93</sup> Pink grapefruit, watermelon, and tomatoes, especially those that have been heat-treated (eg, cooked, canned),<sup>83</sup> are great sources of this phytonutrient. Tomatoes provide about 80% of the lycopene in American diets, with per capita annual intake equaling almost 18 lb of fresh and 69 lb of canned tomatoes.<sup>90</sup> In fact, 85% of lycopene consumption comes from tomato products.<sup>90</sup> Despite high consumption from tomato products, a recent survey of Americans 25 years and older found that only 8% were aware of lycopene sources in the food supply.<sup>94</sup>

### **Lutein & zeaxanthin**

These carotenoids reduce risk of macular degeneration. Lutein and zeaxanthin content

is high in dark green produce and yellow corn. Mean daily lutein intake of adults was found to be about 1347  $\mu\text{g}$ .<sup>91</sup> Given the sources of these phytonutrients and intake levels of these sources, the majority of these carotenoids in the American diet likely come from corn, apples, tomatoes, and leafy green vegetables. Despite low consumption of leafy green vegetables by Americans, these vegetables provide a lot of lutein and zeaxanthin, so even small amounts contribute greatly to overall means intake estimates.

### ***Indoles and allicin***

Indoles are a family of phytochemicals that may reduce the risk of certain types of cancer, including breast cancer.<sup>95</sup> They are found mainly in cruciferous vegetables, like cauliflower, broccoli, and leafy greens like kale and turnip greens.<sup>95</sup> Alliums are found in garlic and onions and may help lower cholesterol as well as reduce risk for certain cancers.<sup>95</sup> As can be seen from Table 2, intakes of vegetables rich in either indoles or allicin compounds is fairly low in the American diet.

### **WHAT FOODS ARE AVAILABLE IN US FOOD MARKETS?**

The US food supply is high quality, plentiful, and diverse. With the exception of some inner city and remote rural areas, most Americans have ready access to abundant food supplies in a variety of food stores. For instance, there are more than 34 000 supermarkets in the United States, each selling 45 000 or more foods<sup>96</sup> in diverse forms ranging from raw to frozen to canned to dehydrated. Today, total available protein is around 95 g/d—more than enough for the vast majority of Americans. In addition, vitamins and minerals are accessible in amounts that can amply meet the nation's needs.<sup>10,97</sup> Enrichment and fortification boost nutrient availability even higher.

For those Americans who may have limited access to the fresh food supply (eg, those living in inner city and remote rural areas), several options are available for providing alternative sources of nutrient-rich food that

have prolonged shelf lives. Advances in food preservation and processing have made the food supply nutrient-rich as well as safer than ever, while modern food-processing methods preserve nutrient integrity, making the nutrient content of fresh, frozen, and canned foods highly comparable.<sup>83,98</sup> The ability to stock and store frozen and canned food allows for those with more limited food availability access the option to stock a kitchen with shelf-stable (or longer shelf life) nutrient-dense foods capable of meeting total nutrient needs. Furthermore, frozen and canned foods provide options for busy consumers looking for quick and easy ways to prepare meals.

### **WHY ARE AMERICANS EATING WHAT THEY ARE EATING?**

Food choices are affected by numerous personal, biological, and environmental variables.<sup>99-105</sup> Research findings indicate that the most important dimensions affecting food choices of adults and teens appear to be food appeal, health considerations, and economics. Studies examining the dimensions affecting food choices of children could not be located.

#### **Food appeal**

Food appeal is generally defined as taste (in reality, flavor<sup>101</sup>) of food, but also includes food appearance and preferences. Virtually all research in this area identifies taste as the most important factor teens and adults consider when choosing food.<sup>76,102,106-111</sup> Although few studies have specifically investigated the importance of the visual appearance of food, young adults report that this factor has an strong effect on their food choices.<sup>109</sup>

While the significance of taste as a guiding force in food selection does not differ with income or age group,<sup>112</sup> its importance varies with race. Taste is rated more important by both African Americans and Hispanics than by whites.<sup>112</sup> Whether the importance of taste differs between men and women is not clear. One nationwide study reported that taste was more important to women than to men,<sup>112</sup> while findings from the 1994-1995

CSFII and 1994 Diet and Health Knowledge Survey (DHKS) indicate that taste importance is about the same for both sexes.<sup>110</sup> In addition, both men and women reported that personal preference for food influences the selections they make.<sup>113</sup>

In a national survey, Glanz et al<sup>112</sup> investigated whether the importance of taste in food selection varied by the health orientation (health consciousness) of participants. Regardless of where individuals were on the health orientation continuum (from most to least health oriented), the importance they placed on the taste of food varied little.<sup>112</sup>

### Health considerations

Health considerations usually include the importance placed on nutrition (nutrient content) and weight control (calorie content). More than 90% of the participants in the USDA 1994-1995 CSFII and 1994 DHKS surveys indicated that nutrition was second only to taste in importance when selecting foods.<sup>110</sup> The value placed on nutrition did not differ by household income<sup>112,114</sup> or educational status.<sup>114</sup>

Adults of all ages report that nutrition is an important factor when making food choices,<sup>106,110,115,116</sup> with its importance being greater in older adults<sup>112</sup> and lesser in teens.<sup>76</sup> An examination by gender reveals that nutrition is more important to women than to men.<sup>110,112</sup> A comparison of the importance of nutrition on food choices by racial groups (whites, African American, Hispanic, Other) found that this food selection factor was most important to African Americans, least to whites.<sup>112</sup>

Highly health-oriented (eg, exercise regularly, eat a healthy diet, watch their weight, do not smoke or drink beyond moderation) people rate nutrition as a more important selection factor than those less health oriented.<sup>112</sup> The value placed on nutrition by consumers is reflected in their dietary choices. Indeed, fruit and vegetable intake is positively correlated with degree of importance placed on nutrition whereas fast food consumption is inversely related.<sup>112</sup>

### Weight control

Concern about body weight, physical appearance, and attractiveness guides food selection<sup>117,118</sup> for many people and may be a more important motivator than health overall.<sup>117</sup> In one national study, weight control concerns were most important to older people<sup>112</sup>; however, a study of college students found that weight concern is the most prevalent reason given for actively avoiding a food.<sup>119</sup> Body weight and appearance concerns are important among young adults<sup>106</sup>; however, when asked to indicate the importance of this factor on food selection, teens rated it less important than other factors like food appeal and convenience.<sup>76</sup>

The importance placed on weight control as a food selection factor does not appear related to income, but its importance is greater for women, older people, and nonwhites.<sup>112</sup> African Americans placed more importance on weight control as a factor in food selection and whites the least.<sup>112</sup>

As might be expected, highly health-oriented people rate weight control as a more important selection factor than those less health oriented.<sup>112</sup> This finding is supported by the fact that the emphasis placed on weight concerns is positively correlated with fruit and vegetable intake and negatively with fast food and cheese intake.<sup>112</sup>

### Economics: Money, time, and effort

Economic considerations include the monetary cost of food as well as the time needed to procure, prepare, and eat food. The cost of food in the United States averages 10% of income, down from 14% in 1970. Approximately 40% of every food dollar buys foods prepared outside the home, up from 26% in 1970.<sup>120</sup>

According to the 20th Annual Report on Eating Patterns in America, "As a result of time-pressed lifestyles, the major factors that drive eating habits seem to be time and money. If a meal is not cheap, it better be quick, and vice versa."<sup>121</sup> Data from the 1994-1995 CSFII and 1994 DHKS indicate that food

price was important for more than 80% of adults surveyed, but its level of importance trailed far behind other factors studied (ie, taste, nutrition, the safety of the food, and how well the food keeps).<sup>110</sup> How well the food keeps is a food selection factor that affects overall food cost. The single study that investigated the importance of this factor found that it was important to more than 83% of adults with its importance being greater for women than for men.<sup>110</sup>

Young adults report that cost/financial resources have a major impact on their food choices.<sup>115</sup> Indeed, monetary cost is more important to younger people than to their older counterparts.<sup>112</sup> A comparison of the importance of cost on food choices by racial groups (whites, African American, Hispanic, Other) revealed that this food selection factor was most important to Hispanics, least to whites.<sup>112</sup> Women<sup>110,112</sup> and low-income individuals<sup>112</sup> all ranked cost more important than their comparison groups. Degree of health orientation appears to have little effect on the importance placed on cost as a food selection factor.<sup>112</sup>

Time available to prepare food is a surging influence on foods consumed at meal times. In 1965, Americans spent an average of 44 minutes preparing meals and 21 minutes cleaning up. By 1995, just 27 minutes were spent preparing meals and clean-up took 4 minutes.<sup>11,122</sup> In 1987, 43% of all home cooked meals contained at least 1 item that was made from scratch; however, this rate decreased to 38% 10 years later.<sup>123</sup> A national survey indicated that lack of effort and ease of preparation were the primary reasons adults gave when asked why they prepared the dish they served for dinner.<sup>124</sup> A little more than 40% of dinners prepared at home are ready to eat in less than 30 minutes, with use of the oven decreasing and microwave increasing.<sup>72</sup> Lack of time for meal planning, preparation, and eating may raise the ratio of snacking to meals, limit food variety, reduce the number of meals eaten as a family, and increase the frequency of eating out or ordering take out.<sup>112,125,126</sup>

## **Convenience**

In addition to time constraints, lack of food-preparation skills and disinterest in food preparation are key factors driving the need and desire for convenience.<sup>126-128</sup> Recent data show that about one quarter of Americans regularly use convenience foods when preparing dinner at home, 17% bring home take-out from restaurants and supermarkets,<sup>72</sup> and fewer fresh foods are being used.<sup>72,124</sup> No-cook meals are gaining popularity; currently sandwiches are the most popular dinnertime main dish.<sup>124</sup>

Data from 1994-1995 CSFII and 1994 DHKS indicate that ease of preparation was important for about three quarters of the adults surveyed, but its level of importance ranked last after taste, safety of the food, nutrition, price, and how well the food keeps.<sup>110</sup> Similarly, teens ranked convenience importance lower than taste.<sup>76</sup>

Adults of all ages, especially younger adults living in single person households, report that lack of time and need for convenience greatly influenced their food choices.<sup>106,112,115,129</sup> Convenience as a food selection factor is usually reported as more important by women than by men.<sup>110,129</sup> In addition, this factor is more important to those with low income.<sup>112</sup> A comparison of importance placed on convenience by racial groups (whites, African American, Hispanic, Other) revealed that this food selection factor was most important to African Americans, least to whites.<sup>112</sup>

The degree of health orientation appears to have little effect on importance of convenience,<sup>112</sup> except when children are present in the household.<sup>129</sup> Health-conscious adults named convenience as a factor in meal preparation more often in households with children than those without children.

The quest for convenience may affect food choice. For example, intake of fruits, vegetables, and breakfast cereal is negatively correlated with importance of convenience while fast food consumption is positively correlated.<sup>112</sup> However, because the nutrient content of recipes prepared using frozen or canned convenience foods is comparable

to those made with fresh ingredients,<sup>130</sup> the value placed on convenience need not negatively affect nutrient intake.

### Other factors

In addition to food appeal, health considerations, and economics, other factors affect food choices. Research suggests that people with more nutrition knowledge tend to eat healthier diets than those who are less well informed.<sup>131,132</sup> The effect of knowledge is frequently reported to be relatively modest; however, British researchers argue that the effect of knowledge may be stronger than typically reported because study instruments are often not well validated.<sup>133</sup> Using a well-validated measure of nutrition knowledge, these researchers found that knowledge was significantly associated with healthy eating. Respondents in the highest knowledge quintile were nearly 25 times more likely to meet fruit, vegetable, and fat intake recommendations than those in lowest quintile.<sup>133</sup>

The safety of a food is another factor, though not well studied, that has been reported to affect food choices. This factor ranked very close to taste among both men and women surveyed in the 1994-1995 CSFII and 1994 DHKS.<sup>110</sup>

Food marketing, including advertising, is generally acknowledged to affect food purchases, particularly those made by children.<sup>134</sup> Although no published research conducted with US-based participants could be located to ascertain the importance consumers placed on marketing as a factor influencing their food choices, other studies do indicate that marketing can affect nutrition knowledge and beliefs,<sup>135-138</sup> increase the number of and type of food purchase requests and choices,<sup>122,139-141</sup> and influence snack frequency as well as calorie and nutrient intake.<sup>142-144</sup> The large expenditure on marketing fast foods (\$11 billion in the United States alone in 1997) is considered a key factor in the increased consumption of food prepared outside the home in general and of energy-dense, micronutrient-poor foods in particular.

Still other reasons for selecting foods include familiarity, novelty, ethical considerations, environmental issues (contaminants, pesticides, recycling/waste, food production techniques), animal rights, mood, natural ingredients versus synthetic ingredients, religious doctrine, culture, political values, media, situation (where person is, whom they are with, occasion), self-efficacy, attitudes, and associative meanings (comfort, memories).<sup>76,102,104,107,145-151</sup> However, these are not well studied in the US population.

### WHERE ARE AMERICAN MEALS PREPARED AND EATEN?

The frequency of eating commercially prepared foods rose 11% between 1987-1992 and 1999-2000.<sup>17</sup> Today, more than 90% of Americans are consuming food each day that was prepared away from home.<sup>121</sup> The physical location where meals prepared away from home are actually eaten is shifting. Meals eaten at a retail food establishment declined from an annual per capita average of 93 in 1985 to 80 meals in 2005, while meals prepared away from home and eaten in a car or at home have increased.<sup>121</sup> Regardless of age group, picking up meals to take home to eat is a popular occurrence. About 61% of people younger than 35 years and about half of those older than 35 years bring home takeout at least once per week.<sup>72</sup>

The consumption of commercially prepared foods has important health implications. Foods purchased and eaten away from home contribute about one quarter of the daily intake of calories, protein, fat, carbohydrate, fiber, and key vitamins and minerals.<sup>110</sup> As expected, the increased frequency of eating commercially prepared food has altered calorie and nutrient intake levels and/or shifted the source where they are obtained from. For example, energy from foods at home decreased 11% to 21%, while energy intake from restaurant/fast food increased 91% to 208% during this same time period.<sup>41</sup>

Meals eaten away from home supply Americans with a large portion of their dietary fat

and are associated with increased energy intake due to their higher energy density (from both fat and sugar) compared with foods prepared and eaten at home.<sup>17,152</sup> As the number of meals eaten away from the home each week increased, energy intake from total and saturated fat rose while the contribution of protein to total energy intake appeared to decline.<sup>17</sup> Breakfast and dinner meals consumed away from home were higher in total energy and percentage of energy from total fat and saturated fat than when those meals were prepared and consumed at home.<sup>153</sup>

The consumption of food prepared away from home affects intake of whole grains, milk, fruits, and vegetables, too. CSFII 1994–1996 data reveal that, for all Americans 2 years and older, the greatest intake of whole grains (approximately 85%) is supplied by foods prepared at home, whereas only about 6% of all whole grain intake comes from foods consumed from fast food and restaurants.<sup>35</sup> Milk consumption is inversely related to fast-food intake among teens.<sup>154</sup> Fruit and vegetable intake frequently is limited when eating out, but in 2005, side and main salads were among the top 10 most popular foods ordered by adults. For kids younger than 6 years, fruit and nonfried vegetables were among the most popular.<sup>72</sup>

Fast food restaurants are of particular interest. For Americans aged 2 years and older, energy intake from high-fat fast foods, such as french fries, burgers, Mexican food, and pizza, has risen significantly since the late 1980s.<sup>41</sup> CSFII 1994–1996 data for Americans 20 years and older indicate that fast food consumption is associated with a diet high in both total energy and energy density.<sup>155</sup> Increased portion sizes of meals prepared at fast food and other restaurants may have contributed to this calorie intake increase.<sup>156,157</sup> In addition, even though surveys report Americans are more aware of trans fats, intake of high-trans fat foods, like fried chicken sandwiches, crackers, and cookies from restaurants, is up.<sup>158</sup>

Meals eaten at home, regardless of where they were prepared, often are consumed in front of the television and are not eaten as

a family.<sup>127,159–162</sup> Television is on during dinnertime 4 or more times each week in one third or more of American households.<sup>162</sup> Families who routinely watch TV during meal-times eat fewer fruits and vegetables and more pizzas, snack foods, and soft drinks than families who separate eating and TV viewing activities.<sup>163,164</sup> A nationwide survey of older youth indicated that approximately one third had eaten dinner with all or most of the family members living in their homes 2 times or less during the previous week—nearly half of these reported having no family meals.<sup>165</sup> When children do not eat family dinners, they are more likely to eat meals that are of lower nutritional quality. The frequency of family meals with at least 1 parent present is positively correlated with intake of fruits, vegetables, grains, calcium-rich foods, fiber, folate, iron, and vitamins B6, B12, C, and E, and negatively correlated with intake of soft drinks and saturated fat.<sup>154,161,162,165,166</sup>

Regardless of where Americans choose to eat, it is a quick affair. In 2003, for all meals combined, Americans spent about 65 minutes eating and drinking each day: 39 minutes at home, 13 minutes at restaurants, 6 minutes at work, and the rest elsewhere.<sup>167</sup>

#### **WHEN ARE AMERICANS EATING AND DECIDING WHAT TO EAT?**

CSFII 1994–1995 data indicate that Americans are eating meals and snacks more frequently, which may affect calorie intake and when calories are consumed (ie, at a meal or as part of a snack). Specifically, a comparison of data from 1977–1989 with 1994–1996 showed that while the number of meals eaten daily increased by about half a meal (3.92 to 4.53 males and 3.86 to 4.44 females), calories per meal declined only slightly (from 573 to 566 calories for males and 422 to 408 calories for females).<sup>11</sup> In addition, the number of snacks eaten daily in 1994–1995 was 60% higher than levels reported in 1977–1978.<sup>11</sup> Calories contributed by dinner dropped between 1977–1978 and 1994–1995 while calories contributed by

breakfast, lunch, and snacks rose. Snacks provided the greatest increases in caloric intake: between 1977-1978 and 1994-1996, the energy received from snacks increased 90% for males and 112% for females.<sup>11</sup>

In addition to calories, when food is eaten (how often and meals vs snacks) may affect nutrient intake. For instance, increased meal frequency may have some benefits. Those who ate more frequently (6 or more times daily) had lower dietary fat, cholesterol, and sodium intake and higher intakes folic acid, vitamin C, magnesium, iron, and fiber, than those who ate less frequently (1 to 2 times a day).<sup>168</sup>

Breakfast, eaten by more than 85% of the population, also has important effects on nutrient intake.<sup>110,154</sup> An analysis of the CSFII 1994-1996 data revealed that calorie-for-calorie, breakfast was a nutrient-rich meal.<sup>44</sup> Breakfast provides about 18% of daily energy intake and about one fourth of the recommended dietary allowance for vitamins A and C, folate, iron, and calcium. Breakfast also provides about 18% of the DV for fiber. The high nutrient levels supplied by breakfast are likely due to the popularity of fortified breakfast cereals, milk, and orange juice at this meal.<sup>86</sup>

More than three quarters of the population report eating snacks.<sup>110</sup> Compared to breakfast, on a per calorie basis, snacks deliver fewer nutrients. That is, snacks provided an average of 17% of total daily energy intake yet delivered only about 12% of vitamin A and iron, 13% of folate, 15% of vitamin C, and 16% of calcium<sup>44</sup> consumed daily. Furthermore, consumption of salty snack foods has increased 132% to 280% for Americans 2 to 59 years old.<sup>41</sup>

In addition to when eating occurs, another aspect to consider is when Americans decide what they will eat. While data of this type are largely unavailable, a recent report based on data from more than 50 000 Americans indicated that more than one third of Americans decide what to make for dinner at the last minute.<sup>121,169</sup> Half reported that they served a particular dish for dinner because it required little or no planning.<sup>124</sup>

## WHO IS PREPARING MEALS IN AMERICAN HOMES?

While data are limited, Economic Research Service findings indicate that women spend more time food shopping and preparing meals than men.<sup>167</sup> Specifically, about 18% of women grocery shop on a given day, compared with 11% of men. Estimates are that in 2005, Americans went to the supermarket about 2 times per week.<sup>96</sup> Women spend an average of 59-minute grocery shopping each week—double the time men spend.<sup>167</sup> Women also invest about 48 minutes daily preparing food and cleaning up in comparison with 15 minutes devoted to these tasks by the opposite sex.<sup>167</sup> Adults with children younger than 18 spend more time preparing food and cleaning up after meals, but the additional time investment for women exceeds that of men.<sup>167</sup>

## PART II QUALITATIVE INTERVIEWS: HOW CAN AMERICANS ACHIEVE A HEALTHY DIET?

A qualitative research design was utilized to answer, "How can Americans achieve a healthy diet?" First, an interview protocol was developed on the basis of the author-generated summary of the current American diet to ensure that questions focused on aspects of the current American diet (eg, overconsumption or underconsumption of key nutrients/food components, factors relating to current dietary habits, etc) for which guidance is needed by Americans to improve the healthfulness of dietary intake. Second, key informants (ie, experts in food and nutrition) were recruited by e-mail to participate in a 30-minute individual telephone interview. The recruitment e-mail explained the purpose of the interview, time commitment, and assurance that all responses would remain confidential. The study funding source was not disclosed to participants. Third, a trained researcher conducted key informant interviews with 23 experts in food and nutrition (91% registered dietitians, 35% had formal culinary training, 64% were parents). To ensure that

**Table 3.** Key informant interview questions

- Given the state of the American diet described in the literature review, what advice would you give Americans to improve their diets?
- Given the US population's time, stress, and reliance on restaurant, takeout, and convenience foods, what advice would you give to help improve their diets?
- How can we demystify false beliefs associated with the time required to prepare nutritious meals?
- What could families do to eat together more often?

key informants had the same baseline information, all were asked to review the information in Part I of this article. The interview protocol, approved by the institutional review board of the authors' university, included 4 broad items (Table 3). Finally, the collected interview data were analyzed by researchers trained in qualitative data analysis. The 17 unique themes that emerged from the interview data are presented and discussed below.

### **Make eating healthfully a priority**

After air and water, food—a healthy diet—is the most important ingredient needed for life. All too often meals and snacks are an unplanned, haphazard, mishmash of foods that are eaten quickly with little regard for anything other than how quickly the food can be procured and eaten. Experts indicate that it is time to elevate this vital “ingredient” of life to the priority level it deserves. That is, nourishing our bodies needs to be a priority—healthful meals and snacks deserve a larger slice from the time-stressed pie. As one expert said, “the benefits [of healthy meals] far outweigh any efforts needed to prepare them.” Making nutrition a priority means planning ahead, stocking pantries, and learning how to prepare nutritious foods at home and choose healthy meals when eating out—it does not have to mean a huge shift in time allocation or learning new food preparation skills.

The array of convenience and restaurant foods sold provide nutritious,<sup>83,98,130</sup> flavorful, time-saving, labor-conserving alternatives that can be combined in exponentially different ways to provide nutrient dense, delicious meals in a hurry.

To help consumers make eating a healthy diet a priority without sacrificing time or convenience, key informants stated that nutrition professionals need “to be more open to canned and frozen foods,” “let people know it's ok to use these foods,” and “embrace convenience when making recommendations and give people more options of foods to choose from that are healthy, the more options that we give them the more likely they will be to add them to their diets. People don't want to be limited.” Another expert indicated that we “need to work with food manufacturers to . . . make [food] more healthful.”

### **Know the value of a healthy diet**

It is hard to invest time, energy, and money in a healthy diet when the dividends it pays are abstract or not known. “People need to know the value . . . before they make changes to . . . their diets.” Nutrition professionals should provide explicit examples like “eating fewer fatty foods can reduce your chances of heart attack” and “eating more corn and other vegetables can help prevent macular degeneration—a leading cause of blindness in older people.” Another part of this message is encouraging Americans to get moving—exercise is the chief partner to diet in helping to promote health and prevent disease.

### **Engage in mindful eating**

Many Americans are completely unaware of just how much they are putting into their mouths, and research suggests that this is related to both mindless eating and being unaware of how our environment, including portion size, influences how much we consume.<sup>170</sup> Making eating the primary activity, rather than multitasking while eating, can help control and improve dietary intake. For example, paying attention to the amount being consumed during the meal helps diners keep intake in check.<sup>171,172</sup> To

stay focused, one interviewed expert recommended we “eat without distractions.” Distractions, like emotional upset and watching television while eating, are associated with increased calorie intake and meal frequency as well as initiation of eating even when a person is not hungry.<sup>163,173-177</sup>

### **Savor the flavors of food**

Consider the procedure taught to those in wine discovery classes—the instructor encourages participants to look at the color, take small sips, and let the beverage thoroughly roll around the tongue while thinking about the flavor, mouthfeel, and taste memories evoked before swallowing. This procedure teaches students to become aware of the myriad qualities of wine, develop an appreciation of the flavors, and identify personal preferences. This type of procedure is rarely applied to food and no mention of it could be located in the literature. However, one expert advised that “food tastings” are essential—“before someone will eat ‘healthy’ foods they have to try them and see that they do taste good and can be enjoyed.” Food tastings can help consumers “discover their own palate . . . learn what they like . . . learn [to] group foods by flavor . . . [which] can help . . . increase the variety of foods they consume” as well as discover new foods, updated versions of old favorites, and other forms of food (eg, dehydrated, canned, fresh, frozen versions).

### **Retrain our palates**

One expert pointed out that “the American palate. . . [is] trained to like sugar and sodium,” as well as the luscious mouthfeel of fat. But, “people can modify their taste [preferences] over time” by gradually using less sugar, less salt, and fewer fatty foods.<sup>178</sup> Food manufacturers can help by modifying “the foods on the market [to] reduce the amounts of sugar and sodium in them” and offering reduced fat alternatives such as low-fat salad dressing.

### **Let food do its intended job**

One expert advised that we “recreate our relationships with food and respect food more

for what it can do for our [physical] health.” According to the old adage, “food is more than something to eat.” In addition to using it to appease hunger and appetite, food is used in many other ways—some are positive (promoting social interaction) while others are less so (using food as an emotional salve). Using food to cope, instead of more constructive methods, lays the groundwork for emotional eating episodes that can derail dietary improvement efforts.<sup>179</sup>

### **Focus on portion size**

In the words of one expert, “no food is illegal”—it is the amounts eaten and food choices within the context of the overall diet that determine the healthfulness of one’s diet. According to one key informant, “portion size is key—it needs to be emphasized more.” Monitoring intake of calories, fat, or any other nutrient requires a great deal of attention to detail—perhaps more than the typical consumer wishes to invest. To bring calories and fat in line with recommendations, Americans need to focus on portion sizes. This single concrete step requires less time investment than counting calories or adding up points. Indeed, intake parallels portion size; that is as portion size increases so does intake.<sup>180-182</sup> Research shows that people often will consume food directly from the package and consider the package size itself to be a serving size (whether it is or not).<sup>170</sup>

Over the past 2 decades, portion sizes of individually packaged and ready-to-eat prepared foods have grown as have the portion sizes served at restaurants.<sup>183</sup> With large portions now commonplace, consumers may perceive them as appropriate amounts to eat at a single eating occasion<sup>184</sup> and thus, experience “portion distortion.” Portion distortion may hinder optimal nutrient and calorie intake and efforts to improve health.<sup>185</sup>

Low-cost, easily obtained portion size measurement aids (eg, measuring cups, tennis ball, deck of cards) and brief training on their use can greatly enhance portion size estimation skills.<sup>186-188</sup> These tools also can help “undistort” portion distortion by teaching

consumers to judge whether quantities served at home or in retail food establishments are in line with their needs and make informed decisions about how to control intake.<sup>186</sup> Other useful aids to portion control are foods packaged in individual servings (eg, 100-calorie snack packs, single serving zip-top cans of fruit).

“To “undistort” typical portion sizes, policy-makers could refine Nutrition Facts labels to make the number of servings in a single container more prominent and. . . encourage food service operations to make Nutrition Facts labels available to patrons and urge food manufactures to make foods and beverages in single unit containers equal to one serving. Yet another important step is for nutrition professionals to. . . develop new, effective ways to ease the discrepancy between what clients perceive as being typical portion sizes and the amount. . . they actually need to maintain health.”<sup>185(p1417)</sup>

### **Dropout of the clean plate club**

Data from a nationwide survey indicate that even though restaurant portions have increased, two thirds of Americans continue to eat their entire entrée all or most of the time.<sup>189</sup> To be a clean plate club dropout, one expert proposed that consumers “order one less meal than the number of people [in the group] since there is often so much food.” Another recommended people “split the meal or take half home” when eating out. Given that individuals tend to eat more when served more,<sup>180-182</sup> it may be helpful to have half the portion wrapped before beginning to eat.

### **Read and heed Nutrition Facts labels**

Nutrition Facts labels are the most widely available nutrition education tool in the United States—they are found on virtually all packaged foods. These labels provide a nutrient and calorie profile in a format that, for many, is easy to read and use.<sup>190-192</sup> Making it a point to read the label on each food (at least the first time a food is purchased) can help consumers gradually build their knowledge base about the nutrient and calorie content

of foods—being aware of nutrient and calorie contributions makes it possible for people to make informed food choices (eg, choose fruit packed in natural juice vs heavy syrup for less added sugar, choose plain vegetables over those in sauce for less fat and sodium). Moreover, by noting the serving size and putting it in context to the entire package size, portion size estimation skills can grow. In the words of one interviewed expert, nutrition professionals should “educate people on how to read the label.”

### **Engage in self-discovery**

Knowing what is in food is only half the equation; consumers also need to know what they need to eat and how their diet compares to dietary guidelines. Recommendations need to be given in familiar terms (ie, using food rather than nutrients). One key informant indicated that free, easy-to-use, and easy-to-access resources, such as MyPyramid-Tracker.com, could help Americans achieve this goal. These resources also can aid consumers in building their awareness of foods they are eating that are high in nutrients they need to emphasize, such as vitamins and minerals, and those many need to trim, like sugar and fat. Although awareness alone does not necessarily translate into better health practices, improvements are unlikely without knowledge of how to make them.<sup>193,194</sup>

### **Change slowly and permanently**

Changing is difficult, even when changes are for the better and are being made by a highly motivated person. Interviewed experts advocated that nutrition professionals should “encourage people to change their diets a little at a time” and “pick one factor to focus on, once accomplished. . . change other things.” Because “tastes drives food selection. . . people need to be encouraged to consume foods they like,” but “look at their diets and see where they may be able to trim 100 to 200 extra calories” each day. Key informants indicated that this could be as simple as “using herbs, spices, lemon, or low calorie condiments instead of heavy sauces,” trying “spray

salad dressings... that add flavor without too many calories,” “not drinking that extra soda,” “choosing low fat dairy products,” “eating less cheese topping on pizza,” “choosing whole deli meats (like turkey, ham) over loafs (salami, bologna),” or eating a few less bites of a high-fat or sugary food.

To identify the changes to make, one informant suggested that consumers ask themselves what they like about a food that presents a particular challenge and use the answer to find a healthy alternative. For instance, if sweetened soft drinks are the problem food, “ask yourself what you like about soda, the sweetness? flavor? bubbles? If you like the bubbles, switch to seltzer water; if you like the flavor or sweetness switch to diet” or try a mix of regular and diet soda.

### **Raise nutrient density and lower energy density**

To achieve this goal, one key informant advised, “fill up on more nutrient dense foods,” such as fruits and vegetables, that also are less calorie dense. Nutrient dense foods are those that deliver many nutrients per calorie. Calorie dense foods are those that provide many calories per unit of weight (eg, 1000 g of water provides 0 calories while a similar amount of oil provides 9000 calories). Water can be an important contributor to bringing dietary intake under control because it adds weight to food without adding calories. (Several studies report that individuals appear to consume a constant weight of food not a constant number of calories.<sup>195-200</sup> By increasing its weight with calorie-free water, food becomes less energy dense.) Increasing water intake, as well as fiber intake, provides satiety without calories. For instance, the ample fiber and water content in fruits and vegetables enhance satiety, diminish feelings of deprivation and hunger, and reduce the calorie density of the diet by displacing calorie dense foods.<sup>5,196,199,201-203</sup> Eating solid foods that are high in water more effectively reduces energy intake, suppresses hunger, and enhances feelings of satiety than consuming equal amounts of a beverage with

a food.<sup>201-206</sup> Some solid foods, like fruits and vegetables, are naturally high in water. Other foods can be prepared to contain greater a volume of water (eg, chicken rice soup instead of chicken rice casserole, or adding fruit or vegetables to entrées).<sup>195,202,207</sup>

### **Make it easy to eat healthfully**

People “have a ‘feed me now’ mentality” and often do not think carefully before making food choices, and they “just eat whatever is available.” Persuading consumers to select nutritious options is easier when the options also accommodate other preferences like convenience and taste appeal.<sup>208,209</sup> Several key informants indicated that if healthful foods are easily available and visible, “you are more likely to consume them.” An example offered by one was, “if fruits and vegetables are available in appealing ways, like cut up or sliced, people will eat them.” Others advised, stock up on snacks that are “healthy choices that are also fast” to prepare and eat and leave them in your car, office, and home. Place them where your kids will see them when they are looking for an after school snack.

Meals need to be fast and easy, too. The array of convenience food available offers viable options for Americans looking to boost the nutrient quality of their diets, while not increasing time needed to prepare a healthier meal. However, we still need to demystify false beliefs associated with the time and energy required to prepare nutritious meals. Consumers need to know that “food fast does not have to be fast food,” stated one expert. With convenience being a major factor driving food intake choice,<sup>106,112,115,129</sup> nutrition professionals need to be creative and specific in their recommendations for helping Americans make speedy, healthy meals. One expert stated, “people can speed up cooking by using already cut produce, frozen or canned produce, and ready-to-eat meal components (like rotisserie chicken).” Another advised, “keep it plain and simple—omit sauces which often add calories and fat and may be difficult to make.” Instead of excluding healthful foods from the menu that may be beyond

one's cooking skill or confidence level, look for alternatives. For instance, "tuna is a great way to add more omega 3s," but preparing "fresh fish can be intimidating to people," so "encourage people to cook with vegetable oils and eat canned tuna or salmon." For those concerned about the higher fat, salt, or sugar in some convenience foods, at mealtime "balance them... by adding a plain potato (steamed in the microwave)," ready-to-eat fresh salad from the supermarket salad bar, or selecting brands with less fat, salt, or sugar. To take the edge off hunger while the meal cooks, "start meals with lower calorie, low sodium soups." In addition, the experts recommended steaming, stir frying, grilling, microwaving, and using crockpots to speed and simplify meal preparation.

The key informants also proposed suggestions for convenience food manufacturers to aid consumers in their quest for fast and healthy foods. They recommended that food manufacturers "make food packaging of healthy foods more appealing to consumers" and "start making more nutrient dense foods" by altering levels of problem nutrients. For instance, one key informant stated, "food manufacturers should take it on themselves to reduce sodium in food, not eliminate but reduce." Another pointed out that, "omega 3 fatty acids are not in a lot of foods," so we should "encourage food manufacturers add omega 3s to foods."

### **Plan ahead**

"Planning ahead is key to making better choices—plan a week ahead or when you are driving to work in the morning, just have a plan," advised one key informant. To keep the plan on track, one suggestion was to "use a day of the week when you have more time and prepare meals . . . to eat later in the week." Another suggestion was that consumers "should always have 'staples' on hand." (Traditionally, "staples" referred to flour, sugar, and other basic ingredients with a long-shelf life used to prepare meals from scratch, today, "staples" have expanded to include canned, frozen, dehydrated, and other processed foods that have

a longer shelf life than fresh perishable items.) Keeping a stock of healthy, easy-to-prepare ingredients needed to pull several meals together in minutes can help consumers eat a healthier diet.<sup>208</sup> Organizing the stock as "meal units" can speed meal selection decisions and shorten meal planning and preparation time. For example, for an Italian-themed meal, place a box of dried pasta, clams in a can or pouch, canned crushed tomatoes, dried oregano, and an onion together on a shelf or in a basket—when it is time for dinner, grab these ingredients and start cooking. Top with fresh Parmesan cheese from the refrigerator and serve the entire meal in less than 30 minutes.

Planning ahead also is important when eating out. Experts pointed out that consumers should always "remember that they have a choice of what to eat, even when eating out." "Ask questions when eating out and ask for things in specific ways to help reduce fat, sugar, and sodium."

### **Expand nutrition education to include food education**

To make healthful eating a priority, nutrition education needs to include "food education" that "starts in early childhood." Nutrition education often focuses on nutrients, an abstract concept to many. To make these lessons more concrete, we should "teach nutrition using food examples" and provide "education about cooking." Nutrition professionals need to help people "understand the importance of cooking" skills and overcome the feeling that making food at home somehow makes a person "less professional and more domestic."

Fortunately, opportunities to learn how to put together nutritious meals and snacks in a hurry are increasing. Numerous cookbooks and Web sites supply tips for making quick meals and meals with minimal ingredients. The sheer popularity of the Food Network and cooking shows supports the notion that Americans are interested in cooking. Cooking shows, as well as demonstrations in grocery stores, may be a solution to the problem of

a generation growing up not knowing how to cook. To benefit Americans most, “cooking shows . . . should focus on using more nutrient dense foods . . . so people learn more about cooking healthy foods.” The media can help by letting “people know they can cook healthy meals at home that won’t cut into their precious time.”

Another part of food education is becoming acquainted (or reacquainted) with the many products in supermarkets. New products appear in supermarkets almost daily—some are new products and others are updated versions of old favorites. One expert indicated that to keep meals interesting, she buys at least one food product she has not tried before each time she grocery shops. It might be an exotic fruit, a new brand of canned beans, or reduced fat salad dressing. Experimentation with new foods and food forms (fresh, ready-to-eat, frozen, canned, or dried) can help families find new solutions to mealtime dilemmas.

### **Schedule family meals and make them a priority**

The nutrition experts recommended teaching parents about “the benefits (not only nutritionally, but behaviorally) of eating meals together as a family” via the schools or national campaigns. Many felt that for family mealtime to become a reality, “there needs to be a social change so that people don’t feel so pressured to be involved in everything and therefore not have time to prepare and eat healthy meals together.” Analyzing time priorities may help those who feel time-starved

to find time for family meals. For example, American households watch 3 to 7 hours of television nightly—some of this discretionary entertainment time could be reallocated to mealtime.<sup>210</sup>

### **Use information from the media wisely**

Media (television, Internet, newspapers, magazines) are the main source of nutrition and health information for most Americans.<sup>211,212</sup> If a news story sounds too good to be true or runs counter to generally accepted health knowledge, consumers need to gather more information before making changes. Experts indicated that the media has a role in helping Americans eat more healthy diets. “There needs to be more responsibility on the part of the media (all forms) to prevent the dissemination of . . . nutrition information” that is false, misleading, or confusing.

### **CONCLUSION**

The American diet needs improvement. Fortunately, the American food supply has all the elements needed to support optimal dietary health—it is safe, nutritious, abundant, readily accessible, and diverse in variety and form. The array of healthy food choices available can accommodate almost all dietary preferences, needs, and resource constraints (time, energy, skill). The key to a dietary pattern that nurtures good health is choosing nutritious foods that accommodate personal preferences like convenience and taste appeal.

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