

Chapter 13

What People Know and Do Not Know About Nutrition

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The tremendous growth in scientific knowledge of the relationship between diet and health has been integrated into current dietary recommendations and sparked national campaigns to educate Americans on healthier eating habits. In this chapter, we look at how much the typical American knows about nutrition, whether the average level of nutrition knowledge has increased, and what implications this has for changing eating habits.

Introduction

Recent years have seen a tremendous growth in scientific knowledge of the relationship between diet and health. This increase in knowledge has informed dietary recommendations to promote health and longevity and has sparked national campaigns to educate Americans on more healthful eating habits. But how has this affected the average person? Does the typical American know much about nutrition? Is the average level of nutrition knowledge on the rise? And what implications does this have for changing eating habits?

Using data from a variety of public and private sources—including the Food and Drug Administration’s (FDA) Health and Diet Survey (HDS), the U.S. Department of Agriculture’s (USDA) Diet and

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Health Knowledge Survey (DHKS), the Food Marketing Institute's (FMI) Trends Survey, and the American Dietetic Association's (ADA) 1995 Nutrition Trends Survey¹—we examine the level of nutrition knowledge among American consumers and trends in nutrition knowledge levels over time. The extent and limitation of consumers' nutrition knowledge—what people know and do not know about nutrition—and the implications for changing dietary behavior will be considered.

Measures of Knowledge and Attitudes

Nutrition-related knowledge can range from an understanding of the chemical structure of nutrients to knowledge of low-fat cooking methods. Rogers (1983) identified three types of knowledge: (1) awareness (say, of diet-disease relationships), (2) knowledge of principles (e.g., cholesterol is found in animal foods only), and (3) how-to knowledge (e.g., how to select foods with less fat or how to read a food label accurately).

Attitudes can also play an important role in shaping behavior. Attitudes frequently assessed by nutrition surveys include belief in the relationship of diet and health, the importance of nutrition compared with other food attributes (taste, etc.), the importance of following specific dietary guidelines, and perceived barriers to dietary change.

Awareness of Diet-Disease Relationships

Awareness of a relationship between diet and health (diet-disease relationships) may stimulate interest in learning about nutrition and healthful eating habits, thus acting as a first step in acquiring the knowledge necessary for dietary improvement. The Health and Diet Survey (HDS), conducted by FDA, began tracking top-of-the-mind awareness of dietary risk factors associated with specific chronic diseases in 1982. A set of open-ended questions (e.g., “Have you heard about cancer being related to things people eat or drink?”, “What things that people eat or drink might be related to cancer?”) measures the levels of knowledge, awareness, and perceived importance of individual dietary risk factors at the same time. Respondents must have

¹ Additional information on each data source is provided in the appendix.

some knowledge and awareness of risk factors to make a given response, and the prevalence of any response indicates the perceived importance of that dietary factor.

American consumers show fairly high levels of awareness of the relationship between their diets and serious chronic diseases such as heart disease and cancer. This is particularly true of diet-disease relationships that have been targeted by major public health campaigns (Derby and Fein, 1995): sodium and hypertension; cholesterol, saturated fat, total fat and heart disease; and dietary fiber and cancer (Levy and Heimbach, 1989). Public health campaigns, along with growing media attention to diet and health topics and health-oriented marketing of food products, have raised awareness among less educated as well as more educated consumers (Ippolito and Mathios, 1996) (see also chapter 11).

Diet and Hypertension

The relationship between sodium consumption and hypertension (high blood pressure) was one of the first to be widely publicized in a government-endorsed public health campaign. According to a national survey by the National Heart, Lung, and Blood Institute (NHLBI) (NIH, 1981), only 12 percent of consumers were aware of a link between sodium consumption and hypertension in 1978. By 1982, following an FDA/NHLBI-sponsored initiative to educate the public and encourage manufacturers to display sodium content on food labels, the proportion who mentioned sodium as a “likely cause of high blood pressure” nearly tripled, making sodium second to emotional stress as the most cited cause of hypertension (Heimbach, 1985). FDA and NHLBI tracked the impact of the sodium initiative from 1982 to 1994 (fig. 1), and sodium was consistently perceived as the dominant dietary risk factor for hypertension. Awareness has declined since 1982, and the difference between mentions of sodium and mentions of dietary fat—the second most mentioned dietary factor linked to hypertension—narrowed over time.

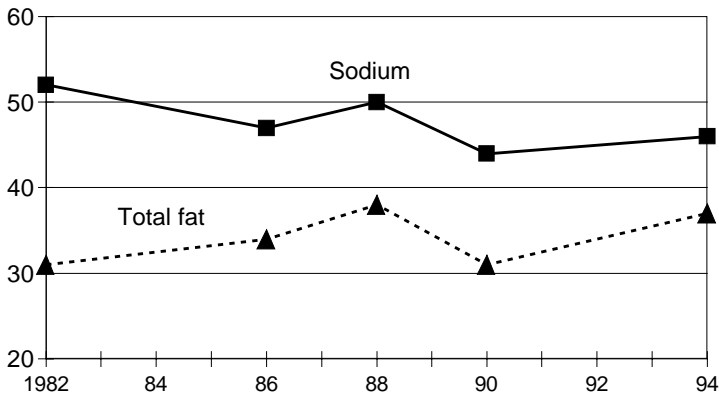
Diet and Heart Disease

The NHLBI initiated the National Cholesterol Education Program in 1985 to educate the public about the prevention of coronary heart disease by lowering blood cholesterol through diet. Awareness of fat

Figure 1

Trends in awareness of diet-hypertension relationships, 1982-94, selected years

Percent who mention



"Sodium" includes mentions of sodium or salt. "Total fat" includes mentions of fat in general, specific fats (saturated, polyunsaturated), and cholesterol. Mentions of specific foods or types of food that contain fat are not included in this analysis. Source: FDA Health and Diet Surveys.

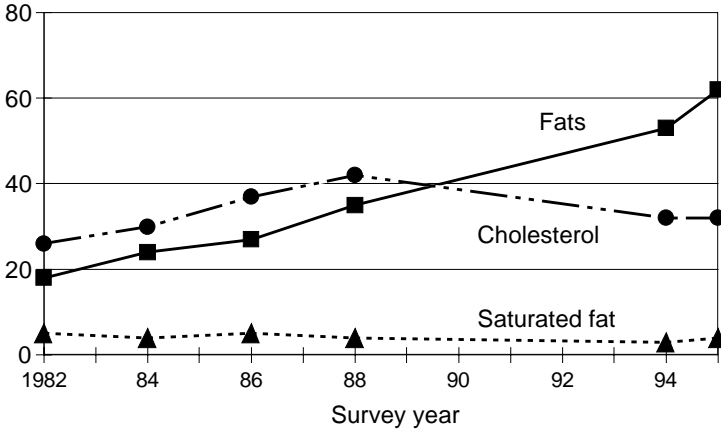
and cholesterol as dietary risk factors for heart disease was increasing after 1982 when the HDS began tracking awareness of dietary factors and continued to increase following the NHLBI program in 1985. During the early and mid-1980's, cholesterol was perceived as the most important dietary risk factor for heart disease, but it was displaced after 1988 by fat (fig. 2). By 1995, over 60 percent of consumers identified fat as a dietary factor related to heart disease. Awareness of cholesterol, on the other hand, increased to a high of 42 percent in 1988, subsequently declining to 32 percent in 1994 and 1995.

From 1982 to 1995, mentions of saturated fat as a risk factor for heart disease showed little change, despite the fact that saturated fat was highlighted in the program as being more atherogenic than dietary cholesterol. The failure of saturated fat to penetrate the public consciousness as an important dietary risk factor may be due to individuals' trying to simplify dietary guidance. The public may be less interested in learning the nuances of nutrition science, which complicate their food selection tasks, than in having practical rules of

Figure 2

Trends in awareness of diet-heart disease links, 1982-95, selected years (unweighted data)

Percent who mention



For the purpose of this analysis, only mentions of the three specific nutrients are included. Mentions of specific foods are not included.

Source: FDA Health and Diet Surveys.

thumb (e.g., avoid fat) that apply broadly and easily to most food choices. This may be particularly true when concern about dietary risk factors expands beyond nutritionally informed consumers to the broader population, and when food product advertising and marketing are the primary channels by which consumers receive their information about nutrition.

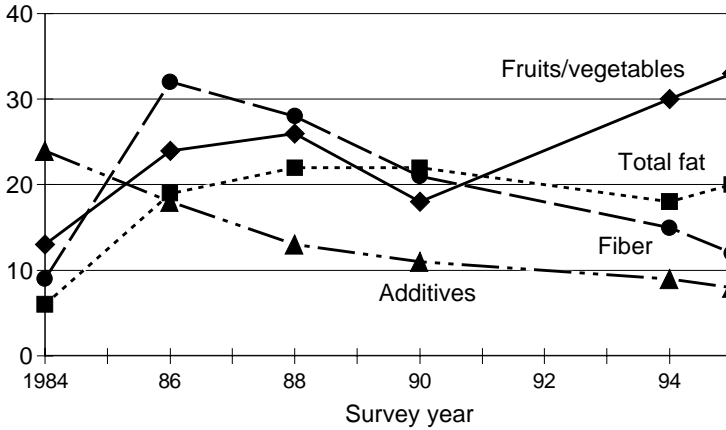
Diet and Cancer

Awareness of diet-disease relationships for cancer has also increased significantly in recent years, but it remains at a lower level than for heart disease. In 1984, consumers were most likely to mention food additives—such as artificial colors, nitrates, and preservatives—as dietary factors related to cancer (fig. 3). Since then, other dietary factors—such as dietary fiber, fat, and fruits and vegetables—have become more important. Although fewer consumers associate fat with cancer than with heart disease, by 1995 about one in five consumers mentioned fat as a dietary risk factor for cancer.

Figure 3

Trends in awareness of diet-cancer relationships, 1984-95, selected years (unweighted data)

Percent who mention



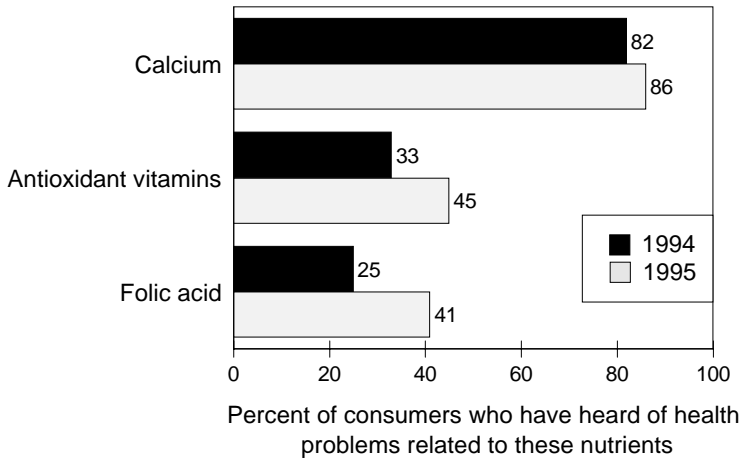
"Fat" includes mentions of fat in general, specific fats (saturated/polyunsaturated), cholesterol, or fried foods. "Additives" includes mentions of additives, artificial colors, nitrates, or preservatives. "Fiber" includes mentions of fiber, roughage, whole-grain cereals, or bran. "Fruits and vegetables" includes general and specific mentions of fruits and vegetables.

Source: FDA Health and Diet Surveys.

Dietary links between foods (fruits and vegetables) and cancer prevention show a change over time. In the mid-1980's, when dietary fiber received considerable attention from both public health authorities such as the National Cancer Institute and advertisers (e.g., the Kellogg high-fiber cereal campaign), fiber was the most frequently mentioned dietary factor for preventing cancer (Levy and Stokes, 1987). More recently, fruits and vegetables have received increasing recognition; by 1995, one in three consumers mentioned fruits or vegetables, nearly three times as many as mentioned fiber (Levy and Derby, 1996). Recently, the National Cancer Institute has emphasized the importance of fruit and vegetable consumption via its "Five-A-Day" campaign (Eisner and others, 1992), whereas, without continued reinforcement, the salience of the fiber message has diminished. However, since eating five fruits and vegetables per day is an effective way of increasing fiber intake while also obtaining other beneficial food components, this shift in awareness is appropriate for decreasing cancer risk.

Figure 4

Awareness of recent nutrition issues, 1994-95



Source: FDA Health and Diet Surveys (unweighted data).

Awareness of Emerging Diet-Disease Relationships

In 1994 and 1995, the HDS asked consumers if they had heard of health problems related to eating too much or too little of nutrients recently identified as having potentially important health effects. Awareness of the relationship of calcium to health was quite high (86 percent in 1995), while a smaller, but growing, proportion of consumers had heard about health problems related to not eating enough antioxidant vitamins (45 percent) or enough folic acid (41 percent) (fig. 4).

USDA's Diet and Health Knowledge Survey (DHKS) also examined consumers' awareness of nutrient relationships to health, with findings that were generally consistent with the HDS. Comparing DHKS data collected in 1989-91 with data collected in 1994, one of the most interesting findings was the increase in awareness of calcium-health relationships. Between the 1989-91 DHKS and the 1994 DHKS, awareness of health problems related to calcium intake rose from 63 percent of main meal planners to 85 percent. Among female meal planners, awareness rose from 65 percent to 88 percent. The higher awareness among women is not surprising, given that low calcium intakes have been publicized as a risk factor for osteoporosis, a

condition that primarily affects women. The DHKS also found that almost all adults—95 percent—agreed that being overweight is a health problem.

Implications

Top-of-the-mind awareness reflects both awareness of particular diet-disease relationships and the salience of this information to consumers. The HDS data on trends in awareness indicate that public education media campaigns can be effective in increasing awareness and perceived importance of diet-disease relationships, especially those that apply broadly and relatively easily to food choices, such as decreasing fat. Consumers may be less interested in more detailed messages, such as those on saturated fat. Awareness may also shift in relationship to new information and/or new educational messages, as indicated by the decrease in mentions of fiber as a dietary factor associated with cancer and the increase in mentions of fruits and vegetables.

Although research has shown that awareness can be associated with dietary improvement (Variyam and others, 1995), the data presented here indicate that awareness by itself is not a panacea. Awareness of health problems related to overweight is all but universal, yet obesity remains a growing health problem in our society (Kuczmarski and others, 1994; American Heart Association, 1998). Similarly, despite the rise in awareness of the relationship between calcium and health, particularly among women, data from USDA's Continuing Survey of Food Intakes by Individuals (CSFII) indicate no change in calcium intake among women age 20 and over between 1989-91 and 1994— at both time periods, calcium intake averaged only 75 percent of the women's RDA² (Tippett and others, 1995; USDA, 1996).

Those seeking to effect dietary change must keep in mind that awareness is only one factor in shaping dietary behavior. For example, an analysis of 1990-91 CSFII-DHKS data indicated that although awareness of the relationship of calcium to health had a positive effect on women's likelihood of meeting their calcium RDA, other factors, such as eating more food away from home, were negatively related to calcium intake (Guthrie, 1996). Even though nutrition educators are successful in increasing awareness of the calcium-health relationship,

² Based on the RDA for calcium established in 1989 by the National Academy of Sciences.

other social changes, such as the rise in eating away from home, may counteract their efforts.

Also, individuals, although aware of diet-disease relationships, may have an erroneous perception of the nutrient adequacy of their own diets (see also chapter 15). For example, respondents to the 1994-95 DHKS were asked to estimate how their diets compared with “what is healthy” for selected nutrients. Of those who said their diets were about right in calcium, only 38 percent met the 1989 RDA for calcium.

Thus, it cannot be assumed that simply by increasing awareness of diet-disease relationships, dietary change will always occur. Other influential factors must also be considered in shaping dietary change efforts.

Knowledge of Nutrition Principles

Nutrition is concerned with the relationship of food and health, and one can think of nutrition knowledge as encompassing both health-oriented and food-related principles. Health-oriented principles (for example, knowledge that saturated fat acts differently on cholesterol levels than does unsaturated fat) can provide a deeper understanding of diet-health relationships than simple awareness, thereby improving an individual’s ability to understand and implement dietary change. Food-related principles (for example, that saturated fat is more likely to be solid at room temperature, whereas unsaturated fat is more likely to be liquid) also facilitate dietary improvement by providing relatively simple “decision rules” for consumers to use in making food choices. Food guides may also be seen as providing consumers with a set of principles for translating dietary recommendations into behavioral terms.

Knowledge of Fats and Cholesterol

To evaluate the impact of the NHLBI’s Cholesterol Education Campaign, the HDS has included a set of questions since 1984 related to consumer knowledge about dietary fats and cholesterol (table 1). Levy and others (1993) found that public knowledge about dietary fats and cholesterol was quite poor: only 3 of the 11 questions asked in 1988 were answered correctly by a majority of consumers. There was no overall increase in knowledge from 1984 to 1988. Total scores were highest for those who were more educated and middle-aged. Significant improvements were seen for respondents who had

Table 1—Trends in knowledge of dietary fat and cholesterol

Question (correct response in bold)	1984	1986	1988	1990	1994	1995
	<i>Percent</i>					
<i>Are saturated fats usually found in:</i>						
Animal products like meat and dairy products	55	60	62	69	NA	67
Vegetables and vegetable oils	15	10	11	11	NA	13
Not sure	30	30	27	20	NA	20
<i>Are polyunsaturated fats usually found in:</i>						
Vegetables and vegetable oils	55	55	55	61	NA	57
Animal products like meat and dairy products	13	12	13	16	NA	16
Not sure	32	33	32	23	NA	27
<i>Which kind of fat is more likely to be liquid rather than a solid:</i>						
Polyunsaturated fats	32	34	34	36	NA	NA
Saturated fats; equally likely to be liquids	32	28	30	38	NA	NA
Not sure	36	38	36	26	NA	NA
<i>Which kind of fat is more likely to raise people's blood cholesterol level:</i>						
Saturated fats	52	51	56	60	62	61
Polyunsaturated fats; both of them; neither of them	20	20	20	25	24	23
Not sure	28	29	24	15	14	16
<i>Which kind of fat is higher in calories:</i>						
Both the same	21	20	21	26	NA	26
Saturated fats; polyunsaturated fats	43	44	46	53	NA	49
Not sure	35	37	33	21	NA	25
<i>Is cholesterol the same thing as:</i>						
Neither	36	38	41	54	NA	49
Saturated fat; polyunsaturated fat	19	21	21	21	NA	15
Not sure	45	41	38	25	NA	36
<i>If a food is labeled cholesterol-free, is it also:</i>						
It could be either high or low in saturated fats	NA	29	35	50	40	39
Low in saturated fats; high in saturated fats	NA	48	44	41	46	46
Not sure	NA	23	21	9	14	15
<i>If a product is labeled as containing only vegetable oils, would it be:</i>						
It could be either high or low in saturated fat	NA	NA	29	33	40	46
Low in saturated fat; high in saturated fat	NA	NA	47	53	45	37
Not sure	NA	NA	24	14	15	17

--Continued

Table 1—Trends in knowledge of dietary fat and cholesterol, continued

Question (correct response in bold)	1984	1986	1988	1990	1994	1995
	<i>Percent</i>					
<i>If a fat or oil has been hydrogenated, has it become:</i>						
More saturated	10	11	17	26	25	26
Less saturated	26	27	32	37	36	32
Not sure	64	63	51	37	39	42
<i>Is cholesterol found in:</i>						
Animal products like meat and dairy	31	32	33	32	NA	28
Vegetables/vegetable oils; all foods containing fat/oil	55	53	53	59	NA	54
Not sure	14	15	14	9	NA	18
<i>Have you ever heard of monounsaturated fats or oils?</i>						
Yes	NA	NA	27	34	NA	49
No	NA	NA	73	66	NA	51
<i>Have you heard of trans-fatty acids?</i>						
Yes	NA	NA	NA	NA	NA	32
No	NA	NA	NA	NA	NA	68
<i>Do trans-fatty acids raise blood cholesterol, lower blood cholesterol, or have no effect on blood cholesterol?</i>						
Raise cholesterol	NA	NA	NA	NA	NA	11
Lower cholesterol; have no effect	NA	NA	NA	NA	NA	6
Not sure	NA	NA	NA	NA	NA	83
Sample size	4,007	4,004	3,201	1,198	1,945	1,001

NA indicates that the question was not asked in that year.

Source: 1984-1990 HHS/FDA Health and Diet Survey; 1994 HHS/FDA Food Label Use and Nutrition Education Survey; 1995 HHS/FDA Health and Diet Survey--Food Label Use and Nutrition Education Survey Replicate.

been diagnosed with high blood cholesterol and those on cholesterol-lowering diets (whether physician-recommended or self-initiated). A common mistake noted in this study was that consumers assumed saturated fat, high calories, and cholesterol tend to occur together in foods, leading to a good/bad categorization of foods.

Between 1988 and 1995, there were modest improvements in knowledge (table 1). The item showing the largest improvement was awareness of monounsaturated fats, with 49 percent saying they had

heard of this type of fat (an increase of 22 percent since 1988). One in three had heard of trans-fatty acids but few consumers (11 percent) understood they would raise cholesterol, while the majority (83 percent) did not know their effect.

Some areas of knowledge remain low. Only one in four respondents knew that saturated and polyunsaturated fats have the same number of calories; more assumed saturated fats have higher calories. Only one in four understood that if a fat is hydrogenated it becomes more saturated (26 percent in 1995, up 9 percent since 1988); one in three believed a fat would become less saturated, while 42 percent could not answer. Knowledge that cholesterol is found only in animal products declined (28 percent in 1995, down 5 percent since 1988); 54 percent believed that cholesterol is found in all foods that contain oils.

A comparison of responses in 1988 and 1995 by education level showed that an education effect was maintained. Significantly fewer consumers with less than a high school education answered correctly, and there was no significant increase among this group in their knowledge of dietary fat and cholesterol over time. Those with at least a high school education improved on about half of the items tracked.

These results suggest that consumers still have limited knowledge about dietary fats and cholesterol, even though these are the nutrients they are most likely to express concerns about and to indicate they pay attention to in foods (Derby and Fein, 1995). To the extent consumers choose to rely on their existing knowledge and expectations about fats and cholesterol, they may misjudge the nutritional qualities of some foods. The Nutrition Facts label—which provides information on the total fat, saturated fat, and cholesterol content of most packaged foods—and health claims related to heart disease that may appear on qualifying low-fat, low-cholesterol foods can help overcome this lack of understanding.

Food Guides

Food guides have historically been used to provide consumers with a set of principles for translating dietary recommendations into behavioral terms. For example, an individual who wishes to consume the recommended amount of calcium can consult a food guide for foods that are good sources of calcium (e.g., the milk, yogurt, and cheese group) and the appropriate amount of food from that group to consume.

Table 2—Awareness of dietary advice

Item	1994	1995
	<i>Percent yes</i>	
<i>Have you heard anything about the following information on diet and health:</i>		
Dietary Guidelines for Americans	30	30
Food Guide Pyramid	33	43*
Five-A-Day Program	22	24

* Significantly higher at $p < 0.05$.

Source: 1994 HHS/FDA Food Label Use and Nutrition Education Survey (n = 1,945); 1995 HHS/FDA Health and Diet Survey--Food Label Use and Nutrition Education Survey Replicate (n = 1,001).

Food guides are a commonly used nutrition education tool with a long history. USDA, in particular, has been a leader in food guide development (see chapter 2). The first USDA food guide was developed in 1916 (Welsh, 1994). USDA has since revised its food guides periodically to conform to advances in nutrition knowledge and changes in dietary recommendations. The current USDA Food Guide was developed in the mid-1980's and was featured in the 1990 edition of the *Dietary Guidelines for Americans* (USDA/DHHS, 1990). It gained further prominence with the publication in 1992 of the *Food Guide Pyramid*, a graphic representation of the major principles of the Food Guide (Welsh and others, 1992). This graphic has appeared on a wide range of nutrition education and food marketing materials and has achieved a high level of consumer recognition in a short time.

In the 1994 and 1995 HDS, consumers were asked if they had heard of the *Dietary Guidelines for Americans*, the *Food Guide Pyramid* and the Five-A-Day program (a program to encourage consumption of fruits and vegetables) (table 2). In 1995, there was a significant increase in the percentage who had heard of the *Food Guide Pyramid*, and it was recognized by more consumers than either the Dietary Guidelines or Five-A-Day program (Levy and Derby, 1995).

Consumers' knowledge of food guide recommendations was assessed in both the 1990-91 DHKS and the 1994-95 DHKS, a time period of particular interest since the *Food Guide Pyramid* graphic was released by USDA in 1992. Table 3 compares the percentages of

Table 3—Knowledge of food guide recommendations among main meal planners, 1990-91 and 1994-95

Question 1994-95: Let's begin by talking about the number of servings from different food groups that a person should eat each day. How many servings from the [food group] would you say a person of your age and sex should eat each day for good health?

Question 1990-91: Let's begin by talking about your opinion of the amount of food, such as fruits, vegetables, and meats, that people should eat each day for good health. How many servings of [food group] should a person eat daily if one serving equals [amount]?

Food group [amount]	1990-91	1994-95
	<i>Percent of meal planners reporting answer that corresponds to Food Guide Pyramid recommendation</i>	
Fruit group ¹		
Fruit [1 piece whole fruit] ²	70	74
Vegetable group ¹		
Vegetables [a half cup of cooked vegetables] ²	33	55
Milk, yogurt, and cheese group ¹		
Dairy products [1 cup of milk or slice of cheese] ²	60	59
Bread, cereal, rice, and pasta group ¹		
Grain products [1 slice of bread or a half cup of cooked cereal, rice, or pasta] ²	2	8
Meat, poultry, fish, dry beans, and eggs group ¹		
Meat, poultry, or fish [a piece the size of a medium hamburger] ²	53	60

¹ Phrasing used in 1994-95; sample serving amount not given in 1994-95.

² Phrasing used in 1990-91.

Source: USDA Diet and Health Knowledge Surveys (weighted data).

main meal planners in each time period who reported believing that they needed to consume a number of servings daily from each of the five major food groups that corresponds to Food Guide Pyramid recommendations (2-4 servings per day of fruit, 3-5 servings per day of vegetables, etc.). Knowledge of recommendations varied considerably among food groups, ranging from a high of 74 percent of 1994-95 meal planners reporting the correct recommendation for the fruit group to a

low of 8 percent for the bread, cereal, rice, and pasta group.³ In 1994-95, the DHKS surveyed the general adult population as well as meal planners. Their knowledge of Food Guide Pyramid recommendations was similar to that of meal planners (data not shown).

Except for the milk, yogurt, and cheese group, knowledge of recommendations for the major food groups increased between the two time periods, especially for vegetables—from 33 percent to 55 percent. Generally, those who did not know the recommendations gave answers that fell below the amounts recommended. However, for the milk, yogurt, and cheese group in both 1990-91 and 1994-95 and for fruit in 1994-95, there were appreciable minorities of respondents who believed they should consume more servings from these food groups than the *Food Guide Pyramid* recommends (fig. 5).

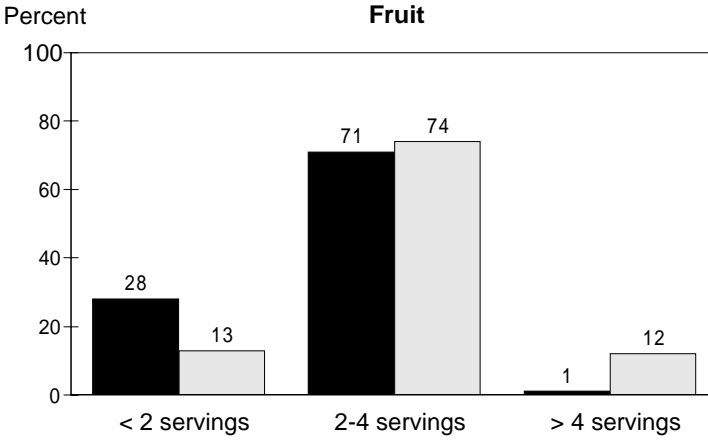
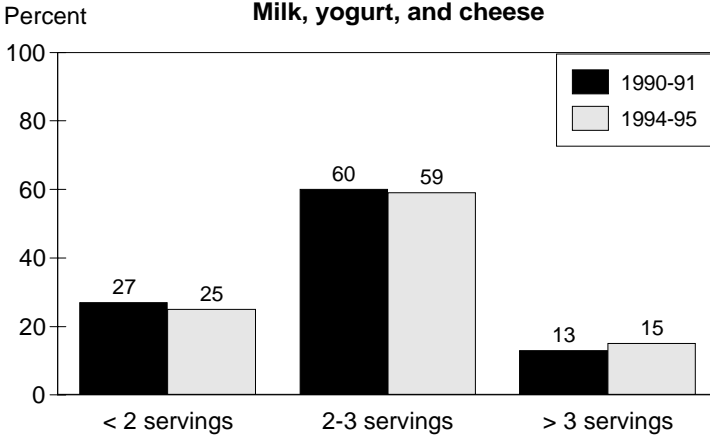
The difference in knowledge of recommendations regarding each of the major food groups raises questions as to how consumers are acquiring and assimilating knowledge of Food Guide Pyramid recommendations. Recommendations for some food groups have been publicized widely—for example, fruit and vegetable recommendations, as a part of the 5-A-Day program (Eisner and others, 1992). This may be a factor in what seems to be an increasing belief that these foods should be consumed in larger amounts. Since fruits and vegetables have been identified as underconsumed food groups (see chapter 5; also Kennedy and others, 1995), the increase in knowledge of fruit and vegetable recommendations could be highly beneficial to the diets of Americans.

The continued ignorance concerning recommended grain consumption may be due to the lack of a broad-based promotion program such as 5-A-Day, or to consumer confusion as to what the recommendation really means. Shaw and others (1996) note that for most food groups, the food guide serving amount is similar to the size of a portion most typically consumed (e.g., for vegetables, the Food Guide Pyramid serving is ½ cup cooked vegetable or 1 cup raw leafy greens, which corresponds well to the size of a typical portion). For

³ For each of the five major food groups, a range of recommended servings appears on the Food Guide Pyramid graphic (2-4 servings fruit, 3-5 servings vegetables, etc.). The specific recommendation for a given person varies by age and sex. However, any answer within that range was accepted as correct, since it was felt that it was unreasonable to expect individuals to know their precise recommendation within the range.

Figure 5

Beliefs of main meal planners concerning intake of...



* 1 percent of individuals responded "don't know."

Source: Diet and Health Knowledge Survey, 1990-91 and 1994-95 (weighted data).

grains, however, the typical portion is approximately twice that of a Food Guide Pyramid serving (e.g., a typical portion is 1 cup rice or pasta, 1 whole hamburger bun, etc., whereas the Food Guide Pyramid servings are half those amounts). Thus, one reason for the difficulty in learning or accepting this recommendation may be confusion about serving amounts. Further examination of DHKS 1995 data indicates that 43 percent of consumers believe they should eat 3-5 servings of grains daily, which, if they are assuming a serving to be twice the size that the food guide serving actually is, would approximate the 6-11 serving recommendation.

Nevertheless, 1994-95 DHKS data also indicate that almost 50 percent of consumers believe they need fewer than three servings of grains daily. It appears that many consumers are not convinced of a health need for grains—perhaps because they do not have a clear understanding of the health value of grains or because they hold conflicting beliefs. For example, according to a 1995 survey by the Wheat Food Council and American Bakers Association, 40 percent of consumers think bread is fattening and 35 percent think starches should be avoided. Given the 1995 Dietary Guidelines Advisory Committee's urging that Americans learn to make grains the center of their plate (USDA, 1995), more investigation of barriers to recognition of the role of grains in the diet should be undertaken.

How-To Knowledge

Rogers (1983) describes how-to knowledge as the “information necessary to use an innovation properly.” In other words, it is the very concrete, specific knowledge and skills guiding day-to-day implementation of a desired behavior, such as choosing a healthful diet. An example is the ability to discriminate between foods that contain desirable nutritional properties (e.g., are lower in fat or higher in fiber) and similar foods with less desirable nutritional characteristics, either by having a general knowledge of food composition or by reading and interpreting food label information properly.

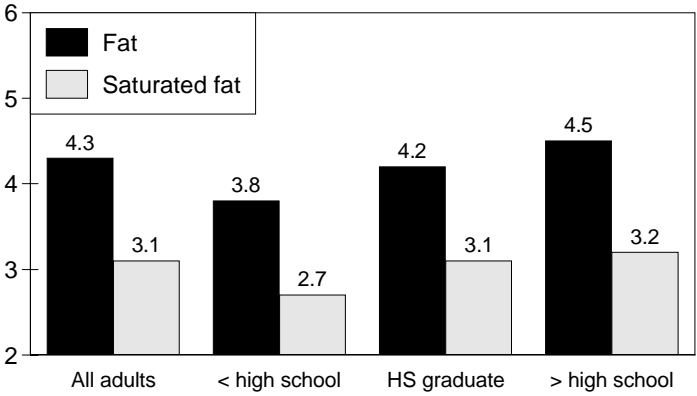
Knowledge of Food Composition

The 1994 DHKS posed a series of questions designed to measure consumers' ability to select foods that are lower in fat or saturated fat and to assess their ability to interpret food label information correct-

Figure 6

Ability to identify foods higher in fat/saturated fat

Average number of correct answers
(fat out of 6; sat. fat out of 4)



Source: USDA Diet and Health Knowledge Survey, 1994 (weighted data).

ly. Consumers were asked to identify which, in a series of paired foods, was higher in fat (hot dogs or ham, yogurt or sour cream, etc.) or higher in saturated fat (liver or T-bone steak, butter or margarine, etc.). Almost 80 percent were able to identify the higher fat food in five of six paired comparisons of foods and 60 percent were able to identify the higher saturated-fat food in three of four food pairs. Better-educated respondents were more able, on average, to identify higher fat and saturated fat foods (fig. 6).

In 1989-91, DHKS respondents (primarily the household meal planners) were also asked to select the higher fiber food from six pairs of foods (fruit or meat, popcorn or pretzels, etc). Smallwood and Blaylock (1994) report that in 1989-90, about 80 percent of meal planners were able to identify the higher fiber food from five of the six sets of pairs. The most difficult paired comparison was lettuce and kidney beans—only 59 percent correctly identified kidney beans as the higher-fiber food. This is consistent with other research that has found that many consumers are not aware of the high fiber content of legumes (Guthrie, 1988). The USDA Food Guide has identified legumes as a category of foods that should be consumed in greater amounts by Americans (USDA, 1985). However, consump-

tion of legumes by Americans remains relatively low (USDA, 1996). The 1995 Dietary Guidelines Advisory Committee (USDA, 1995) noted that the role of legumes in the diet is not well understood by consumers and added clarifying text in the 1995 edition of the *Dietary Guidelines for Americans* (USDA/DHHS, 1995). It will be interesting to assess any future changes in consumer knowledge and attitudes regarding this category of foods. Perhaps educational efforts to increase consumer awareness of legumes' fiber content would contribute to increased consumption.

Food Label Use

In the past, making healthful food choices required greater effort on the part of consumers in order to acquire relevant information. With the Nutrition Labeling and Education Act, implemented in 1994, consumers have a point-of-purchase tool for most packaged and some fresh foods that lessens the need to memorize nutritional information. Consumers concerned about a particular nutrient such as saturated fat can easily compare different foods. The regulations applied to front-label claims (i.e., nutrient content claims such as “low fat” or “reduced fat” and health claims concerning the relationship between fat and heart disease or cancer) also enable consumers to identify healthful foods without prior how-to knowledge. For example, consumers may become more aware of the high fiber content of legumes as more products include nutrient content and fiber-related health claims. Some canned foods—such as pea soup and pork and beans—have already begun including this information on their packages.

Different how-to knowledge may be required to deal with other food selections. Nutrition information in supermarkets for the top-selling fresh fruits, vegetables, seafood, and meats is often available on posters, shopping bags, or grocery store handouts as part of a voluntary labeling program, but consumers may fail to notice this information. Restaurants do not generally provide detailed nutritional profiles of their offerings, although some chain and fast-food restaurants have such information available by request. Although new restaurant regulations ensure that menu items identified as low-fat, for example, must comply with defined standards, consumers still must rely largely on their own knowledge to identify healthful menu options. Consumers with prior knowledge, such as that tested in the food comparisons in

Table 4—Ability to interpret quantitative information on food constituents

Question: If one serving of food contained [food constituent], would you consider that to be a low amount or a high amount?

Food constituent	Low ¹	High	Don't know ²
	<i>Percent</i>		
100 milligrams of sodium	22	63	15
20 grams of fat	10	78	12
15 milligrams of cholesterol	28	44	28
5 grams of fiber	61	17	22
10 grams of saturated fat	14	69	17

¹ Correct answer in bold; definitions of “low” and “high” based on food labeling regulations.

² Percentages do not include those for whom a valid response was not ascertained.

Source: USDA Diet and Health Knowledge Survey, 1994 (weighted data).

the DHKS, would be able to make more informed food choices in situations where food labels are not available.

Food Label Interpretation

Research has demonstrated that most consumers are not knowledgeable about quantitative requirements or recommendations for various nutrients. This makes it difficult to accurately judge whether a food is high or low in specific nutrients, even those many consumers express concern about—such as fat, cholesterol, or sodium. The American Dietetic Association asked consumers to estimate the recommended levels for fat, calories, sodium, cholesterol, calcium, and blood cholesterol (ADA, 1993). About half correctly identified guidelines for calories, calcium, and blood cholesterol, but none answered correctly for sodium or cholesterol and less than 10 percent answered correctly for fat, saturated fat, or calories from fat.

Similarly, in 1994, DHKS respondents were given sample amounts of food constituents that might be found in a serving of food and asked to identify them as being low or high amounts (table 4). In three of five cases—for sodium, cholesterol, and fiber—the correct response was given by less than 30 percent of respondents. Seventy-eight percent of respondents correctly identified 20 grams of fat as being a

high amount per serving, and 69 percent correctly identified 10 grams of saturated fat as high. These mixed results indicate that quantitative information about food constituents is very difficult for consumers to interpret. This is probably not surprising since different quantitative measures are used for different food constituents (e.g., milligrams vs. grams). Moreover, what is a high absolute amount for one food constituent may not be for another (e.g., 5 grams of fiber is a high amount per serving but 5 grams of fat is not).

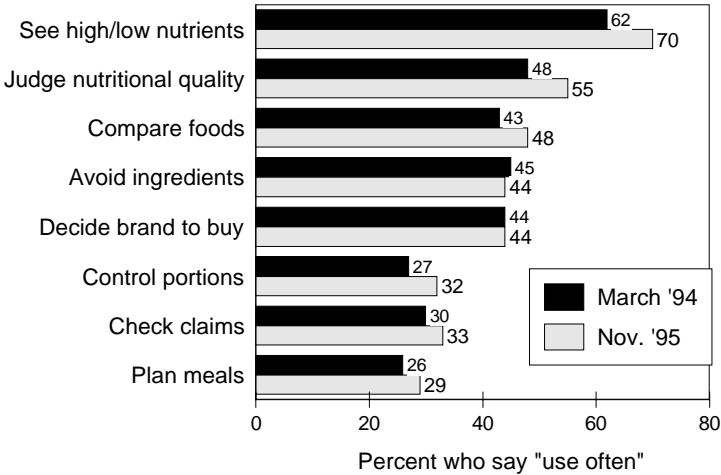
FDA conducted two experimental studies to examine options for presenting nutrient information on the food label (Levy, Fein and Schucker, 1991, 1992, 1996). The percent Daily Value (DV) information had the most consistently positive benefits for dietary management tasks. Consumers were better able to judge high and low nutrient levels and to recognize the implications of a product's nutrition profile for their daily diet with labels that included percent DV. With only metric information (grams and milligrams), even when the format also included reference DV's for the nutrients, consumers tended to respond to the absolute size of the numbers used to describe the nutrients. This led to errors such as perceiving 115 milligrams of sodium as high and 5 grams of saturated fat as low. These findings were instrumental in the decision to include percent DV on the revised food label. The 1994 and 1995 HDS surveys showed a significant increase in the use of food labels to compare products and to determine how high or low the food is in particular nutrients.

FDA is tracking changes in food label use (fig. 7). From 1994 to 1995, there were significant increases in the proportion of consumers who said they use food labels "to see how high or low the food is in things like calories, salt, vitamins, or fat"; "to get a general idea of the nutritional content of the food"; and "to compare different food items with each other." The information on nutrient amounts such as fat, sodium, and carbohydrate was the part of the label consumers reported using most often and that increased most in use from 1994 to 1995 (Levy and Derby, 1995), while there was no change in use of the ingredient list, serving size, or nutrient content descriptors.

In a recent survey by *Prevention* magazine and the Food Marketing Institute (1997), approximately one in four shoppers reported they had started buying a product because of something they read on the nutrition label, and one in three had stopped buying a product based

Figure 7

Why consumers use food labels



Source: FDA Health and Diet Surveys (unweighted data).

on the nutrition label. Cited most frequently as the cause of these changes was fat content.

Knowledge of food composition and label-reading skills are only two types of how-to information. Since food purchase and preparation involve numerous behaviors, many other types of how-to knowledge may be useful to consumers. For example, consumer research on promotion of fruit and vegetable use has shown that in addition to nutrition information, consumers also desire how-to information on selection, storage, preparation, and menu planning, as well as practical tips on how to incorporate fruits and vegetables into quick meals and meals eaten away from home (Guthrie and others, 1992). It is probably not feasible to incorporate assessment of such a wide range of types of how-to information into national surveys, but it is important for those seeking to promote dietary change to be aware of this issue. More targeted, in-depth consumer research that focuses on eliciting a fuller range of the types of how-to knowledge needed and desired by consumers may be an important first step in planning nutrition education and promotion campaigns.

Table 5—Importance of nutrition and other food attributes

Attribute	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
	<i>Percent rating "very important"</i>									
Nutrition	76	75	75	77	75	76	74	78	77	76
Taste	87	88	90	89	91	90	90	88	87	89
Price	64	66	71	75	74	70	69	66	66	64
Product safety	74	71	72	71	72	69	69	75	73	75
Storability	40	43	43	46	45	41	41	43	44	45
Food prep. time	37	36	38	41	36	36	35	38	39	36
Ease of preparation	36	33	34	36	37	34	35	36	37	37
Packaging can be recycled	--	--	48	45	41	38	34	34	31	31

-- indicates category not asked in that year.

Source: FMI, *Trends '89*; *Trends '96*; *Trends '98*.

Attitudes

Attitudes represent an individual's subjective feelings about an issue (e.g., whether following a healthful diet is important) or an object (e.g., whether low-fat foods taste good). Many behavioral theorists consider attitudes to be crucial predictors of behavior (Axelson and Brinberg, 1989). Whereas knowledge may provide the individual with the information necessary to implement a behavior change, attitude may determine whether the individual is motivated to implement that change.

For example, when choosing foods, nutrition is only one consideration, along with taste, price, convenience, etc. If consumers do not value nutrition as a factor in food selection or if they value other factors more highly, they may not choose nutritious foods even if they are knowledgeable about nutrition.

Since 1988, the Food Marketing Institute's (FMI) *Trends* survey has assessed the value consumers place on nutrition compared with other food attributes (table 5). Since 1989, the percentage of shoppers rating nutrition as "very important" has remained at or above 75 percent (except in 1995). Belief in the importance of product safety increased significantly in 1996 and has remained high. Nevertheless, taste remains the most important factor in food choice. Therefore, we cannot expect consumers to change to more healthful food choic-

Table 6—Perceived importance of dietary recommendations

	By gender			By education		
	All ¹	Male	Female	< high school	HS grad.	> high school
	<i>Percent rating "very important"</i>					
Use salt/sodium in moderation	55	47	61	57	53	55
Choose a diet low in sat. fat	57	51	62	54	54	59
Choose a diet with plenty of fruits and vegetables	67	61	73	69	66	68
Use sugars only in moderation	54	48	59	58	53	52
Choose a diet with adequate fiber	51	44	57	49	53	51
Eat a variety of foods	61	56	65	56	61	62
Maintain a healthy weight	75	70	80	71	74	77
Choose a diet low in fat	61	52	69	60	59	63
Choose a diet low in cholesterol	58	52	63	64	58	55
Choose a diet with plenty of breads, cereals, rice, and pasta	34	30	37	30	30	37
Eat at least two servings of dairy products daily	37	29	44	35	40	36

¹ All respondents; valid percent; weighted data.

Source: USDA 1994 Diet and Health Knowledge Survey.

es unless they also believe that those food choices taste good. In 1994, about 30 percent of consumers, responding to a poll conducted by the American Dietetic Association and the International Food Information Council, asserted that healthy foods do not taste good, indicating that taste preferences may be a significant barrier to dietary change.

Since the FMI *Trends* survey began tracking dietary concerns in 1983, concern about the fat content of the diet has grown astronomically—from 9 percent of consumers in 1983 to 65 percent in 1995. By 1998, concern had dropped slightly, to 59 percent of consumers, but fat content was still the primary dietary concern of most Americans. Concern about calories, on the other hand, remains quite low, and concern about the vitamin/mineral content of the diet has dropped so much that it was no longer included in the 1998 report.

USDA's 1994 DHKS used a different approach to assessing consumers' dietary concerns. Consumers were asked to rate the importance of following specific dietary guidelines (table 6). The results are somewhat, but not completely, consistent with the FMI *Trends* data. Based on DHKS data, 61 percent of consumers thought it was

Table 7—Importance of the Dietary Guidelines

To you personally, is it very important, somewhat important, not too important, or not at all important to...

IF NEEDED SAY: The question is not asking about your actual eating habits. It is asking about the **importance** of the statement to **you personally**.

Item	Importance			
	Very	Somewhat	Not too	Not at all
	<i>Percent</i>			
Choose a diet with plenty of fruits and vegetables	78	18	2	2
Eat a variety of foods	71	24	3	2
Choose a diet low in sat. fat	63	25	5	7
Choose a diet w/adequate fiber	60	28	7	5
Use salt or sodium only in moderation	57	23	9	11
Choose a diet low in cholesterol	52	31	10	7
Choose a diet with plenty of breads, cereals, rice, and pasta	52	33	9	6
Eat at least two servings of dairy products daily	41	32	16	11

Source: 1995 HDS/FLUNES replicate. n = 1,001 (unweighted data).

important to eat a low-fat diet, consistent with FMI data. However, some preoccupations not identified by the FMI *Trends* survey were rated as important by as many or more consumers.

Maintaining a healthy weight was considered very important by 75 percent of consumers, in contrast to the relatively low interest in caloric content of foods identified by the FMI *Trends* survey. Given the increasing prevalence of overweight in our society, it might be useful to examine further what seem to be contradictory findings.

The importance of eating a variety of foods is the first dietary guideline message and one consumers seem to accept—61 percent agreed that this is very important. If variety is defined by consuming foods from the five major food groups in the USDA *Food Guide Pyramid* in the recommended proportions, however, some aspects of variety seem to be more important to consumers than others. Two-thirds—67 percent—considered it very important to choose a diet with plenty of fruits and vegetables, but only 37 percent considered it very important to consume two servings of dairy daily and only 34 percent consider it very important to choose a diet with plenty of grains. More information about what variety really means may be necessary

Table 8—Importance of the Dietary Guidelines, by sex and education

To you personally, is it very important, somewhat important, not too important, or not at all important to...

Item	Gender		Education		
	Male	Female	< HS	HS grad.	> HS
	<i>Percent rating item "very important"</i>				
Choose a diet with plenty of fruits and vegetables	69	84	73	76	81
Eat a variety of foods	69	72	49	68	76
Choose a diet low in saturated fat	53	69	50	62	66
Use salt or sodium only in moderation	49	61	44	50	63
Choose a diet low in cholesterol	46	55	55	54	50
Choose a diet with adequate fiber	53	64	48	59	64
Choose a diet with plenty of breads, cereals, rice, and pasta	45	57	41	51	55
Eat at least two servings of dairy products daily	29	48	43	43	40
Sample size	365	636	123	325	547

Source: 1995 HDS/FLUNES replicate. n = 1,001 (unweighted data).

to help translate their belief in the importance of a varied diet into consumption of a diet that meets food guide recommendations.

Women generally rated the importance of following dietary guidelines higher than men, but both sexes agreed in their relative prioritization of most guidelines (table 6). Maintaining a healthy weight and choosing a diet with plenty of fruits and vegetables were the guidelines rated “very important” by the highest percentages of both men and women. Education seemed to have little impact on consumers’ ratings.

The 1994 and 1995 HDS corroborated the results, with strong majorities rating the guidelines to eat plenty of fruits and vegetables and a variety of foods as personally very important (table 7). Majorities also endorsed nutrient-specific guidelines related to saturated fat, dietary fiber, and cholesterol as very important. As in the DHKS, fewer consumers regarded eating plenty of grains or at least two dairy servings as very important, although nearly half of the women considered consuming two servings of dairy products to be very important (table 8). Most respondents realize that health suffers from consuming too little calcium, but their view of how much is enough differs from what dietary experts recommend.

Table 9—Importance of the Dietary Guidelines, by age group

To you personally, is it very important, somewhat important, not too important, or not at all important to...

Item	Age			
	18-34	35-49	50-64	65+
	<i>Percent rating item "very important"</i>			
Choose a diet with plenty of fruits and vegetables	76	79	79	80
Eat a variety of foods	62	72	77	76
Choose a diet low in saturated fat	58	67	67	60
Choose a diet with adequate fiber	46	66	65	67
Use salt or sodium only in moderation	55	58	57	57
Choose a diet low in cholesterol	46	51	60	57
Choose a diet with plenty of breads, cereals, rice, and pasta	54	55	51	46
Eat at least two servings of dairy products daily	45	42	36	39
Sample size	317	342	187	155

Source: 1995 HDS/FLUNES replicate. n = 1,001 (unweighted data).

Again, women were more likely than men to rate each item as personally very important, in particular eating at least two servings of dairy products daily, choosing a diet low in saturated fat, and choosing a diet with plenty of fruits and vegetables (table 8). Respondents with more than a high school education tended to rate the guidelines as more important. Younger respondents (age 18-34) were less likely to consider a diet with adequate fiber and low in cholesterol as very important (table 9).

FDA has found evidence that rating these dietary guidelines as personally important—in particular the guidelines related to specific nutrients (dietary risk factors)—is associated with dietary management behaviors such as using food labels and monitoring caloric and nutrient intake (Levy and Derby, 1995).

Attitudinal Barriers to Dietary Change

Negative attitudes about some of the perceived consequences of changing dietary behavior may be barriers to dietary change. One major attitudinal barrier mentioned previously is the belief by many consumers that healthy foods do not taste good. Similarly, the ADA *1995 Nutrition Trends Survey* found that 38 percent of consumers

believed that to improve their diets they would have to give up favorite foods.

Another issue is cost. In a survey conducted by FMI and *Prevention* magazine (1995), 51 percent of consumers agreed with the statement, "It costs more to eat healthy foods." For low-income consumers, this may be a serious barrier to change. This belief may be derived from the cost of some products marketed as nutritionally improved.

Frazao and Allshouse (1996) found that food products modified in fat, sodium, or other food components generally cost more than their standard counterparts. If consumers believe that dietary change requires buying these specialty foods, they will perceive change to be more expensive. However, one can also follow a healthful diet less expensively by using standard food products that are naturally moderate in fat and sodium (McAllister and others, 1994). Nutrition education messages, especially those directed toward low-income consumers, need to emphasize that healthful diets can be purchased and prepared at a variety of cost levels and to provide examples of healthful diets of varying costs.

Time constraints were cited as an obstacle to change by 21 percent of consumers (ADA, 1995). Mothersbaugh and others (1993) found that time constraints had a negative effect on an individual's performance of recommended dietary practices. However, when an individual had more nutrition knowledge, the negative effect of time constraint was near zero. Nutrition knowledge may mitigate the effects of time constraint by teaching planning and preparation skills or by giving consumers more information on their options for planning a healthful diet. Given the increasing feelings of time constraint expressed by consumers, it would be interesting and useful to explore further how nutrition education can help consumers to overcome time constraint as an obstacle to dietary change.

A final obstacle to dietary change cited by many consumers is confusion about dietary advice. Responding to the ADA *Nutrition Trends Survey* (1995), 21 percent of consumers agreed that there are so many conflicting studies they don't know what to believe, and 8 percent said they did not know or understand dietary guidelines. The development of the Dietary Guidelines for Americans as a clear, consistent message to consumers about what they should eat to be healthy was meant to alleviate consumer confusion as a barrier to dietary change. Continued promotion of the Dietary Guidelines as a

source of consistent, reliable advice may help overcome this barrier (Sutton and others, 1995).

Self-Reported Behavioral Effects Of Information

Because so many factors affect food-related behavior, it can be difficult to assess the effects of nutrition information on actual food selection and consumption. However, some insight can be gained from examining consumers' own perceptions of their use of nutrition information. In the FMI *Trends 1997* survey, shoppers were asked what types of information had led them to make changes in food purchases. Sixty-one percent reported having changed food purchases because of information on the nutrition label, whereas 27 percent had changed purchases because of the *Food Guide Pyramid* and 23 percent had changed purchases because of the "Five-a-Day" campaign. It is not surprising that nutrition labeling would have the greatest effect on food purchasing, since it offers consumers information that can be used to compare specific food products when making a purchase. However, the general guidance offered by the *Food Guide Pyramid* and the promotional messages conveyed by the 5-A-Day Program also seem to be having effects on food purchase and may affect other food-related behaviors as well (e.g., meal planning, cooking practices, etc.).

Conclusion

Several aspects of consumers' nutrition knowledge appear to have increased in recent years, although many gaps remain. One notable change in recent years is consumers' increased knowledge of recommendations to increase fruit and vegetable intake. Based on data from USDA's DHKS, knowledge of USDA Food Guide recommendations for fruit and vegetable intake increased markedly between 1990-91 and 1994, at least among household meal planners. In addition, by 1995, eating more fruits and vegetables had replaced eating more fiber or less fat as the dietary behavior consumers were most likely to mention as reducing risk of cancer. The period between 1990-91 and 1995 coincided with the release of the *Food Guide Pyramid* and ongoing activities of the National Cancer Institute's 5-A-Day campaign. These educational and promotional activities may

have been influential in increasing consumers' knowledge of fruit and vegetable recommendations.

By contrast, awareness of saturated-fat intake as a risk factor for heart disease did not increase, despite being emphasized in educational messages from the National Cholesterol Education Program. This illustrates the difficulty of communicating more complex nutrition information, even with large public health education efforts. If nutrition educators want consumers to act on more detailed nutrition information, such as the fatty acid composition of foods, they may need to develop new strategies for simplifying their information communication or behavioral recommendations.

Along with the *Food Guide Pyramid*, another major nutrition information tool released in recent years is the revised nutrition label, which now appears on virtually all packaged foods (see also chapter 11). Consumers report high rates of label use, and FMI data indicate that the nutrition label appears to influence food purchase decisions. However, research indicates that most consumers are unaware of quantitative recommendations for the nutrients on the food label. Nutrition education that focuses on interpreting label information correctly and making use of simplifying tools such as the percent Daily Value may help translate consumer enthusiasm for the new label into improved food selection.

In general, to develop effective nutrition education and promotion messages, nutritionists need to consider what types of knowledge are most needed and how much knowledge average individuals can reasonably be expected to assimilate. This is complicated by the fact that changing from a typical American diet to one that meets the recommendations of the *Dietary Guidelines for Americans* does not require one simple behavioral change but, rather, numerous changes. The type and extent of knowledge needed to accomplish a dietary change may vary, depending on the nature of the change being made. For example, it may be relatively easy to add to one's diet a desired food component, like fiber for which a few foods are particularly good sources, if one is aware of the relationship of that food to health and knows some general principles of food selection (e.g., fruits, vegetables, and grains are good sources of fiber). However, it may be harder to subtract from one's diet a food component like fat that is present to a varying extent in a wide range of foods. In the first case, awareness and some knowledge of basic principles, such as familiari-

ty with the *Food Guide Pyramid*, may be sufficient for dietary change. In the second case, more specific, how-to information—such as knowledge of low-fat cooking methods or of how to read and interpret nutrition labeling—may be needed.

Given the complexity of dietary change, it is also important to consider how much people can reasonably be expected to learn. Nutrition is a complex subject that many consumers find confusing. For example, foods are mixtures of many compounds and may contain both nutrients consumers are encouraged to consume in larger amounts (e.g., calcium) and those they have been urged to moderate (e.g., sodium or fat). This may frustrate consumers who, reasonably, feel they should not need an indepth knowledge of food composition to successfully negotiate a grocery shopping trip. As new food products proliferate and the food supply becomes more varied and complex, simplifying tools such as the *Food Guide Pyramid* and the nutrition label may be extremely important in reducing the amount of consumer knowledge needed to a more manageable level. FMI data indicate that consumers seem to be finding these tools useful and applying them to their food selection behavior, but further examination of their impacts on food choice and diet quality is needed.

Despite the emphasis of this chapter on nutrition knowledge, it is important to keep in mind that nutrition knowledge is not a panacea. Many other factors affect food choice. Those seeking to effect changes in diet may meet resistance because of consumers' taste preferences and time and cost constraints. To create dietary change, strategies for overcoming these obstacles also must be developed. These strategies can take multiple forms. Changes in food production and processing may lead to the development of more healthful, good-tasting food choices. In addition, behavioral strategies to overcome taste prejudices against healthful foods may help to change behavior. For example, the developers of a campaign to promote low-fat milk consumption in a Latino community used free “taste tests” to overcome negative perceptions of the taste and quality of low-fat milk (Wechsler and Wernick, 1992).

Another frequently cited factor in behavior change is the environmental setting. For example, eating away from home has been found by several researchers to be associated with differences in diet quality (Haines and others, 1992; Guthrie, 1996; Lin and Guthrie, 1996) (see also chapter 12). Possible reasons may be the more limited

choice in away-from-home eating environments or the fact that consumers have less information about the nutrient content of foods served in restaurants and other eating establishments. Also, consumers may view eating away from home as an exception to their normal dietary habits, regardless of how frequently it occurs, and an opportunity to “splurge.” Therefore, effective dietary change strategies may need to include both environmental modification and efforts to change consumer attitudes toward eating out. Some examples of environmental modifications would be changes in institutional meal patterns, as with USDA’s current School Meals Initiative to reduce fat and saturated fat in school meals, or provision of increased information on away-from-home food choices.

In conclusion, an important step in promoting dietary change is to identify the nutrition-related knowledge and skills most needed by consumers and to develop simplifying tools such as the *Food Guide Pyramid* or the nutrition label to communicate them. But it is also important to identify the other factors necessary for success, such as positive attitudes toward healthful eating and a supportive environment for dietary change, and to develop effective promotion strategies for putting those factors into place.

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Appendix: Data Sources

Health and Diet Survey (HDS)

The FDA conducts this periodic omnibus survey of American consumers to track consumer attitudes, knowledge, and reported behaviors related to diet and health issues—including cholesterol awareness and practices, dietary management practices, dietary fat and cholesterol knowledge, awareness of diet-disease risk factors, food label use, dietary supplement use, and awareness of dietary guidance. The National Heart, Lung, and Blood Institute (NHLBI) cosponsored four of the surveys to evaluate the effectiveness of the national Cholesterol Education Campaign (Schucker and others, 1991, 1987). The Food Safety and Inspection Service (FSIS) at USDA and the Office of Disease Prevention and Health Promotion at the Public Health Service joined FDA in sponsoring the 1994 survey, designed to provide baseline data on food label use prior to implementation of new labeling regulations (Derby and Levy, 1994).

The HDS was initiated in 1982 and repeated in 1984, 1986, 1988, 1990, 1994 (as the Food Label Use and Nutrition Education Survey), and 1995. The surveys include recurring questions on key topics to provide trend data (e.g., diet-disease awareness) and one-time questions that address specialized topics or emerging issues (e.g., perceptions of the new food label). The HDS is based on telephone interviews with nationally representative samples of American adults age 18 and older in the continental United States.

Diet and Health Knowledge Survey (DHKS)

This survey, conducted by USDA, collects information on diet-related knowledge, attitudes, and practices of Americans. It was begun in 1989, as a telephone followup to USDA's 1989-91 Continuing Survey of Food Intakes by Individuals. At that time, DHKS respondents were individuals who identified themselves as the main meal planners for their households. When a second cycle of the DHKS was begun in 1994, the sampling procedure was changed to include adults 20 and older, regardless of meal planner status. Those who are the household's meal planner are still identified as such, allowing comparison between the two time periods. However, there were also some changes in questions between the 1989-91 and the 1995 DHKS. Therefore, it is not always possible to make comparisons between the two time periods, even for meal planners. In both time periods, the DHKS oversampled low-income respondents. Survey weighting factors have been applied to all results presented here, however, to present findings that are more applicable to the American population as a whole.

FMI Trends Survey

The Food Marketing Institute (FMI), a nonprofit association primarily made up of food retailers and wholesalers, began surveying food shoppers to assess trends in food shopping and related behaviors in 1973. In 1983, a segment on nutrition-related attitudes and practices was added to the survey. The survey is conducted on an annual basis; the sampling methodology results in a nationally representative cross-section of shoppers.

ADA 1995 Nutrition Trends Survey

The American Dietetic Association (ADA), an association of nutrition professionals, conducted this survey in May 1995 and assessed consumer beliefs about nutrition, attitudes toward dietary change, and awareness of nutrition information sources, such as the Food Guide Pyramid.

Food Label Format Studies

Prior to the Nutrition Labeling and Education Act (NLEA),¹ many packaged foods did not have labels, and existing food labels did not consistently provide the nutrition information of greatest public health concern (Institute of Medicine, 1990). Since limited data were available on options for the food label format, research was needed to compare the relative effectiveness of alternative label formats in terms of how easily consumers could use them for everyday purposes and make correct inferences about the nutritional characteristics of the food.

The FDA nutrition label format studies tested format elements (e.g., adjective descriptors, nutrient amounts in metric units or percentages) for a variety of label use tasks (e.g., product comparison, use of the daily value concepts) to identify a format that met the objectives of the NLEA—that the food label provide information consumers can readily comprehend and understand in the context of a total daily diet.

A shopping mall intercept methodology was used to test alternative presentation formats for conveying nutrient and health information to consumers. This methodology was chosen because it allows consumers to observe alternative presentations and provides geographically and demographically diverse samples of shoppers. Participants were interviewed individually. The 1991 Label Format Study (Format Study 2) tested seven label formats (three from the 1990 Label Format Study and four new formats) with an expanded set of five tasks (Levy and others, 1996).

¹ Public Law 101-535, November 9, 1990, 104 Stat. 2353-2367.