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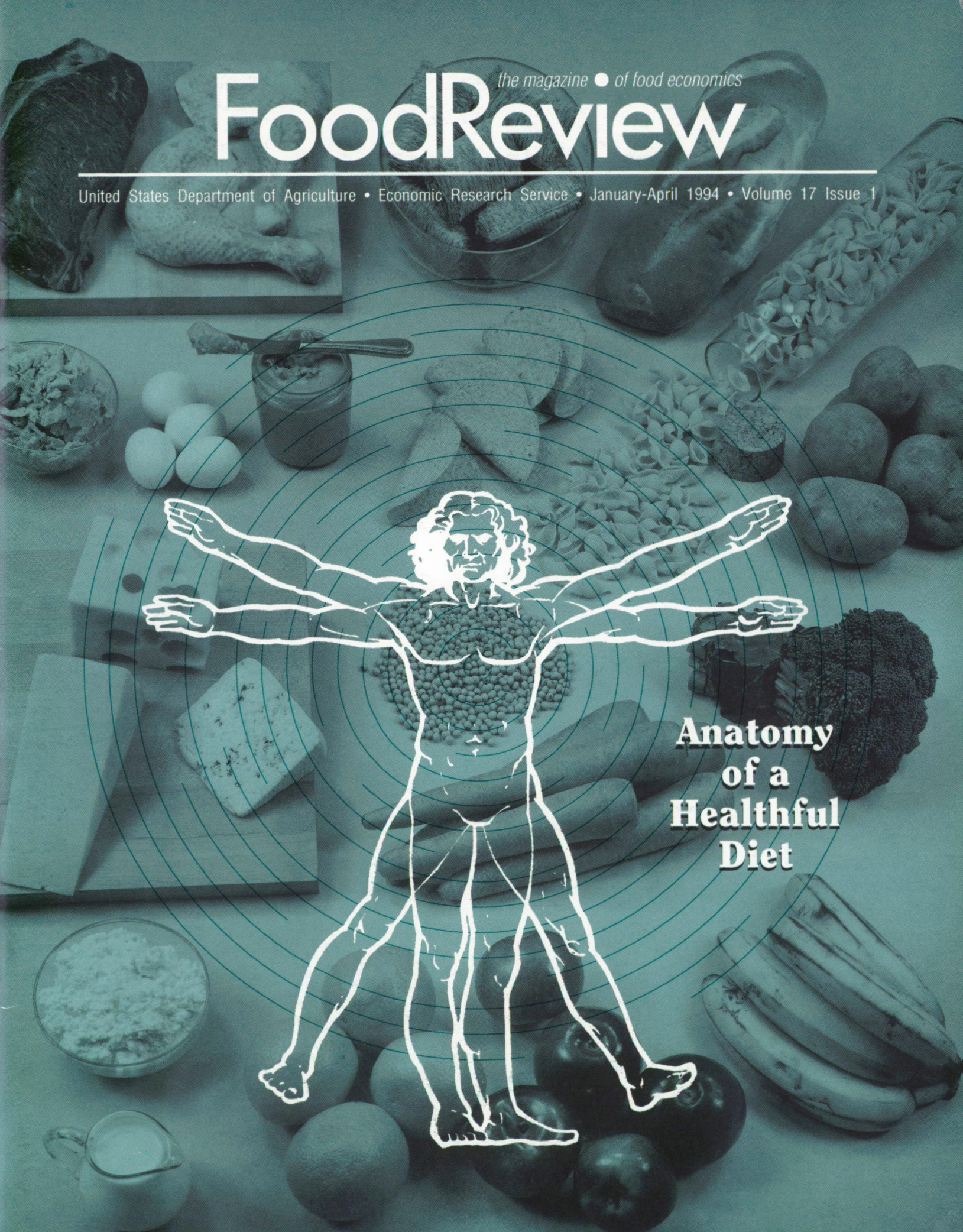

Anatomy of a Healthful Diet

...Upfront

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Nutrition Reports in This Issue Based on First-of-Kind Surveys

Several of the articles in this issue are based on results of a new type of survey conducted by USDA's Human Nutrition Information Service—the Diet and Health Knowledge Survey (DHKS). The survey gathers information on the attitudes and knowledge about nutrition, diet, and health of the household's main meal planner/preparer.

The DHKS was designed so that information from it could be linked, for the first time on a nationwide basis, to information on food consumption from USDA's Continuing Survey of Food Intakes by Individuals (CSFII). This combined information allows researchers to analyze how individual attitudes and knowledge about healthy eating affect food choices and dietary status.

The CSFII for 1989 and 1990 provide dietary data covering 3 consecutive days for individuals of all ages. The first day's data were collected in a personal in-home interview using a 1-day dietary recall. The second and third days' data are from a 2-day dietary record kept by the respondents. Personal data—such as income, age, race, and education—were also collected, as were self-reported health status, weight, and height.

The 1989 and 1990 DHKS were conducted as a telephone follow-up to the CSFII. Individuals identified in the CSFII as the main meal planner/preparer for the household were contacted about 6 weeks after the CSFII and asked a series of questions about diet and health.

The article by Tippett and Goldman on how well U.S. diets meet the recommendations of the Dietary Guidelines is based exclusively on CSFII data and provides information that may be generalized to the population. Frazao and Cleveland's article on fat and cholesterol consumption and Smallwood and Blaylock's article on fiber intake are based on combined DHKS/CSFII data, and represent only the household's main meal planners/preparers—these data may not be representative of all individuals in the population. Rose's article about maintaining a healthy weight is based on a subset of the DHKS/CSFII data—it includes only women who were not pregnant or breastfeeding at the time of the survey and who provided information on their weight.

To provide a consistent way of reporting income over several time periods and to help account for inflation, the articles express household income for the previous calendar year as a percentage of the Federal poverty thresholds. These levels are determined by the Federal Government and differ by household size and composition. For example, the average poverty threshold for a household of four in 1989 was $11,669.

Inside...

The High Costs of Poor Diets

Betsy Frazao
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When an obese, inactive, middle-aged person dies from a heart attack, the cause of death is listed as cardiac arrest or heart disease. But a recent study published in the Journal of the American Medical Association (JAMA) would attribute the actual cause to a poor diet and inactivity.

Chronic conditions—such as heart disease, cancer, stroke, and diabetes—are generally cited as the causes of death because they represent the major condition identified at the time of death. However, these conditions actually result from a combination of risk factors, some of which may have been controlled by the individual—such as smoking, diet, and inactivity.

When nongenetic, or external, factors contribute to death, the deaths are considered to be premature. But premature mortality represents only one cost. A second type of cost is associated with a deterioration in the quality of life, which often precedes premature mortality. Identification of the external risk factors—those that potentially can be modified by the individual—would aid preventive efforts, improve the quality of life, and reduce health care costs.

To this end, the JAMA study calculated the number of deaths according to the underlying risk factors, rather than to the condition itself.

Diet Behind the Leading Causes of Death

Of the 10 leading causes of death in the United States, 4—including the top 3—are associated with dietary excesses: coronary heart disease, some types of cancer, stroke, and noninsulin-dependent diabetes mellitus (also called type II diabetes, or adult-onset diabetes) (table 1). Together, these conditions account for nearly two-thirds of the deaths occurring each year in the United States.

In 1991, there were 720,000 deaths attributed to coronary heart disease. The American Heart Association estimates that about 1.5 million heart attacks occur each year, and that coronary heart disease costs Americans an estimated $52 billion in direct health care expenditures and lost productivity.

It is estimated that more than 1 million new cases of cancer will have been diagnosed in the United States in 1993. Over 500,000 Americans died of cancer in 1991, with associated costs of $104 billion.

Strokes affect over 500,000 people each year. In 1991, over 143,000 died of stroke. Some 3 million Americans suffer from stroke-related disabilities, at an annual cost of more than $18 billion.

Table 1
Leading Causes of Death in the United States in 1991

	Number
Heart disease	720,162
Cancer	514,657
Stroke	143,181
Chronic obstructive pulmonary diseases	90,650
Accidents and adverse effects	89,347
Pneumonia and influenza	77,860
Diabetes	48,951
Suicide	30,810
HIV infections	29,555
Homicide and legal intervention	26,513

Source: U.S. Department of Health and Human Services, Public Health Service, National Center for Health Statistics. "Advance Report of Final Mortality Statistics, 1991," *Monthly Vital Statistics Report*, Vol. 42, No. 2, supplement, 1993.

The author is an economist with the Commodity Economics Division, Economic Research Service, USDA.

Improve Diet To Reduce Risks of Chronic Diseases

Genetic predisposition increases some people's risk for some of these chronic diseases, making it difficult to determine the proportion of chronic diseases that could be reduced by dietary changes alone. Some experts estimate that 35 percent of all cases of cancer could be prevented through dietary changes alone. According to the JAMA article, about a third of the decline in coronary artery disease mortality from 1968 to 1976 was due to reductions in serum cholesterol levels, and half of all type II diabetes is estimated to be preventable by controlling obesity.

In the recent JAMA study, the authors reviewed hundreds of studies conducted since 1977 to attempt to identify the underlying risk factors behind the deaths.

The effects of dietary factors and physical activity patterns were hard to distinguish, so the JAMA study included both together. The interdependence of both as

> *"risk factors is illustrated by the case of obesity, which is associated with increased risk for cardiovascular disease, certain cancers, and diabetes, and is clearly related to the balance between calories consumed and calories expended through metabolic and physical activity. Similarly, high blood pressure, a major risk for stroke, can be affected by dietary sodium, obesity, and sedentary lifestyle."*

Using conservative estimates, and being careful not to double count deaths with overlapping risk factors (such as alcohol or illegal drugs), the JAMA study estimated that 300,000 (14 percent) of the 2.1 million deaths in 1990 could be attributed to poor diets and/or inadequate physical activity.

It should be noted that other health conditions—which may not lead to premature mortality but definitely impact on the quality of life and health costs—may also be affected by diet. For example, inadequate intake of calcium may increase the risk of osteoporosis. The National Osteoporosis Foundation estimates that some 25 million Americans suffer from osteoporosis, which causes 1.5 million bone fractures a year, at an annual cost of $10 billion in medical charges. These costs are expected to rise to $200 billion per year by the year 2040. Osteoporosis affects mostly women—over half of all women over age 50. However, about 5 million men are also at risk for osteoporosis-related fractures—one third of all men by age 75.

Thus, there is an urgent need to educate Americans about how to improve dietary patterns. The *Dietary Guidelines for Americans* represents the major Federal effort in this direction, providing a daily guide of nutrient recommendations as well as a reference for food choices (see "The Dietary Guidelines Focus on Reducing Excessive Intakes" elsewhere in this issue). And, the new nutrition labeling regulations, which mandate nutrition labels on most foods and update the list of nutrients that appear on the labels, are also intended to help consumers make healthier food choices.

Consumers seem to be heeding the advice to improve the healthfulness of their diets (see "Diets More Healthful, But Still Fall Short of Dietary Guidelines" elsewhere in this issue). However, most diets still fall short of the Dietary Guidelines. New survey data now allow researchers to look for the first time on a national basis at the role that awareness of diet-disease relationships, and nutrition knowledge and attitudes, may play on increasing the healthfulness of an individual's diet and weight (see articles by Frazao and Cleveland, Smallwood and Blaylock, and Rose).

As was so clearly stated in the Surgeon General's 1988 Report on Nutrition and Health:

> *"For the two out of three adult Americans who do not smoke and do not drink excessively, one personal choice seems to influence long-term health prospects more than any other: what we eat."*

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The Dietary Guidelines Focus on Reducing Excessive Intakes

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Over this century, advances in agriculture, food processing, and food enrichment programs have made nutrient-deficiency diseases, such as scurvy and pellagra, rare among Americans. Yet 4 of the 10 leading causes of death today are diseases where diet plays a part—coronary heart disease, some types of cancer, stroke, and diabetes.

Diet-related diseases now represent the top three causes of mortality—ahead of infectious diseases, many of which have been eliminated by medical advances over the century.

Diet composition and physical activity levels have also changed substantially over this century. Many American diets have too many calories and too much fat, cholesterol, and sodium. They also have too little complex carbohydrates and fiber. Such diets are one cause of America's high rates of obesity and chronic diseases.

Although the exact role of diet in chronic diseases is still being studied, nutrition authorities agree that enough is known about diet's effect on health to encourage certain changes in dietary practices.

The *Dietary Guidelines for Americans* (fig. 1) are seven recommendations for a healthful diet—advice for healthy people 2 years of age or more. These serve as the central statement of Federal nutrition policy and the focus of nutrition education programs to improve the health and wellbeing of the Nation.

Following the Dietary Guidelines will help Americans enjoy better health:

- ***Eat a variety of foods*** to get energy (calories) and the more than 40 nutrients needed for good health, such as protein, vitamins, minerals, and fiber. Many foods are rich sources of several nutrients, but no single food can supply all the nutrients in the amounts needed.

The Dietary Guidelines suggest directional changes in the consumption of food components—such as "choose a diet with plenty of vegetables, fruit, and grain products"—to reduce the risks of chronic disease.

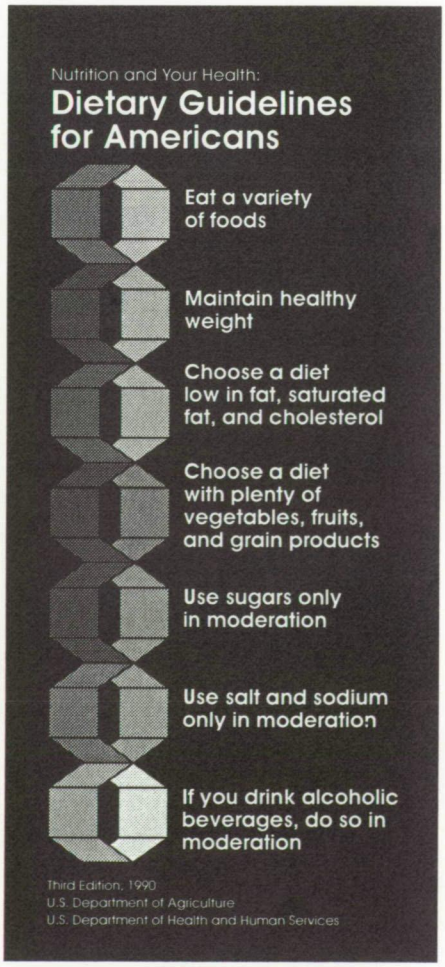
The authors are nutritionists with the Human Nutrition Information Service, USDA.

- ***Maintain a healthy weight*** to reduce the chances of high blood pressure, heart disease, a stroke, certain cancers, and non-insulin-dependent diabetes.
- ***Choose a diet low in fat, saturated fat, and cholesterol*** to reduce the risk of heart attack and certain types of cancer. Because fat contains over twice the calories as an equal amount of carbohydrates or protein, a diet low in fat can help maintain a healthy weight.
- ***Choose a diet with plenty of vegetables, fruit, and grain products*** to receive the needed vitamins, minerals, fiber, and complex carbohydrates and to help reduce the intake of fat. It's important to get these nutrients from a variety of foods rather than from supplements alone. For example, research indicates that some of the benefits from a high- fiber diet may come from the food that provides the fiber, rather than from the fiber itself.
- ***Use sugars only in moderation.*** A diet with lots of sugars has too many calories and/or too few nutrients for most people and can contribute to tooth decay. Excessive use can displace more nutritious foods, resulting in low nutrient intakes.
- ***Use salt and sodium only in moderation*** to help reduce risk of high blood pressure, especially for those whose blood pressure rises with excessive salt consumption.
- ***If you drink alcoholic beverages, do so in moderation.*** Alcoholic beverages supply calories, but little or no nutrients. Drinking alcohol also causes many health problems and accidents and can lead to addiction. Too much alcohol may cause cirrhosis of the liver, inflammation of the pancreas, damage to the brain and heart, and increase the risk for many cancers.

Dietary Advice Updated With Scientific Advances

The Dietary Guidelines are the latest in a history of Federal efforts at nutrition education and dietary guidance. Government nutritionists have provided advice to Americans about what to eat for nearly a century.

In 1902, W.O. Atwater, pioneer nutrition investigator and the first director of the Office of Experiment Stations in USDA, emphasized the importance of variety, proportionality, and moderation in healthful eating. He stated, "for the great majority of people in good health, the ordinary food materials . . . make a fitting diet, and the main question is how to use them in the kinds and proportions fitted to the actual needs of the body." Many of our dietary guidance efforts have focused on answering this question.



The first USDA food guide in 1916 translated the emerging science of nutrition into national dietary recommendations for consumers. As more was learned about vitamin and mineral requirements and food consumption patterns of the population, food guides such as the "Basic Seven" (1946) and the "Basic Four" (1958) focused on choosing enough of the kinds of foods to provide the nutrients needed for good health.

These guides outlined a "foundation diet" made up of minimum numbers of servings of nutritious foods from several food groups that together would provide a major share of the recommended amounts of vitamins and minerals known at the time these guides were developed. These foundation diets provided only about one-half to two-thirds of average energy (calorie) needs. It was assumed that people would include additional, less nutritious foods to meet their calorie needs. However, these guides provided little specific guidance about the use of fats and sweets.

In the 1960's, research began to indicate a connection between excessive consumption of certain dietary components—such as fat, saturated fat, cholesterol, and sodium—and the risk of some chronic diseases, such as heart disease and stroke.

A turning point in Federal dietary guidance came in 1977, when the U.S. Senate Select Committee on Nutrition and Human Needs issued *Dietary Goals for the United States*. These goals shifted the focus from obtaining adequate amounts

of vitamins and minerals to avoiding excessive intakes of food components that had been linked to chronic diseases.

In 1980, USDA and the Department for Health and Human Services (DHHS) published the first edition of *Nutrition and Your Health: Dietary Guidelines for Americans* to help consumers make healthier food choices. These guidelines suggested directional changes in the consumption of food components—reduce intake of fat, sugar, sodium, and alcohol, and increase the intake of starch and fiber—to reduce the risk of chronic diseases, such as heart disease, high blood pressure, diabetes, dental caries, and some cancers.

The Dietary Guidelines were revised and reissued in 1985 and again in 1990, based on expert review of relevant new research.

A 1988 study found widespread adoption and acceptance of the Dietary Guidelines by national, State, and local professionals involved in the communication of food and nutrition information. The health professionals interviewed emphasized the importance of having health and nutrition experts speak with one voice in identifying important dietary practices. They also urged that dietary guidelines be kept constantly before the public, in a variety of presentations.

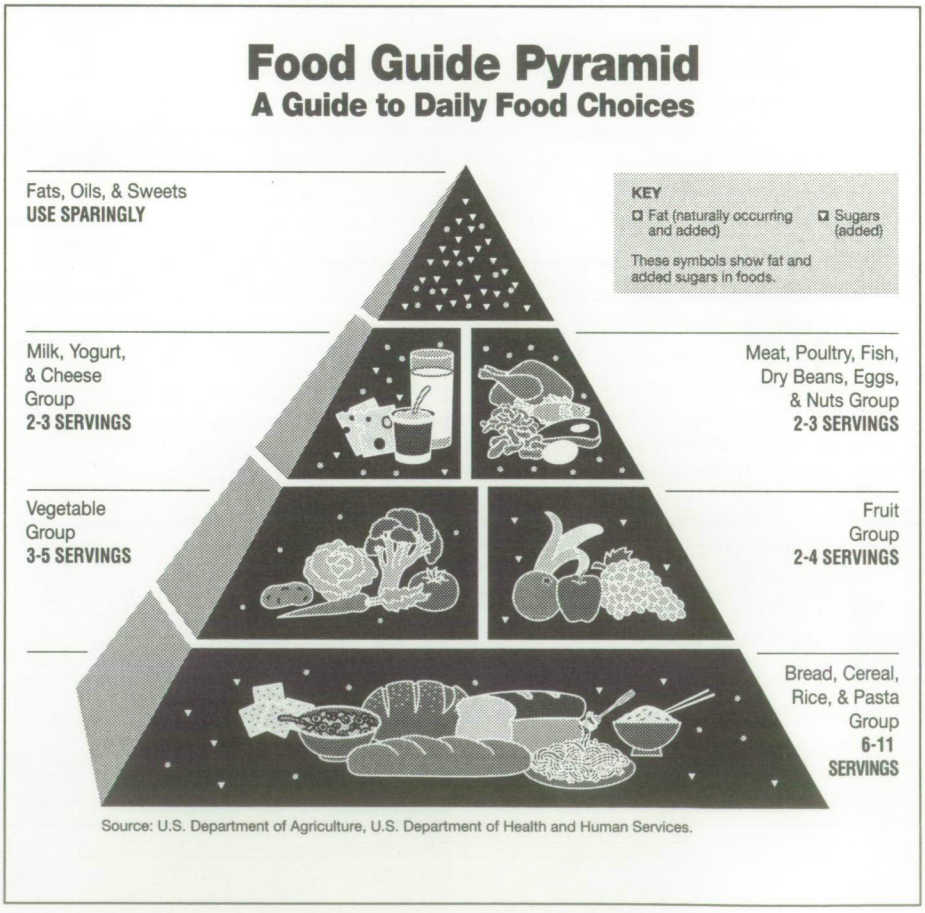
Consumer evaluation of the Dietary Guidelines bulletin showed that consumers wanted more specific food-related guidance, definitions of technical terms, and practical tips for behavior change strategies.

While these studies highlight the importance of the Dietary Guidelines for both nutrition professionals and consumers, they also indicate a need for more information on how to use the Dietary Guidelines in choosing foods that make up a healthful diet.

The Food Guide Pyramid Shows How To Use the Dietary Guidelines

When applying the Dietary Guidelines to food choices, one must keep in mind that they apply to the total diet—not just one food, one meal, or even one day, but all food choices over time. They are intended to work together to help people choose a healthy diet. For example, choosing a diet with plenty of vegetables, fruit, and grain products helps to lower fat intake. A diet low in fat and moderate in sugars will help in maintaining a healthy weight. Choosing foods with less fat will make room for calories from the variety of foods needed to get enough protein, vitamins, and minerals.

USDA's Human Nutrition Information Service (HNIS) developed a new food guide to help people use the Guidelines. Unlike earlier ones, the new food guide organizes information about food so that it can be used to make food selections that meet objectives for both nutrient adequacy and moderation of those components related to risk of chronic disease. It outlines the num-



bers of servings from each of five major food groups, and recommends sparing use of a sixth food group—fats, oils, and sweets.

A booklet describing the food guide provides additional information on how to choose foods within each food group that are low in fat, saturated fat, cholesterol, added sugars, or sodium. The pamphlet also explains how to keep total intake of these components to recommended limits.

The Food Guide Pyramid puts all this information together in a graphic presentation that conveys key concepts of the food guide—variety, proportionality, and moderation (fig. 2). Variety among food groups is shown by the names of the groups and by the separate sections of the pyramid. Variety within food groups is shown by pictures of typical food items. Proportionality is conveyed by the size of the food group sections and the text indicating numbers of servings. Moderation of foods high in fat and added sugars is shown by the small size of the tip of the pyramid and the text specifying that people use them sparingly. Moderation related to food choices within food groups is shown by the density of the fat and added sugars symbols in the food groups. The latter message is more clearly explained in the accompanying food guide booklet.

Since its release, the extensive use of the Food Guide Pyramid by nutrition and health professionals, educators, media, and the food industry promises to make it an effective educational tool.

The Future for Dietary Guidelines

In the future, more and better screening tests will become available to help individuals assess their personal relative risk for developing chronic diseases related to diet. Results from such tests will provide information about the specific dietary changes most likely to improve one's health.

A new Dietary Guidelines Advisory Committee will soon be convened to review dietary recommendations for the population. We expect continued emphasis on choosing a diet low in fat, with plenty of vegetables, fruit, and grain products—foods rich in dietary fiber and antioxidant nutrients (such as vitamins A, C, and E, which may help reduce risk of some types of cancer). Lowfat milk and lean meats will continue to be important sources of calcium, iron, and zinc in U.S. diets.

Even though "designer foods" with enhanced nutrient content may become available, there will be continued emphasis on consumption of a wide variety of foods from diverse food groups. This way, consumers will be less likely to miss out on food components about which we know little at the moment. It can also help them avoid unforeseen adverse nutrient interactions.

We also expect a greater emphasis on adequate physical exercise in addition to a healthful diet for attaining and maintaining maximal health and wellbeing and preventing chronic disease.

The Dietary Guidelines and the USDA Food Guide may be revised as the science base evolves. But it is likely that the underlying themes of variety, proportionality, and moderation initiated almost 100 years ago will apply to choosing healthy diets for many years to come.

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Diets More Healthful, But Still Fall Short of Dietary Guidelines

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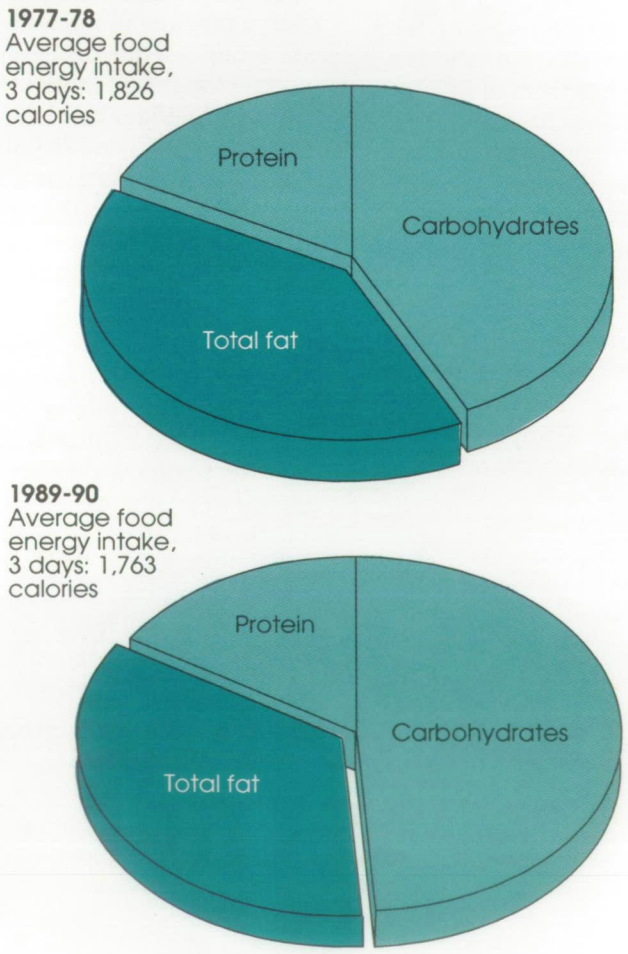
How well do our diets meet the *Dietary Guidelines for Americans*? Have changes in what we eat moved us closer to dietary recommendations made by science and health groups?

The trend toward lower fat, higher carbohydrate diets between 1977-78 and 1989-90 is a step in the right direction (fig. 1). However, the proportion of our food energy that comes from fat is still higher than recommended, and survey data suggest that individuals are not increasing their consumption of fruit and vegetables as recommended. The large increases in the share of milk that was lowfat or skim and in the share of soft drinks that were low-calorie suggest that people are interested in limiting calories, fat, and sugar. However, the shift toward eating more mixtures—many of which may be high in fat—and drinking more of regular soft drinks suggests the opposite.

Data from the 1989 and 1990 Continuing Survey of Food Intakes by Individuals (CSFII), conducted

Figure 1

The Share of Calories From Fat Has Fallen — But it Is Still Above the Recommendation



Tippett is a home economist and Goldman is a mathematical statistician with the Human Nutrition Information Service, USDA.

by USDA's Human Nutrition Information Service, provide information on the type and quantity of foods individuals ate during 3 consecutive days. From this, we can assess how well Americans are following the principles for healthy eating as described in the *Dietary Guidelines for Americans*.

The estimates presented here are averages for the 7,780 individuals of all ages who provided information on their dietary intake for all 3 days. These estimates are compared with similar data collected in the 1977-78 Nationwide Food Consumption Survey to see how eating patterns and intake levels have changed over time.

Eat a Variety of Foods

This first Dietary Guideline aims at ensuring that we obtain all the nutrients we need from food. Because different foods supply different nutrients, a daily diet should contain an assortment of foods from each of the five major food groups: bread, cereal, rice, and pasta; vegetables; fruit; milk, yogurt, and cheese; and meat, poultry, fish, dry beans, eggs, and nuts.

One way to assess variety is to look at the types and amounts of foods consumed and the changes that have occurred over time. But that may not tell the whole story, so it is important to also look at nutrient intakes. The many foods we eat provide us with most of the nutrients we need, but as a population, our diets are still short in some nutrients.

Diets in 1989-90 differed considerably from those in 1977-78 (fig. 2). In 1989-90, we ate more mixtures that were mainly meat, poultry, or fish (such as hamburgers, stews, and chicken sandwiches) and fewer separate cuts of beef and pork (such as steaks and roasts). There was little change in the average amounts eaten of poultry and of fish and shellfish, although a greater proportion of people ate foods from these groups. We drank less whole milk and more lowfat and skim milk than a decade earlier. We ate fewer eggs. We ate more grain products, especially grain mixtures, cereals, and pastas. We drank more carbonated soft drinks, especially low-calorie soft drinks. But, fruit and vegetable consumption changed very little—despite dietary advice to eat more.

Some of these consumption changes may indicate interest in diet and health issues. The changes also may reflect shifts in incomes and in relative food prices. And, these trends may be influenced by industry efforts to meet the public's desire for health and convenience: they have offered increased numbers and varieties of restaurants, microwave-ready products, commercially prepared convenience foods, carryout meals and home-delivered food, and supermarkets with bakeries, delicatessens, and salad bars.

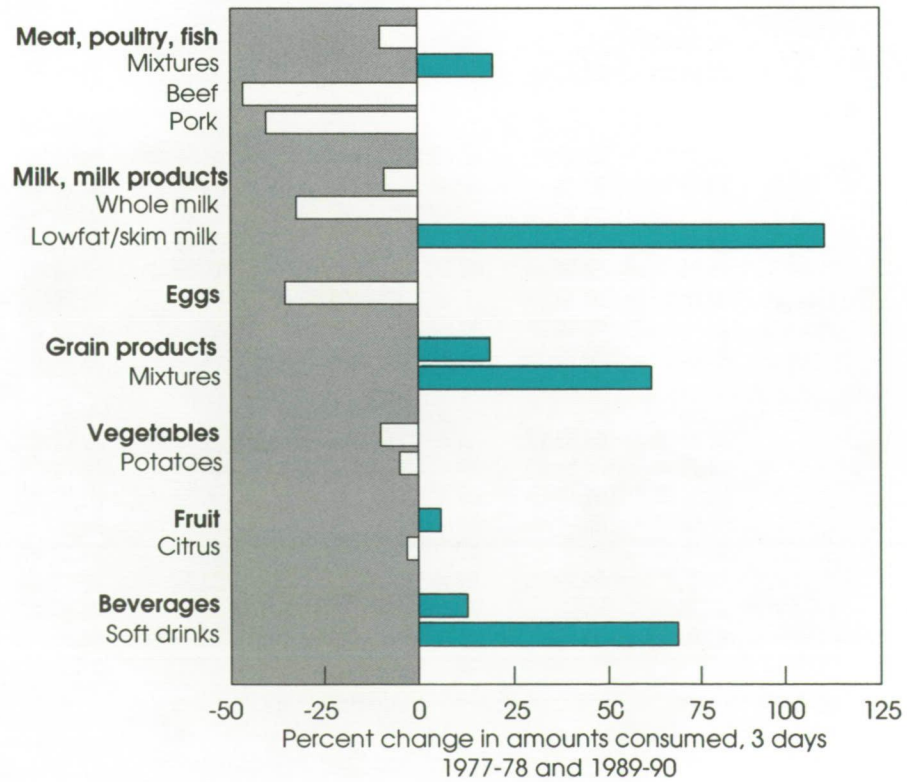
Some of the estimated changes—such as the apparent decline in consumption of beef and pork and the lack of change in the consumption of poultry, fish and shellfish, fruit, and vegetables—are contrary to trends suggested by food disappearance data. Some of these differences may be due to the different methodologies, and to our not knowing how much meat, cheese, grains, fruit, or vegetables are included in mixed dishes (see boxes).

As a result, intake estimates for some food groups—particularly meats, cheese, vegetables, and grains—may be higher or lower than would be the case if foods in the mixtures were divided up and counted separately.

Perhaps rather than eating less of certain foods, individuals are just changing the way they eat—

Figure 2

Diets Have Changed in the Past Decade



consuming more meat in meat mixtures, for example. In 1989-90, 17 percent of individuals reported eating a hamburger (or cheeseburger or pizzaburger) at least once in 3 days—up from 10 percent in 1977-78. (Not surprisingly, a greater proportion of teenagers than of other age groups ate hamburgers.)

The wide array of foods consumed in 1989-90 provided the Recommended Dietary Allowances (RDA) for many nutrients, but not for others. In general, the nutrients that were below the RDA in 1989-90 are the same nutrients that were below the RDA a decade earlier.

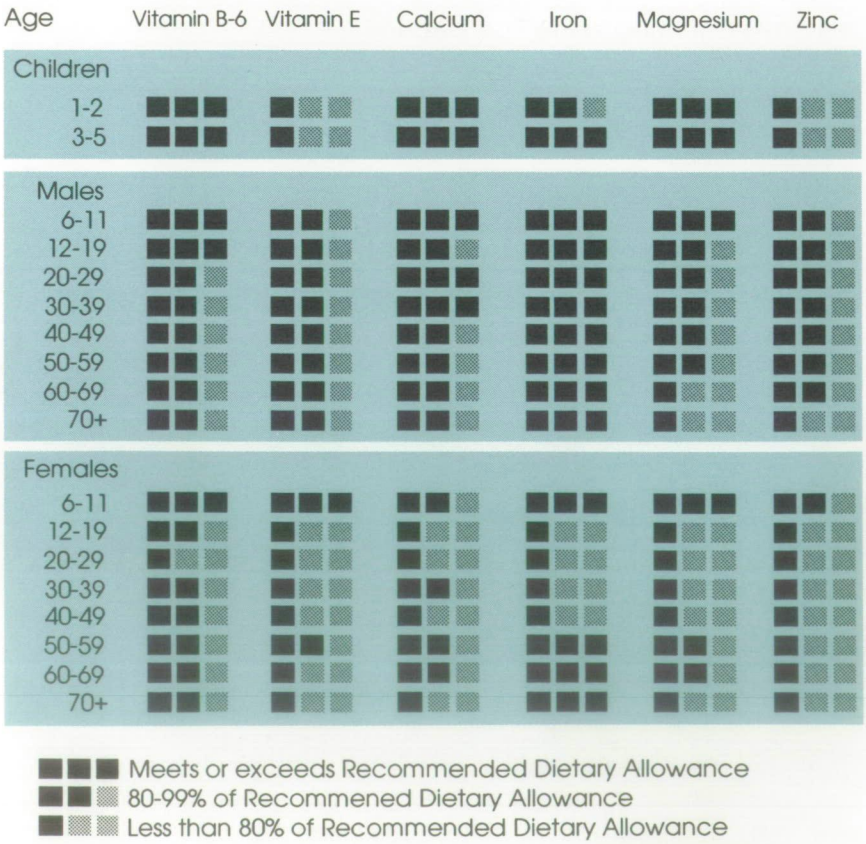
Average intakes for most population groups exceeded the RDA for protein, vitamin A, vitamin C, thiamin, riboflavin, niacin, folate, vitamin B-12, and phosphorus. For other nutrients—notably vitamins B-6 and E, calcium, iron, magnesium, and zinc—intakes were below the RDA for many groups (fig. 3). (Vitamin E and zinc were not examined in 1977-78.)

Intakes of three nutrients—vitamin B-6, calcium, and zinc—were below the RDA regardless of income, but intakes were lower for low-income than for high-income individuals. Average calcium intake varied by race and was much lower for blacks (75 percent of RDA) than for whites (91 percent of RDA). Vitamin B-6 and zinc intakes were similar for blacks and whites, although both races had intakes below the RDA.

An average intake below the RDA does not necessarily mean that people in a group are malnourished. Individual nutrient requirements differ, and the RDA are set high enough to meet the requirements of most healthy people. Thus, the RDA exceed the requirements of many individuals. However, the risk that some individuals have inadequate intakes increases as the average intake for the group falls further below the RDA.

Figure 3

Intakes of Several Nutrients Below the RDA, 1989-90



Maintain Healthy Weight

Obesity is a major health problem in the United States. It is linked with high blood pressure, heart disease, stroke, adult-onset diabetes, and certain cancers.

Survey respondents were classified as underweight, acceptable weight, or overweight using self-reported height and weight. A lower percentage were classified as acceptable weight in 1989-90 than in 1977-78 (table 1). Considerably more were classified as overweight—particularly men age 40 to 59 years. About 3 percent of the overweight men and 11 percent of the overweight women reported that they were on a low-calorie or weight-loss diet (for additional information on this subject, see "Attitudes and Behaviors Related to Weight Status" elsewhere in this issue).

Although the proportion of the population classified as overweight increased considerably since 1977-78, calorie levels fell slightly for most groups in the same period. The average caloric intake in 1989-90 was 1,763, compared with 1,826 in 1977-78. Men ate more than women—2,119 calories compared with 1,492 calories in 1989-90. But, on average, men also have higher energy requirements than women.

For nearly all age, income, and race groups, the reported calorie intakes were below the average recommended in the 10th edition of the Recommended Dietary Allowances. However, some evidence suggests that people participating in nutrition surveys underreport the food they eat, either by completely omitting foods or by under-

Table 1
More People Are Overweight Than a Decade Ago

Gender and age	Underweight		Acceptable weight		Overweight	
	1977-78	1989-90	1977-78	1989-90	1977-78	1989-90
			Percent			
Males:						
20-29 years	15	13	73	70	12	17
30-39 years	6	4	73	67	21	29
40-49 years	7	4	70	62	23	35
50-59 years	5	4	72	58	23	39
60-69 years	7	4	72	69	21	27
70 and over	12	15	76	66	12	19
20 and over	9	7	73	66	18	28
Females:						
20-29 years	14	11	72	76	14	13
30-39 years	9	7	73	67	18	26
40-49 years	5	5	70	63	25	33
50-59 years	4	2	67	60	29	38
60-69 years	4	6	64	52	32	42
70 and over	10	8	66	66	24	26
20 and over	8	7	69	65	22	28

Note: Data may not total 100 due to rounding.

estimating the amount eaten. Moreover, these average energy allowances are designed for people with light to moderate levels of physical activity, and Americans' actual level of physical activity may be lower.

Choose a Diet Low in Fat, Saturated Fat, and Cholesterol

Americans are advised to limit total fat intake to no more than 30 percent of calories and to keep saturated fat intake to less than 10 percent of calories. Many health authorities recommend a daily cholesterol intake of less than 300 milligrams (mg).

In 1989-90, total fat provided 35 percent of calories, and saturated fat supplied about 12.5 percent—with little difference by sex, age, income, or race. Although the percentage of calories from fat in our diets is above the recommendation, it is down considerably from the 40-percent level in 1977-78.

Cholesterol intakes averaged 259 milligrams in 1989-90, but were considerably higher for men than for women. Among men, average cholesterol intakes ranged from 296 milligrams for those age 70 and over to 365 milligrams for those age 20 to 29 years. Cholesterol intake was not measured in 1977-78, so no comparisons are possible.

A much higher percentage of both men and women had 3-day intakes that met the recommendation for cholesterol than met the recommendations for total fat and saturated fat. About one-fifth of men and one-fourth of women had diets that met the recommendations for fat; similar proportions met the recommendation for saturated fat. About half of the men and four-fifths of the women had diets that met the recommendation for cholesterol. Only 11 percent of men and 17 percent of women had diets that met all three recommendations (for additional information, see "Diet-Health Awareness About Fat and Cholesterol—Only a Start" elsewhere in this issue).

More lower-fat products and changes in food choices have probably contributed to the reduced percentage of energy from fat. For example, our intake of whole fluid milk fell 32 percent between 1977-78 and 1989-90, while that of low-fat/skim milk rose 108 percent.

How Food Is Reported

The CSFII collected information about foods eaten over 3 days. Over 3,500 foods were reported in 1989-90. For purposes of analyses, these foods were combined into about 70 food groups and subgroups.

Survey procedures call for the collection of information on food as individuals eat it. Foods are coded and then assigned to one of the food groups and subgroups.

Mixtures, such as stew, macaroni and cheese, and sandwiches, are assigned to the food group of the main ingredient. For example, spaghetti, pizza, and fruit pies are assigned to the grain products' group, even though they may also contain foods from the meat, dairy, vegetable, or fruit groups. Similarly, ham sandwiches and cheeseburgers are assigned to the meat group, even though they also contain foods from the grain, dairy, or vegetable groups.

Work is underway to break these mixtures into their component parts for assignment to the appropriate group. Data on mixtures that were mainly grain or mainly meat, poultry, fish were published with the 1987-88 Nationwide Food Consumption Survey.

In this article, the meat, poultry, fish group includes beef, pork, lamb, veal, game, frankfurters, sausages, luncheon meats, poultry, and fish and shellfish, as well as mixtures in which the main component is meat, poultry, or fish.

Grain products include yeast breads and rolls, cereals and pastas, quick breads, pancakes, french toast, cakes, cookies, pastries, pies, crackers, popcorn, pretzels, and corn chips, as well as grain mixtures (mixtures in which a grain product is the main ingredient, such as pizza, tacos, or macaroni). Other food groups also include mixtures. For example, egg salad sandwiches are classified with eggs, and potato salad is classified with potatoes.

(See box at the end of this article for details about consumption estimates.)

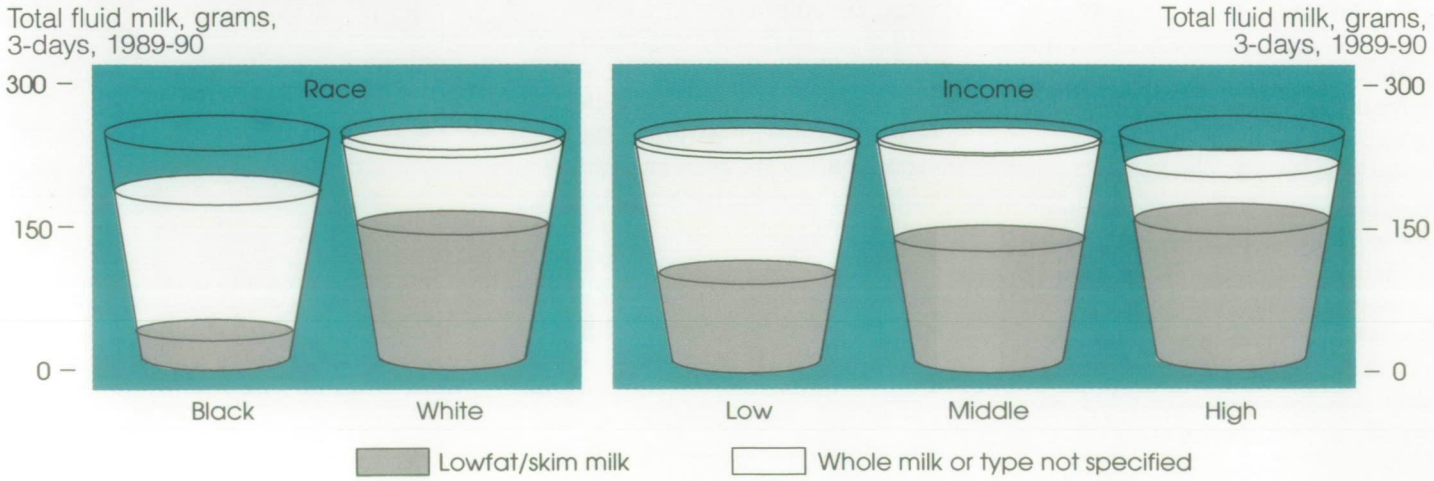
More lower-fat products, leaner meats, and changes in food choices have probably contributed to the reduced percentage of energy from fat. For example, our intake of whole fluid milk fell by nearly a third (down 32 percent) between 1977-78 and 1989-90, while our intakes of lowfat/skim milk rose 108 percent. In 1989-90, older Americans drank larger proportions of their milk as lowfat or skim milk than did younger age groups—possibly because older people are more aware of dietary guidance to reduce fat or are more concerned about health than are younger people. Whites drank a larger proportion of their milk as lowfat or skim milk than blacks. The proportion of milk that was lowfat or skim milk also increased with income (fig. 4).

Choose a Diet With Plenty of Vegetables, Fruits, and Grains

The Dietary Guidelines used to stress the importance of complex carbohydrates and dietary fiber in a healthy diet. The 1990 edition was revised to focus on the foods that contain these dietary components. Adults are now advised to eat at least three servings of vegetables and two servings of fruit each

Figure 4

Consumption of Lowfat/Skim Milk Is Higher for Some Population Groups



day, as well as six servings of grain products.

Average intake of grain products increased by 19 percent between 1977-78 and 1989-90, with consumption of grain mixtures up 62 percent (fig. 2). In both surveys, almost everyone ate some grain products. The percentage eating grain mixtures rose from 45 to 60 percent.

Pizzas illustrate how consumption of grain mixtures increased over the decade. The amount of pizza consumed tripled from 6 to 19 grams per day between 1977-78 and 1989-90, and the percentage of people eating pizza at least once in 3 days grew from 10 to 23 percent. In 1989-90, children ages 6 to 11 years were the biggest consumers of pizza—45 percent of boys and 39 percent of girls this age ate pizza at least once in the 3-day survey period.

Pizzas illustrate the 62-percent increase in the consumption of grain mixtures between 1977-78 and 1989-90. The amount of pizza consumed tripled, and the percentage of people eating pizza at least once in 3 days grew from 10 to 23 percent.

Between 1977-78 and 1989-90, the average intake of vegetables (in grams) declined by about 10 percent (fig. 2). However, this consumption may be underestimated, because vegetables are frequently eaten as part of mixtures (such as carrots or potatoes in stews and tomatoes in sandwiches, casseroles, or pizza) and would be grouped with the main ingredient (meat or grain mixtures). Most individuals ate vegetables at least once in 3 days in both 1977-78 and 1989-90.

In 1989-90, consumption of white potatoes made up one-third of total vegetable consumption—eaten by three-fourths of the respondents at least once in 3 days. Overall, about 15 percent of the intake of potatoes was in the form of french fries (not including potato chips, potato skins, or other types of fried potatoes). The proportion of white potatoes eaten as french fries was highest among males under age 30 and females under age 20.

Fruit consumption was about the same in 1989-90 as in 1977-78. In both surveys, only three-fourths of individuals ate fruit or drank fruit juice at least once over 3 days; the remainder consumed no fruit at all during those days.

Vegetables and fruit are major sources of vitamins A and C in the diet. Although average intakes by all sex and age groups for both vitamins are above the RDA, the averages conceal variations. For women age 20 years and over who ate no fruit, average intakes of vitamin C ranged from 60 to 81 percent of the RDA, compared with 126 to 166 percent of the RDA for all women. Individuals who ate no fruit in the 3 days also consumed more calories from fat (37 percent) than did all individuals (35 percent).

The average intake of fiber in 1989-90 was 13 grams. Men tended to consume more fiber (16 grams) than did women (12 grams). Although the Dietary Guidelines make no recommendation on the amount of fiber that should be consumed, these levels fall well below the 20 to 30 grams recommended by the National Cancer Institute (for additional information on fiber, see "Fiber: Not Enough of a Good Thing?" elsewhere in this issue).

Use Sugars Only in Moderation

Currently, it's impossible to examine intakes of total sugars in the diet using the CSFII because the survey nutrient database does not include total sugar. However, food disappearance data suggest that sugar consumption is on the rise.

Much of the sugar we eat is found as an ingredient in other foods, such as cookies or cakes, sweetened beverages, and other processed foods. This makes it difficult for people to know how much sugar they are actually consuming, or to realize that their consumption of sugar is increasing.

For example, in 1977-78, consumption of soft drinks was about half the consumption of either milk or coffee. By 1989-90, however, the amounts were almost equal. While average milk and coffee consump-

Survey Consumption Estimates May Differ From Food Disappearance Trends

Consumption estimates from the Continuing Survey of Food Intakes by Individuals (CSFII) may not match food disappearance trends because of differences in the collection methods.

Food disappearance data reflect the amount of the major food commodities entering the marketing channels, regardless of their final use. The food disappearance data estimate the total amount available for consumption as the residual after exports, industrial uses, seed and feed use, and year-end inventories are subtracted from the sum of production, beginning inventories, and imports. The use of conversion factors allow for subsequent processing, trimming, shrinkage, or loss in the distribution system. However, the estimates also include residual uses for which data are not available (such as miscellaneous nonfood uses, and changes in retail and consumer stocks). Because the food disappearance data come from market channels, the data are available only on a per capita basis and cannot be used to estimate consumption by sex, age, or demographic group.

The CSFII collects information on the kinds and amounts of foods eaten at home and away from home. The data provide estimates of food actually ingested for individuals classified by sex, age, income, race, and region.

Consumption estimates derived from food disappearance data tend to overstate actual consumption because they include spoilage and waste accumulated through the marketing system and in the home. On the other hand, survey estimates may understate actual consumption because respondents in surveys tend to underreport what they ate. Thus, the food disappearance estimates may be viewed as representing an upper estimate of consumption, while the CSFII data represent a lower estimate. The food disappearance data are used more appropriately as indicators of trends in consumption over time, while the survey data are used appropriately as measurements of food actually eaten.

tion stayed about the same, soft drink consumption increased 69 percent from 141 grams to 238 grams (an 8-ounce cup of fluid milk, coffee, or soda weighs about 245 grams). Although the intake of low-calorie soft drinks more than tripled from 20 grams in 1977-78 to 62 grams in 1989-90, the sugar-sweetened type makes up about three-fourths of the total consumption of soft drinks.

Use Salt and Sodium Only in Moderation

The Food and Nutrition Board of the National Academy of Sciences has recommended that daily intakes of salt (sodium chloride) be limited to 6 grams. This translates into a daily sodium intake of 2,400 milligrams.

The average intake of sodium in 1989-90 was 2,946 milligrams—3,701 milligrams for men and 2,397 milligrams for women. (Intakes of sodium were not examined in 1977-78.) However, these intakes are underestimated because they do not include salt added at the table. ■

Diet-Health Awareness About Fat and Cholesterol—Only a Start

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Most people seem to understand that eating too much fat and cholesterol could adversely affect their health. But when it comes to consumption, that awareness is not translated into effective behavior. Are consumers getting adequate information, ignoring the information, or misinterpreting the specifics?

For several decades, the public health community in the United States has been advising consumers to reduce their intakes of total fat, saturated fat, and cholesterol to lower the risks of coronary heart disease (see box). Eating less fat also can lower the risk of cancer and obesity.

Many consumers have heard these messages. According to a number of surveys by the Food Marketing Institute, nutrition is a major consideration for shoppers, and consumers report having changed their diets due to health concerns. In particular, consumers report eating less red meats and more fish and poultry, frying foods less often, and limiting their use of fats and oils.

National food availability data confirm some of these consumption trends. But two separate studies by USDA suggest that changes in food consumption patterns do not necessarily result in lower intakes of fat.

For example, a 1991 study by USDA's Economic Research Service showed that although women with higher education levels made greater changes in their diets between 1977 and 1988 than did women with less education, these

The new nutrition labels, which will soon appear on most processed foods, will provide information on the level of fat, saturated fat, and cholesterol in one serving of that food and will define nutrient-content claims, such as "fat-free." This should not only make it easier for consumers who wish to improve their diet to do so, but it also may encourage food manufacturers to provide more healthful food choices to consumers.

Frazao is an economist with USDA's Economic Research Service and Cleveland is a nutritionist with USDA's Human Nutrition Information Service.

Fat and Cholesterol: What Are They and Where Are They Found?

Most health authorities recommend that individuals 2 years of age and older consume less fat, saturated fat, and cholesterol. Populations with diets high in fat have more obesity and certain types of cancer. A diet low in saturated fat and cholesterol can help maintain a desirable level of blood cholesterol and reduce the risk of heart disease.

Fat is the most concentrated source of food energy (calories). Butter, margarine, shortening, and oil are obvious sources of fat. Other major sources of fat are well-marbled meats, poultry skin, whole milk, cheese, ice-cream, nuts, seeds, salad dressings, and some baked products.

All fats contain both saturated and unsaturated fat (fatty acids). Saturated fats are found in large proportions in fats of animal origin, in tropical oils (coconut, palm kernel, and palm oils), and in some hydrogenated fats (margarine and vegetable shortening).

Cholesterol is a component of all the body cells of humans and animals. It is needed to form hormones, cell membranes, and other body substances. Cholesterol is present in all animal products—meat, poultry, fish, milk and milk products, and egg yolks—and in mixtures, such as baked products and mayonnaise, that contain egg yolks, cheese, milk, butter, or lard as ingredients. Foods of plant origin, such as fruit, vegetables, grains, nuts, seeds, and dry beans and peas, contain no cholesterol.

changes did not result in significantly different levels of fat intake between the two groups. Basically, the women with higher education traded fat from one source for another, such as from red meats to dairy products and grain-based mixtures (such as pizza), with little net effect on overall intake of fat.

Similarly, a 1989 study by USDA's Human Nutrition Information Service (HNIS) shows little difference in fat intake of women in various income groups, even though higher-income women were more likely to decrease their intake of meat, whole milk, and eggs between 1977 and 1985.

New USDA surveys provide the first opportunity on a national scale to compare consumers' actual food intake with their awareness about diet and health, and their knowledge, attitudes, and self-rating of their diets. These are the 1989 and 1990 Diet and Health Knowledge Survey (DHKS) and the 1989 and 1990 Continuing Survey of Food Intakes by Individuals (CSFII), both conducted by HNIS (see the inside front cover of this issue for more details on the surveys).

In the CSFII, household members provided detailed information on what they ate for 3 consecutive days as well as personal information, such as income, race, education, and health status. In the DHKS, the main meal planner/preparer in each CSFII household was asked a series of questions to assess attitudes and knowledge about the *Dietary Guidelines for Americans*, nutrition, and diet and health relationships.

Results presented here are from data on 513 men and 2,367 women who were the main meal planners/preparers for their households, who completed the DHKS, and who provided information on their food intake for 3 days in the CSFII.

Diet-Disease Awareness Higher for Cholesterol Than for Fats

Public-health efforts to increase consumer awareness of diet-disease relationships aim to make consumers understand that what they eat may affect their health. Such efforts are based on the assumption that consumers who are aware of diet-disease relationships will be motivated to adopt more healthful diets.

Consumers interviewed in the DHKS were asked, "Have you heard about any health problems that might be related to . . . (how much fat a person eats, how much saturated fat a person eats, how much cholesterol a person eats)?"

If respondents answered "yes," they were then asked "What problems are these?" Respondents were encouraged to provide as many answers as possible. Some may not have been able to provide an answer right away, although they might have recognized some problems if cued.

For purposes of this analysis, diet-health "awareness" meant that the individual had heard of health problems that might be related to how much fat, saturated fat, or cholesterol a person eats, regardless of whether or not they correctly identified the associated health problems.

More meal planners were aware of health problems associated with cholesterol than were aware of problems associated with fat or saturated fat (table 1). This finding has important implications for nu-

Table 1
Diet-Disease Awareness Is Higher for Cholesterol Than for Fat

Consumer profile	Consumers aware of health risks associated with consumption of— Total fat	Saturated fat	Cholesterol
	Percent of meal planners		
Overall average	76	64	87
Gender:			
Women	77	63	87
Men	75	64	86
Age group:			
Under 30 years	69	55	87
30-49 years	79	66	89
50 years and over	77	65	83
Education:			
Less than high school	66	48	73
Completed high school	71	60	86
More than high school	85	74	93
Income level (percent of poverty line)[1]:			
130 percent and less	62	48	74
131-185 percent	73	63	82
186-350 percent	76	61	88
Over 350 percent	84	72	92
Race:			
White	77	66	88
Black	72	53	79

[1]The poverty line adjusts household income for household size and composition. In 1989, the average poverty threshold for a household of four was $11,669. The Food Stamp Program uses 130 percent of the poverty line as the cutoff for its income eligibility criteria; the Women, Infants, and Children (WIC) Program uses 185 percent of the poverty line as the cutoff for its income eligibility criteria.

trition education programs, since intake of saturated fats has a bigger impact on blood cholesterol levels—and, therefore, on risk for heart disease—than does intake of either total fat or cholesterol.

Awareness of the relationships between health and how much fat, saturated fat, and cholesterol a person eats was similar for both male and female meal planners (table 1). For fat and saturated fat, awareness levels were lower for meal planners under age 30 than for older meal planners. For fat, saturated fat, and cholesterol, awareness levels increased with education and income levels, and were higher among whites than among blacks.

Only a Fourth Met Recommendations for Fat Intake

Both male and female meal planners had an estimated average intake of 35 percent of calories from fat and 12 percent of calories from saturated fat—above the maximum levels recommended by the *Dietary Guidelines for Americans* of 30 percent or less of calories from fat and less than 10 percent of calories from saturated fat. Three-quarters of the meal planners exceeded these recommended levels for both fat and saturated fat (table 2).

Meal planners fared better in meeting the cholesterol level recommended by many health authorities of less than 300 milligrams (mg) of cholesterol per day for both women and men. The estimated intake for women was 221 mg, while that for men was 327 mg. Nearly four out of five women meal planners met the recommendation for cholesterol, compared with less than half of the men (table 2). This gender difference is not surprising. Because men generally eat more food and calories than women do, their average cholesterol intake is higher than women's. But the recommendation is the same for all individuals, regardless of the number of calories consumed.

Meal planners 50 years and older were more likely than younger meal planners to meet the dietary recommendations for fat, saturated fat, and cholesterol (table 2). There was no clear relationship

between education or income and meeting the recommendations. Whites did better than blacks in meeting the dietary recommendation for cholesterol, but not for fat or saturated fat, in spite of their higher awareness of the effect of all three dietary components on disease.

In general, meal planners aware of diet-disease relationships were not more likely than others to meet the recommended intakes for fat, saturated fat, or cholesterol (table 2). This suggests that whereas awareness may stimulate change, a number of other factors (such as nutrition knowledge, taste, cultural patterns, convenience, prices, and income) may intervene and reduce its influence on consumption.

Table 2
More Meal Planners Meet Recommendations for Cholesterol Than for Fat

Consumer profile	Consumers meeting dietary recommendations for— Total fat	Saturated fat	Cholesterol
	Percent of meal planners		
Overall average	24	25	73
Gender:			
Women	23	26	79
Men	24	22	49
Age group:			
Under 30 years	25	25	67
30-49 years	19	18	69
50 years and older	29	34	81
Education:			
Less than high school	25	28	72
Completed high school	22	23	74
More than high school	25	25	72
Income level (percent of poverty line)[1]:			
130 percent and less	25	24	75
131-185 percent	24	31	78
186-350 percent	27	29	70
Over 350 percent	21	22	72
Race:			
White	23	25	75
Black	20	23	61
Diet-disease awareness:			
Fat-disease relationship—			
Aware	23	25	73
Not aware	26	25	73
Saturated fat-disease relationship—			
Aware	23	26	72
Not aware	25	25	75
Cholesterol-disease relationship—			
Aware	23	25	73
Not aware	27	29	69

[1]The poverty line adjusts household income for household size and composition. In 1989, the average poverty threshold for a household of four was $11,669. The Food Stamp Program uses 130 percent of the poverty line as the cutoff for its income eligibility criteria; the Women, Infants, and Children (WIC) Program uses 185 percent of the poverty line as the cutoff for its income eligibility criteria.

Meal Planners Underestimate Fat, Overestimate Cholesterol in Diets

One factor influencing consumption could be the individual's assessment of the adequacy of his or her own intake. Individuals who believe their current intake levels are about right may see no need to act on their diet-disease awareness and change their dietary practices.

But, individual perception about the level of intake of one's diet does not always match reality. When asked to compare the levels of fat, saturated fat, and cholesterol in their own diet with "what is most healthful," both men and women meal planners tended to underestimate the amount of fat and saturated fat in their diets, but overestimate the amount of cholesterol. Whereas 41 percent of the meal planners thought the level of fat in their diets was "about right," and 49 percent thought their diets were "about right" for saturated fat, only 25 percent of the meal planners actually met the recommendations for fat and saturated fat. Conversely, slightly more than half of the meal planners thought their diets were "about right" for cholesterol, although nearly three-fourths met the recommendation for cholesterol.

Those With High Blood Cholesterol More Likely To Be on a Special Diet

A number of studies have found that the presence of a health condition plays an important role in increasing awareness of diet-disease relationships and fostering changes in dietary patterns. Not surprisingly, the existence of a health condition for which a low-fat/low-

cholesterol diet may be recommended (high blood cholesterol, heart disease, cancer, and stroke) was positively associated with being on a special low-fat/low-cholesterol diet.

Among those with at least one of the four health conditions above, 19 percent were on a special low-fat/low-cholesterol diet, compared with only 4 percent of those without any of the conditions. Among those with heart disease, 28 percent said they were on a special low-fat/low-cholesterol diet, compared with 7 percent of those without heart disease. Among those with high blood cholesterol, 32 percent were on a special low-fat/low-cholesterol diet, compared with 5 percent of those without high blood cholesterol.

It is not clear why more than two-thirds of those with high blood cholesterol or heart disease did not report being on a special low-fat/low-cholesterol diet. Had these individuals been advised by their doctors to reduce their intake of fat, saturated fat, or cholesterol? If so, had they not fully understood the advice, or had they decided not to follow the advice? Or, were they not advised to do so? How many meal planners were trying to reduce their intake of fat, saturated fat, and cholesterol, but just did not consider themselves as "being on a special diet"?

One would expect that those who had been told by a doctor about their health condition would also have been told by the doctor about the importance of diet to their condition and, would, therefore, have higher levels of awareness about the diet-disease relationship. This was true among those with high blood cholesterol, but not for heart disease (fig. 1). Those with and without heart disease had similar diet-disease awareness about fat and cholesterol, but not about saturated fat.

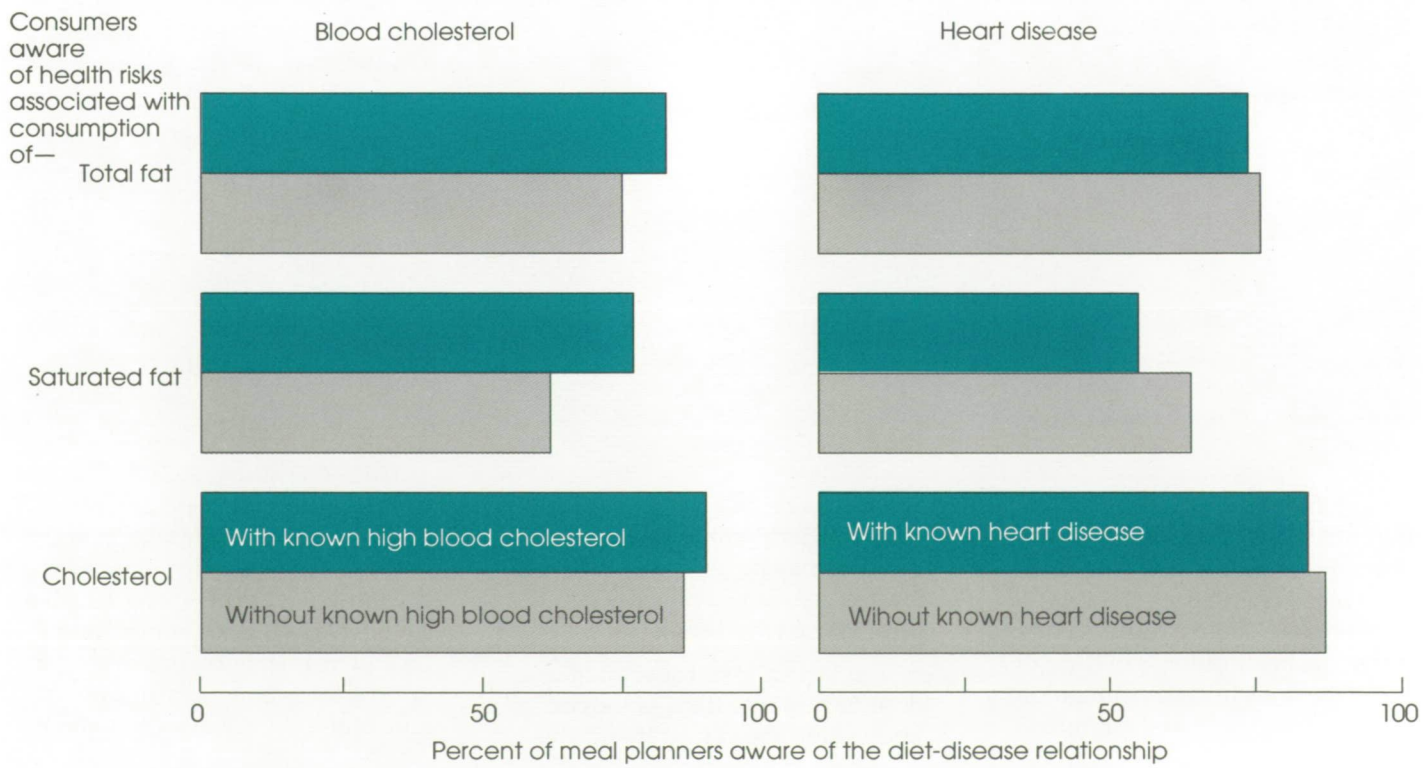
Insufficient Knowledge May Hamper Diet Efforts

Meal planners who reported being on a special low-fat/low-cholesterol diet had lower average intakes of fat, saturated fat, and cholesterol, and were more likely to meet recommendations for fat, saturated fat, and cholesterol than were those not on such diets (table 3).

However, two-thirds of those on a low-fat/low-cholesterol diet still consumed more than 30 percent of their calories from fat, and over half consumed more than 10 percent of their calories from saturated fat—suggesting that some of these low-fat/low-cholesterol diets may not be quite that low in fat. Al-

Figure 1

Meal Planners With High Blood Cholesterol Are More Aware of Diet-Health Risks Than Are Those Without High Blood Cholesterol



How To Be Wiser About Fat Intake

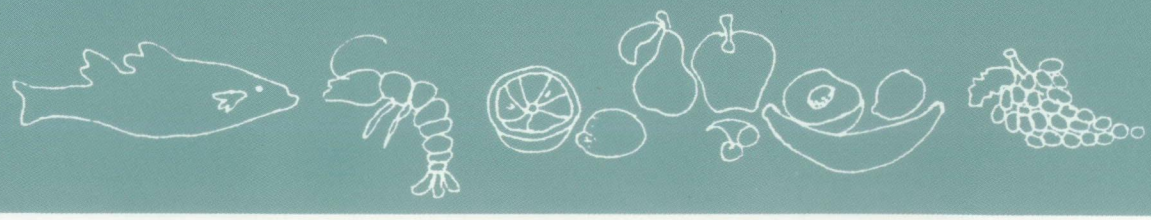
Dietary factors—particularly a high intake of fats—are associated with increased risk for obesity and certain types of cancer.

The Dietary Guidelines recommend that, for those age 2 and older, fat intake should provide 30 percent or less of calories. An easy way for adults to estimate their upper limit on grams of fat is to divide their healthy weight by 2 (see table for suggested weights). Thus, for an adult whose healthy weight is 120 pounds, total daily intake should not exceed 60 grams of fat; at 180 pounds, it's 90 grams of fat. (Note, however, that this is just a simple formula—and may need to be adjusted up or down to account for sex, age, health, and physical activity levels). This formula underestimates fat for children.

Knowledge of the fat content of foods may help consumers choose a low-fat diet. Consumers can find how many grams of fat are in a serving of food by looking at the nutrition labels. It is important to determine, however, how the serving size listed on the label compares with the amount of the foods eaten.

The list below illustrates the differences in the fat content of some foods commonly eaten. Each amount of food listed contains about 5 grams of fat.

- **Breads and cereals:** 4 English muffins, 1 biscuit or blueberry muffin, 1/5 of a cheese Danish, 1/8 donut, 1-1/3 frozen waffles, 3-1/2 egg bagels, 10 graham crackers, 43 cups Corn Chex cereal.
- **Vegetables:** 9 cups broccoli or 1 cup broccoli with 1 tablespoon cheddar cheese sauce, 6 pounds shredded romaine lettuce or 1 cup romaine lettuce with 2 teaspoons blue cheese dressing, 32 baked potatoes or 1 baked potato with 3 tablespoons sour cream.
- **Fruit:** 10 apples or bananas, 8 cups sweetened applesauce, 10 cups blueberries, 2 pounds grapes, 15 kiwis, 32 oranges, 64 peaches, 6 cups strawberries, 7 cups cubed watermelon.
- **Dairy:** 1/2 cup whole milk, 2 cups 1-percent milk, 25 cups skim milk, 1-1/3 cups lowfat or 30 cups nonfat yogurt, 1/2 ounce cheddar cheese, 1 ounce part-skim mozzarella, 1 tablespoon cream cheese or heavy cream, 3 tablespoons half-and-half or sour cream.
- **Meats:** 1-2/3 slices crisp bacon, 1 ounce extra-lean ground beef, 3-1/2 ounces eye of round roast, 1-3/4 ounce broiled sirloin steak, 1 ounce broiled or 1/2 ounce fried pork chop.
- **Poultry:** *Roast chicken:* 2-1/2 ounces breast with skin or 5 ounces without skin, 1 ounce dark meat with skin or 1-3/4 ounces without skin. *Roast turkey breast:* 1-1/4 pounds without skin, 8 ounces with skin.
- **Fish:** 7-1/2 ounces broiled striped bass, 3 ounces broiled Atlantic salmon, 1-1/2 ounces fried catfish, 2 cups steamed crab, 16 ounces steamed shelled shrimp or 1-1/2 ounces fried shrimp, 9 ounces water-packed or 2 ounces oil-packed albacore tuna.



though many consumers think they are eating a low-fat/low-cholesterol diet, and many state they have made changes in the way they prepare and eat foods to improve the healthfulness of their diets, some are still consuming more than the recommended amounts.

It could be that the meal planners' nutrition knowledge (or lack thereof) may be hampering their efforts to consume a diet low in fat, saturated fat, and cholesterol.

The DHKS asked several questions to measure meal planners' knowledge about the fat and cholesterol content of food and other general knowledge about fat and cholesterol. Most meal planners did fairly well in choosing which of a pair of foods is higher in fat or cholesterol. They correctly answered an average of three out of four of the cholesterol comparisons

Dried beans: 2 cups baked beans, 5 cups black beans, 6 cups pinto beans, 2/3 cup refried beans with cheese.

Eggs: 1 large boiled or poached, 2/3 scrambled or in an omelet, 3/4 fried.

Desserts: 1/2 small brownie, 1 chocolate chip cookie, 1/24 of a frosted chocolate cake, 1-3/4 angel food cakes, 1/3 cup chocolate pudding, 1/5 cup premium vanilla ice cream.

Fast foods: 1/7 Burger King Whopper, 1/6 Big Mac, 1/2 Taco Bell bean burrito, 1/6 sausage biscuit, 1/12 Taco Salad, 1/6 Kentucky Fried Chicken Extra Crispy thigh, 1/4 serving Chicken McNuggets, 1/2 cup french fries.

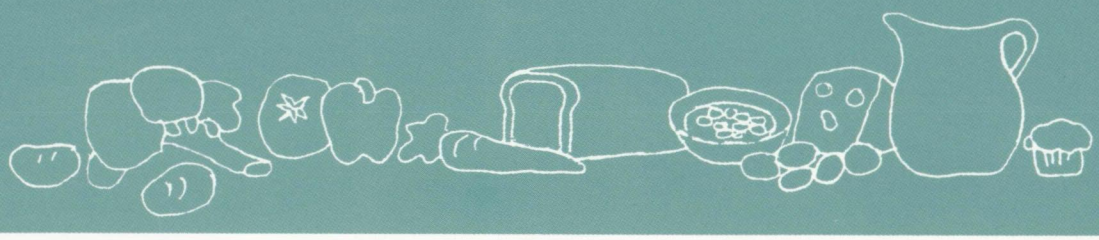
Snacks: 7 potato chips, 2 cups buttered popcorn or unlimited containers of unbuttered, 1/2 ounce corn chips, 1 tablespoon peanuts, 2 teaspoons peanut butter, 1/2 ounce milk chocolate.

Source: Adapted from (with permission from the author), Frances Price, "Making Sense of How Much Fat Is in a Gram," *The Journal*, Dec. 8, 1993.

Suggested Weights for Adults[1]

Height[2]	Weight	
	19 to 34 years	35 years and over
	Pounds[3]	
5'0"	97-128	108-138
5'1"	101-132	111-143
5'2"	104-137	115-148
5'3"	107-141	119-152
5'4"	111-146	122-157
5'5"	114-150	126-162
5'6"	118-155	130-167
5'7"	121-160	134-172
5'8"	125-164	138-178
5'9"	129-169	142-183
5'10"	132-174	146-188
5'11"	136-179	151-194
6'0"	140-184	155-199
6'1"	144-189	159-205
6'2"	148-195	164-210
6'3"	152-200	168-216
6'4"	156-205	173-222
6'5"	160-211	177-228
6'6"	164-216	182-234

[1]The higher weights in the ranges generally apply to men, who tend to have more muscle and bone; the lower weights more often apply to women, who have less muscle and bone. [2]Without shoes. [3]Without clothes. Source: U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Nutrition and Your Health: Dietary Guidelines for Americans.* Third edition, 1990.



and six of the eight fat comparisons. And, 60 percent knew that foods labeled cholesterol-free could be either high or low in saturated fat. However, only 39 percent knew that cholesterol is found only in animal products (nearly half thought it was found in all foods containing fat), and only one-third knew that the type of fat more likely to be a liquid than a solid is a polyunsaturated fat.

By adding all the correct answers to the questions relating to fat and cholesterol, a total knowledge score was developed, ranging from 0 to 15. On average, total knowledge was higher among women and whites, and increased with age, education, and income. Meal planners aware about fat, saturated fat, or cholesterol, or those on a special low-fat/low-cholesterol diet, also had higher knowledge scores. Those with higher knowledge scores were more likely

Table 3
Meal Planners on Special Low-Fat/Low-Cholesterol Diet Are More Likely To Meet Recommendations for Fat, Saturated Fat, and Cholesterol

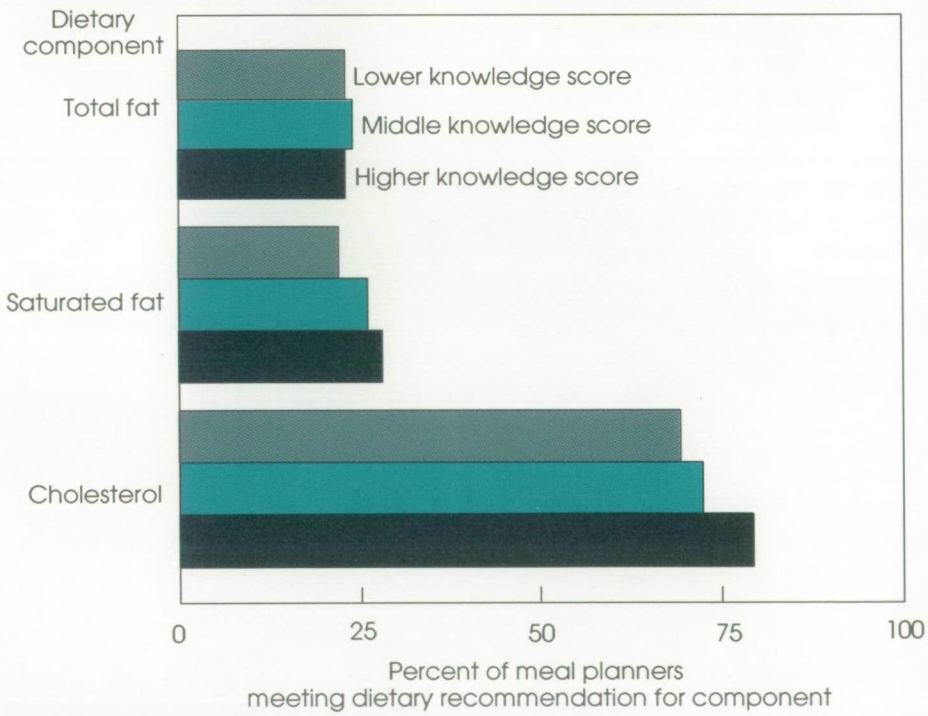
Consumer profile	Intake level of—			Consumers meeting recommendation for—		
	Total fat	Saturated fat	Cholesterol	Total fat	Saturated fat	Cholesterol
	Percent of calories		*milligrams*	*Percent of meal planners*		
On special low-fat/ low-cholesterol diet	32.1	10.5	188.6	33	49	88
Not on special low-fat/ low-cholesterol diet	34.9	12.3	247.1	23	23	72

than those with lower knowledge scores to meet the recommendations for saturated fat and cholesterol, but not for total fat (fig. 2).

Help Is on the Way for Consumers Interested in Improving Diets

The U.S. Government plays an important role in educating consumers about diet-disease relationships and good nutrition. The new nutrition labels, which will soon appear on most processed foods, will provide information on the level of fat, saturated fat, and cholesterol in one serving of that food. This should not only make it easier for consumers who are interested in improving their diets to do so, but it may also encourage food manufacturers to provide more healthful food choices to consumers.

Figure 2
Knowledge Helps Meal Planners Meet Recommendations for Saturated Fat and Cholesterol



Lower knowledge score = 0 -10 correct (34.3 percent of the sample); Middle knowledge score = 11 -12 correct (39.2 percent of the sample); and Higher knowledge score = 13-15 correct (26.5 percent of the sample).

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Fiber: Not Enough of a Good Thing?

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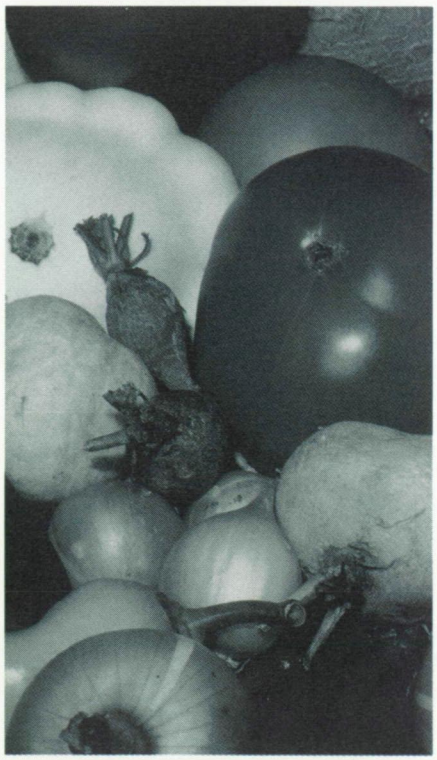
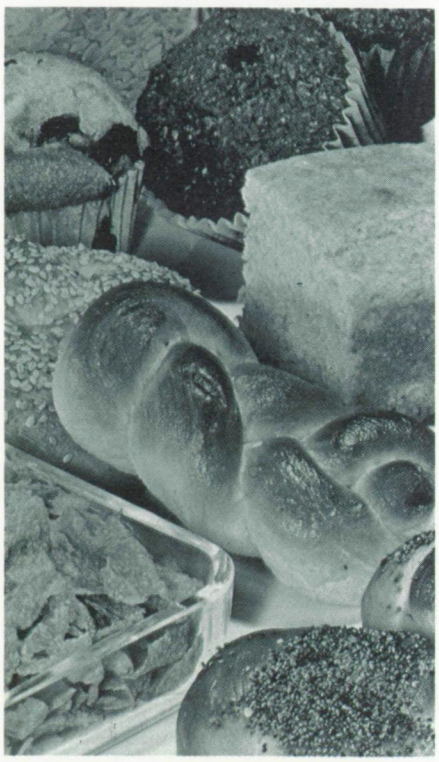
The most recent Surgeon General's *Report on Nutrition and Health* advises Americans to increase consumption of all complex carbohydrates, including dietary fiber.

Despite intensive efforts by nutritionists, manufacturers, and others to spread the word about the virtues of fiber, intakes remain below the levels recommended by some health authorities. One reason may be that some population groups still know little about fiber and its relationship to health. Who are they? Likewise, what groups can identify foods high in dietary fiber and which Americans have the highest fiber intake?

Data from USDA's 1989-90 Diet and Health Knowledge Survey (DHKS) and its associated Continuing Survey of Food Intakes by Individuals (CSFII) provided the basis for this article. The CSFII survey collects information on what Americans eat and how much they eat, as well as personal health-related data. The DHKS, a follow-up survey to the CSFII, collects information from the household's main meal planner/preparer on his or her attitudes and knowledge about food and nutrition and health issues (see inside front cover for more information about the surveys). These surveys are among the first to provide information on nutritional knowledge and attitudes and food consumption from the same individual. Only meal planners/preparers who provided 3 days of food intake information and completed the DHKS are reported in this article. There were 2,880 respondents meeting these criteria.

These surveys reveal that many meal planners are aware of the relationship between what they eat and their overall health. With regard to dietary fiber, a fair number are aware of the link between intake and various health problems. A number of meal planners are





Regardless of a person's age, race, or income, two food categories provided the bulk of dietary fiber: cereal and bakery products, and vegetables and potatoes. Fruit seems to be a neglected source.

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also able to distinguish among high- and low-fiber foods.

Yet despite this "good news," average dietary fiber intakes are still far below amounts recommended by the National Cancer Institute and the American Cancer Society—suggesting that nutritional knowledge and awareness may not be sufficient to spur consumption changes.

Advantages to a High-Fiber Diet Relatively Clear

According to the CSFII, Americans currently consume about 12 grams of dietary fiber per day, a far cry from the National Cancer Institute's recommendation of eating foods that provide 20 to 30 grams of fiber per day. The Daily Reference Value, established by the Food and Drug Administration for use on food labels, is 11.5 grams of dietary fiber per 1,000 calories—28.75 grams of fiber in a 2,500 calorie diet. Consequently, we have a long way to go before reaching most recommended intakes and, therefore, obtaining the full advantages of a high-fiber diet.

Much has been written concerning the link between dietary fiber consumption and health. Elevated blood cholesterol levels are known to be one of the chief risk factors in heart disease, and a number of studies have linked diets high in soluble-fiber with reduced blood cholesterol levels (see box for more on the types of fiber). Only soluble fiber may produce a significant reduction of blood cholesterol levels, and the exact mechanism of this action is not yet totally understood.

"Eating foods with fiber is important for proper bowel function and can reduce symptoms of chronic constipation, diverticular disease, and hemorrhoids," according to the *Dietary Guidelines for Americans*. The guidelines suggest

Dietary Fiber: A Complex Carbohydrate

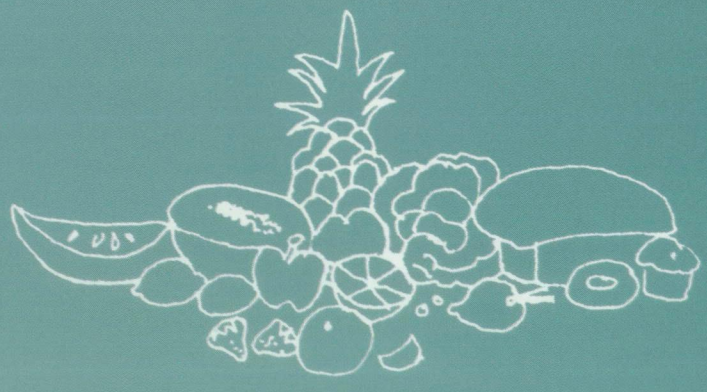
Sugar, fruit, vegetables, and breads are all sources of carbohydrates. In fact, all sugars and starches that we eat, as well as dietary fiber, are carbohydrates. Most carbohydrates are converted by the body into an essential substance—glucose, the main sugar in the blood and the body's basic fuel.

There are two general types of carbohydrates: simple and complex. Simple carbohydrates are the familiar sugars contained in such products as non-diet sodas and candy—foods that are generally high in calories with little nutritional value. In contrast, most foods containing complex carbohydrates are loaded with nutritional extras. Compare, for example, a slice of whole wheat bread, which contains 130 calories, and a regular soda with 150 calories. In addition to carbohydrates, the bread contains valuable nutrients, such as protein, B vitamins, iron, and dietary fiber. The soda contains none of these nutritional benefits.

All dietary fibers have two things in common: they are found only in plant foods and they are resistant to human digestive enzymes. While most other foods are digested and then absorbed as they pass through the small intestine, dietary fiber enters the large intestine relatively intact. This helps reduce symptoms of chronic constipation, diverticular disease, and some types of "irritable bowel."

Dietary fiber is divided into two basic groups, soluble and insoluble. Insoluble dietary fiber absorbs many times its weight in water, expanding in the intestine. This type of dietary fiber is found mainly in whole grains and on the outside of seeds, fruit, legumes, and other foods. This type of fiber is key in promoting more efficient elimination by increasing stool bulk and may alleviate some digestive disorders. It is also thought to play a role in colon cancer prevention.

Soluble dietary fiber is found in fruit, vegetables, seeds, brown rice, barley, oats, and oat bran. It can help produce a softer stool, and it works to increase cholesterol excretion in the bowel (by binding bile acids) and preventing their reabsorption.



that diets low in dietary fiber may increase the risk of developing certain types of cancer.

Research on the link between dietary fiber and health is not sufficiently developed to associate a specific type of fiber or characteristic of fiber— such as particle size, chemical composition, or water-holding capacity—with reducing health risks. That is, the specific mechanism through which fiber works to reduce health risks has not yet been found. It is not clear whether the health benefits are due to fiber or to other substances in foods that contain fiber.

For these reasons, the new nutrition labeling regulations require food labels which make health claims about dietary fiber intake to contain very specific language. The new food labeling regulations set forth by The Nutrition Labeling and Education Act of 1990 currently specifically prohibit health claims relating fiber consumption to reduced risk for coronary heart disease and cancer. The new regulations do allow health claims relating diets low in fat and high in fiber-containing grain products, fruit, and vegetables to a reduced risk of cancer and/or coronary heart disease.

Some People Know About Fiber and Believe They Need More of It

The DHKS revealed that nearly 9 out of 10 meal planners believe that what you eat can make a big difference in your chances of getting a disease; about 12 percent disagreed. About 59 percent of the meal planners felt their diet was healthy and saw no need to change. In contrast, about 40 percent disagreed with the statement that their diet is healthy and change is not necessary.

When it came to fiber, 42 percent of the meal planners thought their diets should contain more. Only 3 percent thought their diets contained too much fiber, while over 50 percent thought their diets were about right in fiber (table 1). Those feeling their diets should be lower in fiber consumed only 7.3 grams per day, meal planners believing their diets contained about the right amount consumed 11.4 grams, while those thinking their diets should be higher in fiber consumed 12.5 grams. All of these groups fell well below the National Cancer Institute's recommended daily consumption of 20 to 30 grams.

Over half (54 percent) of the meal planners indicated that they were aware of health problems associated with fiber intake (table 2). Of those, 15 percent mentioned circulation and heart problems, 40 percent mentioned cancer, and about 56 percent said bowel problems. Meal planners who were

Table 1
Many Believe They Get the Right Amount of Fiber in Their Diet

Group	Share of meal planners	Meal planners report the level of fiber in their diet should be— Lower	Higher	About right
		Percent		
All	100	3	42	51
Age:				
Under 30 years	18	5	47	45
30-49 years	45	3	52	43
50-69 years	24	3	30	64
70 years and over	13	2	20	70
Sex:				
Male	20	2	42	50
Female	80	4	41	52
Race:				
White	85	3	41	53
Black	11	6	49	40
Other[1]	4	3	32	56
Income, percent of poverty line[2]:				
130 percent and less	18	5	35	54
131-185 percent	11	2	43	53
186-350 percent	28	2	40	53
Over 350 percent	43	4	45	50
Education:				
Less than high school	21	3	43	49
Completed high school	35	4	43	50
More than high school	43	2	37	59

Note: Data may not total due to rounding. [1]"Other" race includes Aleuts, Eskimos, American Indians, Asian/Pacific Islanders, and other nonwhite/nonblacks. [2]The poverty line adjusts household income for household size and composition. In 1989, the average poverty threshold for a household of four was $11,669. The Food Stamp Program uses 130 percent of the poverty line as the cutoff for its income eligibility criteria; the Women, Infants, and Children (WIC) Program uses 185 percent of the poverty line as the cutoff for its income eligibility criteria.

Table 2
Over Half Are Aware of Fiber's Health Benefits

Group	Share of meal planners	Awareness of link between low fiber intake and health risk: Aware	Unaware	No answer
		Percent		
All	100	54	46	1
Age:				
Under 30 years	18	45	54	1
30-49 years	45	59	40	1
50-69 years	24	56	44	1
70 years and over	13	42	56	2
Sex:				
Male	20	50	49	1
Female	80	55	45	1
Race:				
White	85	56	43	1
Black	11	41	59	—
Other[1]	4	48	52	—
Income, percent of poverty line[2]:				
130 percent and less	18	38	62	1
131-185 percent	11	49	49	3
186-350 percent	28	56	43	1
Over 350 percent	43	61	39	—
Education:				
Less than high school	21	35	63	2
Completed high school	35	51	51	1
More than high school	43	65	65	—

Note: Data may not total due to rounding. — = Less than 1 percent. [1]"Other" race includes Aleuts, Eskimos, American Indians, Asian/Pacific Islanders, and other nonwhite/nonblacks. [2]The poverty line adjusts household income for household size and composition. In 1989, the average poverty threshold for a household of four was $11,669. The Food Stamp Program uses 130 percent of the poverty line as the cutoff for its income eligibility criteria; the Women, Infants, and Children (WIC) Program uses 185 percent of the poverty line as the cutoff for its income eligibility criteria.

aware of health problems consumed 12.9 grams of fiber per day compared with 10.5 grams for those unaware of the linkage.

Most of the meal planners were aware, at least generally, that different kinds of dietary fiber have different bodily interactions. About 75 percent agreed that different kinds of fiber have different health benefits. Only 18 percent disagreed with the statement.

Meal planners were able to identify which in a pair of foods was higher in fiber in about five out of six cases—exceeding the Federal Government's goal that by 1990, 70 percent of the population would be able to identify foods that are good sources of fiber. When asked which foods had more fiber (fruit or meat, cornflakes or oatmeal, whole wheat or white bread, orange juice or apples, popcorn or pretzels, and kidney beans or lettuce), about 80 percent chose the correct food in at least five out of six comparisons. The only example that fell short of the goal was for kidney beans versus lettuce. Only 59 percent of the respondents correctly identified kidney beans as having more fiber.

On average, female meal planners were more likely than male meal planners to correctly identify the better fiber sources (table 3).

Both income and education seemed to be associated with knowledge about sources of fiber. For example, out of six questions, the highest income meal planners answered an average of 5.2 questions correctly, compared with 4.3 for the lowest income group. Meal planners with at least some college background answered about 5.2 questions correctly, while those with less than a high school education correctly identified only 4.2.

Translating Awareness Into Intake

A first step in meeting the challenge of improving dietary fiber intake is to identify target groups that have low dietary fiber intakes and determine whether they lack awareness of the nutritional benefits of increased fiber consumption.

Consumption of fiber increases with age (table 3). Meal planners under age 30 consume 10.5 grams of fiber daily, while those over age 70 consume 13.1 grams. And, older meal planners are much more likely than their juniors to believe that their diets contain about the right amount of fiber to be considered healthful (table 1). Yet, age is not clearly associated with awareness of health problems associated with fiber intake. Over half of meal planners under age 30 and those over age 70 did not know of any diet-health link associated with fiber (table 2). This compares with 40 to 44 percent for middle-age meal planners.

Male meal planners consume about 20 percent more fiber each day than do female meal planners (14 grams versus 11.7), mainly because of their higher food intake. About the same share of men and women meal planners, 50 percent, thought their diets contained about the right amount of fiber. However, female meal planners were

Table 3
Meal Planners Can Identify Good Sources of Fiber

Group	Correctly identified the better source of fiber among two foods	Fiber intake
	Average number of correct answers (out of six)	*Grams*
All	4.8	12.0
Age:		
Under 30	4.7	10.5
30-49 years	5.0	10.8
50-69 years	4.9	12.7
70 and over	4.5	13.1
Sex:		
Male	4.4	14.0
Female	4.9	11.7
Race:		
White	4.8	12.3
Black	4.9	9.5
Other[1]	4.5	12.3
Income, percent of poverty line[2]:		
130 percent and less	4.3	11.1
131-185 percent	5.0	12.5
186-350 percent	4.8	11.2
Over 350 percent	5.2	13.0
Education:		
Less than high school	4.2	11.1
Completed high school	4.9	12.3
More than high school	5.2	12.3

[1]"Other" race includes Aleuts, Eskimos, American Indians, Asian/Pacific Islanders, and other nonwhite/nonblacks. [2]The poverty line adjusts household income for household size and composition. In 1989, the average poverty threshold for a household of four was $11,669. The Food Stamp Program uses 130 percent of the poverty line as the cutoff for its income eligibility criteria; the Women, Infants, and Children (WIC) Program uses 185 percent of the poverty line as the cutoff for its income eligibility criteria.

New Nutrition Labels Coming

In January 1993, the Federal Government established new regulations which change the format and content of nutrition labels, standardize serving sizes, and define a number of claims regarding nutrient content.

The new format is required for most processed food products that are labeled after May 8, 1994 (for other than meat or poultry foods) or July 6, 1994 (for meat and poultry products). A number of foods in the stores are already sporting the new labels.

The new content provides information of current interest to consumers, such as the amount of saturated fat, cholesterol, and dietary fiber in one serving of the food. Standardized serving sizes will make it easier for consumers to compare products. Strict definitions of terms—such as "low fat," "light," "reduced fat," "low cholesterol," and "high fiber"—will help minimize confusion.

more likely to be aware of problems associated with fiber intakes.

A lower percentage of black than white meal planners were aware of health problems associated with the amount of fiber people eat. Fewer black meal planners thought their diets contained sufficient fiber than did white meal planners (40 percent versus 53 percent), and this is evidenced by their lower intakes: 9.5 grams versus 12.3 grams, respectively.

The awareness of health problems related to fiber intake appears to be associated with income and education (table 2). Sixty-one percent of the highest income meal planners said they were aware of such health problems, compared with 38 percent among the lowest income group. Only 35 percent of meal planners with less than a high school education knew of health problems associated with fiber consumption, compared with 65 percent of those with more than a high school education.

Fruit a Neglected Source of Fiber

Regardless of a person's age, race, or income, two food categories provided the bulk of dietary fiber. Meal planners received an average of 42 percent of their dietary fiber from cereal and bakery products and 28 percent from vegetables and potatoes (table 4). (The food groups used were developed by USDA's Human Nutrition Information Service. In general, mixtures, such as TV dinners and casseroles, are categorized by their primary ingredient.)

The percentage of total dietary fiber received from any given food category varied with individual characteristics. For example, black

Table 4
Cereal and Bakery Products Are the Primary Source of Fiber

Group	Total fiber intake	Reported consumption from—					
		Meat, poultry, fish,and egg dishes	Cereal and bakery	Legumes nuts, and seeds	Fruit	Vegetables and potatoes	Other
	Grams	*Percent of fiber in daily diet*					
All	12.0	7	42	8	11	28	4
Age:							
Under 30 years	10.5	8	45	7	8	27	5
30-49 years	10.8	7	43	7	10	28	5
50-69 years	12.7	6	40	10	13	30	3
70 years and over	13.1	5	41	8	16	28	2
Race:							
White	12.3	7	43	8	11	28	4
Black	9.5	7	36	12	9	31	5
Other[1]	12.3	8	42	10	13	24	3
Income, percent of poverty line[2]:							
130 percent and less	11.1	7	39	13	10	28	3
131-185 percent	12.5	7	42	6	11	29	5
186-350 percent	11.2	7	41	8	11	29	4
Over 350 percent	13.0	7	44	7	12	27	4

Note: Data may not total due to rounding. [1]"Other" race includes Aleuts, Eskimos, American Indians, Asian/Pacific Islanders, and other nonwhite/nonblacks. [2]The poverty line adjusts household income for household size and composition. In 1989, the average poverty threshold for a household of four was $11,669. The Food Stamp Program uses 130 percent of the poverty line as the cutoff for its income eligibility criteria; the Women, Infants, and Children (WIC) Program uses 185 percent of the poverty line as the cutoff for its income eligibility criteria.

Measuring Fiber Content in Foods

Since dietary fiber is such a complex group of substances, it is difficult to measure the amount of fiber contained in various foods. Old methods measured fiber left after strong chemicals "digested" food—called "crude" fiber. But this amount of crude fiber only tells part of the story since the chemicals destroy some insoluble, and much soluble, fiber.

Today, milder chemicals and enzymes are used to analyze foods for their fiber content. What remains in these analyses is "dietary" fiber. The amount of dietary fiber in a food includes soluble and insoluble fiber, and this measure is usually two to five times larger than its crude fiber.

A variety of methods have been developed for determining dietary fiber and for determining the soluble and insoluble fractions of dietary fiber. New research will continue to improve the available data on dietary fiber in foods.

Good sources of fiber	Serving size	Dietary fiber
	Standard reference	*Grams per serving*
Grains:		
Bread, white	1 slice	0.6
Bread, whole wheat	1 slice	2.0
Oatmeal, dry	1/3 cup	2.9
Rice, white, cooked	1/2 cup	0.3
Rice, brown, cooked	1/2 cup	1.8
Fruit:		
Apple, with skin	1 small	3.7
Banana	1 small	2.7
Figs, dried	10 fruit	17.4
Pear, with skin	1 large	4.0
Prunes, dried	10 medium	6.0
Vegetables:		
Asparagus, cooked	1/2 cup	1.9
Broccoli, cooked	1/2 cup	2.3
Carrots, cooked, sliced	1/2 cup	2.6
Green peas, frozen, then cooked	1/2 cup	4.4
Potato, with skin, baked	1/2 cup	4.8
Tomatoes, raw	1 medium	1.4
Legumes:		
Blackeye peas, canned	1/2 cup	4.0
Kidney beans, cooked	1/2 cup	6.5
Lentils, cooked	1/2 cup	7.8
Lima beans, canned	1/2 cup	5.8
Pinto beans, canned	1/2 cup	4.2
White beans, cooked	1/2 cup	6.3

Source: USDA, Human Nutrition Information Service, *USDA Nutrient Data Base for Standard Reference, Rel. #10*, 1993.

meal planners received 36 percent of their fiber from cereal and bakery products and 31 percent from vegetables and potatoes, versus 43 and 28 percent, respectively, for white meal planners.

Older meal planners tended to receive more of their fiber from fruit—16 percent for those over age 70, compared with 8 percent for those under age 30. Meal planners in the highest income households tended to receive less fiber from legumes, nuts, and seeds than did those with the lowest incomes. Instead, the highest income meal planners received more fiber from fruit, and from cereals and bakery products.

The arrival of mandated nutrition labels in 1994 and increased efforts by Federal and State governments and private groups to encourage people to eat healthier diets should push Americans higher up on the nutrition learning curve. These activities, coupled with food industry efforts to develop and market alternative food products of higher nutritional quality, will begin to pay dividends to all Americans in the form of healthier and longer lives. In turn, eating healthier should help drive down health care costs associated with nutrition-related diseases—an added advantage for all of us.

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Attitudes and Behaviors Related to Weight Status

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The Dietary Guideline to maintain a healthy weight may be one of the most difficult to meet. This guideline is not new—having appeared as a recommendation in Government publications for close to 15 years. But despite public investment in health education and new evidence which shows that a majority of Americans are aware of health problems associated with being overweight, the percentage of overweight people in the United States is actually increasing.

Information from two recent national surveys—the 1989-90 Diet and Health Knowledge Survey (DHKS) and the Continuing Survey of Food Intakes by Individuals (CSFII)—reveals some interesting insights into the awareness, attitudes, and behaviors about food intake, weight maintenance, and related nutrition and health issues. These are the first national surveys to gather this information as well as food consumption data from the same individual.

For the surveys, conducted by USDA's Human Nutrition Information Service, a nationally representative sample of people was selected and asked to provide 3 days of food intake information. In addition, the main meal planners/preparers for the household answered questions about their weight and their attitudes and knowledge about diet and health. The sample used for this article consisted of 2,232 women who were not pregnant or breastfeeding. (For additional information about these surveys, see the inside front cover of this issue.)

The surveys support what nutritionists have known for some time—that awareness of the relationship between diet and health may not be enough to change behavior effectively. In fact, the survey found that among women, awareness of health problems associated with being overweight did not lessen the likelihood of being overweight.

Being overweight is a condition which cuts across economic, educational, and racial groups. Yet, preliminary analyses of the survey data show that some women are more likely to be fatalistic about changing their weight, less likely to exercise during their leisure time, and more likely to be overweight.

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However, women who value the importance of maintaining a desirable weight appear less likely to be overweight than are those who do not possess this attitude. These women are also more likely to engage in moderate to heavy physical activity during leisure time, which may partly explain the association with weight status.

More Are Overweight Today Than in the 1970's

In *Healthy People 2000*, the Nation's health professionals set a goal of reducing the percentage of people who are overweight by more than 20 percent of the rate in the late 1970's. This goal seems ambitious, especially in light of recent trends. Self-reported weight and height data from women responding to the 1989-90 CSFII surveys reveal that 30 percent of those aged 20-74 years are overweight. This is slightly higher than the 27 percent of women of the same age who were found to be overweight in the 1976-80 National Health and Nutrition Examination Survey (NHANES), which weighed respondents.

Although the surveys are not directly comparable, it appears that the percentage of overweight women is increasing. Preliminary data from phase I of the third NHANES (1988-91) show that a greater percentage (35 percent) of women are overweight today than in the late 1970's.

As has been found in other surveys, the CSFII shows that a larger percentage of low-income women are overweight than are high-income women. Likewise, weight status is similarly associated with education level. For example, women with 8 years or less of education are more likely to be overweight than are those who have more schooling (table 1).

A higher percentage of black women are overweight than white women in all age groups. The prevalence is particularly high—52 percent—for black women in their 30's and 40's.

Table 1
Being Overweight Is a Condition Which Cuts Across Economic, Educational, and Racial Lines

Respondent profile	Overweight[1]	Aware of weight-health link[2]
	Percent of women meal planners	
Age:		
Under 30 years	12	70
30-49 years	30	81
50 years and over	34	71
Race:		
White	27	76
Black	46	75
Income level (percent of poverty line):[3]		
185 percent and under	30	68
186-350 percent	35	73
Over 350 percent	24	82
Education (years of schooling):		
8 years or less	37	57
9-11 years	30	68
12 years	29	78
Over 12 years	26	79

Notes: [1]For women, overweight is defined as a body mass index (BMI) of 27.3 or greater. BMI is a ratio of weight (in kilograms) divided by the square of height (in meters). [2]Women were considered "aware" of the weight-health link if they identified diabetes, hypertension, heart disease, or some cancers as a health problem that might be related to being overweight. [3]The poverty line is a set of income thresholds used by the Bureau of Census to determine poverty status of households. The thresholds—which vary by family size, age of household head, and number of children under 18 years of age—are updated annually to reflect inflation. In 1989, for example, the average poverty threshold for a household of four was $11,669.

Most Are Aware of the Link Between Weight and Health

While a number of women meal planners may underreport their actual weight, they adequately assess their weight condition—that of being overweight or not. About 90 percent of women who were overweight considered themselves to be overweight, and 67 percent who were not overweight did not consider themselves as such.

In addition to being aware of their own weight condition, women meal planners are generally aware of the relationship between weight and disease. The health consequences of being overweight have been well documented. Experts generally agree that excessive body weight is associated with an increased risk for developing diabetes, hypertension, heart disease, and some cancers. About 90 percent of the women in the survey had heard of some unspecified health problem related to being overweight, and 75 percent knew that this health problem was one of the four conditions mentioned above.

However, not everyone was equally aware of the risk of health problems. Only 57 percent of women meal planners with no high school education were aware of the connection, compared with

78 percent of high school graduates. And, women with no high school education were more likely to be overweight (37 percent) than were high school graduates (29 percent).

Health educators have theorized that awareness of the link between having a condition, in this case being overweight, and getting a disease is only one of several factors predicting whether people adopt healthy behaviors leading to a change in that condition. Those aware of the health risk of being overweight were not less likely to be overweight (fig. 1).

Clearly, some individuals are more likely to be aware of the risks of being overweight precisely because they are overweight. Education to increase awareness about the link between diet and health is not the magic bullet for promoting healthy outcomes, but it may be a good place to start the process of behavioral change—especially for less educated people.

Weight Is an Important Consideration for Most

How people feel about a topic may have as much to do with how they behave as does what they know. Accordingly, the DHKS asked a number of questions about how people feel about specific nutritional advice or health behaviors. Those with certain attitudes about weight were less likely to be overweight than were others.

Over three-quarters of the women meal planners (77 percent) felt that maintaining a desirable weight was important to them. These women were less likely to be overweight (28 percent) than were those for whom maintaining a desirable weight was not important (41 percent) (fig. 1).

The women were also asked whether they agreed or disagreed with the following statement: "Some people are born to be fat and some thin; there is not much you can do to change this." About a quarter (26 percent) seemed to indicate a fatalistic viewpoint by agreeing with this statement, compared with 46 percent who disagreed with the statement.

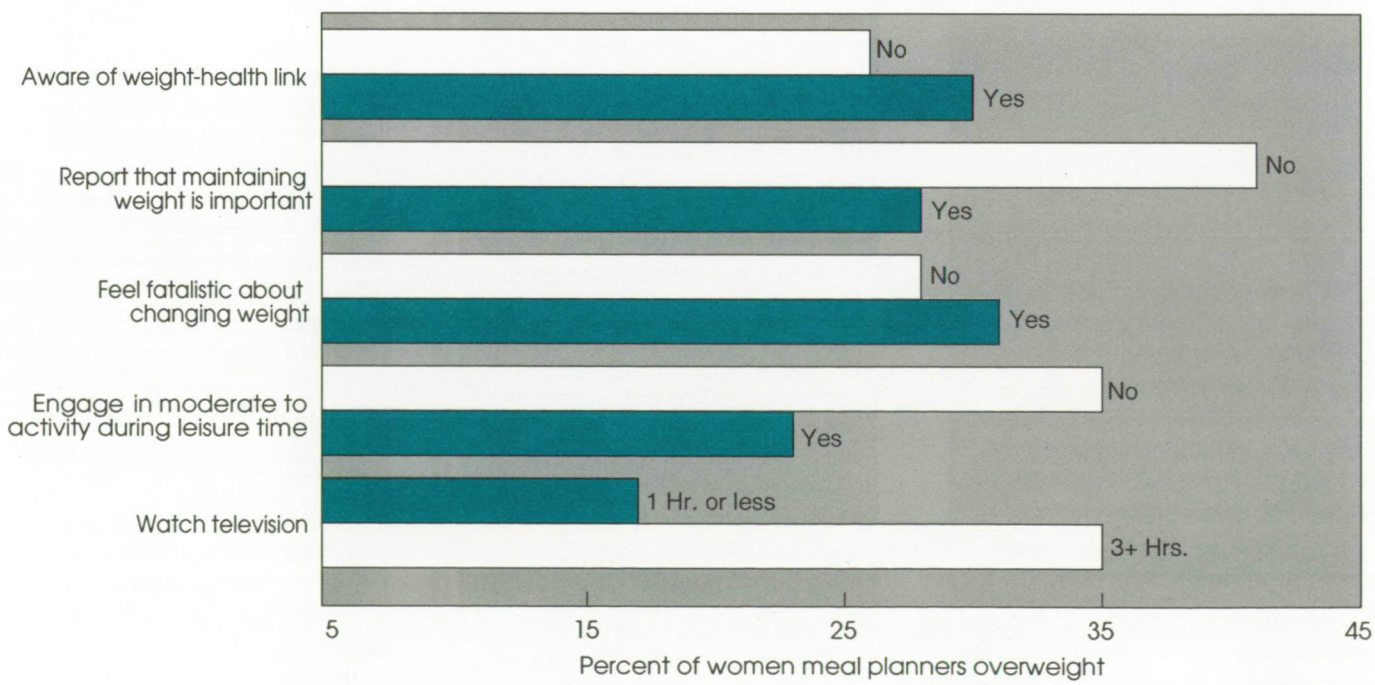
Older women, black women, and women with less education or income were more likely to be fatalistic about changing their weight and were also more likely to be overweight (fig. 2).

Diet and Exercise Behaviors Related to Weight Status

A number of factors, such as genetics, metabolism, overeating, and lack of exercise, have been studied as causes of an overweight condition. While there is controversy in the scientific community about the relative importance of these factors, there is general agreement that in order to lose weight, one must decrease the intake of food calories, increase the amount of energy expended in physical activity, or do some combination of the two.

Figure 1

Thirty-Five Percent of Women Who Watched Television 3 or More Hours Per Day Were Overweight



Diet

Women who were overweight consumed about the same amount of calories as did those who were not overweight. This agrees with some past research, which has found that overweight people do not necessarily consume more calories than do others.

Some recent research has shown that the overall diet one eats may be related to weight status—the overweight may consume more calories from fats and oils. In this study, women who were overweight reported consuming a slightly higher percentage of calories from fat than did those who were not overweight.

While some may speculate that the overall diet quality is as important as the amount consumed, researchers are quick to point out that self-reported diet information should be interpreted with caution, since many people underreport their food intake.

Only about 6 percent reported being on a low-calorie or weight-loss diet. Although more overweight women were on diets (12 percent) than other women (4 percent), the overall percentage on diets seems relatively low. Other recent Federal surveys indicate that 28 to 34 percent of women are trying to lose weight by eating fewer calories. This difference may stem from the question sequence and/or wording. The question on weight-loss diet was asked only of those who responded affirmatively that they were on a "special diet." Yet, many who were on a diet may not have seen anything special about it.

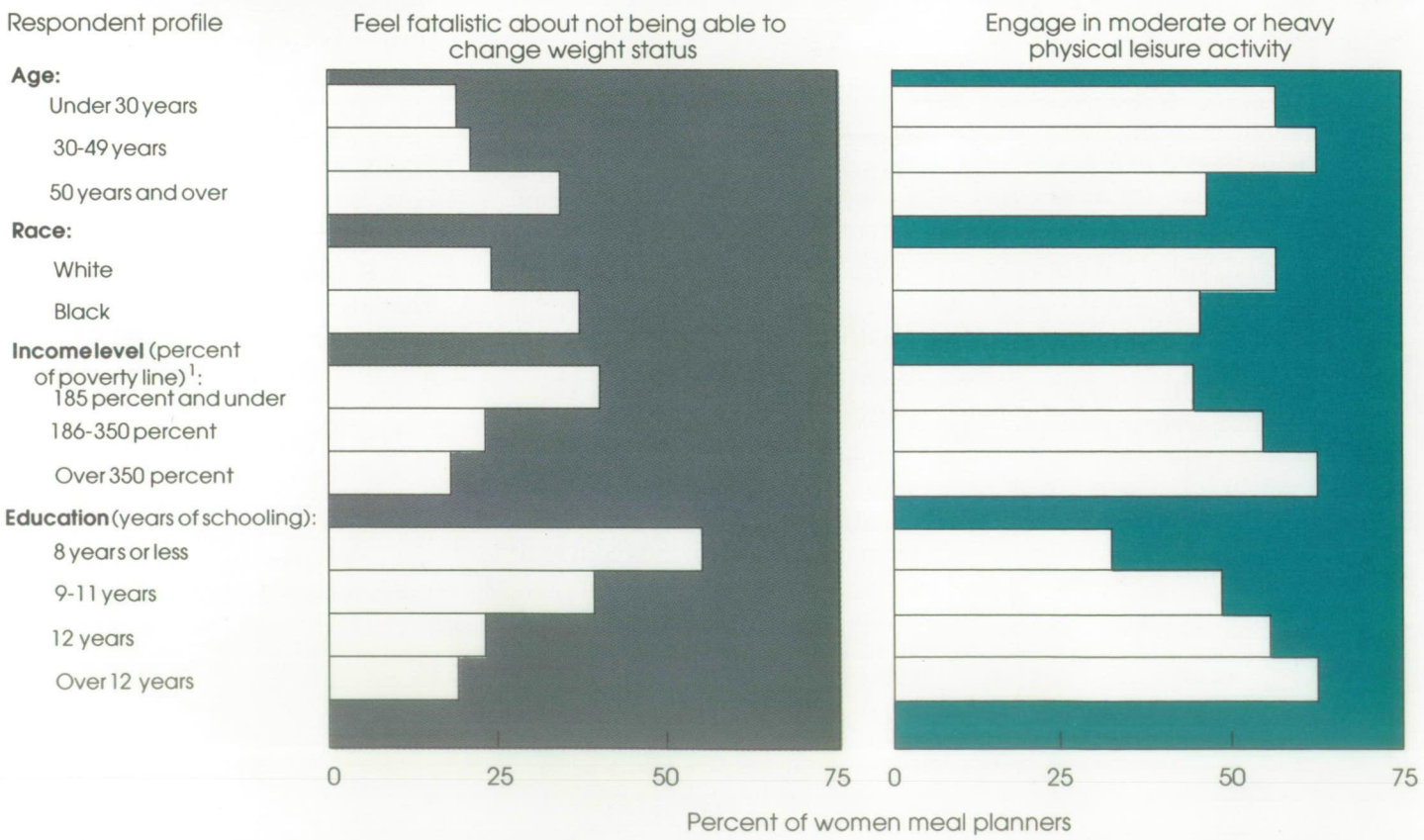
The low percentage of dieters also may indicate that more people are trying to follow current nutritional wisdom, as opposed to being actively engaged in crash weight-loss diets or other extreme approaches to losing weight rapidly.

Exercise

Health professionals advise that regular exercise is an important component of a healthy lifestyle. Over half (55 percent) of the women meal planners reported that their usual level of physical activity during leisure time was moderate or heavy. But, this varied

Figure 2

Demographics Play a Role in Attitudes About Weight Status and Physical Activity



Notes: [1] The poverty line is a set of income thresholds used by the Bureau of Census to determine poverty status of households. The thesholds—which vary by family size, age of household head, and number of children under 18 years of age—are updated annually to reflect inflation. In 1989, for example, the average poverty threshold for a household of four was $11,669.

greatly across different demographic groups. Older women, black women, and women with less education or income reported exercising less (fig. 2).

Those more active during leisure time were less likely to be overweight than were others. About 23 percent of women meal planners who engaged in moderate or heavy activity were overweight, compared with 35 percent of others (fig. 1).

Exercise behavior appears to be consistent with the attitudes described about weight. Individuals for whom maintaining a desirable weight was important were more likely to have a moderate or heavy level of physical activity than were women for whom weight was not important. Those who were more fatalistic about changing their weight status were less likely to report that they exercised moderately during leisure time.

As with exercise behavior, attitudes about weight were correlated with time spent watching television. For example, those who were fatalistic about changing their weight status tended to watch more television than did those who were not.

Watching television has been shown to correlate with an overweight condition. In the DHKS, more than twice as many women who watched 3 or more hours per day of television were overweight than were those who watched 1 hour per day or less (fig. 1). An obvious reason for the correlations between television watching and weight status is that relatively few calories are expended while sitting. The constant bombardment of food advertisements might also increase the consumption of high-calorie snack foods.

"Clearly, some are more likely to be aware of the risks of being overweight precisely because they are overweight. Education to increase awareness about the link between diet and health is not the magic bullet for promoting healthy outcomes, but it may be a good place to start the process of behavioral change."

Maintaining a Healthy Weight Is a Difficult Process

Being overweight is a condition which cuts across economic, educational, and racial groups. Yet, preliminary analyses of the CSFII and DHKS survey data show that women meal planners with less education and income are more likely to be fatalistic about changing their weight, less likely to exercise during their leisure time—favoring television instead—and are more likely to be overweight.

The difficulty of maintaining a healthy weight is mirrored by the complexity of the interaction between knowledge, attitudes, and behaviors in this area. Inability to maintain weight loss can lead to an attitude of fatalism about the subject, which, in turn, can lead to giving up on healthy diet or exercise behaviors, which can worsen the original condition. Studies have shown that only a small percentage of people who lose weight in weight-loss programs are able to keep it off over an extended period of time. Those people who are likely to be successful in this area are the ones who adopt mutually reinforcing healthy behaviors and positive attitudes about weight control.

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The Food Industry Discovered That Nutrition Information Sells... But Something Happened in 1993

New products

Product claim	1988	1989	1990	1991	1992	1993
			Number			
Reduced fat or low fat	275	626	1,024	1,198	1,257	847
Reduced calorie or low calorie	475	962	1,165	1,214	1,130	609
Reduced sugar or low sugar	52	188	331	458	692	473
Low cholesterol or no cholesterol	126	390	694	711	677	287
Reduced salt or low salt	202	378	517	572	630	242
Added fiber or high fiber	56	73	84	146	137	51
Added calcium or high calcium	4	27	20	15	41	14

Note: Health claim categories are not additive, as new products may carry more than one claim.

Dairy Products and Breakfast Cereals Are the Main Categories Introducing Lower Fat Products

Products introduced in 1993*

Category	Total	Low/reduced/no fat	
	Number	*Number*	*Percent*
Dairy products	1,099	261	23.7
Breakfast cereals	99	22	22.2
Soups	248	34	13.7
Bakery products	1,420	153	10.8
Processed meat/poultry	454	47	10.4
Entrees	631	59	9.4
Desserts	158	8	5.1
Side dishes	680	35	5.1
Candy, gum, snacks	2,042	91	4.5
Fruit and vegetables	407	13	3.2
Condiments	3,148	91	2.9
Beverages	1,845	17	0.9
Baking ingredients	383	3	0.8
Total	12,614	834	6.6

*Excludes baby foods and pet foods.
Source: *Prepared Foods*, various issues.

Food Prices Rose Moderately for the Third Consecutive Year

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With consumers cutting back on spending and other effects of the slow pace of economic recovery, food prices, as measured by the Consumer Price Index (CPI), rose at a slower rate than the CPI for all other goods and services for the third consecutive year. Food prices in 1993 increased 2.2 percent above 1992 levels (see table 1).

Prices for food purchased in grocery stores rose 2.4 percent, while the cost of food purchased in restaurants and fast food establishments rose only 1.8 percent. These increases compare with a 3-percent rise in price levels of all other goods and services. Adjusted for inflation, however, food prices in 1993 declined—just as they did in the previous 2 years.

Lackluster Consumer Demand Held Down Price Rises

The slow recovery in the general economy has been the major factor keeping the rise in food prices low. Economic recovery from the 1991 recession continued at a slow pace through 1993.

Disposable income, a key factor influencing consumer demand, rose very slowly—less than 1 percent. When income growth is sluggish, consumer demand, including demand for food, will also be sluggish. This is not to say that consumers eat less—rather, they buy different kinds of foods. For example, consumers cut back on foods with convenience or services added, such as heat-and-serve and other ready-to-eat foods. People

The cold, wet weather throughout the first half of 1993 pushed up prices for meat and fresh vegetables—particularly lettuce and tomatoes. Combined, these foods carry a 16-percent weight in the food CPI and are responsible for about a third of its 2.2-percent rise in 1993.

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also cut back on eating at restaurants and fast food establishments. And, they buy more basic ingredients and prepare meals at home from scratch. This behavior has been evident since the recession began and it continued through 1993. One indicator of lackluster demand is the small 1.8-percent increase in the CPI for food away from home—the smallest increase since 1964.

Weather Hinders Production, Pushes Up Meat and Produce Prices

Overall, 1993 was a miserable year for U.S. agriculture. Weather in 1993 brought record- or near record-low temperatures, record-high temperatures, record precipitation, and drought.

Most of the country was wetter, snowier, and colder than normal during the winter. California had the wettest winter in 24 years, with precipitation 400 percent of normal. In February, heavy rains caused flooding in southwest Arizona's farm belt. Bitter cold hit the Nation's midsection in early March. Winter precipitation was 150 percent of normal in the upper Mississippi Valley, saturating soils and contributing to record flooding a few months later.

As spring approached in mid-March, a storm of record magnitude developed in the Gulf of Mexico. The storm tracked up the East Coast to New England, leaving in its wake record snowfall and record cold temperatures. As spring progressed, damp, cool weather in the western Corn Belt, east-central Plains, and the Mississippi Delta delayed planting and slowed progress of crops already planted. Spring rains over Minnesota, Wisconsin, South Dakota, Iowa, Missouri, and Kansas were 150 percent of normal. This wet spell was to remain unbroken through most of the summer.

Table 1

1993 Was the Third Consecutive Year of Moderate Increases in the CPI for Food

Consumer Price Indexes	1993	1992	1991
		Percent change	
Food	2.2	1.2	2.9
Food away from home	1.8	2.0	3.4
Food at home	2.4	.7	2.6
Meat, poultry, and fish	3.3	-.8	2.3
Meats	3.0	-1.4	3.1
Beef and veal	3.6	-.1	2.8
Pork	3.1	-4.7	3.3
Other meats	1.6	.2	3.7
Poultry	4.2	-.1	-.8
Fish and seafood	3.2	2.3	1.1
Eggs	8.1	-10.6	-2.3
Dairy products	.7	2.7	-1.1
Fats and oils	.2	-1.4	4.3
Fruit and vegetables	2.3	-.3	4.6
Fresh fruit	2.5	-5.0	13.5
Fresh vegetables	6.6	2.3	2.2
Processed fruit and vegetables	-1.6	2.7	-1.9
Processed fruit	-3.9	4.5	-3.7
Processed vegetables	1.6	.2	.8
Sugar and sweets	.2	2.9	3.7
Cereals and bakery products	3.4	3.9	4.1
Nonalcoholic beverages	.3	.2	.5
Other prepared foods	2.6	2.2	4.5

Source: Bureau of Labor Statistics.

With soils saturated from winter and spring rains, summer rains caused widespread flooding in the Midwest. The flooding covered 10 million acres, 87 percent of which was cropland. Losses to property amounted to over $12 billion and flood-related deaths came to 48. A stagnant Bermuda High, which caused the rains in the Midwest, also caused record-high temperatures and a severe drought in the southeast. Corn crops from Georgia to Virginia, many of which were planted late due to spring storms, had little chance to develop because of the heat and dry conditions.

As fall came, weather patterns changed, allowing drying in the Midwest. However, cool temperatures hindered final crop development. The fall brought wintery cold to much of the Nation; however, the East Coast experienced record-warm temperatures during mid-November.

The cold, wet weather throughout the first half of 1993 pushed up prices for fresh vegetables and meats. Combined, these foods carry a 16-percent weight in the food CPI and are responsible for about a third of its 2.2-percent rise in 1993.

In January through March 1993, the wet, cold weather damaged crops or disrupted harvests in western and eastern growing areas, reducing supplies of a number of fresh vegetables and pushing prices up. This weather also prevented field preparation for spring crops. As a result, spring crops were planted late in California as well as in East Coast growing areas as far north as New Jersey, where planting usually begins in mid-March. By April, dry weather helped planting progress in most areas, but cool weather still slowed plant development and harvests were held back even further.

This pushed fresh vegetable prices, particularly lettuce and tomatoes, sharply higher than a year earlier. Prices peaked in May 1993 at 26.7 percent above those of May 1992. By June, vegetable harvests were beginning from a much wider geographic area as the summer season started (spring harvests ordinarily would be winding down by June). However, late-planted spring vegetables in California and on the East Coast were finally being harvested, causing large supplies of fresh vegetables in the markets. The CPI for fresh vegetables declined about 12 percent from May to June but remained above June 1992 levels. The fresh vegetable CPI for all of 1993 averaged 6.6 percent above 1992.

The cold weather also affected meat and pork supplies and prices. Wet, muddy conditions in feedlots—along with cold temperatures—retarded weight gains in cattle. The number of cattle going to slaughter slowed, with very few finished cattle that would grade USDA Choice beef. The CPI for beef and veal continued to climb until it peaked in May when warmer, dryer weather brought better conditions in feedlots and cattle began finishing faster. Retail prices began to decline but remained well above levels of a year earlier. Cold weather also slowed weight gains in hogs. Time required for hogs to reach market weights increased, causing a slowdown in pork production. For all of 1993, beef prices averaged 3.6 percent above 1992 and pork prices were 3.1 percent higher. Because of higher red meat prices, consumers chose more poultry, pulling poultry prices up 4.2 percent.

Summer brought more rain to the Midwest, causing serious flooding in the western Corn Belt. The floods, however, had a minimal impact on the CPI for food because most of the damage involved corn

and soybeans used primarily for animal feed. However, some vegetables for processing were lost in Wisconsin and Minnesota. Shoppers may find higher prices in 1994 for canned and frozen peas, green beans, and sweet corn. Higher prices for these vegetables alone can have only a negligible effect on the CPI for all food.

Other Food Prices Rose Only Slightly

For most other foods, prices were modestly higher—with some up only tenths of a percent. Among the foods not already mentioned, cereals and bakery products group was the only category which increased more than the CPI for all items.

Cereals and Bakery Products

The CPI for cereals and bakery products rose 3.4 percent last year—up 4.5 percent for cereals and up 4.1 percent for bread. Those increases were partially offset by a 0.2-percent decline in the CPI for flour and prepared flour mixes. Most of the price rise can be attributed to stronger demand as consumers switched to more basic foods to prepare at home. For example, cereal is relatively inexpensive on a per-serving basis, easy to fix, and is considered healthy. Also in order to economize, consumers working outside the home are more likely to carry a brown bag lunch rather than buying lunch at a local eatery, thus one source of stronger demand for bread.

Fresh Fruit

The CPI for all fresh fruit rose 2.5 percent over 1992. Declines in prices for apples and bananas—the most popular fruit—were offset by increased prices for oranges and other summer fruit. A small California Valencia orange crop sharply boosted orange prices, particularly in late summer. The wet, cool weather caused lower yields for nectarines, apricots, grapes, and plums, pushing the CPI for other fresh fruit higher.

Dairy Products

The CPI for dairy products rose only 0.7 percent last year. Retail prices for fresh milk and cream rose slightly (1.3 percent) in 1993, while prices for manufactured dairy products (except ice cream) declined. Cheese prices declined 0.1 percent, and butter prices fell 6.1 percent. Lackluster demand in the dairy market is indicative of the sluggish 1993 general economy. Slow movement of dairy products in 1993 brought a buildup of inventories of some processed products which, in turn, led to lower prices.

Fats and Oils

The fats and oils CPI rose 0.2 percent in 1993. While prices of margarine, salad oils, and shortening inched up slightly, those increases were essentially offset by lower prices for peanut butter. Large supplies of peanuts following 2 years of relatively strong yields were responsible for lower peanut butter prices. Vegetable oil stocks were drawn down slightly from high levels of the previous year, pushing oil prices slightly higher. Higher oil prices pitted against lackluster consumer demand had little effect on fats and oils at the retail price level.

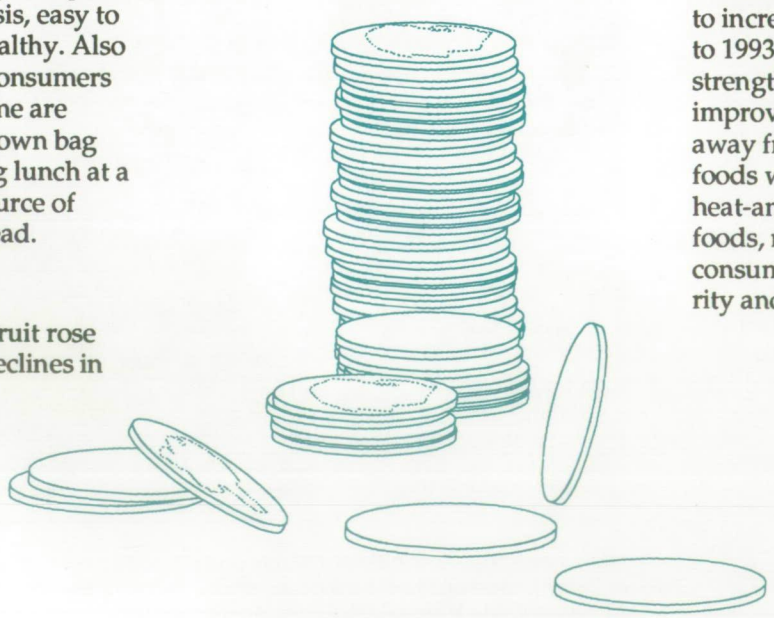
Eggs

The CPI for eggs rose 8.1 percent—the highest increase of all the food categories in 1993. This followed a 10.6-percent decline the year before.

Very small changes in egg supplies elicit large changes in prices. Egg production expanded in 1992—driving prices down and pressuring producer profits. In 1993, producers held production gains to a minimum. With stronger export demand reducing supplies available for the domestic market, prices increased.

What's in Store for 1994

Food prices in 1994 are expected to increase at a modest pace similar to 1993. Consumer demand will strengthen as the general economy improves, particularly for food away from home. Demand for foods with services added, such as heat-and-serve or already prepared foods, may remain sluggish until consumer confidence in job security and income stabilizes. ■



Much Room for Growth in Latin America's Food Expenditures and Consumption

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Although not the poorest in the world, Latin American diets fall behind those in the United States and Canada. But, income growth in Latin America would likely increase demand for food and lead to improved diets. Because of its relative size and expected rapid population growth, the Latin American market may offer more fertile ground for growth in food demand than can be found in the United States and Canada, where most consumers already enjoy abundant and varied diets.

A comparison between Latin American diets and food budgets with those in the United States and Canada provides a glimpse of the path that lower-income Western Hemisphere countries may take as their per capita incomes grow. Understanding how food demand may expand in the future is useful in determining food needs and evaluating market size and trade prospects.

While consumers in the United States and Canada devoted 13 and 11 percent of their income on food, their counterparts in Latin America spent an average of 33 percent. This suggests that Latin Americans would likely spend a significant share of any increased income on food.

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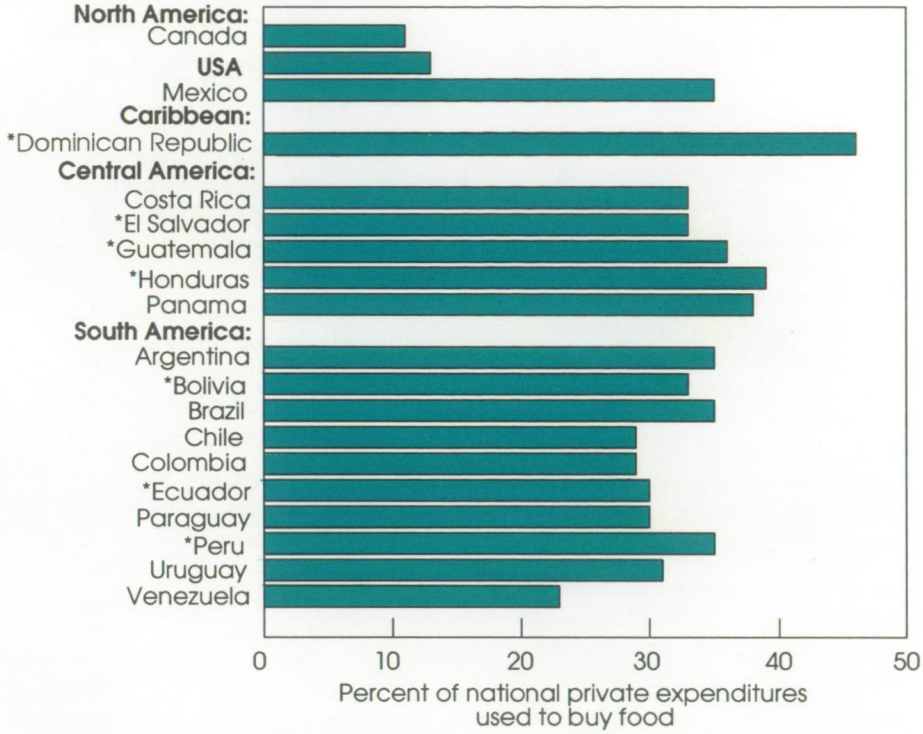
To compare Western Hemisphere food consumption patterns, four factors are examined: the share of income spent on food, the percentage of per capita calorie requirements available in the food supply, the amount of protein available, and the share of calories that come from carbohydrate sources.

Data on the food budget share are from the World Bank's *World Development Report, 1992*. The amount of calories and protein available in the food supply, as well as the calorie share from food grains and tubers, are calculated based on 1986-90 averages from United Nations Food and Agriculture Organization (FAO) food balance sheets. These levels are then compared to intake recommendations specific to each country published in the 1977 *FAO Fourth World Food Survey*.

Figure 1

Share of Income Spent on Food in the Western Hemisphere: U.S. and Canada Lowest



*Designated as food deficit by United Nations Food and Agriculture Organization (FAO).
Source: World Bank data, 1980 and 1985.

Latin American Countries Spend a High Proportion of Income on Food

As an essential for life, food gets priority in household budgets. In some poorer countries, consumers spend more than half their income on food.

Rising incomes in poorer countries quickly push up household food budgets as consumers are able to purchase more food and items not previously affordable. As food needs are met, more of the additional income is then allocated to other items, such as shelter, health care, household goods, and entertainment, so that the food budget eventually makes up a smaller and smaller share of total income. (Income growth in high-income countries can rapidly increase demand for certain food items, however, such as convenience foods.)

Examining the share of national income spent on food helps researchers understand whether most households in a particular country are struggling to meet their basic food requirements.

The share of consumers' budget allocated to food differs widely throughout the Western Hemisphere (fig. 1). While the United States and Canada devoted 13 and 11 percent, respectively, of all private spending to food, Latin America spent an average of 33 percent.

These differences are to be expected, given the wide gaps in per capita incomes. According to the World Bank, U.S. and Canadian incomes were above $20,000 (U.S. dollars) per person in 1990, while average Latin American income was US$2,180—about one-tenth that of the United States, and below the world average of US$4,200.

The high percentage of income spent on food in Central and South America and the Caribbean suggests that Latin Americans would likely spend a significant share of any increased income on more food. However, this income growth would have to occur among the poorer Latin American households to result in national increases in food demand, since income growth concentrated on the already well-off households would likely result in growing expenditures on nonfood consumer goods.

Two Indicators of Diet Quality: Availability of Calories and Protein

Adequate caloric intake is an important measure of dietary quality. Studies have shown that when an individual's energy needs are met, there is a high probability that other important nutrients—such as protein and certain vitamins—also will be obtained in sufficient quantities.

Establishing a recommendation for caloric intake is a complex procedure, since energy needs vary with age, sex, average body size, climate, and physical activity level (both at work and at leisure). The 1977 FAO requirements attempt to take these factors into account, and are based on the age and sex distribution of each nation's population, the people's average body size, and the country's climate. They also include a 10-percent buffer for "normal" activity beyond minimum life-sustaining levels to allow for energy to undertake physical work and play. However, while these are useful, it should be recognized that methods for setting caloric recommendations continue to evolve in the nutritional sciences.

A second important indicator for comparing dietary adequacy is protein intake. Protein is essential for growth, repair of body tissues, building of bones and teeth, and many other important functions.

Establishing a recommendation for protein is also complex because not all protein sources are of equal quality (see box). Proteins from animal sources contain a complete array of amino acids in the proportion needed by the body and, therefore, most of the protein is usable by healthy individuals. In contrast, many plant products that contain protein—such as cereals, roots, and legumes—lack some essential amino acids, so that not all of their protein content is usable by humans. However, it is possible to obtain complete protein, supplying all the essential amino acids, by combining protein from different plant sources.

To compare protein supplies available between different countries, we took into account the lower usability of protein from plant sources (see box). A quality-adjusted protein level was calculated for each country in the Western Hemisphere using the assumption that plant proteins provide half the amount of usable protein as animal protein.

Latin American Diets Lag Behind United States, Canada

Latin American consumers spend a larger share of their income on food than do people in the United States or Canada. But because per capita incomes are much lower in Latin America, most consumers there are not able to purchase as much food as their U.S. and Canadian counterparts.

Both per capita calorie and protein supplies in Latin American diets are below U.S. levels. In fact, national food supplies in some of these countries are below the level needed to meet the population's nutritional needs.

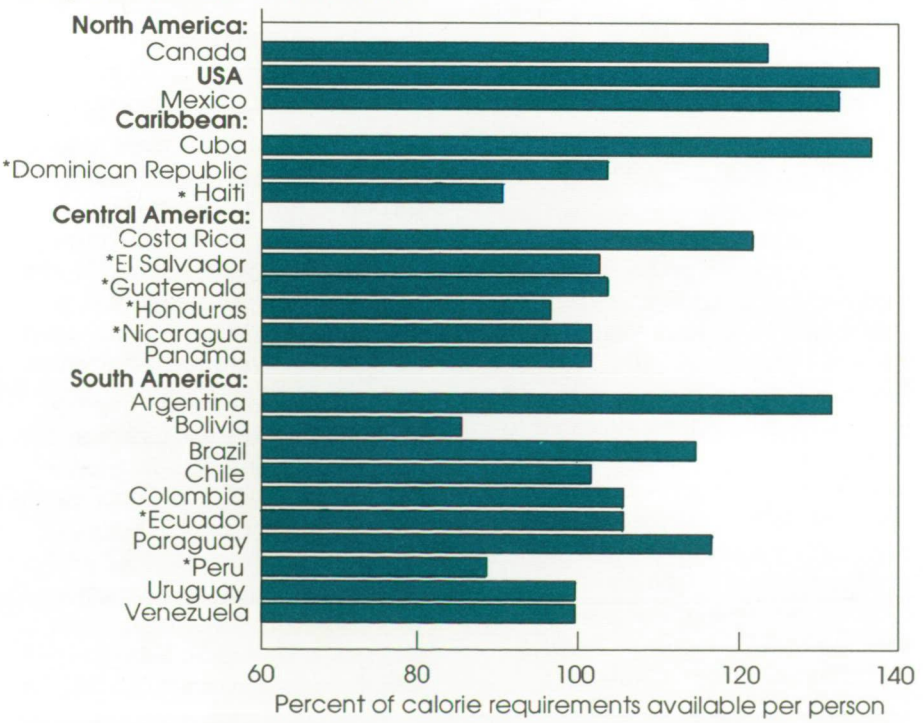
The FAO classifies countries as "food deficit" if national production is insufficient to cover total food requirements and if they have per capita income below the level used by the World Bank to determine eligibility for special, concessionary loan terms (the 1991 level was equivalent to US$1,235 per person per year).

Food supplies in Western Hemisphere countries designated as "food deficit" by FAO—the Dominican Republic, Haiti, El Salvador, Guatemala, Honduras, Nicaragua, Bolivia, Ecuador, and Peru—either do not meet average per capita calorie requirements or have only a small calorie surplus available (fig. 2).

Calorie levels in some other countries that are not classified as food deficit—notably Chile, Colom-

Figure 2

Caloric Intakes in Four Latin American Countries Compare With the United States



*Designated as food deficit by United Nations Food and Agriculture Organization (FAO). Note: Intake data are 1986-90 averages. Source: Calculated from FAO food balance sheets. Caloric requirements are from FAO's 4th World Food Survey.

bia, Panama, Uruguay, and Venezuela—are also below or only slightly above per capita caloric intake recommendations. The caloric levels available in these countries are similar to those in other developing countries, such as India and China.

In contrast, the food supplies in the United States, Canada, Argentina, Costa Rica, Cuba, and Mexico all offer at least a 20-percent calorie surplus over the per capita average caloric requirement (fig. 2). (However, there have been reports of shortages of imported foods in Cuba since the dissolution of the Soviet Union, formerly Cuba's major trade partner.) Similar calorie surpluses are found in other industrialized countries, such as the former Soviet Union, France, Poland, and Japan.

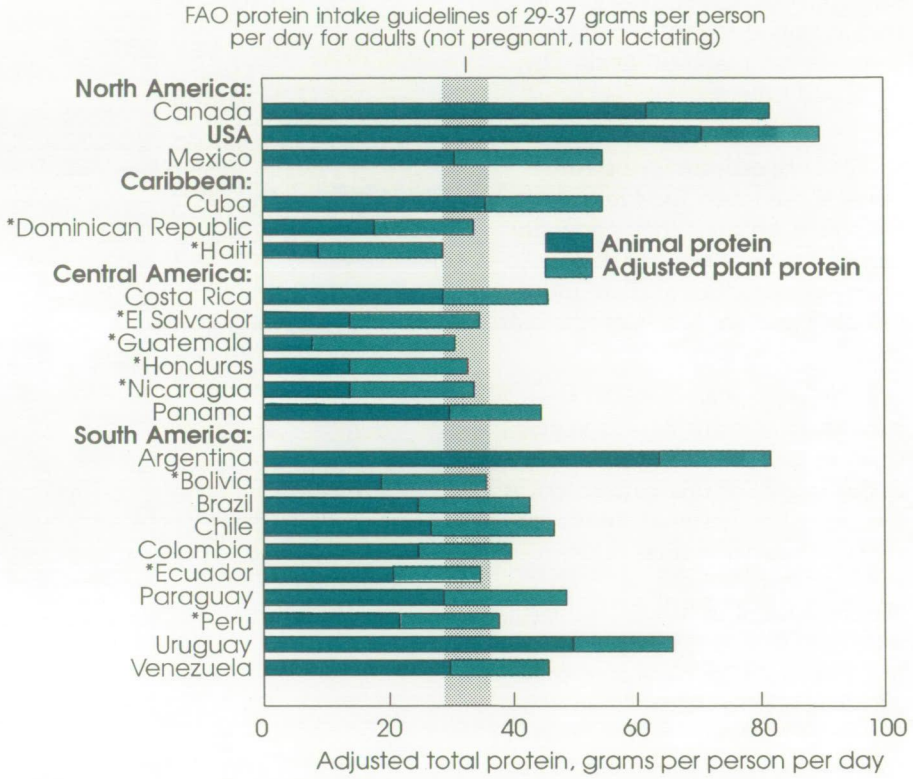
It should be noted, however, that although the adequacy of the food supply in meeting caloric requirements can be used for a comparison of diets between nations, it should not be used as the sole indicator of hunger or malnutrition in any particular country, since averages cannot account for unequal distribution of food within regions or households, or for seasonal variations in the diet. Hunger and malnutrition can and do exist even in countries with large caloric surpluses.

The Latin American countries with food supplies inadequate to meet per capita caloric requirements would almost certainly use rising income to buy more food. The other countries in which food supplies are marginally adequate also would likely increase food intake with income growth. The surplus per capita caloric intake levels found in higher income countries suggest that consumers often prefer to have food supplies well above the minimum requirements when they can afford it.

As with caloric intake, the food supplies in those countries classified as food deficit ranked the lowest in quality-adjusted protein levels (fig. 3). However, all have per capita quality-adjusted protein levels within or above the FAO adult intake guidelines' range of 29 to 37 grams per person per day, but below the world average of 48 grams per person per day (see box).

Figure 3

Latin American Protein Supplies Adequate, But Below U.S. Level



*Designated as food deficit by United Nations Food and Agriculture Organization (FAO). Intake data are 1986-90 averages. Source: Calculated from FAO food balance sheets.

In contrast, quality-adjusted protein intake levels in the United States and Canada are over twice the FAO guidelines. Argentina's per capita intake levels are comparable with those in the United States and Canada. The remaining Latin American countries also have quality-adjusted protein intake levels well above the FAO guidelines.

Even though food supplies in all Latin American countries provide enough protein to meet the FAO's adult intake guidelines, most provide less than half of what is available in the United States and Canada. This suggests that an increase in Latin American incomes could increase the demand for protein-rich foods, particularly more animal products.

Higher Incomes Would Reduce Reliance on Starchy Staples

In addition to increased demand for animal products, income growth in poor households is likely to bring other changes in food consumption patterns, such as increased consumption of fats, oils, sugar, as well as more highly processed foods. As a result, a diminishing share of calories would come

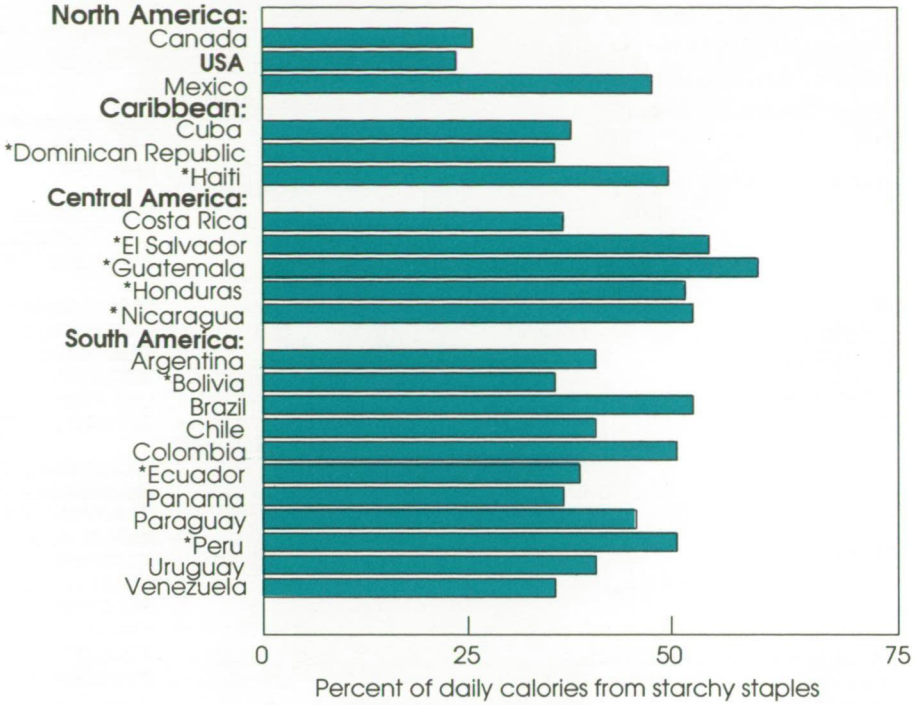
from inexpensive carbohydrate sources, or "starchy staples," which include wheat, maize, rice, sorghum, and other food grains, as well as potatoes, sweet potatoes, yams, cassava, and other starchy roots and tubers.

The reliance on starchy staples makes both economic and nutritional sense when food resources are scarce, because they generally require fewer agricultural resources to produce and are more affordable than meat or vegetable oils.

Latin American diets depend heavily on starchy staples, especially in countries classified as food deficit (fig. 4). While consumers in the United States and Canada derive one-fourth of their calories from grains, potatoes, and other starchy roots and tubers, these provide one- to two-thirds of calories in Latin America. However, food supplies in most Latin American countries contain a smaller share of starchy staples than the world average of 56 percent.

Figure 4

Latin American Diets Depend Heavily on Starchy Staples



*Designated as food deficit by United Nations Food and Agriculture Organization (FAO). Note: Starchy staples are all food grains and starchy roots and tubers. Intake data are 1986-90 averages. Source: Calculated from FAO food balance sheets.

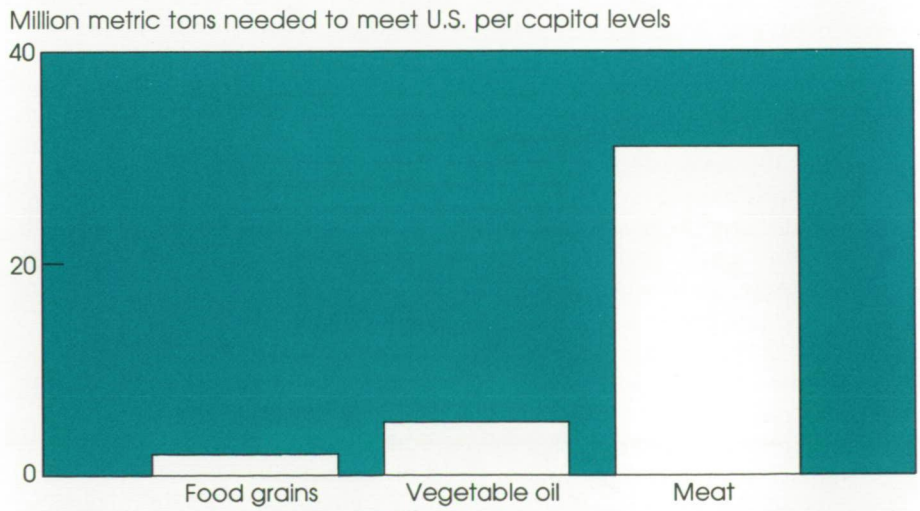
Food Supplies Must Increase Significantly To Reach U.S. Levels

To bring Latin American average per capita food consumption up to the 1990 U.S. level would require significant increases in food supplies—especially more expensive foods, such as meat and vegetable oils.

Latin American food grain consumption is already high in many countries because consumers depend on grains to meet a large share of food needs. However, eight of these countries have per capita food grain supplies below the U.S. level of 113 kilograms per person per year. Supplies in Bolivia, Belize, Colombia, Dominican Republic, Ecuador, Haiti, Paraguay, and Peru range between 86 and 105 kilograms per capita per

Figure 5

Latin American Food Supplies Must Increase Significantly To Reach U.S. Levels



Note: Data are based on 1990 consumption levels. Source: Calculated from FAO food balance sheets.

Not All Proteins of Equal Quality

Protein quality and usability can differ tremendously between different kinds of foods. Thus, a variety of scales have been developed to measure the relative quality of protein of foods. For example, the Food and Agriculture Organization (FAO) and World Health Organization (WHO) developed a chemical scoring system to rank food protein quality in relationship to hen's eggs, a very high-quality source.

Under FAO's scoring system, eggs score 100 in food protein quality. In comparison, wheat, potatoes, some pulses, some nuts and seeds, cassava, and maize range around 50 to 55, while rice, barley, and sweet potatoes are around 65. Soybeans score 74—very high for a plant source. Meats and fish score 99-100. Cow's milk scores 95; human milk 100.

Because the body actually uses less of the plant proteins, it is necessary to consume greater quantities of plant proteins as compared to meat, milk, or eggs to obtain the same amount of usable protein. That is, the 49 score for maize means that about 2 kilograms of maize would have to be eaten to obtain the same amount of protein as 1 kilogram of beef, which has a protein-quality score of 100.

However, it is possible to improve the usability or score of plant protein by combining two or more different types of protein-containing foods. For example, when eaten alone, the protein from maize scores 49 on the FAO scale. However, when eaten with other protein from legumes, nuts, seeds, or even animal protein, the maize protein usability improves.

For this study, the quality-adjusted protein intake level was estimated by adding the amount of protein available from animal sources to half the amount of protein available from plant sources (since only part of it is usable). The quality-adjusted protein intake level represents the level of intake if, on average, the plant sources scored 50 on the FAO/WHO scale. This method does not account for the complementary interaction between plant sources to achieve complete proteins, nor the inability of the human body to use protein from any source when chronic hunger exists.

The FAO intake recommendations, or "safe level of intake," for high-quality protein (scoring 95 to 100) ranges from 14 to 38 grams per day for children and adolescents, and from 29 to 37 grams for adults. However, pregnant and lactating women need up to twice the amount of protein as do other women. The "safe level" protein intake range for adults (not pregnant, not lactating) is shown by the shaded area in figure 3.

Such protein "safe levels" should not be interpreted as exact nutritional requirements. Instead, these are guidelines which have been set high enough so that almost all healthy individuals will meet their physiological needs by consuming these recommended quantities of protein.

year. (However, roots and tubers provide a significant supplement to starchy staple calories in Bolivia, Colombia, Haiti, Paraguay, and Peru). To bring the average per capita grain consumption of these eight countries up to the 1990 U.S. level would require an additional 2 million metric tons (mmt) of grain per year.

Virtually all major Latin American countries have less meat and vegetable oil available per capita than do U.S. consumers. In 1990, vegetable oil available for consumption in the United States was 23 kilograms per capita, over twice that of Latin America's average of 9.5 kilograms. U.S. meat supplies were 115 kilograms per person in 1990, compared with an average of 35 kilograms in Latin America—only 30 percent of the U.S. level. Vegetable oil supplies would have to increase by 5 million metric tons per year, and meat supplies would have to increase by 31 million metric tons to bring Latin America up to the 1990 U.S. levels.

In addition, food supplies would have to grow at the same rate as the Latin American population, about 2 percent per year, to maintain these higher per capita consumption levels.

This strong population growth makes the region an important potential market—most of the Western Hemisphere's consumers live in Latin America, and they will make up an ever-increasing share of the population. In 1990, 60 percent of all people living in the Western Hemisphere were citizens of Mexico, Central or South America, and the Caribbean. These same countries are expected to be home to an additional 130 million people by the year 2005, while the combined U.S. and Canadian population is expected to grow by a more modest 30 million. ■

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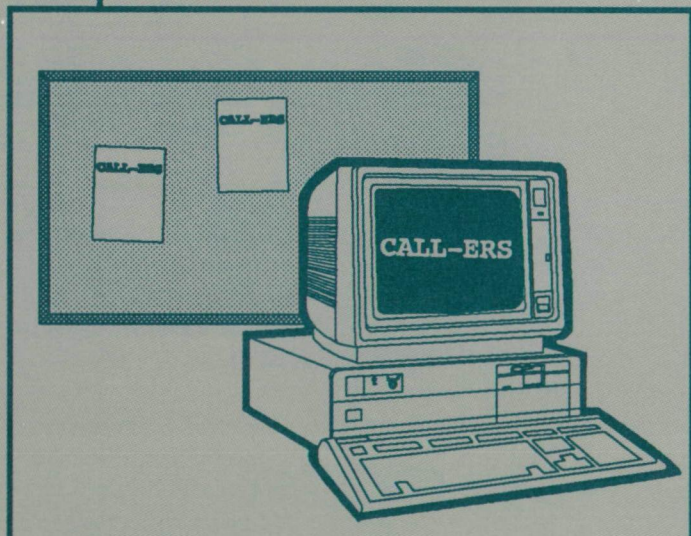

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- The Uruguay Round agreement on agriculture will lead to substantially improved access for U.S. agricultural exports.
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- U.S. agricultural exports are expected to increase by between $1.6 billion and $4.7 billion in 2000 and between $4.7 billion and $8.7 billion in 2005.
- Increased exports mean more export-related jobs, particularly for high-value and value-added products.
- Increased exports will raise farm prices, increase farm income, and lower Government outlays on price and income support programs.
- The Uruguay Round marks a beginning, not an end. The Uruguay Round agreement in agriculture is the first step in moving world agriculture toward more liberalized markets.
- Perhaps even more important for the *future* is the discipline the Uruguay Round will apply to countries that might otherwise choose closed markets, production-inducing internal supports, and subsidized exports. This agreement has important consequences for our large trading partners that are currently outside the GATT: China, Taiwan, and the nations of the former Soviet Union.

Provisions of the Agreement

The Uruguay Round (UR) Agreement is an historic effort to open world agricultural markets, prompting increased trade and dynamic growth. The agricultural agreement covers four areas and is implemented over a 6-year period, 1995-2000:

Export Subsidies. Subsidized exports must be reduced by 21 percent in volume and 36 percent in budget outlays over 6 years from the 1986-90 base period.

Market Access Provisions. Under the UR agreement, all nontariff import barriers are to be converted to bound tariffs. (This conversion process is referred to as "tariffication.") These tariffs as well as other (pre-existing) tariffs will be reduced by a minimum 15 percent and on average 36 percent over the 6-year implementation period.

Internal Supports. Under the UR, total internal support is reduced over 6 years by 20 percent from a 1986-88 base period. No changes would be required in U.S. policies to meet a cut in total internal support.

Sanitary and Phytosanitary Measures. The sanitary and phytosanitary agreement for the first time enables countries to use GATT rules to check the use of unjustified health-related regulations that restrict trade while assuring a country's right to protect food safety and animal and plant health.

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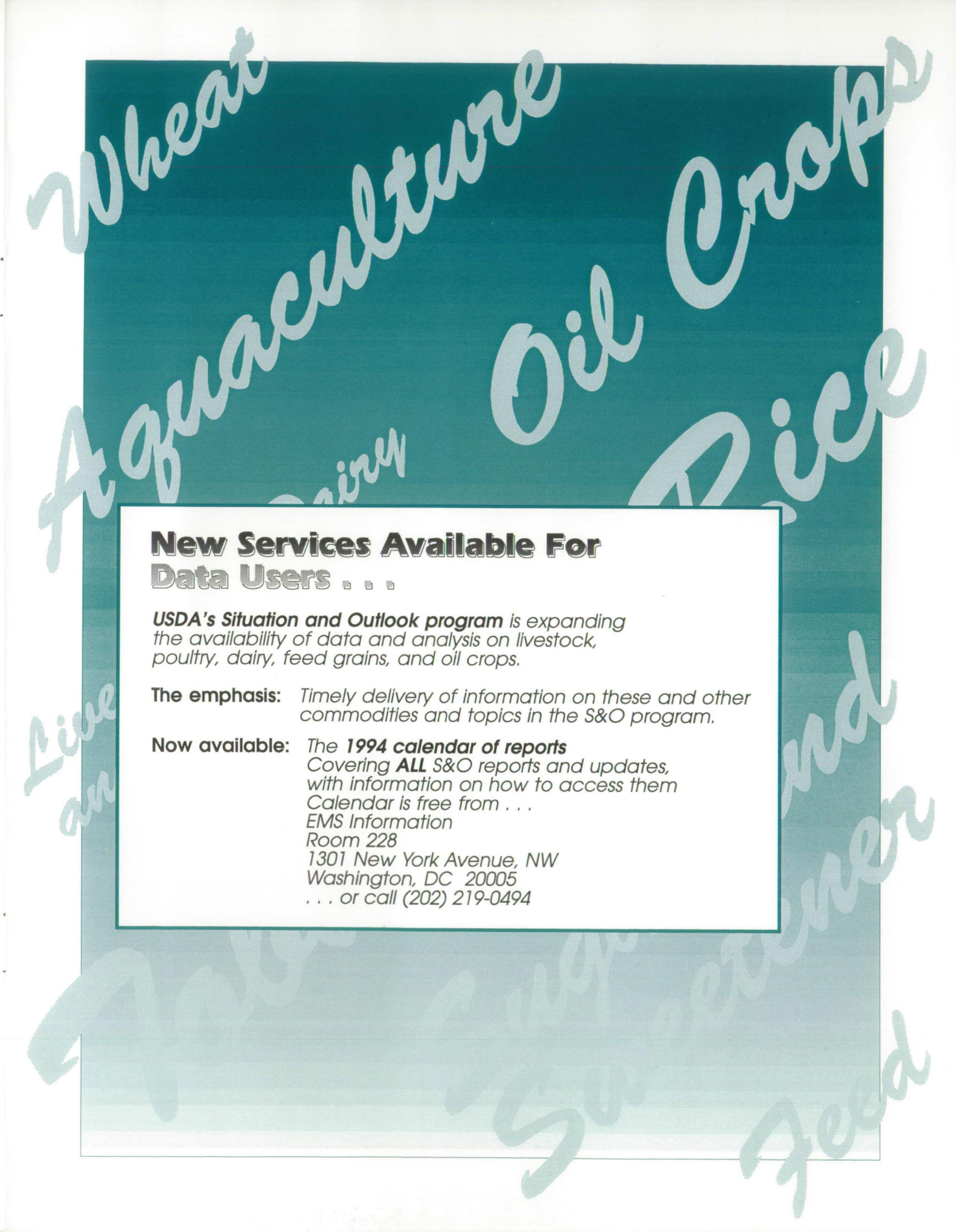

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