



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Fruit and Vegetables: Their Importance in the American Diet

Joanne F. Guthrie, Claire Zizza, and Nancy Raper
(301) 436-5810 (301) 436-8470 (301) 436-5625

Fruit and vegetables play an important role in the American diet. They are good sources of many essential vitamins and minerals, low in fat, and high in dietary fiber and complex carbohydrates.

Encouraging fruit and vegetable consumption is a major emphasis of the Federal Government's dietary guidance policy. "Choose a diet with plenty of vegetables, fruits, and grain products," is one of the seven basic recommendations of the Dietary Guidelines for Americans, the official statement of Federal dietary guidance policy, which is published jointly by the U.S. Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS) (see "Animal Products: Their Contribution to a Balanced Diet," elsewhere in this issue). Since the early 1900's, food guides from USDA have urged Americans to include plenty of fruit and vegetables in their daily diet.

Yet consumption of fruit and vegetables continues to fall below recommended amounts. To address this problem, public and private organizations are instituting

programs aimed at consumer education. Nutrition labeling may also increase consumers' awareness of the nutritional value of fruit and vegetables and promote consumption.

Use of Fruit and Vegetables Up

Since the 1970's, the overall "use" (see box on data sources) of fruit and vegetables has increased—especially fresh noncitrus

fruit, such as bananas, grapes, apples, avocados, pineapples, and strawberries, as well as certain fresh vegetables, including lettuce, onions, tomatoes, carrots, cauliflower, and broccoli.

Among the processed products, the quantity of vegetables used for freezing has increased, while that used for canning has declined.

Potato use has increased due to the popularity of frozen french fries. Americans also are drinking



Vegetables, especially dark-green and deep-yellow types, are the major sources of carotenes in the U.S. food supply.

Guthrie and Raper are nutritionists, Zizza is a home economist, with USDA's Human Nutrition Information Service.

more fruit juices, especially orange juice.

Important Contributors of Vitamins and Minerals

Estimates of nutrients available from the U.S. food supply and the nutrient contribution of major food groups are calculated by nutritionists at USDA's Human Nutrition Information Service (HNIS) (see box on data sources).

Fruit and vegetables are important sources of numerous vitamins and essential minerals, as well as dietary fiber, while providing little fat and calories. In 1988, for example, fruit and vegetables accounted for only 8 percent of the calories and 1 percent of the fat in the American food supply, while providing 94 percent of the carotenes and 90 percent of the vitamin C.

Vitamin A, Carotenes

Although retinol—the essential nutrient known as vitamin A—is found only in animal foods, plant foods contain compounds called carotenes that can be converted to retinol or vitamin A in the body. Therefore, foods containing carotenes are considered a source of vitamin A.

Vitamin A has long been known to be essential to normal vision, as well as other physiological functions. There has been recent interest in carotenes as a separate dietary component, because some research findings indicate that foods high in carotenes may protect people against some forms of cancer.

Vegetables, especially dark-green and deep-yellow types, are the major sources of carotenes, providing 88 percent of the total supply in 1988 (table 1). Fruit, especially deep-yellow fruit like cantaloupe and dried apricots, are also good sources of carotenes.

USDA food consumption survey data from 1985 indicate that average diets of adult men and women

Data Sources

The U.S. Food Supply Series is the only source of data available on long-term food and nutrient trends in the American food supply. Instead of measuring foods consumed by individuals, foods available for consumption are measured from foods which flow through the food-distribution system.

Quantities of food available for consumption are measured by subtracting exports, ending inventories, and nonfood use from total production, imports, and beginning inventories. Estimates overstate actual intakes because they include food that is discarded in processing, lost in spoilage, or thrown away at home. Nutritionists at USDA's Human Nutrition Information Service (HNIS) convert data on foods available for consumption into per capita nutrient availability, using nutrient data from USDA's National Nutrient Data Bank.

Since the early 1980's, gaps in the data on commercially produced fresh and processed fruit and vegetables have presented problems in estimating availability. Trade organizations no longer furnish data for estimating the canned and frozen vegetable supply due to disclosure problems and a decline in the number of firms reporting. USDA's National Agricultural Statistics Service (NASS) data have replaced the industry data, but the NASS estimates are based on farm weight rather than on pack weight. Also,

NASS estimates do not include all of the vegetables for which pack data were formerly available. Budget considerations have eliminated some NASS data as well.

To compensate for the missing data, HNIS researchers have assumed that use of the unreported fruit and vegetables has remained constant since 1981. Because use of some of these is large, the accuracy of some of the nutrient estimates is uncertain.

Nevertheless, this data series is a unique source of information on the U.S. food supply and its nutrient content since the turn of the century. Therefore, it is the most appropriate data source for examining trends in food and nutrient availability.

Data on per capita nutrient availability permit assessment of the potential of the food supply to satisfy the nutritional needs of Americans. USDA also conducts food-consumption surveys that provide additional information on the food and nutrient intakes of Americans. These data can be used to assess nutrient intakes of population groups and compare intakes to dietary recommendations, such as the Recommended Dietary Allowances (RDA's) established by the National Academy of Sciences. Food consumption survey data used in this article were obtained from USDA's Continuing Survey of Food Intakes of Individuals, conducted in 1985 and 1986.

(age 19-50 years) met the Recommended Dietary Allowance (RDA) for vitamin A, as established by the National Academy of Sciences (NAS) (see box on data sources).

However, data from surveys conducted by the U.S. Department of Health and Human Services indicate that low-income young children, particularly those of

Table 1
Vegetables and Fruit Are Low in Fat, High in Many Vitamins and Minerals

| Item | Citrus fruit and juices | Other fruit | Percent of total daily supply | | | Total amount available per person |
|-----------------------|-------------------------|-------------|---------------------------------------|------------------|----------------|-----------------------------------|
| | | | Dark-green and deep-yellow vegetables | Other vegetables | White potatoes | |
| Food energy | 1.0 | 2.2 | 0.4 | 1.8 | 2.6 | 3,600 kilocalories |
| Protein | .6 | .7 | .5 | 2.5 | 2.3 | 105 grams |
| Carbohydrates | 2.0 | 4.5 | .8 | 3.4 | 4.9 | 425 grams |
| Fat | * | .4 | .1 | .3 | .1 | 168 grams |
| Saturated fatty acids | * | .2 | * | .1 | .1 | 60 grams |
| Calcium | 1.4 | 1.3 | 1.4 | 4.4 | .9 | 890 milligrams |
| Phosphorus | .8 | 1.1 | .9 | 3.9 | 3.1 | 1,540 milligrams |
| Magnesium | 2.4 | 4.5 | 2.1 | 7.9 | 6.2 | 330 milligrams |
| Iron | .6 | 2.4 | 1.7 | 6.9 | 4.7 | 17.1 milligrams |
| Zinc | .4 | 1.0 | .7 | 3.5 | 3.0 | 12.7 milligrams |
| Copper | 2.1 | 5.4 | 1.7 | 9.2 | 11.1 | 1.7 milligrams |
| Potassium | 4.2 | 7.1 | 2.9 | 11.5 | 13.9 | 3,480 milligrams |
| Vitamin A | .6 | 2.1 | 36.5 | 5.1 | 0 | 1,630 retinol equivalents |
| Carotenes | 1.2 | 4.5 | 77.5 | 10.8 | 0 | 770 retinol equivalents |
| Vitamin E | .6 | 2.8 | 2.3 | 4.8 | .4 | 16.7 milligrams alpha-TE |
| Vitamin C | 27.3 | 14.9 | 11.3 | 21.3 | 15.8 | 118 milligrams |
| Thiamin | 2.8 | 2.2 | 1.3 | 5.0 | 5.0 | 2.2 milligrams |
| Riboflavin | .8 | 2.2 | 1.3 | 3.8 | 1.3 | 2.4 milligrams |
| Niacin | .7 | 1.8 | 1.0 | 4.6 | 6.3 | 26 milligrams |
| Vitamin B-6 | 1.8 | 8.6 | 2.7 | 7.5 | 12.2 | 2.2 milligrams |
| Folacin | 9.5 | 3.5 | 4.4 | 18.0 | 4.9 | 284 micrograms |
| Vitamin B-12 | 0 | 0 | 0 | 0 | 0 | 9.1 micrograms |

*Less than 1 percent.

Source: N.R. Raper, C. Zizza, and J. Rourke. *Nutrient Content of the U.S. Food Supply*, Home Economics Research Report No. 50. USDA, HNIS. 1992.

Mexican-American background, may be at risk of low vitamin A status.

Vitamin C

Fruit and vegetables provided approximately 90 percent of the vitamin C in the food supply in 1988. Citrus fruit provided the largest share, 27 percent.

Most Americans consume their RDA for vitamin C. However, low intakes may be a concern for certain groups. Cigarette smokers, in particular, appear to need more vitamin C than do nonsmokers. NAS recommends that smokers consume at least 100 milligrams of vitamin C per day, compared with the RDA of 60 mg/day for adult nonsmokers. Yet USDA survey data indicate that in 1985 adult female

smokers consumed an average of 64 mg/day of vitamin C.

Vitamin B-6

Vegetables contributed 22 percent of the vitamin B-6 in the food supply in 1988. White potatoes contributed over half the amount from vegetables. Fruit provided an additional 10 percent of the total supply.

Some population groups consumed lower-than-recommended levels of vitamin B-6. According to USDA survey data, average vitamin B-6 intakes of men and women age 19-50 years were below the RDA in 1985.

Folacin

Folacin is a B vitamin essential for healthy red blood cell formation and formation of genetic material (DNA). Adequate folacin intake is particularly important for a healthy

pregnancy—a pregnant woman's RDA for folacin is more than double that of a woman who is not pregnant. Using USDA survey data collected in 1985 and 1986, HNIS researchers found that average intakes of folacin for pregnant women age 19-39 years were higher than those of nonpregnant women—but not high enough to meet their RDA.

In 1988, vegetables were the major sources of folacin in the food supply, accounting for 27 percent. Fruit, primarily citrus, accounted for another 13 percent.

Other Vitamins

Fruit and vegetables contribute important amounts of other vitamins to the U.S. food supply: about 16 percent of thiamin, 14 percent of niacin, 11 percent of vitamin E, and

9 percent of riboflavin. Fruit and vegetables do not contribute to vitamin B-12 in the food supply, because it is found naturally only in animal products.

Potassium

Potassium is a mineral that works with sodium to regulate the body's fluid balance. Vegetables provided the largest share of potassium in the food supply in 1988, 28 percent, and fruit provided 11 percent.

Average potassium intakes of men and women appear to meet the minimum requirements established. (Although consumption of foods like fruit and vegetables that are naturally rich in potassium is recommended, taking potassium supplements without medical supervision may be dangerous, and is not recommended to the general population.)

Iron

Fruit and vegetables contribute about 16 percent of the available iron. Lack of iron is the most common nutrient deficiency in America (see "Animal Products: Their Contribution to a Balanced Diet," elsewhere in this issue). Some dark-green vegetables (like spinach) and dried fruit (such as apricots) are particularly good sources of iron.

Other Minerals

Fruit and vegetables also contribute other essential minerals to the food supply. Most notably, they contribute almost 30 percent of the copper available in the food supply and 23 percent of the magnesium.

USDA survey data show that in 1985, average magnesium intakes of women were below their RDA, while men met their recommended intake.

Dietary Fiber

Dietary fiber is found only in foods of plant origin. Although dietary fiber is not considered a nutrient because it is not digested and

absorbed, its presence in the diet promotes healthy gastrointestinal function.

USDA food consumption survey data indicate that in 1985, American women consumed an average of 12 grams of fiber per day, compared with the National Cancer Institute's recommended intake of 20-30 grams per day (not to exceed 35 grams/day). Fruit and vegetables supplied 42 percent of the total fiber in women's diets.

Efforts To Promote Fruit and Vegetables

Virtually all major Federal and private health organizations agree on a simple fact: that Americans should increase their consumption of fruit and vegetables.

The Food Guide Pyramid, USDA's current food guide, recommends that Americans consume two to four servings of fruit and three to five servings of vegetables each day.

Yet USDA food consumption survey data show that, on average, women consumed fewer than three

servings of vegetables per day in 1985, even when vegetables from mixed dishes (such as the carrots and potatoes in a beef stew) are taken into account. Fruit consumption was also low. In fact, a surprisingly large number of women—almost 20 percent—ate no fruit or fruit juice at all over the course of 4 days.

Why does consumption continue to fall below recommendations? One possible explanation is that despite the efforts of nutritionists and health professionals, many consumers are not aware of the importance of consuming recommended amounts of fruit and vegetables.

Preliminary results from USDA's 1989 Diet and Health Knowledge Survey indicate that about a quarter of all meal preparers felt that it was "not at all important" to eat at least five servings of fruit and vegetables each day.

Responding to a survey conducted by the California Department of Health Services, many consumers stated that eating fruit



Even though Federal and private health organizations encourage Americans to eat more fruit and vegetables, consumption continues to fall below recommendations.

and vegetables was inconvenient, and preparing them took too much time.

To encourage consumers to eat more fruit and vegetables, public and private organizations have undertaken several activities. The 1990 edition of the Dietary Guidelines for Americans modified the guideline "Eat Foods with Adequate Starch and Fiber" to "Choose a Diet with Plenty of Vegetables, Fruit, and Grain Products." The 1990 guidelines also include a daily food guide recommending the number of servings from the major food groups. HNIS has also developed educational materials with tips on simple, convenient ways to add fruit and vegetables to the

daily diet, whether eating at or away from home.

In 1988, the California Department of Health Services launched the "5-A-Day For Better Health" campaign to promote fruit and vegetables. For this effort, public health agencies cooperated with the produce industry and retail grocers to encourage consumers to eat at least five servings of fruit and vegetables each day.

The program's success spurred a national program, developed by the produce industry in conjunction with the National Cancer Institute. The program features point-of-purchase information, consumer education materials, food demonstrations, recipes, and other information promoting fruit and vegetable consumption.

Changes in nutrition labeling may also affect consumption of fruit and vegetables. Under the Nutrition Labeling and Education Act of 1990, nutrition labeling will soon become mandatory for processed fruit and vegetables, while voluntary labeling of fresh produce is encouraged. Nutrition labeling of at least the 20 most frequently consumed fresh fruit and vegetables will soon be available in many grocery stores under a voluntary program. The produce industry expects that by showing the nutritional value, nutrition labeling will promote consumption of fruit and vegetables.

Representatives of the produce industry are looking for ways to use labeling in their marketing strategies. Results of supermarket promotions that featured point-of-purchase nutrition information of fresh produce indicate that labeling can encourage purchases of fruit and vegetables, especially when combined with practical tips on selection, preparation, and menu planning.

Selected References

Cleveland, L.E., and K. Tippet. "Report on the Diet and Health Knowledge Survey," *Agriculture Outlook '91: Agriculture in a World of Change*, Proceedings of the 67th Annual Outlook Conference, USDA, ERS, Washington, DC, Nov. 27-29, 1990.

Cook, D.A., and K.L. Koegel. "Identifying Foods Consumed as Ingredients of Mixtures," *Proceedings of the Fourteenth National Nutrient Databank Conference*, University of Iowa, Iowa City, June 19-21, 1989.

Life Sciences Research Office, Federation of American Societies for Experimental Biology. *Nutrition Monitoring in the United States—An Update Report on Nutrition Monitoring*, DHHS Publication No. (PHS) 89-1255. Prepared for the U.S. Department of Agriculture and the U.S. Department of Health and Human Services. Sept. 1989.

National Academy of Sciences, Food and Nutrition Board, Subcommittee on the Tenth Edition of the RDAs. *Recommended Dietary Allowances*, 10th edition. Washington, DC: National Academy Press, 1989.

Raper, N.R., C. Zizza, and J. Rourke. *Nutrient Content of the U.S. Food Supply*, Home Economics Research Report No. 50. USDA, HNIS. 1992.

U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Nutrition and Your Health: Dietary Guidelines for Americans*, 3rd edition, USDA Home and Garden Bull. No. 232. 1990.

Welsh, S., and J.F. Guthrie. "Changing American Diets," *Micro-nutrients in Health and in Disease Prevention*, A. Bendich and C.E. Butterworth, eds. New York, NY: Marcel Dekker, Inc., 1991. ■

Shopping for Information on the food industry?



find It In . . .

The 1991 edition of **Food Marketing Review**

Facts, figures, trends in food processing, wholesaling, retailing, and service

Just **\$14 per copy** (plus shipping & handling—10% for U.S. addresses, 35% for foreign, including Canada)

Call toll-free; **1-800-999-6779** in the U.S. and Canada (Other areas call **301-725-7937**)

Order number AER-657