



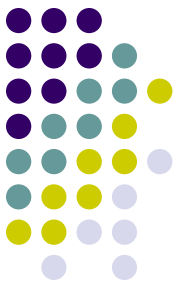
Dietary Fiber in the U.S. Food Supply

**Lisa Bente, RD; Hazel Hiza, PhD, RD;
and Thomas Fungwe, PhD**

**United States Department of Agriculture
Center for Nutrition Policy and Promotion
Washington, DC**

January 2008

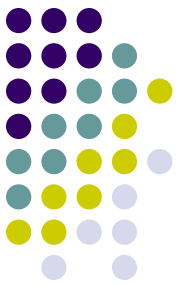
USDA is an equal opportunity provider and employer.



Introduction

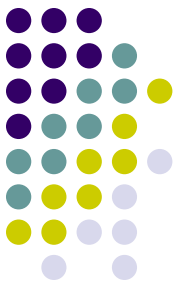
This session is intended to introduce students to a working knowledge of dietary fiber as defined by the Institute of Medicine (IOM) and the data series used to report trends on how much nutrients and other food components are available for consumption, on a per person and per day basis.

Session Overview for Instructor



Outline

| Session Overview | Instructional Slides | Supplemental |
|---------------------|----------------------------------------------------|---------------------------------------------------------------------------|
| Background | Importance of Fiber | Learn More at www.cnpp.usda.gov |
| Learning Objectives | Definitions of Fiber and Sources | Sources of Food Supply Data |
| Key Messages | Daily Recommendations | Uses of Food Supply Data |
| | Source of Information on Availability of Fiber | The Food Supply and Federal Dietary Guidance |
| | Fiber Recommendations Versus Fiber Availability | Background on DRIs |
| | Sources of Fiber in the U.S. Food Supply | Nutrient Values Provided by DRIs |
| | Data Limitation | |



Background Information

Audience:

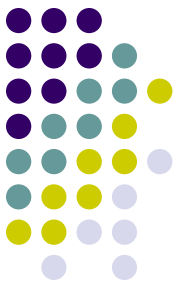
Students in Introductory College Nutrition Classes

Instructional Time:

One Hour

Instructional Slides:

Slides 7-20



Key Messages

- Adequate amounts of dietary fiber help to maintain health and reduce risks of colon cancer and coronary artery disease.

- Sources of dietary fiber in the U.S. food supply are:
 - Grain products
 - Vegetables
 - Fruits
 - Legumes, nuts, and soy



- Data on availability of food sources, on a per capita basis, and major food sources for dietary fiber are available from the Nutrient Content of the U.S. Food Supply Series.
- Per capita data on dietary fiber from the U.S. Food Supply Series and Estimated Average Requirements (EAR) differ.



A nutritionally adequate food supply has been linked to providing sufficient kilocalories, macronutrients, and micronutrients to meet the nutritional needs of the U.S. population.

The Importance of Consuming Adequate Dietary Fiber



- The functional properties of dietary fiber have significant protective effects against some chronic diseases.
- Eating grains, especially whole grains, provides such health benefits as reduced risk of coronary heart disease and colon cancer.

Dietary Fiber Defined



- Dietary fiber (commonly called bulk or roughage) is the edible nondigestible component of carbohydrate and lignin naturally found in plant food;* however, bacteria in the lower gut may metabolize part of it. Major sources of dietary fiber include cereal bran, sweet potatoes, and legumes.

Total Fiber = Dietary Fiber + Functional (or added) Fiber
(Excluded: fiber-like products, either extracted or synthesized, that do not have proven health benefits.)

*IOM definition.

Functional Fiber Defined



- Functional fiber consists of isolated, nondigestible carbohydrates that have beneficial physiological effects in humans.*

Example: pectin extracted from citrus peel and used as a gel that is the basis for jams and jellies.

***IOM definition.**

Dietary Fiber: Soluble and Insoluble



- Soluble and insoluble dietary fibers are generally found together in foods. However, some foods are better sources of one type than of the other.
- Soluble dietary fiber is digestible.
- Insoluble dietary fiber is nondigestible.

Benefits and Sources of Soluble Fiber



- Soluble fiber attracts water and turns to gel during digestion, thus slowing digestion.
- Research shows that soluble fiber lowers cholesterol (important in the prevention of heart disease) and delays glucose absorption (important in glucose control).

Oat bran, barley, beans, and lentils are primary sources of soluble fiber.

Benefits and Sources of Insoluble Fiber



- Insoluble fiber appears to speed the passage of foods through the stomach and intestines.
- Insoluble fiber adds bulk to the stool, reducing the incidence of constipation.

Wheat bran, vegetables, and whole grains are primary sources of insoluble fiber.

Daily Recommendations of Dietary Fiber Needed* by Age/Gender



| Children | | Males | | Females | |
|-----------------|--------------|--------------|--------------|----------------|--------------|
| Years | Grams | Years | Grams | Years | Grams |
| 1-3 | 19 | 9-13 | 31 | 9-18 | 26 |
| 4-8 | 25 | 14-50 | 38 | 19-50 | 25 |
| | | 51+ | 30 | 51+ | 21 |

*Recommendations, in grams, are based on Estimated Average Requirements (EARs).

Major Source of Information on the Availability of Dietary Fiber in the U.S. Food Supply



The Nutrient Content of the U.S. Food Supply Series . . .

- Is a historical series of data reflecting the availability of food in the U.S. food supply.
- Includes information, since 1909, on the amount of nutrients available for consumption.
- Reports data on a per person and per day basis.

Percentage Difference Between Age/Gender-Weighted Recommendations and Per Capita Grams of Fiber Available for Consumption



| Year | EAR Weighted data (grams of dietary fiber) | Food supply data (per capita per day grams of dietary fiber) | % Difference |
|------|-----------------------------------------------|--------------------------------------------------------------------|--------------|
| 1995 | 28 | 24 | 14 |
| 1996 | 30 | 25 | 17 |
| 1997 | 28 | 25 | 11 |
| 1998 | 28 | 25 | 11 |
| 1999 | 30 | 25 | 17 |
| 2000 | 28 | 25 | 11 |
| 2001 | 28 | 25 | 11 |
| 2002 | 28 | 24 | 14 |
| 2003 | 28 | 25 | 11 |
| 2004 | 28 | 25 | 11 |
| 2005 | 28 | 25 | 11 |

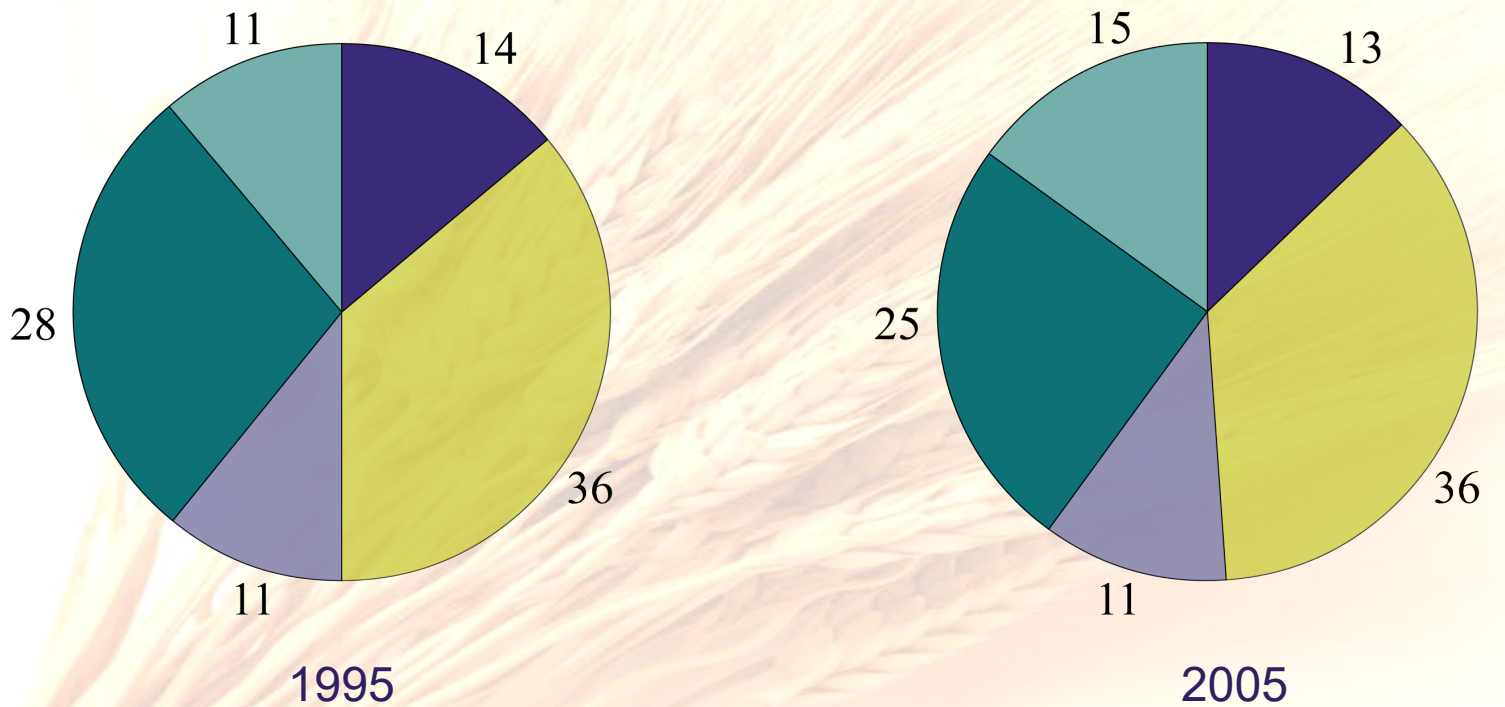
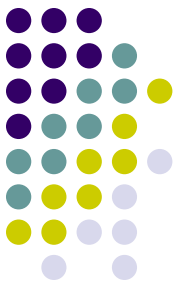


13%:

The average difference between the EAR-weighted data on dietary fiber and the U.S. food supply data on dietary fiber.

- When dietary fiber data from the U.S. Food Supply Series and EAR recommendations are compared, the EAR data should be weighted because the recommendations are based on age and gender.

Major Sources of Dietary Fiber in the U.S. Food Supply, 1995 vs. 2005



■ Legumes, Nuts, Soy ■ Grain Products ■ Fruits ■ Vegetables ■ Other Foods



- Contributions of grains to dietary fiber were stable at 36 percent; contributions of vegetables decreased from 28 to 25 percent.
- Contributions of legumes, nuts, and soy to dietary fiber were stable: 14 and 13 percent; as were the contributions of fruits: 11 percent.
- Contributions to dietary fiber by other foods increased from 11 to 15 percent. These contributions came from spices, cocoa, tea, and coffee. Meat, fish, poultry; dairy; eggs; fats and oils; and sugars and sweeteners contributed no dietary fiber.

Dietary Fiber in the U.S. Food Supply: Data Limitation



- Underreporting of whole wheat and breakfast cereals affects the estimates on the dietary fiber that is available for consumption.
- Because of underreporting, estimates on the amount of dietary fiber available for consumption may actually be closer to the EAR recommendations.



Nutrient data from the U.S. Food Supply Series are useful in terms of evaluating the effects of technological and marketing changes on the food supply over time.



To Learn More About the U.S. Food Supply

- Review and download the Food Supply reports.
- Research nutrients of interest by using the Interactive Food Supply.

Visit www.cnpp.usda.gov

The screenshot shows the website header with the USDA logo and the text 'United States Department of Agriculture Center for Nutrition Policy and Promotion'. Below the header is a navigation bar with links for 'Home', 'About Us', 'News & Media', 'Publications', and 'Contact Us'. The main content area features a search bar labeled 'Search CNPP' and a 'Go' button. Below the search bar are links for 'Search all USDA' and 'Search Tips'. A 'Browse by Subject' sidebar lists various topics, with 'Nutrient Content of the U.S. Food Supply' highlighted. The main content area displays the title 'Nutrient Content of the U.S. Food Supply' and a description: 'The Nutrient Content of the U.S. Food Supply is a historical data series, beginning in 1909, on the amounts of nutrients per capita per day in food available for consumption. An interactive version of this series allows users to query nutrient and pyramid servings information online.' Below this is a 'Downloads' section with a link to 'Adobe Reader'. A 'Publications and Current Information' section lists 'Nutrient Content of the U.S. Food Supply, 1909-2004: A Summary Report' and 'Nutrient Content of the U.S. Food Supply, 1909-2000'. A 'NEW!' badge is placed over the link for 'Interactive Nutrient Content of the U.S. Food Supply (1909-2005)'. The page footer indicates 'Last Modified: 09/05/2007'.



Sources of Food Supply Data

Economic Research Service provides

- Per capita estimates of food commodities available for consumption

Agricultural Research Service provides

- Standard Reference of nutrients available for specific foods
- Added nutrients

United States Department of Agriculture

Sources of Food Supply Data

Other Sources

**National Oceanic and Atmospheric Administration,
National Marine Fisheries Service**

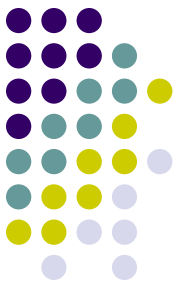
Fish and seafood data

50 States

Game harvest data

U.S. Department of the Interior, U.S. Fish and Wildlife Service

Duck and geese data



Uses of the U.S. Food Supply Data

- To address questions relating to historical trends, suppliers' response to demand, and establishing food and nutrient policy.
- To examine historical trends and evaluate changes in the American diet and to make international comparisons.
- To examine relationships among food supplies, diet, and health.



The U.S. Food Supply and Federal Dietary Guidance

- Data in the U.S. Food Supply Series are important to policymakers for translating nutrient goals for Americans into goals for food production and supply levels.
- To ensure that sufficient nutrients are available to the whole population, the nutrient levels in the food supply need to exceed recommended allowances because the estimates reflect the amount available before losses from trimming, cooking, plate waste, and spoilage.



Background Information on the Dietary Reference Intakes

- The Institute of Medicine of the National Academy of Sciences publishes the Dietary Reference Intakes (DRI) for dietary components, including macronutrients, vitamins, minerals, and fiber. The DRIs consist of the RDAs, EARs, AIs, and ULs.
- Recommended values are provided for each life cycle group—from birth through childhood, sexual maturity, midlife, and old age.



Nutrient Values Provided by the Dietary Reference Intakes

- **Recommended Dietary Allowance (RDA)**
The average daily intake level sufficient to meet the nutrient requirements of 97 to 98 percent of healthy individuals.
- **Tolerable Upper Level (UL)**
The highest level of daily nutrient intake that is likely to pose no risks of adverse health effects to almost all individuals in the general population.



- **Estimated Average Requirement (EAR)**
The nutrient intake value sufficient to meet the requirements of half the healthy individuals in a group. The Nutrient Content of the U.S. Food Supply Series uses this DRI for nutrient comparisons.
- **Adequate Intake (AI)**
The recommended daily intake based on approximations of nutrient intake by a group (or groups) of healthy people. It is used when the RDA cannot be determined.

Supplemental Information

References



- Institute of Medicine, Food and Nutrition Board. (2002). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids, Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc*. Washington, DC: National Academy Press.
- Hiza, H., Bente, L., & Fungwe, T. (In Press). *Nutrient Content of the U.S. Food Supply, 2005*. Available at www.cnpp.usda.gov.
- Gerrior, S., Bente, L., & Hiza, H. (2004). *Nutrient Content of the U.S. Food Supply, 1909-2000*. (Home Economics Research Report No. 56). U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.