

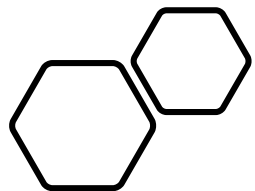
**Dietary Guidelines for American II/II**  
*Evidence-based Policies for Creating a Healthy Eating Pattern*  
*Based on USDA Dietary Guideline*

**AGSC 5540: Food Policies and Regulations**

*9-10-2020*

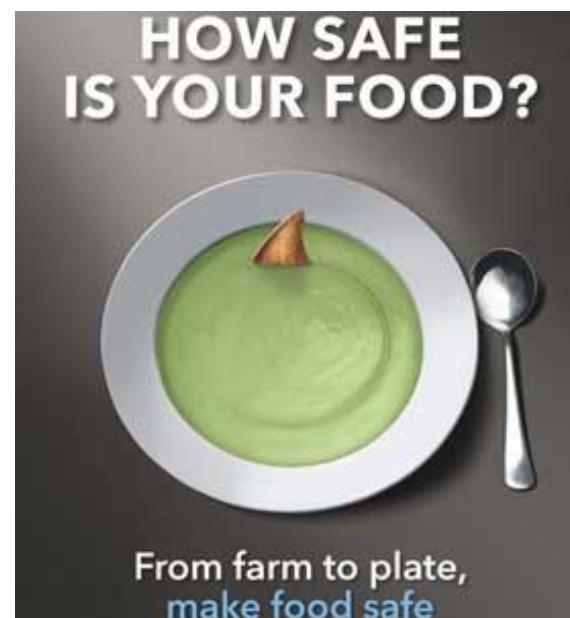
*Tennessee State University, Nashville, TN*

*Aliyar Cyrus Fouladkhah: Faculty Director, Public Health Microbiology Laboratory*



# Today's Game Plan

- History of Food Safety Regulations
- Last part of DGA
- Talking about term papers
- Asking for your preference:
- *Assignment delivery: Email or Google doc*
- *Lecture slides: Email or eLearn*
- *Mid-term Exam: In-person or take-home*



# Assignment #2: Term Paper Topic and Literature Review

Due before start of the class on 9/17/2020

(Email to afouladk@tnstate.edu)

(1) Please let us know what topic of your paper is. If you would like us to assign a topic to you or if you would like to discuss it, you could just email the instructor with time that works for you or join the Zoom office hours on Wednesdays.

(2) Please let us know what option you choose for your paper?

## Option 1: Brief Review Paper

10 to 20 peer-review research articles; 5 to 10 pages (double space)

## Option 2: 3-page Food for Public Health Series Article

Up to 20 references and selected article will be co-edited by student (first author) instructor and teaching fellow to be posted on Public Health Microbiology Food for Public Health Series website.

**Selected articles will also get 25 extra point.**

## Option 3: Full Length Review Paper

Up to 50-100 peer-review research articles and selected article will be co-edited by student (first author) instructor and teaching fellow

Selected students will receive up to \$1200 towards open-access publication of their work in Special issues explained in syllabus

**Selected articles will also get 50 extra point.**

## Assignment #2: Term Paper Topic and Literature Review

(3) Please identify the **needed peer-reviewed articles** related to your final term paper. Please save the papers on your computer since we will use them for constructing your final term paper. Please provide the list of your literature cited as follow:

**Students who choose the third option will have additional week for this assignment, until 10/24/2020.**

*Journal Articles:*

1. Author 1, A.B.; Author 2, C.D. Title of the article. Abbreviated Journal Name Year, Volume, page range.

*Books and Book Chapters:*

2. Author 1, A.; Author 2, B. Book Title, 3rd ed.; Publisher: Publisher Location, Country, Year; pp. 154–196.

***How Extra points work for this class?*** We will add all your extra points you accumulate during the semester and will divide them by 100 and add them to your final grade. Let's say you obtain 220 points during the semester, that means 2.2 point will be added to your final grade. All your points will be added in the course spreadsheet.

# Term Paper Example

Papers will be analyzed for similarity index



## Option 1: Brief Term Paper



### Food For Thought: The Complexity of Obesity with the Black Community

Lauren Odum

Studies show that two-thirds of African Americans 20 years of age or older are obese or overweight. The purpose of this paper is to outline why obesity is such a prevalent issue within the black community, and actions that can be taken to reduce these staggering statistics. Topics explored will include effects of being overweight, lack of access to healthy, affordable food and adequate health care, along with the cultural standards within the black community that perpetuate this epidemic. The goal of this research is to shed light on an often-overlooked topic and provide possible long-term solutions.

## Option 2: An Outreach Article

### Protecting Yourself and Your Family from Extra Salt in Diet

Contributors: Aliyar Fouladkhah, Janelle Robinson, and Yonda Richardson



Sodium chloride, commonly known as salt, is essential for health and has historically been part of our diet. It is also an indispensable part of food manufacturing, and an ingredient in a wide array of manufactured packaged food products in market. Higher than recommended amounts of salt in diet, however, have considerable deleterious effects on our health. At current time, American adults of nearly all ages, consume considerably higher than recommended amount, the level that is currently recognized as safe for maintaining health<sup>(1)</sup>. Extra salt in diet, is strongly linked to elevated levels of blood pressure and other chronic diseases<sup>(2)</sup>. Unfortunately, hypertension (high blood pressure) in adults is one of the leading underlying causes of preventable and premature deaths, both nationally and internationally<sup>(3)</sup>.

At current time, 26% of people around the world suffer from hypertension, one of the direct consequences of extra salt in diet. As high as 27% of U.S. adults are also currently suffering from hypertension and another 31% have a condition called prehypertension that can lead to hypertension. Overall, in American adults, lifetime probability of developing these conditions is approaching 90%<sup>(4)</sup>. So stakes are very high and many people are negatively affected by extra salt in diet. New studies also show that extra amount of salt in our diet could be responsible for increased likelihood of other

health complications such as cardiovascular diseases, several types of cancer, obesity incidences, and development of asthma<sup>(5)</sup>. Now that we know the extent of the problem, let's see where the extra salt in diet comes from, and how we can avoid extra dietary salt to prevent or reduce these health complications for ourselves and our families.

USDA Dietary Guidelines estimate about 75% of dietary sodium comes from the consumption of processed foods and ready-to-eat products, items that we buy from supermarket<sup>(1)</sup>. Salt is one of the cheapest ingredients (around 15 cents per pound) and also improves taste and increases shelf-life of many products. So for taste, quality, and also economic reasons, salt is a very common ingredient in many packaged foods we buy from supermarket. Another study similarly estimated that 77% of salt in western diets comes from consumption of processed foods, 12% from existing salt in natural foods, 6% from added salt during dining, and 5% from added salt during cooking<sup>(4)</sup>. Just to give an example, natural sodium content of beef (topside roast) and raw salmon are about 48 and 110 mg in 3-oz (100 g) portions, but the sodium content of canned corned beef and smoked salmon is about 950 and 1880 mg in same portion sizes of 3-oz. We can all reduce salt intake by reading the nutrition labels on the back of packaged products prior to purchase. So with moderation and balance in consumption of high-sodium foods or if possible, by avoiding them from diet, it is possible to protect our health meaningfully from the above-mentioned health complications. Of course we can try what public health professionals call "stealth approach," by trying to reduce extra salt in diet gradually to adopt our taste to a diet with moderate amount of sodium. Interestingly, avoiding salt entirely in our diet could also lead to negative health consequences, so just like many other health and nutrition practices, moderation and balance is the key.

Do you know what the main high-sodium food products are? Review of recent studies show that processed meats, breads, cheeses, sauces, and spreads are some of the main contributors of extra dietary sodium<sup>(5)</sup>. More specifically, around 40% of sodium in a typical western diet comes from breads and rolls, cold cuts/cured meats, pizza, poultry, soups, sandwiches, cheese, pasta mixed dishes, meat mixed dishes, and savory snacks<sup>(6)</sup>. So by minimizing consumption of these high-sodium foods, by carefully examining the nutritional labels of packaged food, trying to gradually adopt our taste to a diet with lower amount of salt, and with moderation and balance we can move towards even

## Option 3: Review Paper



microorganisms



Review

### Outbreak History, Biofilm Formation, and Preventive Measures for Control of *Cronobacter sakazakii* in Infant Formula and Infant Care Settings

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Received: 18 January 2019; Accepted: 9 March 2019; Published: 12 March 2019



**Abstract:** Previously known as *Enterobacter sakazakii* from 1980 to 2007, *Cronobacter sakazakii* is an opportunistic bacterium that survives and persists in dry and low-moisture environments, such as powdered infant formula. Although *C. sakazakii* causes disease in all age groups, infections caused by this pathogen are particularly fatal in infants born premature and those younger than two months. The pathogen has been isolated from various environments such as powdered infant formula manufacturing facilities, healthcare settings, and domestic environments, increasing the chance of infection through cross-contamination. The current study discusses the outbreak history of *C. sakazakii* and the ability of the microorganism to produce biofilms on biotic and abiotic surfaces. The study further discusses the fate of the pathogen in low-moisture environments, articulates preventive measures for healthcare providers and nursing parents, and delineates interventions that could be utilized in infant formula manufacturing to minimize the risk of contamination with *Cronobacter sakazakii*.

**Keywords:** *Cronobacter sakazakii*; powdered infant formula; *Cronobacter* outbreaks; preventive measures; infant care setting



# *Food Safety Regulations in the United States*

## *A Historical Perspective*

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### Important Dates

- September is Food Safety Education Month
- June 7 Global Food Safety declared by the United Nation
- **First document global food safety Law:** The Assize of Bread in 1202
- Was proclaimed by King John of England in 1202 (**Adulteration of bread with ingredients such as ground peas or beans**)
- **First document American food safety Law:**
- 1646: American colonists **enacted a replica** of the Assize of Bread regulation
- 1785: **Massachusetts Act Against Selling Unwholesome Provisions**
- 1862: USDA and FDA Formed by President Abraham Lincoln
- 1862 and 1890 Merrill Act for Lan-grant institutions



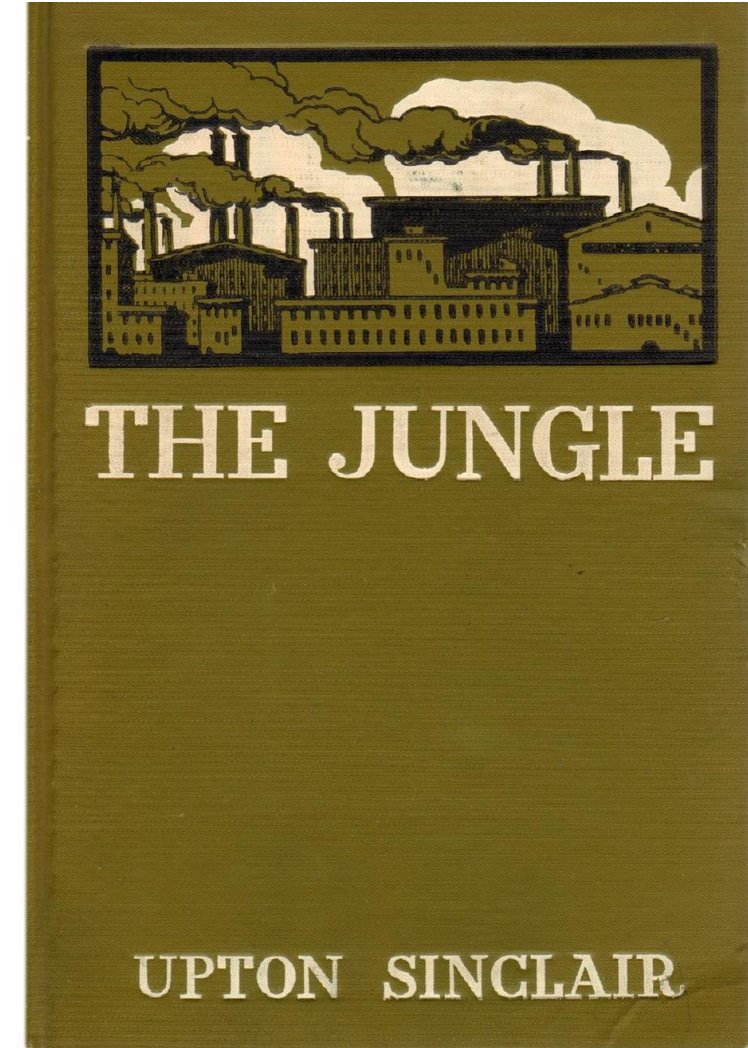
*Food Safety Regulations in the United States  
A Historical Perspective*

**1906: Pure Food and Drug Act**

Prevented the manufacture, sale, or transportation of **adulterated or misbranded** foods, drugs, medicines, and liquors.

**1906: Federal Meat Inspection Act**

Prohibited the sale of **adulterated or misbranded** meat and meat products for food and ensured that meat and meat products were slaughtered and processed under sanitary conditions.





# *Food Safety Regulations in the United States A Historical Perspective*



## **1938 – Pure Food and Drug Act Revised**

Congress passed a complete revision of the 1906 Pure Food and Drug Act in 1938.

### **The Federal Food, Drug, and Cosmetics Act of 1938**

#### **Contained several new provisions:**

- Requiring safe tolerances be set for unavoidable poisonous substances,
- Authorizing standards of identity, quality, and fill-of-container for foods
- Authorizing factory inspections
- Adding the remedy of court injunctions to the previous penalties of seizures and prosecutions.





# *Food Safety Regulations in the United States*

## *A Historical Perspective*

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- **1949 – “Procedures for the Appraisal of the Toxicity of Chemicals in Food” Published**  
The FDA published its first **guidance to industry**: "Procedures for the Appraisal of the Toxicity of Chemicals in Food." This gave the FDA a way to **influence industry actions without mandating specific requirements**.
- **1957 – Poultry Products Inspection Act Passed**  
Congress passed the Poultry Products Inspection Act which mandated the inspection of poultry products sold in **interstate commerce**, in response to the expanding market for **ready-to-cook** and **processed poultry products**.



# In the news yesterday... Extremely concerning ...

*“...CHICAGO (Reuters) - The Trump administration said on Wednesday it will **stop requiring U.S. plants that produce egg products to have full-time government inspectors**, in the first update of inspection methods in 50 years. Under a new rule that takes effect immediately, the U.S. Department of Agriculture will allow companies like Cargill Inc and Sonstegard Foods to use different food-safety systems and procedures designed for their factories and equipment....”*

## Trump administration rolls back U.S. inspection rules for egg products

REUTERS

Tom Polansek, Reuters • September 9, 2020



FILE PHOTO: Workers sort eggs after pasteurization at the National Pasteurized Eggs plant in Lansing

By Tom Polansek

CHICAGO (Reuters) - The Trump administration said on Wednesday it will stop requiring U.S. plants that produce egg products to have full-time government inspectors, in the first update of inspection methods in 50 years.

Under a new rule that takes effect immediately, the U.S. Department of Agriculture will allow companies like Cargill Inc and Sonstegard Foods to use different food-safety systems and procedures designed for their factories and equipment.

# *Food Safety Regulations in the United States A Historical Perspective*



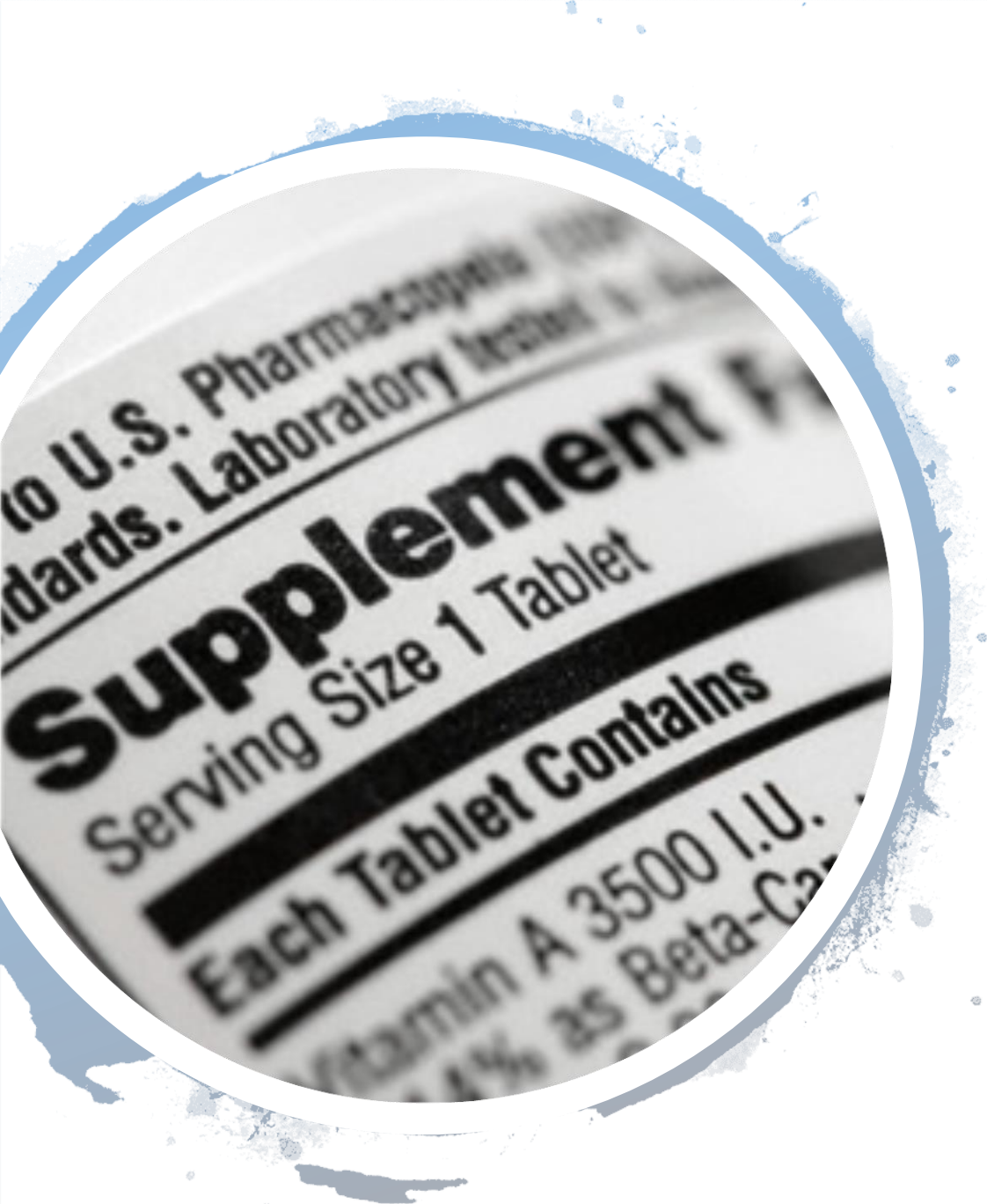
## **1958 – Federal Food, Drug, and Cosmetics Act of 1938 Amended**

The Federal Food, Drug, and Cosmetics Act of 1938 was amended to include the **Food Additive Amendment**, due to consumer concerns about the impact of unknown chemicals in the food they consumed. The amendment ensured the safety of ingredients used in processed foods.

## **1962 – Consumer Bill of Rights Introduced**

President John F. Kennedy proclaimed the Consumer Bill of Rights, which stated that **consumers have a right to safety, to be informed, to choose**, and to be heard. These rights have a direct correlation to the many food safety acts and amendments that preceded it, and that were yet to come. **[Transparency, front of package labeling?]**





# *Food Safety Regulations in the United States*

## *A Historical Perspective*

- **1967 – Fair Packaging and Labeling Act Enacted**  
The Fair Packaging and Labeling Act was enacted to prevent **unfair or deceptive packaging** and labeling of **many household products, including foods**. The Act requires the identification of the commodity, the **name and location** of the manufacturer, packer, or distributor, and the **net quantity** of contents in terms of weight, measure, or numerical count.
- **1970 – Centers for Disease Control (CDC) Began Keeping Records on Foodborne Illness**  
The Centers for Disease Control (CDC) **began keeping records on foodborne illness** related deaths in the U.S., marking the beginning of modern data collection on foodborne illness outbreaks.

# Food Safety Regulations in the United States

## A Historical Perspective

- **1973 – First Major Food Recall in U.S.**  
The first major food recall in the U.S. occurred, following a nationwide illness outbreak from canned mushrooms. More than 75 million cans of mushrooms were removed from store shelves.
- **Botulism, *C. botulinum*, 12D requirement**
- **Now concern: Honey and infant botulism under age of 12 months**
- **1977 – Food Safety and Quality Service Created**  
The Food Safety and Quality Service was created to perform meat and poultry grading and inspection. It was later reorganized and renamed the **Food Safety and Inspection Service (FSIS)** in **1981**.



# Food Safety Regulations in the United States A Historical Perspective

- **1992-1993: *Escherichia coli* O157:H7 outbreak in Pacific Northwest**
- Major concern and changes in meat industry. HUS in kinds under the age of 5.
- **1996 – Pathogen Reduction/HACCP Systems Landmark Rule Issued**  
FSIS issued its landmark rule, Pathogen Reduction/HACCP Systems. The rule focuses on the **prevention and reduction of microbial pathogens** on raw products that can cause illness. HACCP was implemented in all FSIS- and state-inspected meat and poultry slaughter and processing establishments across the nation, between January **1997 and January 2000**.
- **1997 – Food and Drug Modernization Act Amended**  
In 1997, the Food and Drug Modernization Act amended the Federal Food, Drug, and Cosmetic Act. Among the major provisions in the Act is an expansion of the **FDA's authority to regulate health and nutrient content claims**, and to establish processes related to the food contact substances in new products.

Newsletter snapshot from 1992-1993 outbreak



Alex Donley  
Chicago, IL  
1987 - 1993



Katie O'Connell  
Kearney, NJ  
1990 - 1992



Scott Hinkley  
Saranac, MI  
1990 - 1993



Lauren Rudolph  
Carlsbad, CA  
1986 - 1992

*E. coli* O157:H7  
kills more than one  
victim each day.  
**WHO IS NEXT?**



???? ??????  
??????, ??  
19\_\_ - 19\_\_



# *Food Safety Regulations in the United States*

## *A Historical Perspective*

- **2000 – Global Food Safety Initiative (GFSI) Created**  
**Food industry leaders** created the Global Food Safety Initiative (GFSI) to collaboratively drive industry improvement to reduce food safety risks and increase consumer confidence in the delivery of safe food.
- **2011 – Food Safety Modernization Act (FSMA) Signed Into Law**  
The Food Safety Modernization Act (FSMA) was signed into law. FSMA enables the **FDA** to focus on food safety **preventative measures** rather than being **reactionary** when an outbreak occurs. The FDA will have a legislative mandate to require comprehensive, science-based preventive controls across the food supply, including: mandatory preventive controls for food facilities, mandatory produce safety standards, and the authority to prevent intentional contamination. In addition, FSMA provides the FDA with the necessary tools **for inspection, compliance, and incident response**.
- **2019 – Blueprint for a New Era of Smarter Food Safety**  
The FDA announced its intention to develop a **Blueprint for a New Era of Smarter Food Safety** addressing several areas including **traceability, digital technologies**, and evolving food business models. Emphasis on **emerging technologies**.

[Very early in development: Plan for New processing methods, packaging material, temperature control, e-commerce]

[Public hearing, advisory committee, curriculum development, public hearing, and legislation approval ..]

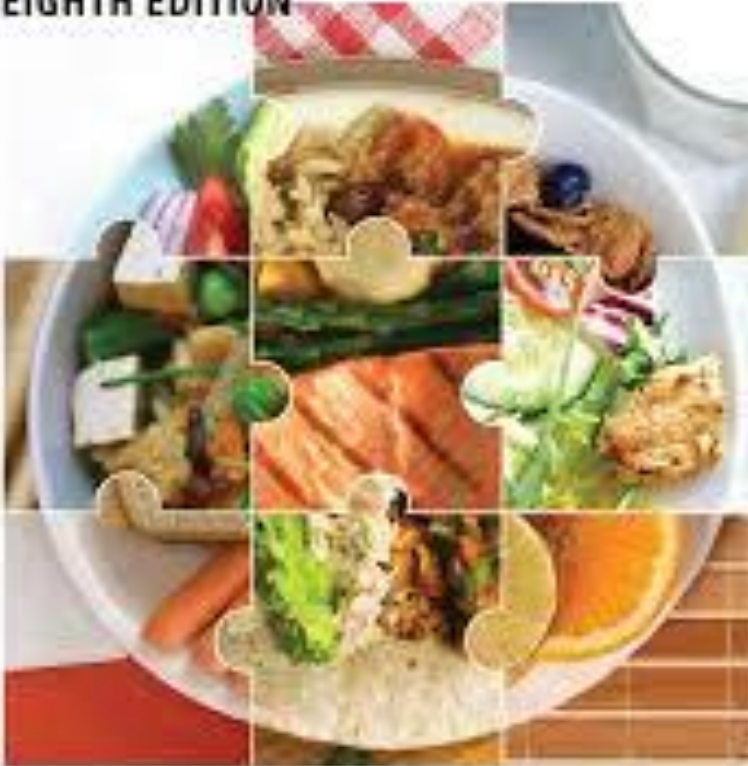


**FDA FOOD SAFETY  
MODERNIZATION ACT**

**GFSI**

**Global Food  
Safety Initiative**

**DIETARY  
GUIDELINES**  
FOR AMERICANS  
2015-2020  
EIGHTH EDITION

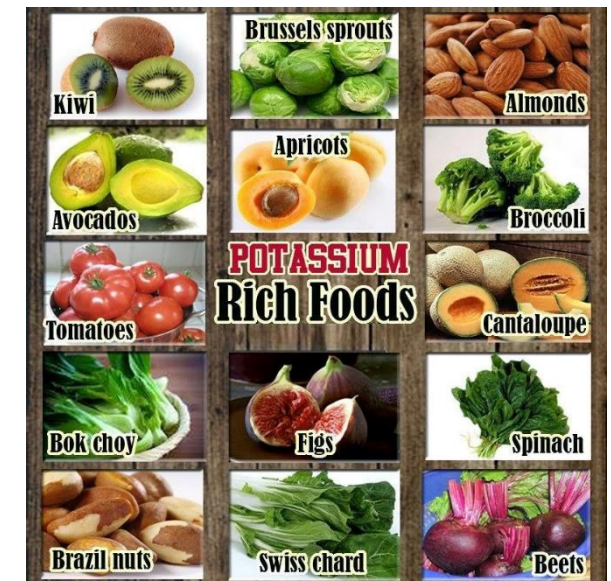


**Dietary Guidelines for American II/II**  
*Evidence-based Policies for Creating a  
Healthy Eating Pattern  
Based on USDA Dietary Guideline*

# Public Health Burden of food and diet-related chronic diseases

- **Hypertension**
- 74.5 million **Americans—34 percent** of U.S. 15 adults—have hypertension (another **36% prehypertension**).
- **36%** of American adults have prehypertension—blood pressure numbers that are higher than normal, but not yet in the hypertension range.
- Hypertension is a **major risk factor** for heart disease, stroke, congestive heart failure, and kidney disease.
- Dietary factors that increase blood pressure include **excessive sodium and insufficient potassium intake**, overweight and obesity, and excess alcohol consumption.

*(<1% of American adults meet the joint sodium and potassium guideline)*





# *Public Health Burden of food and diet-related chronic diseases (continued)*

## **Cardiovascular Disease**

- 81.1 million Americans—**37 percent** of the population—have cardiovascular disease.
- **Major risk factors** include high levels of **blood cholesterol** and **other lipids**, **type 2 diabetes**, **hypertension** (high blood pressure), metabolic syndrome, **overweight and obesity**, physical inactivity, and tobacco use.
- **16 percent** of the U.S. adult population have high total blood cholesterol.



# *Public Health Burden of food and diet-related chronic diseases* (continued)

- **Diabetes**
- Nearly 24 million people—almost **11 percent** of the population—**ages 20 years and older** have 17diabetes.
- The **vast majority of cases are type 2 diabetes**, which is heavily influenced by **diet** and **physical activity**.
- About 78 million Americans—**35 percent** of the U.S. adult population **ages 20 years or older**—have **pre-diabetes**.
- **Pre-diabetes** (also called impaired glucose tolerance or impaired fasting glucose) means that blood glucose levels are higher than normal, but not high enough to be called diabetes.



# Public Health Burden of food and diet-related chronic diseases *(continued)*

- **Cancer**
- **Almost one in two men and women**—approximately **41 percent** of the population—will be diagnosed with cancer during their lifetime.

## Osteoporosis

- **One out of every two women** and **one in four men** ages 50 years and older will have an osteoporosis-related fracture in their lifetime.
- About **85 to 90 percent of adult bone mass** is acquired by the age of **18 in girls** and the age of **20 in boys**.
- Adequate **nutrition** and regular participation in **physical activity** are important factors in achieving and maintaining optimal bone mass.





# National Nutrition Monitoring and Related Research Act of 1990

- Poor diet and physical inactivity
- Epidemic of overweight and obesity
  - Men, women and children
  - All segments of the society
- Poor diet and physical inactivity: a **leading cause of premature morbidity and mortality**
- **Absence of harmonized national policy and guidelines for food, nutrition and health**
- Lead to enactment of:

## **National Nutrition Monitoring and Related Research Act of 1990**

*(Public Law 101-445, Title III, 7 U.S.C. 5301 et seq.)*

104 STAT. 1034

PUBLIC LAW 101-445—OCT. 22, 1990

Public Law 101-445  
101st Congress

An Act

To strengthen national nutrition monitoring by requiring the Secretary of Agriculture and the Secretary of Health and Human Services to prepare and implement a ten-year plan to assess the dietary and nutritional status of the United States population, to support research on, and development of, nutrition monitoring, to foster national nutrition education, to establish dietary guidelines, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

### SECTION 1. SHORT TITLE.

This Act may be cited as the “National Nutrition Monitoring and Related Research Act of 1990”.

### SEC. 2. PURPOSES.

The purposes of this Act are to—

(1) make more effective use of Federal and State expenditures for nutrition monitoring, and enhance the performance and benefits of current Federal nutrition monitoring and related research activities;

(2) establish and facilitate the timely implementation of a coordinated National Nutrition Monitoring and Related Research Program, and thereby provide a scientific basis for the maintenance and improvement of the nutritional status of the

Oct. 22, 1990  
[H.R. 1608]

National  
Nutrition  
Monitoring and  
Related  
Research Act of  
1990.  
Inter-  
governmental  
relations.  
Business and  
industry.  
Health  
professions.  
Science and  
technology.  
7 USC 5301 note.  
7 USC 5301.

<https://www.gpo.gov/fdsys/pkg/STATUTE-104/pdf/STATUTE-104-Pg1034.pdf>

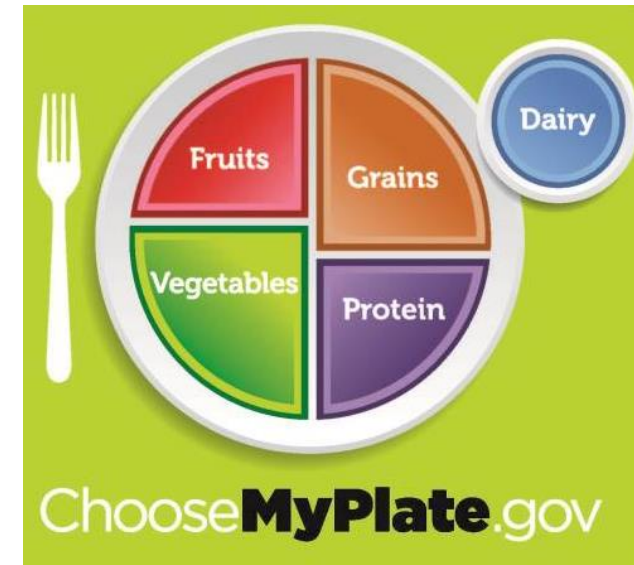
# What is USDA Dietary Guideline?

- National Nutrition Monitoring and Related Research Act of 1990 Requires:
  - *United States Department of Agriculture (USDA)*
  - *Department of Health and Human Services (DHHS)*
- Review and Update Dietary Guidelines for Americans (**DGA**) every **five years**
- Prior to NNMRR Act of 1990, DGA existed in less volumes editions:
  - *Earliest revision, Wilbur Olin **Atwater**, 1894*
  - *The revisions of **1980 and 1985**, less extensive than post NNMRR Act*
- Current DGA has two **main concepts** of:
  - *Maintain calorie balance over time to achieve and sustain a healthy weight (**quantity of diet**) **avoiding positive energy balance***
  - *Consuming nutrient-dense foods and beverages (**quality of diet**)*
- Current DGA promotes two **eating patterns** of:
  - USDA Food Patterns
  - DASH (Dietary Approaches to Stop Hypertension) Eating Plan



# DGA main concepts

- **Maintain calorie balance over time to achieve and sustain a healthy weight** (**quantity of diet**)
  - *Decrease the calories consumption*
  - *Increase the calories expenditure through physical activity*
- **Consuming nutrient-dense foods and beverages** (**quality of diet**)
  - Reduction in consumption of:
    - *Sodium,*
    - *Calories from solid fats,*
    - *Added sugars,*
    - *Refined grains.*
  - Increase in consumption of:
    - *Vegetables, fruits, and whole grains,*
    - *Fat-free or low-fat milk and milk products,*
    - *Seafood, lean meats and poultry, eggs,*
    - *Beans and peas, and nuts and seeds.*





# *Foods and Nutrients to Increase*

- Many Americans do not eat the **array of foods** that will provide all needed nutrients **while staying within calorie needs**.
- In the United States, **foods** with intakes are **lower than recommended** for
  - *Vegetables,*
  - *Fruits,*
  - *Whole grains,*
  - *Milk and milk products,*
  - *Oils*
- As a result, dietary intakes of several **nutrients** are lower than recommended (**nutrients of public health concern**):
  - *Potassium,*
  - *Dietary fiber,*
  - *Calcium,*
  - *Vitamin D.*
- Several other nutrients for **specific population groups**:
  - *Folic acid* for women who are capable of becoming pregnant
  - *Supplement* for the *elderly*



# *Foods and Nutrients to Increase General Recommendations*

- Increase **vegetable and fruit intake**.
- Eat a **variety of vegetables**, especially **dark-green and red and orange vegetables and beans and peas**.
- Consume at **least half** of all grains as **whole grains**.
- **Increase whole-grain** intake by replacing refined grains with whole grains.
- Increase intake of **fat-free or low-fat milk and milk products**, such as milk, yogurt, cheese, or fortified soy beverages.
- Choose a **variety of protein foods**, which include **seafood, lean meat and poultry, eggs, beans and peas, soy products, and unsalted nuts and seeds**.



## *Foods and Nutrients to Increase General Recommendations*

- Increase the **amount and variety of seafood** consumed by choosing seafood **in place of some meat and poultry**.
- **Replace protein foods that are higher in solid fats** with choices that are lower in **solid fats** and calories and/or are sources of **oils**. (**80/20 ground meat**)
- Use **oils to replace solid fats** where possible.
- Choose foods that provide more **potassium, dietary fiber, calcium, and vitamin D**, which are nutrients of concern in American diets.
- These foods include **vegetables, fruits, whole grains, and milk and milk products**.





# Foods and Nutrients to Increase Recommendations Specific Age Groups

## Women capable of becoming pregnant

- Choose foods that supply **heme iron**, which is more readily absorbed by the body, additional **iron sources**, and **enhancers of iron absorption** such as vitamin C-rich foods.
- Consume **400 micrograms (mcg) per day of synthetic folic acid** (from **fortified foods and/or supplements**) in addition to food forms of folate from a varied diet.
- *[Low childhood mortality in the United States]*
- *[Since 1998, folic acid (B9) required breads, cereals, pasta, flour, rice, cornmeal and other processed grain products] Whole Grain Cereals Vs. Processed Cereals ... Pizza Crust?*

## Women who are pregnant or breastfeeding

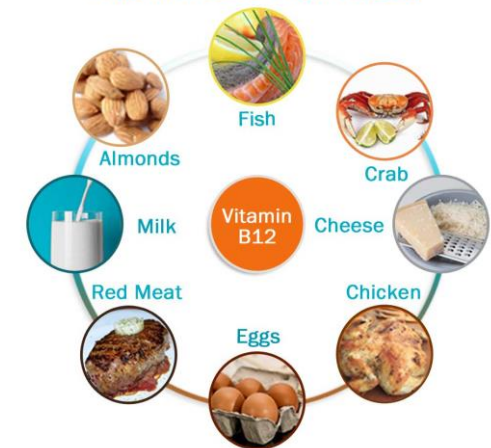
- Consume **8 to 12 ounces of seafood per week** from a variety of seafood types.
- Due to their **methyl mercury content**, **limit white (albacore) tuna to 6 ounces per week** and **do not eat the following four types of fish**: tilefish, shark, swordfish, and king mackerel.
- If **pregnant, take an iron supplement as recommended** by an obstetrician or other health care provider.

## Individuals ages 50 years and older

- Consume foods **fortified with vitamin B12**, such as **fortified cereals**, or **dietary supplements**.



Vitamin B12 Rich Foods



# *Foods and Nutrients to Increase*

## *Overview*

- **Current evidence supporting the health benefits associated with increased:**

- *Vegetables*
- *Fruits*
- *Whole grains*
- *Fat-free or low-fat milk and milk products*
- *Seafood*
- *Oils*



- **An important underlying principle:**

- Control calories to **manage body weight** while making choices to support these food and nutrient recommendations.
- Source of an array of **bioactive food compounds** with beneficial **physiological, behavioral, and immunological** effects (e.g. curcumin in turmeric etc.).
- The best way to do this is to consume foods in **nutrient-dense** forms.

# Foods and Nutrients to Increase

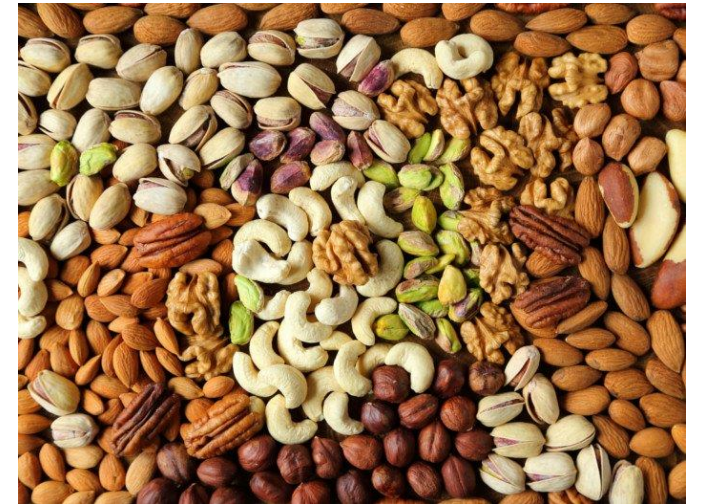
## Overview *(continued)*

- **What are nutrient-dense foods?**

- Nutrient-dense foods provide *vitamins, minerals*, and other substances that may have positive health effects, with relatively few calories.
- They are lean or *low in solid fats*
- *Minimize or exclude added solid fats, added sugars, and added refined starches*
- Nutrient-dense foods also minimize or exclude *added salt or other compounds high in sodium*.
- Ideally, they are in forms that retain naturally occurring *components such as dietary fiber*.

- **Examples of nutrient-dense foods:**

- Vegetables
- Fruits
- Whole grains
- Fat-free or low-fat milk and milk products
- Seafood
- Lean meats and poultry
- Eggs, beans and peas (legumes)
- Nuts and seeds that are prepared *without added solid fats, sugars, starches, and sodium*





# *Exercise 1*

- What are the food categories that American Adults would need to increase in their diet?
- What are the nutrients of public health concern in American Adults?
- What is the nutrient of concern in women of childbearing age according to USDA DGA?
- What are the DGA general recommendation for:
  - Women capable of becoming pregnant?
  - Women who are pregnant or breastfeeding?
  - Individuals ages 50 years and older?
- What are the characteristics of nutrient dense foods and what are the nutrient dense foods?

# Foods and Nutrients to Increase Fruits and Vegetables

*2 and 1/2 cups of vegetables and fruits per day*

- **Three reasons** to eat more vegetables and fruits based on DGA guidelines:

(1) Most vegetables and fruits are **major contributors** of a number of **under-consumed nutrients**:

- Folate,
- Magnesium,
- Potassium,
- Dietary fiber,
- Vitamins A, C, and K *[Fat soluble vitamins: A, D, E, and K vs. Water soluble vitamins]*

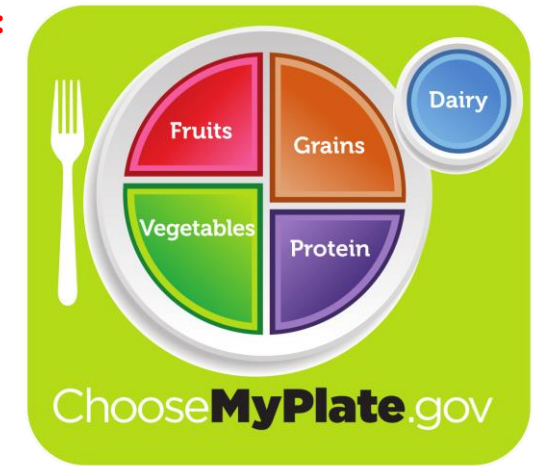


(2) Based on NHANES epidemiological data, they are association with reduced risk of many **chronic diseases**:

- At least *2 and 1/2 cups of vegetables and fruits per day* is associated with a reduced risk of cardiovascular disease, including heart attack and stroke.
- Some vegetables and fruits may be protective against *certain types of cancer (colon cancer)*

(3) Most vegetables and fruits, **when prepared without added fats or sugars**, are **relatively low in calories**. **[Dressings???)**

- Eating them instead of higher calorie foods can help adults and children achieve and maintain a healthy weight.



# Foods and Nutrients to Increase Fruits and Vegetables

## Current Intake of recommended amounts of vegetables:

- Almost all Americans ages 2 years and older, usual intake **falls below amounts recommended**.

## Current Intake of recommended amounts of Fruits:

- Most Americans **2 to 3 years** of age consume recommended amounts of total fruits,
- Americans ages **4 years and older** **do not consume recommended** amounts of total fruits.
- Children ages **2 to 18 years** and adults' ages **19 to 30 years** consume **more than half** of their **fruit intake as juice**:

## DGA perspective of fruit juice:

- *Although 100% fruit juice can be part of a healthful diet, [Heat treatment and bioactive compounds]*
- *But, it lacks dietary fiber*
- *When consumed in excess can contribute extra calories.*

## The majority of the fruit recommended should come from **whole fruits**:

- *Fresh fruits*
- *Canned fruits*
- *Frozen fruits (comparable to fresh fruits)*
- *Dried forms*
- *When juices are consumed, 100% juice should be encouraged. (Deceptive advertisements? 100% vitamin C?)*
- *To limit intake of added sugars, fruit canned in 100% fruit juice is encouraged over fruit canned in syrup.*





# Foods and Nutrients to Increase Fruits and Vegetables

DGA has **two additional specific sections** for:

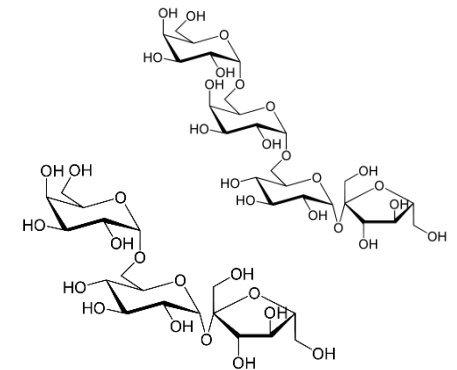
- Beans and peas
- The content of juice in juices

## Beans and Peas:

- Beans and peas are the mature forms of legumes (**High in raffinose and stakiose sugars**).
- **They include:** kidney beans, pinto beans, black beans, garbanzo beans (chickpeas), lima beans, black-eyed peas, split peas, and lentils.
- **Beans and peas are excellent sources of:**
  - Protein
  - Nutrients, such as **iron and zinc**, similar to seafood, meat, and poultry. (*Major problem in Global health Zinc and Iron and B12*)
  - Dietary fiber and nutrients such as **potassium and folate**
- Because of their high nutrient content, beans and peas may be **considered both as a vegetable and as a protein food**. Individuals can count beans and peas as either a vegetable or a protein food.

## Exception:

- Green peas and green (string) beans **are not considered to be “Beans and Peas.”** [*Very low in protein, but very functional protein in food industry*]
- **Green peas** are similar to other **starchy vegetables** and are grouped with them.
- **Green beans** are grouped with **other vegetables** such as onions, lettuce, celery, and cabbage because their nutrient content is similar to those foods.



# Foods and Nutrients to Increase Fruits and Vegetables



## DGA note on the **content of juice in juice products**

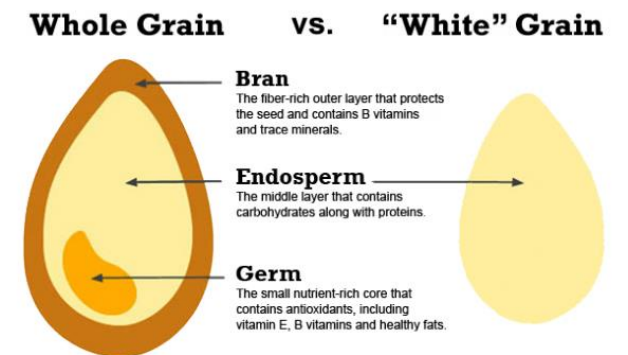
- The percent of juice in a beverage may be found on the package label, such as “contains 25% juice” or “100% fruit juice.” (**made from concentrate, much lower nutritional quality**)
- **Heat treatment** could eliminate nearly all vitamin C and many bioactive food compounds [*High Pressure processing??*]
- Some labels may say they provide **100% of a nutrient**, such as “provides 100% Daily Value for vitamin C.”
- Unless the package also states it is “**100% juice**,” it is not 100% juice.
- **Sweetened juice products** with minimal juice content, such as juice drinks, are considered **sugar-sweetened beverages** rather than **fruit juice** (**WONF, N&A flavored**). HFCF???



COMPANY LOGO		Goodnature		PERCENTAGE OF JUICE	
JUICE NAME		SWEET Green		100% JUICE	
INGREDIENTS IN DESCENDING ORDER		PINEAPPLE CUCUMBER GREEN APPLE		<b>Nutrition Facts</b> 1 Servings Per Container Serving size 16 oz (454g) Amount per serving <b>Calories 150</b> Total Fat 1g 2% Saturated Fat 0g 0% Trans Fat 0g 0% Cholesterol 0mg 0% Sodium 10mg 2% Total Carbohydrate 34g 12% Dietary Fiber 0g 0% Total Sugars 10g 20% Includes 0g Added Sugars 0% Protein 0g Vitamin D 0mcg 0% Calcium 100mg 10% Iron 2mg 10% Potassium 900mg 20% Vitamin A 750mcg 80% Vitamin C 150mg 150% Percent Daily Values are based on a diet of other people's secrets.	

# Foods and Nutrients to Increase Grains

- **Whole grains** include the entire grain seed, usually called the kernel.
- The **kernel** consists of three components—the **bran, germ, and endosperm**.
- If the kernel has been **cracked, crushed, or flaked**, then, to be called a “**whole grain**” a food must retain the same relative proportions of these components as they exist in the intact grain (minimally processed)
- (1) Whole grains are consumed either:
  - **Single food** (e.g., wild rice or popcorn)
  - **Ingredient in foods** (e.g., in cereals, breads, and crackers).
- **Some examples of whole-grain:** buckwheat, bulgur, millet, oatmeal, quinoa, rolled oats, brown or wild rice, whole-grain barley, whole rye, and whole wheat.
- **(2) Refined grains** have been **milled** to *remove the bran and germ* from the grain.
- This is done to give grains a **finer texture** and improve their shelf life, but it *also removes dietary fiber, iron, and many B vitamins*.
- **(3) Enriched grains** are grain products with **B vitamins** (thiamin, riboflavin, niacin, folic acid) and **iron** added.
- Most *refined-grain products are enriched* (Pizza?).



# Foods and Nutrients to Increase Whole Grains

## Whole Grains

- Source of nutrients such as *iron, magnesium, selenium, B vitamins, and dietary fiber.*
- Whole grains could vary considerable in *dietary fiber content*
- Choosing *whole grains that are higher in dietary fiber* has *additional health benefits (Absorption of Cholesterol, sugar, and saturated fats and GI cancers)*

## Health Benefits: (NHANES epidemiological data)

- *Moderate evidence:* Whole-grain intake may reduce the risk of cardiovascular disease
  - *Moderate evidence:* Associated with a lower body weight
  - *Limited evidence:* Reduced incidence of type 2 diabetes
- 
- At least **half of recommended total grain intake (6 oz per day)** should be whole grains.
  - **Less than 5 percent of Americans** consume the minimum recommended amount of whole grains
  - On average, **Americans eat less than 1 ounce-equivalent of whole grains per day**





# Foods and Nutrients to Increase Whole Grains

## Recommendation:

- Replace many *refined-grain* foods with *whole-grain* foods
- When *refined grains* are eaten, they should be *enriched*
- Individuals may choose to consume *more than half of their grains as whole grains*

## Very important if 100% whole grain is consumed in diet:

- To ensure nutrient adequacy, individuals who consume all of their grains as whole grains should include some that *have been fortified with folic acid*, such as some *ready-to-eat whole-grain cereals*.
- This is *particularly important for women who are capable of becoming pregnant*.

## Specific Recommendations:

- At least *half of total grains* as whole grains can be met in a number of ways (*Figure*).
- The relative amount of grain in the food can be inferred by the placement of the grain in the *ingredients list*.
- The *whole grain should be the first ingredient or the second ingredient, after water*.
- For foods with *multiple whole-grain ingredients*, they should appear near the *beginning of the ingredients list*.

## Many grain foods contain both whole grains and refined grains: (*Advertisements could be very misleading*)

- Foods with at least **51 percent** of the *total weight as whole-grain ingredients* contain a substantial amount of whole grains.
- Another example is foods with at least **8 grams** of whole grains per ounce-equivalent.

1. 3 ounces of 100% whole grains and 3 ounces of refined-grain products



2. 2 ounces of 100% whole grains, 2 ounces of partly whole-grain products,<sup>b</sup> and 2 ounces of refined-grain products



3. 6 ounces of partly whole-grain products



# *Foods and food component to reduce*

## *Summary- Refined Grains*

- On average, Americans consume 6.3 ounce-equivalents of refined grains per day
- The recommended amount of refined grains is no more than **3 ounce-equivalents** per day
- **Ounce-equivalents**
  - *1 slice of bread*
  - *1 cup of ready-to-eat cereal*
  - *½ cup of cooked rice, cooked pasta, or cooked cereal* Further recommendation:
- At least 50% of grains to be from whole grain sources
- **Whole Grains** (the bran, germ, and endosperm):

whole-wheat flour, bulgur (cracked wheat), oatmeal, whole cornmeal, and brown rice. *[At least 8 gram of whole gram per oz]*



# *Foods and food component to increase*

## *Milk and Milk Products*

**Milk and milk products contribute nutrients, such as:**

- *Calcium*
- *Vitamin D (for products fortified with vitamin D)*
- *Potassium*

**Health benefits based epidemiological studies:**

- *Moderate evidence: improved **bone health**, especially in children and adolescents.*
- *Moderate evidence: reduced risk of **cardiovascular disease** and **type 2 diabetes***
- *Moderate evidence: lowering **blood pressure** in adults.*

**Suggested Intake (fat-free or low-fat milk and milk products):**

- **3 cups per day: adults and children and adolescents ages 9 to 18 years**
- **2 and ½ cup per day: children ages 4 to 8 years**
- **2 cups: children ages 2 to 3 years**



# *Foods and food component to increase* *Milk and Milk Products*

Intake of milk and milk products, including **fortified soy beverages**, is **less than recommended** amounts for:

- Most adults
- Children
- Adolescents ages 4 to 18 years
- Many children ages 2 to 3 years
- In general, **intake is lower for females than for males** and declines with age

## **Current Intake:**

- **Almost half** of the milk and milk product intake in the United States comes from **cheese** (**some have as high as 30% fat**)
- The majority of current **fluid milk intake** comes from **reduced fat (2%) or whole (full-fat) milk**





# Foods and food component to increase *Milk and Milk Products*

## Recommendation:

- Choosing *fat-free or low-fat milk* and milk products provides the same nutrients with less solid fat and thus fewer calories.

## Benefits of **Fat-free or low-fat** fluid milk or yogurt:

(fat-free about 80 Kcal per cup vs 150 for whole milk)

- **More nutrient per calorie** (more nutrient dense) i.e. potassium, vitamin A, and vitamin D
- **Less cholesterol and saturated fats** (and **less salt in cheese products**)
- For individuals who are **lactose-intolerant**, low-lactose and lactose-free milk products are recommended.
- **Soy beverages fortified with calcium and vitamins A and D** are considered part of the milk and milk products group because they are similar to milk both nutritionally and in their use in meals. (New studies caution for two main isoflavones, **genistein and daidzein**)



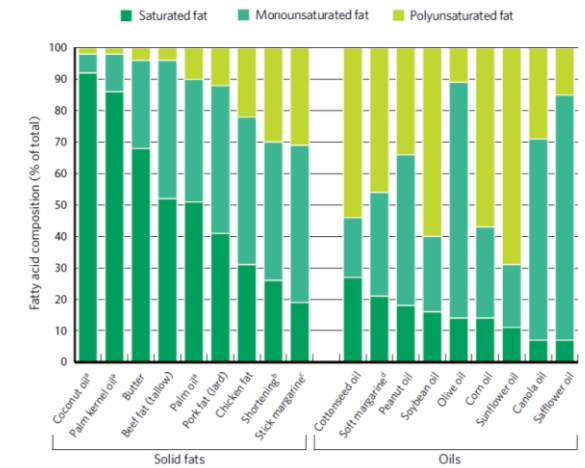
## *Exercise 2*

- Based on DGA guidelines what are the three reasons to increase consumption of fruits and vegetables?
- What is the current status of fruits and vegetables consumption in the United States?
- Based on American Dietary Guidelines what are the health benefits of Beans and peas? Are they considered as vegetable or protein foods?
- According to Dietary Guidelines for Americans (DGA) what are the whole grains, refined grains, and enriched grains?
- According to Dietary Guidelines for Americans (DGA) what proportion of whole grain and/or how many grams of whole grain would need to be in one ounce-equivalent of product to have substantial benefits associated with whole grains?
- What are the health benefits of low-fat or fat-free dairy products?

# Foods and food component to increase Oils

Fats with a high percentage of monounsaturated (**MUFA**) and polyunsaturated (**PUFA**) fatty acids are usually liquid at room temperature and are referred to as “oils”

- Replacing some **saturated fatty acids with unsaturated fatty acids** lowers both total and low-density lipoprotein (**LDL**) blood **cholesterol levels**.
- **Main sources of Oils:**
- Oils are **naturally present in foods** such as olives, nuts, avocados, and seafood.
- Other common oils are **extracted from plants**, such as canola, corn, olive, peanut, safflower, soybean, and sunflower oils
- **Processed Foods:** mayonnaise, oil-based salad dressings, and soft (tub or squeeze) margarine with no *trans* fatty acids
- **Coconut oil, palm kernel oil, and palm oil** are high in saturated fatty acids
- **Partially hydrogenated** oils contain *trans* fatty acids.
- For **nutritional purposes**, they should be considered **solid fats**.



# *Foods and food component to increase* *Oils*

**Americans consume more solid fats but less oil than is desirable.**

**15-30% daily calorie from Fat**

**Less than 10% from saturated fats**

Some suggestion:

- *Soft margarine instead of butter or stick margarine,*
- *Replacing meats and poultry with **seafood** or unsalted nuts,*
- *Using **vegetable oils** instead of solid fats, such as butter, in cooking (**soy oil=vegetable oil on products label**)*





# Foods and food component to increase Dietary Fiber

- Dietary fiber is the **non-digestible form of carbohydrates** and lignin.

## Dietary fiber naturally occurs in plants:

- *Helps provide a **feeling of fullness***
- *Important in **promoting healthy laxation***
- *Limits **abortion of cholesterol** and fats and sugars*

## Some of the best sources of dietary fiber are:

- *Beans and peas, such as navy beans, split peas, lentils, pinto beans, and black beans.*

## Additional sources of dietary fiber are:

- *Vegetables, fruits, whole grains, and nuts.*
- All of these foods are **consumed below recommended levels** in the **typical American diet**.



# *Foods and food component to increase Dietary Fiber*

**Health benefits** based on epidemiological studies (**naturally occurring fibers**):

- Reduce the risk of **cardiovascular disease**
- Obesity
- Type 2 diabetes
- Promoting healthy **lipid profiles**
- Promoting healthy **glucose tolerance**
- Ensure normal gastrointestinal function
- Fiber is sometimes **added to foods** and it is **unclear** if added fiber provides the same health benefits as naturally occurring sources (**clinical equipoise and expenses**)



# Foods and food component to increase Dietary Fiber

- Most Americans **greatly under consume dietary fiber**
- Typical intake averages **only 15 g per day**.
- The **Allowable Intake (AI)** for fiber is **14 g per 1,000 calories**, or **25 g per day for women** and **38 g per day for men**.

**Breads, rolls, buns, and pizza crust** made with **refined flour**:

- *Are **not** among the best sources of dietary fiber*
- *But **currently contribute substantially to dietary fiber** consumption because they are ubiquitous in typical American diets.*
- To meet the **recommendation for fiber**, Americans should increase their consumption of:
  - *Beans and peas,*
  - *Other vegetables, fruits,*
  - *Whole grains, and other foods with naturally occurring fiber.*
  - **Whole grains vary in fiber content.**
- The **Nutrition Facts label** can be used to compare whole-grain products and find choices that are higher in dietary fiber.



# *Foods and food component to increase*

## *Protein Foods*

- **Protein foods** include seafood, meat, poultry, eggs, beans and peas, soy products, nuts, and seeds.
- In addition to protein, these foods contribute **B vitamins** (e.g., niacin, thiamin, riboflavin, and B6), **vitamin E, iron, zinc, and magnesium** to the diet. (1/3 of world population iron deficient)
- However, **protein also is found in some foods** that are classified in other food groups (e.g., **milk and milk products**).
- The **fats in meat, poultry, and eggs** are considered **solid fats**, while the fats in **seafood, nuts, and seeds** are **considered oils**.
- **Meat and poultry** should be consumed in lean forms to **decrease intake** of solid fats.
- **Some Americans need to increase** their total intake of protein foods, while **others are eating more than is recommended**.
- **Meat, poultry, and eggs** are the most **commonly consumed protein** foods,
- **Seafood, beans and peas, soy products, nuts, and seeds** are consumed in **proportionally smaller amounts**.





# *Foods and food component to increase*

## *Protein Foods*

- Health Benefit from epidemiological studies:
- **Moderate evidence** indicates that eating **peanuts and certain tree nuts** (i.e., walnuts, almonds, and pistachios) reduces risk factors for **cardiovascular disease** when consumed as part of a diet that is nutritionally adequate and within calorie needs.
- Because nuts and seeds are **high in calories**, they should be eaten in **small portions** and used to **replace** other protein foods, like some meat or poultry, rather than being added to the diet.
- **Protein has building blocks: Amino Acids, (9 to 10) some are essential**
- Animal protein typical considered “**perfect**:” containing all essential AA
- Plant-based proteins are mostly consider “**imperfect**:” missing essential AA
- Plant proteins could be **match to have “perfect” profile**: i.e. wheat protein and peanut butter



# *Foods and food component to increase*

## *Seafood*

- Contains “perfect” protein and non-saturated fats (essential AA and PUFA)
- An intake of 8 or more ounces per week (less for young children)
- About 20% of total recommended intake of protein foods
- Mean intake of seafood in the United States is approximately 3 1/2 ounces per week
- An increased intake is recommended



### **Concern:**

- **Health risks** associated with **methyl mercury**, a heavy metal found in seafood in varying levels
- Certain species of fish should be limited

# Foods and food component to increase *Seafood*

- Seafood contributes a range of nutrients:
- **Omega-3 fatty acids:** eicosapentaenoic acid (**EPA**) and docosahexaenoic acid (**DHA**).
- A very essential nutrients in early stages of life:
  - *During fetal growth and development*
  - *Early infancy*
  - *Childhood*

## Therefore, recommendation:

- **Women who are pregnant or breast-feeding** consume at least **8 and up to 12 ounces of a variety of seafood per week**, from choices that are **lower in methyl mercury**.
- **Women who are pregnant or breastfeeding should not eat four types** of fish because they are high in methyl mercury. (**Tilefish, Shark, Swordfish, and King mackerel**). **Methyl mercenary could affect cognitive performance of newborn**
- Women who are pregnant or breastfeeding **can eat all types of tuna**, including white (albacore) and light canned tuna, but **should limit white tuna to 6 ounces per week because it is higher in methyl mercury**.



# Nutrients of Public Health Concern

## Potassium

- Dietary potassium **can lower blood pressure** by blunting the adverse effects of sodium on blood pressure.
- Other possible benefits: **reduced risk of developing kidney stones** and **decreased bone loss**
- The **Adequate Intake (AI)** for potassium for adults is **4,700 mg per day**.
- **AIs** are amounts of a nutrient that are adequate for **almost everyone in the population**
- Available evidence suggests that **African Americans and individuals with hypertension** especially benefit from **increasing intake of potassium**.
- Few Americans, including **all age-gender groups**, consume potassium in amounts equal to or greater than the AI.
- Individuals with **kidney disease** and those who take **certain medications**, such as ACE inhibitors, should consult with their health care provider for specific guidance on potassium intake. (**Main limitation for potassium enrichment of foods or substitution of sodium chloride in diet**)
- **Dietary sources** of potassium are found in all food groups, notably in **vegetables, fruits, and milk and milk products**.





# Nutrients of Public Health Concern

## Calcium

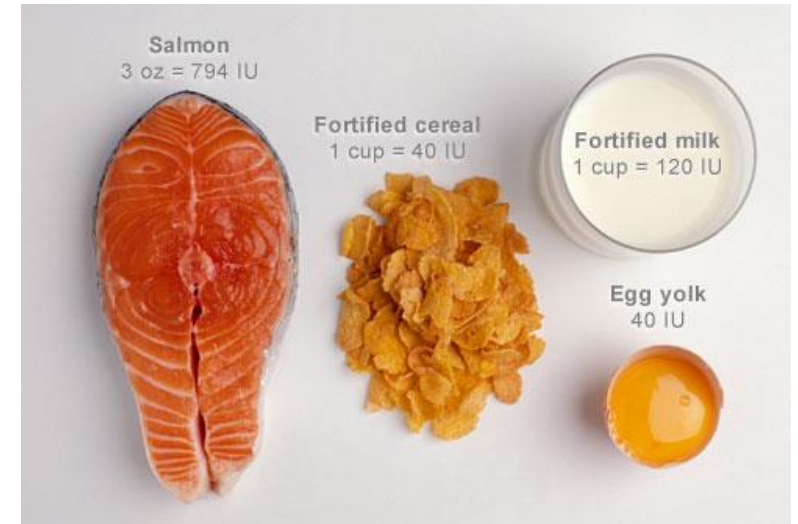
- Adequate calcium status is important for optimal **bone health**.
- Calcium serves vital roles in **nerve transmission, constriction and dilation of blood vessels, and muscle contraction**.
- Significant number of Americans have **low bone mass, a risk factor for osteoporosis**, which places them at risk of bone fractures. (50% and 25% of women and men over 50, respectively)
- **Age groups of particular concern** due to **low calcium intake from food** include:
  - *Children ages 9 years and older,*
  - *Adolescent girls,*
  - *Adult women*
  - *Adults ages 51 years and older.*
- **Calcium recommendations** may be achieved by consuming recommended levels of **fat-free or low-fat milk and milk products** and/or consuming alternative calcium sources (**3 cups for adults**)
- **Removing milk and milk products** from the diet **requires careful replacement** with other food sources of calcium, including **fortified foods**. (Calcium for vegetarians same for b12 and Iron)
- **Calcium in some plant foods is well absorbed**, but consuming **enough plant foods to achieve** the RDA may be **unrealistic for many**.
- About **85 to 90 percent of adult bone mass** is acquired by the age of **18 in girls** and the age of **20 in boys**.



# Nutrients of Public Health Concern

## Vitamin D

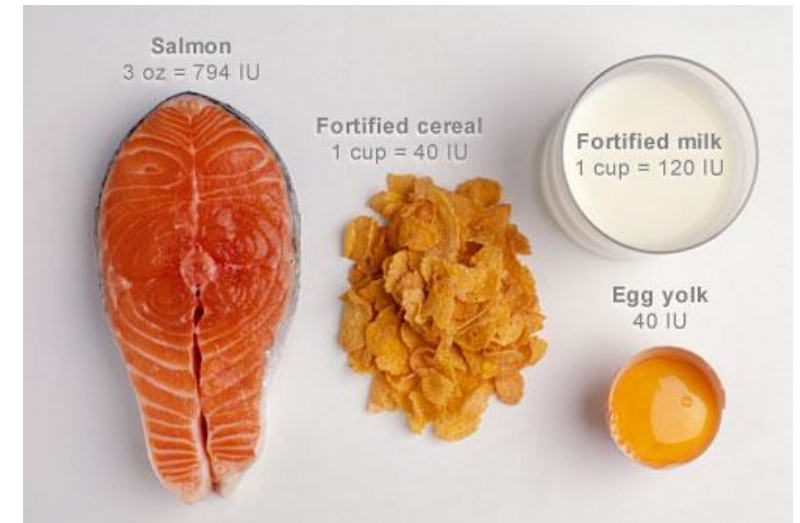
- Adequate vitamin D status is important for health.
- Extreme lack of vitamin D (i.e., vitamin D deficiency) results in **rickets in children** and osteomalacia (**softening of bones**) in adults.
- Adequate **vitamin D** also can help reduce the **risk of bone fractures**. (Fat soluble, toxicity concern in high doses)
- Although **dietary intakes of vitamin D are below recommendations**, recent data from the National Health and Nutrition Examination Survey (NHANES) indicate that **more than 80 percent of Americans have adequate** vitamin D blood levels.
- Vitamin D is unique in that **sunlight** on the skin enables the body to make vitamin D.



# Nutrients of Public Health Concern

## Vitamin D

- In the United States, most **dietary vitamin D** is obtained from **fortified foods**, especially **fluid milk and some yogurts**.
- **Some other foods and beverages**, such as breakfast cereals, margarine, orange juice, and soy beverages, also **are commonly fortified** with this nutrient.
- **Natural sources** of vitamin D include some kinds of **fish** (e.g., salmon, herring, mackerel, and tuna) and **egg yolks**, which have smaller amounts. It also is available in the form of **dietary supplements**.
- The RDAs for vitamin D, which assume **minimal sun exposure**, are **600 IU** (15 mcg) per day for **children** and most adults and **800 IU** (20 mcg) for adults older than 70 years.
- As intake increases above **4,000 IU (100 mcg) per day**, the potential risk of adverse effects increases.



# *Additional nutrients of concern for specific groups:*

## *Iron*

- **Substantial numbers of women** who are capable of becoming pregnant, including adolescent girls, are **deficient in iron**.
- They can **improve their iron** status by choosing foods that supply **heme iron**, which is more readily absorbed by the body, as well as additional **iron sources and enhancers** of iron absorption such as vitamin **C-rich foods**.
- **Sources of heme iron** include lean meat and poultry and seafood.
- **Sources of non-heme iron include:** beans, lentils, and spinach, as well as foods enriched with iron, such as most breads and cereals.
- Non-heme iron is **not as readily absorbed** by the body.
- **Women who are pregnant** are advised to take an **iron supplement** as recommended by an obstetrician or other health care provider.





# Additional nutrients of concern for specific groups:

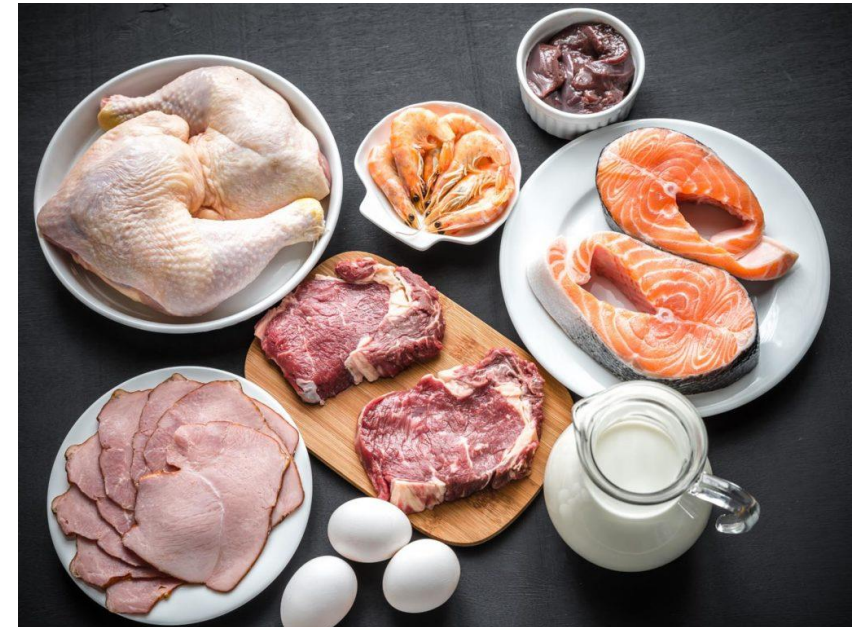
## Folate

- **Folic acid fortification** in the United States has been successful in reducing the incidence of **neural tube defects**.
- However, **many women capable of becoming pregnant still do not meet the recommended intake for folic acid**.
- All women capable of becoming pregnant are advised to consume **400 mcg of synthetic folic acid** daily (from **fortified foods and/or supplements**) in addition to food forms of folate from a varied diet.
- **Women who are pregnant** are advised to consume **600 mcg of dietary folate** equivalents daily from all sources.
- **Natural sources of food folate** include beans and peas, oranges and orange juice, and dark-green leafy vegetables such as spinach and mustard greens.
- Folic acid is the form added to foods such as **fortified grain products** (**Breakfast cereals, granola etc.**)



## *Additional nutrients of concern for specific groups:* *Vitamin B12*

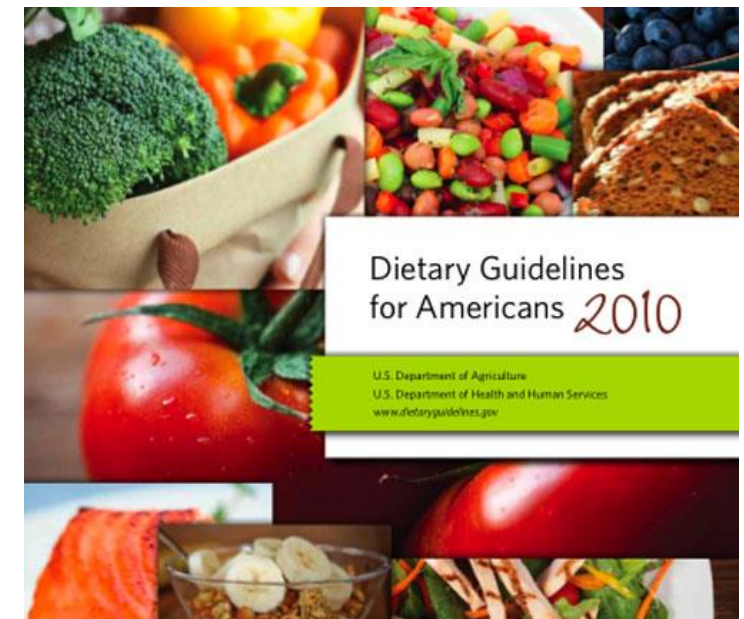
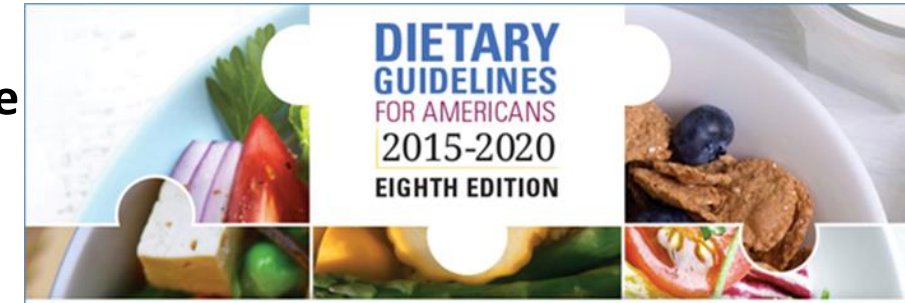
- On average, Americans ages 50 years and older **consume adequate vitamin B12**.
- Nonetheless, a substantial proportion of individuals ages 50 years and older may have **reduced ability to absorb naturally occurring vitamin B12**.
- However, the **crystalline form of the vitamin is well absorbed**.
- Therefore, individual's ages 50 years and older are encouraged to include **foods fortified** with vitamin B12, such as **fortified cereals**, or **take dietary supplements**.



# Foods and food component to increase

## Summary

- Many Americans do not eat the **variety and amounts of foods** that will provide **needed nutrients** while **avoiding excess calorie** intake.
- They should **increase their intake** of vegetables, fruits, whole grains, fat-free or low-fat milk and milk products, seafood, and oils.
- **These food choices** can help promote **nutrient adequacy**, keep **calories in control**, and **reduce risks of chronic diseases**.
- They **provide an array of nutrients**, including those of **public health concern**: **potassium, dietary fiber, calcium, and vitamin D**.
- It is important that **while increasing intake of these foods**, Americans make choices that minimize intake of calories from **solid fats and added sugars**, which provide few essential nutrients.



*Sources of Lecture content*



# Last Chapter: Building Healthy Eating Patterns

## Chapter Outline

- **Healthy eating Patterns**
  - Research on *dietary approaches to stop hypertension (dash)*
  - Research on *Mediterranean-style eating patterns*
  - Research on *vegetarian eating patterns*
- Common **elements of the healthy eating patterns** examined
- Principles for **achieving a healthy eating Pattern**
- Focus on **nutrient-dense foods**
- Remember that **beverages** count
- Follow **food safety principles**
- Consider the role of supplements and fortified foods
  - *Vitamin D*
  - *Folic acid*
  - *Vitamin B12*
  - *Iron supplements for pregnant women*





# *Building Healthy Eating Patterns*

## *Research on Dietary Approach to Stop Hypertension (DASH)*

- The **DASH** eating pattern and **its variations** have been tested in **clinical trials**.
- In these studies, **specific foods are provided and health impacts monitored over time**.
- **Prospective studies** also have been conducted in groups of people who make their own food choices, to identify and evaluate eating patterns that are similar to DASH.
- **DASH emphasizes** vegetables, fruits, and low-fat milk and milk products
- Includes whole grains, poultry, seafood, and nuts



# *Building Healthy Eating Patterns*

## *Research on Dietary Approach to Stop Hypertension (DASH)*

- DASH pattern is typically:
- Low in **sodium, red and processed meats, sweets, and sugar-containing** beverages
- One of the original DASH study diets also was lower in **total fat** (27% of calories) than typical American intakes
- DASH-style patterns lowered **blood pressure**, improved **blood lipids**, and reduced **cardiovascular disease** risk compared to diets that were designed to resemble a typical American diet.
- **Eating patterns that are similar to DASH** also have been associated with a reduced risk of cardiovascular disease and **lowered mortality**.



# Building Healthy Eating Patterns

## Research on Research on Mediterranean-style Eating Patterns

- A large number of cultures and agricultural patterns exist in countries that **border the Mediterranean Sea**, so the “Mediterranean diet” is not one eating pattern.
- **No single set of criteria** exists for what constitutes a **traditional Mediterranean eating pattern**.
- In **general terms**, it can be described as an eating pattern that **emphasizes vegetables, fruits and nuts, olive oil, and grains** (often whole grains).
- Only **small amounts of meats and full-fat milk and milk products** are usually included.
- It has a high **mono-unsaturated to saturated fatty acid intake ratio** and often includes **wine** with meals.
- Associated with a **low risk of cardiovascular disease** over time.
- In most studies, individuals with a higher **Mediterranean diet score** have reduced **cardiovascular disease** risk factors, reduced incidence of cardiovascular disease, and a **lower rate of total mortality**.





# Building Healthy Eating Patterns

## Research on Vegetarian Eating Pattern

- The types of vegetarian diets consumed in the United States vary widely.
- **Vegans** do not consume any animal products,
- **Lacto-ovo** vegetarians consume milk and eggs.
- Some individuals eat diets that are primarily vegetarian but may include small amounts of meat, poultry, or seafood (**flexitarians**)
- Vegetarian-style eating patterns have been associated with **improved health** outcomes:
  - *Lower levels of obesity*
  - *Reduced risk of cardiovascular disease*
  - *Lower blood pressure.*
- On average, vegetarians consume:
  - *Lower proportion of calories from fat (particularly saturated fatty acids)*
  - *More fiber*
  - *More potassium*
  - *More vitamin C*
  - **Major Challenge: Calcium, protein, folic acid, B12, Zinc, Vitamin A**





# Building Healthy Eating Patterns

## Common elements of the healthy eating patterns

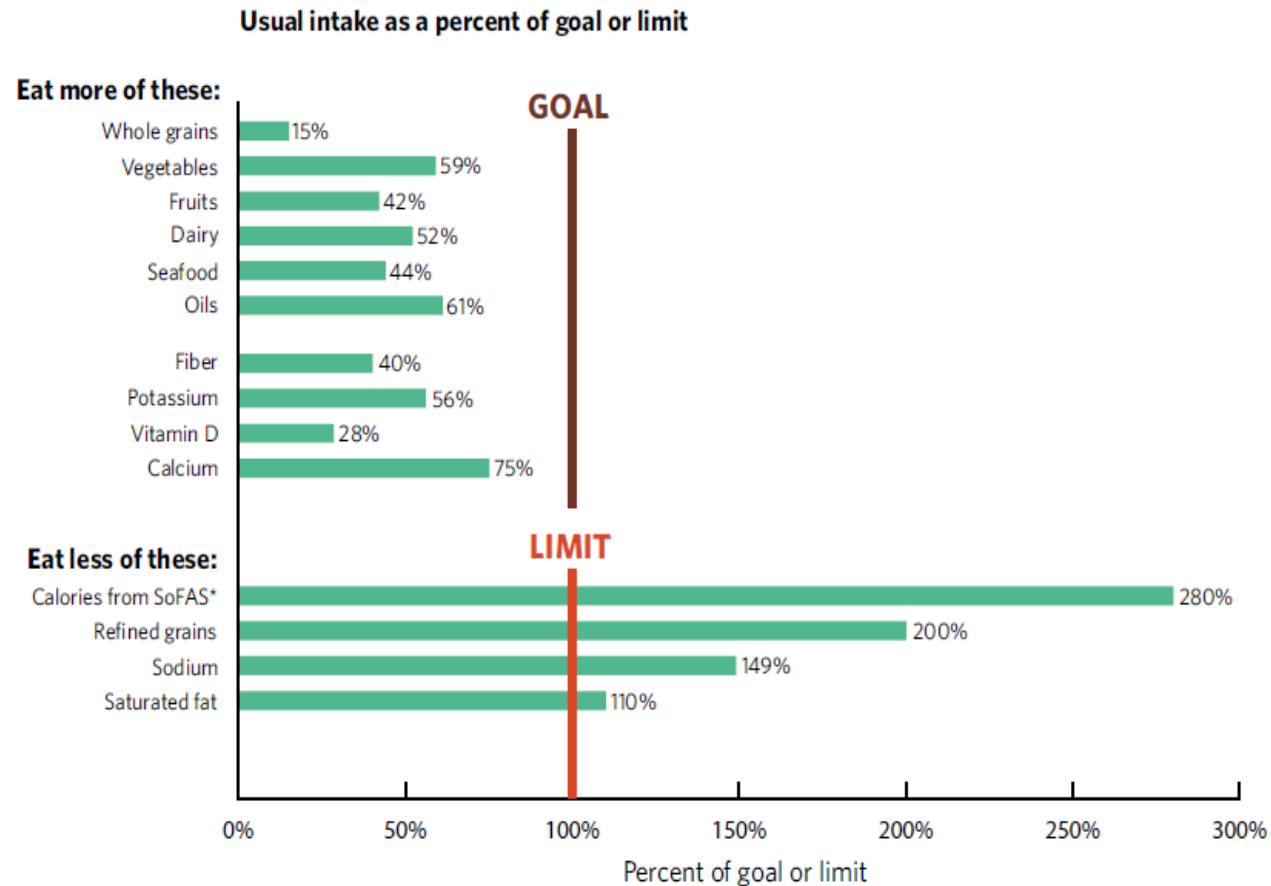
- Healthy eating patterns around the world are diverse
- **Some common threads exist**
  - They are abundant in **vegetables and fruits**.
  - Many emphasize **whole grains**.
  - They include moderate amounts and a variety of foods **high in protein** (seafood, beans and peas, nuts, seeds, soy products, meat, poultry, and eggs).
  - They include only **limited amounts** of foods high in added sugars and
  - May include **more oils than solid fats**.
  - Most are **low in full-fat milk and milk products**.
  - Some include **substantial amounts of low-fat milk and milk products**.
  - **In some patterns, wine is included with meals**.
- Compared to typical American diets, these patterns tend to have:
  - **High unsaturated to saturated fatty acid ratio**
  - **High dietary fiber and potassium content**
  - **Relatively low in sodium** compared to current American intake.





# Building Healthy Eating Patterns

## Common elements of the healthy eating patterns



# *Four Principles for achieving a healthy eating Pattern*

## *(1) focus on nutrient-dense foods*

- A healthy eating pattern focuses on nutrient-dense foods:
- Vegetables
- Fruits
- Whole grains
- Fat-free or low-fat milk and milk products
- Lean meats and poultry, seafood
- Eggs, beans and peas, and nuts and seeds that are prepared without added solid fats, sugars, starches, and sodium.
- **Combined into an eating pattern**, these foods can provide the full range of essential nutrients and fiber

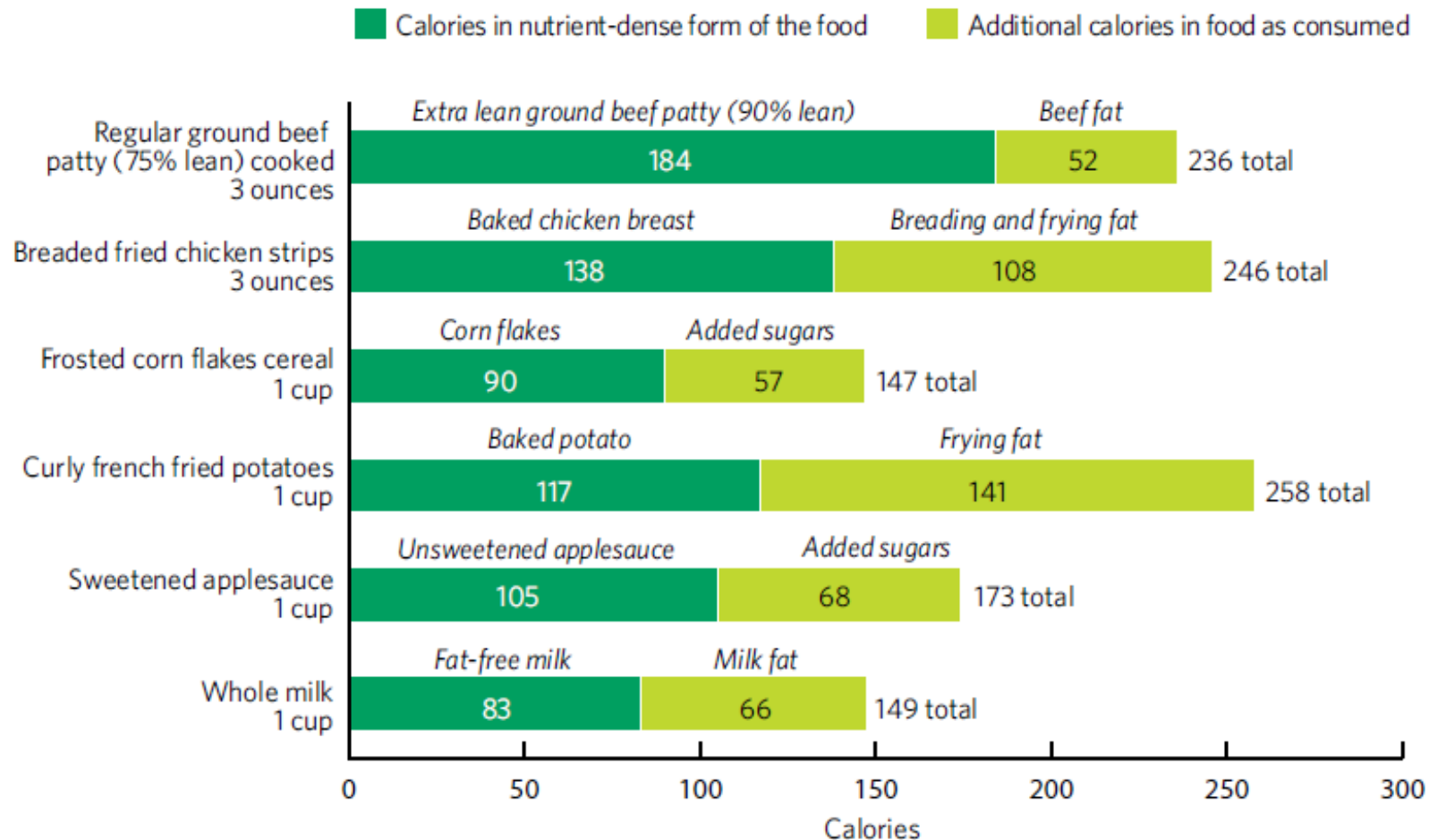






# Four Principles for achieving a healthy eating Pattern

## (1) focus on nutrient-dense foods



# Four Principles for achieving a healthy eating Pattern

## (2) Calories from beverages

- **Beverages** contribute substantially to overall dietary and calorie intake for **most Americans**.
- Although they provide needed **water**, many beverages **add calories** to the diet **without providing essential nutrients**.
- Currently, American adults ages *19 years and older* consume an average of about **400 calories per day as beverages**.
- The major types of beverages consumed by adults, in descending order by average calorie intake, are: *regular soda, energy, and sports drinks; alcoholic beverages; milk (including whole, 2%, 1%, and fat-free); 100% fruit juice; and fruit drinks*.
- Children **ages 2 to 18 years** also consume an **average of 400 calories** per day as beverages. The major beverages for children are **somewhat different** and, in order by average calorie intake, are: *milk (including whole, 2%, 1%, and fat-free); regular soda, energy, and sports drinks; fruit drinks; and 100% fruit juice*.



# Four Principles for achieving a healthy eating Pattern

## (3) Follow food safety principles

- Ensuring food safety is an important principle for building healthy eating patterns.
- Foodborne illness affects more than **48 million individuals in the United States every year**
- Leads to **128,000 hospitalizations and 3,000 deaths**.
- The proportion of outbreaks that can be attributed to unsafe food safety practices in the **home** is **unknown**, but is **assumed to be substantial**.

### Preventive Measures:

- *Washing hands*
- *Rinsing vegetables and fruits*
- *Preventing cross-contamination*
- *Cooking foods to **safe internal temperatures***
- ***Storing foods** safely in the home kitchen are the behaviors most likely to prevent food safety problems.*





# *Four Principles for achieving a healthy eating Pattern*

## (3) Follow food safety principles

### **Four basic food safety principles are:**

- **clean hands**, food contact surfaces, and vegetables and fruits.
- **Separate raw, cooked, and ready-to-eat** foods while shopping, storing, and preparing foods.
- Cook foods to a **safe temperature**.
- **Chill (refrigerate)** perishable foods promptly.

### **High risk of foods for foodborne diseases:**

- **Raw (unpasteurized) milk, cheeses, and juices;**
- Raw or **undercooked animal foods**, such as seafood, meat, poultry, and eggs;
- **Raw sprouts.**
- These foods are recommended to be avoided.



# *Four Principles for achieving a healthy eating Pattern*

## *(4) Role of supplement and fortified foods*

- A fundamental premise of the **Dietary Guidelines** is that **nutrients should come primarily from foods**.
- Intact **nutrient-dense foods**, typically contain the essential vitamins and minerals and fiber
- So it is **recommended meet their nutrient requirements**:
- **Healthy eating pattern** that includes nutrient-dense forms of foods
- **Balancing calorie intake**
- **Balancing energy expenditure**
- **Dietary supplements or fortification** of certain foods may be advantageous in **specific situations**



# Four Principles for achieving a healthy eating Pattern

## (4) Role of supplement and fortified foods

- **Vitamin D:**

- For many years, *most fluid milk* has been fortified with vitamin D
- *Vitamin D increases calcium absorption*
- Prevent the disease “rickets”.
- *Vitamin D-fortified milk is now the major dietary source of vitamin D for many Americans.*

Other beverages and foods that often are fortified with **vitamin D** include:

- *Orange juice*
  - *Soy beverages*
  - *Yogurt*
- As intake increases above 4,000 IU (100 mcg) per day, the potential risk of adverse effects increases (**Fat Soluble**)



# *Four Principles for achieving a healthy eating Pattern*

## *(4) Role of supplement and fortified foods*

- **Folic Acid:**
- More recently, **folic acid fortification of enriched grains** was mandated to reduce the incidence of **neural tube defects** (serious birth defects of the brain and spine).
- Subsequently, folate intake has increased substantially.
- It is recommended that all women who are capable of becoming pregnant consume **400 mcg per day of folic acid** from these fortified foods or from dietary supplements, in addition to eating food sources of folate.





# *Four Principles for achieving a healthy eating Pattern*

## *(4) Role of supplement and fortified foods*

### **Vitamin B12:**

- Foods fortified with the crystalline form of vitamin B12, such as fortified cereals, or vitamin B12 supplements, are **encouraged for individuals older than age 50 years**
- A substantial proportion of elderly individuals may **have reduced ability to absorb naturally occurring vitamin B12**
- The ability to absorb the **crystalline form** is not affected by age
- In addition, **vegans** should ensure adequate intake of vitamin B12 through fortified foods or supplements.



### **Iron supplements for pregnant women:**

- **Iron supplementation** during pregnancy is routinely recommended for pregnant women to help meet their **iron requirements**.
- Obstetricians often monitor the need for iron supplementation during pregnancy

# *Exercise 3*

- What are the natural food contain oil, the common oils, and foods mainly composed oil in American diet?
- What are the main food contributors to American Dietary fiber?
- What is the current recommendation for consumption of seafood?
- What is the recommended daily allowance of Vitamin D and what is the maximum recommended level of consumption per day?
- What are the main elements of DASH diet, what it stands for and what are the health benefit associated with DASH-style diet?
- Comparing the American Style Diet with eating patterns with substantial health benefits, name 10 dietary element could be increased and 4 that could be limited to enhance the healthfulness of a western-type diet.
- What are the calorie content of one gram of protein, carbohydrate, alcohol, and fat?
- What are the preventive measures and four basic principles of food safety discussed in DGA? What high risk foods are specifically mentioned to be avoided?
- What are the target population recommended to take Vitamin B12 supplement? And Why?

Thank you

