Food Safety & Security

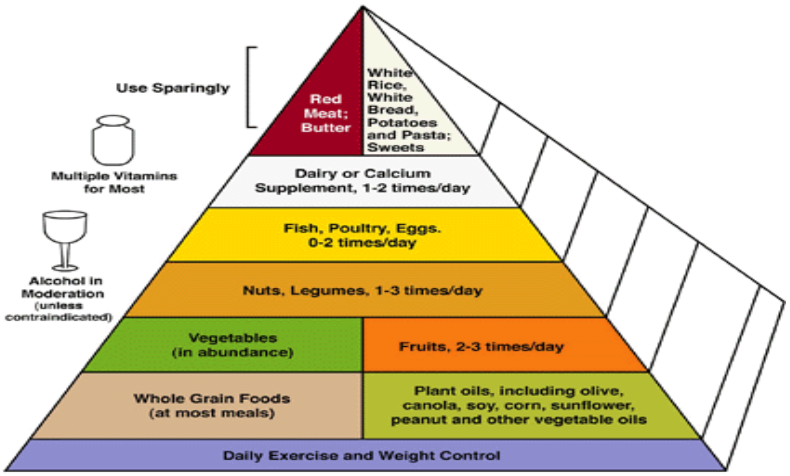
ENVH 111

University of Washington >
School of Public Health & Community Medicine >
Department of Environmental & Occupational Health Sciences

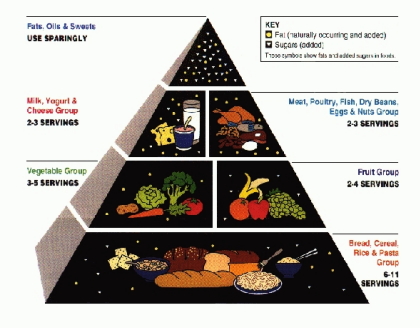
Food Security

- How long can you live without food?
- A month or two, with water.
- How many people worldwide have food insecurity?
- About 800 Million
- What are the health effects of chronic hunger and malnutrition?
- Stunted growth; cognitive problems; vitamin deficiency diseases;

Healthy Eating Pyramid



US FDA 'My Plate'



Dietary Reference Intakes

- Recommended Dietary Allowances
- Based on:
  - Estimated Average Requirements
  - Recommended Dietary Allowances
  - Adequate Intake
  - Tolerable Upper Intake Levels

Food Additives

- Preservatives
  - Antimicrobial
  - Anti browning
  - Antioxidant
- Nutritional
  - Vitamins/minerals
- Flavorings
  - diacetyl
- Colorings
- Texture
  - Emulsifiers
  - Stabilizers
- Miscellaneous
  - Enzymes
  - Catalysts
  - Solvents
  - Propellants

Food Additives

Colorants
Aspartame
BHT, BHA (butylated hydroxytoluene, butylated hydroxyanisole)
Caffeine
Mono-sodium glutamate (MSG)
Olestra
Potassium Bromate
Sulfites

Food-related Illnesses

Allergens

Contaminates

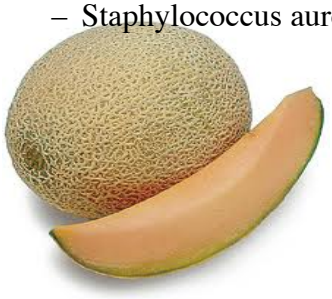
- Biological = Infection
  - The presence of microorganisms in large numbers, which multiply in the gut and overwhelm the body's defenses
- Chemical = Toxic effects
  - chemicals or "toxins" produced by micro-organisms, *or* by contamination with natural or manufactured chemicals

Common Food Allergens

- Milk products
  Milk, cheese, cottage cheese, cream cheese, yogurt, cream, sour cream, ice cream, butter
- Kola family
  Chocolate and cola (Coke, Pepsi, etc.)
- Wheat
  Bread, pasta, cake, cookies, crackers, doughnuts, pancakes, many beers
- Eggs
  Egg white and/or egg yolk
- Legumes
  Peanuts (raw, roasted, peanut butter, oil), soybeans (raw,roasted, soy milk, tofu, soy sauce)

Types of Food-related Pathogens

- Parasites
  - Toxoplasma gondii
  - Entamoeba histolytica
  - Giardia lamblia
- Spore-forming Bacteria
  - Clostridium botulinum
  - Clostridium Perfringens
- Viruses
  - Norwalk viruses
  - Hepatitis A
- Non-spore forming Bacteria
  - Salmonella spp.
  - Listeria monocytogenes
  - Eschericia coli O157:H7
  - Staphylococcus aureus



Microbiological Contaminates

- *Salmonella*
- Bacterial infection
- Eggs, chicken, milk products
- Raw fruits and veggies
- Diarrhea, fever, abdominal cramps
- Onset: 1-3 days
- Duration: 4-7 days

Microbiological Contaminates

- *Listeria monocytogenes*
- bacterial infection
- Reheat hot dogs, lunch meats, old cuts, sausages
- Soft cheeses, raw un-pasteurized milk
- Fever, headache, nausea, miscarriage, fatal infections
- Uncommon, but potentially fatal

Microbiological Contaminates

- *Norwalk* virus
- Salads, ice, shellfish
- Fecal oral transmission
- Onset: 24-48 hours
- Duration: usually 1-3 days
- Diarrhea, nausea, vomiting, cramps
- 50,000 hospitalizations

Microbiological Contaminates

- *Karenia brevis*
- Dinoflagellate metabolite (neurotoxin)
- AKA 'Red Tide'
- Accumulate in shellfish
- Onset: 1-3 hours
- Numbness of lips, fingertips; respiratory paralysis

Unintentional 'Food Additives'

Pesticides

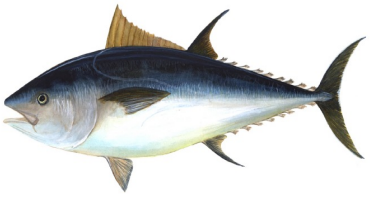
Antibiotics

Foreign bodies

Chemical Contaminants

Inorganic Mercury (metallic)

- Combustion of fossil fuel
- Industrial discharges and wastes
- Thermometers; Dental amalgams



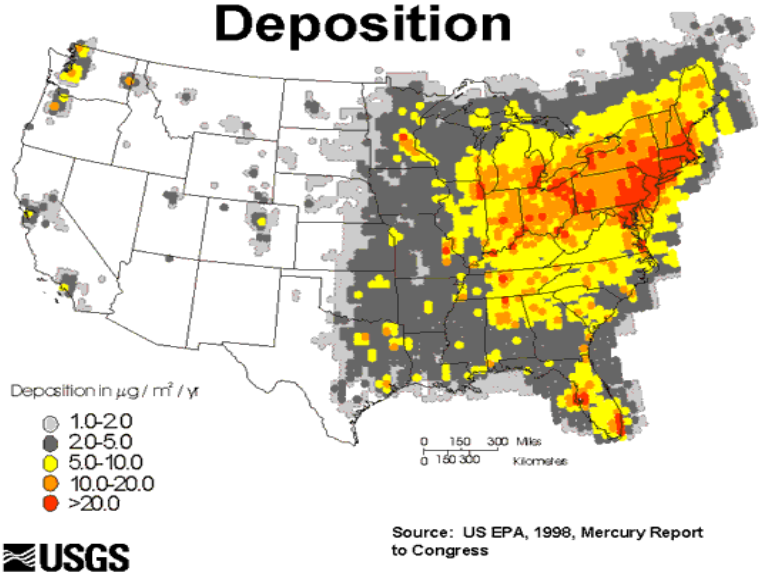
Methylated to Organic Mercury

- Bio-accumulates in fish

Neurobehavioral Effects of Organic Mercury (methyl mercury)

- Developing nervous system
- Blindness; Deafness
- Cerebral Palsy - Seizures
- Abnormal reflexes & muscle tone
- Retarded motor development

National Atmospheric Hg Deposition



USGS

Source: US EPA, 1998, Mercury Report to Congress

Mercury Consumption Limits

- US FDA – 1 ppm (ug/g) in fish
  - limit in canned tuna
- US EPA – 0.1 ug/kg/day
  - reference dose (RfD)
  - 110# woman would eat 5 grams of tuna a day to achieve 0.1 ug/kg/day
- Washington State - limit consumption to <1 can/day

High Risk Individuals

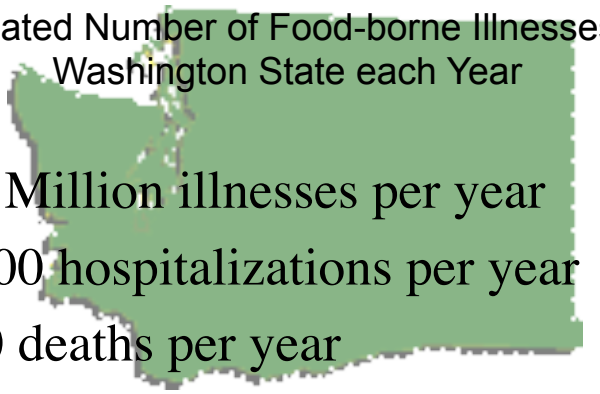
- Infants
- Children
- Pregnant Women
- Senior Citizens
- Sick
  - Antibiotics
  - Antacids
  - Immuno-suppressive drugs
- Immuno-compromised
  - Recent major surgery
  - Pre-existing or chronic conditions
  - HIV/AIDS
  - Diabetes
  - Cancer
  - Liver or kidney damage
  - Ulcers

US Food Related Illnesses & Deaths

- 76,000,000 cases annually in the U.S.
- 5,000 Deaths
- 325,000 hospitalizations
- 20-30% worker hand contact

Washington Numbers

Estimated Number of Food-borne Illnesses in Washington State each Year

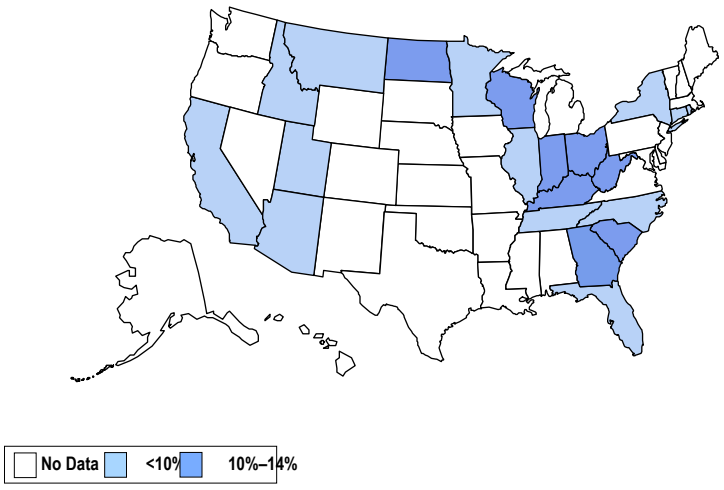


- 1.5 Million illnesses per year
- 6,500 hospitalizations per year
- 100 deaths per year

Food Security and Safety

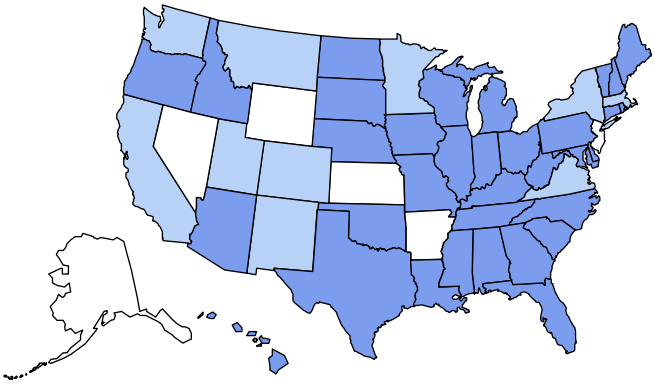
- How long can you live without food?
- How many people worldwide have food insecurity?
- What are the health effects of chronic hunger and malnutrition?
- Food-related illnesses
- How many people worldwide are overweight?
  - BMI (weight in kg ÷ height in m^2) > 29

Obesity Trends* Among U.S. Adults
BRFSS, 1985
(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults
BRFSS, 1990

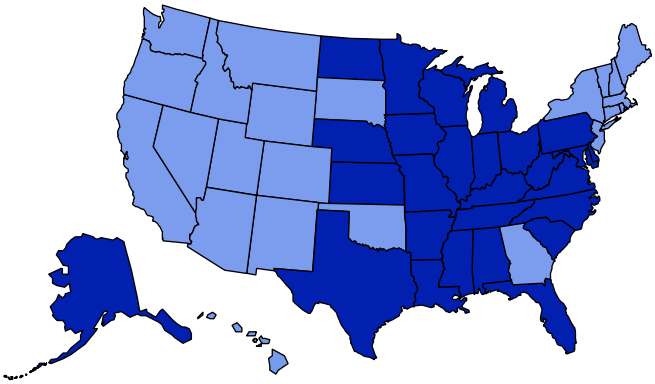
(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



No Data | <10% | 10%–14%

Obesity Trends* Among U.S. Adults
BRFSS, 1995

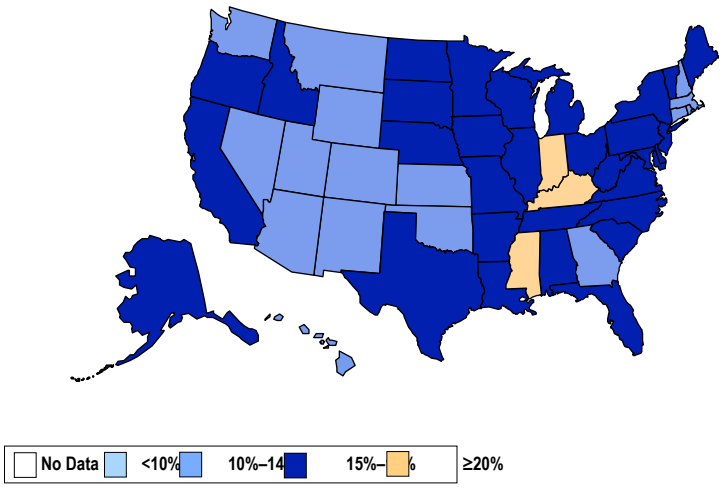
(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



No Data | <10% | 10%–14% | 15%–19%

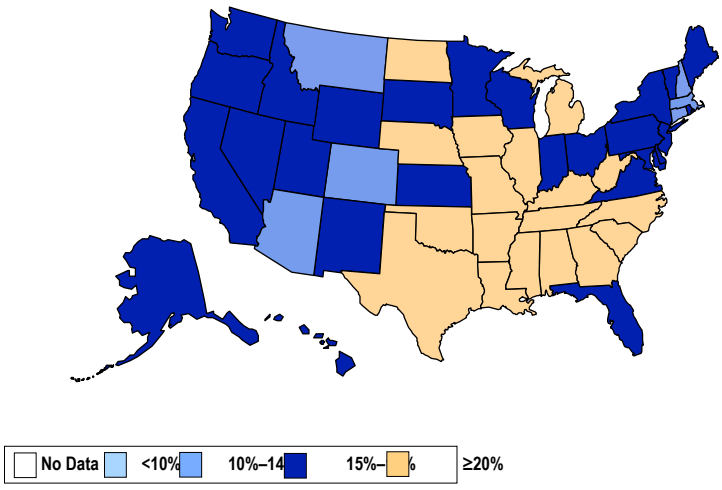
Obesity Trends* Among U.S. Adults
BRFSS, 1997

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



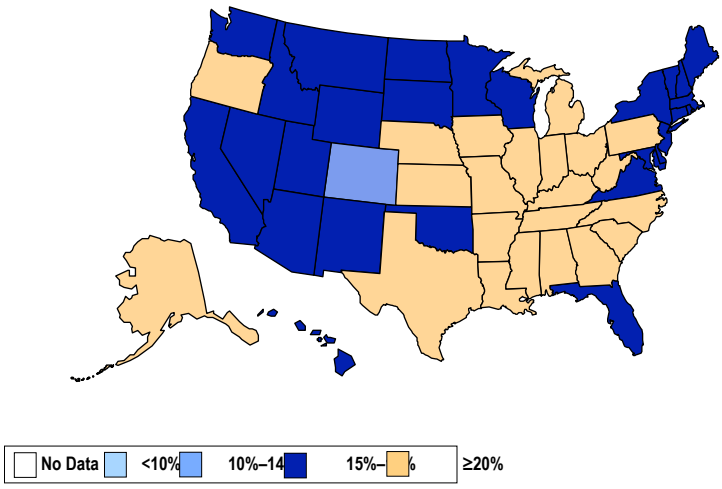
Obesity Trends* Among U.S. Adults
BRFSS, 1999

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



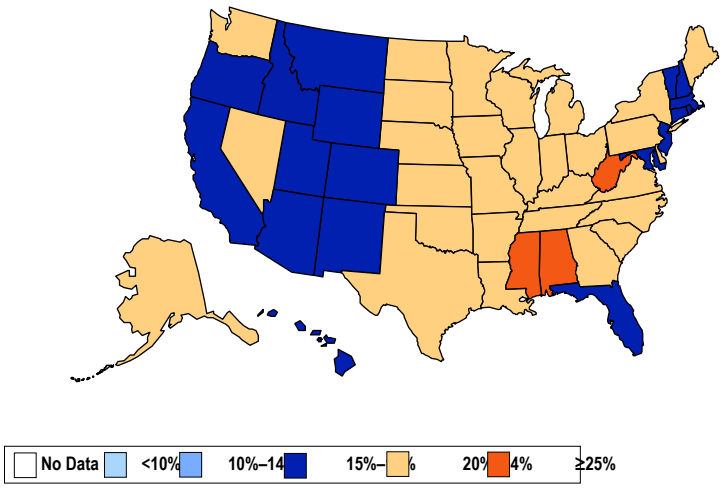
Obesity Trends* Among U.S. Adults
BRFSS, 2000

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



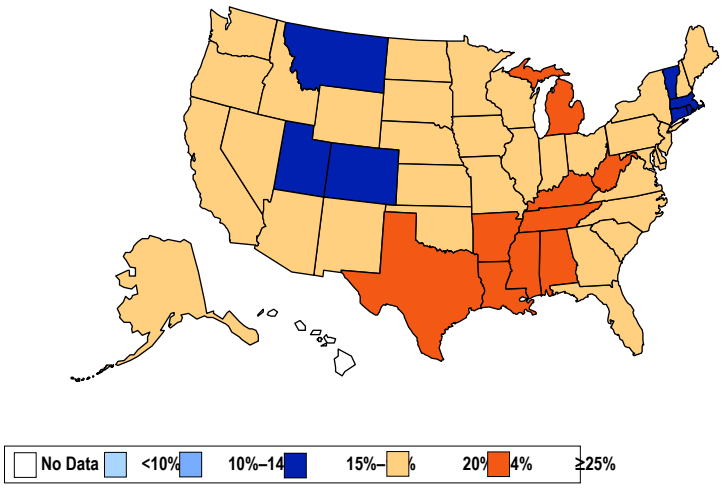
Obesity Trends* Among U.S. Adults
BRFSS, 2002

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



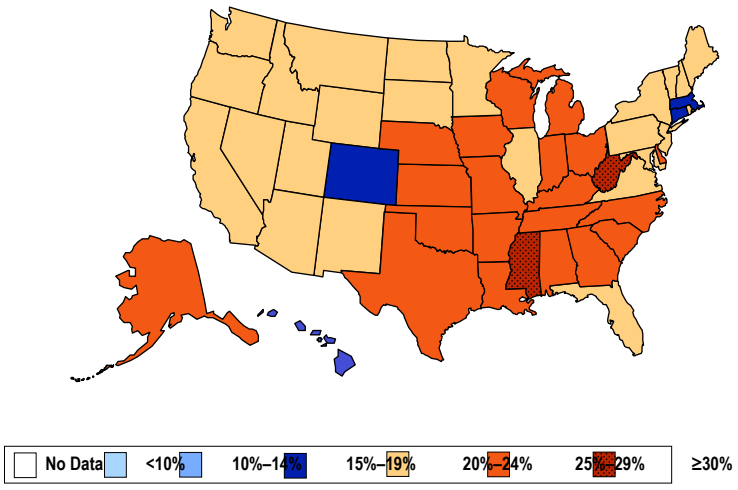
Obesity Trends* Among U.S. Adults
BRFSS, 2004

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



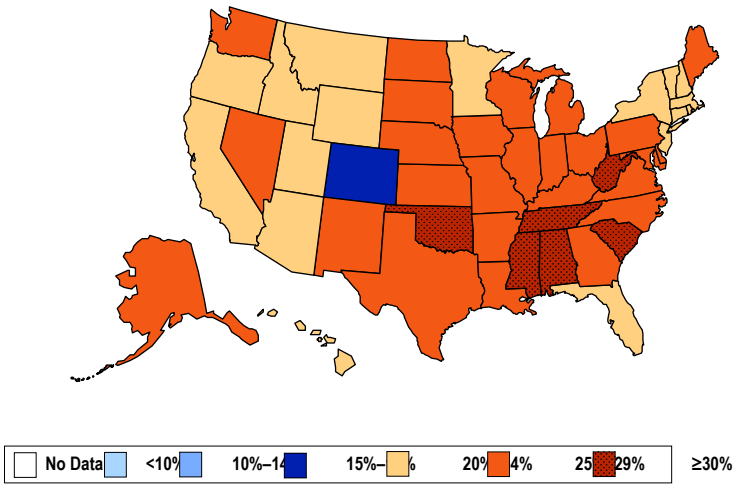
Obesity Trends* Among U.S. Adults
BRFSS, 2006

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



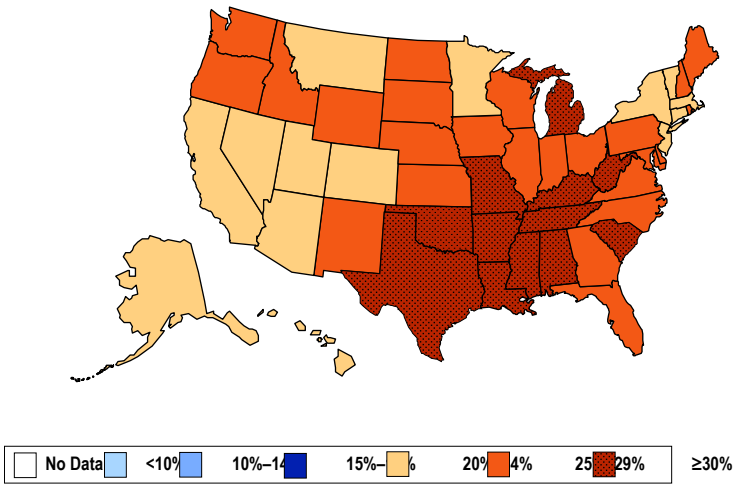
Obesity Trends* Among U.S. Adults
BRFSS, 2008

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults
BRFSS, 2010

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



Food Industry and Obesity

- Eating out (45% food spending)
- Life style (exercise; built environ)
- More prepared/pre-packaged foods
- Fast foods (higher in sugar, calories, fat, flavor enhancers)
- Greater selection of foods
- Portion sizes

Obesogens

- Chemical compounds that disrupt normal development and homeostatis of metabolism of lipids
- Endocrine disrupters
  - Bisphenol A (production of plastics; recycle code 3 or 7
- Signal proteins to tell a developing fetus to make more fat cells

Food consumption changes

Changes in eating habits
More types of foods (seasonal)
Greater shelf life (transportation)
More imported foods
New food processes
Use of additives

Food Service Industry Changes

Employee turnover
Insufficient supervision & training
Poor sanitation practices
    Poor Hand-washing
Cross Contamination
Improper Heating & Cooling

Food Production Changes

Greater use of pesticides & fertilizers

Greater use of antibiotics in meat production

Mass production of food

Use of growth promoters & growth regulators

Stabilizers to increase shelf life & flavor

Who regulates our food?

- Food and Drug Administration (FDA):
  - All foods except those of the USDA; inspecting food plants, imported foods and food composition
- U.S. Department of Agriculture (USDA):
  - meat, poultry and eggs
- Environmental Protection Agency (EPA):
  - Regulates the fishing industry, pesticide use
- State and Local Health Departments

State & Local Health Departments

- Food protection programs
  - Restaurant inspections
  - Food worker cards
  - Inspections
  - Training and education
  - Outbreak investigations

Food Code: HACCP

- Hazard, Analysis, and Critical Control Points
- Hazard analysis of events in a food operation
- Concentrates on "critical" control points
- Establish critical limits
- Develops monitoring procedures
- Creates record keeping system
- Establishes verification procedures

Safe Food Consumption

1. Choose unprocessed food
2. When eating processed food choose thoseprocessed for safety
3. Avoid contact between raw and cooked food
4. Cook food thoroughly
5. Eat cooked food immediately
6. Store cooked food immediately
7. Reheat cooked foods thoroughly
8. Wash hands frequently
9. Keep kitchen surfaces clean
10. Use clean water

Prevention