Chapter 11 - Diet and Health

PowerPoint Lectures for
Nutrition: Concepts and Controversies, eleventh edition
Frances Sizer and Ellie Whitney

Lectures by Judy Kaufman, Ph.D.

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Can your diet affect your risk of developing a disease?

It depends on the disease. There are two main kinds:

- Degenerative (a.k.a. chronic)
- Infectious
**Introduction**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Deaths per 100,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td>210</td>
</tr>
<tr>
<td>Cancers</td>
<td>170</td>
</tr>
<tr>
<td>Strokes</td>
<td>40</td>
</tr>
<tr>
<td>Chronic lung diseases</td>
<td>20</td>
</tr>
<tr>
<td>Accidents&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>15</td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>15</td>
</tr>
<tr>
<td>Pneumonia and influenza</td>
<td>15</td>
</tr>
<tr>
<td>Kidney diseases</td>
<td>10</td>
</tr>
<tr>
<td>Infections of the blood</td>
<td>5</td>
</tr>
</tbody>
</table>

<sup>a</sup>Rates are age adjusted to allow relative comparisons of mortality among groups and over time.

<sup>b</sup>Motor vehicle and other accidents are the leading cause of death among people aged 15-24, followed by homicide, suicide, cancer, and heart disease. Alcohol contributes to about half of all accident fatalities.

Source: Data from National Center for Health Statistics, 2006.
Nutrition and Immunity

- Adequate nutrition is a key component in maintaining a healthy immune system to defend against infectious disease.
- Both deficiencies and excessive nutrients can harm the immune system.
Nutrition and Immunity

Malnutrition and infection worsen each other

- Disease
- Impaired food assimilation
- Impaired nutrition status
- Weakened immunity
- Worsened disease

Further malnutrition and disease
Nutrition and Immunity

Deficiencies in these can lower immunity:

- Protein
- Energy
- Vitamins A, D, E, C, B
- Iron, copper, zinc, magnesium, selenium

Excesses in these can lower immunity:

- Iron, zinc
## Nutrition and Immunity

### Table 11-1: Effects of Protein-Energy Malnutrition (PEM) on the Body’s Defense Systems

<table>
<thead>
<tr>
<th>System Component</th>
<th>Effects of PEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>Skin becomes thinner, with less connective tissue to serve as a barrier for protection of underlying tissues; skin sensitivity reaction to antigens is delayed.</td>
</tr>
<tr>
<td>Digestive tract membrane and other body linings</td>
<td>Antibody secretions and immune cell numbers are reduced.</td>
</tr>
<tr>
<td>Lymph tissues</td>
<td>Immune system organs&lt;sup&gt;a&lt;/sup&gt; are reduced in size; cells of immune defense are depleted.</td>
</tr>
<tr>
<td>General response</td>
<td>Invader kill time is prolonged; circulating immune cells are reduced; immune response is impaired.</td>
</tr>
</tbody>
</table>

<sup>a</sup>Thymus gland, lymph nodes, and spleen.
The Concept of Risk Factors

- **Risk factors** show a correlation with a disease – that is, they occur together with the disease.

- A diet may contribute to several degenerative diseases.

- A person’s family history and laboratory test results can reveal strategies for disease prevention.
The Concept of Risk Factors

Diet Risk Factors
- Diet high in fat
- Excessive alcohol intake
- Low complex carbohydrate intake
- High sugar intake
- Genetics
- Age
- Smoking and tobacco use
- Environmental contaminants

Other Risk Factors

Chronic Diseases
- Cancers
- Hypertension
- Diabetes (type 2)
- Osteoporosis
- Atherosclerosis
- Obesity
- Stroke
- Diverticulosis
- Dental and oral disease

Relationships:
- Some cancers
- Atherosclerosis
- Stroke and heart attack
- Hypertension
- Obesity
- Gallbladder disease
- Diabetes
### Table 11-2: Family Medical History

These conditions in parents, grandparents, or siblings, especially occurring early in life, may raise a warning flag for you:

- Alcoholism
- Cancer
- Diabetes
- Heart and artery diseases
- Hypertension
- Liver disease (cirrhosis)
- Osteoporosis
In the U.S., almost 80 million men and women suffer some form of heart disease (CVD) such as heart attack and stroke.

Almost 1 million people die each year from these causes.

- In all its forms, CVD kills more U.S. women than any other cause.
At the root of most forms of CVD is **atherosclerosis**, the common form of hardening of the arteries.

Most people have well-developed **plaques** by the time they reach age 30.
Atherosclerosis

These coronary arteries bring nourishment to the heart muscle. If one of these arteries becomes blocked by plaque, the part of the heart muscle that it feeds will die.

A healthy artery provides an open passage for the flow of blood.

Plaques form along the artery's inner wall, reducing blood flow. Clots can form, aggravating the problem.
What causes plaques to form?

- A diet high in saturated fat is a major contributor.

- Inflammation of the artery is also involved; it comes from different factors such as:
  - High LDL cholesterol
  - Hypertension
  - Toxins from cigarette smoking
  - High blood levels of homocysteine
  - Certain viral or bacterial infections
How Plaques Form

Inflammation causes the immune system to:

- Send white blood cells (macrophages) to remove the oxidized LDL cholesterol.
- As the macrophages engulf the LDL, they become known as foam cells, which themselves become oxidized, attracting more immune scavengers to the scene.
- Muscle cells of the arterial walls divide in an attempt to heal the damage, but they mix with foam cells to form hardened plaques.
- Mineralization increases the hardening of the plaques.
Arteries hardened and narrowed by plaques cannot expand as blood flows through, which raises blood pressure.

This further damages the artery walls.

If the pressure causes the wall to weaken and balloon out, it is called an aneurysm.

- Can be fatal if occurs in the aorta.
Abnormal blood clotting also threatens life.

- **Platelets** are involved in blood clotting under normal circumstances.
- In atherosclerosis, platelets clot the blood in an injured, hardened artery.
  - A stationary clot = **thrombus**
  - If thrombus closes off a blood vessel = **thrombosis**
  - If the clot breaks loose = **embolus**
  - If the embolus becomes stuck = embolism which can lodge in a heart artery and cause a **heart attack**; if embolism is in brain = **stroke**
Plaques and Blood Clots

Opposing the clot-forming actions of platelets is one of the eicosanoids, an active product of an **omega-3 fatty acid** in fish oils.
A blood clot in an artery, like the fatal heart embolism shown, blocks the flow of blood to tissues fed by that artery.
# Risk Factors for CVD

## Major Risk Factors for Heart Disease

See Figure 11-7 for standards by which to judge blood lipids, obesity, and blood pressure.

Risk factors that cannot be modified:
- Increasing age
- Male gender
- Genetic inheritance

Risk factors that can be modified:
- High blood LDL cholesterol
- Low blood HDL cholesterol
- High blood pressure (hypertension)
- Diabetes
- Obesity (especially central obesity)
- Physical inactivity
- Cigarette smoking
- An “atherogenic” diet (high in saturated fats including *trans* fats and low in vegetables, fruits, and whole grains)

Note: Risk factors highlighted in color have relationships with diet.

How many risk factors do you have?

- 1- 3
- 4 – 6
- More than 6
Three major risk factors for CVD cannot be modified by lifestyle choices:

- Age
- Gender
- Genes
High LDL and Low HDL Cholesterol

Low HDL relative to LDL increases risk

Elevated risk of heart disease

High HDL relative to LDL decreases risk

Reduced risk of heart disease
# High LDL and Low HDL Cholesterol

<table>
<thead>
<tr>
<th></th>
<th>Total blood cholesterol (mg/dL)</th>
<th>LDL cholesterol (mg/dL)</th>
<th>HDL cholesterol (mg/dL)</th>
<th>Triglycerides, fasting (mg/dL)</th>
<th>Body mass index (BMI)</th>
<th>Blood pressure systolic / diastolic (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unhealthy</strong></td>
<td>240</td>
<td>160–189&lt;sup&gt;a&lt;/sup&gt;</td>
<td>&lt;40</td>
<td>200–499&lt;sup&gt;b&lt;/sup&gt;</td>
<td>30</td>
<td>140 / 90</td>
</tr>
<tr>
<td><strong>Borderline</strong></td>
<td>200–239</td>
<td>130–159&lt;sup&gt;c&lt;/sup&gt;</td>
<td>59–40</td>
<td>150–199</td>
<td>25–29.9</td>
<td>120/80–139/89&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Healthy</strong></td>
<td>200</td>
<td>100&lt;sup&gt;e&lt;/sup&gt;</td>
<td>60</td>
<td>150</td>
<td>18.5–24.9</td>
<td>120 / 80</td>
</tr>
</tbody>
</table>

<sup>a</sup> 190 mg/dL LDL indicates a very high risk.

<sup>b</sup> 500 mg/dL triglycerides indicates a very high risk.

<sup>c</sup> LDL cholesterol-lowering medication may be needed at 130 mg/dL, depending on other risks.

<sup>d</sup> These values indicate prehypertension.

<sup>e</sup> 100–129 mg/dL LDL indicates a near or above optimal level.

<sup>f</sup> Body Mass Index (BMI) was defined in Chapter 9; BMI standards are found on the inside back cover.
**High LDL and Low HDL Cholesterol**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Points</th>
<th>HDL (mg/dL)</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>20–34</td>
<td>-9</td>
<td>-7</td>
<td></td>
</tr>
<tr>
<td>35–39</td>
<td>-4</td>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>40–44</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>45–49</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>50–54</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>55–59</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>60–64</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>65–69</td>
<td>11</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>70–74</td>
<td>12</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>75–79</td>
<td>13</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Systolic Blood Pressure (mm Hg)</td>
<td>Points</td>
<td>Untreated</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>&lt;120</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>120–129</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>130–139</td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>140–159</td>
<td></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>≥160</td>
<td></td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Cholesterol (mg/dL)</th>
<th>Points</th>
<th>Age 20–39</th>
<th>Age 40–49</th>
<th>Age 50–59</th>
<th>Age 60–69</th>
<th>Age 70–79</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>&lt;160</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>160–199</td>
<td></td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>200–239</td>
<td></td>
<td>7</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>240–279</td>
<td></td>
<td>9</td>
<td>11</td>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>≥280</td>
<td></td>
<td>11</td>
<td>13</td>
<td>8</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>

<p>| Smoking (any cigarette smoking in the past month) | Points | | | | |
| Smoker |        | 8        | 9        | 5        | 7        | 3        | 4        |
| Nonsmoker | | 0        | 0        | 0        | 0        | 0        | 0        |</p>
<table>
<thead>
<tr>
<th>Total Points</th>
<th>Risk</th>
<th>Total Points</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0</td>
<td>&lt;1%</td>
<td>&lt;9</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>0–4</td>
<td>1%</td>
<td>9–12</td>
<td>1%</td>
</tr>
<tr>
<td>5–6</td>
<td>2%</td>
<td>13–14</td>
<td>2%</td>
</tr>
<tr>
<td>7</td>
<td>3%</td>
<td>15</td>
<td>3%</td>
</tr>
<tr>
<td>8</td>
<td>4%</td>
<td>16</td>
<td>4%</td>
</tr>
<tr>
<td>9</td>
<td>5%</td>
<td>17</td>
<td>5%</td>
</tr>
<tr>
<td>10</td>
<td>6%</td>
<td>18</td>
<td>6%</td>
</tr>
<tr>
<td>11</td>
<td>8%</td>
<td>19</td>
<td>8%</td>
</tr>
<tr>
<td>12</td>
<td>10%</td>
<td>20</td>
<td>11%</td>
</tr>
<tr>
<td>13</td>
<td>12%</td>
<td>21</td>
<td>14%</td>
</tr>
<tr>
<td>14</td>
<td>16%</td>
<td>22</td>
<td>17%</td>
</tr>
<tr>
<td>15</td>
<td>20%</td>
<td>23</td>
<td>22%</td>
</tr>
<tr>
<td>16</td>
<td>25%</td>
<td>24</td>
<td>27%</td>
</tr>
<tr>
<td>≥17</td>
<td>≥30%</td>
<td>≥25</td>
<td>≥30%</td>
</tr>
</tbody>
</table>
Plaques of atherosclerosis trigger abnormal blood clotting and induce hypertension, leading to heart attacks or strokes.

Atherosclerosis and hypertension worsen each other.
Diabetes, a major independent risk factor for all forms of CVD, increases the risk of death from these causes.

In diabetes, atherosclerosis progresses rapidly, blocking blood vessels and diminishing circulation.

Risk of CVD is 2 to 4 times higher than for a person without diabetes.
Physical activity expands the heart’s capacity to pump blood to the tissues with each beat, thereby reducing the pulse.

Activity also stimulates development of new arteries to nourish the heart muscle.

Activity favors a leaner body.

The DRI committee recommends 30 minutes of light, balanced exercise to improve the odds against heart disease.
Smoking

❖ Cigarette smoking powerfully increases the risk for CVD.

❖ Smoking:

  • Damages the heart directly with toxins
  • Raises blood pressure
  • Makes clots more likely by damaging platelets
  • Deprives the heart of oxygen
  • Damages the lining of blood vessels
Diet influences the risk of CVD.

An “atherogenic diet” is high in saturated fat, *trans* fat, and cholesterol – increases LDL cholesterol.
A distinct array of risk factors often occurs with CVD.

**Metabolic syndrome** includes central obesity and at least two of the following:

- High fasting blood glucose or type 2 diabetes
- Hypertension
- Low blood HDL
- High blood triglycerides

- A.k.a. **Syndrome X** or **insulin resistance syndrome**
What role do you think diet plays in minimizing the risk of developing CVD?

1. a lot
2. a little
3. no role
# Diet to Reduce CVD Risk

## Table 11-4: How Much Does Changing the Diet Change LDL Cholesterol?\(^a\)

<table>
<thead>
<tr>
<th>Diet-Related Component</th>
<th>Modification</th>
<th>Possible LDL Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated fat</td>
<td>&lt;7% of calories</td>
<td>8–10%</td>
</tr>
<tr>
<td>Dietary cholesterol</td>
<td>&lt;200 mg/day</td>
<td>3–5%</td>
</tr>
<tr>
<td>Weight reduction (if overweight)</td>
<td>Lose 10 lb</td>
<td>5–8%</td>
</tr>
<tr>
<td>Soluble, viscous fiber</td>
<td>5–10 g/day</td>
<td>3–5%</td>
</tr>
</tbody>
</table>

\(^a\)See Table 11-9, p. 433 for other dietary changes believed to influence risk of CVD.
Controlling Dietary Lipids

- Lowering intakes of saturated fat and trans fat lowers blood LDL cholesterol and this reduces heart disease.

* Dietary Guidelines for Americans recommend:
  - No more than 10% of calories from saturated and trans fat combined
  - No more than 35% of calories from total fat
  - Less than 300 mg a day of cholesterol
When diets are rich in whole grains, vegetables, and fruits, rates of CVD are low and life expectancies are long.
A heart-healthy diet provides abundant complex carbohydrates in the form of whole grains, vegetables, and fruit.

- Soluble fiber helps improve blood lipids.
- Foods rich in fiber also provide minerals to help control blood pressure, antioxidants to help protect against LDL oxidation, phytochemicals, and vitamins and minerals.
- Supplements of nutrients or phytochemicals have failed to provide benefits.
In middle-aged and older people, one or two drinks a day will reduce the risk of CVD.

In young people, the risks of alcohol greatly outweigh any potential benefit.

- Heavy alcohol use elevates blood pressure, damages the heart muscle, elevates the risk of stroke, increases the risk of breast cancer, and has many other damaging effects on the body’s organs.
Other Dietary Factors

- **Sterol** and **stanol esters** that are added to certain kinds of margarines, orange juice, and other foods help lower blood cholesterol levels about 7 to 10 percent.
Pharmaceutical doses of niacin act like a drug and lower LDL and possibly raise HDL but other drugs also work without the side effects.

Diet and exercise can lower blood pressure and lead to needed weight loss.

A meal of fish twice a week can help favor the right balance of fatty acids so that clot formation is less likely.
Hypertension is silent, progressively worsens atherosclerosis, and makes heart attacks and strokes likely.

All adults should know their blood pressure.

- Two numbers are important:
  - The **systolic pressure** (ventricular contraction)
  - The **diastolic pressure** (relaxation phase)
  - Ideal resting blood pressure is lower than 120 over 80
Nutrition and Hypertension

The most effective single step you can take against hypertension is to learn your own blood pressure.
How Does Blood Pressure Work in the Body?

1. Pumping pressure from the heart

2. Start of capillary. Fluid can cross the thinner walls.

3. Blood pressure forces the fluid from the bloodstream across the wall at the start of the capillary. Small molecules, oxygen, glucose, amino acids, and salts move out with the water.

4. Blood proteins and cells remaining are becoming more concentrated. Blood pressure is decreasing.

5. End of capillary. Fluid flows back in.

6. Blood is now so concentrated that it attracts fluid back into the capillary. Small molecules (waste products) accompany the fluid.
Blood pressure is vital to life.

When the pressure is right, the cells receive a constant supply of nutrients and oxygen and can release their wastes.
For the kidneys to filter waste materials out of the blood and into the urine, blood pressure has to be high enough to force the blood’s fluid out of the capillaries into the kidney’s filtering networks.
By obstructing blood vessels, atherosclerosis fools the kidneys, which react as if there were a water deficiency.

The kidneys raise blood pressure high enough to get the blood they need, but in the process they may make the pressure too high for the arteries and heart to withstand.

Hypertension also mechanically injures the artery linings.
In addition to atherosclerosis, several major risk factors predict the development of hypertension.

- Age
- Genetics
- Obesity
- Salt intake
- Other dietary factors (low fruit, vegetable, nut, and low-fat milk intake)
- Alcohol (more than 2 drinks per day)
How Does Nutrition Affect Hypertension?

To prevent hypertension:

- Lower salt intake
- Lose weight if needed
- Use alcohol in moderation
- Increase consumption of fruits, vegetables, fish, and low-fat dairy products
- Reduce intakes of fat
- Calcium, potassium, magnesium, and other nutrients seem to also play a role, as does physical activity
- DASH diet (Dietary Approaches to Stop Hypertension)
How Does Nutrition Affect Hypertension?

**Table 11-5: The DASH Eating Plan**

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Recommended Number of Daily Servings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>7–8</td>
</tr>
<tr>
<td>Vegetables</td>
<td>4–5</td>
</tr>
<tr>
<td>Fruits</td>
<td>4–5</td>
</tr>
<tr>
<td>Milk (fat-free/low-fat)</td>
<td>2–3</td>
</tr>
<tr>
<td>Meat (lean)</td>
<td>2 or less</td>
</tr>
<tr>
<td>Calories</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Note: The DASH eating plan recommends that fats, oils, and sweets be used sparingly.

*a* For details turn to Appendix E.

b The DASH eating plan also includes recommended servings for nuts, seeds, and dry beans (4 to 5 per week).
For people who have hypertension and are overweight, a weight loss of as little as 10 pounds can significantly lower blood pressure.

Moderate physical activity can lower almost everyone’s blood pressure, even people without hypertension.
High intakes of salt and sodium are associated with hypertension.

As salt intakes decrease, blood pressure drops in a stepwise fashion.

- African Americans, people with a family history of hypertension, people with kidney problems or diabetes, and older people respond more sensitively to a reduction in salt.

No one should consume more than the UL which is 2,300 mg of sodium per day.
Does anyone in your family have high blood pressure?

1. No
2. Yes
3. I don’t know
Do you know your blood pressure?

1. No
2. Yes
In moderate doses, alcohol initially relaxes the arteries and so reduces blood pressure.

In higher doses, alcohol raises blood pressure.

Moderation:

- No more than 2 drinks a day for men
- No more than 1 drink a day for women (this amount raises a woman’s risk of breast cancer)
Increasing calcium, potassium, and magnesium often reduces blood pressure
Consumer Corner: Complementary and Alternative Medicine

Where do you turn when illness strikes?

1. an acupuncturist
2. an herbalist or herbal remedies
3. a physician
4. or a practitioner of complementary and alternative medicine (CAM)
<table>
<thead>
<tr>
<th>Alternative Therapy Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>acupuncture</strong> (ak-you-punk-chur) a technique that involves piercing the skin with long, thin needles at specific anatomical points to relieve pain or illness. Acupuncture sometimes uses heat, pressure, friction, suction, or electro-magnetic energy to stimulate the points.</td>
</tr>
<tr>
<td><strong>complementary and alternative medicine (CAM)</strong> a group of diverse medical and health-care systems, practices, and products that are not considered to be a part of conventional medicine. Examples include acupuncture, biofeedback, chiropractic, faith healing, and many others.</td>
</tr>
<tr>
<td><strong>herbal medicine</strong> use of herbs and other natural substances with the intention of preventing or curing diseases or relieving symptoms.</td>
</tr>
</tbody>
</table>
Unlike relatively new conventional therapies, some CAM therapies have been used for centuries but have not been scientifically evaluated for safety or effectiveness.

Most medical schools do not teach CAM therapies and most insurance doesn’t pay for it.
A common contention of CAM practitioners — that many of today’s alternative therapies will become tomorrow’s mainstream medical treatments—is unfounded.

Most, on testing, have proved ineffective, or harmful.
Many herbal medicines have several serious drawbacks

- Some do not contain the right ingredient in the right amount listed on the label
- Some are harmful
- Some are contaminated, such as with lead, mercury, and arsenic
The macrobiotic diet is promoted for curing diseases but has not been proved scientifically to be beneficial.
### TABLE 11-7 Selected Herbs: Their Effects and Hazards

#### Hazardous

- **belladonna** any part of the deadly nightshade plant; a fatal poison.
- **hemlock** any part of the hemlock plant, which causes severe pain, convulsions, and death within 15 minutes.
- **pennyroyal** relatives of the mint family brewed as tea or extracted as oil; used as mosquito repellent, claimed to treat various conditions. Tea produced multiple organ failure in infants; ¼ teaspoon of oil caused convulsions and coma; 2 tablespoons caused the death of an 18-year-old expectant mother within 2 hours, despite hospitalization.

#### Probably Hazardous

- **chaparral** an herbal product made from ground leaves of the creosote bush and sold in tea or capsule form; supposedly, this herb has antioxidant effects, delays aging, “cleanses” the bloodstream, and treats skin conditions—all unproven claims. Chaparral has been found to cause acute toxic hepatitis, a severe liver illness. Deaths reported.
- **comfrey** leaves and roots of the comfrey plant; believed, but not proved, to promote cell proliferation. Toxic to the liver in doses ordinarily used. Deaths reported.
- **foxglove** a plant that contains a substance used in the heart medicine digoxin.
- **germander** an evergreen bush used in small quantities as a flavoring for alcoholic beverages. Recommended for gout and other ills, it causes often-irreversible liver damage and abnormalities. Deaths reported.
- **kava** the root of a tropical pepper plant, often brewed as a tea consumed for its calming effects. Adverse effects include skin rash, lethargy, mental disorientation, and liver injuries, including hepatitis, cirrhosis, and fatal liver failure. Deaths reported.
- **lobelia** (low-BEE-lee-uh) dried leaves and tops of lobelia (“Indian tobacco”) plant used to induce vomiting or treat a cough; abused for a mild euphoria. Causes breathing difficulty, rapid pulse, low blood pressure, diarrhea, dizziness, and tremors. Possible deaths reported.
- **sassafras root** bark from the sassafras tree; once used in beverages but now banned as an ingredient in foods or beverages because it contains cancer-causing chemicals.

**Could Be Hazardous**

- **echinacea** (EK-eh-NAY-see-ah) an herb popular before the advent of antibiotics for its “anti-infectious” properties and as an all-purpose remedy, especially for colds and allergy and for healing of wounds. Research is mixed on these claims. An insecticidal property opens questions about safety. Also called *cone-flower*.

- **ginkgo biloba** an extract of a tree of the same name, claimed to enhance mental alertness but not proved to be effective or safe.

- **ginseng** (JIIN-seng) a plant root containing chemicals that have stimulant drug effects. *Ginseng abuse syndrome* is a group of symptoms associated with the overuse of ginseng, including high blood pressure, insomnia, nervousness, confusion, and depression.

- **kombucha** (KOM-boo-sha) a product of fermentation of sugar-sweetened tea by various yeasts and bacteria. Proclaimed as a treatment for everything from AIDS to cancer but lacking scientific evidence. Microorganisms in home-brewed kombucha have caused serious illnesses in people with weakened immunity. Also known as *Manchurian tea, mushroom tea, or Kargasok tea*.

- **skullcap** a native herb with no known medical uses but found in remedies. Other species may be harvested and sold as skullcap, so it has not been determined whether several deaths from liver toxicity reportedly from skullcap were in fact from another herb.
Table 11-7 Selected Herbs: Their Effects and Hazards (continued)

Safety Undefined

- **aloe** a tropical plant with widely claimed value as a topical treatment for minor skin injury. Some scientific evidence supports this claim; evidence against its use in severe wounds also exists.
- **cat’s claw** an herb from the rain forests of Brazil and Peru; claimed, but not proved, to be an “all-purpose” remedy.
- **chamomile** flowers that may provide some limited medical value in soothing menstrual, intestinal, and stomach discomforts.
- **feverfew** an herb sold as a migraine headache preventive. Some evidence exists to support this claim.
- **kudzu** a weedy vine whose roots are harvested and used by Chinese herbalists as a treatment for alcoholism. Kudzu reportedly reduces alcohol absorption by up to 50% in rats.
- **Salacia oblonga** an herb of India; extract may reduce glycemic response to meals. Safety studies are lacking.
- **saw palmetto** the ripe fruit or extracts of the saw palmetto plant. Claimed to relieve symptoms associated with enlarged prostate but reported as ineffective in research.
- **St. John’s wort** an herb containing psychoactive substances that has been used for centuries to treat depression, insomnia, bed-wetting, and “nervous conditions.” Some scientific reports find St. John’s wort equal in effectiveness to standard antidepressant medication for relief of depression. Long-term safety, however, has not been established.
- **valerian** a preparation of the root of an herb used as a sedative and sleep agent. Safety and effectiveness of valerian have not been scientifically established.
- **witch hazel** leaves or bark of a witch hazel tree; not proved to have healing powers.

*See also Table 9-11 of Chapter 9, p. 353.
Nutrition and Cancer

- **Cancer** ranks second to heart disease as a leading cause of death and disability in the U.S.
- For women age 40 – 79 and men aged 60 – 79 years, cancer is the leading cause of death.
Can an individual’s chosen behaviors affect the risk of contracting cancer?

1. Yes
2. No
3. I don’t know
For most cancers, lifestyle factors and environmental exposures become the major risk factors.

An estimated 20 – 50 percent of cancers are influenced by diet.

- Foods or their components may cause cancer.
- Foods or their components may promote cancer.
- Foods or their components may protect against cancer.
# Nutrition and Cancer

## Table 11-8 Factors Associated with Cancers at Specific Sites

<table>
<thead>
<tr>
<th>CANCER SITES</th>
<th>TREND (U.S.)</th>
<th>ASSOCIATED WITH:</th>
<th>POSSIBLE PROTECTIVE EFFECT FROM:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder cancer</td>
<td>NC</td>
<td>Cigarette smoking and alcohol; weak association with coffee and chlorinated drinking water</td>
<td>Fruits and vegetables (especially fruits); adequate fluid intake</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>NC</td>
<td>High intakes of food energy, alcohol intake; low vitamin A intake; obesity; sedentary lifestyle; probably high saturated fat and meat intake; possibly high sucrose intake</td>
<td>Monounsaturated fats; physical activity; vegetables and fruits; calcium and vitamin D</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>↓</td>
<td>Folate deficiency; viral infection; possibly cigarette smoking</td>
<td>Adequate folate intake; possibly, fruits and vegetables</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>↓</td>
<td>High intakes of fat (particularly saturated fat), red meat, alcohol, and supplemental iron; low intakes of fiber, folate, vitamin D, calcium, and vegetables; obesity; inactivity; cigarette smoking</td>
<td>Vegetables, especially cruciferous (cabbage-type); fruits; calcium, vitamin D, and dairy intake; possibly, whole wheat and wheat bran; high levels of physical activity</td>
</tr>
<tr>
<td>Kidney cancer</td>
<td>↑</td>
<td>Possibly, high intakes of red meat (especially fried, sautéed, charred, burned, or cooked well-done); cigarette smoking; obesity</td>
<td>Fruits and vegetables, especially orange-colored and dark green ones</td>
</tr>
<tr>
<td>Cancer Type</td>
<td>Risk Factors</td>
<td>Dietary Recommendations</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Mouth, throat, and esophagus cancers</td>
<td>Heavy use of alcohol, tobacco, and especially combined use; heavy use of preserved foods (such as pickles); low intakes of vitamins and minerals; obesity (esophageal)</td>
<td>Fruits and vegetables</td>
<td></td>
</tr>
<tr>
<td>Liver cancer</td>
<td>Infection with hepatitis virus; high intakes of alcohol; iron overload; toxins of a mold (aflatoxin) or other toxicity</td>
<td>Vegetables, especially yellow and green ones</td>
<td></td>
</tr>
<tr>
<td>Lung cancer</td>
<td>Smoking; low vitamin A; supplements of beta-carotene (in smokers); air pollution</td>
<td>Fruits and vegetables</td>
<td></td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>Possibly, high lactose intake from milk products; inversely correlated with oral contraceptive use</td>
<td>Vegetables, especially green leafy ones</td>
<td></td>
</tr>
<tr>
<td>Pancreatic cancer</td>
<td>Possibly, high intakes of red meat; correlated with cigarette smoking</td>
<td>Possibly, fruits and vegetables, especially green and yellow ones (particularly in high-risk populations)</td>
<td></td>
</tr>
<tr>
<td>CANCER SITES</td>
<td>TREND (U.S.)</td>
<td>ASSOCIATED WITH:</td>
<td>POSSIBLE PROTECTIVE EFFECT FROM:</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>NC</td>
<td>High intakes of fats, especially saturated fats from red meats and possibly milk</td>
<td>Possibly; cooked tomatoes, soybeans, soy products, and flaxseed; adequate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>products; beta-carotene (high blood levels)</td>
<td>selenium intake</td>
</tr>
<tr>
<td>Stomach cancer</td>
<td>↓</td>
<td>High intakes of smoke- or salt-preserved foods (such as dried, salted fish);</td>
<td>Fresh fruits and vegetables, especially tomatoes; possibly, foods rich in vitamin A and beta-carotene</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cigarette smoking; possibly, refined flour or starch; infection with ulcer-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>causing bacteria</td>
<td></td>
</tr>
</tbody>
</table>


NC = No change—no significant trend.

How Does Cancer Develop?

Cancer arises in the genes when a cell’s DNA sustains damage from a carcinogen, such as a free-radical, radiation, and other factors.

- Damage occurs daily, but most is repaired.
- Occasionally, a damaged cell loses its ability to self-destruct and replicates uncontrollably, resulting in a mass of abnormal tissue – a tumor.
How Does Cancer Develop?

Life-threatening cancer occurs if the tumor tissue, which cannot perform it’s normal functions, overtakes the healthy organ in which it developed or disseminates its cells through the bloodstream to other parts of the body.
How Does Cancer Develop?

Cancer develops through these steps:

1. Exposure to a carcinogen
2. Entry of the carcinogen into a cell
3. **Initiation** of cancer as the carcinogen damages or changes the cell’s genetic material (**carcinogenesis**)
How Does Cancer Develop?

1. Exposure to and entry of carcinogen (invisible) into normal cells.
2. Initiation by carcinogen that damages a cell’s DNA; the cell multiplies, passing on the damage.
3. Promoters enhance the development of tumors, which may be noncancerous (benign) or cancerous (malignant).
4. Cancerous tumor releases cells into the bloodstream (metastasis).
Contaminants and naturally occurring toxins can be carcinogenic, but they are monitored in the U.S. food supply.
Diet factors substantially influence cancer development.

The degree of cancer risk imposed by the food depends partly on the eater’s genetic inheritance, but the exact nature of this relationship is not yet known.
When calorie intakes are reduced, cancer rates fall.

In animal experiments, this **caloric effect** proves to be one of the most effective dietary interventions to prevent cancer.

No evidence yet that this is true for humans too.
When a population’s calorie intake rises, cancer rates rise in response.

Obesity-related cancers include:

- Colon
- Breast (in postmenopausal women)
- Endometrial
- Kidney
- Esophageal
- Possibly ovarian and prostate
Fat appears to be a cancer promoter in animals.

Evidence remains mixed about whether this is also true in humans.

Type of fat may be important.

- Omega-6 polyunsaturated fatty acids may promote cancer.
- Omega-3 fatty acids from fish may protect against some cancers and may support recovery during treatment for cancer.
Cancers of the head and neck correlate strongly with the combination of alcohol and tobacco use and low intakes of green and yellow fruits and vegetables.

Alcohol alone is associated with cancers of the mouth, throat, and breast.
Red Meats

Evidence links diets high in red meat with a moderately elevated risk of cancers of the digestive tract, breast, and prostate.

- Processed meats may be of special concern.
  - Contain additives, nitrite or nitrates that in the digestive tract form possible carcinogens

- Broiled, fried, grilled, or smoked meats also generate carcinogens as they cook.
Much evidence now weighs in favor of eating a diet rich in high-fiber, low-fat foods.

Unclear if the fiber itself lowers the risk of colon cancer or some other characteristic of a high-fiber diet.

People who drink adequate fluid each day may be less prone to develop colon or bladder cancer.
Folate and Other Vitamins

- Folate deficiency seems to make certain cancers of the cervix, colon, skin, and other sites more likely.
- Vitamin D may also be protective against cancers other than skin cancer.
A steady diet of whole foods like these, not individual chemicals, lowers people’s cancer rates.
Some scientific evidence suggests a beneficial effect of sufficient dietary calcium against colon cancer.

Iron may promote colon cancer.

Adequate zinc, copper, and selenium may minimize cancer risks, perhaps by supporting antioxidant enzymes.
Some phytochemicals in fruits and vegetables are thought to be anticarcinogens.

Infrequent intake of **cruciferous vegetables** is common among people with colon cancer.

Almost 80 percent of U.S. adults report consuming fewer than five fruits and vegetables per day.
How many servings of fruits and vegetables do you eat each day?

a. 0 - 1
b. 2 - 3
c. 4 - 5
d. More than 5
e. I have no idea
Percentage of U.S. adults consuming five or more servings of fruits and vegetables a day.
Cruciferous vegetables
Conclusion

Nutrition is often associated with promoting health, and medicine with fighting disease, but no clear line separates nutrition and medicine.
“If you do not smoke or drink excessively, your choice of diet can influence your long-term health prospects more than any other action you might take,” states a former surgeon general.
Food Feature: Diet as Preventative Medicine

- high in whole grains
- high in vegetables
- adequate in nutrients
- moderate in calories
- high in fiber and fluid
- low in saturated and trans fats
- little or no alcohol
- high in fruit
- high in bacteria
- fungi
- atherosclerosis
- heart disease
- diabetes
- cancer cells
- stroke
- obesity
- parasites
- hypertension
- stress
- viruses
- alcohol
- cancer cells
- stroke
### Dietary Guidelines for Disease Prevention

#### Table 11-9: Dietary Guidelines for Lowering Disease Risks

<table>
<thead>
<tr>
<th>AMERICAN HEART ASSOCIATION DIET AND LIFESTYLE RECOMMENDATIONS, 2006</th>
<th>NATIONAL HEART, LUNG, AND BLOOD INSTITUTE’S THERAPEUTIC LIFE CHANGES (TLC) DIET TO LOWER LDL CHOLESTEROL</th>
<th>AMERICAN CANCER SOCIETY RECOMMENDATIONS FOR NUTRITION AND PHYSICAL ACTIVITY FOR CANCER PREVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbohydrates</strong></td>
<td><strong>Lipids</strong></td>
<td><strong>Healthy body weight:</strong> Choose foods that help maintain a healthy weight throughout life.</td>
</tr>
<tr>
<td>■ 50–60% calories from carbohydrates (primarily complex carbohydrates from whole-food sources).</td>
<td>■ Less than 7% of calories from saturated fat.</td>
<td>■ Choose foods low in energy, fat, and sugar.</td>
</tr>
<tr>
<td>■ 20–30 g dietary fiber per day.</td>
<td>■ 25–35% of calories from total fats.</td>
<td>■ Eat small portions of high-calorie, high-fat, or high-sugar foods.</td>
</tr>
<tr>
<td><strong>Lipids</strong></td>
<td>■ Up to 10% calories from polyunsaturated fats.</td>
<td>■ Balance energy intake with physical activity.</td>
</tr>
<tr>
<td>■ Less than 7% of calories from saturated fat.</td>
<td>■ Up to 20% calories from monounsaturated fats.</td>
<td>■ Lose weight if currently overweight or obese.</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>■ 200 mg or less of cholesterol per day.</td>
<td><strong>Variety:</strong> Eat a variety of healthful foods, with an emphasis on plant sources.</td>
</tr>
<tr>
<td>■ Approximately 15% calories from protein.</td>
<td>■ Keep trans fatty acids low.</td>
<td><strong>Vegetables and fruits:</strong> Eat five or more servings of a variety of vegetables and fruits each day.</td>
</tr>
</tbody>
</table>
| These additional dietary changes can further reduce LDL cholesterol in... | **Whole grains:** Choose whole grains (such as oats and whole-wheat bread) instead of refined grains (such as sweetened cereals and pastries) and sugars (such as soft drinks and candies). |...
Minimize your intake of beverages and foods with added sugars.

Choose and prepare foods with little or no salt.\(^b\)

If you consume alcohol, do so in moderation (1 drink a day for women, 2 for men).

When you eat food that is prepared outside of the home, follow these recommendations.

**Meats:** Limit consumption of red meats, especially those high in fat and processed.
- Choose fish, poultry and legumes as alternatives to beef, pork, and lamb.
- Select lean cuts and small portions.
- Bake, broil, or poach instead of frying or charbroiling.

**Alcohol:** if you drink alcoholic beverages, limit consumption to no more than 2 drinks per day for men and 1 drink a day for women.

**Physical activity:** Adopt a healthy, active lifestyle.
- Engage in at least moderate activity for 30 minutes or more on 5 or more days of the week (45 minutes or more of moderate to vigorous activity on 5 or more days per week may further reduce the risk of breast and colon cancers).


\(^a\)Recommendations for CVD prevention in healthy people. People with heart disease should aim for less than 200 milligrams of cholesterol per day. More omega-3 fatty acids may be beneficial, preferably from fish, but a physician may prescribe a supplement of fish oil. If blood cholesterol is high and diet and exercise do not bring it down, consider adding 2 grams daily of plant sterol- and stanol-esters from foods.

\(^b\)Strive for a maximum of 2,300 mg of sodium per day.
Choose unsaturated fats in place of saturated fat and \textit{trans} fat
Every legitimate source of dietary advice urges people to include a variety of fruits, vegetables, and legumes in the diet, not just for nutrients but also for the phytochemicals that combine synergistically to promote health.
Go for Variety

Whenever you switch from food to food, you dilute whatever is in one food with components from the others.
Be Physically Active

Exercise regularly, all your life
Controversy: Reversing the Obesity Epidemic

Obese family game time
Controversy: Reversing the Obesity Epidemic

- An estimated 300,000 people die each year in the U.S. from obesity-related illnesses.
- In addition, $60 billion is spent nationally on obesity-related health care each year.
Does Our Culture Make Obesity Likely?

- High-calorie foods
  - Large portions
  - Inexpensive
  - Readily available
  - Heavily advertised

- Overeating

- Increased body fatness

- Less exercise:
  - Automobiles, elevators,
  - other labor-saving devices
  - Sedentary leisure time

- Reduced fitness

- Increased stress

- Sleep disturbances

- Feeling of low energy

- Use of caffeine, weight-loss pills, alcohol, tobacco

- Less motivation to move more desire to eat
Over the last 50 years, societal changes have influenced both our diet and activity patterns, engendering behaviors of too little activity and too much food.
Physical Activity

- The lack of physical activity shares blame for the nation’s weight gain.

- It takes special effort to be physically active.

- There are barriers to physical activity.
  - For example, it is impossible for many people to bike to work due to distance, or dangerous roadways.
Food Habits

- The human diet has changed more over the past 50 years than in any other comparable period of recorded history.

- Changes in the family structure and working habits have played roles in these changes.
As demand for inexpensive, convenient, good-tasting meals has increased so has supply.

Grocery stores now have more prepared foods.

More people eat in restaurants and in doing so give up control of their diets.
Foods purchased and eaten outside the home now account for upward of 45 percent of the average food budget.
Eating Out More Often

Meals and Snacks Consumed Away from Home, projected, 1970-2008

Percentage of food budget

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Typically, foods highest in energy density are lowest in price: high-energy refined sweets, refined grains and high-fat meats cost less than lower-energy-density fresh meats, fruits, and vegetables on a cost per calorie basis.

- Fast foods and convenience foods often fit these descriptions, are budget-friendly, and appeal to family appetites.
Food Advertising and Portion Sizes

- The food industry spends more than $33 billion each year on advertising and other efforts.
- The National Cancer Institute spends $1 million each year to promote fruit and vegetable intake.
Our society produces abundant food relatively inexpensively.

- Consequently, restaurants make larger profits when they attract more customers by offering much larger food portions in exchange for just a little more money.

- By making a larger soft drink a “better deal” the customer is getting many more calories for only another 10 cents!!
The “Buy More” Strategy

diamond Size does matter
The Effects of Increasing Portion Sizes on Body Weight

**Table C11-1: Some Factors Contributing to U.S. Obesity**

<table>
<thead>
<tr>
<th>Food-Related Factors</th>
<th>Physical Activity-Related Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time constraints; too little time to plan meals, shop, or cook.</td>
<td>Time constraints; too little time to exercise.</td>
</tr>
<tr>
<td>More meals away from home; greater portion sizes and calorie intakes from restaurant meals.</td>
<td>Sedentary leisure activities.</td>
</tr>
<tr>
<td>Greater consumption of energy-dense fast foods.</td>
<td>Sedentary employment.</td>
</tr>
<tr>
<td>Increased food portion size over time.</td>
<td>Fatigue from too little exercise and excess weight.</td>
</tr>
<tr>
<td>Higher cost of lower-energy-density lean meats, fish, fruits, and vegetables; lower costs of foods high in energy density.</td>
<td>Reliance on labor-saving devices and transportation.</td>
</tr>
<tr>
<td>Inequitable distribution of resources; limited access to high-quality fresh produce; few supermarkets in low-income neighborhoods.</td>
<td>Roadblocks to exercise in the built environment, such as lack of bike paths, sidewalks, crosswalks, and safe stairwells.</td>
</tr>
</tbody>
</table>
A child in this country views more than 40,000 advertisements per year watching TV alone.

The American Academy of Pediatrics, the World Health Organization, and other concerned groups have called for limits on food advertisements aimed at children.
The president of the national association representing restaurant owners summed up the food industry position this way: “Restaurants have a wide variety of choices on their menus, and people make the choice to eat what they want and when they want every day. This is all about personal responsibility and moderation.”
Do you think restaurants should offer healthy alternatives to typical high-fat fast food?

- Yes
- No
Do you think restaurants should post the calories next to each food?

1. Yes

2. No
Do you generally order healthy choices at restaurants?

- Yes
- No
Toward a Fitness-Prone Society

- Nutrient-dense foods
  - Appropriate portions
  - Attractive pricing
  - Readily available
  - Appropriately advertised

- More motivation to move
- Less desire to eat inappropriately

- Appropriately food and fluid intake
- Healthy body composition

- Moderation in caffeine and alcohol

- Feeling energetic most days

- Sound, beneficial sleep

- Daily exercise
  - Walking-friendly communities
  - Bike trails to work, shopping
  - Stairways in convenient locations

- Increased fitness
- Reduced stress
Many food companies have added lower-fat, lower-calorie, portion-controlled heart-healthy product lines and have eliminated the largest of their overlarge portions.

By one estimate, for every one salad purchased at Burger King, 10 Whoppers are sold; and for every one Veggie Burger, 100 Whoppers are sold.
Some people say it is the government’s role to do something about the obesity problem.

Government alone can not fight obesity.

A combined approach that includes policy changes, new research, and actions by industries and individuals may yield a workable plan for attacking obesity.
The Government’s Roles

**What Can Be Done By Whom to Reverse the Obesity Epidemic?**

A coordinated effort among the following groups may eventually stop the current U.S. trend toward greater body weight. Some of the initiatives listed below are currently underway, and many new ideas are emerging.

| Scientific community | Conduct research focused on unanswered questions regarding weight regulation and obesity development. |
| Federal agencies such as FDA, USDA, Department of Health and Human Services, Centers for Disease Control and Prevention, among others | Improve food labels for consumer comprehension. Develop new consumer education initiatives. Press for consumer nutrition information for restaurant foods. Sustain initiatives to tackle childhood obesity, such as providing produce to the nation’s schools and developing plans for school health and fitness. Subsidize urban farmer’s markets and other programs to ensure availability of fresh produce to low-income groups. |
| Food, beverage, and restaurant industries | Adjust package designs to encourage control of portion sizes. Reduce prices of healthful low-energy-density items. Decrease energy density of existing products while maintaining flavor. Change marketing strategies to encourage health-promoting food and beverage choices. Print links to Internet sites to educate consumers on reading labels. Print material promoting healthful food and exercise options on labels. |
| Individual consumers | Lobby lawmakers to require that new developments provide for and encourage walking and bicycling. Lobby for landscaping, trees, and walkways in parking lots to make them inviting and safe. Write letters to building owners, asking them to improve stairwell appearance and safety and to provide convenient access. Join neighborhood associations and speak up for changes that support physical activity, spearhead an effort to create a local farmer’s market. Lobby lawmakers to fund nutrition and physical education classes, and improve the nutritional profile of foods available at local schools. Congratulate schools that have replaced candy and soda with fruit and low-fat milk options and are reversing the trend toward hiring fast-food companies to provide school lunches for children. |
Individuals can choose to change their own environments and behaviors.

While the scientific community admonishes the population to “consume calories in balance with energy expenditure,” the food industry throws its might behind “eat more” messages to increase food sales.