



# Achieving Optimal Health: Wellness and Nutrition

## Chapter Fifteen





## Chapter Objectives:

After reading and studying this chapter, students should be able to:

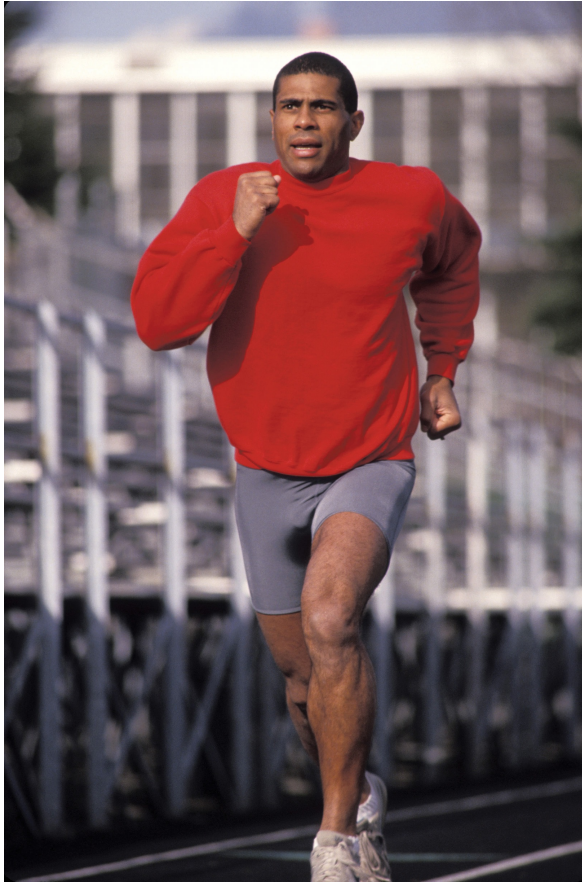
1. Identify and describe the nutritional pros and cons of diets and food trends.
2. Discuss the role of dietary supplements and the importance of using food as your primary nutritional source.
3. Define fitness and explain the essential elements of physical fitness.
4. List the physical, mental, and emotional benefits of physical activity.
5. Discuss the roles of nutrition and lifestyle choices in the prevention and management of chronic disease.



## Chapter Objectives:

6. Describe the ideal environment for microorganisms to reproduce.
7. Give examples of bacteria, viruses, parasites, and molds that have the potential to cause foodborne illness.
8. Discuss government efforts to protect the health of the population, and precautions consumers can take to protect themselves.
9. Discuss forms of activism in areas of food and nutrition.
10. List steps individuals can take to support sustainable agriculture.
11. List some of the jobs available to students who are interested in a career in food and nutrition.

# Introduction



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- The terms *risk factor*, *good cholesterol*, and *bad cholesterol* were not always on the tip of everyone's tongue when it came to cardiovascular disease.
- *Scientific evidence continues to correlate the relationship between good dietary habits, adequate exercise, and a healthy body.*



# The Framingham Heart Study

- Conducted by what is now known as the National Heart, Lung, and Blood Institute in Massachusetts, the Framingham Heart Study changed the way healthcare professionals and consumers alike regard the prevention of heart disease. (<https://www.framinghamheartstudy.org>)
- In the 1940s, little was known about the general causes of heart disease and stroke. Most doctors thought a hardening of the arteries was a natural part of aging, and that rising blood pressure with age was not a serious issue.



# The Framingham Heart Study

- In 1948, researchers enrolled more than five thousand participants between ages thirty and sixty-two from Framingham, Massachusetts.
  - The participants returned to the study every two years for a detailed medical examination and laboratory tests.
- In 1971, the Framingham Heart Study enrolled a second generation, and in 2002, a third generation joined the study.



# Video 15.1: The Framingham Heart Study

Video Source: <https://youtu.be/q4CzMthg-uo>



# The Framingham Heart Study

- The findings of these extensive, long-term studies have revealed that high blood pressure, diabetes, cholesterol, and LDL cholesterol in particular, as risk factors for heart disease.
- The study also identified lifestyle choices as factors which increased the risk of cardiovascular disease, including eating an unhealthy diet, remaining sedentary, and smoking.
- Researchers have now initiated the Framingham Nutrition Studies, which examine the connection between diet and nutrition to the risk and outcomes of cardiovascular disease.





# Introduction

- The link between good nutrition and good health is an undebatable scientific fact.
- Given the consequences of poor dietary choices and lifestyle habits, it is worthwhile to assess your current food and activity profile to determine areas for improvement.
- It is important to remember that there are no quick fixes, but with dedication, hard work, and persistence, much can be accomplished. Are you willing to put forth the effort necessary to create change in your life?
- As you read this chapter, you will be presented with tools and concepts to help you with this task.



## 15.1 Diet Trends and Health

- In the past, health was regarded merely as the absence of illness.
- Today, we focus on the idea of **wellness**, which is a state of optimal well-being that enables an individual to maximize their potential.
- Wellness includes a host of dimensions which affect one's quality of life, including physical, mental, emotional, social, environmental, and spiritual.



## 15.1 Diet Trends and Health

- **Dietary Food Trends**
  - Hundreds of years ago, when food was less accessible and daily life required much more physical activity, people worried less about obesity and more about simply getting enough to eat.
  - In today's industrialized nations, conveniences have solved some problems and introduced new ones, including the hand-in-hand obesity and diabetes epidemics.
  - New dietary trends encourage those seeking to lose weight to eat healthy, whole foods first, while adopting a more active lifestyle.



## 15.1 Diet Trends and Health

- **Functional Foods**
  - Many people seek out foods that provide the greatest health benefits.
  - **Functional foods** not only help meet basic nutritional needs but also are reported to fight illness and aging.
  - The Academy of Nutrition and Dietetics (AND) recognizes four types of functional foods.



## 15.1 Diet Trends and Health

- Group 1: **Conventional foods** represent the simplest form of functional foods.
  - They are whole foods that have not been modified and include whole fruits and vegetables, yogurt and kefir, and dark chocolate.
- Group 2: **Modified foods** have been fortified, enriched, or enhanced with additional nutrients or bioactive compounds.
  - Examples include calcium-fortified orange juice, breads enriched with B vitamins, iodized salt, cereals fortified with vitamins and minerals, margarine enhanced with plant sterols, and energy drinks that have been enriched with herbs (ginseng or guarana) or amino acids (taurine).



## 15.1 Diet Trends and Health

- Group 3: **Medical foods** are designed for enteric administration under the guidance of a medical professional.
  - They are created to meet very specific nutritional requirements and include liquid formulas for people with kidney disease, liver disease, diabetes, or other health issues.
- Group 4: **Special dietary use foods** do not have to be administered under a doctor's care and can be found in a variety of stores.
  - They address special dietary needs and meet the nutritional requirements of certain health conditions and include gluten-free foods, lactose-free dairy products, and formulas and shakes that promote weight loss.



## 15.1 Diet Trends and Health

- **Popular Diets**

- Certain diet plans take the concept of functional foods one step further, by striving to prevent or treat specific conditions.
  - For example, it is widely understood that people with diabetes need to follow a particular diet.
- Although some of these diet plans may be nutritionally sound, use caution because some diets may be fads or be so extreme that they actually *cause* health problems.
- Before experimenting with a diet, discuss your plans with your doctor or a registered dietitian.



## 15.1 Diet Trends and Health

- **The DASH Diet**

- The Dietary Approaches to Stop Hypertension, or DASH diet, focuses on reducing sodium intake to either 2,300 milligrams per day or 1,500 milligrams per day.
- The DASH diet is an evidence-based eating plan that can help reduce high blood pressure, and may also decrease the risk of heart attack, stroke, diabetes, osteoporosis, and certain cancers.
- DASH dieters eat lots of whole grains and high-fiber fruits and vegetables, and moderate amounts of low-fat dairy products, lean meats, and heart-healthy fish.





## 15.1 Diet Trends and Health

- DASH limits the use of saturated fats, restricts the consumption of sweets and alcohol, and calls for consuming less added sugar and drinking fewer sugar-sweetened drinks.
- It also calls for replacing red meat with fish and legumes and for increased calcium, magnesium, potassium, and fiber intake.



## 15.1 Diet Trends and Health

- DASH tips to lower sodium include:
  - Using spices instead of salt to add flavor
  - Reading sodium content on processed or canned food labels, and choosing low-sodium options
  - Removing some sodium from canned foods (such as beans) by rinsing the product before consumption
  - Avoiding salt when cooking



# The Pros and Cons of a DASH Diet

| Diet      | Pros   | Cons  |
|-----------|--|---|
| DASH Diet | <ul style="list-style-type: none"><li>• Recommended by the National Heart, Lung, and Blood Institute, the American Heart Association, and many physicians</li><li>• Helps to lower blood pressure and cholesterol</li><li>• Reduces risk of heart disease and stroke</li><li>• Reduces risk of certain cancers</li><li>• Reduces diabetes risk</li></ul> | <ul style="list-style-type: none"><li>• There are very few negative factors associated with the DASH diet</li></ul> |



## 15.1 Diet Trends and Health

- **The Gluten-Free Diet**
  - The gluten-free diet helps people whose bodies cannot tolerate **gluten**, a protein found in wheat, barley, and rye.
  - It is prescribed for patients with gluten intolerance and celiac disease, an autoimmune disorder with a genetic link.
  - A gluten-free diet finds replacements for bread, cereal, pasta, and emphasizes fresh fruits, vegetables, and other foods without gluten.
  - The gluten-free trend has become something of a fad even for those without a gluten intolerance.



# The Pros and Cons of a Gluten-Free Diet

| Diet             | Pros  | Cons   |
|------------------|---|--|
| Gluten-Free Diet | <ul style="list-style-type: none"><li>• Reduces the symptoms of gluten intolerance, such as chronic diarrhea, cramping, constipation, and bloating</li><li>• Promotes healing of the small intestines for people with celiac disease, preventing malnutrition</li><li>• May support weight loss</li><li>• May be beneficial for other autoimmune diseases, such as Parkinson's disease, rheumatoid arthritis, and multiple sclerosis</li><li>• May be helpful for Types 1 and 2 diabetes and anemia</li></ul> | <ul style="list-style-type: none"><li>• Risk of folate and iron deficiencies</li><li>• Special gluten-free products can be hard to find and expensive</li><li>• Requires constant vigilance and careful food label reading, since gluten is found in many products</li></ul> |



## 15.1 Diet Trends and Health

- **Low-Carb Diets**

- Low-carb diets, which include the Atkins Diet, South Beach Diet, and Ketogenic Diet, focus on limiting carbohydrates—such as grains, fruit, and starchy vegetables—to promote weight loss.
- Proponents of this approach believe that because limiting carbs generally lowers insulin levels, it would then cause the body to burn stored fat instead.
- However, some studies have shown that people who followed certain low-carb diet plans for two years lost an average of nearly 9 pounds, which is similar to the amount of weight lost on higher carbohydrate diets.



## 15.1 Diet Trends and Health

- The benefits of this kind of diet include an emphasis on whole, unprocessed foods and a de-emphasis of refined carbohydrates, such as white flour, white bread, and white sugar.
- Dieters using the low-carb approach tend to consume twice as many saturated fats as people on a diet high in healthy carbohydrates.
- Low-carb diets are also associated with a higher energy intake, and the notion that “calories don’t count,” which is prevalent in this kind of diet, is not supported by scientific evidence.



# The Pros and Cons of a Low-Carb Diet

| Diet          | Pros   | Cons  |
|---------------|--|---|
| Low-Carb Diet | <ul style="list-style-type: none"><li>• Restricts refined carbohydrates, such as white flour and white sugar</li><li>• May temporarily improve blood sugar or blood cholesterol levels</li></ul> | <ul style="list-style-type: none"><li>• Not entirely evidence-based</li><li>• Results in higher fat and protein consumption</li></ul> |





## 15.1 Diet Trends and Health

- **The Macrobiotic Diet**

- The macrobiotic diet is part of a health and wellness regimen based in Eastern philosophy.
- Foods are paired based on their so-called yin or yang characteristics.
  - *Yin* foods are thought to be sweet, cold, and passive, while *Yang* foods are considered to be salty, hot, and aggressive.
- Whole grains make up about 50 percent of the calories, raw and cooked vegetables comprise about 30 percent, and bean or vegetable-based soups and broths can make up 5 to 10 percent.



## 15.1 Diet Trends and Health

- The macrobiotic diet prohibits certain foods, such as chocolate, tropical fruits, and animal products.
- The macrobiotic diet focuses on foods that are low in saturated fats and high in fiber, which can help to lower the risk of cardiovascular disease. Proponents of this diet also believe that it may protect against cancer.
- Extreme macrobiotic eating can be low in protein, low in calories, and pose a risk for starvation. In addition, the diet is also very low in essential vitamins and minerals.



# The Pros and Cons of a Macrobiotic Diet

| Diet             | Pros   | Cons  |
|------------------|--|---|
| Macrobiotic Diet | <ul style="list-style-type: none"><li>• Low in saturated fats and high in fiber</li><li>• Emphasizes whole foods and de-emphasizes processed foods</li><li>• Rich in phytoestrogens, which may reduce the risk of estrogen-related cancers</li></ul> | <ul style="list-style-type: none"><li>• Not entirely evidence-based</li><li>• Lacks certain vitamins and minerals; supplements are often required</li><li>• Can result in a very low caloric intake</li><li>• Lack of energy may result from inadequate protein</li></ul> |



## 15.1 Diet Trends and Health

- **The Mediterranean Diet**

- The traditional Mediterranean diet incorporates many elements of the dietary choices of people living in Greece and southern Italy, and focuses on small portions of nutritionally-sound food.
- This diet features food from plant sources, including vegetables, fruits, whole grains, beans, nuts, seeds, breads and potatoes, and olive oil.
- It also restricts the consumption of processed foods.
- Other aspects include consuming fish and poultry at least twice per week, eating red meat only a few times per month, having up to seven eggs per week, and drinking red wine in moderation and with meals.



## 15.1 Diet Trends and Health

- Unlike most diets, the Mediterranean diet does not cut fat consumption across the board, rather it incorporates low-fat cheese and dairy products, and it substitutes olive oil, canola oil, and other healthy oils for butter and margarine.
- Research has shown that people who follow the diet have some of the lowest rates of chronic disease and the highest rates of longevity among the populations of the world.
- It also helps to decrease excess body weight, blood pressure, blood fats, and blood sugar and insulin levels significantly.



# The Pros and Cons of a Mediterranean Diet

| Diet               | Pros  | Cons  |
|--------------------|---|---|
| Mediterranean Diet | <ul style="list-style-type: none"><li>• A reduced risk of cardiovascular disease and mortality</li><li>• A lower risk of cancer</li><li>• De-emphasizes processed foods and emphasizes whole foods and healthy fats</li><li>• Lower sodium intake, due to fewer processed foods</li><li>• Emphasis on monosaturated fats leads to lower cholesterol</li><li>• Highlighting fruits and vegetables raises consumption of antioxidants</li></ul> | <ul style="list-style-type: none"><li>• Does not specify daily serving amounts</li><li>• Potential for high fat and high calorie intake as nuts and oils are calorie-dense foods</li><li>• Drinking one to two glasses of wine per day may not be healthy for those with certain conditions</li></ul> |



## 15.1 Diet Trends and Health

- **The Raw Food Diet**

- The principle behind **raw foodism** is that plant foods in their natural state are the most wholesome for the body.
- People who practice raw foodism eat only uncooked and non-processed foods, emphasizing whole fruits and vegetables.
- Staples of the raw food diet include whole grains, beans, dried fruits, seeds and nuts, seaweed, sprouts, and unprocessed produce.
- The positive aspects of this eating method include consuming foods that are high in fiber and nutrients, and low in calories and saturated fat.



## 15.1 Diet Trends and Health

- The raw food diet offers little in the way of protein, dairy, or fats, which can cause deficiencies of the vitamins A, D, E, and K.
- In addition, not all foods are healthier uncooked, such as spinach and tomatoes.
- Also, cooking eliminates potentially harmful microorganisms that can cause foodborne illnesses.





# The Pros and Cons of a Raw Food Diet

| Diet                 | Pros   | Cons   |
|----------------------|--|--|
| <b>Raw Food Diet</b> | <ul style="list-style-type: none"><li>• Emphasizes whole foods</li><li>• Focuses on nutritionally-rich foods</li><li>• High in fiber</li></ul> | <ul style="list-style-type: none"><li>• Not entirely evidence-based</li><li>• Very restrictive and limits protein and healthy fat intake</li><li>• Could encourage the development of foodborne illness</li><li>• Extremely difficult to follow</li><li>• Can cause deficiencies in essential vitamins</li></ul> |



## 15.1 Diet Trends and Health

- **Vegetarian and Vegan Diets**
  - Vegetarian and vegan diets have been followed for thousands of years for different reasons, including as part of a spiritual practice, to show respect for living things, for health reasons, or because of environmental concerns.
  - Broadly speaking, vegetarians eat beans, grains, and fruits and vegetables, and do not eat red meat, poultry, seafood, or any other animal flesh.
  - A vegan diet is the most restrictive vegetarian diet - vegans do not eat dairy, eggs, or other animal products, and some do not eat honey.



## 15.1 Diet Trends and Health

- Well-balanced vegetarian/vegan eating plans can lower the risk of a number of chronic conditions, including heart disease, diabetes, and obesity.
- They also help to promote sustainable agriculture.
- However, if a vegetarian/vegan does not vary his or her food choices, the diet may be insufficient in calcium, iron, omega-3 fatty acids, zinc, and vitamin B<sub>12</sub>.



# The Pros and Cons of a Vegetarian/Vegan Diet

| Diet                              | Pros   | Cons  |
|-----------------------------------|--|---|
| <b>Vegetarianism and Veganism</b> | <ul style="list-style-type: none"><li>• May reduce cancer risk</li><li>• May reduce heart disease risk</li><li>• May reduce obesity risk</li><li>• May help prevent Type 2 diabetes</li><li>• Helps with weight reduction and weight maintenance</li></ul> | <ul style="list-style-type: none"><li>• Guidelines regarding fat and nutrient consumption must be followed</li><li>• Requires vigilance to watch out for hidden animal products</li><li>• Requires negotiating meals and holidays with meat-eating friends and family</li></ul> |



## 15.1 Diet Trends and Health

- **Food Supplements and Food Replacements**
  - Vitamins, minerals, herbal remedies, and **supplements** of all kinds constitute big business and many of their advertising claims suggest that optimal health and eternal youth are just a pill away.
  - The main types of dietary supplements are:
    - Macronutrients (amino acids, proteins, essential fatty acids)
    - Micronutrients (vitamins and minerals that promote healthy body functions)
    - Probiotics (beneficial bacteria such as the kind found in the intestines)
    - Herbal supplements, which often target a specific body part, such as bones.



## 15.1 Diet Trends and Health

- The following people may benefit from taking daily vitamin and mineral supplements:
  - Women who are pregnant or breast-feeding
  - Premenopausal women who may need extra calcium and iron
  - Older adults
  - People with health issues that affect their ability to eat
  - Vegetarians, vegans, and others avoiding certain food groups



## 15.1 Diet Trends and Health

- Vitamins, minerals, and other assorted remedies should be considered as extras. They are add-ons – not replacements – for a healthy diet.
- When considering taking supplements, it is important to recognize possible drawbacks that are specific to each kind.
- Also, remember that a supplement is only as good as the diet that accompanies it.



## 15.1 Diet Trends and Health

- **Micronutrient Supplements:** Some vitamins and minerals are toxic at high doses. Therefore, it is vital to adhere to the Tolerable Upper Intake Levels (UL) so as not to consume too much of any vitamin.
- **Herbal Supplements:** Some herbs cause side effects, such as heart palpitations and high blood pressure, and must be taken very carefully. Also, some herbs have contraindications with certain medicines.
- **Amino Acid Supplements:** Certain amino acid supplements, which are taken by bodybuilders among others, can increase the risk of consuming too much protein.





## 15.1 Diet Trends and Health

- The following are helpful questions to explore before deciding to take a supplement:
  - Does the scientific community understand how this supplement works and are all its effects well known?
  - Is there proof that the supplement actually performs in the manner that it claims?
  - Does this supplement interact with food or medication?
  - Is taking this supplement necessary for my health?
  - Is the supplement affordable?
  - Is the supplement safe and free from contaminants?



## 15.2 Fitness and Health

- A well-rounded exercise program is crucial to become and remain healthy.
- Physical activity improves your health in a number of ways. It promotes weight loss, strengthens muscles and bones, keeps the heart and lungs strong, and helps to protect against chronic disease.
- There are four essential elements of physical fitness: cardiorespiratory endurance, muscle strength, muscle endurance, and flexibility.



## 15.2 Fitness and Health

- **The Essential Elements of Physical Fitness**
  - Building **cardiorespiratory endurance** through aerobic exercise is an excellent way to maintain a healthy weight.
  - Regular, moderate aerobic activity, about thirty minutes at a time for five days per week, trains the body to deliver oxygen more efficiently, which strengthens the heart and lungs, and reduces the risk of cardiovascular disease.
  - The most common standard for evaluating cardiorespiratory endurance is the **VO<sub>2</sub> max** test. VO<sub>2</sub> max is your maximal oxygen uptake.
  - The higher your VO<sub>2</sub> max, the more oxygen you can consume, and the faster or longer you can walk, run, bike, or swim, among other aerobic activities.



## 15.2 Fitness and Health

- **Muscle strength** and **muscle endurance** are two other essential elements of physical activity, not just for athletes and bodybuilders but for children, seniors, and everyone in between.
- The support that your muscles provide allows you to work, play, and live more efficiently.
- Strength training involves the use of resistance machines, resistance bands, free weights, or other tools.
- If strength training is performed at least twice a week, it can help to improve muscle strength and endurance, and to increase bone strength.
- Strength training can also help you to maintain muscle mass during a weight-loss program.



## 15.2 Fitness and Health

- **Flexibility** is the range of motion available to your joints.
- Yoga, tai chi, Pilates, and stretching exercises work to improve this element of fitness.
- Stretching not only improves your range of motion, it also promotes better posture, and helps you perform activities that can require greater flexibility, such as chores around the house.
- In addition to working on flexibility, older adults should include balance exercises in their regular routine.



## 15.2 Fitness and Health

- Some forms of exercise confer multiple benefits, which can help you to balance the different elements of physical fitness.
- For example, riding a bicycle for thirty minutes or more not only builds cardiorespiratory endurance, it also improves muscle strength and muscle endurance.
- However, addressing fitness standards in all four categories generally requires incorporating a range of activities into your regular routine.



## 15.2 Fitness and Health

- **Metabolic Fitness**

- **Metabolic fitness** relates to the number of calories you require to survive and the number of calories you burn during physical activity.
- The rate at which a person burns calories depends on body shape, body composition, sex, age, nutritional status, and genetics.
- One measurement of metabolic fitness is **resting metabolic rate**, or RMR, which is a measurement of the amount of energy required for the body to maintain its basic functions while at rest.
- On average, RMR accounts for between 50 and 70 percent of a person's total daily energy expenditure.
- Various factors can affect the RMR, and as a result it is not a perfect measurement for metabolic fitness.



## 15.2 Fitness and Health

- A second measurement of metabolic fitness is the number of calories burned during physical activity.
- The amount of calories burned depends on the rate at which the heart beats, how much oxygen is delivered to tissues, and how efficiently metabolic reactions consume oxygen and burn calories.
- One of the best estimates of energy expenditure during exercise is how much oxygen a person consumes.
- Increasing your daily activity and shedding excess weight help to improve metabolic fitness.





## 15.2 Fitness and Health

- **Keeping Fit: The Benefits of Physical Activity**
  - Regular physical activity is one of the best things you can do to achieve optimal health.
  - Individuals who are physically active for about seven hours per week lower the risk of dying early by 40 percent.
  - Improving your overall fitness involves sticking with an exercise program on a regular basis.
  - Physical activity not only helps to maintain your weight, it also provides a wealth of benefits – physical, mental, and emotional.



## 15.2 Fitness and Health

- **Physical Benefits**
  - Getting the recommended amount of physical activity each week, about 150 minutes of moderate, aerobic exercise, such as power walking or bicycling, does not require joining a gym, wearing spandex, or taking expensive, complicated classes.



## 15.2 Fitness and Health

- Even slightly increased activity can lead to physical benefits, such as:
  - Longer life
  - Healthier weight
  - Cardiovascular disease prevention
  - Management of chronic conditions
  - Energy boosts
  - Strong bones



## 15.2 Fitness and Health

- **Mental and Emotional Benefits**
  - The benefits of an exercise program are not just physical, they are mental and emotional as well.
  - The mental and emotional benefits of physical activity include:
    - Mood improvement
    - Reduced risk of depression or limited symptoms of it
    - Cognitive skills retention
    - Better sleep



## 15.2 Fitness and Health

- **Changing to a More Active Lifestyle**
  - A physically active lifestyle yields so many health benefits that it is recommended for everyone.
  - Change is not always easy, but even small changes such as taking the stairs instead of the elevator, or parking farther away from a store to add a bit more walking into your day can lead to a more active lifestyle and set you on the road to optimal health.
  - As you change to a more active lifestyle, select an activity that you can integrate into your schedule smoothly, so you can maintain it.
  - No matter what your preference, you are more likely to stick to a workout program if you enjoy it.



## 15.2 Fitness and Health

- Whatever activities people choose to do, if they expend an extra 500 calories per day, they will lose 1 pound per week, become more physically fit, and maintain a healthy nutritional profile.
- The exact number of calories expended per hour will vary, depending on an individual's weight and level of exertion.



## 15.2 Fitness and Health

- It can be helpful to keep these numbers in mind when considering a program of aerobic activity:
  - Walking at two miles per hour burns about 204 calories/hour
  - Bicycling burns about 292 calories/hour
  - Jogging burns about 606 calories/hour
  - Golf burns about 314 calories/hour (if players carry their clubs)
  - Ballroom dance burns about 219 calories/hour
  - Tennis burns about 584 calories/hour



## 15.3 Threats to Health

- **Chronic Diseases**

- Chronic diseases are ongoing, life-threatening, and life-altering health challenges and they are the leading cause of death worldwide.
- They cause significant physical and emotional suffering and are an impediment to economic growth and vitality.
- It is important, now more than ever, to understand the different risk factors for chronic disease and to learn how to prevent their development.





## 15.3 Threats to Health

- **The Risk Factors of Chronic Disease**
  - A **risk factor** is a signal that your chances for acquiring a chronic disease may be increased.
  - Risk factors are NOT a 100-percent guarantee that a person will develop a chronic disease, only that the conditions are right. A risk factor indicates a correlation, not a causation.
  - Chronic disease usually develops alongside a combination of the following risk factors: genetics, a prior disease such as obesity or hypertension, dietary and lifestyle choices, and environmental problems.

## 15.3 Threats to Health

*Obesity is a risk factor for a number of conditions, including arthritis and certain cancers.*

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## 15.3 Threats to Health

- Risk factors such as genetics and age cannot be changed. However, some risk factors can be altered to promote health and wellness (such as diet).
- Making more healthy dietary choices can greatly reduce that risk.
- People without a genetic predisposition for a particular chronic illness can still develop it. Not having a genetic predisposition for a chronic disease is not a guarantee of immunity.



## 15.3 Threats to Health

- **Cardiovascular Disease**

- According to the Centers for Disease Control and Prevention (CDC), heart disease is the leading cause of death in the United States.
- The disease generally starts with **atherosclerosis** or a hardening of the arteries.
- Arteries start to narrow and harden when fats accumulate along their inner walls and form plaques.
- A plaque is made of fat, cholesterol, calcium, and other substances found in blood.



## 15.3 Threats to Health

- Plaque formation causes arteries to narrow and harden, which elevates blood pressure.
- Higher blood pressure strains the heart and causes more damage.
- Arterial walls can become so weakened due to high blood pressure that they balloon and form what is known as an **aneurysm**.
- The plaques themselves can also rupture due to a spike in blood pressure and the body responds by forming blood clots.



## 15.3 Threats to Health

- A stable clot can slowly kill off surrounding tissue, or grow so big that it blocks blood circulation and causes **thrombosis**.
- When a moving clot becomes stuck in an artery too small for its passage, it cuts off blood flow and causes cell death. This is referred to as an **embolism**.
- Blood clots in heart and brain arteries can cause heart attacks or strokes.



## Table 15.2 The Risk Factors for Cardiovascular Disease

| Unmodifiable Risk Factors   | Modifiable Risk Factors  |
|---|--|
| <ul style="list-style-type: none"><li>• <b>Age.</b> Risk increases for men at forty-five, and for women at fifty-five.</li><li>• <b>Sex.</b> Men have a higher risk than women, though the risk for women steeply rises after menopause.</li><li>• <b>Family history.</b> The more family members who have heart disease, the greater the risk.</li></ul> | <ul style="list-style-type: none"><li>• <b>Cigarette smoking.</b> Nicotine constricts blood vessels, and carbon monoxide damages their inner lining, which increases the risk of atherosclerosis.</li><li>• <b>Obesity.</b> Excess weight worsens other risk factors.</li><li>• <b>Diabetes.</b> This condition is associated with an increased risk of heart disease. Both types have certain risk factors in common, including obesity and high blood pressure.</li><li>• <b>Physical inactivity.</b> Lack of exercise is associated with heart disease.</li><li>• <b>Cholesterol levels.</b> High levels of blood cholesterol can increase the risk. A high level of low-density lipoprotein (LDL), or the “bad” cholesterol, is a common contributing factor. However, a low level of high-density lipoprotein (HDL), or “good” cholesterol, can also promote atherosclerosis.</li></ul> |



## 15.3 Threats to Health

- **Steps to Reducing the Risk of Cardiovascular Disease**
  - Diet and nutrition can play a significant role in reducing the risk of cardiovascular disease.
  - It is helpful to lower sodium intake, increase consumption of dietary fiber, and limit consumption of saturated fat.
  - In addition, it is important to replace refined starches and added sugar with whole grains, fruits, and vegetables.
  - Emphasizing vegetable-based sources of protein, can be beneficial, as well as consuming more soy products.
  - It is also important to maintain a healthy weight, manage cholesterol levels, and avoid smoking or chewing tobacco.





## 15.3 Threats to Health

- **Hypertension**

- Chronic high blood pressure, also known as **hypertension**, is a significant health hazard affecting one out of three adults in the United States.
- This chronic condition is a major cause of heart attacks and strokes, yet it has no symptoms until blood pressure reaches very high levels.
- The only way to find out if you have high blood pressure is to get an accurate reading of your resting blood pressure rate, which is best done by a medical professional and should be monitored regularly.



## 15.3 Threats to Health

- Blood pressure readings consist of two numbers.
  - The top number measures **systolic** pressure (when the heart contracts).
  - The bottom number measures **diastolic** pressure (when the heart is at rest).



## 15.3 Threats to Health

- The key blood pressure numbers to keep in mind are:
  - **Ideal.** 120 over 80 or below
  - **Prehypertension.** Higher than 120 over 80 and lower than 139 over 89
  - **Hypertension.** Greater than 139 over 89



## Table 15.3 The Risk Factors for Hypertension

| Unmodifiable Risk Factors   | Modifiable Risk Factors  |
|---|--|
| <ul style="list-style-type: none"><li>• <b>Age.</b> After fifty-five, the risk of developing high blood pressure is 90 percent.</li><li>• <b>Race.</b> African-Americans are more likely to develop hypertension, manifest it at a younger age, and have higher blood pressure readings.</li><li>• <b>Family history.</b> There is a strong genetic component to high blood pressure, and an individual's risk goes up along with the number of family members who have hypertension.</li></ul> | <ul style="list-style-type: none"><li>• <b>Weight.</b> Roughly 60 percent of people with hypertension are obese.</li><li>• <b>Sodium consumption.</b> The more salt in a person's diet, the more likely they are to have high blood pressure.</li><li>• <b>Alcohol.</b> Drinking more than two drinks per day for men and one drink for women increases the likelihood of hypertension.</li><li>• <b>Diet.</b> In addition to salt and alcohol consumption, other dietary factors increase chances of developing hypertension.</li></ul> |



## 15.3 Threats to Health

- **Steps to Reducing the Risk of High Blood Pressure**
  - Although it is not possible to change one's age or genetics, there are actions that people can take to decrease their risk of hypertension.
  - Techniques to reduce blood pressure include becoming physically active, maintaining a healthy weight, reducing sodium intake, using alcohol moderately, and following the DASH diet.
  - Vitamin C, calcium, and potassium have all been shown to promote healthy blood pressure.
  - It is also vital to monitor your blood pressure levels on a regular basis.



## 15.3 Threats to Health

- **Cancer**

- More than one hundred diseases are classified as different forms of cancer, all of them characterized by the uncontrolled growth of abnormal cells.
- Cancer is triggered by mutations in a cell's genetic material.
- The cause of these changes may be inherited, or it may result from exposure to carcinogens, which are agents that can cause cancer.
- Carcinogens include chemicals, viruses, certain medical treatments such as radiation, pollution, or other substances and exposures that are known or suspected to cause cancer.



## 15.3 Threats to Health

- Under normal conditions, a healthy cell will either repair any damage that has been done or self destruct so that no future cells will be affected.
- Cells become cancerous when their DNA is damaged, but they do not self-destruct or stop reproducing as normal cells would.
- As these abnormal cells continue their rapid growth, in most cancers they coalesce in a mass called a **tumor**.
- Cancer cells can also invade other organs and spread throughout the body in a process known as **metastasis**.



## 15.3 Threats to Health

- Intervention at any of these early stages could prove to be quite beneficial, because it is thought that most cancers are the result of lifestyle choices and environmental exposure.
- The risk factors for different cancers can vary.
- For example, exposure to ultraviolet radiation from the sun and from tanning beds is a risk factor for skin cancer, while exposure to asbestos is a risk factor for mesothelioma cancer.





## Table 15.4 The Risk Factors for Cancer

### Unmodifiable Risk Factors

- **Age.** Most cancers occur in people over the age of sixty-five. However, people of all ages, including children, can get cancer.
- **Family history.** Certain types of cancer have a genetic link. However, environmental factors may also play a part.

### Modifiable Risk Factors

- **Tobacco.** Smoking or chewing tobacco greatly increases the risk for certain cancers, including cancer of the lungs, bladder, cervix, kidneys, mouth, and pancreas.
- **Alcohol.** Drinking alcohol is linked to cancers of the mouth, throat, esophagus, and breast, as well as to cancers of the neck and head.
- **Obesity.** Linked to cancers of the colon, uterus, pancreas, esophagus, kidney, and breast.
- **Cooking techniques.** Grilling, smoking, and preparing meat at high temperatures forms carcinogens.



## Table 15.4 The Risk Factors for Cancer

### Modifiable Risk Factors

- **Red meat.** The risk of colon cancer seems to increase with the consumption of red meat and processed meat.
- **Cured meats.** According to a recent study, there is a mild risk of pancreatic cancer with the consumption of cured meats, such as sausage, pepperoni, bacon, ham, smoked turkey, salami, and hot dogs.
- **Physical inactivity.** Linked to colon, breast, and other cancers.
- **Exposure to chemicals.** People who have jobs that expose them to chemicals on a regular basis, such as construction workers and painters, have an increased risk of cancer.
- **Viruses or bacteria.** Certain viruses or bacteria may increase the risk of developing cancer. For example, human papillomaviruses, which are sexually transmitted, are the primary cause of cervical cancer.



## 15.3 Threats to Health

- **Steps to Reducing the Risk of Cancer**
  - According to the American Cancer Society, half of all American men and one-third of American women will be diagnosed with some form of cancer in their lifetime.
  - The American Institute for Cancer Research (AICR) has published guidelines for preventing cancer and staying healthy.
  - These include several dietary and lifestyle choices, such as participating in physical activity for thirty minutes per day or more, maintaining a healthy weight, and consuming a plant-based diet.



## 15.3 Threats to Health

- Several epidemiological studies have found a link between eating plenty of fruits and vegetables and a low incidence of certain cancers.
- Fruits and vegetables containing a wide variety of nutrients and phytochemicals may either prevent or reduce the oxidative damage to cell structures.
- Cruciferous vegetables, such as cauliflower, broccoli, and Brussels sprouts, may also reduce the risk of certain cancers, such as endometrial, esophageal, and others.
- Studies have also shown that the more fiber you have in your diet, the lower your risk of colon cancer.



## 15.3 Threats to Health

- Vitamin D and antioxidants have been linked to lowering the risk of some cancers (however taking an iron supplement may promote others).
- Obtaining vital nutrients from food first is the best way to help prevent or manage cancer.
- Regular and vigorous exercise can lower the risk of breast and colon cancers.
- Wearing sunblock, staying in the shade, and avoiding the midday sun can reduce your risk for skin cancer



## 15.3 Threats to Health

- **Diabetes**

- The World Health Organization reports that more than 346 million people around the world have diabetes.
- **Diabetes mellitus** is a metabolic disorder that results when the pancreas does not produce enough insulin to meet its needs or the body does not effectively utilize the insulin that it does produce.
- The most common complication is hyperglycemia (elevated blood sugar), which gradually leads to damage in many of the body's systems, most notably the eyes, kidneys, nerves, and heart and blood vessels.



## 15.3 Threats to Health

- There are three kinds of diabetes:
  - **Type 1 diabetes** is an autoimmune condition in which the pancreas does not produce insulin.
  - **Type 2 diabetes** results when the pancreas produces enough insulin initially, but the body is unable to use the hormone properly (insulin resistance).
  - **Gestational diabetes** is a condition seen in about 3 to 8 percent of pregnant women and is caused by a shortage of insulin or by pregnancy hormones.



## Table 15.5 The Risk Factors for Diabetes

### Unmodifiable Risk Factors

- **Age.** Risk increases after age forty-five
- **Medical history.** Diabetes during a previous pregnancy or recently giving birth to an infant who weighs more than 9 pounds.
- **Family history.** A history of diabetes among one or more close relatives.
- **Race and ethnicity.** Individuals from specific ethnic groups may have an increased risk for developing diabetes, including African Americans, Hispanic Americans, Asian Americans, and Native Americans.
- **Viruses.** Exposure to: Epstein-Barr, Coxsackie, mumps, or cytomegalo viruses may trigger Type 1 diabetes.





## Table 15.5 The Risk Factors for Diabetes

### Modifiable Risk Factors

- **Cigarette smoking.** Nicotine constricts blood vessels, and carbon monoxide damages their inner lining, which increases the risk of Type 2 diabetes.
- **Obesity.** Excess body weight, especially around the waist, is a major contributing factor to Type 2 diabetes.
- **Physical inactivity.** Lack of exercise is strongly associated with diabetes.
- **High blood pressure.** Greater than or equal to 140/90 mmHg.
- **Cholesterol levels.** HDL cholesterol under 35 mg/dL.
- **Blood sugar.** Impaired glucose tolerance.
- **Blood fats.** Elevated triglycerides (250 mg/dL or more).



## 15.3 Threats to Health

- **Steps to Reducing the Risk of Diabetes**
  - Unfortunately, Type 1 diabetes is almost impossible to prevent, although some clinical research suggests that breastfeeding an infant for at least three months may decrease the child's risk of developing this condition.
  - However, people who are at risk for Type 2 or gestational diabetes can take steps to avoid the disease.
  - It is crucial to achieve and maintain a healthy body weight through regular physical activity.
  - Proper nutrition is also vital, and it is important to restrict sugary snacks, beverages, and desserts, and to limit the intake of trans fats and saturated fats.



## 15.3 Threats to Health

- In addition, those who are at risk should consume whole grains, legumes, fruits, and vegetables, along with two servings of nonfried fish per week.
- For people over age forty-five, it is important to have a glucose test every three years.
- In order to assess your health status, the following is recommended:
  - Early diagnosis through blood testing
  - Blood pressure measurement
  - Blood lipid measurement

# Video: Preventing & Managing Chronic Disease



- Source: <https://www.youtube.com/watch?v=iXI4MFVLY9A>



## 15.3 Threats to Health

- **Food: The Best Medicine**

- Poor dietary choices and a sedentary lifestyle account for about 300–600 thousand deaths every year according to the US Department of Health and Human Services. (13x higher than the deaths due to gun violence.)
- The typical North American diet is too high in saturated fat, sodium, and sugar, and too low in fiber in the form of whole fruits, vegetables, and whole grains to keep people healthy.
- Making sound nutritional choices can also provide support for individuals undergoing treatment for short-term or chronic conditions.



## 15.4 Foodborne Illness and Food Safety

- Sometimes called “food poisoning,” **foodborne illness** is a common public health problem that can result from exposure to a pathogen or a toxin via food or beverages.
- Raw foods, such as seafood, produce, and meats, can all be contaminated during harvest (or slaughter for meats), processing, packaging, or during distribution.
- For all kinds of food, contamination also can occur during preparation and cooking in a home kitchen or in a restaurant.
- In many developing nations, contaminated water is also a major source of foodborne illness.



## 15.4 Foodborne Illness and Food Safety

- Annually, 1 out of 6 Americans becomes sick after consuming contaminated foods or beverages.
- Foodborne illness can range from mild stomach upset to severe symptoms, or even fatalities.
- The problem of food contamination can not only be dangerous to your health, it can also be harmful to your wallet.
- For example, medical costs and lost wages due to salmonellosis, just one foodborne disease, are estimated at over \$1 billion per year.



## 15.4 Foodborne Illness and Food Safety

- **At-Risk Groups**

- Whether you become seriously ill from a food illness depends on the microorganism, the amount you have consumed, and your overall health.
- In addition, young children, elderly people, and pregnant women all have a higher chance of becoming very sick after consuming contaminated food.
- Exposure to contaminated food could also pose problems for diabetics, cancer patients, people who have liver disease, and people who have stomach problems as a result of low stomach acid or previous stomach surgery.





## 15.4 Foodborne Illness and Food Safety

- **The Major Types of Foodborne Illness**
  - Foodborne illnesses are either infectious or toxic in nature.
  - Microbes, such as bacteria, cause food infections, while toxins, such as the kind produced by molds, cause intoxications.
  - However the illness occurs, the microbe or toxin enters the body through the gastrointestinal tract, and as a result common symptoms include diarrhea, nausea, and abdominal pain.
  - One of the biggest misconceptions about foodborne illness is that it is always triggered by the last meal that a person ate; however, it may take several days or more before the onset of symptoms.



## 15.4 Foodborne Illness and Food Safety

- **Food Infection**

- According to the CDC, more than 250 different foodborne diseases have been identified.
- Most are **food infections**, which means they are caused from food contaminated by microorganisms, such as bacteria, parasites, or viruses.
- Food infections can be sporadic and often are not reported to physicians; however, occasional outbreaks occur that put communities, states and provinces, or even entire nations at risk.



## 15.4 Foodborne Illness and Food Safety

- **The Reproduction of Microorganisms**
  - Bacteria, one of the most common agents of food infection, are single-celled microorganisms that are too small to be seen with the human eye.
  - In order to reproduce within food, microorganisms require the following:
    - **Temperature.** Between 40°F and 140°F, which is called the **danger zone**, bacteria grow rapidly.
    - **Time.** More than two hours in the danger zone.



## 15.4 Foodborne Illness and Food Safety

- **Water.** High moisture content is helpful. Fresh fruits and vegetables have the highest moisture content.
- **Oxygen.** Most microorganisms need oxygen to grow and multiply, but a few are anaerobic and do not.
- **Acidity and pH Level.** Foods that have a low level of acidity (or a high pH level) provide an ideal environment, since most microorganisms grow best around 7.0 pH and not many will grow below 4.0 pH. Examples of higher pH foods include meat, seafood, milk, and corn. Examples of low pH foods include citrus fruits, sauerkraut, tomatoes, and pineapples.
- **Nutrient Content.** Microorganisms need protein, starch, sugars, fats, and other compounds to grow. Typically high-protein foods are better for bacterial growth.



## 15.4 Foodborne Illness and Food Safety

- **Food Intoxication**

- **Food intoxications** are caused by natural toxins or harmful chemicals.
- These and other unspecified agents are major contributors to episodes of acute gastroenteritis and other kinds of foodborne illness.
- Like pathogens, toxins and chemicals can be introduced to food during cultivation, harvesting, processing, or distribution.
- Some toxins can lead to symptoms that are also common to food infection, such as abdominal cramping, while others can cause different kinds of symptoms and complications, some very severe.



## 15.4 Foodborne Illness and Food Safety

- **The Causes of Food Contamination**
  - About one hundred years ago, typhoid fever, tuberculosis, and cholera were common diseases caused by food and water contaminated by pathogens.
  - Over time, improvements in food processing and water treatment eliminated most of those problems in North America.
  - Today, other bacteria and viruses have become common causes of food infection.



## 15.4 Foodborne Illness and Food Safety

- **Bacteria**

- All foods naturally contain small amounts of bacteria.
- Poor handling and preparation of food, along with improper cooking or storage can multiply bacteria and cause illness.
- Most bacteria grow undetected because they do not change the color or texture of food or produce a bad odor.
- Freezing and refrigeration slow or stop the growth of bacteria, but does not destroy the bacteria completely. The microbes can reactivate when the food is taken out and thawed.



## 15.4 Foodborne Illness and Food Safety

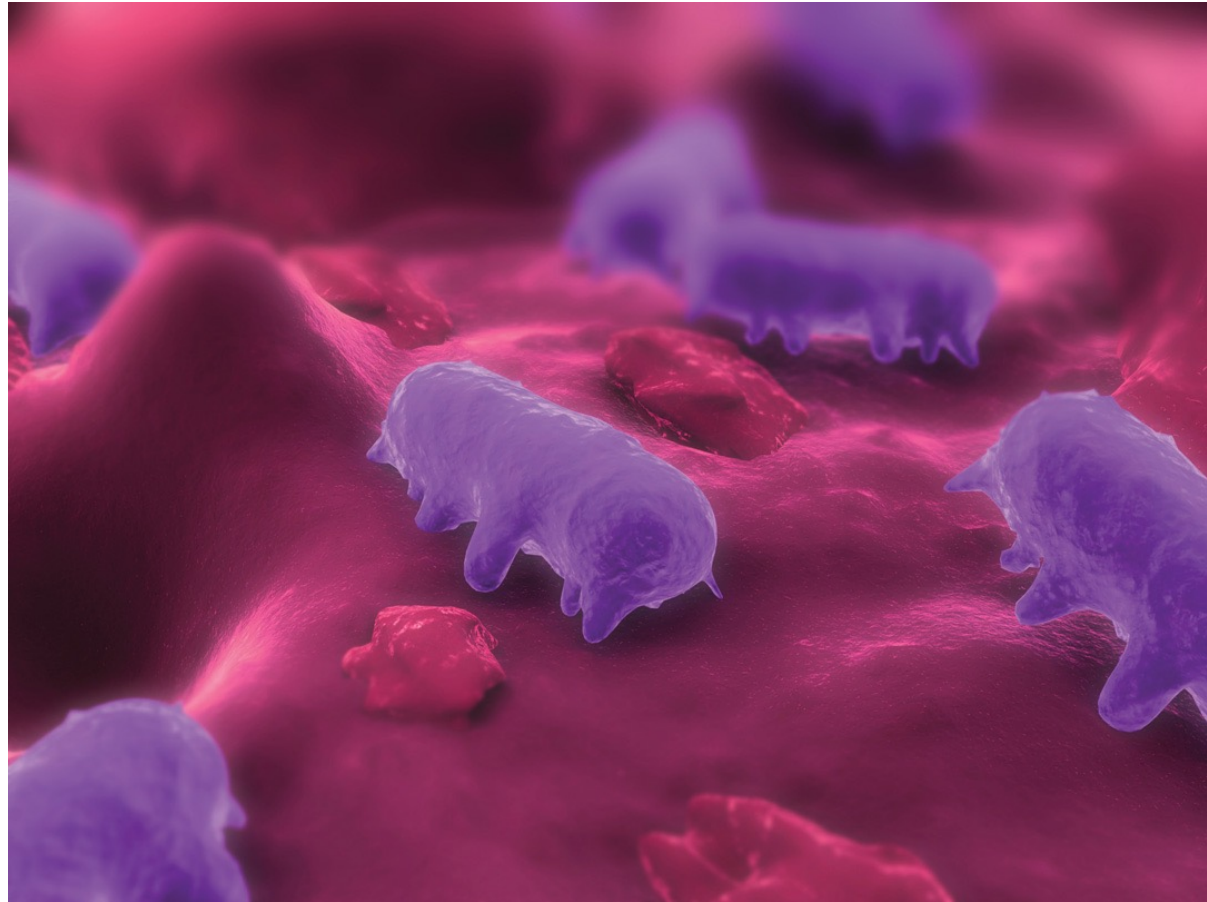
- One of the most common bacteria causing food infections is *Salmonella*, which can spread to humans via a variety of different animal-origin foods, including meats, poultry, eggs, dairy products, and seafood.
- Salmonellosis, typically brings about fever, diarrhea, and abdominal cramps within twelve to seventy-two hours after eating, usually, the illness lasts four to seven days, and most people recover without treatment.



## 15.4 Foodborne Illness and Food Safety

*Salmonella* was first identified in 1885 and many types of this kind of bacteria exist. The incidence of *Salmonella* infections has risen dramatically in the past few decades.

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## 15.4 Foodborne Illness and Food Safety

- The bacterium *Listeria monocytogenes* is found in soft cheeses, unpasteurized milk, and seafood.
- It causes a disease called listeriosis that can bring about fever, headache, nausea, and vomiting.
- *Listeria monocytogenes* mostly affects pregnant women, newborns, older adults, and people with cancer and compromised immune systems.



## 15.4 Foodborne Illness and Food Safety

- The food infection *E. coli* is caused by *Escherichia coli*.
- Sources include raw or undercooked meat, raw vegetables, unpasteurized milk, minimally processed ciders and juices, and contaminated drinking water.
- Symptoms can occur a few days after eating, and include watery and bloody diarrhea, severe stomach cramps, and dehydration.
- In young children, an *E. coli* infection can cause kidney failure and death.



## 15.4 Foodborne Illness and Food Safety

- The bacterium *Clostridium botulinum* causes botulism.
- Sources include improperly canned foods, lunch meats, and garlic.
- Symptoms are seen within four to thirty-six hours after eating and can include nerve dysfunction, such as double vision, inability to swallow, speech difficulty, and progressive paralysis of the respiratory system.
- Botulism can also be fatal.



## 15.4 Foodborne Illness and Food Safety

- *Campylobacter jejuni* causes the disease campylobacteriosis, and is the most commonly identified bacterial cause of diarrhea worldwide.
- Consuming undercooked chicken, or food contaminated with the juices of raw chicken, is the most frequent source of this infection.
- Other sources include raw meat and unpasteurized milk.
- Within 2 to 5 days after consumption, symptoms can begin and include diarrhea, stomach cramps, fever, and bloody stools.



## 15.4 Foodborne Illness and Food Safety

- The food infection shigellosis is caused by *Shigella*.
- Sources include undercooked liquid or moist food that has been handled by an infected person.
- The onset of symptoms occurs one to seven days after eating, and can include stomach cramps, diarrhea, fever, and vomiting.
- Once a person has had shigellosis, the individual is not likely to get infected with that specific type again for at least several years.



## 15.4 Foodborne Illness and Food Safety

- *Staphylococcus aureus* causes staphylococcal food poisoning.
- Food workers who carry this kind of bacteria and handle food without washing their hands can cause contamination.
- Other sources include meat and poultry, egg products, cream-filled pastries, tuna, potato and macaroni salad, and foods left unrefrigerated for long periods of time.
- Symptoms can begin thirty minutes to eight hours after eating, and include diarrhea, vomiting, nausea, stomach pain, and cramps.
- This food infection usually lasts one to two days.



## 15.4 Foodborne Illness and Food Safety

- Found in raw oysters and other kinds of seafood, *Vibrio vulnificus* belongs to the same family as the bacteria which cause cholera.
- Symptoms can begin anywhere from six hours to a few days after consumption, and include chills, fever, nausea, and vomiting.
- This disease is very dangerous and can result in fatalities, especially in people with underlying health problems.





## 15.4 Foodborne Illness and Food Safety

- **Virus**

- **Hepatitis A** is one of the more well-known food-contaminating viruses.
- Sources include raw shellfish from polluted water, and food handled by an infected person.
- At first, symptoms include malaise, loss of appetite, nausea, vomiting, and fever. Three to ten days later, additional symptoms can manifest, including jaundice and darkened urine.
- Severe cases of a hepatitis A can result in liver damage and death.



## 15.4 Foodborne Illness and Food Safety

- The most common form of contamination from handled foods is the **norovirus**.
- Sources include raw shellfish from polluted water, salads, sandwiches, and other ready-to-eat foods handled by an infected person.
- The norovirus causes gastroenteritis and within one to three days it leads to symptoms, such as nausea, vomiting, diarrhea, stomach pain, headache, and a low-grade fever.



## 15.4 Foodborne Illness and Food Safety

- **Parasitic Protozoa**

- Food-contaminating parasitic protozoa are microscopic organisms that may be spread in food and water.
- *Anisakis*, microscopic worms that invade the stomach or the intestines. Sources of this parasite include raw fish.
- *Cryptosporidium* lives in the intestines of infected animals. Another common source is drinking water.
- *Giardia lamblia* is another parasite that is found in contaminated drinking water.
- *Toxoplasma gondii* causes the infection toxoplasmosis, which is a leading cause of death attributed to foodborne illness in the United States. Sources include raw or undercooked meat and unwashed fruits and vegetables.



## 15.4 Foodborne Illness and Food Safety

- **Mold Toxins**

- **Molds** are microscopic fungi that live on animals and plants. Foods that contain mold may also have bacteria growing alongside it.
- Some molds, like the kind found in blue cheese, are desirable in foods, while other molds can be dangerous.
- **Mycotoxins** are natural, poisonous substances that can make you sick if they are consumed.
- The Food and Agriculture Organization of the United Nations estimates that mycotoxins affect 25 percent of the world's food crops.

## 15.4 Foodborne Illness and Food Safety

*Mold can grow on fruits, vegetables, grains, meats, poultry, and dairy products, and typically appears as gray or green “fur.”*

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## 15.4 Foodborne Illness and Food Safety

- The most dangerous mycotoxins are **aflatoxins**, which are produced by strains of fungi called *Aspergillus*.
- Aflatoxins can cause aflatoxicosis in humans, livestock, and domestic animals.
- Symptoms include vomiting and abdominal pain. Possible complications include liver failure, liver cancer, and even death.
- Many countries try to limit exposure to aflatoxins by monitoring their presence on food and feed products.



## 15.4 Foodborne Illness and Food Safety

- **Poisonous Mushrooms**

- Like molds, mushrooms are fungi and the poisonous kind produces mycotoxins that can cause food intoxication.
- Toxic mushrooms, also known as toadstools, can cause severe vomiting and other symptoms; however, only a few varieties are fatal.
- Toxic mushrooms cannot be made safe by cooking, freezing, canning, or processing.
- The only way to avoid food intoxication is to refrain from eating them.





## 15.4 Foodborne Illness and Food Safety

- **Pesticides**
  - **Pesticides** are important in food production to control diseases, weeds, insects, and other pests. They protect crops and ensure a large yield.
  - Synthetic pesticides can leave behind residues, particularly on produce, that can be harmful to human health.
  - Foods that contain the highest levels of pesticide residue include conventionally-grown peaches, apples, bell peppers, celery, nectarines, strawberries, cherries, pears, spinach, lettuce, and potatoes.
  - Foods that contain the lowest levels of pesticide residue include avocados, pineapples, bananas, mangoes, asparagus, cabbage, and broccoli.





## 15.4 Foodborne Illness and Food Safety

- In many cases, the amount of pesticide exposure is too small to pose a risk.
- Harmful exposures can lead to certain health problems and complications, including cancer.
- Infants and young children are more susceptible to the hazards of pesticides than adults.
- Many farmers now rely on alternatives to synthetic pesticide use, including crop rotation, natural pesticides, and planting nonfood crops nearby to lure pests away.
- **Organic foods** are grown or produced without synthetic pesticides or fertilizer, and all growers and processors must be certified by the US Department of Agriculture (USDA).



## 15.4 Foodborne Illness and Food Safety

- **Pollutants**

- Pollutants are another kind of chemical contaminant that can make food harmful.
- **Dioxins** are chemical compounds created in industrial processes, such as manufacturing and bleaching pulp and paper. Dioxin exposure has been linked to cancer.
- When metals contaminate food, it can result in serious and even life-threatening health problems. A common metal contaminant is **lead**, which can be present in drinking water, soil, and air.



## 15.4 Foodborne Illness and Food Safety

- **Methyl mercury** occurs naturally in the environment and is also produced by human activities. This highly toxic chemical can cause mercury poisoning, which leads to developmental problems in children, as well as autoimmune effects.
- **PCBs, or polychlorinated biphenyls**, are man-made organic compounds that are used commercially. Health effects include physical and neurological development in children, and this compound is potentially a carcinogen.



## 15.4 Foodborne Illness and Food Safety

- **Protecting the Public Health**
  - Most foodborne infections go unreported and undiagnosed.
  - Even so, the CDC estimates that about seventy-six million people in the United States become ill from foodborne pathogens or other agents every year.
  - In North America, a number of government agencies (including the CDC, the FDA, the USDA, and Health Canada) work to educate the public about food infections and intoxications, prevent the spread of disease, and quell any major problems or outbreaks.



## 15.4 Foodborne Illness and Food Safety

- **Efforts on the Governmental Level**
  - The USDA and the FDA enforce laws regarding the safety of domestic and imported food.
  - In addition, the Federal Food, Drug, and Cosmetic Act of 1938 gives the FDA authority over food ingredients.
  - Other government agencies that play a role in protecting the public include the Food Safety and Inspection Service (a division of the USDA), the Agricultural Research Service, the National Institute of Food and Agriculture, and the Environmental Protection Agency (EPA).



## 15.4 Foodborne Illness and Food Safety

- The EPA and FDA, also monitor the use of pesticides.
- The Food Quality Protection Act, which was passed in 1996, requires manufacturers to show that pesticide levels are safe for children.
- In Canada, Health Canada works with local governments, industries, and consumers to establish food safety throughout the nation.
- The Canadian Food Inspection Agency, enforces the safety policies and standards set by Health Canada.



## 15.4 Foodborne Illness and Food Safety

- **Efforts within the Food Industry**
  - The Hazard Analysis Critical Control Points (HACCP) is a system within the food industry designed to promote food safety and prevent contamination by identifying all areas in food production and retail where contamination could occur.
  - The USDA requires the food industry to follow HACCP for meat and poultry, while the FDA requires it for seafood, low-acid canned-food, and juice.



## 15.4 Foodborne Illness and Food Safety

- **Efforts on the Consumer Level: What You Can Do**
  - Consumers can also take steps to prevent foodborne illness and protect their health.
  - The four most important steps for handling, preparing, and serving food are:
    1. **Clean**
    2. **Separate**
    3. **Cook**
    4. **Chill**





## 15.4 Foodborne Illness and Food Safety

- **Buying Food**

- It is best to buy your food from reputable grocers with clean, sanitary facilities, that keep products at appropriate temperatures.
- Consumers should examine food carefully before they purchase it.
- Fresh meat and poultry are usually free from mold, but cured and cooked meats should be examined carefully.
- Also, avoid torn, crushed, or open food packages, and do not buy food with frost or ice crystals. Avoid bruised fruit.
- It is also a good idea to keep meat, poultry, seafood, and eggs separate from other items in your shopping cart as you move through the grocery store.



## Video 15.4 Start at the Store: Prevent Foodborne Illness

- Source: <https://www.youtube.com/v/rNwl3ww6wvo>



## 15.4 Foodborne Illness and Food Safety

- **Storing Food**

- Refrigerate perishable foods quickly; they should not be left out for more than two hours.
- The refrigerator should be kept at 40°F (or 4°C) or colder, and checked periodically with a thermometer.
- Wrap meat packages tightly and store them at the bottom of the refrigerator, so juices won't leak out onto other foods.
- Raw meat, poultry, and seafood should be kept in a refrigerator for only 2 days.
- Be sure to consume leftovers within 3 to 5 days, so mold does not have a chance to grow.



## 15.4 Foodborne Illness and Food Safety

- **Preparing Food**

- Wash hands thoroughly with warm, soapy water for at least twenty seconds before preparing food and every time after handling raw foods.
- Fresh fruits and vegetables should also be rinsed thoroughly under running water to clean off pesticide residue. Washing also removes most dirt and bacteria from the surface of produce.
- Defrost meat, poultry, and seafood in the refrigerator, microwave, or in a water-tight plastic bag submerged in cold water; room temperature is an ideal temperature for bacteria to grow.
- Always use clean cutting boards, which should be washed with soap and warm water by hand or in a dishwasher after each use.



## 15.4 Foodborne Illness and Food Safety

- Wash the top before opening canned foods to prevent dirt from coming into contact with food.
- **Cooking Food**
  - Cooked food is safe to eat only after it has been heated to a temperature that is high enough to kill bacteria.
  - You cannot judge the state of “cooked” by color and texture alone; use a food thermometer to be sure.
  - The appropriate minimum cooking temperature varies depending on the type of food.
  - When microwaving, rotate the dish and stir contents several times to ensure even cooking.



## 15.4 Foodborne Illness and Food Safety

- **Serving Food**

- Hot food should be kept above the safe temperature of 140°F, using a heat source such as a chafing dish, warming tray, or slow cooker.
- Cold foods should be kept at 40°F or lower.
- When serving food, keep it covered to block exposure to any mold spores hanging in the air.
- Use plastic wrap to cover foods that you want to remain moist, such as fresh fruits, vegetables, and salads.
- After a meal, do not keep leftovers at room temperature for more than two hours.



## 15.5 Start Your Sustainable Future Today

- Adopting sustainable practices can go a long way toward helping you achieve optimal health, while also helping to protect the health of our planet.
- **Sustainability** involves meeting present nutritional needs while preserving resources for the future.
- Ideally, sustainable practices include methods that are healthy, conserve the environment, protect livestock, respect food industry workers, provide fair wages to farmers, and support farming communities.



## 15.5 Start Your Sustainable Future Today

- **Living a Sustainable Lifestyle**
  - Utilizing an environmentally-friendly approach to good nutrition is a great way to remain and stay healthy.
  - As an initial step, you might try to buy more whole foods rather than processed foods. You might also drink more water, rather than sodas and juices with added sugar.
  - Other suggestions to live a more sustainable lifestyle include:
    - **Learn more about food**





## 15.5 Start Your Sustainable Future Today

- Eat a plant-based diet
  - Support local farmers
  - Join a community garden
  - Help spread the word
  - Sign up for a CSA (community-supported agriculture)
- Refer to Section 15.5 in the book for more information on each of these.



## 15.5 Start Your Sustainable Future Today

- **Changing Your Behavior**
  - Living a sustainable lifestyle and achieving optimal health is not easy.
  - While creating and implementing change is not easy, the more conscious you are of the process, and the more you prepare, the greater the chances are for success.
  - Learning about the different stages of behavioral change can help you take a proactive approach to living a sustainable lifestyle.



## 15.5 Start Your Sustainable Future Today

- **The Transtheoretical Model of Behavioral Change**
  - The Transtheoretical Model of Behavioral Change identifies the five stages of change, along with things that can help people move through these different stages.
  - It also includes strategies which help people make, create, and continue behavioral change.



## 15.5 Start Your Sustainable Future Today

- The five stages of the Transtheoretical Model of Behavioral Change are:
  1. Precontemplation
  2. Contemplation
  3. Preparation
  4. Action
  5. Maintenance



## 15.5 Start Your Sustainable Future Today

- Adopting a healthier lifestyle requires changes not only in behavior, but also in attitude and perception. The Transtheoretical Model calls them *decisional balance* and *self-efficacy*.
- **Decisional balance** means a person has realized that the benefits of making healthy changes outweigh any risks.
- **Self-efficacy** means a person has self-belief and the confidence to make and maintain positive changes.



## 15.5 Start Your Sustainable Future Today

- The Theoretical Model of Behavioral Change also includes ten techniques and strategies for bringing about change:
  1. **Consciousness-raising**
  2. **Dramatic Relief**
  3. **Environmental Reevaluation**
  4. **Social Liberation**
  5. **Self-Liberation**
  6. **Helping Relationships**



## 15.5 Start Your Sustainable Future Today

7. Counterconditioning

8. Reinforcement Management

9. Stimulus Control

10. Self-reevaluation

- Combining knowledge of the change process with the effective use of strategies can help everyone turn their good intentions into healthier lifestyles.



## 15.6 Careers in Nutrition

- Both **dietitians** and **nutritionists** provide nutrition-related services to people in the private and public sectors.
  - A dietitian is a healthcare professional who has registered credentials and can provide nutritional care in the areas of health and wellness for both individuals and groups.
  - A nutritionist is an unregistered professional who may have the credentials of a dietitian, or may have acquired the knowledge via other avenues.
- People in both professions work to apply nutritional science, using evidence-based best practices, to help people nourish their bodies and improve their lives.





## 15.6 Careers in Nutrition

- Becoming a registered dietitian requires a Bachelor's or Master's degree in dietetics, including courses in biology, chemistry, biochemistry, microbiology, anatomy and physiology, nutrition, and food-service management.
- To become a registered dietetic technician you must complete a dietetic technician program that involves supervised practice.
- Forty-seven states have licensure requirements for registered dietitians and nutritionists.



## 15.6 Careers in Nutrition

- **Working in Nutrition**
  - Dietitians and nutritionists plan food and nutrition programs, promote healthy eating habits, and recommend dietary modifications.
  - Some individuals work in the government, while others are solely in the private sector.
  - Some jobs in nutrition focus on working with athletes, while others provide guidance to patients with long-term, life-threatening diseases.



## 15.6 Careers in Nutrition

- Nutritionists and dietitians who work for the government may become involved with federal food programs, federal agencies, communication campaigns, or creating and analyzing public policy.
- On the local level, clinical careers include working in hospitals and nursing-care facilities.
- Nutrition jobs in the community often involve working in public health clinics, cooperative extension offices, and HMOs to prevent disease and promote the health of the local community.
- Nutrition jobs in the nonprofit world involve antihunger organizations, public health organizations, and activist groups.



## 15.6 Careers in Nutrition

- Nutritionists and dietitians can also find employment opportunities in advertising, marketing, and food manufacturing.
- Consultant careers can include working in wellness programs, supermarkets, physicians' offices, gyms, and weight-loss clinics.
- Nutrition careers in the corporate world include designing wellness strategies and nutrition components for companies, working as representatives for food or supplement companies, designing marketing and educational campaigns, and becoming lobbyists.
- There are employment opportunities in farm management, marketing and sales, compliance, finance, and land surveying and appraisal.



## 15.6 Careers in Nutrition

- **Working toward Tomorrow**
  - Good health allows you to function normally and work hard to pursue your goals. Yet, achieving optimal health cannot be underestimated.
  - Scientific evidence provides the basis for dietary guidelines and recommendations.
  - Researchers in the field of nutrition work to advance our knowledge of food production and distribution.
  - The findings that are uncovered today will influence not only what we eat, but how we grow it, distribute it, prepare it, and even enjoy it tomorrow.