

Nutrition

An Applied Approach

Chapter 11 Achieving and Maintaining a Healthful Body Weight

FOURTH
EDITION

Janice Thompson • Melinda Manore

What Is a Healthful Body Weight?

A healthful weight

- Is appropriate for your age
- Is maintained without constant dieting
- Is compatible with normal blood pressure, lipid levels, and glucose tolerance
- Is based on family history of body shape and weight
- Promotes good eating habits and allows for regular physical activity
- Is acceptable to you

What Is a Healthful Body Weight?

- **Underweight** is having too little body fat to maintain health
- **Overweight** is having a moderate amount of excess body fat
- **Obesity** is having an excess of body fat that adversely affects health
- **Morbid obesity** is body weight exceeding 100% of normal, creating a very high risk for serious health complications

Evaluating Body Weight

A person's actual weight is not the only factor to consider

Determining if a person's body weight is healthful should include

- Determining the body mass index (BMI)
- Measuring body composition
- Assessing the *pattern* of fat distribution

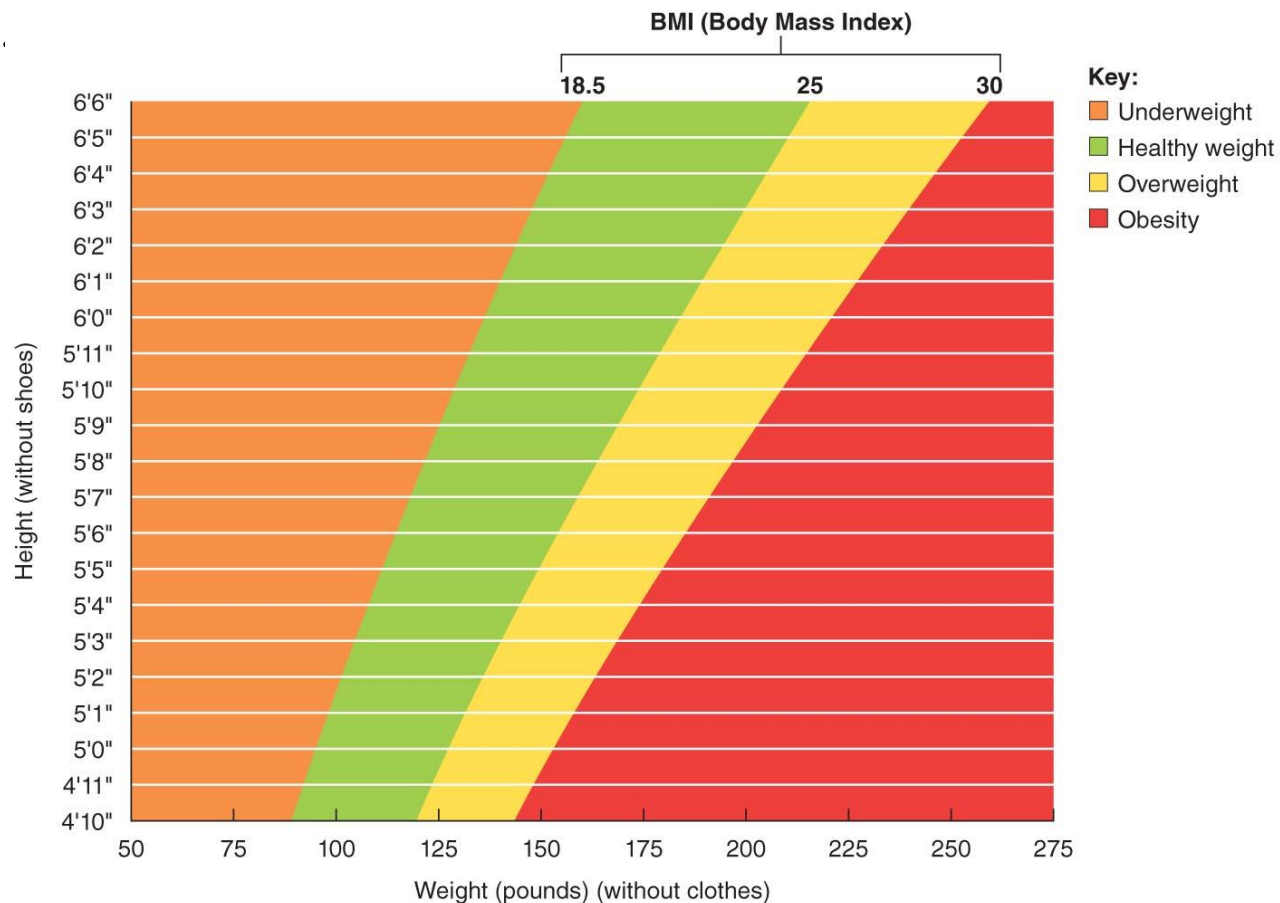
Body Mass Index

Body mass index (BMI) = weight (kg)/height (m)²

- Expresses the ratio of a person's weight to the square of his or her height
- BMI provides an important **clue** about one's overall health
- BMI does not tell people how much of a person's body mass is fat or where this fat is distributed
- Note: BMI values below 18.5 or above 30 have increased risks of health problems

Body Mass Index

- Note: BMI results are distorted in people with high muscle mass.



Body Composition

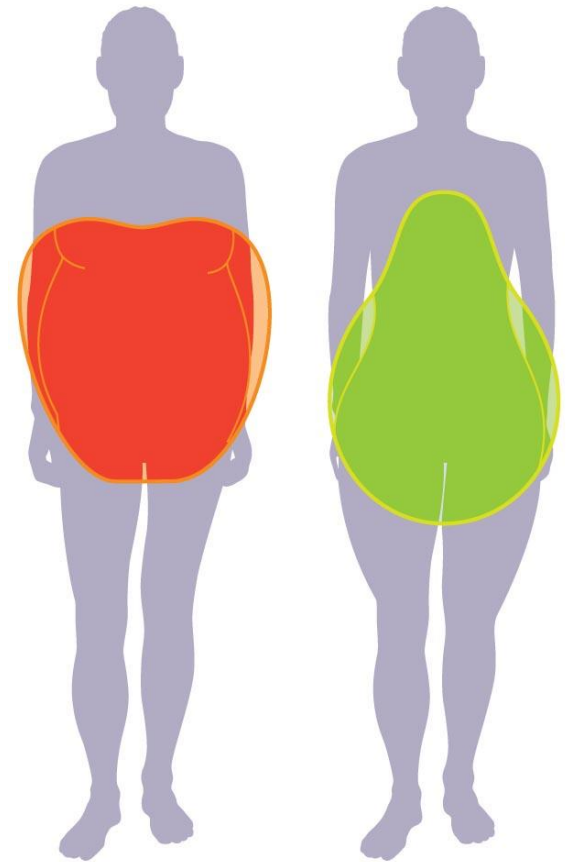
• **Body Composition** is the measurement of body fat and lean body mass

- Can be measured by
 - Underwater weighing
 - Skinfold measurements
 - Bioelectrical impedance analysis (BIA)
 - Dual-energy x-ray absorptiometry (DXA)
 - Bod Pod

Method	Limitations
<p>Underwater weighing: Considered the most accurate method. Estimates body fat within a 2–3% margin of error. This means that if your underwater weighing test shows you have 20% body fat, this value could be no lower than 17% and no higher than 23%. Used primarily for research purposes.</p>	<p>• Subject must be comfortable in water. • Requires trained technician and specialized equipment. • May not work well with extremely obese people. • Must abstain from food for at least 8 hours and from exercise for at least 12 hours prior to testing.</p>
<p>Skinfolds: Involves “pinching” a person’s fold of skin (with its underlying layer of fat) at various locations of the body. The fold is measured using a specially designed caliper. When performed by a skilled technician, it can estimate body fat with an error of 3–4%. This means that if your skinfold test shows you have 20% body fat, your actual value could be as low as 16% or as high as 24%.</p>	<p>• Less accurate unless technician is well trained. • Proper prediction equation must be used to improve accuracy. • Person being measured may not want to be touched or to expose their skin. • Cannot be used to measure obese people, as their skinfolds are too large for the caliper.</p>
<p>Bioelectrical impedance analysis (BIA): Involves sending a very low level of electrical current through a person’s body. As water is a good conductor of electricity and lean body mass is made up of mostly water, the rate at which the electricity is conducted gives an indication of a person’s lean body mass and body fat. This method can be done while lying down, with electrodes attached to the feet, hands, and the BIA machine. Hand-held and standing models (which look like bathroom scales) are now available. Under the best of circumstances, BIA can estimate body fat with an error of 3–4%.</p>	<p>• Less accurate. • Body fluid levels must be normal. • Proper prediction equation must be used to improve accuracy. • Should not eat for 4 hours and should not exercise for 12 hours prior to the test. • No alcohol should be consumed within 48 hours of the test. • Females should not be measured if they are retaining water due to menstrual cycle changes.</p>
<p>Dual-energy x-ray absorptiometry (DXA): The technology is based on using very-low-level x-rays to differentiate among bone tissue, soft (or lean) tissue, and fat (or adipose) tissue. It involves lying for about 30 minutes on a specialized bed fully clothed, with all metal objects removed. The margin of error for predicting body fat ranges from 2% to 4%.</p>	<p>• Expensive; requires trained technician with specialized equipment. • Cannot be used to measure extremely tall, short, or obese people, as they do not fit properly within the scanning area.</p>
<p>Bod Pod: A machine that uses air displacement to measure body composition. This machine is a large, egg-shaped chamber made from fiberglass. The person being measured sits inside, wearing a swimsuit. The door is closed and the machine measures how much air is displaced. This value is used to calculate body composition. It appears promising as an easier and equally accurate alternative to underwater weighing in many populations, but it may overestimate body fat in some African American men.</p>	<p>• Expensive. • Less accurate in some populations.</p>

Pattern of Fat Distribution

- **Fat distribution pattern** is measured by waist-to-hip ratio and waist circumference
- **Apple-shaped fat patterning:** upper body
 - Increased risk for chronic diseases (type 2 diabetes, heart disease, hypertension)
- **Pear-shaped fat patterning:** lower body
 - No significant increased risk for chronic diseases



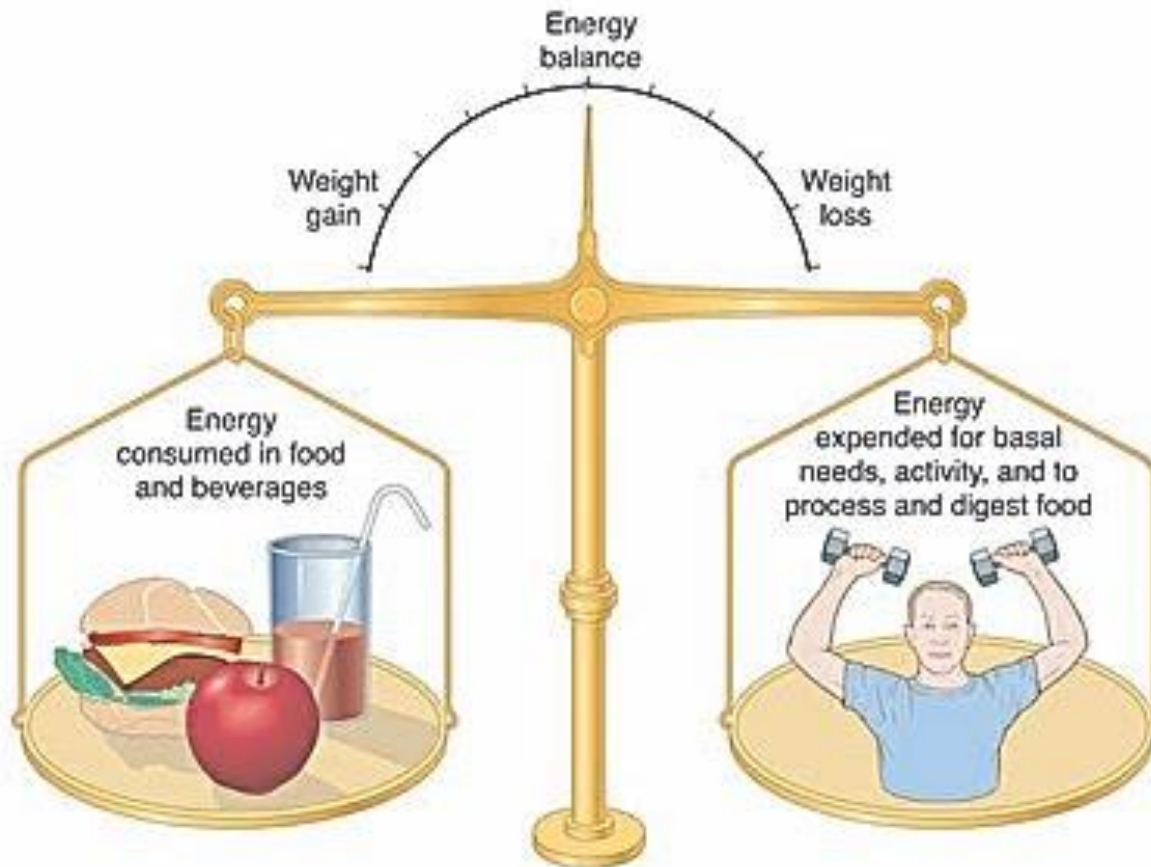
(a) Apple-shaped fat patterning

(b) Pear-shaped fat patterning

Energy Budget

Energy intake = calories you eat

Energy expenditure = calories you burn



Energy Balance

Energy balance occurs when
energy intake = energy
expenditure

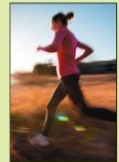
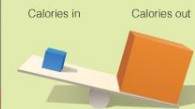
- Energy intake = kcal from food
- Energy expenditure
 - Energy expended at rest (basal metabolic rate)
 - Physical activity
 - Thermic effect of food



Energy balance is the relationship between the food we eat and the energy we expend each day. Finding the proper balance between energy intake and energy expenditure allows us to maintain a healthy body weight.

ENERGY DEFICIT

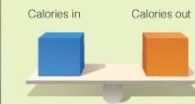
When you consume fewer Calories than you expend, your body will draw upon your stored energy to meet its needs. You will lose weight.



ENERGY INTAKE < ENERGY EXPENDITURE = WEIGHT LOSS

ENERGY BALANCE

When the Calories you consume meet your needs, you are in energy balance. Your weight will be stable.



ENERGY INTAKE = ENERGY EXPENDITURE = WEIGHT MAINTENANCE

ENERGY EXCESS

When you take in more Calories than you need, the surplus Calories will be stored as fat. You will gain weight.



ENERGY INTAKE > ENERGY EXPENDITURE = WEIGHT GAIN

Basal Metabolic Rate

- **Basal metabolic rate (BMR)** is the energy expended to maintain basal, or **resting/fundamental functions** of the body.
 - 60–75% of total energy expenditure
 - More lean tissue increases your BMR
 - BMR decreases with age, 3–5% per decade after age 30

TABLE 11.1 Factors Affecting Basal Metabolic Rate (BMR)

Factors That Increase BMR	Factors That Decrease BMR
Higher lean body mass	Lower lean body mass
Greater height (more surface area)	Lower height
Younger age	Older age
Elevated levels of thyroid hormone	Depressed levels of thyroid hormone
Stress, fever, illness	Starvation or fasting
Male gender	Female gender
Pregnancy and lactation	
Certain drugs, such as stimulants, caffeine, and tobacco	

Metabolic Factors

- **Four factors that may promote weight gain** and stifle weight loss:
 - Relatively low metabolic rate
 - Low level of spontaneous physical activity
 - Low nervous system activity
 - Low fat burning

Physiologic Factors

- **Leptin** is a hormone that causes **reduced food intake**
 - Higher levels is generally good
 - Levels can decline after long dieting
- **Ghrelin** is a hormone that **stimulates appetite**
 - Moderate/low levels are generally good

Achieve & Maintain Healthful Weight

- **Healthful weight change requires**
 - *Gradual* change in energy intake
 - Regular and appropriate physical exercise
 - Application of behavior modification techniques

- **The 3 Prong Approach**
 1. Nutrition
 2. Cardio
 3. Resistance Training

Achieve & Maintain Healthful Weight

- Diet plans to **avoid – Fad Diets**
 - Promoters claim the program is based on some new discovery
 - Rapid weight loss (>2 lb/week) with no exercise
 - Special foods only available from promoter
 - Rigid and limited menu
 - Diets that over- or underemphasize specific, narrowly defined nutrients as the key to weight loss

Three Basic “Styles of Diets”

- There are three basic types of diets to avoid:
 1. High carb (low fat and protein)
 - Can be effective. Lots of research on this diet. Does not provide effective long-term weight loss.
 2. Low carb (high fat and protein)
 - Can be effective. Not enough research conducted on long-term weight loss.
 3. Low fat (high carb and protein)
 - Can be effective. This is an unpopular diet (difficult to achieve). Supplementation is required.

Weight-Loss Strategies

Guidelines for successful weight loss

1. **Set realistic goals**

- Specific, Reasonable, Measurable

2. **Eat smaller portions of calorie dense foods**

- Consume foods low in energy (calorie) density – focus on nutrient density

3. **Participate in regular physical activity**

- Critical for long-term maintenance of weight loss

4. **Focus on Reducing Refined Sugar and Increasing Fiber intake.**

- This keeps insulin levels low and glucagon levels high which is **CRITICAL** for weight loss and maintenance of weight

Underweight

- **Effective weight gain** should include
 - Eating 500 to 1,000 extra kcal/day
 - Eating frequently throughout the day
 - Selecting healthful, energy-dense foods
 - Avoiding tobacco products, which depress appetite and increase BMR
 - Regular exercise with resistance training

Metabolic Syndrome

- Risk factors:
 - Abdominal obesity
 - High triglyceride levels
 - Low HDL (healthy cholesterol)
 - High blood pressure
 - High fasting blood sugar

- People with metabolic syndrome are
 - Twice as likely to develop heart disease
 - Five times as likely to develop type 2 diabetes

Weight-loss surgery

- **Liposuction** is a surgery used to remove excess fat from under the skin by suction.
- Drawbacks:
 - Blood clots
 - Skin and nerve damage
 - Adverse drug reactions
 - Deformations and enlargement of fat cells

Discuss these statements

- Feed Muscle, Burn Fat
- You can't outrun your fork
- Show me your friends, and I'll show you your fitness level
- 95% of weight-loss efforts fail
- Metabolic damage is often a result of the bodies starvation response
- Yoyo dieting