Nutrition: Infancy, Childhood, and Adolescence
Nutrition During Infancy: Introduction

- The first year of life is a time of rapid growth and development.
- Breast milk or iron-fortified formula is the primary food the first year.
- Gradual introduction of solids begins at four to six months of age.
- Mealtimes with toddlers should be a pleasant and relaxed environment.
Nutrition During Infancy

- Energy and Nutrient Needs
  - Energy Intake and Activity
    - Infants weight doubles the first five months
    - Infants weight triples by one year. (20-25#)
    - Increases about 10 inches in height by 1 year
    - High basal metabolic rate
    - Rapid growth
    - about 450 kcalories needed per day at birth
      - 100 kcalories per kilogram or 45 kcal/pound body weight
Weight-for-age percentiles: Girls, birth to 36 months

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
Energy and Nutrient Needs

- **Energy Nutrients**
  - **Carbohydrates:**
    - 60 grams/day 1-6 months
    - 95 grams/day 7-12 months
  - **Fat:** 30-31 grams per day
  - **Protein** especially important for growth and development
    - 1.5 grams per kg 1st 6 months
    - 1.2 grams per kg 6 months-1 year
Nutrition during Infancy

- Energy and Nutrient Needs
  - Vitamins and Minerals
    - More than double the needs of an adult in proportion to weight
    - Vitamin A, vitamin C, vitamin D and iodine are especially high
  - Water
    - Higher % of body weight is water compared to adults
    - Breast milk or infant formula normally provide adequate water
    - Dehydration from diarrhea and vomiting is a concern.
Recommended Intakes of an Infant and an Adult Compared on the Basis of Body Weight

Vitamin D recommendations for an infant are 10 times greater per pound of body weight than those for an adult male.

Pound for pound, niacin recommendations for an infant and an adult male are similar.

Key:
- 20-year-old male (160 lb)
- 5-month-old infant (16 lb)

Fig. 16-2, p. 531
First Days of Life

Generally weighs from 7 to 9 pounds; length is 19 to 21 inches. Head is relatively large and has soft spot on top. Startles and sneezes easily. Jaw may tremble. May hiccup and spit up.

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Breast Milk

- American Academy of Pediatrics strongly recommends breastfeeding the full term infant, except where specific contraindications exist.

- What practices have the greatest impact on the infants nutrition?
  - The milk the infant receives
  - The age at which solids are started

- The AAP recommend exclusive breastfeeding for the 1st 6 months and breastfeeding with additional solids until 1 year.

- Frequency:
  - Approximately every 2 -3 hours, 8-12 feedings per day, about 10-15 minutes per side.
Breast Milk

Energy Nutrients:

- CHO - Lactose
  - easily digested, enhances calcium absorption
- Fat - Linoleic acid, linolenic, arachidonic, DHA
- Protein - Alpha-Lactalbumin

Vitamins:

- Vitamins are adequate in breast milk except for Vitamin D
  - D supplement recommended for those who are exclusively breastfed
Percentages of Energy-Yielding Nutrients in Breast Milk & in Recommended Adults Diets

- **Breast milk**
  - Protein: 6%
  - Fat: 55%
  - Carbohydrate: 39%

- **Recommended adult diets**
  - Protein: 21%
  - Fat: 26%
  - Carbohydrate: 53%

**Key:**
- Orange: Protein
- Yellow: Fat
- Blue: Carbohydrate
Breast Milk

Minerals:
- Adequate calcium
- Low in iron—but high bioavailability
- Low in fluoride
- Low in sodium

Supplements:
- Vit D
- Iron after 6 months
- Fluoride after 6 months
**TABLE 16-2** Supplements for Full-Term Infants

<table>
<thead>
<tr>
<th></th>
<th>Vitamin D&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Iron&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Fluoride&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breastfed infants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth to 6 months of age</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months to 1 year</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formula-fed infants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth to 6 months of age</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6 months to 1 year</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<sup>a</sup>Vitamin D supplements are recommended for all infants who are exclusively breastfed and for any infants who do not receive at least 1 liter (1000 milliliters) or 1 quart (32 ounces) of vitamin D-fortified formula per day.

<sup>b</sup>All infants 6 months of age need additional iron, preferably in the form of iron-fortified infant cereal and/or infant meats. Formula-fed infants need iron-fortified infant formula.

<sup>c</sup>At 6 months of age, breastfed infants and formula-fed infants who receive ready-to-use formulas (these are prepared with water low in fluoride) or formula mixed with water that contains little or no fluoride (less than 0.3 ppm) need supplements.

Breast Milk

Immunologic Protection:

- Colostrum-produced first 2-3 days
  - Contains antibodies and WBCs
  - protects the infant from infections against which mom has developed immunity
- Bifidus factors - Promotes friendly bacteria
- Lactoferrin -
  - binds iron, helps absorb iron, limits bacteria from getting iron
- Lactadherin - helps prevent infant diarrhea
- Growth factor
- Lipase enzyme
- Sterile
Nutrition during Infancy

• Breast Milk
  • Allergy and Disease Protection
    • Fewer allergies than formula-fed babies
    • Lower blood pressure as adults
    • Lower blood cholesterol as adults
    • Protection against cardiovascular disease
  • Other Potential Benefits
    • Less obesity as adults
    • Indications of positive effect on later intelligence
Infant Formula

- Composition
  - Attempt to copy composition of breast milk
  - Iron-fortified
- No protective antibodies
- Safe preparation

<table>
<thead>
<tr>
<th></th>
<th>Breast milk</th>
<th>Infant formula</th>
<th>Cow's milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>6%</td>
<td>9%</td>
<td>20%</td>
</tr>
<tr>
<td>Fat</td>
<td>55%</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>39%</td>
<td>42%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Key:
- Orange: Protein
- Yellow: Fat
- Blue: Carbohydrate
Nutrition during Infancy

- **Infant Formula**
  - **Infant Formula Standards**
    - AAP guidelines:
      - formula should reflect the composition of human milk taken from well-nourished mothers during the 1st or 2nd month of lactation, when the infants growth rate is high
    - FDA mandates safety and nutritional qualities
  - **Special Formulas**
    - For premature infants or those with inherited diseases
    - Hypoallergenic formulas or soy formulas for infants with allergies
    - Soy formulas for lactose intolerance and vegans
Nutrition during Infancy

- Infant Formula
  - Inappropriate Formulas
    - Soy beverages are nutritionally incomplete and inappropriate.
    - Goat’s milk is deficient in folate.
  - Nursing Bottle Tooth Decay
    - Can be caused by formula, milk, or juice
    - Prolonged exposure to formula when sleeping
    - Upper and lower teeth may be affected by decay.
Nursing Bottle Tooth Decay
Infant at 1 Month

One Month
Has regained weight lost after birth and more.
Lifts head briefly when placed on stomach. Whole body moves when infant is touched or lifted. Eats every two to four hours.

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Four Months

Weight nearly doubled. Has grown three to four inches. Follows objects with eyes. Reaches toward objects with both hands; plays with fingers; puts fingers and objects into mouth. Holds head up steadily though back needs support. Attempts to roll over. Awake longer at feeding time. Eats seven or eight times per day. Sleeps six to seven hours at night.
When Can You Introduce Cows Milk?

- AAP: May introduce whole cows milk after 1 year of age.
- Problems with early introduction
  - Associated with intestinal bleeding if less than 6 months.
  - Poor iron source
  - Low in vitamin C
  - High in calcium
  - High in sodium
  - High in protein.
- Can be transitioned to Low Fat (2%) between 2-5 years of age
When Can You Introduce Solids?

- **When to begin:**
  - 4-6 months
  - Depends on developmental readiness

- **To prevents food allergies:**
  - Start with single food ingredient
  - One at a time, in small portions
  - 4-5 days between foods
  - Introduce rice cereal 1st; is least allergenic
    - Introduce wheat cereal last
  - Allergic reactions include skin rash, digestive upset, or respiratory discomfort
# Infant Development and Recommended Foods

<table>
<thead>
<tr>
<th>Age (mo)</th>
<th>Feeding Skill</th>
<th>Appropriate Foods Added to the Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–4</td>
<td>Turns head toward any object that brushes cheek. Initially swallows using back of tongue; gradually begins to swallow using front of tongue as well. Strong reflex (extrusion) to push food out during first 2 to 3 months.</td>
<td>Feed breast milk or infant formula.</td>
</tr>
<tr>
<td>4–6</td>
<td>Extrusion reflex diminishes, and the ability to swallow nonliquid foods develops. Indicates desire for food by opening mouth and leaning forward. Indicates satiety or disinterest by turning away and leaning back. Sits erect with support at 6 months. Begins chewing action. Brings hand to mouth. Grasps objects with palm of hand.</td>
<td>Begin iron-fortified cereal mixed with breast milk, formula, or water. Begin pureed meats, legumes, vegetables, and fruits.</td>
</tr>
</tbody>
</table>
| 10–12    | Begins to master spoon, but still spills some. | Add variety. Gradually increase portion sizes.  

*Portion sizes for infants and young children are smaller than those for an adult. For example, a grain serving might be ¼ slice of bread instead of 1 slice, or ¼ cup rice instead of ½ cup.  
Nutrition during Infancy

- Introducing Solid Foods
  - Choice of Infant Foods
    - Should be provided with variety, balance, and moderation
    - Palatable and nutritious
    - No added salt, sugar, or seasonings
    - Safe and convenient
Nutrition during Infancy

- Introducing Solid Foods
  - Foods to Provide Iron
    - Iron-fortified cereals with vitamin C-rich foods and juices
    - Meat or meat alternatives such as legumes
  - Foods to Provide Vitamin C
    - Vegetables first, then fruits
    - Set limits on fruit juice consumption at 4-6 ounces per day.
Nutrition during Infancy

- Introducing Solid Foods
  - Foods to Omit
    - Concentrated sweets
    - Products with sugar alcohols (sorbitol) that may cause diarrhea
    - Canned vegetables contain too much sodium.
    - There is a botulism risk with honey and corn syrup.
    - Choking hazards from carrots, cherries, gum, hard or gel-like candies, hot dogs, marshmallows, nuts, peanut butter, popcorn, raw celery, whole beans, and whole grapes (listed on pg 557)
Twelve Months

Twelve Months
Usually has tripled birthweight and increased length by 50%. Grasps and releases objects with fingers. Holds spoon, but uses it poorly.

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Foods at 1 Year

- Whole cows milk: 2-3 cups per day
  - More than this can lead to “milk anemia”
  - Can switch to lowfat after 2 years
- Meats, iron fortified cereals, breads, fruits, vegetables
- Drink from a cup
SAMPLE MENU

**Breakfast**
- 1 scrambled egg
- 1 slice whole-wheat toast
- ½ c whole milk

**Morning snack**
- ½ c yogurt
- ¼ c fruit

**Lunch**
- ½ grilled cheese sandwich: 1 slice whole-wheat bread with 1 slice cheese
- ½ c vegetables (steamed carrots)
- ¼ c 100% fruit juice

**Afternoon snack**
- ½ c fruit
- ½ c toasted oat cereal

**Dinner**
- 1 oz chopped meat or ¼ c well-cooked mashed legumes
- ½ c rice or pasta
- ½ c vegetables (chopped broccoli)
- ½ c whole milk

**NOTE:** This sample menu provides about 1000 kcalories.

a Include citrus fruits, melons, and berries.

b Include dark green, leafy and deep yellow vegetables.
One to Two Years

Gains in height and weight continue at a lower rate; appetite is less. Uses finger and thumb to pick up things. Soft spot grows smaller and then disappears. Baby teeth continue to appear. Usually takes one long nap a day. Drinks from a cup, attempts to feed self with a spoon. Likes to eat with hands. Pulls self up to standing position. Walks alone.

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Mealtimes with Toddlers

- Discourage unacceptable behavior
- Let toddlers explore new foods
- Don’t force food on children
- Provide nutritious foods and let children choose
- Limit sweets
- Make mealtimes enjoyable
Body Shapes of One-Year-Old and Two-Year-Old Compared

One-Year-Old

Two-Year-Old
Two to Three Years

Slower and more irregular gains in height and weight. Has all 20 teeth. Runs and climbs, pushes, pulls, lugs, walks upstairs one step at a time. Feeds self using fingers, spoon, and cup; spills a lot. At times has one favorite food. Associates the sensation of hunger with a need for food.

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Three to Four Years

Gains 4–6 pounds and grows about 2–3 inches. Feeds self and drinks from a cup quite neatly, carries things without spilling. May give up sleep at nap time, substituting quiet play.
Nutrition during Childhood

- Energy and Nutrient Needs
- Energy Intake and Activity
  - Needs vary widely because of growth and physical activity.

**TABLE 16-5 Estimated Daily kCalorie Needs for Children**

<table>
<thead>
<tr>
<th>Children</th>
<th>Sedentary&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Active&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 to 3 yr</td>
<td>1000</td>
<td>1400</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 to 8 yr</td>
<td>1200</td>
<td>1800</td>
</tr>
<tr>
<td>9 to 13 yr</td>
<td>1600</td>
<td>2200</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 to 8 yr</td>
<td>1400</td>
<td>2000</td>
</tr>
<tr>
<td>9 to 13 yr</td>
<td>1800</td>
<td>2600</td>
</tr>
</tbody>
</table>

<sup>a</sup>*Sedentary* describes a lifestyle that includes only the activities typical of day-to-day life.

<sup>b</sup>*Active* describes a lifestyle that includes at least 60 minutes per day of moderate physical activity (equivalent to walking more than 3 miles per day at 3 to 4 miles per hour) in addition to the activities of day-to-day life.
Nutrition During Childhood

- Energy and Nutrient Needs
  - Carbohydrate
    - Carbohydrate recommendations are the same as those for adults
      - 130 grams per day
  - Fiber
    - Age 1-3    19 grams
    - Age 4-8    25 grams
    - Age 9-13
      - Boys    31 grams
      - Girls   26 grams
    - Varies with gender and age (p 541)
Energy and Nutrient Needs

- Fat and Fatty Acids
  - Children 1-3 years:
    - should have 30-40% of energy from fat.
  - Children 4-18 years:
    - should have 25-35% of energy from fat.

- Protein
  - Needs increase slightly with age
  - Requirement considers nitrogen balance, the quality of protein consumed, and the added needs of growth
Nutrition during Childhood

- Vitamins and Minerals
  - Needs increase with age.
  - Balanced diet meets all needs except iron
    - Iron-fortified foods are important.
  - To prevent iron deficiency:
    - need 7-10 mg/day
  - Toddlers age 1-2 years are at risk:
    - High milk diet (>2 cups/day), juice
    - High sugar, fats, snacks
Food Patterns for Children

ChooseMyPlate.gov

Grains
Make half your grains whole
- Start smart with breakfast. Look for whole-grain cereals.
- Just because bread is brown doesn’t mean it’s whole grain. Search the ingredients list to make sure the first word is “whole” (like “whole wheat”).

Vegetables
Vary your veggies
- Color your plate with all kinds of great-tasting veggies.
- What’s green and orange and tastes good? Veggies! Go dark green with broccoli and spinach, or try orange ones like carrots and sweet potatoes.

Fruits
Focus on fruits
- Fruits are nature’s treats—sweet and delicious. Go easy on juice and make sure it’s 100%.

Milk
Get your calcium-rich foods
- Move to the milk group to get your calcium. Calcium builds strong bones. Look at the carton or container to make sure your milk, yogurt, or cheese is low-fat or fat-free.

Meat & Beans
Go lean with protein
- Eat lean or low-fat meat, chicken, turkey, and fish. Ask for it baked, broiled, or grilled—not fried.
- It’s nutty, but true. Nuts, seeds, peas, and beans are all great sources of protein, too.

For a 1400-kcalorie diet (suitable for many children ages 4 to 8), include the amounts below from each food group.

<table>
<thead>
<tr>
<th>Grains</th>
<th>Vegetables</th>
<th>Fruits</th>
<th>Milk</th>
<th>Meat &amp; Beans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat 5 oz. every day; at least half should be whole</td>
<td>Eat 1 1/2 cups every day</td>
<td>Eat 1 1/2 cups every day</td>
<td>Get 2 1/2 cups every day</td>
<td>Eat 4 oz. every day</td>
</tr>
</tbody>
</table>

For a 1800-kcalorie diet (suitable for many children ages 9 to 13), include the amounts below from each food group.

<table>
<thead>
<tr>
<th>Grains</th>
<th>Vegetables</th>
<th>Fruits</th>
<th>Milk</th>
<th>Meat &amp; Beans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat 6 oz. every day; at least half should be whole</td>
<td>Eat 2 1/2 cups every day</td>
<td>Eat 1 1/2 cups every day</td>
<td>Get 3 cups every day</td>
<td>Eat 5 oz. every day</td>
</tr>
</tbody>
</table>

Oils
- Oils are not a food group, but you need some for good health. Get your oils from fish, nuts, and liquid oils such as corn oil, soybean oil, and canola oil.

Find your balance between food and fun
- Move more. Aim for at least 60 minutes every day, or most days.
- Walk, dance, bike, rollerblade—it all counts. How great is that!

Fats and sugars—know your limits
- Get your fat facts and sugar smarts from the Nutrition Facts label.
- Limit solid fats as well as foods that contain them.
- Choose food and beverages low in added sugars and other kcaloric sweeteners.
Five to Six Years
Growth continues at about the same rate. Legs lengthen. Six-year permanent molars usually appear (new teeth, not replacing baby teeth). Begins to lose front baby teeth. Prefers plain, bland, and unmixed foods.

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Hunger and Malnutrition

Hunger and Behavior:

- Directly affects academic performance.
- Poor concentration
- Shorter attention span
- Lower score on I.Q. Tests
- Average child needs to eat about every 4 hours
Hunger and Malnutrition

Iron Deficiency and Behavior:
- Brain is affected before blood effects.
- Shorter attention span
- Overall performance
- Disruptive
- Poor test performance

Other Nutrients Deficiencies:
- Aggressive, disagreeable, irritable, sad.
- Evaluate diet, correct deficiencies.
## Physical Signs of Malnutrition in Children

<table>
<thead>
<tr>
<th>Well-Nourished</th>
<th>Malnourished</th>
<th>Possible Nutrient Deficiencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hair</td>
<td>Shiny, firm in the scalp</td>
<td>Protein</td>
</tr>
<tr>
<td>Eyes</td>
<td>Bright, clear pink membranes; adjust easily to light</td>
<td>Pale membranes; spots; redness; adjust slowly to darkness</td>
</tr>
<tr>
<td>Teeth and gums</td>
<td>No pain or caries, gums firm, teeth bright</td>
<td>Missing, discolored, decayed teeth; gums bleed easily and are swollen and spongy</td>
</tr>
<tr>
<td>Face</td>
<td>Clear complexion without dryness or scaliness</td>
<td>Off-color, scaly, flaky, cracked skin</td>
</tr>
<tr>
<td>Glands</td>
<td>No lumps</td>
<td>Swollen at front of neck, cheeks</td>
</tr>
<tr>
<td>Tongue</td>
<td>Red, bumpy, rough</td>
<td>Sore, smooth, purplish, swollen</td>
</tr>
<tr>
<td>Skin</td>
<td>Smooth, firm, good color</td>
<td>Dry, rough, spotty; “sandpaper” feel or sores; lack of fat under skin</td>
</tr>
<tr>
<td>Nails</td>
<td>Firm, pink</td>
<td>Spoon-shaped, brittle, ridged</td>
</tr>
<tr>
<td>Internal systems</td>
<td>Regular heart rhythm, heart rate, and blood pressure; no impairment of digestive function, reflexes, or mental status</td>
<td>Abnormal heart rate, heart rhythm, or blood pressure; enlarged liver, spleen; abnormal digestion; burning, tingling of hands, feet; loss of balance, coordination; mental confusion, irritability, fatigue</td>
</tr>
<tr>
<td>Muscles and bones</td>
<td>Muscle tone; posture, long bone development appropriate for age</td>
<td>“Wasted” appearance of muscles; swollen bumps on skull or ends of bones; small bumps on ribs; bowed legs or knock-knees</td>
</tr>
</tbody>
</table>
Malnutrition and Lead

Malnourished children are more vulnerable to lead poisoning:

- More than 300,000 children in U.S. have high blood lead concentrations
- Low socioeconomic background
- Under the age of 6 years old
- Low intake of calcium, zinc, iron, Vit C, or D
- Pica (eat dirt or paint chips)
- Anemia
- Symptoms include diarrhea, irritability, fatigue
Malnutrition and Lead

- Lead toxicity problems
  - Accumulates in bones, brain, teeth and kidneys
  - Balance impairment
  - Motor development impaired
  - Learning disabilities
  - Behavioral problems
Hyperactivity

• Cause is unknown
• Affects 5-10% of school-age children
• Interferes with social development and academic behavior
• Dietary changes and alternative therapies do not solve true hyperactivity.
• There is no scientific evidence to support a link between sugar intake and hyperactivity or attention deficit disorder.
• Symptoms tend to improve as the child gets older
• Pay attention to your child’s overall environment-
  • Regular sleep
  • Regular mealtimes
  • Regular outdoor activity
Adverse Reactions to Food

Food Allergies:
Only 6-8% of children are diagnosed with true food allergies

- Production of antibodies or histamines.
- Immediate or delayed reaction
  - Minutes-24 hours
- Symptomatic or asymptomatic
Nutrition during Childhood

- **Food Allergy and Intolerance**
  - **Anaphylactic Shock**
    - Life-threatening food allergy reaction
    - Foods may include **eggs, milk, soy, peanuts**, tree nuts, wheat, fish, and shellfish
    - Often outgrow allergies to eggs, milk, and soy
    - Recognize symptoms (page 548)
    - Epinephrine injections (adrenalin) can be used to counteract anaphylactic shock.
    - Food labeling to identify common allergens and additives
Food Allergy and Intolerance

• Food Intolerances
  • Adverse reactions to foods and other discomforts are not all food allergies
  • stomachaches
  • headaches
  • rapid pulse rate
  • nausea
  • wheezing
  • hives
  • bronchial irritation
  • coughs

• Symptoms without antibody production
Childhood Obesity

- Number of overweight children has dramatically increased
  - Overweight defined
    - Above 85\textsuperscript{th} percentile
  - Obesity defined
    - Above 95\textsuperscript{th} percentile
  - Severe obesity defined
    - Above 99\textsuperscript{th} percentile
Body Mass Index-Index-for-Age Percentiles: Boys and Girls Age 2-20

Key:
- Orange: Overweight ≥95th percentile
- Blue: Normal 10th to 85th percentile
- Yellow: At risk of overweight >85th percentile
- Green: Underweight <10th percentile

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Trends in Childhood Obesity

Key:
- Orange: 2–5 years
- Green: 6–11 years
- Purple: 12–19 years

The graph shows the percentage of children classified as obese over different age groups from 1970 to 2000.
Childhood Obesity

Estimated 32% of U.S. children between 2-19 years of age are overweight (17% are obese)

- Genetic and Environmental Factors
  - Parental obesity is a risk factor. Parents act as role models.
    - Overweight teens with one obese parent have an 80% chance of becoming obese adults
  - Poor diet and physical inactivity are risk factors.
  - Convenience foods and meals eaten away from home
  - Non-nutritious choices at school
  - Sedentary activities, e.g. watching television
  - Energy-dense soft drinks
TV and Obesity

- Requires no additional energy beyond BMR
- Replaces vigorous activity
- Encourages snacking
- Promotes a sedentary lifestyle
- Children with TVs in their bedrooms have increased risk for becoming overweight
- More than 25% of school-aged children in the US watch 4 or more hours of TV every day
- AAP recommends limiting TV and video time to 2 hours per day
Childhood Obesity

Growth-
- Grow taller at first, then stop growing at a shorter height
- Greater bone and muscle mass, thus “stocky” appearance
- Begin puberty earlier

Physical Health
- High Cholesterol, Trig & LDL
- High blood pressure
- Increased risk of Type 2 Diabetes

Psychological
- Victims of prejudice
- Rejection and discrimination
- Poor self image
Recommended Eating and Physical Activity Behaviors to Prevent Obesity

The Expert Committee of the American Medical Association recommends the following healthy habits for children 2 to 18 years of age to help prevent childhood obesity:

- Limit consumption of sugar-sweetened beverages, such as soft drinks and fruit-flavored punches.
- Eat the recommended amounts of fruits and vegetables every day (2 to 4.5 cups per day based on age).
- Learn to eat age-appropriate portions of foods.
- Eat foods low in energy density such as those high in fiber and/or water and modest in fat.
- Eat a nutritious breakfast every day.
- Eat a diet rich in calcium.
- Eat a diet balanced in recommended proportions for carbohydrate, fat, and protein.
- Eat a diet high in fiber.
- Eat together as a family as often as possible.
- Limit the frequency of restaurant meals.
- Limit television watching or other screen time to no more than 2 hours per day and do not have televisions or computers in bedrooms.
- Engage in at least 60 minutes of moderate to vigorous physical activity every day.

Nutrition during Childhood

- Childhood Obesity
  - Diet
    - Reduce rate of weight gain, rather than attempt weight loss
  - Strategies
    - Serve kcalorie-controlled family meals.
    - Involve children in shopping and preparing meals.
    - Encourage children to eat when hungry, eat slowly, enjoy food, and stop eating when full.
    - Teach them to select nutrient-dense foods.
    - Limit high-fat and high-sugar foods.
    - Never force children to clean plates.
    - Plan for nutritious snacks.
    - Discourage eating while watching television.
Nutrition during Childhood

- Childhood Obesity
  - Physical Activity
    - Limit sedentary activities.
    - Encourage regular vigorous activity.
    - Parents need to set good examples.
Nutrition during Childhood

- Childhood Obesity
  - Psychological Support
    - Weight-loss programs with parental involvement
    - Positive influence on eating behaviors
  - Behavioral Changes
    - Focus on how to eat
    - Parental and media influence-shape their self-concept
    - Teaching consumer skills
Mealtimes at Home

- Honor preferences
- Participation
- Avoid power struggles
- Avoid Choking risk foods
- Control Snacks
- Prevent dental caries
- Role model!
**TABLE 16-8 Food Skills of Preschool Children**

<table>
<thead>
<tr>
<th>Age 2 years, when large muscles develop:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Uses a spoon</td>
</tr>
<tr>
<td>• Helps feed self</td>
</tr>
<tr>
<td>• Lifts and drinks from a cup</td>
</tr>
<tr>
<td>• Helps scrub fruits and vegetables, tear lettuce or greens, snap green beans, or dip foods</td>
</tr>
<tr>
<td>• Wipes table</td>
</tr>
<tr>
<td>• Places items in recycle bin or trash</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age 3 years, when medium hand muscles develop:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Spears food with a fork</td>
</tr>
<tr>
<td>• Feeds self independently</td>
</tr>
<tr>
<td>• Adds ingredients to pancake batters, cookie recipes, salads or other mixed dishes</td>
</tr>
<tr>
<td>• Helps wrap, pour, mix, shake, stir, or spread foods</td>
</tr>
<tr>
<td>• Helps crack nuts with supervision</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age 4 years, when small finger muscles develop:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Uses all utensils and napkin</td>
</tr>
<tr>
<td>• Helps roll, juice, or mash foods</td>
</tr>
<tr>
<td>• Helps measure dry ingredients</td>
</tr>
<tr>
<td>• Cracks egg shells</td>
</tr>
<tr>
<td>• Helps make sandwiches and toss salads</td>
</tr>
<tr>
<td>• Peels foods such as hard-boiled eggs and bananas</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age 5 years, when fine coordination of fingers and hands develops:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Measures liquids</td>
</tr>
<tr>
<td>• Helps grind, grate, and cut (soft foods with dull knife)</td>
</tr>
<tr>
<td>• Uses hand mixer with supervision</td>
</tr>
</tbody>
</table>

*These ages are approximate. Healthy, normal children develop at their own pace.*
Healthful Snack Ideas

| TABLE 16-10 Healthful Snack Ideas—Think Food Groups, Alone and in Combination |
| Selecting two or more foods from different food groups adds variety and nutrient balance to snacks. The combinations are endless, so be creative. Whenever possible, choose whole grains, low-fat or reduced-fat milk products, and lean meats. |

| Grains |
| Grain products are filling snacks, especially when combined with other foods: |
| - Cereal with fruit and milk |
| - Crackers and cheese |
| - Whole-grain toast with peanut butter |
| - Popcorn with grated cheese |
| - Oatmeal raisin cookies with milk |

| Vegetables |
| Cut-up, fresh, raw vegetables make great snacks alone or in combination with foods from other food groups: |
| - Celery with peanut butter |
| - Broccoli, cauliflower, and carrot sticks with a flavored cottage cheese dip |

| Fruits |
| Fruits are delicious snacks and can be eaten alone—fresh, dried, or juiced—or combined with other foods: |
| - Apples and cheese |
| - Bananas and peanut butter |
| - Peaches with yogurt |
| - Raisins mixed with sunflower seeds or nuts |

| Protein Foods |
| Seafood, meat, poultry, eggs, legumes, nuts, seeds, and soy products add protein to snacks: |
| - Refried beans with nachos and cheese |
| - Tuna on crackers |
| - Luncheon meat on whole-grain bread |

| Milk and Milk Products |
| Milk can be used as a beverage with any snack, and many other milk products, such as yogurt and cheese, can be eaten alone or with other foods as listed above. |
Nutrition during Adolescence

- Growth and Development
  - Growth speeds up and continues for about 2 ½ years.
  - Gender differences
    - Females begin puberty at 10-11 years of age, grow 6 inches taller, add fat, and gain about 35 pounds.
    - Males begin puberty at 12-13 years of age, grow 8 inches taller, add lean body mass, and gain 45 pounds.
Physical Changes of Adolescence - Females

Growth
Rapid gains peak around age 12, then growth slows to a stop at maturity.

Hair
Hair grows on underarms and genital area; other body hair may grow coarser and longer.

Skin
Acne may develop.

Body shape and composition
Hips widen, fat deposits collect, and breasts develop.

Hormonal changes
Ovaries produce more estrogens and progesterone.

Reproductive organs
Uterus and ovaries enlarge; genitals enlarge; ovum ripening begins; normal vaginal secretions begin, including a mucuslike daily secretion and monthly menstruation.
Physical Changes of Adolescence - Males

Growth
Rapid gains peak around age 14, then growth slows to a stop at maturity.

Hair
Hair of forehead begins to recede. Hair grows on face, underarms, and around genitals; other body hair may grow coarser and longer.

Skin
Acne may develop.

Body shape and composition
Muscle tissue develops.

Hormonal changes
Testicles produce more testosterone.

Reproductive organs
Penis and testicles enlarge; sperm production begins; ejaculations begin.
Nutrition in Adolescence

- **Energy:**
  - Needs depend on:
    - Rate of growth
    - Body size
    - Physical activity
  - Active male may need about 3500 kcal
  - Sedentary female may need about 1700 kcal

- **Vitamins**
  - RDA increases for most vitamins
Nutritional Adolescence

- Iron needs increase:
  - F- for menstruation
  - M- for increase in lean body mass

- Calcium:
  - 90% of females and 70% of males age 12-19 have calcium intakes below recommendation
  - 1300 mg/day
  - Reach peak bone mass
  - 4 servings per day
Adolescent Food Habits

- Snacks provide $\frac{1}{4}$ of the teenagers energy intake
  - High in sugar, fat and sodium
- About $\frac{1}{3}$ of their meals are eaten away from home
  - Eat fast food
- They often skip breakfast
- They drink soft drinks instead of milk or juice
  - Low in calcium, high in sugar and caffeine
- Influenced by their peers
Average Daily Intakes of Milk and Soft Drinks Compared

Over the years, adolescent milk intakes have decreased as soft drink intakes have increased.
Problems Adolescents Face

- Marijuana
- Drug Abuse
- Smoking
- Smokeless tobacco
- Alcohol abuse
End of Chapter 16

Nutrition: Infancy, Childhood, and Adolescence