13.3: Childhood and Nutrition

Skills to Develop

- Summarize nutritional requirements and dietary recommendations for school-aged children.
- Discuss the most important nutrition-related concerns during childhood.

Nutritional needs change as children leave the toddler years. From ages four to eight, school-aged children grow consistently, but at a slower rate than infants and toddlers. They also experience the loss of deciduous, or “baby,” teeth and the arrival of permanent teeth, which typically begins at age six or seven. As new teeth come in, many children have some malocclusion, or malposition, of their teeth, which can affect their ability to chew food. Other changes that affect nutrition include the influence of peers on dietary choices and the kinds of foods offered by schools and afterschool programs, which can make up a sizable part of a child’s diet. Food-related problems for young children can include tooth decay, food sensitivities, and malnourishment. Also, excessive weight gain early in life can lead to obesity into adolescence and adulthood.

Childhood (Ages Four to Eight): “Growing Pains”

At this life stage, a healthy diet facilitates physical and mental development and helps to maintain health and wellness. School-aged children experience steady, consistent growth, with an average growth rate of 2–3 inches (5–7 centimeters) in height and 4.5–6.5 pounds (2–3 kilograms) in weight per year. In addition, the rate of growth for the extremities is faster than for the trunk, which results in more adult-like proportions. Long-bone growth stretches muscles and ligaments, which results in many children experiencing “growing pains,” at nighttime in particular. Elaine U. Polan, RNC, MS and Daphne R. Taylor, RN, MS, Journey Across the Life Span: Human Development and Health Promotion (Philadelphia: F. A. Davis Company, 2003), 150–51.
In school-aged children, muscle mass and strength increase and motor skills show improvement. Image used with permission (Public Domain; Tysto).

**Energy**

Children’s energy needs vary, depending on their growth and level of physical activity. Energy requirements also vary according to gender. Girls ages four to eight require 1,200 to 1,800 calories a day, while boys need 1,200 to 2,000 calories daily, and, depending on their activity level, maybe more. Also, recommended intakes of macronutrients and most micronutrients are higher relative to body size, compared with nutrient needs during adulthood. Therefore, children should be provided nutrient-dense food at meal- and snack-time. However, it is important not to overfeed children, as this can lead to childhood obesity, which is discussed in the next section. Parents and other caregivers can turn to the MyPlate website for guidance: [http://www.choosemyplate.gov/](http://www.choosemyplate.gov/).

**Macronutrients**

For carbohydrates, the Acceptable Macronutrient Distribution Range (AMDR) is 45–65 percent of daily calories (which is a recommended daily allowance of 135–195 grams for 1,200 daily calories). Carbohydrates high in fiber should make up the bulk of intake. The AMDR for protein is 10–30 percent of daily calories (30–90 grams for 1,200 daily calories). Children have a high need for protein to support muscle growth and development. High levels of essential fatty acids are needed to support growth (although not as high as in infancy and the toddler years). As a result, the AMDR for fat is 25–35 percent of daily calories (33–47 grams for 1,200 daily calories). Children should get 17–25 grams of fiber per day.

**Micronutrients**

Micronutrient needs should be met with foods first. Parents and caregivers should select a variety of foods from each food group to ensure that nutritional requirements are met. Because children grow rapidly, they require foods that are high in iron, such as lean meats, legumes, fish, poultry, and iron-enriched cereals. Adequate fluoride is crucial to support strong teeth. One of the most important micronutrient requirements during childhood is adequate calcium and vitamin D intake. Both are needed to build dense bones and a strong skeleton. Children who do not consume adequate vitamin D should be given a supplement of 10 micrograms (400 international units) per day. Table 13.1 shows the micronutrient recommendations for school-aged children. (Note that the recommendations are the same for boys and girls. As we...
progress through the different stages of the human life cycle, there will be some differences between males and females regarding micronutrient needs.)

### Table 1: Micronutrient Levels during Childhood

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Children, Ages 4–8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A (mcg)</td>
<td>400.0</td>
</tr>
<tr>
<td>Vitamin B₆ (mcg)</td>
<td>600.0</td>
</tr>
<tr>
<td>Vitamin B₁₂ (mcg)</td>
<td>1.2</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>25.0</td>
</tr>
<tr>
<td>Vitamin D (mcg)</td>
<td>5.0</td>
</tr>
<tr>
<td>Vitamin E (mg)</td>
<td>7.0</td>
</tr>
<tr>
<td>Vitamin K (mcg)</td>
<td>55.0</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>800.0</td>
</tr>
<tr>
<td>Folate (mcg)</td>
<td>200.0</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>10.0</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>130.0</td>
</tr>
<tr>
<td>Niacin (B₃) (mg)</td>
<td>8.0</td>
</tr>
<tr>
<td>Phosphorus (mg)</td>
<td>500.0</td>
</tr>
<tr>
<td>Riboflavin (B₂) (mcg)</td>
<td>600.0</td>
</tr>
<tr>
<td>Selenium (mcg)</td>
<td>30.0</td>
</tr>
<tr>
<td>Thiamine (B₁) (mcg)</td>
<td>600.0</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>5.0</td>
</tr>
</tbody>
</table>


**Factors Influencing Intake**

A number of factors can influence children’s eating habits and attitudes toward food. Family environment, societal trends, taste preferences, and messages in the media all impact the emotions that children develop in relation to their diet. Television commercials can entice children to consume sugary products, fatty fast-foods, excess calories, refined ingredients, and sodium. Therefore, it is critical that parents and caregivers direct children toward healthy choices.
One way to encourage children to eat healthy foods is to make meal- and snack-time fun and interesting. Parents should include children in food planning and preparation, for example selecting items while grocery shopping or helping to prepare part of a meal, such as making a salad. At this time, parents can also educate children about kitchen safety. It might be helpful to cut sandwiches, meats, or pancakes into small or interesting shapes. In addition, parents should offer nutritious desserts, such as fresh fruits, instead of calorie-laden cookies, cakes, salty snacks, and ice cream. Also, studies show that children who eat family meals on a frequent basis consume more nutritious foods. Dakota County, Minnesota. “Research on the Benefits of Family Meals.” © 2006. Last revised April 30, 2012. 
http://www.co.dakota.mn.us/Departmen...amilyMeals.htm.

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**Children and Malnutrition**

Malnutrition is a problem many children face, in both developing nations and the developed world. Even with the wealth of food in North America, many children grow up malnourished, or even hungry. The US Census Bureau characterizes households into the following groups:

- food secure
- food insecure without hunger
- food insecure with moderate hunger
- food insecure with severe hunger

Millions of children grow up in food-insecure households with inadequate diets due to both the amount of available food and the quality of food. In the United States, about 20 percent of households with children are food insecure to some degree. In half of those, only adults experience food insecurity, while in the other half both adults and children are considered to be food insecure, which means that children did not have access to adequate, nutritious meals at times. Coleman-Jensen, A. et al. “Household Food Security in the United States in 2010.” US Department of Agriculture, *Economic Research Report*, no. ERR-125 (September 2011).

Growing up in a food-insecure household can lead to a number of problems. Deficiencies in iron, zinc, protein, and vitamin A can result in stunted growth, illness, and limited development. Federal programs, such as the National School Lunch Program, the School Breakfast Program, and Summer Feeding Programs, work to address the risk of hunger and malnutrition in school-aged children. They help to fill the gaps and provide children living in food-insecure households with greater access to nutritious meals.

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**The National School Lunch Program**

Beginning with preschool, children consume at least one of their meals in a school setting. Many children receive both breakfast and lunch outside of the home. Therefore, it is important for schools to provide meals that are nutritionally sound. In the United States, more than thirty-one million children from low-income families are given meals provided by the National School Lunch Program. This federally-funded program offers low-cost or free lunches to schools, and also snacks to afterschool facilities. School districts that take part receive subsidies from the US Department of Agriculture (USDA) for every meal they serve. School lunches must meet the *2010 Dietary Guidelines for Americans* and need to provide one-third of the RDAs for protein, vitamin A, vitamin C, iron, and calcium. However, local authorities make the decisions about what foods to serve and how they are prepared. US Department of Agriculture. *National School Lunch

Video \(\PageIndex{1}\): The USDA Introduces New School Lunch Standards. (click to see video). This video focuses on changes to the National School Lunch Program in the United States.

Children and Vegetarianism

Another issue that some parents face with school-aged children is the decision to encourage a child to become a vegetarian or a vegan. Some parents and caregivers decide to raise their children as vegetarians for health, cultural, or other reasons. Preteens and teens may make the choice to pursue vegetarianism on their own, due to concerns about animals or the environment. No matter the reason, parents with vegetarian children must take care to ensure vegetarian children get healthy, nutritious foods that provide all the necessary nutrients.

Types of Vegetarian Diets

There are several types of vegetarians, each with certain restrictions in terms of diet:
• **Ovo-vegetarians.** Ovo-vegetarians eat eggs, but do not eat any other animal products.

- **Lacto-ovo-vegetarians.** Lacto-ovo-vegetarians eat eggs and dairy products, but do not eat any meat.
- **Lacto-vegetarians.** Lacto-vegetarians eat dairy products, but do not eat any other animal products.
- **Vegans.** Vegans eat food only from plant sources, no animal products at all.

Children who consume some animal products, such as eggs, cheese, or other forms of dairy, can meet their nutritional needs. For a child following a strict vegan diet, planning is needed to ensure adequate intake of protein, iron, calcium, vitamin B_{12}, and vitamin D. Legumes and nuts can be eaten in place of meat, soy milk fortified with calcium and vitamins D and B_{12} can replace cow’s milk.

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### Food Allergies and Food Intolerance

The development of food allergies is a concern during the toddler years. This remains an issue for school-aged children. Recent studies show that three million children under age eighteen are allergic to at least one type of food. American Academy of Allergy, Asthma and Immunology. “Allergy Statistics.” Accessed on March 5, 2012. [http://www.aaaai.org/about-the-aaaai/statistics.aspx](http://www.aaaai.org/about-the-aaaai/statistics.aspx). Some of the most common allergenic foods include peanuts, milk, eggs, soy, wheat, and shellfish. An allergy occurs when a protein in food triggers an immune response, which results in the release of antibodies, histamine, and other defenders that attack foreign bodies. Possible symptoms include itchy skin, hives, abdominal pain, vomiting, diarrhea, and nausea. Symptoms usually develop within minutes to hours after consuming a food allergen. Children can outgrow a food allergy, especially allergies to wheat, milk, eggs, or soy.

Anaphylaxis is a life-threatening reaction that results in difficulty breathing, swelling in the mouth and throat, decreased blood pressure, shock, or even death. Milk, eggs, wheat, soybeans, fish, shellfish, peanuts, and tree nuts are the most likely to trigger this type of response. A dose of the drug epinephrine is often administered via a “pen” to treat a person who goes into anaphylactic shock. National Institutes of Health, US Department of Health and Human Services. “Food Allergy Quick Facts.” Accessed March 5, 2012. [http://www.niaid.nih.gov/topics/foodallergy/understanding/pages/quickfacts.aspx](http://www.niaid.nih.gov/topics/foodallergy/understanding/pages/quickfacts.aspx).

Some children experience a food intolerance, which does not involve an immune response. A food intolerance is marked by unpleasant symptoms that occur after consuming certain foods. Lactose intolerance, though rare in very young children, is one example. Children who suffer from this condition experience an adverse reaction to the lactose in milk products. It is a result of the small intestine’s inability to produce enough of the enzyme lactase, which is produced by the small intestine. Symptoms of lactose intolerance usually affect the GI tract and can include bloating, abdominal pain, gas, nausea, and diarrhea. An intolerance is best managed by making dietary changes and avoiding any foods that trigger the reaction. National Digestive Disease Information Clearinghouse, a service of National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health. “Lactose Intolerance.” NIH Publication No. 09–2751 (June 2009). Last updated April 23, 2012. [http://digestive.niddk.nih.gov/ddise...seintolerance/](http://digestive.niddk.nih.gov/ddise...seintolerance/).

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### The Threat of Lead Toxicity

There is a danger of lead toxicity, or lead poisoning, among school-aged children. Lead is found in plumbing in old homes, in lead-based paint, and occasionally in the soil. Contaminated food and water can increase exposure and result
in hazardous lead levels in the blood. Children under age six are especially vulnerable. They may consume items tainted with lead, such as chipped, lead-based paint. Another common exposure is lead dust in carpets, with the dust flaking off of paint on walls. When children play or roll around on carpets coated with lead, they are in jeopardy. Lead is indestructible, and once it has been ingested it is difficult for the human body to alter or remove it. It can quietly build up in the body for months, or even years, before the onset of symptoms. Lead toxicity can damage the brain and central nervous system, resulting in impaired thinking, reasoning, and perception.

Treatment for lead poisoning includes removing the child from the source of contamination and extracting lead from the body. Extraction may involve chelation therapy, which binds with lead so it can be excreted in urine. Another treatment protocol, EDTA therapy, involves administering a drug called ethylenediaminetetraacetic acid to remove lead from the bloodstream of patients with levels greater than 45 mcg/dL. Mayo Foundation for Medical Education and Research.


Fortunately, lead toxicity is highly preventable. It involves identifying potential hazards, such as lead paint and pipes, and removing them before children are exposed to them.

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**Key Takeaways**

The recommended intakes of macronutrients and micronutrients for children are higher relative to body size compared with nutrient needs during adulthood. Also, children’s daily energy needs vary depending on their level of physical activity and their gender. Girls ages four to eight require 1,200 to 1,800 calories, while boys ages four to eight need 1,200 to 2,000 calories. Some food- and nutrition-related problems that can affect school-aged children include malnutrition, food allergies, food intolerances, and lead toxicity.

**Discussion Starter**

1. Which nutritional issues should parents who raise their children as vegans consider? Examine the vegan lifestyle and its impact on childhood development. Visit the following websites for more information on veganism:

   - [http://www.vrg.org/nutshell/kids.htm](http://www.vrg.org/nutshell/kids.htm)
   - [http://kidshealth.org/parent/nutrition/vegan.html](http://kidshealth.org/parent/nutrition/vegan.html)