

Principles of NUTRITION

Chapter 12—Promoting Healthy Weight

12.2 Behavior Modification

The ABCs of Behavior Modification

In order to achieve a healthy weight, lifestyle changes are required. When it comes to daily habits, such as eating and exercise, change can be difficult. Even though this change is hard, it is not impossible. Changes toward a healthy lifestyle take place over time. There are strategies and theories that can help make behavior change successful. Successful behavior change is rarely as simple as starting or stopping something new. It requires understanding what leads to or motivates the behavior. One model that can assist in behavior change is called the **ABCs of Behavior Modification**. This model considers the cause and effect of a specific behavior. A is for **antecedent**, which is the action or habit to be changed. C is for **consequence**, which is the result of the action or behavior. B is for **behavior**, which is the action or habit to be changed. A is for **antecedent**, which is the action or habit to be changed. C is for **consequence**, which is the result of the action or behavior. B is for **behavior**, which is the action or habit to be changed.

Antecedent → Behavior → Consequence

Action that comes before the behavior The action or habit to be changed Result of the action or behavior

Figure 1: The ABCs of behavior modification¹⁴

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Effective Weight Loss

"You'll never change your life until you change something you do daily. The secret of your success is found in your daily routine."
— John C. Maxwell¹⁵

Achieving a healthy weight involves making changes regarding the mind, the body, and the stomach.¹⁶ The true test of an effective weight loss plan is whether a healthy weight change can be maintained over time.

Weight loss involves the brain, body, and appetites.

Successful weight loss requires realistic expectations. By setting small, achievable goals, individuals can develop a healthy lifestyle. Rather than focusing on weight, improved health should be the central goal of any weight loss plan.¹⁷ Next, an individual who desires weight loss should strive to live an active lifestyle. A physically active lifestyle can contribute to heart health, bone strength, and even cross management. Finally, making healthy food choices is essential for sustaining a healthy weight loss. The Dietary Guidelines for Americans 2015 recommends eating more vegetables, whole grains, low-fat dairy, and lean protein and consuming less saturated and trans fats, added sugars, and sodium.¹⁸

12.3 Treatment for Obesity

Medication, changing lifestyle habits, eating behavior, and increased physical activity may not be enough to help them lose weight long term.¹⁹ If this is the case, a doctor may prescribe medication or further treatment as part of a weight management program. These treatments are not recommended for everyone. A doctor is more likely to prescribe weight loss medication to individuals who are severely obese and have comorbidities.

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medications to lose weight with a BMI equal to or greater than 30 kg/m² or a BMI equal to or greater than 27 kg/m² with weight-related health problems, such as type 2 diabetes or high blood pressure.²⁰

Prescription weight loss medications work to treat obesity in different ways. One oral weight-loss medication, phentermine, stimulates activity in the hypothalamus resulting in suppressed appetite and decreased food intake.^{21,22} Common side effects may include dizziness, change of taste, insomnia, constipation, or dry mouth.²³ Another medication, Orlistat, also known as Xenical or Alli, acts to block dietary fat absorption.²⁴ Some common adverse effects of Orlistat include decreased absorption of fat-soluble vitamins and fat excretion in stool, especially with a high-fat diet.²⁵ Weight loss medications should be used in combination with lifestyle changes, such as a reduced calorie diet and increased exercise.²⁶ A major disadvantage of drug treatment to promote weight loss is that weight regain occurs when the medication is stopped.²⁷

There are also some dietary supplements that are marketed to promote weight loss. However, these supplements are often sold with unproven marketing claims of fat burning or appetite suppression. While these supplements may contribute to short-term changes in weight, they may also cause dangerous side effects and are not effective for long-term weight loss.²⁸ Guarana, also known as Brazilian guarana, is marketed as a weight loss supplement and is claimed to aid in weight loss. However, evidence shows that the caffeine content of guarana may cause side effects, such as increased heart rate and increased blood pressure. Guarana is also associated with abnormal heart rhythms, that are similar to side effects seen in banned supplements.²⁹ Guarana is often found in energy drinks.³⁰ Green tea

Green tea has several side effects and may not be effective in promoting weight loss.

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and green tea extract are sometimes used to promote weight loss, but there is no evidence to support that it contributes to weight loss or maintenance of weight loss.³¹ Because of the high caffeine content, green tea can cause poor sleep and headaches. In high concentrations, green tea has also been found to cause liver problems.³² For many supplements, such as guarana and green tea, research does not support the claim that they are effective in promoting weight loss.³³

When efforts for weight loss have been unsuccessful with diet and exercise, weight loss surgery may be beneficial for individuals with extreme obesity, defined as a BMI greater than or equal to 40 kg/m², or individuals with a BMI of 35 kg/m² with obesity-related health problems such as type 2 diabetes, heart disease, and sleep apnea.³⁴ Possible benefits of weight loss surgery include improvements of these obesity-related health problems. Weight loss surgery may allow some individuals greater physical function and improved quality of life.³⁵

Roux-Y Gastric bypass, more commonly known as **gastric bypass surgery**, involves permanently changing the pathway of food through the digestive system (see Figure 2). In this procedure, the top of the stomach is stapled to create a small pouch. Then, the small intestine is cut between the duodenum and jejunum and reattached to the small pouch. The bypassed section of the duodenum is reattached to the lower part of the jejunum to provide passage for the gastric juice, bile, and pancreatic secretions.³⁶

Roux-Y Gastric Bypass (RYGB)

Figure 2: Gastric bypass surgery permanently re-routes the pathway of food

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This smaller stomach helps people experience feelings of fullness, causing them to eat less. Gastric bypass surgery typically results in a 35% weight loss over 1 to 2 years and a 30% weight loss maintained over 10 years.³⁷ Common complications of weight loss surgery include bleeding, infection, leaking at the surgical site, diarrhea, blood clots, or nutrient deficiencies.³⁸

Weight loss surgery does not eliminate the need for lifestyle changes. Healthy habits are necessary for long-term success.³⁹ With the help of weight loss surgery, eating less and being more physically active may be easier. For long-term health improvements, individuals considering weight loss surgery should be ready to commit to healthy lifestyle habits for the rest of their life.⁴⁰

Potential Complications of Weight Loss Surgery^{41,42}

- Bleeding
- Infection
- Leaking at surgical site
- Diarrhea
- Blood clots
- Nutrient deficiencies

12.4 Promoting Healthy Weights during the Lifecycle

Weight Gain during Pregnancy

During pregnancy, a mother's body changes in many ways. One of the most notable and significant changes is weight gain. BMI can be used to determine body size. A woman's pre-pregnancy BMI can be used to determine a healthy amount of weight to gain during pregnancy (see Table 1). Poor weight gain, especially in the third trimester, could result not only in low birth weight but also infant mortality and intellectual disabilities. The mother may also deliver a preterm baby (born before 36 weeks gestation). Preterm babies are usually born small and are at risk for other concerns such as difficulty breathing, difficulty eating and difficulty maintaining their body temperature.

Table 1: Weight Gain Recommendations for Pregnancy⁴³

Pre-pregnancy BMI	Weight Gain Category	Recommended Weight Gain (lb.)
Below 18.5	Underweight	28–40
18.5–24.9	Normal	25–35
25.0–29.9	Overweight	15–25
Above 30.0	Obese	11–20

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Starting weight below or above the normal range can lead to different complications. Pregnant women with a pre-pregnancy BMI below twenty are at higher risk of a preterm delivery and an underweight infant. Pregnant women with a pre-pregnancy BMI above twenty have an increased risk of the need for a cesarean section during delivery. Therefore, it is optimal to have a BMI in the normal range prior to pregnancy.

Generally, women gain 2 to 5 pounds in the first trimester. After that, it is recommended to gain approximately one pound per week during the second and third trimesters. Some of the new weight is due to the growth of the fetus, while some is due to changes in the mother's body that support the pregnancy. Weight gain often breaks down in the following manner (see Figure 3):

WEIGHT GAIN DISTRIBUTION IN POUNDS

- Fetus 6 lb.
- Placenta 2 lb.
- Amniotic fluid 2 lb.
- Breast tissue 2 lb.
- Uterus 2 lb.
- Maternal blood 3 lb.
- Maternal fluids 4 lb.
- Maternal fat stores 8–12 lb.

Figure 3: Distribution of recommended weight gain during pregnancy⁴⁴

Women who are pregnant with more than one fetus are advised to gain even more weight to ensure the health of their infants and themselves.

The pace of weight gain is also important. If a woman puts on weight too slowly, her physician may recommend nutrition counseling because inadequate weight gain can increase the risk of delivering a baby early or having a baby that does not have sufficient stores. If the gain weight too quickly, especially in the third trimester, it may be the result of edema, or swelling due to excess fluid accumulation. Rapid weight gain may also result from increased caloric consumption.

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or a lack of exercise. A baby's birthweight can help assess how well the pregnancy went. An infant's weight can be categorized as **Small for Gestational Age (SGA)**, **Average for Gestational Age (AGA)**, or **Large for Gestational Age (LGA)**.

Weight below the 10th percentile

Weight between the 10th and 90th percentile

Weight above the 90th percentile

Table 2: Birthweight Categories⁴⁵

Assessing Growth in Infants

Healthy infants grow steadily but not always at an even pace. For example, during the first year of life, height increases by 50 percent, while weight triples. Physicians and other health professionals can use growth charts to track a baby's development process. Because infants cannot stand, the length is used instead of height to determine the rate of a child's growth. Other important developmental measurements include head circumference and weight. All of these must be tracked and compared against standard measurements for an infant's age. Nationally accepted growth charts are based on data collected by the National Center for Health Statistics.⁴⁶ These charts allow for tracking trends over time and comparing with other infants among percentiles within the United States. Growth charts may provide warnings that a child has a medical problem or is malnourished. Insufficient weight or height gain during infancy may indicate a condition known as failure to thrive (FTT), which is characterized by poor growth. FTT can happen at any age, but in infancy, it typically occurs after six months. Some causes include poverty, lack of enough food, feeding inappropriate foods, and excessive intake of fruit juice.

Measuring and tracking an infant's growth is one of the best ways to monitor if the child is receiving adequate nutrition. Common measurements during the first year of life include length, weight, age, weight-for-age, length-for-weight and head circumference-for-age. To best identify poor growth, it is best to plot these measurements on a growth chart. For infants, the charts that are also labeled to use are the growth charts for infants and toddlers. For children aged 2 to 5, the developed using infants that were exclusively breastfed for at least 4 months. The percentiles in the WHO growth charts better reflect the pattern set by following recommendations regarding breastfeeding. The Centers for Disease Control and Prevention developed tracking growth charts of infants that were not necessarily breastfed for the recommended amount of time. It is recommended to use the WHO growth charts until the age of 2 years.⁴⁷ Percentiles reflect how

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children grow compared to children of the same age and gender. For example, a 3-month-old baby girl plotted at the 30th percentile indicates that out of 100 3-month-old baby girls, 30 would be smaller and 70 would be larger. The goal is to have a child follow their growth curve or percentile. Without using growth charts, "checkpoints" can be monitored to do a less detailed assessment of weight and nutritional status. Normal growth would be indicated by the baby's weight doubling by about 5 months and tripling by one year of age.⁴⁸

Healthy Weights in Childhood

The percentage of children with obesity in the United States has more than tripled since the 1970s.⁴⁹ There are several contributing factors for the increase in obesity in children. Some factors that may contribute include:^{50–52}

- Genetics
- Metabolism—how your body changes food and oxygen into the energy it can use
- Eating and physical activity behaviors
- Environmental factors
- Social and individual psychology

There are recommendations regarding both food intake and physical activity to help promote healthy weights and lifestyles in children. It is very effective to teach children to eat healthily and be active by example. Incorporating activity into daily life is a good way to increase movement throughout the day to help build good habits. The diet and activity recommendations are summarized in Table 3.

Dietary Modifications

Physical Activity Recommendations

Table 3: Diet and activity recommendations to promote healthy weights in children⁵³

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Research on the topic of childhood obesity has revealed relationships with immediate effects on their health, not only physically but emotional and social health as well. Children with obesity are impacted in the following ways (see Table 4):

Physical Health	Emotional Health	Social Health
Asthma Sleep apnea Bone and joint pain Type 2 diabetes Risk factors for heart disease	Depression Low self-esteem	Healthy weight peers Social isolation

Table 4: Immediate effects of obesity on children's health⁵⁴

In addition to immediate effects, children with obesity also have higher risk factors for diseases as adults such as obesity, Type 2 diabetes, heart disease, metabolic syndrome and several types of cancer.

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13.1 Nutrition and Pregnancy

Infant nutrition

Human babies change significantly over time, and food is the fuel for those changes. People of all ages need the same basic nutrients—essential amino acids, carbohydrates, essential fatty acids, and twenty-eight vitamins and minerals—to sustain life and health. However, the amounts of nutrients needed differ throughout the human life cycle, the body constantly changes and goes through different periods known as stages. One stage that requires different nutrient needs is pregnancy.

For medical purposes, pregnancy is measured from the first day of a woman's last menstrual period until childbirth, and typically lasts about forty weeks. These forty weeks are then broken down into trimesters which are approximately 13 weeks each. Major changes begin to occur in the earliest days of pregnancy, often weeks before a woman even knows she is pregnant. During this period, adequate nutrition supports cell division, tissue differentiation, and organ development. At each week passes, new milestones are reached. Therefore, women who are trying to conceive should make proper dietary choices to ensure the delivery of a healthy baby. Factors to be considered also include their eating habits. A sedentary lifestyle and a diet low in fresh fruits and vegetables may affect male fertility. Men who drink too much alcohol may damage the quantity and quality of their sperm.⁵⁵ For both men and women, adequate healthy habits also boosts general well-being and makes it possible to meet the demands of parenting.

During pregnancy, a placenta is also developed in the uterus. The placenta plays a critical role in pregnancy in the nutrition of the fetus. Its role is to deliver nutrients and oxygen to the baby and remove waste products from the baby's blood.

Knowing that nutrition during pregnancy is so vital, The Church of Jesus Christ has released a statement to its Latter-day Saint Women which says, "It is important that a pregnant woman eat a healthy variety of foods. Eating properly has a great influence on the unborn baby. Eating well is important that all potential mothers need to prepare their bodies by carefully choosing

Healthy habits during pregnancy will help the health of the unborn child

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what they eat. When they do so, they will have a better chance of having good health and bearing healthy children. When a young woman makes a habit of eating a variety of healthful foods in sufficient amounts, her ability to give birth to healthy infants is improved. Because these established good eating habits will go on into marriage and pregnancy, she will continue eating the right foods and taste the same good habits of nutrition to her children.⁵⁶

Discomforts and Complications of Pregnancy

Pregnancy can lead to certain discomforts, from back strain to swollen ankles. Pregnant women are also likely to experience constipation because increased hormone levels can slow digestion and relax muscles in the bowels. Constipation and pressure from growth of the uterus can result in hemorrhoids, which are another common discomfort.⁵⁷ Getting mild to moderate exercise and drinking enough fluids can help prevent both conditions. Also, eating a high-fiber diet softens the stools and reduces the pressure on hemorrhoids.

Heartburn can occur during the early months of pregnancy due to an increase in the hormone progesterone, and during the later months due to the expanding size of the fetus, which limits stomach contraction. Avoiding chocolate, mint, and greasy foods, and remaining upright for an hour after meals can help prevent women avoid heartburn. In addition, it can be helpful to drink fluids between meals, instead of with food.

Other common complaints can include leg cramps and bloating. Regular exercise can help to alleviate these discomforts. A majority of pregnant women develop gastrointestinal issues, such as nausea and vomiting. Many also experience food craving and aversions. All of these can impact a pregnant woman's nutritional intake and it is important to protect against adverse effects.

Nausea and Vomiting

Nausea and vomiting are gastrointestinal issues that affect many pregnant women, typically in the first trimester. Nausea tends to occur more frequently than vomiting. These conditions are referred to as "morning sickness" because they often occur in the morning. However, not all women and vomiting can occur any day, although it is often worst in the first part of the day.

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Other common complaints can include leg cramps and bloating. Regular exercise can help to alleviate these discomforts. A majority of pregnant women develop gastrointestinal issues, such as nausea

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Often times, even if a pregnant woman consumes a healthy diet, there still is a need to take an iron supplement.

	Non-Pregnant Females	Pregnant Females
Vitamin A [mcg]	700	270
Vitamin B ₁ [mg]	1.3	1.5
Vitamin B ₁₂ [mcg]	2.4	2.6
Vitamin C [mg]	75	85
Vitamin E [mg]	15	15
Vitamin K [mg]	75	85
Calcium [mg]	1000	1000
Folate [mcg]	400	600
Iron [mg]	18	27
Magnesium [mg]	310	350
Niacin [mg]	14	18
Phosphorus [mg]	700	700
Potassium [mg]	3500	3500
Thiamine [mg]	1.1	1.4
Zinc [mg]	8	11

*Note: * RDA values for vitamins and minerals of non-pregnant and pregnant females¹³*

Risks include: increase during pregnancy from 400 micrograms to 400 micrograms per day to prevent neural tube defects. Neural tube defects are conditions associated with the development of the brain, spine, or spinal cord. These defects occur early in pregnancy, prior to day 28, usually before the woman even knows she is pregnant. The two most common neural tube defects are spina bifida and anencephaly.¹³ These conditions are very rarely from some parasites in the lower limbs in spina bifida or an undeveloped brain or skull (anencephaly). Babies born with anencephaly are usually either stillborn or die shortly after birth. Rats is also crucial for fetal development because it helps protect the extra blood a woman's body requires throughout pregnancy. Low folate intake is associated with premature and low-birth-weight infants and growth retardation.

For most micronutrients, recommended intakes are similar to those for non-pregnant women, although it is crucial for pregnant women to make sure to meet the RDAs to help with proper development. In addition, pregnant mothers should avoid exceeding any recommendations. Taking mega doses of supplements can lead to excessive intake of certain

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micronutrients, such as vitamin A and zinc, which may produce toxic effects that can also result in birth defects.

Teratogens are substances that can be harmful to the fetus if they are present during pregnancy.¹³ Examples of teratogens that may cause harm to the fetus include mercury, alcohol, prescription and illegal drugs and harmful levels of vitamins A. These substances may cause physical and mental abnormalities for the developing fetus. When ingested by a pregnant woman, alcohol readily passes through the placenta. Negative effects of alcohol intake during pregnancy may include abnormal mental development and growth of the fetus. Therefore, it is advised that women that are or may become pregnant do not drink alcohol.¹³

Physical Activity during Pregnancy

For most pregnant women, physical activity is important and is recommended in the 2008 Exercise Guidelines for Americans.¹⁴ Regular exercise of moderate intensity, about thirty minutes, five times a week, can help women feel better most days of the week, keeps the heart and lungs healthy, it also helps to improve sleep and boosts mood and energy levels. In addition, women who exercise during pregnancy report fewer discomforts and may have an easier time giving up excess weight after childbirth. Brisk walking, swimming, or an aerobic class geared toward expectant mothers are all great ways to get exercise during a pregnancy. Healthy women who already participate in vigorous activities, such as running, can continue doing so during pregnancy provided they discuss an exercise plan with their physicians.¹⁴

However, pregnant women should avoid activities that could cause injury, such as soccer, football, and other contact sports, or activities that could lead to falls, such as horseback riding and downhill skiing. It may be safer for pregnant women to participate in certain sports, such as tennis, that require no jump or change direction quickly. Soccer diving should also be avoided because it might result in the fetus developing decompression sickness. This potentially fatal condition results from a rapid decrease in pressure when a diver ascends too quickly.

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13.3 Lactation

After the birth of the baby, nutritional needs must be met to ensure that an infant not only survives, but thrives from infancy into childhood. Breastfeeding provides the baby a newborn needs for rapid growth and development. As a result, the World Health Organization (WHO) recommends that breastfeeding be done exclusively for the first six months of an infant's life.¹⁵ New mothers must also consider their own nutritional requirements to help their bodies recover from pregnancy. This is particularly true for women who breastfed their babies, which calls for an increased need in certain nutrients.

Lactation is the process that makes breastfeeding possible, and it is the synthesis and secretion of breast milk. Early in a woman's pregnancy, her mammary glands begin to prepare for milk production. Hormones play a major role in this, particularly during the second and third trimesters. At that point, levels of the hormone prolactin increase to stimulate the growth of the milk duct system, which initiates and maintains milk production. Levels of the hormone oxytocin also rise to promote the release of breast milk when the infant suckles, which is known as the milk ejection reflex, or letdown. However, levels of the hormone progesterone increase for women who are breastfeeding their babies. The protein RDA for women who are lactating is also an additional 25

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One of the first challenges nursing mothers face is learning the correct technique. It may take a little time for a new mother to help her baby properly latch on to her nipples. Improper latching can result in inadequate intake, which could slow growth and development. However, intense, hand-laid Certified Lactation Consultants (IBCLCs), trained OB nurses, and trained registered dietitians are qualified to help new mothers learn the proper technique. Education, the length of maternity leave, and laws to protect public breastfeeding, among other measures, can all help to facilitate breastfeeding for many lactating women and their newborns.

Contraindications to breastfeeding

Although there are numerous benefits to breastfeeding, in some cases there are also risks that must be considered. In the developed world, a new mother with HIV should not breastfeed, because the infection can be transmitted through breast milk. These women typically have access to bottle formula that is safe, and can be used as a replacement for breast milk. However, in developing regions where HIV infection rates are high and acceptable infant formula can be difficult to come by, many newborns would be deprived of the nutrients they need to develop and grow. Also, inappropriate or contaminated bottle formulas cause 1.3 million infant deaths each year. As a result, the WHO recommends that women infected with HIV in the developing world should nurse their infants while taking antiretroviral medications to lower the risk of transmission.¹⁶

Breastfeeding is also not recommended for women undergoing radiation or chemotherapy treatment for cancer. Additionally, if an infant is diagnosed with galactosemia, meaning an inability to process the simple sugar galactose, the child must be on a special diet, which excludes breast milk. This genetic disorder is a very rare condition, however, and only affects 1 in thirty to fifty thousand newborns.¹⁶ When breastfeeding is contraindicated for any reason, formula-enabled parents and caregivers to meet their newborn's nutritional needs.

13.4 Nutrition Recommendations for Infants

Diet and nutrition have a major impact on a child's development from infancy into the adolescent years. A healthy diet not only affects growth, but also immunity, intellectual capabilities, and emotional well-being. One of the most important factors in a child's diet is the amount of calories they receive an adequate amount of needed nutrients to provide a strong foundation for the rest of their lives.

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Nutritional Requirements

Requirements for macronutrients and micronutrients on a per kilogram basis are higher during infancy than at any other point in the human life cycle. These needs are affected by the rapid cell division that occurs during early infancy, which requires energy and protein along with the nutrients that are involved in DNA synthesis. During this period, children are entirely dependent on their parents or other caregivers to meet these needs. For almost all infants six months or younger, breast milk is the best source to fulfill nutritional requirements. An infant may require feedings eight to twelve times a day or more in the beginning. After six months, infants can gradually begin to consume solid foods to help meet nutrient needs.

Energy

Energy needs relative to size are much greater in an infant than in an adult. The RDA to meet energy needs changes as an infant matures and puts on more weight. For example, the equation for the first three months of life is $89 + \text{weight (kg)} \times 100 + 175$ kcal. Based on these equations, the estimated energy requirement for infants from zero to six months of age is 472 to 645 Calories per day for boys and 438 to 593 Calories per day for girls. For infants ages six to twelve months, the estimated requirement is 545 to 844 Calories per day for boys and 593 to 768 Calories per day for girls.¹⁷ However, as infants want to eat well also change over time due to growth spurts, which typically occur about two weeks and six weeks of age, and gain at about three months and six months of age.

Macronutrients

The dietary recommendations for infants are based on the nutritional content of human breast milk. Almost all of the carbohydrate in human milk is lactose, which infants digest and tolerate well. Between ages of six to twelve months, it is appropriate to start introducing other food sources of carbohydrates such as cereal and vegetables. However, infants do not need an early introduction to added sugars. Protein Adequate intake for infants ages two to six months is 1.2 g/kg/day and the Recommended Dietary Allowance for infants seven to twelve (12) months is 1.2 g/kg/day compared to the adult RDA of 0.8 g/kg/day.¹⁸

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Adult Macronutrient Distribution

Infant Macronutrient Distribution

*Note: * Comparison of adult and infant macronutrient distribution. Adults' needs are very different than that of an infant. An infant's diet is very energy dense to ensure adequate intake of calories in a smaller volume.*

Fat is the major source of calories for infants fed human breast milk. The energy density fat provides for the infant is important for the rapid growth and development that occur during infancy. The recommendation of fat is based on the average composition of breastmilk, which is approximately 50% of calories consumed in a day. Breast milk also contains the essential fatty acid, DHA, increasing evidence shows that infants fed breast milk with a higher content of DHA have better eye and brain development. For this reason, it is important for lactating mothers to consume adequate amounts of DHA.¹⁹

Fluids

Infants's needs for fluids are higher than adults because of their increased surface area for size and they also excrete more urine because their kidneys are not fully matured. However, infants that are exclusively breastfed do not require additional water. If water losses are increased due to diarrhea or vomiting, additional fluids may be needed.¹⁹

Micronutrients

Almost all of the nutrients that infants require can be met if they consume an adequate amount of breast milk. There are a few exceptions, though. Human milk is low in vitamin D, which is needed for calcium absorption and bone health, among other things. Therefore, breastfed children often need to take a vitamin D supplement in the form of drops. Infants at the highest risk of vitamin D deficiency are those with darker skin and no exposure to sunlight.

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grams of protein above non-pregnant/non-lactating needs, just as in the second and third trimesters of pregnancy.¹⁵

Benefits of breastfeeding

Breastfeeding has a number of benefits, both for the mother and for the child. Breast milk contains immunoglobulins, enzymes, infection factors, and white blood cells. As a result, breastfeeding boosts the baby's immune system and lowers the incidence of diarrhea, along with respiratory diseases, gastrointestinal problems, and ear infections. Breastfed babies are also less likely to develop asthma and allergies. Breastfeeding lowers the risk of sudden infant death syndrome. In addition, human milk encourages the growth of healthy bacteria in an infant's intestinal tract. All of these benefits remain in place after an infant has been weaned from breast milk. Studies also report other possible long-term effects. For example, breast milk may improve an infant's intelligence and protect against Type 1 Diabetes, Type 2 Diabetes, celiac disease, and obesity.²⁰

Breastfeeding has several other important benefits. It is easier for babies to digest breast milk than bottle formula, which contains proteins made from cow's milk that is harder for the infant's immature digestive tract to handle.²¹ For that reason, it is recommended that cow's milk be avoided during the first year of life. Breastfeeding is more sustainable and results in less plastic waste and other trash. Breastfeeding can also save families money because it does not incur the same cost as purchasing formula. Another benefit is that breast milk is always ready; it does not have to be mixed, heated, or prepared. Also, breast milk is sterile and is always at the right temperature.

In addition, the skin-to-skin contact of breastfeeding promotes a close bond between mother and baby, which is an important emotional and psychological benefit. The practice also provides health benefits for the mother. Breastfeeding helps a woman's bones stay strong, which protects against fractures later in life. Studies have also shown that breastfeeding reduces the risk of breast and ovarian cancers.²⁴

Barriers to breastfeeding

Although breast milk is ideal for almost all infants, there are some challenges that nursing mothers may feel when starting and continuing to breastfeed their infants. These obstacles include painful engorgement or fullness in the breasts, sore and tender nipples, lack of comfort or confidence in public, and lack of accommodation to breastfeeding or express milk in the workplace.

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Solid baby foods can be bought commercially or prepared from regular food using a food processor, blender, food mill, or grinder at home. Usually, an infant cereal can be offered from a spoon between four to six months. By nine months to a year, infants are able to chew soft foods and can eat solids that are well-chopped or mashed.

Infants who are fed solid food too soon are susceptible to developing food allergies. Therefore, as parents and caregivers introduce new foods, they should feed their child only one new food at a time (starting with rice cereal, followed by fruits or vegetables), to help identify allergic responses or food intolerances. An iron supplement or iron-fortified cereal is also recommended at this time.

Feeding problems in infancy

Parents and caregivers should be mindful of certain diet-related problems that may arise during infancy. Certain foods are choking hazards, including foods with skins or foods that are very small, such as grapes. Other examples of potential choking hazards include raw carrots and apples, raisins, and hard candies. Parents should also avoid adding salt or seasoning to an infant's food. Heating an infant's food before the risk of accidental injury or burns, which may occur if the food is heated unevenly or excessively. Keep in mind that an infant cannot communicate that the food is too hot. Also, parents and caregivers should never leave a baby alone at bedtime, because an infant can accidentally choke on pieces of food that are too big or have not been adequately chewed.

Honey has been identified as a source of a specific spore which is called Clostridium botulinum. The spores which can produce a poisonous toxin in a baby's immature intestine, which can cause infantile botulism. Feeding the baby to become very weak and sick. For this reason, it is recommended to not include honey to an infant before age one or older. However, honey as an ingredient in food, such as in cereal, is safe for all ages because it has been adequately heat treated. It is important to note that botulism exists in the environment and has been

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found on fresh fruits and vegetables. This is a good reminder that using good food safety practices such as washing fruits and vegetables is also important.²⁶

Assessing Growth

Healthy infants grow steadily, but not always at an even pace. For example, during the first year of life, height increases by 50 percent, while weight triples. Physicians and other health professionals can use growth charts to track a baby's development process. Because infants cannot stand, length is used instead of height to determine the rate of a child's growth. Other important developmental measurements include head circumference and weight. If a child's weight is not tracked and compared against standard measurements for an infant's age, Nationally-accepted growth charts are based on data collected by the National Center for Health Statistics.²⁷ These charts allow for tracking trends over time and comparing with other infants among percentiles within the United States. Growth charts may provide warnings that a child has a medical problem or is malnourished. Insufficient weight or height gain during infancy may indicate a condition known as failure-to-thrive (FTT), which is characterized by poor growth. FTT can happen at any age, but in infancy, it typically occurs after six months. Some causes include poverty, lack of food found, feeding inappropriate foods, and excessive intake of fruit juice. Measuring and tracking an infant's weight is one of the best ways to monitor if the child is receiving adequate nutrition. Common measurements during the first year of life are length for age, weight for age, length-for-weight and head circumference for age. To best identify proper growth, it is best to plot these measurements on a growth chart. For infants, the charts that are recommended to use are the World Health Organization (WHO) growth charts. These charts were developed using infants that were exclusively breastfed for at least 4 months. The percentiles in the WHO growth charts better reflect the pattern set by following recommendations regarding breastfeeding. The Centers for Disease Control (CDC) charts were developed tracking growth of infants that were not necessarily breastfed for the recommended amount of time. It is recommended to use the WHO growth charts until the age of two years. Percentiles reflect how children grow compared to children with the same age and gender. For example, a 3-month-old baby girl plotted at the 30th percentile indicates that out of 100 3-month-old baby girls, 30 would be smaller and 70 would be larger. The same rule applies to boys and children of other growth curve percentile. Without using growth charts, two "checkpoints" can be monitored to do a less detailed assessment of weight and nutritional status. Normal growth would be indicated by the weight percentile doubling by about 5 months and tripling by one year of age.²⁸

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13.4 Nutrition Recommendations for Young Children

By the age of two, children have advanced from infancy and are on their way to becoming school-age children. Their physical growth and motor development slows compared to the progress they made as infants. However, toddlers experience enormous intellectual, emotional, and social changes. Of course, food and nutrition continue to play an important role in a child's development. During this stage, the diet completely shifts from breastfeeding or bottle-feeding to solid foods along with healthy juices and milk products. Parents of toddlers also need to be mindful of certain nutrition-related issues that may occur during this stage of the human life cycle.

During this phase of human development, children are mobile and grow more rapidly than infants, but are much more active. The toddler years port interesting challenges for parents or other caregivers as children learn how to go on their own and begin to develop personal preferences. However, with the proper diet and guidance, toddlers can continue to grow and develop at a healthy rate.

Energy

The energy requirements for children from ages two to three are about 1,000 to 1,400 Calories a day. In general, a toddler needs to consume about 40 Calories for every inch of height. For example, a young child who measures 32 inches should take in an average of 1,300 Calories a day. However, the recommended calorie intake varies with each child's level of activity. Toddlers require small, frequent, nutritious snacks and meals to satisfy energy requirements. The food of a toddler needs from each food group depends on daily caloric needs. The following Figure (13) describes how a 1,000 Calorie meal plan could be arranged to provide the needs for a child of this age.²⁹

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Meal and Snack Pattern A

These portions allow one way to 1,000 calorie Daily Food Plan can be divided into meals and snacks for a preschooler.

Notes for using the Meal and Snack Sides:

Breakfast	Breakfast Ideas	Afternoon Snack
Cereal and milk Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Scrambled eggs Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Apple slices Toasted bread and jam Toasted bread and butter Toasted bread and fruit
Snack	Morning Snack	Afternoon Snack
Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit
Lunch	Lunch	Afternoon Snack
Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit
Afternoon Snack	Afternoon Snack	Afternoon Snack
Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit
Dinner	Dinner	Dinner
Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit	Toasted bread and jam Toasted bread and butter Toasted bread and fruit

Note your child's diet is not the only factor in their health.

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Macronutrients

For carbohydrate intake, the Acceptable Macronutrient Distribution Range (AMDR) is 45 to 65 percent of daily calories (113 to 167 grams of carbohydrate per 1,000 Calories). Toddlers' needs increase to support their body and brain development. Brightly colored, unrefined carbohydrates, such as peas, orange slices, tomatoes, and bananas are not only nutritious, they also make a good snack. The AMDR for protein is 5 to 20 percent of daily calories (13 to 50 grams of protein per 1,000 Calories). The AMDR for fat for toddlers is 30 to 40 percent of daily calories (33 to 44 grams of fat per 1,000 Calories). Essential fatty acids are vital for the development of the eyes, along with nerve and other types of tissue.³⁰

Micronutrients

As a child grows bigger, the demands for micronutrients increase. These needs for vitamins and minerals can be met with a balanced diet, with a few exceptions. The RDA for toddlers is 15 micrograms of vitamin D per day. Vitamin D fortified milk can help to meet this need. However, toddlers who do not get enough of this micronutrient may be added to take a supplement. Along with Vitamin D, calcium plays an important role in the development of healthy bones and to help children achieve their optimal peak bone mass.³¹ Pediatricians may also prescribe a fluoride supplement for toddlers who live in areas with fluoride-poor water.

Iron deficiency is also a major concern for children between the ages of two and three. An infant who switches to solid foods, but does not eat enough iron-rich foods, can develop iron deficiency anemia. This condition occurs when an iron-depleted body cannot produce enough hemoglobin, a protein in red blood cells that transports oxygen throughout the body. The inadequate supply of hemoglobin for new blood cells results in anemia. Iron deficiency anemia causes a number of symptoms including weakness, pale skin, shortness of breath, and irritability. It can also result in intellectual, behavioral, or motor problems. In infants and toddlers, iron deficiency anemia can occur as young children are weaned from iron-rich foods, such as breast milk and iron-fortified formula. They begin to eat solid foods that may not provide enough of this nutrient. As a result, their iron stores become depleted at a time when this nutrient is so important for brain growth and development.³²

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There are steps that parents and caregivers can take to prevent iron deficiency anemia, such as adding more iron-rich foods to a child's diet, including lean meats, fish, poultry, eggs, legumes, and iron-enriched whole grain breads and cereals. A toddler's diet should provide 7 to 10 milligrams of iron daily. Although milk is critical for the bone-building calcium that it provides, milk intake should not exceed the recommendation of 24 ounces a day to avoid displacing foods rich with iron. Children may also be given a daily supplement, using infant iron drops with iron or ferrous sulfate drops if advised by a doctor. Consuming vitamin C, such as orange juice, can also help to improve iron absorption.³³

Toddler Diarrhea

A variety of conditions or circumstances may cause a toddler diarrhea. Possible causes include bacterial or viral infections, food allergies, or lactose intolerance, among other medical conditions. Excessive fruit juice consumption (more than one 4-ounce cup per day) can also lead to diarrhea.³⁴ Diarrhea presents a special concern in young children because their small size makes them more vulnerable to dehydration. Parents should contact a pediatrician if a toddler has had diarrhea for more than twenty-four hours. If a child is also vomiting, or if they exhibit signs of dehydration, such as a dry mouth or tongue, or sunken eyes, cheeks, or abdomen. Preventing or treating dehydration includes the replacement of lost fluids and electrolytes (sodium and potassium). Oral rehydration therapy, or giving special fluids by mouth, is the most effective measure. Figure 4 describes the recommendations from the American Academy of Pediatrics for pediatric care for children of all ages.

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AMERICAN ACADEMY OF PEDIATRICS

DAILY JUICE RECOMMENDATIONS

Age: 1 to 3 years
Recommendation: No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice.

Age: 4 to 6 years
Recommendation: No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice.

Age: 7 to 10 years
Recommendation: No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice.

Age: 11 to 13 years
Recommendation: No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice.

Age: 14 to 18 years
Recommendation: No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice. No more than 4 to 6 ounces per day (120 to 180 mL) of juice.

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exacerbating the problem, and discussing the issue with a pediatrician. Also, children should not be forced to eat foods that they do not want. It is important to remember that food jags do not have a long-term effect on a toddler's health, and are usually temporary situations that will resolve themselves.³⁵

Dental Caries

Early childhood caries remains a potential problem during the toddler years. The risk of early childhood caries continues to persist because to consume more food with a high sugar content. According to the National Health and Nutrition Examination Survey, children between ages of two and five consume about 200 Calories of added sugar per day.³⁶ Therefore, parents with toddlers should avoid processed foods, such as snacks from vending machines, and sugary beverages, such as soda. Parents also need to instruct a child on brushing their teeth at this time to help a toddler develop healthy habits and avoid tooth decay.

Choking Hazards

Certain foods are difficult for toddlers to consume and pose a high risk of choking. Big chunks of food should not be given to children under the age of four. Also, globs of peanut butter can stick to a younger child's palate and choke them. Popcorn and nuts should be avoided as well, because toddlers are not able to grind food and reduce it to a consistency that is safer for swallowing. Certain raw vegetables, such as baby carrots, whole cherry tomatoes, green beans, and celery are also choking hazards. However, there is no reason that a toddler cannot enjoy well-cut vegetables cut into bite-size pieces.

Developing Healthy Habits

During the toddler years, parents may face a number of problems related to food and nutrition. Possible obstacles include difficulty helping a young child overcome a fear of new foods, or lights over messy habits at the dinner table. It may take a child who is exposed to a new food 10 to 15 times before it is accepted.³⁷ Given in the face of problems and confrontations, parents and other caregivers must stay patient as their preschooler has nutritious choices at every meal. For example, even if a child stubbornly resists eating vegetables, parents should continue to provide them. Before long, the child may change their mind and develop a taste for foods they at first abhorred. It is important to remember this is the time to establish or reinforce healthy habits.

Eating habits develop early in life. They are typically formed within the first few years and it is believed that they persist for years, if not for life. So it is important for parents and other caregivers to help children establish healthy habits and avoid problematic ones. Children begin expressing their preferences at an early age. Parents should find a balance between providing

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