

Oregon WIC Training

**Infant Feeding and  
Nutrition Module**



**Staff Training**



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## Infant Feeding and Nutrition Module

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## About the Infant Feeding and Nutrition Module

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### Introduction

The purpose of this module is to provide WIC staff with information about feeding infants in order to assist WIC participants with factual, practical and up-to-date information about infant nutrition. After completing this module, staff will have the knowledge base they need on infant feeding to better assist WIC participants.

The Infant Feeding and Nutrition Module contains information on:

- nutritional needs of infants,
- starting solids,
- introducing a cup,
- other considerations for feeding infants.

This module will not review infant formula basics including mixing, storing and warming infant formula. These topics are covered in the *Infant Formula Module*.

### Acknowledgement

This module was repurposed with permission from the Nutrition Services Section Nutrition Education/Clinic Services Unit Texas Department of State Health Services.

### How to Use the Infant Feeding and Nutrition Module

This module contains two parts. As you read through each part, the following icon will prompt you to complete the activities.



#### **Activity Icon**

When you see this icon, stop where you are and complete the activity described.

The posttest for this module can be found at the end of the module.

Terms that appear in bold type in the text are defined in the glossary in the back of the module. There is a single Reference List in the back of the module that contains all the references cited throughout the text.







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## Part 1: Birth to Six Months

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During the first year of life, infants reach many developmental milestones. Growth during the first year of life is greater than at any other time. An infant's birth weight will usually double by 6 months of age and triple by their first birthday. Good nutrition is vital for supporting proper growth and development during that first year.

The two sources for providing nutrition to infants are breastmilk or iron-fortified infant formula. Breastfeeding is the biological norm for infant nutrition and the ideal method for feeding infants. Both breastmilk and iron-fortified infant formula provide calories, protein, carbohydrates, fat, water, vitamins and minerals, however breastmilk also provides nutrients, enzymes, growth factors, antibodies and hormones not found in formula.

During the first 6 months of life, the sole source of nutrition should be breastmilk or iron-fortified infant formula only. During the second 6 months of life, breastmilk or iron-fortified infant formula continues to be the primary source of nutrition with the introduction of complimentary foods.

Part one of this module will cover general nutrition standards and feeding guidelines for younger infants, birth to six months of age. Part two of this module will review feeding guidelines specific for ages six months to one year of age. For more information on breastfeeding, refer to the *Level 1 Online Breastfeeding Course*.

## **Nutrition for Growth and Development**

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This section will review the physiological changes infants experience during their first year of life. The parent-child feeding relationship is an important component of infant nutrition and will also be discussed. Finally, the nutrient needs required for proper growth and development will be reviewed. It is important to remember that the nutritional needs of infants vary and should be adjusted to meet their individual needs.

### **Objectives**

After reading this section of the module, you'll be able to:

- Describe the physiological changes of infants.
- Describe a positive parent-child feeding relationship.
- Identify key nutrients needed to support infant growth and development.
- Identify vitamins and minerals needed to support infant growth and development.

### **Physiological Changes**



An infant's body goes through many changes during the first year of life. Newborns for example, have lower levels of stomach acid and digestive enzymes compared to older infants. Even though younger infants are able to digest breastmilk and infant formula fairly easily, they are not ready for the proteins, fats and carbohydrates in solid foods. Generally, when an infant is about 4 to 6 months of age their gastrointestinal tract has matured enough to allow the digestion and absorption of nutrients from solid foods.

In addition, it takes time for the infant's intestinal tract to develop defenses that help protect the infant from allergic reactions to a food. Negative food reactions are discussed on 33.

A newborn's kidneys are immature which means they are not able to fully excrete the waste products from cow's milk and other foods high in protein. Because of all the reasons mentioned above, it is important that for the first 4 to 6 months of life, the only food an infant receives is breastmilk or infant formula.

## The Parent-Child Feeding Relationship

An important aspect of infant nutrition is the parent-child feeding relationship. The parent-child feeding relationship involves all types of communication, both verbal and non-verbal. This feeding relationship begins almost immediately and helps shape the child's eating behaviors for life, so it is important to develop a positive relationship from the beginning.

A positive feeding relationship involves both the parent and the infant. Instead of creating a strict feeding schedule, parents should watch, listen, and react to the infant's hunger and fullness cues. Hunger and fullness cues are discussed on page 11. In a positive relationship, the parents provide nutritious foods that match the infant's feeding skills. In addition, the parents feed the baby in a safe, dependable setting, helping the infant to explore the feeding environment and adjust his intake based on his own appetite. Over time, a positive feeding relationship helps the child to form healthy ideas and attitudes about food, eating, and family interactions.

## Nutrient Needs

**Calories** – Calories are “food energy.” Calories come from food sources and provide energy infants need for activity, growth, and normal development. Babies need more calories per pound of body weight compared to adults because they grow so quickly. The best way to determine whether an infant is consuming enough calories in a day is to monitor the infant's rate of growth over time using the appropriate growth chart. It is important to recognize that the rate of growth in healthy infants may differ between breastfed and formula-fed infants.

Generally speaking, most healthy infants are able to adjust their own intake to get the right amount of calories to meet their energy needs. Caregivers will need to learn to recognize their infants “feeding-cues” (discussed in *Table 1.1. Sequence of Development and Feeding Skills in Healthy, Full-Term Infants*). Infants will grow appropriately when they are allowed to follow their own eating schedule (i.e., eating when they are hungry and stopping when they are full). Ignoring feeding cues may lead to inappropriate eating habits such as over- or under-feeding.

**Protein** – Infants need protein to build, maintain, and repair new tissue, to help with body processes and make enzymes. Proteins can be a source for energy when the diet is lacking in sufficient calories to meet energy needs.



During the first six months, breastmilk or iron- fortified formulas provide an infant's protein. After starting solid foods, a baby also gets protein from foods like meats, beans, grain products, or cheeses.

**Carbohydrates** – Carbohydrates are the main source of energy for an infant's growth and body functions. The main source of carbohydrates during the first six months of an infant's life is lactose. Lactose is the main carbohydrate in human milk and standard cow's milk formulas. Older infants also get other carbohydrates from fruits, vegetables, cereals, breads, and other grain products.

**Lipids** – Lipids are fats, oils, and fat-like substances such as cholesterol. Lipids supply a major source of energy to the growing infant. Infants require greater amounts of fat than adults. Fat should supply between 40 and 50 percent of an infant's energy needs (compared to only 30 percent of an adult's energy needs). Breastmilk and infant formula provide about 50 percent of their calories from lipids.

Essential fatty acids are types of fat that cannot be made by the body and must be provided in the diet, making them "essential". They are used in brain and eye development, help fight infection and disease, and facilitate healthy skin and hair. Fats also function to provide insulation to prevent body heat loss, pad and protect organs, and facilitate the absorption of fat-soluble vitamins A, D, E, and K. Therefore, parents should not limit or restrict fat or cholesterol in the diet of infants.

**Water** – Water helps regulate body temperature for cell metabolism and helps the kidneys excrete waste products. Infants receive water from breastmilk, properly diluted infant formula, foods and plain water. Parents should check with their healthcare provider for the appropriate amount of water to provide. The specifics of water and fluid needs for infants are discussed on page 19.

**Vitamins and minerals** – Infants, like adults, need all the essential vitamins and minerals in order to maintain normal body functions and to prevent deficiency diseases like anemia, scurvy and rickets. Vitamin D, iron, zinc and fluoride are especially important for infants. However, caregivers should not supplement their infants' diets with vitamins or minerals without first consulting with their healthcare provider.



**Vitamin D** – Helps to absorb calcium and phosphorus, develops strong bones, and prevents rickets, a disease that makes the bones soft and weak. The American Academy of Pediatrics (AAP) recommends that all infants get a minimum of 10 µg (400 IU) of vitamin D per day, beginning within the first days of life. The skin produces vitamin D with adequate and safe exposure to the sun. The major food sources of vitamin D for infants include infant formulas and breastmilk. It is important to note that breastmilk only has a limited amount of vitamin D. The AAP recommends a vitamin D supplement for all breastfed infants and all formula fed infants who consume less than 32 ounces of formula per day. (AAP, 2016).

**Iron** – Infants need iron for proper growth, to form healthy blood cells, and to prevent iron-deficiency anemia. Healthy, full-term infants are born with enough iron stores to last for the first four months of life. Some infants may require additional supplementation.

Food sources for iron include iron-fortified infant formulas, iron-fortified infant cereals, meat, legumes, some fruits and vegetables, iron-fortified breads and other grain products. Cow, goat, or soy milks should not be given to infants because they are low in iron, are poorly absorbed and can interfere with iron absorption. As a result, this may lead to iron deficiency anemia.

The iron needs for fully formula-fed infants can be met from iron-fortified infant formula and with the introduction of iron-containing complementary foods after 4 to 6 months of age. Breastmilk contains less iron than iron-fortified formula although it is better absorbed. Premature infants are born with lower iron stores and will require additional iron beyond that of what breastmilk or iron-fortified infant formula can provide.

For breastfed infants less than 12 months of age, only iron-fortified infant formula should be used for weaning or supplementing breastmilk. Parents should be cautioned that iron supplementation should only be done under a healthcare provider's recommendations (AAP, 2010).

**Zinc** – A key nutrient used for growth, protein formation, blood formation, and to strengthen the immune system. Sources of zinc for younger infants include breastmilk and infant formula. For older infants, food sources such as meats, cheeses, yogurts, legumes, and fortified cereals are good sources of zinc. Breastmilk is a good source of zinc in the first 6 months, but does not provide adequate amounts for the older infant.





**Fluoride** – A mineral that helps to strengthen teeth as they are forming and makes them more resistant to tooth decay (dental caries). In fact, fluoride can reduce tooth decay by as much as fifty percent (AAPD, 2011). The main source of fluoride for infants is fluoridated water and infant formulas prepared with fluoridated water. In Oregon, many communities do not have access to fluoridated water.

The AAP, American Academy of Pediatric Dentistry (AAPD), and Centers for Disease Control (CDC) recommend no fluoride supplementation for infants less than 6 months of age. Fluoride intake in the first six months has no affect in preventing the development of dental caries. Infants older than 6 months may require supplementation if the available water supply is not sufficient in fluoride. A pediatric dentist can help parents determine if their infant will require fluoride supplementation. Additional details on fluoride are discussed on page 67.

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## Feeding the Newborn

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Most parents quickly become experts at holding, changing, bathing, and comforting their infants. However, when it comes to feeding their babies, parents often have a lot of questions.

This section of the module discusses newborn reflexes, feeding on cue, feeding patterns, weight gain, growth spurts, and fluid needs of young infants.

### Objectives

After reading this section of the module, you'll be able to:

- Identify and describe three newborn feeding reflexes.
- Identify and describe three hunger and satiety cues.
- Describe methods that can be used to prepare a sleepy infant for a feeding.
- Describe how to determine if an infant is receiving adequate nutrition and hydration.



### Newborn Feeding Reflexes

A baby is born with various reflexes that naturally help the infant learn to feed from the breast. Infants with developmental disabilities may retain these reflexes longer than normally expected or the reflexes may be stronger or weaker than normal.

**Rooting reflex** – When an infant's oral area (corners of the mouth, upper and lower lip, cheek, and chin) is touched by an object, they react. The infant turns in the direction of the object and opens his or her mouth. This reflex allows the infant to locate the source of food (i.e. seek out and grasp a nipple). This reflex is seen from birth until about 4 months.

**Suck/swallow reflex** – When an infant's lips and mouth area are touched, the mouth opens and suckling or sucking movements begin. As liquid moves into the mouth, the tongue immediately moves it to the back of the mouth for swallowing. This reflex facilitates feeding from the breast or bottle but not from a spoon or cup. This reflex is seen from birth until about 4 months.

**Tongue-thrust reflex** – When the lips are touched, the infant's tongue extends out of the mouth. This reflex allows for feeding from the breast or bottle but not from a spoon or cup. This reflex is seen from birth until about 4 to 6 months.

**Gag reflex** – When any object, such as a spoon or a piece of solid food, is placed in the back of the mouth; the infant gags and the object is propelled forward on the tongue. This reflex helps to protect an infant from swallowing inappropriate food or objects that could cause choking. This reflex is one reason for delaying the introduction of complementary foods until 4 to 6 months of age. This reflex diminishes by 4 months but is retained to some extent in adults.

Table 1. Sequence of Development and Feeding Skills in Healthy, Full-Term Infants, reviews the approximate age ranges for when feeding skills are developed in the healthy full-term infant.

### Infant Hunger and Satiety Cues

“How often should I feed my baby?”

“How much should I feed my baby?”

“How do I know if my baby is getting *enough* to eat?”

These are common questions that parents may have. There are general guidelines to help answer these questions, but the truth is, babies are usually the best judges of when to eat and how much to eat. That means parents should avoid strict feeding schedules. A much better approach is to feed an infant when he shows signs that he is hungry and stop when he shows signs that he is full (satiety). This is called “feeding on cue” (previously known as “feeding on demand”).



Feeding on cue helps the baby connect feelings of hunger and fullness with the beginning and end of a feeding, and helps the baby learn to eat based on his appetite.

Newborns need frequent feedings of breastmilk or formula during the day and night, especially for the first few months. This is because their stomachs are small and can only hold a small amount at any one feeding. Most newborns will feed 8 to 12 times a day, about every 1½ to 3 hours. It can be hard to predict when and how often a baby wants to eat, so the key is to watch for and respond to an infant’s hunger cues.

It’s also important to recognize when a baby is full. Trying to force a baby to take extra formula or breastmilk can lead to a negative feeding relationship. By ending a feeding when the baby shows signs of fullness, a parent reinforces the infant’s natural ability to stop eating when he’s satisfied.



*Table 1.1 Sequence of Development and Feeding Skills in Healthy, Full-Term Infants*

Infants Approximate Age	Mouth Patterns	Hand and Body Skills	Feeding Skills or Abilities
Birth through 5 months	<ul style="list-style-type: none"> <li>• Suck/swallow reflex</li> <li>• Tongue thrust reflex</li> <li>• Rooting reflex</li> <li>• Gag reflex</li> </ul>	<ul style="list-style-type: none"> <li>• Poor Control of head, neck and trunk</li> <li>• Needs head support</li> <li>• Brings hands to mouth around 3 months</li> </ul>	<ul style="list-style-type: none"> <li>• Swallows liquids but pushes most solid objects from the mouth</li> <li>• Coordinates suck- swallow-breathe while breast or bottle feeding</li> <li>• Moves tongue forward and back to suck</li> </ul>
4 months through 6 months	<ul style="list-style-type: none"> <li>• Up-and-down munching movement</li> <li>• Transfers food from front to back of tongue to swallow</li> <li>• Draws in upper or lower lip as spoon is removed from mouth</li> <li>• Tongue thrust and rooting reflexes begin to disappear</li> <li>• Gag reflex diminishes</li> <li>• Opens mouth when sees spoon approaching</li> </ul>	<ul style="list-style-type: none"> <li>• Sits with support</li> <li>• Good head control</li> <li>• Uses whole hand to grasp objects (palmer grasp)</li> <li>• Recognizes spoon and hold mouth open as spoon approaches</li> </ul>	<ul style="list-style-type: none"> <li>• Takes in a spoonful of pureed or strained food and swallows without choking</li> <li>• Drinks small amounts from cup when held by another person, with spilling</li> </ul>
5 months through 9 months	<ul style="list-style-type: none"> <li>• Begins to control the position of food in the mouth</li> <li>• Up-and-down munching movement</li> <li>• Positions food between jaws for chewing</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to sit alone unsupported</li> <li>• Follows food with eyes</li> <li>• Transfers foods from one hand to another</li> <li>• Tries to grasp foods with all fingers and pull them into the palm</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to eat mashed foods</li> <li>• Eats from a spoon easily</li> <li>• Drinks from a cup with some spilling</li> <li>• Begins to feed self with hands</li> </ul>
8 months through 11 months	<ul style="list-style-type: none"> <li>• Moves food from side to side in mouth</li> <li>• Begins to use jaw and tongue to mash food</li> <li>• Begins to curve lips around rim of cup</li> <li>• Begins to chew in rotary pattern (diagonal movement of the jaw as food is moved to the side or center of the mouth)</li> </ul>	<ul style="list-style-type: none"> <li>• Sits alone easily</li> <li>• Transfers objects from hand to mouth</li> <li>• Begins to use thumb and index finger to pick up objects (pincer grasp)</li> <li>• Self-feeds finger foods</li> <li>• Plays with spoon at mealtimes, but does not spoon-feed yet</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to eat ground or finely chopped food and small pieces of soft food</li> <li>• Begins to experiment with spoon, but prefers to feed self with hands</li> <li>• Drinks from a cup with less spilling</li> </ul>
10 months through 12 months	<ul style="list-style-type: none"> <li>• Rotary chewing (diagonal movement of the jaw as food is moved to the side or center of the mouth)</li> </ul>	<ul style="list-style-type: none"> <li>• Feeds self easily with fingers</li> <li>• Begins to put spoon in mouth</li> <li>• Dips spoon in food rather than scooping</li> <li>• Demands to spoon-feed self</li> <li>• Begins to hold cup with two hands</li> <li>• Drinks from a straw</li> <li>• Good eye-hand-mouth coordination</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to eat chopped food and small pieces of soft, cooked table food</li> <li>• Begins spoon feeding self with help</li> <li>• Bites through a variety of textures</li> </ul>

Adapted from Infant Nutrition and Feeding – A Guide for Use in the WIC and CSF Programs. United States Department of Agriculture, Food and Nutrition Service, March 2009. FNS-288.

\*Developmental stages may vary with individual infants.

*Table 1.2 Infant Hunger and Satiety Cues*

Infant's Approximate Age	Hunger Cues	Satiety (Fullness) Cues
Birth through 5 months	<ul style="list-style-type: none"> <li>• Wakes and tosses</li> <li>• Sucks on fist</li> <li>• Cries or fusses</li> <li>• Opens mouth while feeding to indicate wanting more</li> </ul>	<ul style="list-style-type: none"> <li>• Seals lips together</li> <li>• Turns head away</li> <li>• Decreases or stops sucking</li> <li>• Spits out the nipple or falls asleep when full</li> </ul>
4 months through 6 months	<ul style="list-style-type: none"> <li>• Cries or fusses</li> <li>• Smiles, gazes at caregiver, or coos during feeding to indicate wanting more</li> <li>• Moves head toward spoon or tries to swipe food towards mouth</li> </ul>	<ul style="list-style-type: none"> <li>• Decreases rate of sucking or stops sucking when full</li> <li>• Spits out the nipple</li> <li>• Turns head away</li> <li>• May be distracted or pays attention to surroundings more</li> </ul>
5 months through 9 months	<ul style="list-style-type: none"> <li>• Reaches for spoon or food</li> <li>• Points to food</li> </ul>	<ul style="list-style-type: none"> <li>• Eating slows down</li> <li>• Pushes food away</li> </ul>
8 months through 11 months	<ul style="list-style-type: none"> <li>• Reaches for food</li> <li>• Points to food</li> <li>• Gets excited when food is presented</li> </ul>	<ul style="list-style-type: none"> <li>• Eating slows down</li> <li>• Clenches mouth shut or pushes food away</li> </ul>
10 months through 12 months	<ul style="list-style-type: none"> <li>• Expresses desire for specific food with words or sounds</li> </ul>	<ul style="list-style-type: none"> <li>• Expresses desire for specific food with words or sounds</li> <li>• Shakes head to say "no more"</li> </ul>

Source: Infant Nutrition and Feeding – A Guide for Use in the WIC and CSF Programs. United States Department of Agriculture, Food and Nutrition Service, March 2009. FNS-288.

**Sleepy Infants** – “Sleepy” infants are exceptions to the feeding on cue approach. These babies are especially calm, non-demanding, and tend to fall asleep shortly after the feeding starts. Some do not wake for a feeding every 1½ to 3 hours, or they may not show normal signs of hunger. If a caregiver relies on hunger cues and fullness cues with a sleepy infant, there is a danger of dehydration, poor weight gain, and eventually failure-to-thrive.

To help wake a sleepy infant and prepare him for a feeding, a mother can try:

- playing with and talking to the baby
- putting the baby in an upright position several times
- rubbing the baby’s hands and feet

- unwrapping or loosening blankets
- changing the baby's clothes or diaper
- skin to skin contact

To make sure a sleepy newborn gets enough to eat, a parent should wait no more than two to three hours between feedings or according to their healthcare provider's instructions. Many breastfed infants can breastfeed when sleepy so mothers are encouraged to offer the breast to babies frequently even when sleepy. Parents and healthcare providers should track a sleepy infant's weight gain and adjust feeding pattern accordingly.

### Typical Breastmilk and Formula Feeding Intake

Intakes of breastmilk or formula can vary significantly between infants. For example, one newborn may take 16 ounces of formula a day and be growing well, while another newborn might need closer to 24 ounces of formula a day for proper growth. Babies will adjust their own intakes from one day to the next to meet their own specific needs. Over time, as an infant grows and their stomach capacity increases, they will feed less often, but take in more at each feeding.

There are no specific guidelines that state exactly how often and how much a baby should be fed. For an idea of approximate amounts, *Box 1.1* lists some general ranges for daily breastmilk and formula feedings.

**Counting wet diapers** – To help determine if a newborn is getting enough breastmilk or formula, parents can track the number of wet diapers each day. By the time infants are 6 days old, newborns should have about 6 wet disposable diapers per day (or more if the diapers are made of cloth). Urine should be pale yellow or clear without a strong smell. Counting wet diapers can be subjective depending on how often caregivers check and change diapers and the type of diapers used. Cloth diapers hold less urine compared to disposable diapers.



*Box 1.1 Typical Breastmilk/Formula Daily Intakes*

These are general ranges for healthy full-term infants. These ranges may not apply to all infants.

**Breastfed Infants:**

Birth to 2 months      8 to 12+ feedings/24 hours

2 months to 6 months 6 to 10+ feedings/24 hours

**Formula-Fed Infants:**

7 to 8 lbs.....16 to 23 oz (2 to 4 oz every 2 to 3 hours)

8 to 10 lbs.....21 to 26 oz. (3 to 5 oz. every 3 to 4 hours)

10 to 12 lbs. ....24 to 28 oz (4 to 6 oz every 3 to 4 hours)

12 to 16 lbs..... 29 to 39 oz. (5 to 8 oz. every 3 to 4 hours)

As a general guideline, an infant will drink about ½ ounce of formula per pound of body weight at each feeding until he's older and routinely eating solid food. To know if an infant is getting enough calories it's important to check weight gain and length.

Source: American Dietetic Association (Pediatric Nutrition Practice Group and Dietitians in Developmental and Psychiatric Disorders Practice Group), 2004. *Children with Special Health Care Needs: Nutrition Care Handbook*. Chicago, Illinois: American Dietetic Association.

**Activity****Case Study: Providing a WIC Mother with Infant Feeding Advice**

Read the case study and answer the questions below.

Lisa is a first time mother who is in your clinic today to certify her 4-month-old infant named Lucy. She has questions about feeding her infant. Use *Table 1.1 and 1.2* to

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answer the following questions to determine if Lucy is ready to begin consuming solids.

Lisa states she gave Lucy some pureed applesauce for the first time this week but is concerned that Lucy did not like it because she kept spitting it out and choked. Lucy is in an infant carrier and starts to fuss. When Lisa removes her from the carrier, you notice that Lucy does not hold her head up without support. Lisa offers Lucy a bottle and she settles down and begins to coo.

1. Table 1.1 lists the age at which infants obtain feeding skills. Has Lucy reached some of the developmental milestones to start feeding?
2. Based on your answer, how would you counsel Lisa as far as starting solids at this time?
3. Table 1.2 lists hunger and satiety cues in infants. What feeding cues did you observe during your time with Lucy?

## **Gaining Weight, Growth Spurts and Sleep**

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Monitoring an infant's growth over time is essential for assessing the adequacy of their nutrition intake. Parents may have concerns about whether their baby is gaining enough weight, growing appropriately, or how to get their infant to sleep through the night.

This section will review methods for monitoring weight gain and identifying growth spurts, as well as appropriate techniques for getting an infant to sleep through the night. Remember that growth patterns are individual to the infant.

### **Objectives**

After reading this section of the module, you'll be able to:

- Identify appropriate patterns of weight gain and growth spurt periods.
- Describe inappropriate practices for getting infants to sleep through the night.

### **Weight Gain and Growth Spurts**

While it is helpful to find out the number of wet diapers, daily nursing sessions, and/or actual amounts of formula that the baby takes in, checking the baby's growth is the only sure way to know if an infant is getting the right amount of calories to meet his energy needs. Throughout the first year, and especially during the first few weeks and months of life, a health professional should make sure a baby's growth is on track.

Newborns often lose weight in the first few days of life, but most return to their birth weight by 2 weeks of age. After a baby returns to his birth weight, he should gain about 4 to 8 ounces a week.

Growth spurts vary from baby to baby but they often occur at these ages:

- 2 to 3 weeks
- 6 weeks
- 3 months

An infant who sets their own feeding pattern will increase their intake during a growth spurt. A breastfed baby will naturally start feeding longer or more often. This stimulates the mother's breast to produce more milk. Bottle-fed infants must rely on the parents to watch for hunger cues and offer more formula during feedings.



When babies don't seem to be satisfied with the amount of infant formula they are getting, parents should offer more formula.

## Sleeping Through the Night

“When will my baby sleep through the night?”

Sleeping through the night is a big milestone that many parents look forward to celebrating. It is important for caregivers to understand that infants may need to wake up for feedings during the night because they grow so quickly and their stomachs are quite small.

Many parents have heard that feeding solids will help babies sleep through the night; however, research does not support this idea. The key is to be patient. Most babies start sleeping for longer stretches of time at around 3 or 4 months of age. At that point, growth slows down a bit and the stomach can hold more food, keeping a baby content for longer periods of time.

Some parents will give infant cereal to their infants as early as 1 or 2 months of age in hopes of getting their infant to sleep through the night. Since younger infants are not developmentally ready to eat from a spoon, some parents will try using a bottle or use a syringe- type infant feeder to give the cereal. These practices increase the risk of choking and can result in problems like over-feeding, constipation, diarrhea, or food allergies. An infant who gets solid foods in place of breastmilk or infant formula might get too many calories and not enough nutrients to grow and develop properly. This is because infant cereal and other baby foods do not provide the same levels of calories and nutrients that breastmilk and formula do.

WIC staff can help parents understand that they need to be patient and that feeding solids too early can be dangerous. Breastmilk or iron-fortified infant formulas are the only foods an infant should have during the first 4 to 6 months of life. Parents should realize that “sleeping through the night” usually is not permanent since many babies resume night feedings during growth spurts or teething.



Young infants need nighttime feedings in order to meet their energy needs. Their tiny stomachs can't hold much, so they usually need to eat about every 2 to 4 hours.

## Water and Fluid Needs of Young Infants (0-6 months)

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Water is an essential nutrient. Infants need water to regulate body temperature, transport nutrients and metabolic waste products for normal kidney function and for the body's cells.

### Objectives

After reading this section of the module, you'll be able to:

- List three “Do’s” for giving an infant water/fluid.
- List two or three consequences of giving an infant too much water.
- Identify appropriate water sources for infants less than six months of age.



Under normal circumstances, healthy infants who are fed adequate amounts of breastmilk or properly-diluted infant formula will get all the water they need from their feedings. There is no need to routinely give plain water to infants less than 6 months of age. Giving too much water can interfere with the infant's ability to absorb the nutrients from breastmilk or infant formula. It can also fill the infant's stomach and cause a feeling of fullness which can decrease an infant's desire to feed. Giving too much water is dangerous and can lead to water intoxication. On the other hand, an infant who is not receiving enough water can become dehydrated. These conditions are discussed on page 55.

In situations where there is extreme hot weather, and especially where there is no air conditioning, it might be appropriate to offer a few ounces of plain water to formula-fed or partially-breastfed babies after consulting with a healthcare provider. A healthcare provider will recommend how much water to give and follow up by checking the infant's intake and growth to be sure the extra water isn't taking the place of other nutrients. Exclusively breastfed infants usually don't need extra water even in hot climates. Parents who are concerned should check with their baby's healthcare provider.

Below are considerations for water and fluid needs.



**Do**

- Correctly follow infant formula preparation instructions.
- Check with the healthcare provider before giving plain water to an infant.
- Check well water sources yearly for contaminants.

**Don't**

- “Stretch” infant formula by adding extra water.
- Concentrate the formula by adding less water than the instructions call for.
- Give water or other beverages (e.g. juice or tea) as a feeding instead of formula or breastmilk.
- Use commercially available “nursery” water, plain water or other beverages (e.g. juice, soda, tea, broth, etc.) to treat diarrhea, vomiting or other illness.
- Offer water to an infant before or after breastfeeding or infant formula feedings as this can lead to life-threatening water intoxication.

**Well-water** – Some households obtain their drinking water from private water wells. While well water is a safe drinking source, there are precautions that should be taken. Well water can contain contaminants such as nitrates, volatile organic compounds (VOC), and bacteria. Of particular concern for infants are nitrates. Nitrates are compounds that are found naturally in some foods but are often found in higher concentrations in well water. Nitrates in well water can come from animal waste, wastewater, and fertilizers. Nitrates are also found naturally on the ground surface in different levels.

Infants and children are more easily affected by nitrates in well water than are adults. Infants whose formula is prepared using well water are at higher risk for nitrate poisoning. Therefore, it is important that well water be tested. The AAP and CDC recommend testing for nitrates every year or more often when necessary to determine nitrate levels. The Environmental Protection Agency (EPA) states that nitrate levels should be less than 10 mg/L MCL (maximum contaminant level), (EPA, September 2011).

If levels are above this, the nitrates can cause an infant to become seriously ill and left untreated, death can occur. Symptoms can



include failure- to-thrive, shortness of breath, or blue skin coloring called “**blue baby syndrome**” (**methemoglobinemia**) (CDC, May 2010). Additional details on nitrates can be found on page 42.

If parents have concerns they should be advised to prepare food and formula from purchased water or public water sources until they are able to have their well tested. Breastfeeding is a safe and better option given that high levels of nitrates have not been shown to pass through breastmilk.





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## Part 2: Six Months to One Year of Age

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As infants grow and develop, their diet expands and their nutrient needs increase over that which breastmilk or infant formula alone can provide. Semisolid or solid foods offered in addition to breast milk or formula to help meet these increased nutrient needs are called **complementary foods**. This module will review developmental stages for infants and how and when to introduce complementary foods. It will also discuss common infant health issues.

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### Changes in the Developing Infant

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At about 6 months of age, a baby's requirements for iron, zinc, and other key nutrients increase and breastmilk alone is no longer able to meet these needs. Also, by 6 months of age a baby's oral-motor skills and body processes are more developed and mature. All of these changes set the stage for starting solids.

#### Objectives:

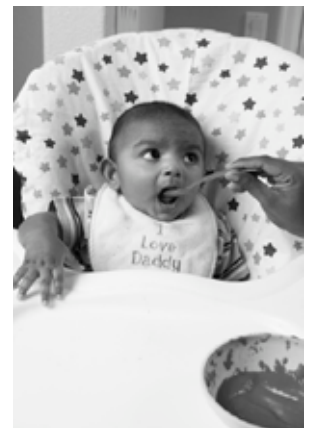
After reading this section, you will be able to:

- Define developmental readiness.
- List three signs of developmental readiness that show a baby is ready to try solid food.
- Describe the physiological reasons for waiting to start solid foods.

#### Developmental Readiness

Determining the best time to introduce an infant to complementary foods can be difficult. The key is to know when an infant has reached **developmental readiness**.

**Changes in oral-motor skills** – Prior to four months of age a baby's swallowing mechanism is designed to work with sucking, but not with chewing or swallowing food. By the time a baby is 4 to 6 months of age his rooting reflex, tongue thrust, suck/swallow reflex, and the gag reflex begin to diminish. At the same time, new oral-motor skills start to emerge. See *Table 1.1 Sequence of*



*Development and Feeding Skills in Healthy, Full-Term Infants* on page 12.

A baby is developmentally ready to eat solid foods when he can do all of the following:

- sit up alone or with help
- hold up his head steady and straight
- show a desire for food by opening his mouth and leaning toward the spoon
- keep his tongue low and flat to receive the spoon close his lips over the spoon and pull food off the spoon as it is removed from the mouth (at first the baby removes food from a spoon with a sucking action)
- move food from the front to the back of his tongue to swallow
- keep most of the food in his mouth rather than pushing it back out onto the chin
- swallow the food without gagging, coughing, or choking
- show that he is full by leaning back, turning away pushing the spoon away, closing his lips together

**Physiological changes** – At birth the gastrointestinal tract is still “immature” and isn’t able to fully digest solid foods.

Physiological growth in infants varies depending on the infant, but by 4 to 6 months of age the gastrointestinal tract of most healthy infants is mature enough to break down the proteins, fats and carbohydrates from complementary foods. Similarly the baby’s kidneys become better equipped to excrete waste products from different types of foods. The infant’s immune system has also matured and there is less risk of a new food causing an allergic reaction.



## Activity

### **Case Study: Determining When an Infant Is Ready To Start Solids**

Read the case study and answer the questions below.

Mary has a premature infant that was born at 35 weeks. He is six months old and in the clinic today. Even though her doctor has stated she could start solids now, she has not given her baby any pureed foods yet. She did give him a small amount of infant cereal this morning before coming to the clinic. How would you help Mary determine if her baby was ready to start solids?

1. List two questions you would ask:
2. What observations could you make while the baby is in the clinic?
3. Are there any resources available for more information on premature infants and feeding guidance?

You determined by your questions and observations that Mary's baby was sitting up by himself and has good head control. Mary stated he opened his mouth when she offered him a spoon of infant cereal today though he was a little messy.

4. Is Mary's baby ready to start solid foods at this time?

## Introducing Solids

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It is natural for a parent to be anxious about their infant's development. They compare their infant's progress to books, charts, and other babies in the hopes that their own baby reaches important milestones on time. This might be a reason why some parents start feeding solid foods at 2 or 3 months of age, long before a baby is developmentally ready.

Foods introduced too early offer little benefit and put an infant at risk, while foods offered too late may result in nutritional deficiencies and/or food aversions.

### Objectives

After reading this section of the module, you'll be able to:

- Identify the risks associated with early and late introduction of solid foods.
- Describe medical conditions that may delay developmental readiness for starting solids.
- Identify appropriate food textures for a specific age range.
- List foods that are appropriate to provide as first foods.
- Explain why foods do not need to be introduced in a certain order.

### Developmental Readiness

Many parents worry that infant formula or breastmilk does not satisfy their baby's hunger and that starting solid foods might help. In some instances, cultural practices or misguided advice from friends or family members can lead to early introduction of solids. They may feel that starting solids sooner is a reflection that their baby is more advanced.

Experts agree that it is important to wait to offer solids until an infant is developmentally and physiologically ready. Feeding solids too early, especially 4 months and younger, puts the baby at risk for a number of problems such as:

**Higher risk of choking** – An infant's early feeding reflexes are designed for sucking breastmilk not chewing and swallowing solid foods.





**Low nutrient intake** – A very young infant who starts solids too early is likely to cut back on breastmilk or infant formula. As a result, they will not get the nutrients they need for growth and development during the early months of life. Breastmilk and infant formula are much more nutrient dense (provide more nutrients per ounce) compared to infant cereal and other baby foods.

**Higher risk of allergic reactions** – In an infant’s early months (less than 4 months old) the intestinal tract (“filtering system”) is immature. As a result, younger infants are more likely to have an allergic reaction to some foods especially if there is a family history of food allergies. Starting solid foods too early increases the chances of an allergic reaction. By about six months of age the intestines are more mature and able to filter out more of the offending food allergens. Food allergies and intolerances are further discussed on page 33.

While developmental readiness is different for each infant, most infants show readiness for solids generally between 4 to 6 months of age. The American Academy of Pediatrics (AAP) recommends mothers breastfeed exclusively for about the first 6 months of life. They should then continue breastfeeding while introducing solid foods until the infant is 12 months of age or longer as mutually desired by mother and infant. Currently, the WIC Program offers solid foods after 6 months of age. Infants who are premature or developmentally delayed will usually begin solid foods at later ages. The key is to watch for signs of developmental readiness and then offer foods and textures that match the infant’s skills.

Late introduction of complementary foods can also have adverse consequences. Infants who are not developmentally delayed but start complementary foods after 6 months of age may reject these foods. This is believed to be due to infants being more comfortable with the easier feeding style of sucking. Another consequence is inadequate nutrition and variety to meet an infant’s daily nutritional needs.

*Table 2.1 How the Recommended Sequence of Introducing Complementary Foods Corresponds with Food Textures and Feeding Styles*

Age Groups	Sequence of Introducing solids	Texture of Complementary Foods	Feeding Style
Birth through 3 months	Breastmilk or Iron-fortified Infant formula	n/a	Breast/Bottle
4 months to 6 months	Complementary foods**	complementary foods; strained/pureed (thin consistency for cereal)	Breast/Bottle; spoon; cup
6 months to 8 months	Complementary foods	complementary foods; strained/pureed (thin consistency for cereal); mashed	Breast/Bottle; spoon; cup
8 months to 10 months	n/a	strained/pureed (thin consistency for cereal)/mashed; ground/finely chopped, chopped	Breast/Bottle; spoon; cup; self-feeding/finger foods
10 to 12 months	n/a	Soft table foods, mashed table foods, finger foods	Breast/Bottle; spoon; cup; self-feeding/finger foods

\*\*Age ranges are representative of when most infants are developmentally ready to begin consuming complementary foods.

Adapted from *Infant Nutrition and Feeding – A Guide for use in The WIC and CSF Programs*. U.S. Department of Agriculture, Food and Nutrition Service, March 2009, FNS-288.

## The First “Test Feedings”

Once an infant is developmentally ready for complementary foods, it is time to try a “test feeding” with the infant’s first solid food.

### First Foods

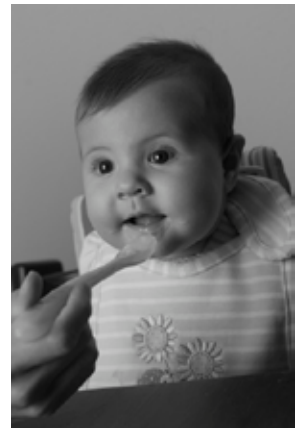
Some caregivers mistakenly believe foods should be introduced in a certain order. For example, some believe that offering fruits before vegetables will mean the baby will not like vegetables. There is no scientific evidence supporting the belief that offering “first foods” in a certain order gives a baby an advantage. Whatever the food choice, a baby’s first food should be single ingredient foods (not a combination of foods) that are nutritious and have a smooth texture and thin consistency.

Once an infant is developmentally ready for complementary foods, it is time to try a “test feeding” with the infant’s first solid food. For most infants it does not matter what the first food choice will be. Traditionally, rice cereal was often the first food recommended based on the idea that it was less likely to cause an allergic reaction. Newer evidence no longer supports this practice. Food reactions are discussed on page 36.

Healthcare providers may suggest foods other than infant cereal as a first food. For example, a provider may advise moms who are exclusively breastfeeding to start with single ingredient meats as a first food choice for the extra iron and zinc. Iron-fortified infant rice cereal or oat cereal are popular options because they provide iron and are easily digested. Parents can adjust the consistency to match the baby’s oral-motor skills.

Here are some suggestions for parents for the first test feedings:

- It is usually best to offer the first solid food after feeding some breastmilk or infant formula. This way, hunger is less of a factor and it is easier to judge the baby’s readiness to accept a food. He will also be less likely to get frustrated if he is not overly hungry. On the other hand, if you are trying to feed an older baby who has repeatedly had no interest in eating from a spoon, it may help to offer the baby’s first food before breastmilk or formula.
- Start with a small amount (about 1 to 2 teaspoons). Let the infant be the guide for how much food to feed. Allow the infant to lead on how often and how fast to feed.



- If using infant cereal, mix 1 tablespoon of cereal with 4 to 5 tablespoons of breastmilk or infant formula so that the cereal is thin. Using breastmilk or infant formula adds additional protein and fat to the cereal whereas water does not contain any calories or nutrients.
- Introduce single-ingredient foods one at a time. This will allow an infant the time needed to become accustomed to the taste and texture of each new food. Waiting also helps identify food sensitivities or allergies that may develop when a new food is started. The AAP suggests waiting a minimum of 2 to 3 days between each new food. As always, progression varies depending on an infant's developmental readiness.

The AAP recommends that within a few months of starting solid foods, infants should include a variety of foods in their diets which may include:

- Breastmilk and/or infant formula
- Meats
- Cereal
- Vegetables
- Fruits
- Eggs

### Developmental Delays



It is important to remember that not all infants are ready to start solid foods at 4 to 6 months of age. Reasons may include:

- Prematurity, low birth weight, failure-to-thrive (FTT)
- Frequent hospitalizations
- Medical disabilities (e.g. Down Syndrome)
- Cleft lip or cleft palate
- Neuromuscular disorders, (e.g. cerebral palsy)
- Feeding tube
- Abuse, neglect, depression

In such cases caregivers will need a referral for guidance and instructions on feeding techniques. In addition, these infants are often already under the care of a specialized feeding team that may include an occupational therapist, speech therapist, and/or registered dietitian. If developmental delays are identified, WIC staff should refer the infant to early intervention or other appropriate resources.



## Activity

### Introducing Solids

Answer the following questions using *Table 2.1 How the Recommended Sequence of Introducing Complementary Foods Corresponds with Food Textures and Feeding Styles*.

1. At what age are complementary foods generally first introduced?
  - A. 6 to 8 months
  - B. 4 to 6 months
  - C. 3 to 5 months
  - D. 2 to 4 months
2. Which textures are appropriate to feed an 8 to 10 month-old-infant? Mark all that apply.
  - A. strained/pureed
  - B. mashed
  - C. chopped
  - D. ground
  - E. finely chopped

3. At what age would it be appropriate to begin to introduce the cup?
- A. 7 to 9 months
  - B. 4 to 6 months
  - C. 10 to 12 months
  - D. 6 to 8 months
4. Infants will begin to self-feed and start finger foods at about the age of 8 to 12 months.
- A. True
  - B. False
5. During their first year of life, infants continue to breastfeed or formula feed once they start complementary foods.
- A. True
  - B. False
6. What texture should an infant be fed when being introduced to complementary foods for the first time? Mark all that apply.
- A. mashed
  - B. thin pureed
  - C. finely chopped
  - D. strained

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## Negative Reactions to Complementary Foods

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Negative or adverse reactions to certain foods are common for some infants. A negative reaction to a food falls into one of two categories: food allergies or food intolerances.

### Objectives

After reading this section of the module, you'll be able to:

- Describe the difference between a food allergy and food intolerance.
- Name at least 3 common allergic reactions.
- Describe the current AAP recommendations for food allergies.

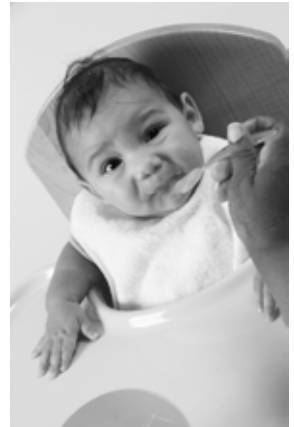
### Food Allergies

A food allergy is a response by the immune system to a food. When an infant ingests a food that his body sees as an “intruder”, the immune system will produce antibodies to destroy the offending allergen (or protein) in the food. In rare but serious cases the infant may experience **anaphylactic shock**.

Infants' immature immune systems put them at risk for allergic reactions to foods. Fortunately, true food allergies are not common and many children outgrow them in early childhood. However, some allergies can last longer or for a lifetime. According to the AAP it is estimated that 80 percent to 90 percent of egg, milk, wheat and soy allergies go away by 5 years of age.

Allergic reactions can occur immediately or hours after a food is consumed. Adverse reactions can include the following symptoms.

- Extreme irritability or colic
- Breathing problems, congestion, wheezing, coughing, sneezing, throat swelling, ear infections
- Skin rashes (e.g. eczema), hives, itching, swelling
- Constipation, diarrhea, vomiting, abdominal pain, nausea
- Failure-to-thrive
- Anaphylactic shock—trouble breathing, severe wheezing, loss of consciousness, or death if not treated immediately



Foods that are commonly associated with food allergies include wheat, soy, peanuts, tree nuts, fish, shellfish, eggs and cow's milk. If caregivers see any of the above symptoms they should immediately stop the offending food and consult with their healthcare provider. Reactions that involve several areas of the body are more severe and may be life-threatening. For severe reactions or life-threatening emergencies contact 911 immediately.

The AAP revised their recommendations for infants considered "at risk" of developing food allergies in 2008. The AAP's recommendations are listed below and are not intended for the general pediatric population; only those considered "at-risk" of developing an allergy. High risk is defined as those infants with at least one first-degree relative (i.e. parent, sibling) with an allergic disorder such as a food allergy.

Recommendations for at-risk infants include:

- Complementary foods should not be introduced before 4 to 6 months of age. Delaying the introduction of complementary foods past this age does not provide an additional protective effect.
- There is currently insufficient evidence to make recommendations for avoidance of specific foods including those listed as highly allergenic foods (fish, eggs, nuts) during pregnancy, lactation or beyond 4 to 6 months of age as a means to protect against the development of allergic disease. (Greer, F.R., Sicherer, S.H. & Burks, A.W., 2008)

For those infants considered not at risk for the development of food allergies there are no restricted foods except for no cow's milk until after one year of age.

### Food Intolerances

Food intolerances are not allergic reactions but "sensitivities" and can cause symptoms that are similar to allergic reactions. Food intolerances do not involve the immune system. Examples include lactose intolerance and celiac disease.







### Activity

#### Case Study: Food Allergies

Read the case study and answer the questions below.

Cora has two children, Brenna age 2 months and Micah age 4 years. Cora reports that Micah has been diagnosed with a peanut allergy by his doctor. She is concerned about her baby and wonders if she will have food allergies too.

1. Would you consider Brenna to be at risk for developing food allergies? Why or why not?
2. What symptoms might Cora see if Brenna eats a food she is allergic to?
3. Referring to the AAP recommendations for infants, what advice would you offer mom?

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## Transition to Table Foods

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During the second six months of infancy a baby's hand, mouth, and body skills develop rapidly. For example, between 5 to 9 months of age, a baby will begin to sit up without help. At around 6 to 8 months of age he starts to develop his pincer grasp, which means he'll begin to pick things up with his thumb and first or second finger. By 12 months of age most babies can easily finger feed, drink fairly well from a cup, and are starting to experiment with self-feeding using a spoon.

### Objectives

After reading this section of the module, you'll be able to:

- Identify basic guidelines related to introducing solid foods to infants.
- Describe safety tips for feeding an infant.
- Describe the guidelines for feeding juice to infants.
- Describe precautions for introducing solid foods.
- State at least 3 foods to avoid feeding an infant.
- State at least 6 foods that are common choking hazards for infants.
- Describe how to prepare/modify a food in order to reduce choking risk.
- Identify correct procedures for using commercial baby foods.
- List tips for preparing and storing foods at home for an infant.
- Define and identify Bisphenol A (BPA).
- Describe recommendations for minimizing BPA exposure.



### New Feeding Skills Lead to New Foods

As a baby's motor skills progress he will go from eating smooth, pureed and strained foods to mashed foods that are thicker and lumpier. Next they will be able to eat ground foods and small pieces of bread, crackers and various soft foods. By 12 months of age, most babies can feed themselves small pieces of table food and enjoy many of the same foods that other family members eat.

## Moving Beyond Baby's First Food: Basic Guidelines

Once a baby is comfortable eating food from a spoon and is eating infant cereal or a different first food several times a day, it's time to offer other smooth-textured foods one at a time. Below are some general guidelines for introducing new foods:

**Sequence of solid foods** – parents often want to know what order to follow when introducing new foods. The key is to make sure foods are safe, nutritious, and are a suitable texture for the baby.

As previously discussed on page 36, some parents may have theories about introducing foods in a particular order. Some say it is better to give vegetables before fruits so babies don't get accustomed to sweet flavors and reject vegetables later on. Other people point out that breastmilk is sweet so starting out with something like fruit or sweet potatoes may actually ease the transition to solid foods and will help the infant be more accepting of vegetables and other foods. However, none of these opinions are scientifically proven.

Again, regardless of what order parents follow they need to consider texture and nutrition for their child when starting new foods.

**Texture** – Babies need to start out on solid foods that are pureed to a thin and smooth texture. Then, as they're able to do more up-and-down chewing and can move the food from side to side in their mouth with their tongue, the texture can progress from pureed to mashed, then to ground, and then to diced. When an infant is able to handle ground food, it is time to offer finger foods.

**Serving amounts** – When starting a new food it is best to start with a small amount (1 to 2 teaspoons) so the baby can experience the new flavor and texture. In later feedings, parents can gradually work up to a tablespoon or more. See page 28, Introducing Solids.

**New foods** – Before trying a mixed food like peas and carrots the baby should first try each ingredient in the mixed foods individually. It is best to offer a new food early in the day so that there is plenty of time during the day to watch for any reactions. See page 28.

**Food Safety** – Parents should wash their hands, the baby's hands, and any utensils, dishes, or other items that touch the baby's food. Be aware that as a baby eats from a spoon, the baby's saliva contaminates the spoon and gets transferred to the serving





of food. Over time, bacteria from the saliva will multiply and can spoil the food. So rather than feeding the baby directly from a jar or container, parents should put a small amount of food in a clean bowl or on a plate. This will keep the food in the container from being contaminated. Parents can cover and store any uncontaminated food in the refrigerator for up to 48 hours. To avoid passing along bacteria, parents should not share eating utensils with the baby or pre-chew food before giving it to a baby. *Box 2.1* summarizes feeding safety tips for parents or caregivers to follow.

#### *Box 2.1 Tips for Feeding Baby Safely*

##### **Place the baby in a safe, upright sitting position.**

Face the baby during the feeding to maintain eye contact and make sure the baby is swallowing the food and not choking or spitting it out.

**Stay relaxed.** Pick a time of the day when you are not rushed and when it is okay for the baby to “play” with his food. Be patient, and be prepared for a bit of a mess.

**Check baby food jars.** Wash baby food jars before opening and make sure the dome or “bubble” on the top of the jar has not popped out before opening.

**Heat foods gently.** It is fine to serve foods at room temperature. If you want to warm the baby’s food set the jar or container in a pan of warm water for a few minutes. Do not use a microwave to heat baby foods since the food can heat unevenly and possibly burn the baby’s mouth.

**Use a small spoon.** A soft rubber-tipped infant feeding spoon is best. Solid foods should never be fed to healthy infants from a bottle or a mechanical feeder.

**Discard leftovers from the dish.** Throw out any leftover food that has been contaminated by the baby’s saliva.

### **The Goal: A Variety of Foods by One Year of Age**

Between the ages of 6 and 12 months an infant will gradually eat more complementary foods. Over time breastmilk and infant formula become part of a healthy diet rather than the main source of nutrients.

By the time an infant is one year of age they should be getting nutrients from a variety of table foods. Also, at 1 year of age they should be ready to start drinking whole milk. At this point they do not need to rely on breastmilk or infant formula to receive extra

nutrients and can transition to whole milk. Of course, breastfed children continue to receive important protective factors from their mothers as long as they get breastmilk, so experts encourage women to keep breastfeeding past the age of one year if both the mother and child want to continue. Breastfed children can drink whole milk, in addition to breastmilk starting at 1 year of age.

### Advice for Parents

Many parents would love specific feeding guides that list exactly what, when and how much to feed a baby during this transitional phase. Keep in mind every baby is unique and even two babies with similar feeding skills are likely to have different daily intakes. So here are some practical guidelines:

**Change along with the baby** – Some parents rush things by offering foods and textures that are beyond the baby’s feeding skills, or the opposite happens. Parents get stuck in a feeding routine and they aren’t aware that their baby is ready to try new foods. Parents should watch their baby’s progress and offer healthy foods that are suited to his changing feeding skills. This idea of responsive parenting is a key part of a healthy parent-child feeding relationship.

**Provide healthy foods** – Since complementary foods replace a certain amount of breastmilk or infant formula, they need to be nutritious. Parents should avoid feeding high-fat, salty, or sweet foods like French fries, chips, hot dogs, sausage, bacon, candies, chocolate, cakes, cookies, doughnuts, sweetened drinks, and other **empty-calorie foods**. Even baby food desserts aren’t recommended since they offer little more than sugar and calories.

All too often, parents or other family members give small bites of cookies, doughnuts, fries, or other empty-calorie foods to a baby, thinking “a little bit won’t hurt.” While it is true it will not “hurt” the baby (unless it is a choking hazard), there is no nutrition value in these foods and they have the potential to become a regular part of a baby’s diet instead of the more nutritious foods. Remember, infants do not need these types of snacks or desserts nor do they expect them – not until family members start offering them.

Infants should not get sodas, fruit drinks, punches, coffees, teas, herbal teas, or other similar beverages. Coffees, teas, and colas all contain caffeine, a stimulant and a diuretic which can interfere with sleep. Coffee and tea also contain **tannic acid**, which decreases iron absorption. Sweetened drinks and sodas are simply empty calories in the form of sugar. Artificial sweeteners like



saccharin (e.g. Sweet 'N Low®) or aspartame (e.g. NutraSweet®) are not appropriate for infants or young children.

**Fruit Juice** –It is important for parents to know that infants *do not need* fruit juice, and that too much fruit juice can lead to real problems.

Juice is a concentrated source of fruit sugars. Even though fruit sugars are naturally occurring, they are simple sugars, much like table sugar. So if an infant sips on juice all day from a bottle or spill-free cup, the juice will constantly coat the teeth and can lead to dental caries. Also, large amounts of sugar or sorbitol from too much fruit juice can lead to problems like diarrhea, bloating and abdominal pain. Juices that contain sorbitol include prune, pear, cherry, peach, and apple juice.

Infants who drink fruit juice from a bottle or cup may consume less breastmilk, infant formula, or other nutritious foods. The result may lead to malnutrition or growth issues, such as short stature. Since fruit juice is such a concentrated source of sugar and calories, too much juice can lead to excess weight gain.



Most brands of fruit juice provide vitamin C, and some brands also contain added calcium or other nutrients. But even if a juice provides extra nutrients, parents still need to limit their infant's intake. Better yet, parents can give their infants whole fruit that's mashed or pureed instead of fruit juice. Whole fruit provides fiber and other beneficial compounds as well as a variety of textures and flavors.

Here are some guidelines for feeding juice to infants:

- Wait to introduce 100 percent fruit juices until the infant is at least 6 months of age or older.
- Limit intake to no more than 4 ounces per day of 100 percent fruit juice.
- *Never* feed infants unpasteurized juice.
- Introduce new fruit juices one at a time and no sooner than a minimum of 2 to 3 days apart to observe for adverse reactions.
- Introduce mixed fruit juices only after the infant has tried each juice individually.
- Avoid offering fruit juice in a bottle or spill proof cup (sippy cup) that can easily be carried around by the infant.

- Avoid offering fruit juice at naptime or bedtime.
- Even though fruit juice is part of the fruit group, do not let fruit juice completely replace whole fruit in the diet.

**Offer plain foods** – There is no need to add salt, sugar, sweeteners, sauces or other seasonings to a baby’s food. It is best for the baby to taste the natural flavor of foods rather than get accustomed to sweet or salty tastes. Practices such as adding butter, sauces or dressings will add unnecessary fat and calories without many other nutrients.

**Respect the baby’s food preferences** – Like adults, babies have their own food likes and dislikes. If a baby rejects a new food, parents should not try to force the new food. Instead, they should hold off and offer the food again in a few days or weeks. It can take as many as 10 to 15 tries before a baby may accept a new flavor or food. Parents should not assume that if they do not like something their baby won’t like it either. Encourage parents to be good role models by trying new foods themselves, and by eating healthy, nutritious foods.

**Try to keep the baby calm** – Encourage parents to show their babies that eating is a positive, pleasant, and relaxed experience. That means finding a comfortable place to feed the infant, not rushing or trying to force the infant to eat a certain food, not getting upset if the infant is a messy eater, having lots of patience, taking time to interact with the infant during feeding, and showing the infant lots of love and attention.

**Encourage an infant to feed himself** – It is up to parents and caregivers to help their infant become an independent eater. Teaching an infant to use a cup (i.e. wean from the bottle) is one way to encourage independence. Giving up the bottle will also help to develop the muscles used for speaking and may aid in preventing tooth decay. Once an infant can eat ground and diced foods, parents can encourage finger feeding by offering strips or small pieces of dry bread, toast, crackers, mild cheese, soft peeled fruit, cooked vegetables, dry cereals, or teething biscuits. Encourage parents to let their baby try a spoon when the baby begins to show an interest. With practice their baby will be able to spoon food into their mouth all on their own.



### Precautions When Introducing Solid Foods

Parents may desire to prepare infant foods at home. Home prepared or commercially prepared foods such as fruits and vegetables are appropriate. Offer a variety of single-ingredient

foods one at a time and wait a minimum of 2 to 3 days between each food introduction. Additional details on home prepared foods are discussed later in this section.

Specific foods are linked to illnesses in young infants, and some can be serious. But the risks related to these foods usually disappear as a baby's gastrointestinal tract, immune system, and other vital processes mature during the first year. Until that time, parents should be mindful of the following foods:

**Nitrates** – The AAP recommends that vegetables such as spinach, green beans, beets, carrots, or squash prepared at home should not be fed to infants less than 6 months of age as these foods may contain **nitrates**. Nitrates are naturally-occurring compounds from soil. Very young infants convert the nitrates into *nitrites* which bind the iron in the blood making it hard for the cells to carry oxygen. This can cause **methemoglobinemia**, a possibly fatal condition in which an infant has difficulty breathing and the skin turns blue. Commercially-prepared infant foods do not have the nitrate risk; however, infants should not be fed solid foods until developmentally ready (about 4 to 6 months of age). See page 20 for additional information on nitrates.

**Honey** – An infant under one year of age should never be given honey in any form. This includes honey used in cooking, baking, or in prepared foods like yogurt with honey, peanut butter with honey, honey graham crackers, or cereals made with honey, such as honey O-shaped cereals.

Honey may contain **Clostridium botulinum** bacterial spores which can cause a serious foodborne illness called infant botulism. The stomach acid in children and adults can destroy these spores, but a baby's stomach isn't acidic enough. If a baby eats honey containing these spores, the spores can grow and make a toxin that causes severe illness and even death. Corn syrups (light and dark) have the potential to be sources of *C. botulinum* spores and should not be fed to infants.

**Cow's milk** – An infant under one year of age should not be given cow's milk. Cow's milk is low in iron, and since an infant's kidneys and digestive system are not yet mature, cow's milk could lead to problems. Problems may include an allergic reaction or gastrointestinal bleeding (due to the formation of large curds) and can interfere with iron absorption.





## Other Foods to Avoid Feeding to Infants

In addition to the specific precautions noted above, parents need to avoid feeding foods that may contain microorganisms, toxins, or other harmful substances. Examples of potentially harmful foods include:

- raw or undercooked meat, fish, poultry, or eggs;
- undercooked or raw tofu;
- raw sprouts (alfalfa, clover, bean, and radish);
- unpasteurized fruit or vegetable juice;
- unpasteurized dairy products and soft cheeses like feta, Brie, Camembert, blue-veined cheeses, and Mexican-style cheeses (queso blanco, queso fresco, queso de hoja, queso de crema, asadero, etc.);
- deli meats, hot dogs, and processed meats (unless heated until steaming hot); and
- shark, swordfish, king mackerel, and tile fish (these fish can contain high levels of mercury). Common varieties that are low in mercury and safe include shrimp, canned light tuna, and salmon. For a complete list of fish and mercury content, WIC staff or caregivers can go to the Food and Drug Administration (FDA) website at [www.fda.gov](http://www.fda.gov).

## Herbal Teas and Dietary Botanical Supplements (DBS)

According to a recent study, 9 percent of mothers reported giving herbal teas and dietary botanical supplements (DBS) to their infants. (Zhang, 2011) The percentage can be as high as 36 percent for WIC mothers. (Lohse, 2006) Herbal teas and DBS are usually given to infants because it is believed they help with fussiness, digestion, colic, teething and relaxation. Some examples of products given to babies include chamomile (manzanilla) tea as well as other teas such as chrysanthemum, lemon, orange and rosemary leaf. Botanical supplements in the form of teething tablets or gripe water are also given. Gripe water is a mixture of bicarbonate, ginger, dill, fennel and chamomile that is given to relieve colic. It may also contain sucrose and alcohol. Most mothers obtain information about these products from friends and relatives and rarely consult their health care provider about their use. (Zhang, 2011)



Many potential problems exist with giving dietary herbs and teas to infants. There are few studies of the effectiveness and safety of many of these preparations. Infants may respond differently than older children and adults because of their small body weight and immature gastrointestinal, nervous and immune systems. Even botanical preparations with a long history of traditional use can be contaminated with heavy metals or bacteria. Children have developed seizures and infections from herbal teas and remedies.

Lead and mercury poisoning from herbal remedies and liver damage from dietary supplements has also been reported (Illinois Poison Center Blog, May 2011).

Other concerns include allergic reactions to botanical preparations as well as drug interactions with other medications that children may be prescribed. In addition, the possibility of water intoxication in young infants can also be a concern if teas are given in place of feedings.

Since the FDA does not regulate botanical preparations or dietary supplements there is no assurance that products contain the same ingredients in the same amounts, even with the same label. For these reasons, the FDA strongly advises against the use of herbal medicines, supplements and teas for children less than one year of age.



When working with participants it is important to be sensitive to their cultural practices. For example, the Hispanic community has a practice of providing chamomile or manzanilla tea for colic to their infants. Due to the health risks, guidance and counseling should be provided. When counseling on the use of herbal teas and DBS in infants, encourage parents to only feed their baby breastmilk or infant formula for the first six months of life. Advise parents to only use medications or vitamins as directed by their healthcare provider. Inform parents and caregivers to always consult a healthcare provider before giving herbs, teas and DBS.

## Choking

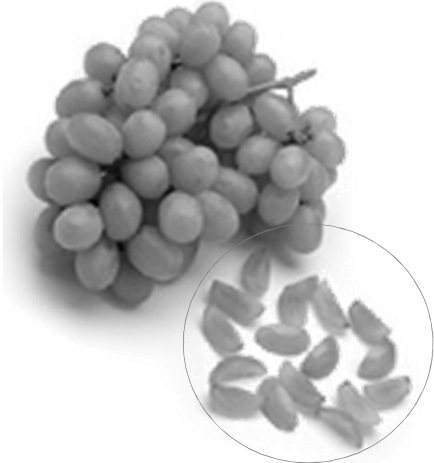
Each year many infants die or suffer serious brain damage as a result of choking on food or some other object. Infants don't always block their airways properly when they swallow, so objects can easily start to "go down the wrong way." In an effort to cough the object up, an infant will inhale deeply and the food or object can quickly enter the air passages to the lungs.

Texture, size, and shape are all factors to consider when feeding an infant. Smooth, slippery foods like grapes and candy are especially hard to control in the mouth and can slip into an infant's airway. If a food cannot be easily chopped or sliced into smaller pieces then you shouldn't give it to a baby. Common foods that are choking hazards include:

- tough or large chunks of meat
- hot dogs, meat sticks, or sausages
- fish with bones; any meat with bones
- large chunks of cheese
- peanuts or other nuts and seeds
- peanut and other nut/seed butters
- whole beans
- cooked or raw whole-kernel corn
- whole uncut cherry or grape tomatoes
- raw vegetable pieces (e.g. carrots, green peas, string beans, celery, etc.) or hard pieces of partially cooked vegetables
- whole uncut grapes, berries, cherries, or melon balls or hard pieces of raw fruit
- whole pieces of canned fruit (cut them up instead)
- fruit pieces with pits or seeds
- uncooked raisins and other dried fruit
- plain wheat germ
- whole grain kernels
- popcorn
- potato/corn chips and similar snack foods
- pretzels
- hard candy, jelly beans, caramels or gum drops/gummy candies
- chewing gum
- marshmallows

**Modify foods so that are easy to chew** – Parents can greatly reduce the risk of choking by cooking foods until they are soft and cutting them into thin slices, strips or small ¼ inch cubes.

It is also important to moisten food that's very dry and to grind or mash food for young infants. Tips include:



Cut up  
grapes.

- Hold your infant while feeding a bottle. Never “prop” a bottle for your infant at any age. Do not leave a bottle in an infant’s crib or playpen. Older infants can hold the bottle while feeding but they should be sitting in your arms or in a highchair or similar chair and the bottle should be taken away when the feeding is finished.
- Make sure the hole in the nipple of your infant’s bottle is not too large to avoid the liquid from flowing through too rapidly.
- Supervise your infant’s mealtimes and snacks and do not leave the infant alone when eating.
- Make sure your infant is sitting still and in an upright position during meals. Encourage your infant to eat slowly.
- Feed small portions.
- Avoid using teething pain relief medicine before mealtime since it may interfere with chewing.
- Serve foods that are the appropriate texture for your infant’s development. Prepare food so that it is soft and does not require much chewing.
- Puree, blend, grind, or mash and moisten food for young infants.
- For the older infant (close to 1 year of age) who can chew, cut foods into small pieces or thin slices that can easily be chewed.
- Cut round foods such as cooked carrots into short strips rather than round pieces. Do not feed raw whole grapes, cherries, berries, melon balls, grapes or cherry tomatoes to your infant. These fruits and vegetables should be cut into quarters, with pits removed before feeding. Large pieces of food can become lodged in the throat and cause choking.
- Remove hard pits and seeds from vegetables and fruit.

- Substitute foods that may cause choking with a safe substitute, such as meat chopped up or mashed ground beef instead of hot dogs or pieces of tough meat.
- Do not feed whole grain kernels of wheat, barley, rice, etc. to your infant. These grains must be cooked and finely ground or mashed before being fed to an infant.
- Do not feed whole nuts or seeds or nut/seed butters which can get stuck to the roof of the mouth.
- Make sure that biscuits, toast, and crackers are eaten only when the infant is in an upright position. An infant who eats these foods while lying down could choke on crumbs.

See Table 2.2 Modifying foods to prevent choking for additional tips for modifying foods.

*Table 2.2 Modifying Foods to Prevent Choking*

Food Group	Tips for Modifying Foods
Fruits	<ul style="list-style-type: none"> <li>• Cut fruit into small pieces. Be sure to cut grapes, cherries, berries, melon balls, and cherry and grape tomatoes into quarters.</li> <li>• Remove skin, pits and seeds from fruit. Do not offer raisins and other dried fruit.</li> <li>• Avoid whole pieces of canned fruit (cut them up instead).</li> <li>• Avoid hard pieces of raw fruit, such as apple.</li> <li>• Cook fruits like apples and pears.</li> </ul>
Vegetables	<ul style="list-style-type: none"> <li>• Cook tough, hard foods until they are soft. Don't give hard pieces of raw or partially cooked vegetables like carrots, green peas, string beans, or celery.</li> <li>• Cut vegetables into short strips rather than round pieces.</li> </ul>
Meats and Other Proteins	<ul style="list-style-type: none"> <li>• Remove all bones from poultry, meat, and especially fish.</li> <li>• Grind, chop or cut meats so that size and texture are developmentally appropriate for the baby.</li> <li>• Cut round foods, like hot dogs, into short strips rather than round pieces. It is better to serve cooked, small, moist pieces of ground beef instead of hot dogs, sausages, or pieces of tough meat or large chunks of meat.</li> <li>• Avoid offering whole beans. Puree or mash cooked dry beans and peas.</li> <li>• Do not feed peanut butter, peanuts, or other nuts, seeds, or butters made from them.</li> </ul>
Breads, Cereals, and Grains	<ul style="list-style-type: none"> <li>• Avoid whole grain kernels, such as wheat berries and whole kernel corn. Instead, cook and mash whole grain kernels.</li> <li>• Avoid crackers, breads and muffins with seeds, nut pieces, popcorn or large whole grain kernels.</li> </ul>
Cheese	<ul style="list-style-type: none"> <li>• Avoid feeding chunks of cheese; instead, cut cheese lengthwise, into strips or small slices.</li> </ul>

### Using Commercially-Prepared Baby Foods

Today's commercially-prepared baby foods are a convenient, safe, sanitary and nutritious food source for infants learning to eat solid foods. Many jarred fruit and vegetable baby foods have added vitamin C. Baby foods can be costly, but smart shoppers can save money by using coupons, comparing prices, and buying brands on sale. WIC provides some commercially-prepared baby foods. Here are some guidelines for parents:

**Choose single-ingredient baby foods** –It is best to offer plain foods instead of mixed dinners, cobblers, puddings or custards, which tend to have a lot of added sauces, flavorings or sugar.

**Check lids/jars** – Before opening, rinse off the lid (to wash off any dirt or contaminants) and check to see if the dome on the top of the jar is depressed. If the dome has popped up before opening, do not use that jar. This means the vacuum seal is broken. Someone may have opened it in the store or it may not have been sealed properly by the manufacturer. The lid should make a popping sound when opened.

**Check jars for “use-by” dates.** Do not buy past the use-by date. If jars are sticky or stained that may indicate the jar has been cracked and the food has been exposed to bacteria. Do not heat any jars or food containers in the microwave because of the possibility of uneven heating of the contents which may burn the baby’s mouth.

**Change texture/thickness** – As a baby’s feeding skills progress, offer intermediate baby foods that offer more texture and thickness to help the baby learn new mouth skills. Once a baby can eat chunkier textures and diced foods there is no need to spend money on the more advanced baby foods designed for older infants. Encourage parents to mash, grind, or cut-up the foods they make at home.

### Making Baby Food at Home

Instead of buying baby food at the store, parents can prepare foods at home for their babies. It can be as easy as mashing up a baked sweet potato or ripe banana. Or, it can be a more involved process of cooking, pureeing, and freezing the final product. The goal is to prepare healthy foods that are the right texture and consistency.

**Cleanliness** – As with any kind of food preparation, it is important to follow basic food safety guidelines to prevent contamination and spoilage. That means washing hands, dishes, and utensils in hot, soapy water and rinsing well.

Hands should be washed with soap and water before feeding, preparing foods or bottles, after changing a diaper, using the bathroom, using tissues, handling pets/animals, or handling any meat or eggs. Caregivers should remember not to reuse a spoon that has been used to “taste test” food.



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**Here are basic tips for making and storing different types of baby food:**

**Fruits and vegetables** – Use fresh or frozen fruits and vegetables (choose frozen items without added salt or sauces). Wash fresh produce before cooking and remove skins, pits, and seeds. (Note: When preparing vegetables like sweet potatoes and acorn squash, its best to first cook the vegetable with the skin on and then scoop the cooked vegetable out of the skin.)

Bake, steam, microwave, or boil fruits and vegetables in just a small amount of water to preserve nutrients. Mash with a fork or put in a blender or food grinder. For a more liquid texture add breastmilk, infant formula, or the cooking water.

Choose canned vegetables that are salt-free. Choose canned fruits without added sugar or packed in their own juice (no syrup). Plain applesauce is also an option.

**Legumes (beans, peas, and lentils)** – Legumes are an excellent source of nutrients for infants. It is best to prepare them without seasonings, salt or fat. Cook the legumes until they are soft enough to easily puree or mash. Canned beans have extra salt, so parents need to drain the liquid from the can and thoroughly rinse the beans with clean water before pureeing or mashing.

**Eggs** – Cook the yolk until hard and mash to the desired texture adding liquid, such as water or breastmilk. The egg should be fully-cooked until “hard,” (no soft cooked eggs).

**Storage tips** – Store homemade fruits and vegetables in a refrigerator for up to 48 hours. Cooked meats and eggs should be used within 24 hours. Home-prepared foods can be stored in a freezer for one month. To store single servings in the freezer, freeze the prepared food in clean ice-cube trays or muffin liners and cover with aluminum foil. Once frozen, remove the food from the tray and store in plastic bags or containers in the freezer. Thaw frozen foods in a dish in the refrigerator or warm them in an oven or pan of water. Throw away any thawed food that is not eaten within 24 hours.

For more detailed instructions, WIC staff can refer to Chapter 5: “Home-Prepared Infant Food”; *Infant Nutrition and Feeding; A Guide for Use in the WIC and SCF Programs (FNS-288)* (2008) from the USDA. Available at: <http://www.nal.usda.gov/wicworks/Topics/FG/CompleteIFG.pdf>.





## **Bisphenol A (BPA)**

BPA is a chemical used in many hard plastics (e.g. baby bottles) and metal based food and beverage cans (e.g. canned liquid infant formula). Recently there have been health concerns over the use of BPA and its potential harmful effects. BPA is currently being studied by the Centers for Disease Control (CDC), National Institutes of Health (NIH) and the FDA. This includes possible exposure of BPA from canned products such as vegetables and beans. The AAP policy statement on BPA recommends that the chemical-management policy in the United States be substantially revised to better protect children and pregnant women (AAP, May 2011). The U.S. Health and Human Services Department (HHS) website states that the six major U.S. manufacturers of baby bottles and infant feeding cups have confirmed to the FDA that as of January 2009, they have not manufactured these products using BPA for the U.S. market.

The following information is pulled directly from the HHS website:

- The FDA has found that powdered infant formula mix typically has no detectable level of BPA.
- Liquid infant formulas that are in cans do have trace amounts of BPA. However, the benefit of good nutrition outweighs the potential risk of BPA exposure. Parents should be advised not to heat these cans on the stove or in the microwave.
- Plastic containers made with BPA used in food preparation have recycle codes on the bottom. In general, plastics that are marked with recycle codes 1, 2, 4, 5, and 6 are very unlikely to contain BPA. Some, but not all, plastics that are marked with recycle codes 3 or 7 may be made with BPA.

The following table lists recommendations released by HHS advising steps that parents can take to minimize exposure to BPA that WIC staff can use as a quick reference guide.

*Table 2.3 Steps to minimize BPA exposure*

1. Follow recommended guidelines to feed your infant.
  - HHS supports the American Academy of Pediatrics' recommendations for infant feeding and supports breastfeeding for at least 12 months whenever possible, as breastmilk is the optimal source of nutrition for infants.
  - If breastfeeding is not an option, iron-fortified infant formula is the safest and most nutritious alternative. The benefit of a stable source of good nutrition from infant formula and food outweighs the potential risk of BPA exposure.
  - Parents should discuss any significant changes to your baby's diet with your baby's doctor or nurse.
2. Discard scratched baby bottles and infant feeding cups.
  - Worn baby bottles and cups are likely to have scratches that harbor germs and—if they contain BPA—may release small amounts of the chemical.
3. Temperature matters.
  - Be careful how you heat up your child's breastmilk or formula. Studies have found there is a very small amount of BPA in plastics and other packaging materials that can transfer to food and liquids. Additional traces of BPA levels are transferred when hot or boiling liquids or foods come in contact with packaging made of BPA.
  - Do not put boiling or very hot water, infant formula, or other liquids into BPA containing bottles while preparing them for your child.
  - Before mixing water with powdered infant formula, the water should be boiled in a BPA-free container and allowed to cool to lukewarm.
  - Ready-to-feed liquid formula can be served at room temperature or gently warmed up by running warm water over the outside of the bottle.
  - Always remember: Never heat baby bottles of any kind in the microwave — the liquid may heat unevenly and burn your infant.
  - Sterilize and clean bottles according to instructions on infant formula labels. They should be left to cool to room temperature before adding infant formula.
4. Check the labels on your bottles and food preparation containers.
  - As a good household practice, only use containers marked "dishwasher safe" in the dishwasher and only use "microwave safe" marked containers in the microwave.

The HHS website provides additional information, including frequently asked questions on BPA for the public and is a good education resource (<http://www.hhs.gov/safety/bpa>).

Baby bottles and sippy cups manufactured since July 2012 and infant formula manufactured since July 2013 are required to be BPA-free.

In July 2012, the FDA restricted the use of BPA in baby bottles and sippy cups. This means that all baby bottles and sippy cups currently on the market are BPA free. More information can be found at: <http://www.gpo.gov/fdsys/pkg/FR-2012-07-17/html/2012-17366.htm>

In July 2013, the FDA restricted the use of BPA in infant formula cans. This means all infant formula now manufactured is in BPA-free containers. More information can be found at: <http://www.gpo.gov/fdsys/pkg/FR-2012-07-17/html/2012-17366.htm>



### **Activity**

#### **Choking Hazards: Use *Table 2.2 Modifying Foods to Prevent Choking***

**to answer the following questions:**

1. What steps should be taken when serving cheese to prevent choking?
  - A. cut into chunks
  - B. do not give at all
  - C. cut lengthwise into strips
  - D. make round pieces
  
2. It would be appropriate to provide raw carrots as long as they are cut into small strips.
  - E. True
  - F. False

3. Mark all foods/preparations that are appropriate to serve:
  - A. cooked vegetables cut into strips
  - B. cooked hot dogs cut into strips
  - C. whole kernel corn
  - D. peanut butter
  - E. raw, cut apples
  - F. cooked, mashed beans
4. To prevent choking, remove pits, seeds and skins from all fruit before serving.
  - A. True
  - B. False
5. To prevent choking, cook vegetables until soft and cut into short strips.
  - A. True
  - B. False
6. List some foods that are common choking hazards.

## Fluids, Cups and Weaning

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Parents often have concerns about weaning their infant off the bottle and when their infant should start to use a cup, or if they are giving enough fluid to their child. This section will answer these and other questions on these topics.

### Objectives

After reading this section, you will be able to:

- Define water intoxication and dehydration.
- List 3 symptoms each of water intoxication and dehydration.
- State basic recommendations for introducing a cup to an infant.
- Explain the main concern related to “spill-proof” cups.
- Identify recommendations related to weaning.
- List two tips for helping an infant give up the bedtime bottle.

### Meeting Fluid Needs in Older Infants (6 to 12 months of age)

In general younger infants who are getting enough breastmilk or infant-formula need little or no extra water. Older infants receive additional water from foods, and plain water. An infant’s healthcare provider may suggest feeding a small amount of sterile water (about 4 to 8 ounces per day) in a cup once the infant starts complementary foods.

**Water Intoxication** – Giving water over and above that which an infant needs can lead to water intoxication, so it is important to avoid giving too much water. Water intoxication can occur in either formula- fed or breastfed infants and can be life threatening. In addition, giving large amounts of water can take the place of nutrients from other foods and limit calorie intake. Too much water can lead to a feeling of being full or bloating. If giving plain water, it is best to offer small amounts throughout the day, after meals, and give no more than 4 to 8 ounces per day or per the healthcare provider’s recommendations.

It is important for parents to add the right amount of water when mixing infant formula and know the signs of water intoxication. Symptoms may include:



- Edema (swelling)
- Hypothermia (below normal body temperature)
- Irritability, fussiness
- Sleepiness
- Seizures

There are situations in which an infant's water needs are increased. If an infant is experiencing diarrhea, vomiting, fever or has a medical condition such as diabetes, the healthcare provider may recommend additional water. This topic is also covered in the *Infant Formula Module*.

Older infants should not get beverages such as fruit drinks, sodas, sweetened water, sports drinks, tea, coffee, etc. Small servings of 100 percent fruit juice with vitamin C can be part of a healthy diet for an older infant, but caregivers should be reminded that juice is not a required food for infants, as discussed earlier in this module.

**Dehydration** – Dehydration is a condition when not enough water or sources of water are provided to meet the body's needs. Dehydration in infants can lead to death, so it is important to recognize the signs of dehydration which include:

- Low volume or output of urine,
- Dark, yellow urine with a strong odor
- Dry membranes in the mouth; dry (or cracked) corners of the mouth
- No tears when crying
- Sunken eyes
- Lethargy, irritability, restlessness

Infants who are suspected of being dehydrated should be immediately referred to their healthcare provider.

### **Learning to Use a Cup**

Learning to use a cup is a gradual process and an important one too. An infant needs to learn to drink from a cup in order to eventually give up bottle feedings. Learning to use a cup also helps with hand- to-mouth coordination. If juice is offered, serve it in a cup instead of a bottle.

**Getting started** – Most babies are ready to drink from a cup when they can sit up without support, which is usually around 6 months of age. Here are some suggestions for parents:

- First let the baby play with and explore a small plastic cup. Show him how you drink out of a cup.
- Next offer just 1 to 2 ounces of water, breastmilk or infant formula in a small plastic cup without a lid. Help him hold the cup, bring it to his mouth, and tip the cup while he takes little sips. Be prepared for a small mess. Typically, part of the sip gets swallowed while the rest spills out of the mouth.
- Try this at just one meal a day until he starts to get comfortable with the cup. Soon he will be holding the cup on his own. At that point, a training cup is helpful.
- Introducing a cup does not mean giving up the breast. A baby can still continue to breastfeed and use a cup for expressed breastmilk, infant formula, water or fruit juice.

**Types of training cups** – These days, there is a confusing variety of training cups to choose from. Here are some basic descriptions:

- **“Tippy” cups** – Most people use this term to refer to the self-righting cups with two handles and a curved weighted bottom. The weighted bottom makes it easier to set the cup down without tipping the cup over. These cups have a screw-on or snap-on lid with a spout.
- **“Spill-proof” cups (i.e. sippy cups)** – These cups have a special lid with a plastic valve under the spout. The valve keeps the liquid from spilling out, a feature that parents love. Sippy cups are not recommended because children tend to carry the cups around, sipping on large amounts of juice, milk or other sugary liquids all day. This practice can lead to serious problems like tooth decay and excess calories.

There are other concerns too. Some health professionals are afraid the “no-spill” spout might lead to speech problems in some children because the child has to *suck* rather than sip the liquid out through the spout. Another concern is that a child can become dependent on the cup just like a bottle or pacifier. There is also the issue of spoilage and contamination. When a cup goes everywhere with a child, it can get dropped on the ground, shared with other



children (sometimes unintentionally), and left behind in a hot car or somewhere outside, making it easy for bacteria to grow.

**Other types of training cups with lids** – Other training cups have lids that are not spill-proof, meaning there is no valve under the lid. That’s a good thing because parents are less likely to let children carry these cups around. There is one kind of lid that has no spout at all; instead there is an opening that lets the liquids flow out freely. This helps children learn to *sip* instead of suck.

**“Leak-proof” containers with straws** – These tumblers are for older infants and toddlers who have learned to drink liquids through a straw. Drinking through a straw helps develop oral muscles and skills in a positive way. When the straw is hidden away under the flip-top, these cups are “leak-proof.” But when the straw is extended for drinking, liquid can spill out.

**Advice for parents about training cups** – Parents should give some thought to choosing and using training cups, especially now that some health professionals have raised concerns about spill-proof cups. But the problem is not the cups, it is the way children misuse the cups.

Some good advice for parents is to choose a training cup that works well for their infant, and then offer liquids only during meal and snack times. They should not let infants drink “at will” throughout the day from any type of training cup or bottle.

## Weaning

“Weaning” can mean from the bottle or weaning from the breast. Information on weaning from the breast is available in the *Level 2 Breastfeeding Module* and is not covered in this module.

**Weaning from the bottle** – This term refers to giving up bottles and drinking from a cup. Weaning is a gradual process. Infants progress at different rates, but weaning usually starts sometime between 6 to 8 months of age. The goal is for parents to wean infants off bottles to a cup by 12 to 14 months of age.

Feeding solid foods and starting the cup are the first steps toward weaning a baby from the bottle. In fact some infants naturally start cutting back on the amount of fluids they take from bottles as they begin eating more solids and drinking from a cup. For infants who are comfortable with a cup, parents can promote the weaning process by offering a cup rather than a bottle at the feeding of least interest and/or at mealtimes when other family members are also



drinking from cups. They should continue using a cup at this feeding for at least several days before stopping another bottle-feeding.

Some babies are very attached to their bottles and have little interest in cups. The parents of these babies need patience for the weaning process. One tip is to wait to give a bottle until after feeding a snack or meal and offering a cup. That way the baby will not be as hungry and a bottle won't be as satisfying as it would have been before the meal or snack.

Some infants will want to keep taking a morning bottle and a bedtime bottle long after they are weaned from other bottle feedings. **WIC recommends that parents completely wean healthy babies from the bottle by 12 to 14 months of age.** Using a bottle past 14 months increases the chances of tooth decay and delayed development of certain feeding skills. Toddlers who continue to bottle-feed tend to drink so much milk that they will not eat enough solid foods. This means they will not get the right balance of nutrients they need and are at risk for developing problems like anemia and obesity.

**Weaning from the bedtime bottle** – This phrase refers to giving up the bottle that an infant has just before bedtime or naptime. The bedtime bottle can be the most harmful to the teeth if it is filled with a beverage other than water and if the baby goes to sleep with the bottle.

Here are some tips for helping an infant give up the bedtime bottle:

- Offer comforts other than a bedtime bottle. One of the best bedtime routines is to read a book to a child before bed. Offer a stuffed toy or blanket and give lots of affection and attention at bedtime.
- Offer a small snack or beverage from a cup near bedtime. Be sure to clean their teeth before bedtime.
- If an infant or child is in the habit of going to bed with a bottle, put a small amount of water in the bottle instead of formula or milk until the child is weaned completely from the bedtime bottle.



## Digestive Disorders and Other Infant Health Issues

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Almost all babies will experience digestive problems like gas, spitting up, or a small bout of diarrhea or constipation. Some infants may have more serious digestive disturbances that require medical treatment. This module will not cover the various digestive disorders covered in the *Basic Infant Formula Module*. This section will cover common infant health issues such as jaundice, oral health, and weight.

### Objectives

After reading this section, you will be able to:

- Describe the 3 types of jaundice.
- List 2 symptoms for identifying jaundice.
- Identify correct statements about oral health for infants.
- List 3 ways parents can help prevent early childhood dental caries in their infants.
- State the current recommendations for providing vitamin D to infants.
- List 4 symptoms of iron-deficiency anemia.
- State the main sources of lead exposure.
- List 4 symptoms of lead poisoning.
- List 3 things parents can do to reduce an infant's risk of lead poisoning.
- List the available resources for obtaining further information about lead prevention poisoning.
- Identify correct statements about excessive weight in infants.
- Describe general infant safety tips for parents and caregivers.

### Jaundice in Newborns

Jaundice occurs when a substance called bilirubin builds up in the baby's blood giving the skin a yellow appearance. **Bilirubin** is one of the by-products left over after red blood cells break down. Normally the liver removes bilirubin from the blood and sends it to the intestines where it is eliminated in the stool. In many newborns

bilirubin builds up faster than the liver is able to break it down often because the liver enzyme that breaks down bilirubin is immature. As a result, blood levels of bilirubin increase, urine turns a brown color, and the skin starts to look yellow.

**Jaundice usually isn't serious** – Most cases of jaundice are harmless. The jaundice usually goes away on its own once the baby's liver matures. During this time a physician will monitor the baby's bilirubin levels.

**Different forms of jaundice** – The main types of jaundice include:

- **Physiologic Jaundice** – This type of jaundice occurs about the second day of life and generally peaks on the third or fourth day before it begins to disappear.
- **Breastmilk Jaundice** – Breastmilk jaundice generally occurs when the infant is about a week old and peaks at about 10 to 21 days of age; however, it can last as long as 2 or 3 months. If the infant is doing well otherwise (i.e. normal bowel movements, normal growth, normal urine output) the physician will monitor bilirubin and no intervention is needed.
- **Not-Enough-Breastmilk Jaundice** – This occurs when the infant is not getting enough breastmilk and is reflected by abnormally high bilirubin levels and/or jaundice lasting longer than usual. In addition, because the infant has low milk intake, bowel movements will be scant and infrequent. Typical reasons for insufficient intake of breastmilk may include low milk production or a poor latch. When breastfeeding is getting off to a slow start, it's critical to provide the mom with lactation support from trained WIC staff or a lactation consultant in the community to assess breastfeeding, identify solutions and encourage moms to continue nursing.

The American Academy of Pediatrics recommends that all newborns see a doctor or nurse sometime around 3 to 5 days of age which is usually when a newborn's bilirubin level is at its peak.

**Treatment for more serious Jaundice** – Sometimes bilirubin can reach high levels that require treatment. One type of treatment involves putting the baby under special blue lights (phototherapy) that converts the bilirubin to a form the baby can excrete in the urine. Another type of treatment involves giving the baby a blood transfusion to remove the bilirubin.



Dangerously high levels of bilirubin can lead to **kernicterus**, a type of brain damage that can cause deafness, developmental delays, and cerebral palsy. Kernicterus is completely preventable if a physician is able to monitor bilirubin levels and provide treatment when necessary.

**Advice for parents** – To avoid problems related to jaundice, it is important for parents to follow these guidelines:

- Make sure their baby is checked for jaundice soon after birth, by 3 to 5 days of age.
- Whenever possible initiate breastfeeding within the first hour after birth and nurse frequently, at least 8 to 12 times a day. If a mother has problems with breastfeeding, refer her to the appropriate WIC staff or her healthcare provider.
- Advise mom to contact her healthcare provider if there is a concern. Even though jaundice is very common and most cases are not serious and do not require treatment, it is important for a physician to be sure the infant's bilirubin levels are not too high.

### Oral Health for Infants

Tooth decay is the most common chronic infectious disease that does not respond to antibiotics and does not heal itself. To ensure that an infant develops and maintains healthy, strong teeth, it is important for parents to provide good nutrition, use proper feeding techniques and keep the baby's mouth, teeth and gums clean, right from the start. The primary teeth (also called baby teeth) and some permanent teeth begin to form in the jaw before birth and keep forming during a baby's first year of life. The first teeth generally begin to erupt around the age of 6 months or later. Developing primary teeth are critical for chewing and eating food, normal development of the jaw bones and muscles, proper placement of the permanent teeth, the appearance of the face, and proper speech development. Since the primary teeth are not fully replaced by permanent teeth until a child is 12 to 14 years old, keeping them healthy and intact during this period is of particular importance.

Several nutrients are necessary for tooth development and include protein, calcium, phosphorus and fluoride. Fiber, such as the fiber from fruits and vegetables, is also an important nutrient as fiber helps stimulate saliva production. Saliva helps protect against dental caries.

**Fluoride** – The *right* amount of fluoride helps make teeth stronger and more resistant to acids that produce dental caries. One source of fluoride for some Oregon communities is tap water that has been fluoridated. If parents are not sure if their tap water contains fluoride they can call their local health department, contact the local water supplier, or ask their pediatric dentist or pediatrician. Families who use well water should contact their county health department to have it tested for fluoride content. Bottled water does not usually contain fluoride. Parents should read all labels for fluoride and check with their healthcare provider or pediatric dentist if there is a concern.

If the water supply does not have enough fluoride, the AAP recommends fluoride supplementation for infants starting at age 6 months. Infants younger than 6 months should not get fluoride supplements regardless of whether they are breastfed or formula fed. It is equally important to understand that too much fluoride over a period of time can cause **fluorosis**, a mottling or staining of the teeth. If a healthcare provider prescribes fluoride, parents need to be sure to give the prescribed amount.

**Dental care starts in infancy** – Parents should start caring for their baby’s gums beginning the first day of life. Dental experts recommend cleaning an infant’s gums by gently using a clean, damp washcloth to wipe and massage the gums after feedings or at least twice a day, including before bedtime. This removes the film of breastmilk or formula from the mouth and gets the baby used to having someone clean their mouth.

As soon as the first teeth erupt, tooth decay can occur, so parents should begin cleaning the teeth as soon as they appear through the gums. Teeth can be cleaned by either wiping or brushing the teeth and gums with a soft clean washcloth or a soft bristled baby-tooth brush and plain water twice a day (morning and evening).

Continue using a clean washcloth to clean those areas in the mouth without teeth. Infants and children under two years old should not use fluoridated toothpaste (unless specifically advised by a pediatric dentist) since they can swallow the toothpaste and get too much fluoride. Parents should keep toothpaste out of a baby’s reach since some babies will eat it straight out of the tube.

**Teething** – As teeth come in (usually around 4 to 7 months), gums can get sore and cause mild irritability, crying, low-grade fever, excess drooling and/or a decreased appetite. During teething, the infant’s gums are red and puffy and the parent may see or feel the emerging tooth.



The following are the Do's and Don'ts for teething:

**Do:**

- Ease an infant's discomfort by using a clean finger to gently rub or massage the affected area.
- Let the infant chew on a clean, cold wet washcloth or a clean chilled teething ring made of firm rubber. Teething rings that go in the freezer can get too hard and may be harmful.
- Clean an infant's gums 2 to 3 times per day with a clean damp washcloth.
- Schedule an appointment with a pediatric dentist after the first tooth erupts, or no later than 12 months of age.

**Don't:**

- Let an infant chew on hard, raw vegetables or ice chips as this is a choking hazard.
- Rub alcoholic beverages on an infant's gums.
- Give infants teething pain medication before mealtime because it may interfere with their chewing. The AAP notes that medications and pain relievers designed to rub on the gums are not very helpful since they quickly wash out of the baby's mouth. (AAP, 2011)

**Avoid spreading bacteria to infants** – Bacteria from an adult's mouth can cause tooth decay in the infant. For example, it is common to see parents bite off or chew a piece of food and give it to a baby. Parents may think they are helping by offering smaller pieces of mashed food, but actually they are passing along bacteria that can cause tooth decay or illness to the baby. Parents can also spread bacteria to their infants by sharing utensils or toothbrushes with the infant, or using their mouths to clean off a bottle or pacifier or test the temperature of a bottle.



**Early childhood caries** – Early childhood caries, previously called “baby-bottle tooth decay,” is a form of severe tooth decay of the primary teeth. Dental caries occur when a baby's teeth are frequently exposed to sugary liquids for long periods of time. Sugar is a natural ingredient found in infant formula, fruit juices, sweetened beverages, cow's milk and breastmilk. Bacteria in the mouth interact with sugar to make an acid that attacks the teeth and over time, lead to decay. Practices such as putting a baby to bed with a bottle of sugary liquid or letting the infant suck on a

bottle or spill-free cup throughout the day can lead to early childhood dental caries.

Early childhood caries typically occur on the front teeth. Parents should periodically check their baby's front teeth for white chalky spots on the teeth along the gum line. White spots are an early sign of decay but, when treated right away can be reversed. Without treatment the decay will continue and a dentist will need to cap or pull the teeth. Tooth decay in young children is painful, costly, and can lead to crooked permanent teeth and speech problems.

A child can also develop psychological or emotional problems that stem from speech impediments or unattractive teeth. To assure that any dental problems are discovered and treated before becoming serious problems, the American Academy of Pediatric Dentistry (AAPD) and AAP recommend that infants receive an oral health risk assessment by a qualified pediatric healthcare professional no later than 12 months of age. Those infants at significant risk of developing dental caries should be evaluated by a dentist between 6 and 12 months. Infants should be taken for their first dental visit after their first tooth erupts or no later than 12 months of age.

Breastfed infants have a lower risk of tooth decay since the mechanics of sucking from the breast and the position of the mother's nipple in the mouth are different from bottle-feeding. Breastmilk does have natural sugars and can still lead to tooth decay if it frequently coats the teeth.

**Tips for preventing early childhood caries** – Here are some guidelines to pass along to parents to help them reduce the risk of tooth decay in their infants:

- Bottles should be used only for feeding infant formula or breastmilk. If juice is offered, use a cup only.
- Do not allow an infant to suck on a bottle while sleeping. Bottles should only be used at feeding times. If the infant falls asleep during a feeding, gently move the infant to stimulate swallowing what is already in the mouth and then put them down to sleep.
- Do not prop a bottle with a pillow or blanket.
- Clean the baby's teeth with a soft, clean washcloth twice a day. A small child size soft bristle toothbrush may be used with extreme care.





- Check the baby's teeth for white spots along the gum line, paying special attention to the top front teeth. If spots are present, caregivers should be encouraged to see a pediatric dentist as soon as possible.
- Begin to shift from bottle feedings to the cup starting around 6 months of age or when developmentally ready. Wean the baby from the bottle by 12 to 14 months of age.
- Do not let older infants or toddlers carry around a bottle or a cup filled with infant formula, milk, juice, or sweetened liquid, or use it as a pacifier throughout the day.
- Infants and children don't need sweetened water, soda pop, iced tea, sports drinks, fruit drinks, or other sweetened drinks. Parents should never dip pacifiers in honey, sugar, syrup, or other sweetened liquid.
- Limit foods and drinks that are sugary, sticky, starchy or chewy.
- These foods and beverages can easily stick to the teeth and gums and increase the risk of tooth decay.
- Do not let your infant suck on lemons or limes. Foods with a lot of acid can destroy tooth enamel.
- Provide healthy infant snacks and foods.

### Vitamin D and Rickets in Infants

The skin produces vitamin D when it is exposed to the sun. Nature intended sunlight, not food to be the primary source of vitamin D for humans. There are very few dietary sources of vitamin D. Food sources include milk-based infant formula, fortified milk products (e.g. cheese, yogurt), flesh of fatty fish (e.g. salmon, tuna, mackerel), beef liver and egg yolks. Breastmilk is a source of vitamin D, but only contains a small amount.

Without enough vitamin D, such as when there is limited sun exposure and lack of dietary resources, rickets can occur.

**Rickets** is a vitamin D deficiency disease that affects skeletal growth in infants and children, making bones soft and weak. Doctors in the U. S. continue to report cases of rickets among infants and children. Dark-skinned infants and children are at higher risk since darker skin produces less vitamin D.

Experts recommend limiting the amount of sun exposure in young infants due to concerns of an increased risk of skin cancer resulting from early sun exposure. Given the limited dietary



sources and risks associated with early sun exposure and due to an increase in the number of rickets cases in the U.S., the AAP revised their vitamin D recommendations in 2008.

The AAP recommends that all infants and children get a minimum of 400 IU of vitamin D per day starting within the first few days of life (AAP, 2016). Since vitamin D is added to infant formula, infants who drink at least 32 ounces per day get the vitamin D they need from the infant formula. Breastfed infants and infants consuming less than 32 ounces of formula need to get the extra vitamin D from liquid vitamin drops.

Vitamin D deficiency is also a concern because it may interfere with adequate absorption of calcium and phosphorous which are needed for proper bone formation and tooth mineralization. Vitamin D is also discussed on page 7.

### **Iron-deficiency Anemia**

Iron is a part of red blood cells and helps carry oxygen to different parts of the body. Most full-term infants are born with enough iron stores to last about the first four months of life. Preterm and low birth-weight infants are born with lower iron stores that typically last only two to three months.

Young infants get iron from breastmilk and iron-fortified infant formula. Once they start eating solid foods, it is important to include iron containing foods into their daily diet. Iron sources include meats, iron-fortified infant cereal, dried beans, and various enriched or fortified bread and cereal products.

Iron levels will start to drop if an infant does not get enough iron in the diet. As the infant's iron status worsens, the blood cells are not able to carry as much oxygen and the baby can develop **iron-deficiency anemia (IDA)**. IDA can also increase the body's ability to absorb lead. Lead poisoning is discussed in the next section.

Symptoms of iron-deficiency anemia may include:

- Weakness
- Tiredness
- Rapid heartbeat
- Irritability
- Loss of appetite

- Stalled growth
- Disturbed sleep
- Pica (eating anything that is not food)
- Pale skin on gums, nails and lines of eyes

Extreme cases of iron-deficiency anemia can lead to serious irreversible problems like:

- Learning problems
- Psychomotor difficulties
- Decrease in immune function

WIC clinics screen babies for anemia around 9 to 12 months of age using either hematocrit or hemoglobin tests as screening tools. If an infant is potentially anemic, a nutritionist should provide counseling and if appropriate, refer the baby to a health care provider. Treatment usually involves iron supplementation. Iron is also discussed on page 7.

## **Lead Poisoning**

Lead poisoning is entirely preventable. Even so, it is a major public health problem among certain groups of infants and children. Lead is a heavy metal that can be found in the air, water, food, dust and soil. Lead poisoning occurs when lead builds up in the body, often over a period of months or years.

Infants and young children are more vulnerable to lead poisoning because a younger child's digestive system absorbs lead more easily. Also, typical infant and toddler behaviors (i.e. putting hands and toys in the mouth, playing and crawling on the floor or the ground, and chewing on window sills or other surfaces) increase the risk of lead poisoning. When a young child ingests lead it can affect the developing brain and cause learning and behavioral problems. It can also harm the kidneys and other organs.

Infants with lead poisoning do not always look or act sick. Symptoms of lead poisoning are often mistaken for other problems.

Symptoms can include:

- Fatigue
- Tingling hands and feet
- Irritability

- Anemia
- Diarrhea/constipation
- Nausea
- High blood pressure
- Weight loss

Extreme cases of lead poisoning can result in:

- Convulsions
- Coma
- Death

A blood test is the only way to know if a baby has lead poisoning. It is recommended that all children be tested at ages 12 months and 24 months.

**Sources of lead exposure** – The main sources of lead exposure in the U.S. are lead-based paint and contaminated dust in older homes and buildings. Lead-based paints were banned for use in housing in 1978. However, many children live in older homes or apartments that still contain lead based paint and there is potential for children to be exposed to peeling paint and ingest paint chips.

Other sources of lead include:

- Contaminated soil outside of older buildings with exterior lead-based paint (lead gets into the soil as the paint breaks down).
- Imported lead glazed pottery.
- Water from lead pipes or pipes with lead solder.
- Traditional home remedies like *azarcon*, *greta*, *pay-loo-ah*, and *litargirio*, which all contain very high amounts of lead (some people use these home remedies for stomach ailments and other health problems).
- Some women who experienced pica during pregnancy give birth to infants with elevated lead levels in the blood.

**Preventing lead poisoning** – Lead poisoning can be prevented with good hygiene and safety practices. The tips below are especially important for families who live in older homes or buildings where lead paint was used.



Infants put their hands and toys in their mouths a lot, which puts them at higher risk for lead poisoning.



- Wash the baby's hands and face with soap and water before meals and at bedtime.
- Frequently wash toys and pacifiers with soap and water.
- Vacuum carpeted floors, wet mop floors, and wet wipe window parts.
- Create barriers in older homes to protect children from lead sources (for example, put tape over lead-painted window sills or door frames or plant grass in bare soil areas).
- Keep the baby away from peeling, chipping or flaking paint.
- Keep the baby from eating non-food items.
- Keep the child away from bare soil areas near old buildings.
- Don't use hot tap water for food or drink. Run cold tap water for 1-2 minutes in the morning and fill a pitcher with the water. Then use this water for drinking, cooking and formula preparation.
- Don't use home remedies to treat a child's illness.

**Reducing lead exposure from food** – The following guidelines are recommended to reduce an infant's possible exposure to lead from foods:

- Do not feed the infant any canned imported foods or beverages. These cans may have lead seams can transfer to the foods inside the can (cans in the U.S. are not soldered with lead).
- In preparing, cooking, storing, or serving foods for an infant:
  - ◆ Avoid using glazed ceramic ware or pottery, especially if imported from another country, for cooking or storing food or beverages;
  - ◆ Do not use leaded crystal bowls, pitchers, or other containers to store foods or beverages;
  - ◆ Never cook or store foods in antique or decorative ceramic or pewter vessels or dishes;

- ◆ Do not use antique utensils for preparing or serving foods; and
- ◆ Store foods or beverages in plastic, stainless steel, or regular glass containers.

**Nutrition is important too** – A healthy diet can help protect an infant from lead in several ways. A full stomach absorbs less lead than an empty stomach, so regular meals are important. Include foods rich in iron and calcium such as lean meats, fortified cereals, cooked egg yolks, greens, yogurt, and cheese, if developmentally appropriate. Foods rich in vitamin C are also important since they help the body absorb iron.

For more information on lead – Parents should talk with their healthcare provider or their local health department.

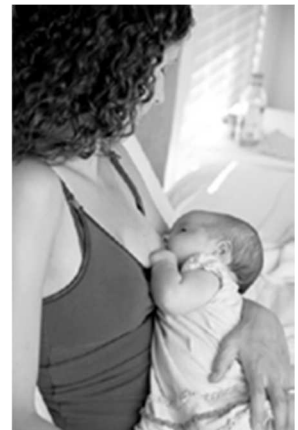
### Excessive Weight in Infants

Previously healthcare providers were not as concerned with babies who were at higher weights in infancy because infants usually lost the extra baby fat by the time they were toddlers. However, due to the prevalence of childhood obesity in the United States, infants at risk for becoming overweight or obese, or those currently in those classifications, need to be evaluated. Early intervention is the key for reversing this trend.

The weight status of the biological parents can tell you something about the infant's risk for overweight or obesity. If the mother was obese at the time of conception or at any point in the first trimester of the pregnancy, or if the biological father is obese, then the baby has a higher risk of becoming obese.

One positive thing a mother can do to try to lower her infant's risk of obesity is to breastfeed. Experts have found that human milk may have certain physiologic factors that might decrease the risk of obesity. Also, it is likely that positive feeding and parenting patterns related to breastfeeding play a role in helping many breastfed children achieve healthy weights.

**Consider feeding practices** – Inappropriate feeding practices can lead to weight gain in infants. Some possible questions to ask parents include: How is the infant formula being mixed? What is offered in the bottle? How does the baby show that they are hungry or full? If an infant's weight is a concern, they can be referred to a nutritionist.



The goal is to help parents make some basic changes so that the *rate* of weight gain will slow down while the infant continues to grow in length.

No matter how much a baby weighs, *NEVER* put a baby on a weight loss diet. Trying to cut back on a baby's intake in an attempt to cause weight loss would be dangerous since the baby wouldn't get the essential nutrients he needs for growth and development. All infants need adequate amounts of breastmilk or iron-fortified infant formula along with nutritious age-appropriate foods throughout the first year of life.

Many parents don't realize that they can help their infant aim for a healthy weight during the first year of the baby's life (see *Boxes 2.2a–2.2c*). By following proper infant-feeding practices, developing a positive parent-child feeding relationship, and encouraging their infants, as well as themselves, to be physically active, parents can make a difference.

## Tips for Promoting a Healthy Weight During Infancy

### *Box 2.2a Healthy Infant Feeding Practices*

- Breastfeed – breastfed babies appear to have a lower risk of becoming overweight or obese.
- Dilute infant formula properly – if the infant formula is too concentrated, then it is higher in calories than what it should be.
- Wait until a baby is developmentally ready before starting solids (wait until at least 4 to 6 months of age, although many experts suggest waiting until about 6 months of age).
- Feed solids with a spoon. Do not put infant cereal in a bottle or infant feeder.
- If juice is offered, do not give more than 4 ounces of 100 percent fruit juice per day, or offer only occasionally.
- Offer healthy foods and snacks like soft fruits, cooked vegetables, cooked beans, tender meats and whole-grain breads and cereals. Avoid empty-calorie foods and drinks like baby food desserts, cakes, cookies, doughnuts, candies, pastries, chocolate, fries, chips, hot dogs, sausage, bacon, sweetened drinks, sodas, fruit punches, etc.
- Serve plain foods to the baby. Do not add butter, oils, sugar, or sauces to foods.
- Check the nutrition labels on baby food jars. Avoid those with added fats, sugars, tapioca, starches, and other fillers.

*Box 2.2b Develop a Positive Feeding Relationship*

- Follow the baby's hunger and fullness cues. Don't force a baby who is full to empty the bottle or finish a jar of baby food. Set appropriate limits on choices and model healthy food choices.
- Don't automatically feed an infant every time he cries. Learn to tell why a baby is crying; is he hungry or is something else bothering him?
- Don't use food as a reward, a bribe, or for comfort.
- Take responsibility for the infant's diet and overall health. Be aware that other people who feed the baby, such as older children, grandparents, and babysitters, may not be as particular about the types of foods they give the baby.
- Provide positive attention to the baby at times other than feeding times.
- Respect the infant's food likes, dislikes, and needs. Don't turn mealtime into a power struggle.

*Box 2.2c Encourage Physical Activity*

- Encourage the infant to be active by playing with him and letting him roll over, crawl, or walk during the day. Don't keep the baby in a playpen or an infant carrier for too long. (Caution: Parents should childproof the home and closely supervise infants.)
- Infants and children younger than 2 years of age should not watch television. Watching television is a very passive activity and it replaces time that could be spent doing something active. TV and other electronic media can get in the way of exploring, playing and interacting with parents and others, which encourages learning and healthy physical and social development. Letting a baby watch television teaches the child a habit that's hard to break.
- Try playing and talking with the baby after feeding rather than encouraging the baby to sleep.

**Infants with Special Health Care Needs**

Conditions like genetic diseases, physical disabilities, and developmental disorders can have a huge impact on a baby's nutritional needs and nutritional care. For example, some genetic conditions such as **galactosemia** affect the way babies metabolize certain nutrients. These infants require special infant formulas that meet their specific needs. Other conditions, such as Down Syndrome or prematurity can affect an infant's chewing ability, swallowing skills or other motor skills. Those infants typically start solid foods later than a normally developing infant and some



infants have difficulty swallowing foods of certain textures. Some medical problems can make an infant more prone to problems like constipation or reflux. Some infants may need to be fed through a feeding tube inserted directly into their stomach. They often need therapy (e.g. speech therapy, occupational therapy) to help them develop their chewing and swallowing skills when it is time for these infants to learn to eat using their mouths.

As a WIC staff member you will encounter all kinds of babies with many different needs. When providing nutrition counseling for special needs infants keep in mind that they may not be able to follow general feeding recommendations and guidelines. WIC staff can provide valuable support to these families in supporting parents by making appropriate referrals, providing special accommodations as necessary, and helping to ensure that they receive optimum nutrition for their infants.

### **Other Health and Safety Tips**

There are many other health and safety measures that parents should know about besides the nutrition topics we have already addressed. Although these precautions are not directly related to infant feeding, they are still very important.

WIC is a setting where staff can help promote infant health and safety in a number of ways—through one-on-one interaction, group discussion, bulletin boards, newsletters, health fairs, etc. WIC staff should make sure their own clinics are safe for infants and young children. *Box 2.3* lists a number of safety tips for parents and caregivers to keep in mind.



*Box 2.3 Baby Safety Tips for Parents and Caregivers*

- Put the baby to sleep on his back to help reduce the risk of Sudden Infant Death Syndrome (SIDS).\*
- Don't smoke around infants and children.
- Don't put the baby in a crib with toys or soft bedding like pillows or blankets. Use tight fitting bed sheets. Don't use crib bumpers.
- Never leave the baby alone with pets or small children.
- Closely watch the baby near a toilet, tub, wading pool, bucket or any other container holding water. Always stay with the baby during a bath.
- Never step away from a baby that is on a changing table, counter top or other high surface. Use gates to block off stairways.
- Anchor bookshelves to the walls, as well as other heavy furniture that can topple over.
- Keep small objects away from the baby to prevent choking.
- Put away breakables, sharp objects and any other hazards that are within 3 feet of the floor. Cover sharp furniture corners and fireplace corners. Cover electrical outlets with safety caps. Remove glass coffee tables or end tables.
- Keep curtain and drapery cords and other cords out of reach of infants and small children.
- The law requires all children be fastened in a passenger safety seat system for children 8 years and younger and below a height of 4'9". NEVER let a young infant or young child ride in the front seat or ride without a safety seat (i.e. infant seat or booster seat).
- Keep household cleaners, medicines and other hazardous compounds out of reach.
- Schedule and keep appointments for well-baby visits and immunizations.

\*One rare exception to putting a baby to sleep on his back may be when a physician instructs parents of an infant with gastroesophageal reflux disease to put the baby on his tummy during sleep. This recommendation is "only considered in unusual cases where the risk of death from complications of GER outweighs the potential increased risk of SIDS" (Arguin and Swartz, 2004). In those select cases it is critical that parents remove all fluffy bedding from the crib.



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## **Resources**

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**References**

**Glossary**



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## Glossary

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**Anaphylactic shock** – A serious allergic reaction that can lead to death. Symptoms can include dizziness, loss of consciousness, labored breathing, swelling of the throat or breathing passages, low blood pressure and heart failure.

**Bilirubin** – A byproduct of red blood cells after they are broken down.

**Clostridium botulinum** – A group of rod-shaped bacteria that produces the botulinum toxin.

**Developmental readiness** – The development of the physical skills necessary for introducing complementary foods to infants. Developmental Readiness determines the types of appropriate foods and feeding style used with feeding.

**Fluorosis** – An abnormal condition caused by excess intake of fluoride and results in the mottling or staining of the teeth.

**Galactosemia** – A rare genetic metabolic disorder where galactose (a sugar) accumulates in the blood because of an enzyme deficiency that would normally convert galactose into glucose.

**Iron-deficiency anemia** – A type of anemia caused when there is insufficient iron for the body to make hemoglobin, a component of red blood cells that carry oxygen throughout the body.

**Jaundice** – A condition, not a disease, where bilirubin builds up in the blood causing a yellowing of the skin and the whites of the eyes.

**Kernicterus** – A type of brain damage that causes cerebral palsy, hearing loss, visual impairments, or mental retardation and is caused by untreated jaundice.

**Methemoglobinemia** – A blood disorder where there is a high amount of methemoglobin, a form of hemoglobin that cannot carry oxygen to the body's tissues. One of the symptoms can be blue-colored skin or "blue-baby syndrome".

**Rickets** – A condition caused by a deficiency of vitamin D, calcium or phosphorus leading to soft and weak bones.

**Sudden Infant Death Syndrome (SIDS)** – The sudden unexpected death of an infant under one year of age. There is no known cause.

**Tannic Acids** – Water-soluble polyphenols with low nutritional value found in plant foods.



