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# Infant Nutrition Module

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**Nutrition Services Section**  
**Nutrition Education / Clinic Services Unit**  
**Department of State Health Services**

*A companion publication, **Infant Nutrition Module Answer Key**,  
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# Infant Nutrition Module

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# Introduction

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It seems everyone has advice about what to feed a baby — from mothers to grandmothers, neighbors to doctors, and magazines to the Internet. But no one’s advice is quite the same, which can be confusing for new parents. As a WIC staff person, you can be a great resource for factual, practical, and up-to-date information about infant nutrition.

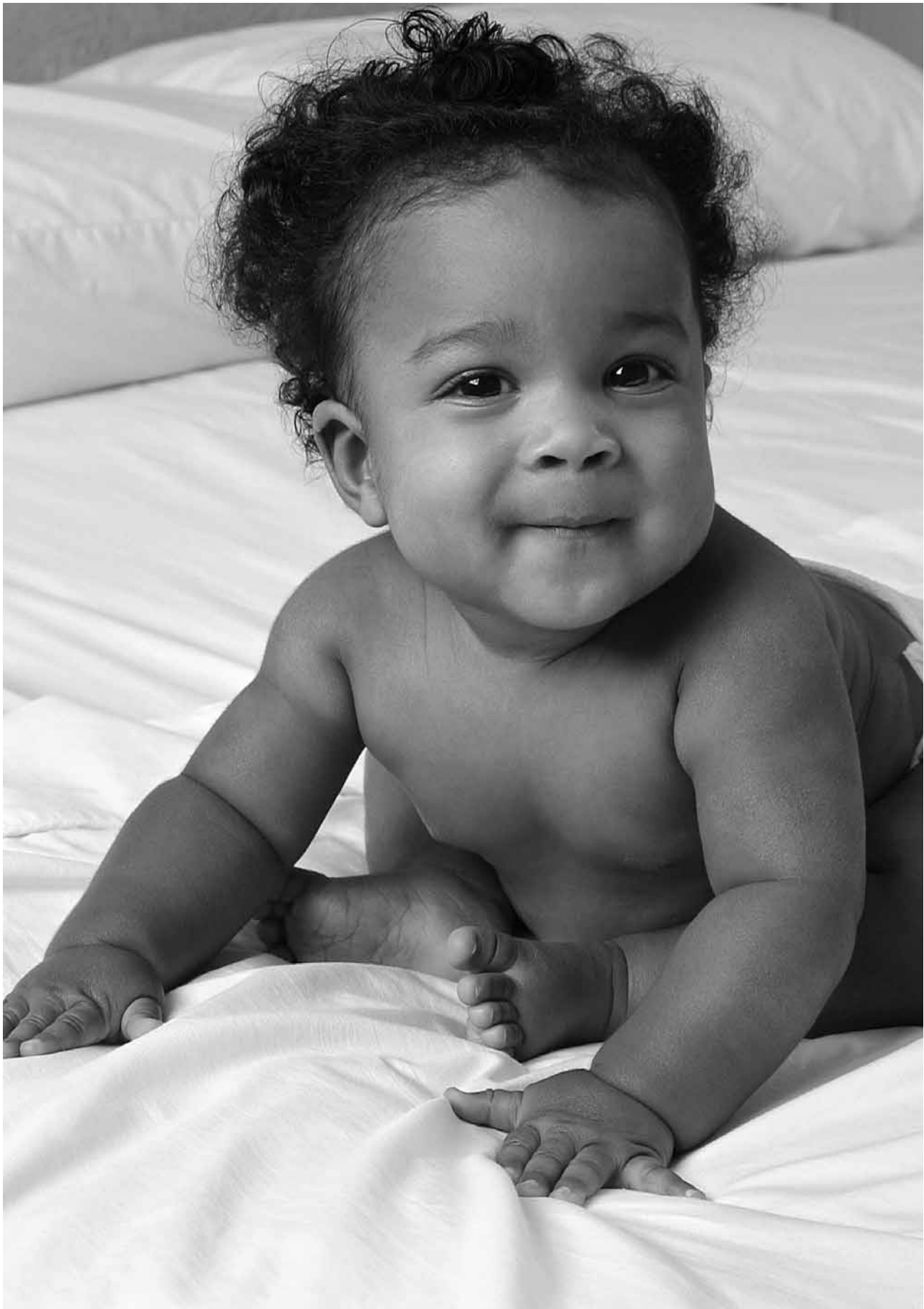
One of the most effective ways WIC staff can improve infant nutrition in their communities is to encourage women to breastfeed. Breastmilk is the best form of nutrition for infants. In fact, many pediatric experts now recommend that women exclusively breastfeed their babies for the first 6 months of life, waiting until babies are about 6 months of age before introducing solid foods.

Of course, there’s more to infant nutrition than breastfeeding. WIC moms and other caregivers want to learn about all aspects of infant feeding, like starting solids, avoiding food allergies, making baby food at home, introducing the cup, and taking care of their baby’s teeth. This module covers these topics, as well as a number of other important infant nutrition issues.

## How to Use This Module

The module is divided into eight parts. The first part is an overview, while the next seven parts cover different feeding stages and topics in more detail. Words that appear in **bold type** are defined in the glossary at the back of the module.

Read each part, then answer the self-test questions before going on. After answering the questions, have your supervisor check them. *Answers to the self-test questions appear in a companion publication, DSHS stock no. 13-37-1.* If you don’t answer the questions correctly, you’ll need to reread the relevant section(s) and find the correct answer(s).





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# Overview: Infant Nutrition During the First Year

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Part 1

## Objectives:

Feeding an infant isn't an exact science, but experts do use scientific research to develop advice about feeding babies. This part of the module is an overview of infant nutrition based on recent research. Specifically, it covers nutrient needs during the first year, changes in oral motor skills, physiological changes, and the parent-child feeding relationship.

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

- indicate what happens when babies are allowed to follow their own feeding schedules;
- compare the fat requirements of infants and adults;
- identify the key nutrient traditionally obtained from sun exposure;
- identify correct statements about infant iron stores and food sources of iron;
- define developmental readiness;
- identify developmental and physiological changes during the first year of life; and
- describe a positive parent-child feeding relationship.

## Nutrition for Growth and Development

Growth during the first year of life is greater than any other time. An infant's birth weight will usually double in four to six months and triple by the child's first birthday. So getting enough calories and other nutrients is crucial for growth and mental development, as well as avoiding problems like anemia and rickets.



Both breastmilk and **iron-fortified infant formula** provide calories, protein, carbohydrates, fat, water, vitamins and minerals. In fact, during the first six months of life, the only food a healthy baby needs is breastmilk or iron-fortified formula. And during the second six months of life, breastmilk or iron-fortified formula should still be the primary fluid. Below is a brief summary of the nutrients an infant needs.

### Nutrient Needs

**Calories (energy)** – Babies need more calories per pound of body weight compared to adults because they grow so quickly. Fortunately, most healthy infants are able to adjust their own intake to get the right amount of calories to meet their energy needs. In fact, when babies are allowed to follow their own eating schedule (eating when they're hungry and stopping when they're full), they usually grow just fine.

**Protein** – Infants need protein to build, maintain, and repair new tissue; to help with body processes; and to make enzymes. During the first six months, breastmilk or iron-fortified formula provides a baby's protein. After starting solid foods, a baby also gets protein from foods like meats, beans, yogurt, cheese, and grain products.

**Carbohydrates** – Carbohydrates are the main source of energy for the body. Most infants consume **lactose**, the main carbohydrate in human milk and standard cow's milk

formulas. Older infants also get other carbohydrates from fruits, vegetables, cereal, bread, and other grain products.

**Fats** – While most adults need to limit their fat intake, babies need plenty of fat. In fact, 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). Essential fatty acids are required for brain and eye development, resistance to infection and disease, and normal growth. So parents shouldn’t severely restrict fat in an infant’s diet.

**Water** – Infants need water to regulate body temperature, for cell metabolism, and to help the kidneys excrete waste products. Newborns get water from breastmilk and formula, while older infants also get water from foods, juices, and plain water. Serious

problems can result when infants get too little water (**dehydration**) or too much water (**water intoxication**). We’ll cover this in more detail in Parts 3 and 6 of the module.



**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. In particular, vitamin D, iron, zinc, and fluoride are especially important for infants.

- **Vitamin D** – A baby needs vitamin D to absorb calcium, develop strong bones, and prevent **rickets**, a disease that makes the bones soft and weak. The skin produces vitamin D when it’s exposed to the sun, and sunlight has traditionally been an important source of vitamin D for infants. But these days, parents are keeping their babies out of the sun due to valid concerns about skin cancer. The American Academy of Pediatrics (AAP) now recommends that infants and children get a minimum of 200 IU of vitamin D per day, starting within the first 2 months of life. (For more information, see Part 8.)

## Part 1



- **Iron** – Infants need iron for proper growth, to form healthy blood cells, and to prevent **iron-deficiency anemia**. Most full-term infants are born with iron stores that last about the first four to six months of life. After that, dietary iron becomes especially important.

Iron-fortified infant formulas provide enough iron to meet an infant's iron needs throughout the first year of life. Breastmilk, in comparison, contains less iron, but the iron in breastmilk is very well-absorbed. Still, after 6 months of age, most breastfed infants need other sources of iron to meet their iron needs.

Iron-fortified infant cereal is a common source of iron for both breastfed and formula-fed infants who are starting solid foods.

Also, some physicians suggest giving pureed meats as an early **complementary** food around 6 months of age, because the body absorbs more iron from meats than from plant sources. Infants also get iron from foods like dried beans, tofu, and enriched grain products. Vitamin C increases iron absorption, so it's helpful to serve foods high in vitamin C along with iron-rich foods.

- **Zinc** – Zinc is a key nutrient for growth and for a healthy immune system, so it's especially important that infants

get enough zinc. Once they start eating solid foods, pureed meats are one of the best sources of zinc for infants.

- **Fluoride** – Fluoride is an especially important mineral during infancy because it strengthens the teeth as they are forming, and makes them more resistant to decay. In fact, fluoride can reduce tooth decay as much as 60 percent.

The main source of fluoride is fluoridated tap water. If the water supply doesn't have enough fluoride, the AAP recommends fluoride supplementation for infants starting at age 6 months (see Part 8 for more information).

## Changes in Oral-motor Skills

How do you know when a baby is ready to try his first spoonful of solid food? Some people may base their answer solely on the baby's age, but there's more to it. You also need to look at his various body skills to see if the infant has reached a stage of **developmental readiness** — a point at which a baby is ready to try new foods, textures and feeding methods.

Learning how to eat involves step-by-step changes in **oral-motor skills**. For example, consider how a baby's mouth skills change over time. At first, a newborn can't chew, but he does have a natural **suck/swallow reflex** that's perfect for sucking breastmilk or formula. Also, a newborn has a strong **gag reflex** that causes him to gag when a spoon or other object is placed in the mouth. By about 4 months of age, the suck/swallow reflex disappears and the gag reflex lessens. Soon the baby can swallow thicker textures without choking. At about 8 months of age, he learns to position food in the mouth and make up and down munching movements. Finally, by 12 months of age, he'll be able to move his jaw diagonally as he chews and moves food to the side or center of his mouth.

Similarly, a baby's hand skills, body strength, and other skills progress during the first year, as shown in Table 1.1. Keep in mind that all infants develop at their own rate. Table 1.1 shows an overlap in ages to allow for differences in development.



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As a baby learns new feeding skills, she becomes developmentally ready to try new foods and feeding methods.

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Part 1

**Table 1.1** *Development of Oral-motor Skills During the 1st Year*

Age Range (approx.)	Oral-motor Skills
0 - 5 months	<ul style="list-style-type: none"> <li>- Lacks good control of head, neck, trunk</li> <li>- Demonstrates rooting reflex*</li> <li>- Exhibits suck/swallow reflex*</li> <li>- Uses tongue thrust reflex*</li> <li>- Demonstrates gag reflex*</li> </ul> <p><i>(*see Part 2 for a description of these newborn reflexes)</i></p>
4 - 6 months	<ul style="list-style-type: none"> <li>- Sits with support</li> <li>- Improves head control</li> <li>- Uses whole hand to grasp objects (palmer grasp)</li> <li>- Early oral reflexes diminish or disappear</li> <li>- Opens mouth when spoon approaches</li> <li>- Uses up/down munching movement</li> <li>- Moves food from front to back of tongue</li> <li>- Draws in upper or lower lip as spoon is removed from mouth</li> </ul>
5 - 9 months	<ul style="list-style-type: none"> <li>- Learns to sit alone, unsupported</li> <li>- Follows food with eyes</li> <li>- Learns to use thumb and index finger to pick up objects (pincer grasp)</li> <li>- Learns to control the position of food in mouth</li> <li>- Uses up and down munching movement, as food is positioned between jaws for chewing</li> </ul>
8 - 11 months	<ul style="list-style-type: none"> <li>- Sits alone easily</li> <li>- Transfers objects from hand to mouth</li> <li>- Moves food from side to side in mouth</li> <li>- Learns to curve lips around rim of cup</li> <li>- Learns to chew in rotary motion (diagonal movement of the jaw as food is moved to the side or center of the mouth)</li> </ul>
10 - 12 months	<ul style="list-style-type: none"> <li>- Learns to put spoon in mouth</li> <li>- Learns to hold cup</li> <li>- Improves eye-hand-mouth coordination</li> <li>- Uses rotary chewing</li> </ul>

**Adapted from:** Feeding Infants – A Guide for Use in the Child Nutrition Programs. United States Department of Agriculture, Food and Nutrition Service, 2001. FNS-258.

So, when is a baby ready to try his first bite of solid food? Most infants are developmentally ready to start solids sometime between 4 and 6 months of age. Some important signs to look for include sitting up with support, good head control, no longer extending the tongue when something touches the lips, and leaning forward and opening the mouth to an approaching spoon. But if, after an initial feeding attempt, the baby pushes solids from his mouth, turns his head away, and/or doesn't welcome a spoon, it's best to hold off and try again in a few weeks or so.

**Some babies develop more slowly** – Some infants learn certain skills a bit later than normal, for no specific reason. Attitude can play a role; some babies are more cautious, while others are more adventurous. Also, medical conditions can delay a baby's development. Examples include: multiple hospitalizations, low birth weight, failure to thrive, cleft lip, cleft palate, Down syndrome, cerebral palsy, abuse or neglect, and not having eaten by mouth for a long time (i.e., fed only from a tube inserted in the stomach or in a vein). Often, these infants aren't developmentally ready for solid foods until six or more months, and they'll usually follow a different schedule for the introduction of solids. So it's always important to look at the infant's developmental readiness before moving on to new foods and textures.

Also, for a premature infant, it's important to consider the infant's **corrected age** rather than his chronological (or actual) age (see *Feeding Your Premature Baby Step by Step*, stock number 13-06-11234).

## Physiological Changes

A baby's body, organs, and vital processes go through many changes during the first year of life. For example, newborns have lower levels of stomach acid and digestive enzymes compared to older infants. So, even though they can digest breastmilk and formula fairly easily, they aren't ready for the proteins, fats and carbohydrates in solid foods. It's not until about 4 to 6 months of age that an infant's gastrointestinal



## Part 1



A newborn's digestive system, kidneys, and immune system aren't mature enough to handle the nutrients in solid foods.

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tract is more prepared to digest and absorb nutrients from solid foods.

Also, it takes time for the baby's intestinal tract to develop its defense mechanisms that help protect the baby from allergic reactions to a food. In fact, health experts recommend that if a baby's family has a history of allergies, the parents should wait until the infant is at least 6 months old before introducing solid foods (see Part 4 for more on allergic reactions to foods).

Similarly, a newborn's kidneys are immature, which means they can't fully excrete the waste products from cow's milk and other foods high in protein. So, for the first four to six months of life, the only food a baby needs is breastmilk or iron-fortified formula.

### The Parent-Child Feeding Relationship



A positive feeding relationship is a two-way communication between the parent and child about food and feeding.

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Another important aspect of infant nutrition is the parent-child feeding relationship. In simple terms, the parent-child feeding relationship involves all types of communication, both verbal and non-verbal, that occur between a parent and child about food and feeding. This feeding relationship begins almost immediately and helps shape the child's eating behaviors for life, so it's important to develop a positive relationship from the beginning.

A positive feeding relationship involves both the parent and the infant. So instead of creating a strict feeding schedule, parents should watch, listen and react to the baby's hunger and fullness cues ("feeding on cue" is discussed in detail in Part 2). 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.



## Summary

- An infant grows more during the first year than any other time after birth. Energy and other nutrients are crucial for growth, development, and preventing deficiency diseases like rickets and iron-deficiency anemia.
- Learning to eat solid foods involves progressive changes in an infant's oral-motor skills. Developmental readiness is a point at which the baby is ready to try new foods, textures and feeding methods. Some babies develop more slowly, especially those with medical conditions like failure to thrive or cerebral palsy.
- The gastrointestinal tract and kidney function mature during the first part of an infant's life, and affect an infant's readiness to progress to new foods and textures.
- The parent-child feeding relationship involves all types of communication, both verbal and non-verbal, that occur between a parent and child about food and feeding. In a positive feeding relationship, the parents watch, listen and react to the baby's hunger and fullness cues instead of following a strict feeding schedule. The infant, in turn, learns to adjust his intake based on his own appetite and energy needs.

## Self-Test Questions

1. *Check the correct answer.* When healthy babies are able to follow their own feeding schedules (eating when they're hungry and stopping when they're full), they usually:

\_\_\_\_\_ eat too much and gain extra weight.

\_\_\_\_\_ don't eat enough and lose weight.

\_\_\_\_\_ adjust their intake to the right amount of calories and grow normally.

2. *Check the correct answer.* Compared to adults, babies need \_\_\_\_\_ in the diet.

\_\_\_\_\_ more fat

\_\_\_\_\_ less fat

\_\_\_\_\_ about the same amount of fat

3. *Fill in the blanks.*

Since parents are keeping babies out of the sun these days, many babies don't produce enough \_\_\_\_\_, a nutrient that babies need for strong bone formation.

4. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ Most infants are born with iron stores that last the entire first year of life.

\_\_\_\_\_ Breastmilk contains less iron than iron-fortified formula, but the iron in breastmilk is very well-absorbed.

5. *Check the correct answer.* Developmental readiness refers to:

\_\_\_\_\_ the point at which a fetus becomes fully developed and is ready for birth.

\_\_\_\_\_ the point at which a baby has acquired new skills and is ready to try new foods, textures and feeding methods.

\_\_\_\_\_ the point at which a breastfed baby is ready to wean from the breast.

6. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ A newborn baby can't chew, but he does have a natural suck/swallow reflex for sucking breastmilk or formula.

\_\_\_\_\_ All infants develop at the same rate and are ready to start solid foods at the same age.

\_\_\_\_\_ A newborn's gastrointestinal tract is fully mature and functional at birth.

7. *Check the correct answer.* In a positive parent-child feeding relationship, the parents should:

\_\_\_\_\_ set up a strict feeding schedule.

\_\_\_\_\_ offer foods and textures that are beyond the infant's feeding skills.

\_\_\_\_\_ watch and respond to the baby's hunger and fullness cues.

\_\_\_\_\_ none of the above.



## Objectives:

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

This part of the module discusses newborn reflexes, feeding on cue, feeding patterns, weight gain, growth spurts, and fluid needs of young infants. After reading this part, you'll be able to:

- identify descriptions of various newborn reflexes;
- list three hunger cues and three fullness cues;
- correctly distinguish characteristics of sleepy infants;
- indicate how to assess if an infant is meeting his energy needs;
- state typical weight changes that occur in newborns;
- identify possible risks related to feeding solids too early;
- indicate the source of water for infants younger than 6 months of age; and
- identify symptoms and scenarios related to water intoxication and dehydration in infants.



Very young infants have reflexes naturally made for breastfeeding. They can't chew and swallow solid foods until they're older.

## Newborn Feeding Reflexes

A baby is born with various reflexes that naturally help the infant learn to feed from the breast.

- **Rooting reflex** – when an object touches the mouth, lips, cheek, or chin, the baby turns his head toward the object and opens his mouth to look for a nipple.
- **Suck/swallow reflex** – after the baby opens his mouth and touches the nipple, he begins sucking movements. Then, as liquid moves into the mouth, the tongue moves it back for swallowing. This reflex helps when feeding from a nipple, but not from a spoon or cup.
- **Tongue-thrust reflex** – When something touches the infant's lips, the tongue extends out of the mouth. This helps prevent the baby from taking in solids before he is ready.
- **Gag reflex** – When any object, such as a spoon or a piece of solid food, is placed toward the back of the mouth, the infant gags and propels the object forward on the tongue. This protects him from swallowing inappropriate foods or objects that might cause choking.

These reflexes are designed to help a newborn learn to suck and swallow milk from the breast. A baby younger than 4 months simply doesn't have the mouth skills needed to eat from a spoon and swallow solid foods.

A baby's early feeding reflexes diminish or disappear by about 4 months or so. Then the infant starts learning new feeding skills that are more suited to eating solid foods. Infants with developmental disabilities might keep these early reflexes for a longer time, and the reflexes can be stronger or weaker compared to other infants.

## Feeding on Cue

“How *often* should I feed my baby?”

“How *much* should I feed my baby?”

“How do I know if my baby's 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. So that means parents should avoid strict feeding schedules. A much better approach is to feed an infant when he shows signs that he's hungry and stop when he shows signs that he's full. 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.

**Hunger cues** – Newborns need frequent feedings of breastmilk or formula during the day and night, especially for the first few months. That's because their stomachs are small and can only hold a small amount at any one feeding. Most newborns will feed eight 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 signs of hunger, or hunger cues. Typical hunger cues include:

- rooting reflex
- hand-to-mouth activity (sucking on a fist)
- small fussing sounds
- facial grimaces where the infant looks like he's about to cry
- crying (however, crying is usually a *late* sign of hunger. It's best for caregivers to respond to the early signs of hunger rather than waiting until the baby is upset and crying.)

**Fullness cues** – It's also important to recognize when a baby is full. Trying to force a baby to take extra formula or breastmilk is usually a hopeless struggle and can lead to a negative feeding relationship. But 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.

A baby who is full shows less interest in feeding. Specific fullness cues include:

- decreased sucking



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This baby is “rooting” or searching for the mother's nipple, a sign that she's hungry and ready to eat.

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## Part 2



It's important to make sure sleepy infants eat often enough and gain enough weight.

- coming off the breast or nipple
- turning away from the nipple, or pushing the bottle away
- showing more interest in other things going on in the room

**Sleepy Infants** - “Sleepy” infants are exceptions to the feeding on cue approach. These babies are especially calm and non-demanding and they tend to fall asleep shortly after the feeding starts. Also some don't 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's 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 baby gets enough to eat, a parent should wait no more than two to three hours between feedings, or according to a doctor's instructions. Then, based on the infant's weight gain, the parents and doctor should discuss whether or not to continue with scheduled feedings.

### **Typical Feeding Patterns and Amounts (0-4 months)**

Intakes of breastmilk or formula can vary quite a bit between infants. For example, one newborn may take in 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. Also, babies will adjust their own intakes from one day to the next to meet their own specific needs. And over time, as an infant grows and stomach capacity increases, he will feed less often, but take in more at each feeding.



So there are no specific guidelines that state exactly how often and how much a baby should be fed. Still, to give you an idea of approximate amounts, Box 2.1 lists some ranges for daily breastmilk and formula feedings.

**Box 2.1 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 - 2 months	8-12+ feedings/24 hours
2 months - 6 months	6-10+ feedings/24 hours

**Formula-Fed Infants:**

7 - 8 lbs .....	16-23 oz (2-4 oz every 2 to 3 hours)
8 - 10 lbs.....	21-26 oz (3-5 oz every 3 to 4 hours)
10 - 12 lbs.....	24-28 oz (4-6 oz every 3 to 4 hours)
12 - 16 lbs.....	29-39 oz (5-8 oz every 3 to 4 hours)

As a general guideline, an infant will drink about ½ oz 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.



The amount of breastmilk or formula an infant takes in 24 hours will vary depending on an infant's age, size, activity level, and growth spurts.

## Part 2

**Counting wet diapers** – To help gauge 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 six 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.

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

While it's 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 level 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. A healthy baby usually has several check-ups during the first month and then periodic visits through four months of age.



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. Infants usually double their birth weight by 4 to 6 months of age and triple it by 1 year of age.

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 his own feeding pattern will increase his intake when he's having a growth spurt. A breastfed baby will naturally start feeding longer or more often, which stimulates the mother's breast to produce more milk. But 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're getting, parents should offer more formula.

### “When Will My Baby Sleep Through the Night?”

Sleeping through the night is a big milestone that many parents look forward to celebrating. But it's important for caregivers to understand that infants *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, but the research doesn't support this idea. Instead, 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.

Still, some parents will give infant cereal to their babies as early as 1 or 2 months of age in hopes of getting their infants to sleep through the night. Since these babies aren't developmentally ready to eat from a spoon, parents will add cereal to a bottle or use a syringe-type **infant feeder**. These practices increase the risk of choking and can result in problems like constipation, diarrhea or food allergies. Also, an infant who gets solid foods in place of breastmilk or formula might not get enough calories and nutrients to



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

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## Part 2

grow and develop properly. That's because infant cereal and other baby foods don't 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 and/or iron-fortified infant formula are the only foods an infant should have during the first 4 to 6 months of life. Lastly, parents should realize that "sleeping through the night" usually isn't permanent, since many babies resume night feedings during growth spurts or teething.



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Healthy young infants don't need plain water. They get all the fluids they need from breastmilk or properly-diluted formula.

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

Water is an essential nutrient. Under normal circumstances, healthy infants get all the water they need from breastmilk or properly-diluted formula. So there are no recommendations to routinely give plain water to young infants. In fact, feeding extra water can cause an infant to cut back on breastmilk or formula, which reduces the baby's nutrient intake.

However, in *very* hot weather, and especially where there's no air conditioning, it might be appropriate to offer a few ounces of plain water to formula-fed or partially-breastfed babies. For young infants, a health-care provider should 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. If parents are concerned, they should check with the baby's health-care provider.

### **Avoiding Dehydration and Water Intoxication in Infants**

Certain circumstances can lead to either dehydration or water intoxication in infants. Both conditions are serious and can be fatal.

**Water intoxication** – This condition occurs when an infant gets too much water or fluids. For example, water intoxication

can result if a family is running low on formula and tries to “stretch” the formula by adding lots of extra water. Other causes include feeding a baby large amounts of extra water because the baby is sick or the weather is very hot. Symptoms of water intoxication include irritability, seizures, convulsions, and difficulty breathing. Water intoxication is serious, so parents should always add the right amount of water to formula. WIC staff should help parents understand the dangers of giving excess water.

**Dehydration** – This condition can occur when an infant doesn’t get enough fluids. For example, a parent worried about a small baby might try to “strengthen” the baby’s formula by using less water than the instructions indicate. Dehydration can also occur if an infant with diarrhea and vomiting doesn’t get medical attention and proper fluid replacement (see Part 7 for more on diarrhea). Parents should know the signs of dehydration: fewer wet diapers, dark yellow urine, dry mouth, no tears when crying, sunken eyes, restlessness, irritability, or lethargy.

Here are some guidelines for caregivers about fluids:

- Be sure to mix formula with the proper amount of water. Don’t try to stretch the amount of formula by adding extra water. Likewise, don’t add less water than the directions call for, unless directed by a doctor.
- There’s no need to routinely offer plain water. In extremely hot weather, it may be appropriate to offer very small amounts of plain water to formula-fed or partially-breastfed babies. Check with a health care provider about amounts.
- Don’t give beverages such as fruit juice, sweetened drinks, tea, etc. in place of infant formula or breastmilk.
- If an infant has diarrhea, vomiting, fever, or other illness, take the baby to a health care provider. Don’t try forcing fluids by giving large amounts of water or other liquids. This could make things worse.
- Know the symptoms of both dehydration and water intoxication. If an infant develops signs of either condition, contact a physician immediately.



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Parents need to mix the right amount of water into the formula. Adding too much or too little water can cause serious problems.

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**Summary:**

- A baby is born with reflexes for sucking and swallowing milk from the breast (rooting reflex, suck/swallow reflex, tongue-thrust reflex, and the gag reflex). These reflexes diminish or disappear by about 4 months of age.
- It's best to feed an infant using hunger and fullness cues, except for "sleepy" babies who don't typically exhibit strong hunger and fullness cues. Daily amounts and feeding patterns vary from baby to baby and from day to day.
- The only way to know if an infant is getting the right amount of breastmilk or formula is to check the baby's growth. Newborns often lose weight the first few days, then return to their birth weight within two weeks. They usually double their birth weight by 4 to 6 months, and triple it by 12 months. Babies respond to growth spurts by feeding longer and/or showing more hunger cues.
- Early introduction of solids does not help babies sleep through the night. Most babies start sleeping through the night around 3 or 4 months of age, when the stomach can hold more food and growth slows down a bit.
- Breastmilk and/or iron-fortified infant formula are the only foods an infant should have for the first four to six months of life. Feeding solids too early increases the risk of choking and other problems, and could decrease breastmilk or formula intake.
- Babies younger than 6 months old don't need plain water. However, formula-fed or partially-breastfed babies may need small amounts of water in very hot weather, especially if there's no air conditioning.
- Water intoxication results from too much fluid and can occur when parents add lots of extra water to formula, or feed extra water to a sick baby. Symptoms include seizures, convulsions, and difficulty breathing. Dehydration occurs when an infant doesn't get enough fluids due to factors like severe diarrhea, vomiting, or not adding enough water to formula. Signs include: fewer wet diapers, dark yellow urine, dry mouth, and no tears when crying.

## Self-Test Questions

1. Choose the correct newborn reflex that matches each description. Use each term only once.

- Tongue-thrust reflex
- Gag reflex
- Suck/swallow reflex
- Rooting reflex

\_\_\_\_\_ If an object touches the mouth, lips, cheek, or chin, the baby turns his head toward the object and opens his mouth, looking for a nipple.

\_\_\_\_\_ When an object, such as a spoon or a piece of solid food, is placed way back in the mouth, the infant gags and propels the object forward on the tongue.

\_\_\_\_\_ After the baby opens his mouth and touches the nipple, he begins sucking movements. As liquid moves into the mouth, the tongue moves it back for swallowing.

\_\_\_\_\_ When something touches the infant's lips, the tongue extends out of the mouth.

2. *List* three hunger cues:

3. *List* three fullness cues:

4. *Check the correct answer.* Sleepy infants:

\_\_\_\_\_ are generally non-demanding.

\_\_\_\_\_ tend to fall asleep shortly after the feeding starts.

\_\_\_\_\_ can become dehydrated and underfed if parents rely too much on hunger and fullness cues.

\_\_\_\_\_ all of the above.

5. *Check the correct answer.* The only sure way to know if an infant is getting enough breastmilk or formula is to check:

\_\_\_\_\_ the number of daily nursing sessions.

\_\_\_\_\_ the amount of formula that the baby takes in each day.

\_\_\_\_\_ the baby's growth.

\_\_\_\_\_ the number of wet diapers per day.

6. *Circle the correct answers.*

Newborns often lose / gain a little weight in the first few days of life, but most return to their birth weight by 2 weeks / 2 months of age. After a baby returns to his birth weight, he should gain about 4 to 8 ounces a week. Infants usually double their birth weight by 4 to 6 months / 10 months of age.

7. *Check the correct answer.* Feeding solids to an infant who isn't developmentally ready:

\_\_\_\_\_ increases the risk that the baby will choke.

\_\_\_\_\_ helps the baby sleep through the night.

\_\_\_\_\_ will cause the baby to drink more breastmilk or formula.

\_\_\_\_\_ all of the above.



8. *Check the correct answer.* Under normal circumstances, healthy infants get all the water they need from:

\_\_\_\_\_ breastmilk and/or properly-diluted formula.

\_\_\_\_\_ juice.

\_\_\_\_\_ plain water.

\_\_\_\_\_ all of the above.

9. *For each statement, indicate either (a) or (b).*

(a) water intoxication

(b) dehydration

\_\_\_\_\_ Routinely adding extra water to “stretch” formula can cause this.

\_\_\_\_\_ Symptoms include: fewer wet diapers, dark yellow urine, dry mouth, no tears when crying, sunken eyes, restlessness, irritability, or lethargy.

\_\_\_\_\_ Symptoms include: difficulty breathing, seizures and convulsions.

\_\_\_\_\_ Without medical attention, severe diarrhea and vomiting can lead to this.

\_\_\_\_\_ Routinely adding too little water when mixing formula can cause this.

\_\_\_\_\_ Force-feeding large amounts of water in hot weather can cause this.



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# Breastmilk and Formula Basics Part 3

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## Objectives:

Breastmilk is the best food for an infant, so it's important for WIC staff to encourage women to breastfeed. Still, for various reasons, many women choose to feed formula to their babies.

Regardless of whether an infant is breastfed or formula-fed, WIC staff should offer sincere and supportive information to help mothers and caregivers feed babies in a safe, healthy, and nurturing way. After reading this part of the module, you'll be able to:

- list three advantages of breastmilk;
- state recommended age for using sanitized water, and for sanitizing bottles and bottle parts;
- state two methods for sanitizing bottles and bottle parts;
- list the basic steps for sanitizing water and preparing infant formula from concentrated-liquid formula;
- identify correct bottle-feeding recommendations; and
- list two reasons why cow's milk is not appropriate for infants.

## Breastmilk

Breastmilk is the preferred source of nutrition for all healthy babies during the first year of life, and it is the only food a baby needs during the first six months. Breastmilk is easier to digest than formula, and it contains natural substances that help protect babies from infections and food allergies. What's more, the nutrient composition of breastmilk is designed



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Breastmilk offers more than just nutrients. It's easily digested, has certain immune properties, and can reduce the risk of various health conditions.

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especially for babies, and it constantly changes to meet the specific needs of the growing infant. Breastmilk costs nothing, requires no mixing, and is always the right temperature.

Also, recent research suggests that breastfeeding may lower the risk of various disorders, including Sudden Infant Death Syndrome, type 1 and type 2 diabetes,

lymphoma, leukemia, Hodgkin's disease, obesity, high blood cholesterol, and asthma. Breastfeeding has also been linked to slightly better performance on cognitive development tests.

This part of the module includes guidelines for feeding *expressed* breastmilk to infants. For information on breastfeeding, common concerns, storing expressed breastmilk, special situations, etc., staff should refer to the Texas WIC *Breastfeeding Promotion & Support Module*, stock number 13-27-1, available from DSHS.

## Infant Formula

Infant formula is designed to be as similar to breastmilk as is technologically possible. Parents should choose formula fortified with iron to make sure their babies get enough iron.



Many kinds of infant formulas are available. For more detailed information on the different types of formula and their compositions, refer to the DSHS Formula Resource Book, stock number 13-174. Some general categories of formulas are listed below, along with a few examples.

- Milk-based formulas (ex: Enfamil LIPIL with Iron, Enfamil with Iron, Similac with Iron, Similac Advance)
- Soy-based formulas (ex: Prosobee LIPIL, Isomil Advance)
- Milk-based formulas with special characteristics (ex: LactoFree LIPIL, Similac PM 60/40 Low Iron, Enfamil AR LIPIL, Good Start Supreme)
- Protein hydrolysate formulas (ex: Nutramigen LIPIL, Pregestimil LIPIL, Alimentum Advance)
- Modular products (ex: MCT oil, Polycose)

**Forms of Infant Formula** – Infant formula is available in three forms: concentrated-liquid, powdered, and ready-to-feed.

- **Concentrated-liquid** formula needs to be mixed with water in a ratio of 1-to-1. That means mixing one 13-ounce can of concentrated liquid formula with one can (or 13 ounces) of water to make 26 ounces of prepared formula. After a can of concentrated-liquid formula is opened, it should be prepared, refrigerated, and used within 48 hours.
- **Powdered formula** is made by mixing the powder with water, based on the directions on the can. Usually, the directions call for mixing one scoop of powder with 2 ounces of water (the scoop is included in the can). Powdered formula is often the best choice for breastfed babies who need occasional formula because it's easy to

## Part 3

make small amounts, and the powder can be stored for up to one month after opening. Once the powder is mixed with water, the prepared formula should be used within 24 to 48 hours, or according to the directions on the label.

- **Ready-to-feed formula** requires no mixing or diluting with water, and is available in bottles and cans of various sizes. It's usually the most expensive choice, but it may be the best choice when the water supply is questionable or when a mother has difficulty correctly mixing concentrated-liquid or powdered formula. Once a can of ready-to-feed formula is opened, it should be refrigerated and used within 48 hours.



**Sanitation** – One of the most important aspects of mixing and using formula is proper sanitation. Intestinal problems in babies are often due to poor water quality or unsafe handling of bottles or equipment rather than sensitivities to the formula itself. That's why it's important to make sure the water is safe for a baby and make sure everything is as clean as possible. This includes bottles, water, hands, can openers, and anything else that comes in contact with the formula. It's also important to follow guidelines for proper storage, both at home and away from home.

**Dilution** – Another key factor in formula preparation is proper dilution. It's very important to mix the concentrated or powdered formula with the right amount of water. Adding either too much or not enough water can lead to serious health problems for the infant. Only a physician should prescribe a dilution or recipe that's different from the manufacturer's directions.

### **Mixing and Storing Formula**

Here are guidelines that you can pass along to caregivers to help them prepare, store and use formula correctly and safely:

**Sanitizing bottles** – The safest practice during the first three months of life is to boil bottles and bottle parts. This is especially true when the water quality is questionable. Some physicians might tell parents to simply wash bottles in hot, soapy water or in the dishwasher, as this may be adequate for healthy newborns in many situations. Still, WIC advises participants to boil bottles since that is the best method for killing bacteria. To boil bottles:

- Wash all bottle parts with hot, soapy water and a bottlebrush. Be sure water passes through the nipple.
- Rinse in hot water. Then place all bottle parts in a large pan, cover with water, and boil for five minutes.
- Remove items from pan, place on a clean cloth or paper towel, and air dry.

Once a baby is three months old, it's usually fine in most situations to just wash bottles by hand or in a dishwasher.

**Sanitizing water for mixing formula** – For at least the first three months of life, WIC recommends sanitizing water by boiling it for one minute and then cooling it. All types of water should be sanitized, including bottled drinking water and distilled water.



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It's important that bottles are thoroughly clean. The safest practice for the first three months of a baby's life is to routinely boil bottles and bottle parts.

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Parents can sanitize water for formula by boiling water for one minute and then cooling it.

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For healthy infants 3 months and older, it's not necessary to sanitize the water unless a physician recommends it; or if the water quality is poor or questionable, as in the case of well water, caregivers should continue to boil the water or use bottled water.

### **To properly boil water:**

- Run cold tap water for one to two minutes before collecting the water in a clean pot or kettle. Running the water helps reduce the amount of lead in the water in case the pipes contain lead. Never use hot water from the faucet to make baby formula or for cooking.
- Bring the water to a rolling boil and boil for one minute. One minute is long enough. Boiling the water for a longer time can concentrate lead in the water. Next, turn off the heat and cool the water with the lid on, either on the stove or in the refrigerator.

**Mixing the formula** – It's important to follow the manufacturer's instructions about how much water to add to the formula, unless a physician prescribes a different dilution. There are several different options for filling and storing bottles, depending on how many bottles someone prepares at one time. See Box 3.1 for step-by-step instructions.

**Storage** – Store prepared formula in the back of the refrigerator, which is the coldest area. To prevent spoiling, don't keep prepared formula at room temperature, and throw out any prepared formula that isn't used within 48 hours. Don't feed a baby a bottle that's left out for more than two hours.

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Parents should follow the dilution directions on the can, unless a doctor has given different instructions.

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### ***Box 3.1 Preparing Infant Formula, Step-by-Step***

- Check the formula's expiration date on the label or lid to be sure it hasn't expired. Also, check the formula label for the proper dilution instructions. It's very important to add the right amount of water. Only a physician should prescribe a dilution that's different from the directions on the can.
- Wash hands thoroughly with soap and warm water. Then use hot, soapy water to wash a pitcher, its lid, and any other utensils you'll use (can opener, measuring cups, etc.). Rinse with boiling water. Have sanitized bottles and water ready and standing by (see directions on page 3-5).
- *If using concentrated-liquid formula* – Before opening, shake the can, and rinse off the top. Open with a clean can opener. Mix one part concentrated-liquid formula with one part water that has been boiled and cooled. If you're using the whole can, mix the 13 ounce can of concentrated formula with a 13 ounce can of boiled and cooled water in the clean pitcher. Stir to mix thoroughly and pour into sanitized bottles. Or, instead of using a pitcher to make a large batch, another option is to mix a smaller amount directly in a sanitized bottle (mix one part concentrated formula with one part water). After a can of liquid formula is opened, refrigerate and use within 48 hours. Throw away unused formula after 48 hours.
- *If using powdered formula* – Follow the directions on the can for measuring the water and powder. Usually, the directions are to add one scoop of powder to 2 ounces of water. Start by measuring the sanitized water into a clean pitcher. Next, add the correct amount of powdered formula to the water in the pitcher. Stir or shake the mixture thoroughly. You can mix enough for a full day's supply or make smaller amounts using sanitized bottles as the mixing containers. After adding the water, stir or shake the mixture thoroughly. Powdered formula can be stored in the can for up to a month, but once the powder is mixed with water, the prepared formula should be used within 48 hours.
- Another option is to store the boiled water in the refrigerator (either in the container it was boiled in or in sanitized bottles), and then mix formula as needed, using a bottle as the mixing container. Boil fresh water on a daily basis.



### **Warming Formula or Expressed Breastmilk**

Babies can drink formula or breastmilk that is either room temperature, slightly cooler, or slightly warmer. If a baby prefers a warm bottle, caregivers should be careful to not warm the liquid beyond body temperature. The best method is to set the bottle in a pan or bowl of warm water for a few minutes, or hold it under warm tap water and then shake the bottle after warming. A few drops of formula on the inside wrist is a good test of temperature. If it feels neither warm nor cold on the wrist, it's the right temperature for a baby.



Parents should never use a microwave to heat infant formula or expressed breastmilk because the liquid can get hot enough to cause serious burns. Even though the outside of the bottle or several drops on the wrist may feel cool, the liquid can heat unevenly inside the bottle. What's more,

formula in bottles with disposable plastic liners can become so hot that the plastic liners burst. Also, heating breastmilk in a microwave can destroy many of the beneficial components of breastmilk.

### **Feeding a Bottle of Formula or Expressed Breastmilk**

Here are some guidelines for using bottles to feed formula or breastmilk to a baby:

**Hold the baby** – It's important to always hold a young baby during a feeding rather than propping the bottle up with a pillow or blanket. Propping the bottle deprives the baby of human contact, while holding the baby helps the parent and infant bond with each other. Also, there's a risk the baby will inhale fluid into the lungs and choke or suffocate (aspirate).

What's more, propping bottles can lead to tooth decay and ear infections. Caregivers should hold the baby in the cradle of the arm, partially upright, making sure the infant's head is a little higher than the rest of the body. This keeps milk from backing up in the inner ear, and can help prevent ear infections.



**Tilt the bottle** – Tilting the bottle and holding it at an angle keeps the bottle’s neck and nipple filled with milk. This helps the baby to avoid swallowing too much air, which can be uncomfortable and make the infant feel full.

**Burp the baby** – A baby will naturally swallow air during a feeding, which can lead to fussiness and crankiness. This happens in both breastfed and bottle-fed infants, but it’s more common when drinking from a bottle. Burping the baby often during a feeding helps to release the air and keeps the baby more comfortable. Parents should try burping a bottle-fed baby after every 2 to 3 ounces, even if the baby doesn’t seem uncomfortable.

**Don’t worry too much about hiccups** – Hiccups are also very common in infants, and they usually bother the parents more than the baby. If hiccups happen during a feeding, pediatricians suggest waiting a few minutes before finishing the feeding. Sometimes it helps to burp the baby and change the baby’s position. Also, it might help to offer feedings before a baby is extremely hungry. But again, many babies don’t seem to be bothered by hiccups.



After a feeding, caregivers should empty the bottle since bacteria can grow and multiply in the bottle.

**Throw out formula or breastmilk after a feeding** – When an infant drinks from a bottle, the baby’s saliva enters the bottle and mixes with the formula or breastmilk. This isn’t a problem during the feeding, but if the bottle is set aside, bacteria will grow and multiply, especially at room temperature. Over time, the bacteria in the liquid can reach a level that can make an infant sick. So after a feeding, caregivers should throw out any unused formula or breastmilk and then wash the bottle with soap and hot water.

**Keep formula and breastmilk chilled when traveling** – If a parent plans to take a baby on an outing (shopping, clinic appointment, etc.), the liquid in the bottles should start out very cold, and then be put in an insulated bag with an ice pack or wrapped in a thick cloth to keep them cold. For longer travel times, it’s a good idea to keep bottles in a small ice chest. For formula-fed babies, other options include buying ready-to-feed formula or taking sanitized water in clean bottles along with a can of powdered formula.

**Use bottles *only* for formula, breastmilk, and, if needed, small amounts of water for older infants** – Caregivers should never put juice, fruit drinks, sweetened liquids, cereal or pureed foods in a bottle. *(Exception: A physician might recommend cereal in the bottle to treat gastroesophageal reflux, also called GER. Even though cereal in the bottle is not the recommended method of feeding solids, when a physician has directed a parent to do so, it is the “prescribed” method and part of an infant’s therapy. Do not go against a physician’s treatment of reflux.)*

**Don’t put a baby to sleep with a bottle** – Putting a baby to sleep in a crib or playpen with a bottle can lead to choking, ear infections, tooth decay, and problems with speech later on. It’s best to never start this habit because it’s a hard one to break. If the parents are putting an older infant to sleep with a bottle, encourage them to put a small amount of plain water in the bottle as they work on changing this habit.



**Near the age of 6 months, a baby begins to hold a bottle on his own** – It’s important for babies to learn to self-feed, so parents can let the baby hold a bottle while sitting up. But a baby shouldn’t carry a bottle around and drink from it throughout the day or use the bottle as a pacifier. This practice can lead to tooth decay, choking, and accidents, plus the liquid in the bottle can go bad.

**Introduce a cup sometime around 6 months of age** – Infants should be weaned from the bottle by 12 to 14 months of age (see Part 6 for more information on weaning and introducing a cup).

### **Cow's Milk and Other Milks are not Recommended for Infants**

Cow's milk and other milks are not appropriate for infants under one year of age. That includes whole, reduced fat, and fat-free milk, powdered milk, dry milk, evaporated milk, sweetened condensed milk, goat's milk, and soy milk. Cow's milk and other milks are poor sources of iron and other nutrients that a baby needs. Even though they contain protein, calories, and, in many cases, calcium, they don't have the same balance of essential nutrients that breastmilk and formula provide.

In addition, cow's milk has a higher level of protein and minerals, which can put stress on a young infant's kidneys. Also, a baby's immature digestive system might not be able to break down the protein in cow's milk, which could result in an allergic reaction or gastrointestinal bleeding.

Most healthy infants can make the transition to whole cow's milk after their first birthday. By that time, their kidneys and intestinal tract are more mature, and they're hopefully eating a wide variety of healthy foods that provide a good portion of the nutrients they need.

### **Summary**

- Breastmilk offers many advantages compared to infant formula.
- Infant formula is designed to be as similar to breastmilk as possible. There are many types of formula, including milk-based, soy-based, lactose-free, and hydrolyzed protein formulas. Formula comes in ready-to-feed, concentrated-liquid and powdered forms.
- Sanitation is very important when mixing and using formula. WIC recommends sanitizing bottles and nipples, and boiling the water for mixing formula for at least the first three months of life. Proper dilution and storage are also important.

## Breastmilk & Formula

- Babies can drink formula that is room temperature, slightly cooler, or slightly warmer. Never use a microwave to heat formula or breastmilk.
- Parents should hold a young baby while feeding rather than propping up a bottle. Burping a baby often during a feeding helps to release air and keeps the baby more comfortable. Parents should throw out any unused formula or breastmilk at the end of a feeding.
- Cow's milk and other milks are not appropriate for infants during the first year of life. Most healthy children can make the transition to whole cow's milk after their first birthday.

## Self-Test Questions

1. *List* three advantages of breastmilk compared to infant formula.

2. *Fill in the blank.*

WIC recommends sanitizing bottles and nipples, and boiling the water for mixing formula for at least the first \_\_\_\_\_ months of life.

3. *Fill in the blanks.*

To sanitize bottles and bottle parts, WIC recommends washing them by hand and then putting them in \_\_\_\_\_ water for \_\_\_\_\_ minute(s).

4. *List* the basic steps for:

a) sanitizing water, and

b) preparing 26 ounces of formula using concentrated-liquid formula.



5. *Check* all the bottle-feeding recommendations that are correct.

\_\_\_\_\_ Save any breastmilk or formula left in the bottle after a feeding and use within the next seven days.

\_\_\_\_\_ If you're "on the go," keep bottles of formula or breastmilk cold using an insulated bag and ice pack or thick cloth.

\_\_\_\_\_ If an infant hasn't learned to use a cup, it's okay to offer juice, fruit drinks, sodas and other sweetened liquids in a bottle.

\_\_\_\_\_ Never use a microwave to heat infant formula or expressed breastmilk because the liquid can get hot enough to cause serious burns.

6. *List* two reasons why cow's milk is not appropriate for infants.



## Objectives

A baby's first spoonful of solid food is an exciting milestone for both the baby and the parents. But like other "firsts" in a baby's life, the infant needs to be developmentally ready before starting solids.

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

- indicate the risks associated with feeding solids too early;
- state the recommended age ranges for introducing solid foods to a baby;
- list three signs of developmental readiness that show a baby is ready to try solid food;
- list two reasons why iron-fortified infant rice cereal is a good food for babies;
- identify guidelines for offering a first test feeding of the baby's first solid food;
- identify correct statements about negative reactions to foods among infants; and
- list three ways parents can help infants avoid allergic reactions to foods.

## Part 4

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Parents need to wait until a baby is developmentally ready before starting solids.

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### **Introducing Solids – Not Too Early**

It's natural for parents to be anxious about their infant's development. They compare their infant's progress to books, charts, and other babies, hoping their own baby reaches important milestones on time. Maybe that's why some parents start feeding solid foods at 2 or 3 months of age, long before a baby is developmentally ready. They may feel that starting solids sooner shows their baby is more advanced.

Also, many parents worry that formula or breastmilk doesn't satisfy their baby's hunger, so they think solid foods might help. What's more, cultural practices or misguided advice from friends or family members can lead to early introduction of solids.

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

- **increased risk of choking** – A baby's early feeding reflexes are designed for sucking breastmilk, not chewing and swallowing solid foods.
- **reduced nutrient intake** – A very young infant who starts solids too early is likely to cut back on breastmilk and formula, and in turn, won't get the nutrients he needs for

growth and development during the early months of life. Breastmilk and formula are much more nutrient dense (provide more nutrients per ounce) compared to infant cereal and other baby foods.

- **greater risk of allergic reactions** – An infant’s immune system and intestinal tract aren’t fully developed, and the younger a baby is, the higher the risk of having an allergic reaction to a food. Starting solid foods too early increases the chances of an allergic reaction.

Currently, the WIC Program recommends introducing solid foods to healthy, full-term infants sometime between 4 and 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 developmental readiness and then offer foods and textures that match the infant’s skills.

There is a growing trend among pediatric experts to recommend waiting until 6 months of age before introducing solid foods. For example, the AAP Breastfeeding Policy released in January 2005 recommends exclusive breastfeeding for about the first 6 months of life, and then gradually starting **complementary foods** rich in iron around 6 months of age. The policy does mention that some infants may need to start solid foods as early as 4 months of age, whereas other infants may not be ready for solids until around 8 months of age.

### Changes in the Developing Infant

At about 6 months of age, a baby’s requirements for iron, zinc, and other key nutrients increase. Also by 6 months of age, a baby’s oral-motor skills and body processes develop and mature. All of these changes set the stage for starting solids.

**Changes in oral-motor skills** – By the time a baby is 4 to 6 months old, his rooting reflex, tongue thrust, and suck/swallow reflex have disappeared, and the gag reflex is diminished. At the same time, new oral-motor skills have started to emerge. A baby is developmentally ready to eat solid foods when the infant can:



Between 4 to 6 months of age, an infant’s early reflexes give way to new oral skills geared toward starting solid foods.

## Part 4

- sit up, with help;
- show good head and neck support;
- show a desire for food by opening the mouth and leaning toward the spoon;
- pull in the upper or lower lip as a spoon is removed from the mouth (the baby removes food from a spoon with a sucking action);
- move food from the front to the back of the tongue to swallow;
- keep most of the food in the mouth rather than pushing it back out onto the chin;
- swallow the food without gagging, coughing, or choking; and
- show that he's full by leaning back and turning away, pushing the food out of the mouth, sealing lips together, or pushing the spoon away.

**Physiological changes** – At birth, the gastrointestinal tract isn't able to fully digest solid foods. 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. Also, the infant's immune system matures, so there's less risk of a new food causing an allergic reaction.



The first test feeding is a chance to see if a baby is developmentally ready for a few small spoonfuls of his first food.

### The First “Test Feedings”

When a baby seems developmentally ready for complementary foods, it's time to try a test feeding with the infant's first solid food. Many physicians suggest using iron-fortified infant rice cereal as a first food. But some health care providers may suggest other choices for a first food, especially for infants starting solids around 6 months of age. Whatever the food choice, a baby's first food should be a single food (not a combination of foods) that is nutritious and has a smooth texture and thin consistency.

Iron-fortified infant rice cereal is a popular option because it provides iron, it's easily digested, and parents can adjust the consistency to match a baby's oral-motor skills. And compared to other grains, rice is not likely to cause an allergic reaction. After introducing rice cereal, parents can offer barley and oat infant cereals at one-week intervals, if desired. But they should wait to offer wheat or corn cereal until the infant is at least 8 months old. Wheat is the grain most likely to cause an allergic reaction in infants.

Here are some suggestions for parents for the first “test feedings” with iron-fortified infant cereal or a different first food:

- It's usually best to offer the first solid food *after* feeding some breastmilk or formula. That way, hunger is less of a factor, so it's easier to judge the baby's readiness. Also, he's less likely to get frustrated if he's not overly hungry. On the other hand, if you're trying to feed an older baby who has repeatedly had no interest in eating from a spoon, it might help to offer the baby's first food *before* breastmilk or formula.
- If using infant cereal, mix 1 to 2 teaspoons of cereal with 4 teaspoons of breastmilk or formula so that the cereal is thin. It's best to use breastmilk or formula in order to add protein and fat to the cereal. Simply adding water to the cereal creates a mixture that has only carbohydrate.
- Put the baby in an upright infant seat for support, or hold the baby, or have someone else hold the baby to help reassure him. Offer a tiny bit (about  $\frac{1}{4}$  teaspoon) of the cereal or food using a small spoon. A rubber-tipped spoon is best because it's softer on the baby's tongue and gums.
- If the baby refuses the food, or spits out all of it and shows signs that he doesn't want another spoonful, then wait a few days or weeks and try again.
- If, on the other hand, he likes it, then gradually proceed until he shows signs that he's full. He'll probably just eat a few spoonfuls at first, and that's all he needs. At this point, solid food is helping him learn to handle new textures; it's



This baby isn't ready for solids — she's backing away and won't open her mouth. In this case, it's best to stop and try again in a few weeks.

## Part 4

not contributing much to his nutritional intake — not yet, anyhow.

Soon the baby will learn to move solids to the back of his mouth. At that point, parents can gradually increase the amount of the baby's first food and offer two feedings a day. And, if they're using cereal, they can add less liquid or thicker cereal. Part 5 of this module will discuss the next phase of introducing other foods and progressing to table foods.

### Negative Reactions to Foods During the First Year



Parents can reduce the risk of allergic reactions to foods by holding off on solids until the baby's immune system is more mature (around 6 months of age).

Negative, or adverse, reactions to certain foods are common for some infants, but research shows that delaying solid foods can help reduce the risk of these reactions. A negative reaction to a food falls into one of two categories: food allergies and food intolerances.

**Food allergies** - a **food allergy** is a response by the immune system to a food. In simple terms, if an infant ingests a food that his body sees as an “intruder,” the infant's immune system produces antibodies to destroy the offending **allergen** (or protein) in the food. The resulting symptoms can include coughing, wheezing, skin rashes, hives, diarrhea, and vomiting. In rare but serious cases, the infant may experience **anaphylactic shock**, characterized by symptoms like trouble breathing, severe wheezing and loss of consciousness.

Compared to children and adults, infants are at greater risk for allergic reactions to foods because of their immature immune systems. Fortunately, true food allergies are not common — experts estimate that only 2 to 8 percent of young children have true food allergies, and many children outgrow them by the time they're 4 or 5 years old. Still, allergic reactions can be quite serious, and some allergies, like peanut allergies, can last a lifetime.

Food allergies can be hard to figure out. One reason is that the symptoms may not be obvious or very intense the first time the baby eats the offending food. But if the baby eats the food again, the symptoms may be more apparent or severe.



Also, a reaction can occur right away or it might not happen until hours after eating. Allergic reactions are most commonly associated with eight foods: eggs, cow's milk, soy, wheat, peanuts, nuts, fish and shellfish.

Heredity can play a role in food allergies. If there's a family history of food allergies among other family members, parents should talk with a physician and/or registered dietitian about dietary restrictions and when to offer certain foods.

Regardless of a family's history of food allergies, there are some steps parents can take to help their infants avoid allergic reactions to foods:

- **Breastfeed** – Research suggests that exclusive breastfeeding during the first 6 months of life lowers the risk of allergic reactions to foods.
- **Wait to begin solids** – Delaying solid foods until the baby's immune system and intestinal tract are more mature can help reduce the chances of allergic reactions. For families with a history of food allergy, physicians recommend waiting until the baby is at least 6 months of age before starting solids.
- **Be cautious** – Caregivers should always be cautious when introducing new foods, offering only one new food at a time and watching closely for signs of a reaction. It's best to wait five to seven days between each new food.

In the case of a mild reaction, parents should stop feeding the food and talk with the baby's health care provider before offering the food again. *Severe* allergic reactions are rare in infants less than 6 months of age, but they can happen. Caregivers should call 911 if a baby has signs of anaphylactic shock.

**Food intolerances** – A food intolerance is an abnormal reaction to a food, but unlike an allergic reaction, a food intolerance does *not* involve the immune system. For example, many parents who are lactose intolerant mistakenly believe they're "allergic" to dairy products and then worry their infant will be "allergic" to everything made with cow's milk.



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Many pediatric experts recommend breastfeeding to help reduce the risk of allergic reactions.

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## Part 4

The fact is people who are lactose intolerant aren't able to digest lactose (the sugar in cow's milk and dairy products). They get gas, cramps, and diarrhea. It's a digestive problem, not an allergic reaction.

It's extremely rare for infants to be born with a lactose intolerance. Some babies will experience a *temporary* lactose intolerance after a bout of diarrhea or antibiotic treatment, but the condition goes away once the baby's gastrointestinal tract recovers. A true lactose intolerance usually doesn't show up until later in childhood.

### Summary



- Parents should wait until an infant is developmentally and physiologically ready before giving solids.
- Introducing solids too soon increases the risk of choking, allergic reactions, and decreased nutrient intake (reduced intake of breastmilk or formula).
- The WIC Program currently recommends introducing solid foods to healthy, full-term infants sometime between 4 to 6 months of age. Infants who are premature or developmentally delayed will usually take longer to begin solid foods.
- The AAP Breastfeeding Policy recommends exclusive breastfeeding for about the first 6 months of life, and then gradually starting solids around 6 months of age.
- By 4 to 6 months of age, an infant's early feeding reflexes give way to new skills geared toward eating solids. Also at this age, the GI tract and kidneys are better equipped to handle solid foods and excrete waste products. At about 6 months of age, requirements for iron, zinc, and other nutrients increase.
- Many experts recommend iron-fortified infant rice cereal as a baby's first food. It's easily digested, provides iron, is not

likely to cause an allergic reaction, and parents can change the consistency to match a baby's skills. Parents should start with just a few teaspoons of rice cereal. If the baby refuses the cereal, they should wait a few days or weeks and try again.

- A food allergy is a response by the immune system to a food. The most common foods that cause allergic reactions are eggs, cow's milk, soy, wheat, peanuts, tree nuts, fish and shellfish. To help avoid allergic reactions, parents should breastfeed, not begin solids too early, and be cautious when introducing new foods. Families with a history of food allergies should wait until 6 months of age to start solids and talk with a physician or registered dietitian about dietary restrictions.
- A food intolerance, like lactose intolerance, does not involve the immune system. It's very rare for infants to be born with a lactose intolerance.



5. *Choose the correct answer.* For the first test feeding with the baby's first solid food, it's best to:

\_\_\_\_\_ use several foods all mixed together.

\_\_\_\_\_ put the food in a syringe-type infant feeder.

\_\_\_\_\_ make sure the food has a smooth texture and a thin consistency.

\_\_\_\_\_ none of the above.

6. *Mark each of the following statements **TRUE** or **FALSE**.*

\_\_\_\_\_ Heredity can play a role in the occurrence of food allergies.

\_\_\_\_\_ Caregivers should wait one to two days between the introduction of each new food.

\_\_\_\_\_ If a baby has an allergic reaction to a food, parents should talk to the baby's health care provider before offering the food again.

\_\_\_\_\_ It's extremely rare for infants to be born with a lactose intolerance.

7. *List three steps parents can take to help infants avoid allergic reactions to foods.*



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# Making the Transition to Table Foods

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Part 5

## Objectives:

An infant's eating skills change dramatically between his first spoonful of solid food and his first birthday cake when he turns a year old. During this transition period, parents need to keep up with their infant's developmental changes and offer new foods and textures that match his new eating skills.

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

- state how long parents should wait between introducing each new food;
- identify correct statements related to introducing solid foods to infants;
- identify five vegetables that can cause methemoglobinemia in young infants;
- list three foods that infants shouldn't eat until after the age of 12 months;
- describe the risk related to feeding honey to an infant;
- list six foods that are common choking hazards for infants;
- describe how to prepare a food in order to reduce choking risk;
- identify correct statements related to using commercial baby foods; and
- list tips for preparing foods at home for an 8-month old infant.



As a baby develops his oral-motor skills, he's able to experience new textures and new foods.

## Developmental Changes in Older Infants

During the second six months of infancy, a baby's hand, mouth, and body skills develop rapidly. For example, by about 7 months of age, a baby will be able to sit up without help. At around 8 or 9 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. And by 12 months of age, most babies can easily finger feed, drink fairly well from a cup, and most are starting to experiment self-feeding with a spoon.

**New feeding skills lead to new foods** – As his motor skills progress, a baby goes from eating smooth, pureed and strained foods to mashed foods that are thicker and lumpier. Next, he will be able to eat ground foods and small pieces of bread, crackers and various soft foods. And 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. Table 5.1 shows how feeding skills, foods and textures progress throughout the first year, especially during this transition to table foods.

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

Once a baby is comfortable eating food from a spoon, and is eating rice cereal or a different first food several times a day, it's time to offer other, smooth-textured foods, one at a time. **Appendix A** of this module provides a summary of foods to introduce to developing infants. Below are some general guidelines about introducing new foods:

- **Sequence of solid foods** – Parents often want to know what order to follow when introducing new foods. According to the AAP, there's no special order to follow. The key is to make sure foods are safe, nutritious, and a suitable texture for the baby.


Still, people have their theories as to the order to follow. Some say it's better to give vegetables before fruits so babies don't get used to sweet flavors and reject vegetables later on. Other people point out that breastmilk is sweet, so starting



First foods need to be safe, nutritious and have the right texture, but parents don't need to follow a special order.




**Table 5.1 Progression of Feeding Skills, Foods, and Textures (0 - 12 months)**



<p><b>0 to 4 months old</b></p> <ul style="list-style-type: none"> <li>• uses newborn reflexes designed for breastfeeding</li> <li>• pushes solid foods from mouth</li> </ul>	<p><b>4 to 6 months old</b></p> <ul style="list-style-type: none"> <li>• sits with support</li> <li>• has good head control</li> <li>• uses palmer grasp</li> <li>• most early reflexes disappear</li> <li>• holds mouth open as spoon approaches</li> </ul>	<p><b>6 to 8 months old</b></p> <ul style="list-style-type: none"> <li>• learns to sit alone</li> <li>• learns to drink from a cup with help</li> <li>• learns to keep thicker pureed foods in mouth</li> </ul>	<p><b>8 to 10 months old</b></p> <ul style="list-style-type: none"> <li>• begins grasping with thumb and index finger</li> <li>• learns to control position of food in the mouth</li> <li>• learns to transfer food from hand to mouth</li> </ul>	<p><b>10 to 12 months old</b></p> <ul style="list-style-type: none"> <li>• feeds self with fingers</li> <li>• shakes head “no” when full</li> <li>• learns to eat chopped food and small pieces of table foods</li> </ul>
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**Breastmilk or iron-fortified formula** (*starting at birth*) – During the first year of life, a baby should get only breastmilk or iron-fortified infant formula; infants should not get cow’s milk or any other type of milk.



**Thin pureed foods** (*starting between 4 to 6 months old*) – Parents should wait until the baby is at least 4 months old and showing signs of developmental readiness before starting the baby’s first food. Many experts suggest waiting until about 6 months of age to start solids, especially for exclusively breastfed infants. Iron-fortified infant rice cereal is a common choice for a baby’s first food, but some health care providers may suggest starting with a different choice for a first food.

**Pureed and mashed foods** (*starting between 6 to 8 months old*) – After the baby has gotten used to the idea of eating from a spoon, offer other thin, pureed foods, one at a time. Then progress to thicker pureed foods, followed by mashed foods.

**Finger foods** (*starting between 8 to 10 months old*) – Begin to offer strips or small pieces of dry bread, toast, crackers, mild cheese, soft peeled fruit, cooked vegetables, dry cereals, and teething biscuits. Avoid foods that are potential choking hazards.

**Ground/chopped foods and small pieces of foods** (*starting between 8 to 10 months old*) – Continue to offer a greater variety of textures. Offer ground foods and then finely chopped foods. Then progress to coarsely chopped foods and small bites of table foods.

out with something like fruit or sweet potatoes may actually ease the transition to solid foods and help the baby be more accepting of vegetables and other foods.

There are also different ideas about feeding meats. Some health care providers suggest giving meats after cereal, fruits, and vegetables, somewhere between 6 to 9 months of age. But others suggest giving pureed meats as an early complementary food, soon after a baby starts on solids at about 6 months of age. The reason is that meats supply protein, zinc, and iron, which are all important nutrients for infants, especially starting at 6 months of age.

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



After introducing a new food, parents should watch for signs of an allergic reaction and wait five to seven days before trying another food.

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- **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 guide the food in their mouths, 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's best to start with a small amount (1-2 teaspoons) so the baby can experience the new flavor and texture. In later feedings, parents can gradually work up to a tablespoon or more.
- **Time between new foods** – Parents should wait five to seven days before introducing another new food, watching for signs of a reaction like vomiting, wheezing, diarrhea, or a rash. Also, before trying a mixed food like peas and carrots, the baby should first try each of the foods individually. Also, it's best to offer a new food early in the day, so that there's plenty of time during the day to watch for any reaction.
- **Food safety** – Parents should wash their hands, the baby's hands, and any utensils, dishes, or other items that touch the baby's food. Also, 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 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, keeping the food in the container uncontaminated. Parents can cover and store any uncontaminated food in the refrigerator for up to 48 hours. Likewise, to avoid passing along bacteria, parents shouldn't share eating utensils with the baby or pre-chew food before giving it to a baby.

***Box 5.1 Tips for Feeding Baby Safely***

**Place the baby in a safe, upright sitting position.** Face the infant 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're not rushed and when it's 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's 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. Don't 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**

At first, small amounts of a baby's first foods provide mostly flavor and texture, while breastmilk and/or iron-fortified formula supply most of the baby's nutrients. But between the ages of 6 and 12 months, an infant will gradually eat more complementary foods. Over time, breastmilk and formula become *part* of a healthy diet rather than a main source of nutrients.



By the time an infant is ready to start drinking whole milk at one year of age, he should be getting nutrients from a variety of table foods. At that point, he doesn't need to rely on breastmilk or formula for extra nutrients, so he can make the switch 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 if both the mother and child want to continue. Breastfed children can drink whole milk, in addition to breastmilk, starting at one 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. But 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. Instead, 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 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, cake, 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.” True, a french fry, small bite of cake, or a cookie certainly won’t “hurt” the baby (unless it’s a choking hazard), but it won’t do him any good either. The real problem is that this practice quickly becomes routine. Soon, empty-calorie foods become a bigger part of the baby’s diet, replacing other, more nutritious foods. Remember, infants don’t need these kinds of snacks or desserts, nor do they expect them — not until family members start offering them.

Likewise, infants shouldn’t get sodas, fruit drinks, punches, coffee, tea, herbal teas, or other similar beverages. Coffee, tea, and colas all contain caffeine, a stimulant and a diuretic. Also, coffee and tea contain tannic acid, which decreases iron absorption. Sweetened drinks and sodas are simply empty



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It’s up to parents to feed healthy foods to their babies. Foods like french fries, hot dogs, sweetened drinks, and desserts shouldn’t be part of a baby’s diet.

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If a baby doesn't like a food, parents should back off and offer the food again in a few days or weeks.

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calories in the form of sugar. And sweeteners like saccharin (e.g., Sweet 'N Low®) or aspartame (e.g., Nutrasweet®) are not appropriate for infants or young children.

**Offer plain foods** - There's no need to add salt, sugar, sweeteners, sauces or other seasonings to a baby's food. It's best for the baby to taste the natural flavor of foods rather than get used to sweet or salty tastes. What's more, adding butter, sauces or dressings adds 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 shouldn't try to force it. Instead they should hold off and offer the food again in a few days or weeks. It can take many tries before a baby starts eating a certain food. Also, adults shouldn't assume that if they don't like something, their baby won't like it either. Lastly, parents should be good role models by trying new foods themselves, and by eating healthy, nutritious foods.

**Try to keep the baby calm** - Parents should 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 a baby to feed himself** - It's up to parents and caregivers to help a baby become an independent eater. Teaching the baby to use a cup is one way to encourage independence. Also, once a baby 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, and teething biscuits. Also, when a baby shows an interest in using a spoon, parents should let him try, even though he'll probably get very little food into his mouth compared to what ends up on his face, the table, and the floor. It usually takes months of practice, but someday he'll be able to spoon food into his mouth all by himself.



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Parents can motivate their babies to self-feed by serving finger foods that have textures suited to the baby's feeding skills.

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## Precautions When Introducing Solid Foods

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:

- **Home-prepared beets, carrots, collard greens, spinach, and turnips** – These five vegetables, when prepared at home, should not be fed to babies younger than 6 months of age. They can be high in **nitrates**, which are naturally-occurring compounds from soil. Very young babies 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 a baby has difficulty breathing and the skin turns blue. Commercially-prepared baby foods contain only traces of nitrates and are not considered a risk to babies younger than 6 months of age.
- **Honey** – An infant under one year of age should never get 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, like honey O-shaped cereals.

Honey may contain *Clostridium botulinum* spores, bacterial spores which can cause a serious food borne 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. (Note: researchers have stated that light and dark corn syrups do not appear to be a potential source of *C. botulinum* spores. Also, most cases of infant botulism are not associated with honey and are probably caused by an infant ingesting *C. botulinum* spores that travel on microscopic dust particles [Arnon, 1998]).

- **Cow's milk** – As mentioned in Part 3, an infant under one year of age should not get cow's milk. Cow's milk is low in



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Parents shouldn't feed honey, cow's milk, or egg whites to infants under one year of age.

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iron, and, since an infant's kidneys and digestive system aren't yet mature, cow's milk could lead to problems like an allergic reaction or gastrointestinal bleeding.

- **Egg whites** – Egg whites are one of the foods commonly linked to allergic reactions in infants, so experts recommend waiting until after 12 months of age to give egg whites. (Note: it's okay to offer cooked egg yolks starting at about 8 months of age. See Appendix A for more information about eggs.)

### **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 tilefish (these fish can contain high levels of mercury).

### **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 Transition to Table Foods

the food or object can quickly enter the air passages to the lungs.

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

- grapes
- raisins
- raw vegetables like carrots
- bites of hard fruit like apples
- whole beans
- round slices of hot dogs
- marshmallows
- candy
- gum
- nuts
- popcorn, snack chips, pretzels
- peanut butter
- crunchy or chewy granola bars

**Fix foods 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. Also, it's important to moisten food that's very dry, and to grind or mash food for young babies. Table 5.2 lists ways to modify different types of foods.

**Follow safe and calm feeding practices** - Parents should avoid practices and situations that increase the risk of choking, such as:

- propping a bottle in an infant's mouth;
- bottle-feeding an infant with a nipple that has too large a hole;
- feeding an infant cereal or other solids in a bottle;



To reduce an infant's risk of choking, parents should cut or chop all of the baby's foods into very small bites.



Cutting up cooked carrots into small ¼-inch pieces makes them much safer than raw whole carrots.

## Part 5

- not closely supervising a baby during a feeding;
- allowing too much excitement or disruption during mealtime;
- letting an infant drink or eat when lying down, walking, talking, crying, laughing, or playing;
- feeding difficult-to-chew foods to an infant with poor chewing and swallowing abilities; and
- feeding an infant portions that are too large, or feeding an infant too quickly.



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Crying and throwing a fit increases the risk of choking. It's best to stop and try the meal again later.

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**Table 5.2 Modifying Foods to Prevent Choking**

<b>Food Group</b>	<b>Tips for Modifying Foods</b>
<b>Fruits</b>	<p>Cut fruit into small pieces. Be sure to cut grapes, cherries, berries, melon balls, and cherry and grape tomatoes into quarters.</p> <p>Remove skin, pits and seeds from fruit.</p> <p>Don't offer raisins and other dried fruit.</p> <p>Avoid whole pieces of canned fruit (cut them up instead).</p> <p>Avoid hard pieces of raw fruit, such as apple.</p> <p>Cook fruits like apples and pears.</p>
<b>Vegetables</b>	<p>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.</p> <p>Cut vegetables into short strips rather than round pieces.</p>
<b>Meats and Other Proteins</b>	<p>Remove all bones from poultry, meat, and especially fish.</p> <p>Grind, chop or cut meats so that size and texture are developmentally appropriate for the baby.</p> <p>Cut round foods, like hot dogs, into short strips rather than round pieces. It's better to serve small, moist pieces of ground beef instead of hot dogs, sausages, or pieces of tough meat or large chunks of meat.</p> <p>Avoid offering whole beans. Puree or mash cooked dry beans and peas.</p> <p>Do not feed peanut butter, peanuts, or other nuts, seeds, or butters made from them.</p>
<b>Breads, Cereals, and Grains</b>	<p>Avoid whole grain kernels, such as wheat berries and whole kernel corn. Instead, cook and mash whole grain kernels.</p> <p>Avoid crackers, breads and muffins with seeds, nut pieces, or large whole grain kernels.</p>
<b>Cheese</b>	<p>Avoid feeding chunks of cheese; instead, cut cheese into very small, thin pieces.</p>



Commercially-prepared baby foods are convenient, nutritious, and they're made using strict safety standards.

## Using Commercially-prepared Baby Foods

Today's commercially-prepared baby foods are convenient, safe, sanitary and nutritious. In fact, many jarred fruits and vegetable baby foods have added vitamin C, boosting the nutritional value even more. Baby foods can be costly, but smart shoppers can save money by using coupons, comparing prices, and buying brands on sale. Here are some guidelines for parents:

- **Choose plain baby foods** – Plain baby foods tend to be more nutrient dense than combination foods or mixed dinners since they don't contain extra sauces, gravies, or flavorings. Also, it's best to offer plain fruits instead of cobblers, puddings, or custards, which tend to have a lot of added sugar.
- **Check lids** – Before opening, rinse off the lid and check to see if dome on the top of the jar is pulled down. This shows that there's a vacuum in the jar and that it's properly sealed. The lid should make a popping sound when opened. If the dome has popped up before opening, don't use that jar. Someone may have opened it in the store or it may not have been sealed properly by the manufacturer.
- **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. But once a baby can eat chunkier textures and diced foods, there's no need to spend money on the more advanced baby foods designed for older infants. At that point, many parents prefer 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.

As with any kind of food preparation, it's 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. Also, parents should follow precautions mentioned already like not giving honey, cow's milk, or egg whites to infants under one year of age. They should also remember not to reuse a spoon that's been used to "taste test" food.

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, it's 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 more liquid, use breastmilk, formula, or the cooking water.

Avoid using canned vegetables since they usually have a lot of salt. Canned fruits without added sugar or packed in their own juice are good to use. Plain applesauce is also an easy option.

- **Meats, poultry, fish** – Remove all fat, gristle, skin and bones. Bake, broil or boil in a small amount of water, then put in a blender or food grinder. When using fish, use only finfish (no shellfish). Also, don't use shark, swordfish, king mackerel, or tilefish since these fish are high in mercury.
- **Legumes (beans, peas, and lentils)** – Legumes are an excellent source of nutrients for infants. It's best to prepare them without seasonings, salt or fat. Cook the legumes until they're 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.



Some baby foods, like mashed bananas, are quite easy to make at home.

## Part 5

- **Egg yolks** – Egg yolks are appropriate for infants starting at about 8 months of age. Cook the yolk until hard, then mash with some liquid (like water or breastmilk) to desired texture. Wait until 12 months of age to offer egg whites and whole eggs.
- **Storage tips** – Store homemade fruits and vegetables in a refrigerator for up to 48 hours; cooked meats and egg yolks 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's not eaten within 24 hours.

For more detailed instructions, WIC staff should refer to the USDA Publication, *Feeding Infants, A Guide For Use in the Child Nutrition Programs* (FNS-258), available at: <http://www.fns.usda.gov/tn/Resources/cover.pdf>. See Chapter 12, entitled “Home Prepared Baby Food.”

### Summary

- After six months, a baby progresses to thicker, lumpier foods, and then ground foods and small bites. By 12 months, most babies feed themselves table foods.
- When introducing a new food, start with one to two teaspoons and then work up to a tablespoon or more. Wait five to seven days between new foods, watching for allergic reactions. Before giving a mixed food, the baby should try each of the foods individually. The sequence of new foods isn't as important as texture and nutrition.
- Parents should follow basic food safety practices when preparing, feeding and storing infant foods. During feedings, the baby should sit upright, facing a parent. Leftover food contaminated with baby's saliva should be thrown out.

- As a baby's eating skills progress, solid foods gradually contribute more nutrients. By 12 months, most babies no longer need the extra nutrients from formula or breastmilk. Still, breastfeeding has many advantages past one year of age.
- Parents should watch their baby's progress and offer healthy foods that are suited to the child's changing feeding skills. Family members should not give small bites of empty-calorie foods to a baby as this can become routine. Parents should offer plain foods, respect food preferences, and teach infants to feed themselves.
- When introducing solid foods, parents shouldn't feed home-prepared beets, carrots, collard greens, spinach, and turnips to babies less than 6 months of age, as they can be high in nitrates. Also, infants under one year of age should not get honey, cow's milk, or egg whites.
- Parents also need to avoid feeding foods to infants that may contain microorganisms, toxins, or other harmful substances. Examples include: unpasteurized juices and dairy products, raw and undercooked meats, raw sprouts, and fish that are high in mercury.
- To reduce the risk of choking, grind or mash food, or cut soft foods into small pieces. Don't feed foods that are choking hazards, and avoid practices like propping a bottle and letting an infant drink or eat when walking, laughing, or playing, or lying down.
- Plain commercial baby foods are more nutritious than combination foods. Parents should check lids of jars and choose baby foods with appropriate textures. When making baby food at home, parents should follow basic food safety guidelines.



## Self-test Questions

1. *Fill in the blanks.*

When feeding new foods to their baby, parents should wait \_\_\_\_\_ to \_\_\_\_\_ days between the introduction of each new food.

2. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ Caregivers must introduce vegetables before fruits or else the child will never like vegetables.

\_\_\_\_\_ Parents should feed at least 6 tablespoons of a brand new food so that the baby can fully experience the new flavor and texture.

\_\_\_\_\_ Parents should wait to offer a mixed food, like peas and carrots, until after the baby has tried all the foods or juices in the mixture.

\_\_\_\_\_ It's best to force the baby to eat a food even if he doesn't like it.

3. *Circle* the five vegetables that should not be prepared at home for children under 6 months of age because they can possibly cause methemoglobinemia in young infants.

Peas

Beets

Sweet potatoes

Carrots

Summer squash

Green beans

Broccoli

Collard greens

Spinach

Okra

Turnips

4. *List* three foods that infants shouldn't eat until after the age of 12 months.





9. A mother asks you about making the following foods for her 9-month-old baby at home: black beans and sweet potato. For both foods, *write down any important tips or information* you would offer to the mother.

- black beans

- sweet potato





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# Fluids, Cups & Weaning

## (6-12 months)

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Part 6

### Objectives:

When should a baby start to use a cup? Does an 8-month old infant need plain water? What's the latest advice about juice? How do you wean a baby from the bottle?

This part of the module answers these and other questions related to fluids, cups and weaning. After reading this part, you'll be able to:

- explain why caregivers shouldn't give too much extra water to an infant;
- state basic recommendations for introducing the cup to an infant;
- state the recommended daily limit of juice for infants;
- explain the main concern related to "spill-proof" cups;
- list suggestions for a mother who gives too much juice to her 11-month-old;
- identify recommendations related to weaning; and
- list two tips for helping an infant give up the bedtime bottle.



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Most infants get all the fluids they need from breastmilk or formula. But it's fine to give a little water to older infants.

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

In general, healthy infants who are getting enough breastmilk or formula need little or no extra water. However, as older infants start eating a variety of solid foods, it is acceptable for parents to offer *small* amounts of plain water. Also, in very hot, humid temperatures, formula-fed infants may need some extra water, especially if they are living without air conditioning.

The important thing is to avoid giving too much water. Large amounts of water can take the place of nutrients from other foods and can even lead to water intoxication. If giving plain water, it's best to offer small amounts throughout the day, after meals, and give no more than 4 to 8 ounces per day.

It's always important for parents to add the right amount of water when mixing formula, and know the signs of dehydration and water intoxication. If an infant has diarrhea, vomiting, fever, or another illness, parents should seek treatment from a health care provider (see Part 7 for more information).

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



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Some infants drink too much juice, which can lead to dental caries, diarrhea, and excess weight gain.

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### **The Latest Advice About Fruit Juice**

Fruit juice has been a routine food for infants for a long time, and many parents think that juice is an essential part of infant feeding. But the truth is, infants *don't need* fruit juice. In fact, too much fruit juice can lead to real problems.

Juice is a concentrated source of fruit sugars. And even though fruit sugars are naturally-occurring, they're 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 (cavities). Also,

large amounts of sugar from too much fruit juice cause problems like diarrhea, bloating and abdominal pain.

Another problem is that babies who fill up on too much juice may cut back on breastmilk or formula, and, in turn, not get all the nutrients they need. And, since fruit juice is such a concentrated source of sugar and calories, too much juice can lead to excess weight gain.

On a positive note, most brands of fruit juice provide vitamin C, and some brands also contain added calcium, vitamin A, or other nutrients. But even if a juice provides extra nutrients, parents still need to limit their infant's intake to no more than 4 ounces of fruit juice per day. 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.



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It's best to limit juice to no more than 4 ounces per day, and to serve juice in a cup with snacks or meals.

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Here are some guidelines for feeding juice to infants:

- Wait until after an infant is using a cup before offering fruit juice (usually around 6 to 8 months of age).
- Always offer juice in a cup, never in a bottle.

## Part 6

- Start with single juice varieties like apple juice or grape juice, and be sure to watch for signs of a negative reaction.
- Choose 100% juices fortified with vitamin C (and possibly other added nutrients).
- Limit fruit juice to 4 ounces per day.
- Offer juice as part of a meal or snack, not as a drink to sip on all day.
- Even though fruit juice is part of the fruit group, don't let fruit juice completely replace whole fruit in the diet.

### 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. Also, learning to use a cup helps with hand-to-mouth coordination. What's more, an infant should drink juice only from a cup, not a bottle.

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This 6-month-old baby is taking her first few sips of water from a cup.

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**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; usually 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 the hang of it. Soon he'll 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 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 (often called “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. But if “no-spill” cups are overused, they're not much different from baby bottles. That's because children tend to carry the cups around, sipping on large amounts of juice, milk or other sugary liquids all day long. This practice can lead to serious problems like tooth decay and excess calories.

There are other concerns, too. First, a child has to *suck*, rather than sip the liquid out through the spout, so some health professionals are afraid the “no-spill” spout might



When cups don't have a spill-proof lid, parents are less likely to let the child take a cup along and drink from it throughout the day.



Parents should choose a cup that will work best for their baby, and then offer liquids only during meal and snack times.

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lead to speech problems in some children. Another concern is that a child can become dependent on the cup, just like a pacifier. Also, there's 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's no valve under the lid. That's a good thing because parents are less likely to let children carry these cups around. There's one kind of lid that has no spout at all; instead there's an opening that lets the liquid 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 isn't the cups; it's 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 shouldn't let infants drink “at will” throughout the day from any type of training cup or bottle.

## Weaning

“Weaning” can mean different things, depending on whether you mean weaning from the bottle or weaning from the breast.

**Weaning from the bottle** – This term refers to giving up bottles and drinking from a cup, a process that usually starts sometime between 8 and 12 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 formula 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 of formula rather than a bottle at the feeding of least interest. 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 more 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 won't be as hungry and a bottle won't be as satisfying as it would've been before the meal or snack.

Some infants will want to keep taking a morning bottle and a bedtime bottle long after they're 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. Also, some toddlers who continue to bottle-feed will drink so much milk that they don't get enough solid foods. That means they don't get the right balance of nutrients they need, and they risk 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's filled with a beverage other than water and if the baby goes to sleep with the bottle. Here are tips for helping an infant give up the bedtime bottle:

- Interest the infant in something other than the 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.



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Offering lots of love and attention at bedtime can help parents wean a baby from a bedtime bottle.

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## Part 6

- Offer a small snack or beverage from a cup near bedtime. Be sure to clean 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.

**Weaning from the breast** – WIC encourages women to breastfeed their babies as long as both mother and baby want to keep breastfeeding. Some women decide to stop within the first few months. Some infants slowly start to wean themselves from the breast once they start eating more solids and begin using a cup. Other women and their babies continue breastfeeding throughout the first year, and some go for two, three or even more years before weaning.

Suggestions and strategies for weaning from the breast depend on the child's age, whether the infant is exclusively breastfed, if the baby drinks from a bottle, if the baby uses a cup, etc. In general, the best approach is to gradually omit nursing sessions one at a time, rather than stopping abruptly. A common method is to start with the feeding that the infant seems least interested in, such as the late-afternoon feeding. A mother can substitute a bottle or cup of expressed milk or iron-fortified formula for this feeding. If a child is older than one year, she can substitute a small cup of whole cow's milk. The mother should keep using a bottle or cup at this feeding at least several days and then stop another nursing session when she's ready or when the opportunity presents itself. Then she can continue this process until the child is entirely weaned from the breast.

By omitting nursing sessions one by one, a woman's breastmilk supply will gradually decrease, with little discomfort, if any. If a mother does experience some engorgement, she can hand-express a little milk — but only enough to relieve the discomfort. Cold compresses may also be helpful.

For more information on weaning from the breast, WIC staff and peer counselors may want to refer to: [How Weaning](#)

Happens by Diane Bengson (1999), published by La Leche League International.



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When it's time to wean from the breast, weaning strategies depend on the baby's age, dietary intake, and other factors.

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### Summary

- Infants eating a variety of solid foods can have up to 4 to 8 ounces of water daily. Hot, humid weather can increase fluid needs, especially if there's no air conditioning.
- Juice is not a required food for infants. In fact, too much juice can lead to diarrhea, excess weight, and cavities. Parents should limit juice to 4 ounces a day, and serve juice in a cup (not a bottle) with meals and snacks.

## Part 6

- Most babies are ready to drink from a cup around 6 months of age. It's best to start with 1 to 2 ounces of water, breastmilk, or formula in a cup without a lid. Introducing a cup does not mean giving up breastfeeding.
- Various training cups have different kinds of lids, handles, spouts, etc. The main concern with “spill-proof” cups is that children tend to carry the cups around and constantly sip on large amounts of juice, milk or other sugary liquids. This practice can lead to tooth decay and excess calories.
- Parents should offer liquids only during meal and snack times. Infants shouldn't drink milk and juice “at will” throughout the day from any type of cup or bottle.
- Weaning from the bottle usually begins after 8 months of age. Parents can use a cup of formula in place of a bottle at one feeding and then try another feeding. WIC recommends weaning babies from the bottle by age 12 to 14 months.
- The bedtime bottle can be harmful if it's filled with something other than water and if the baby goes to sleep with it. The strategy is to interest the infant in something else like a book, toy, or blanket.
- WIC encourages women to breastfeed as long as both mother and baby want to continue. Suggestions for weaning from the breast depend on the child's age, and other circumstances. The best approach is to slowly omit each nursing session one by one, offering a bottle or cup of expressed milk or formula in its place.



6. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ One of the first steps toward weaning a baby off the bottle is teaching the baby to drink from a cup.

\_\_\_\_\_ Parents should replace all bottle feedings with cups, all on the same day. This forces the baby to learn to use a cup.

\_\_\_\_\_ WIC recommends that parents completely wean healthy babies from the bottle by 12 to 14 months of age.

\_\_\_\_\_ Usually, the best approach for weaning from the breast is to gradually omit nursing sessions one at a time, rather than stopping abruptly.

7. *List* two tips for helping an infant give up the bedtime bottle.







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# Conditions Related to the Digestive System

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Part 7

## Objectives:

Almost all babies will experience mild problems like gas, spitting up, or a small bout of diarrhea or constipation. But some infants have more serious digestive disturbances that require medical treatment. After reading this part of the module, you'll be able to:

- define constipation;
- list two possible causes of constipation in infants;
- identify recommendations for treating constipation;
- define diarrhea;
- list three signs of dehydration in infants;
- indicate the main treatment goal for infants with diarrhea;
- explain the difference between spitting up and vomiting;
- describe gastroesophageal reflux;
- identify correct statements related to colic and fussiness;  
and
- list two suggestions for parents to help soothe a fussy baby.



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If a baby seems constipated, it's best to have a health care provider evaluate the baby and make recommendations.

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A baby with constipation needs regular, age-appropriate foods, like breastmilk or formula, cereal, fruits, and vegetables. Small amounts of extra water or juice (like prune, pear, or apple juice) can be helpful.

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## Constipation

An infant with **constipation** has infrequent, hard, and dry stools that are difficult to pass. Some babies may also have other symptoms like abdominal pain or blood in the stool.

Many parents worry if their babies don't have daily bowel movements. But normal bowel patterns vary among infants, depending on age and diet. Some have daily stools, while others only go once every two to three days. Since frequency isn't a very good indicator of constipation, a physician or other health care provider should evaluate the problem.

Different things can cause constipation in an infant, like not getting enough fluids, a poor diet, or getting formula that's too concentrated. Also, constipation is more common in children with certain medical conditions like cerebral palsy and Down syndrome.

**Treatment** – Parents should check with the baby's physician for specific recommendations. Typically, infants with constipation need a normal, age-appropriate diet, along with small amounts of extra water. Foods like infant cereal and strained vegetables and fruits, including strained prunes, are good choices. Also, 1 to 2 ounces per day of prune, pear or apple juice can be helpful. (Note: WIC does not recommend feeding juice to an infant under 6 months of age; however, a physician might instruct a parents to give small amounts of juice to a younger infant in order to treat constipation.)

Sometimes a physician will recommend adding a small amount of corn syrup or other stool softener to an infant's diet. Researchers do not consider corn syrup to be a potential source of *C. botulinum* spores. But remember, parents should never feed honey to an infant since honey can be a source of *C. botulinum* spores. Also, parents shouldn't use an over-the-counter medication for treating constipation unless a doctor prescribes it.

**Iron-fortified versus low-iron formulas** – Many parents have heard that iron in infant formula can cause constipation or other problems like spitting up and colic. So when formula-fed babies experience constipation or other GI disturbances,

some parents blame the iron in the formula, and ask about switching to a **low-iron formula**.

The AAP strongly recommends only *iron-fortified* formula for infants who receive formula. In a 1999 policy, the group states “there is a misconception by some health professionals and parents that infants fed iron-fortified formulas have more gastrointestinal distress...” The policy refers to studies which found no differences in the level of GI problems among infants who received low-iron formula and infants who received iron-fortified formula.

For more information on constipation and tips for parents, refer to the WIC handout, “Common Infant Problems: What About Constipation?” stock number 13-121.

## **Diarrhea**

**Diarrhea** is an increase in the frequency, volume, and water content of stools compared to usual stool patterns. In infants, diarrhea can quickly lead to dehydration, and, if not treated, can be fatal. One goal of treatment is to prevent dehydration by having the child drink a special electrolyte solution. The other goal is to maintain nutrition with an adequate diet and regular feedings of breastmilk or formula.

Sometimes it’s hard to tell if an infant has diarrhea, since stool patterns vary so much among infants. What is normal for one baby may not be normal for another. For example, it’s common for breastfed babies to have frequent, loose stools. But if the stools become bloody, black and even more frequent, then there’s a problem.

Viruses, bacteria, parasites, tension, feeding too much juice, and antibiotic therapy can cause **acute diarrhea** in infants. Acute diarrhea is short-term and resolves within two weeks. Some infants suffer from **chronic diarrhea**, which, by definition, lasts longer than two weeks. Chronic diarrhea often occurs in infants with small intestine disorders, cystic fibrosis, serious infections, and cow’s milk or soy protein allergy.

**Referral** – WIC staff should immediately refer an infant to a doctor if the baby has:

- black or bloody diarrhea,
- more than three episodes of watery diarrhea in 24-hours,
- signs of dehydration (fewer wet diapers, dark yellow urine, dry mouth; no tears when crying; sunken eyes; restlessness, irritability, or lethargy), or
- a fever above 99 degrees F.



When a baby has diarrhea, it's important to prevent dehydration and maintain nutrition.

**Oral Rehydration Therapy** – Oral rehydration therapy (ORT) involves giving the infant a special solution to help replace lost fluids and **electrolytes** (sodium, potassium, chloride and other salts found in the blood, tissue, fluids, and cells). Parents should look for commercially-prepared oral electrolyte solutions (OES) like Pedialyte, Infalyte, Kao Lectrolyte, or Pediatric Electrolyte. These solutions taste very salty, so some infants may refuse them. It's very important to slowly give small sips of the solution (about one teaspoon every two to three minutes) from a cup, by spoon, or by dropper. Parents should follow the doctor's directions about how much to give. One general guideline is to give about  $\frac{1}{4}$  to  $\frac{1}{2}$  cup of the solution for each loose bowel movement.

Parents can also make their own OES (see Box 7.1). The homemade version costs a lot less and is a good option when a commercial solution isn't available. But the flavor of the homemade solution is usually less appealing compared to the commercially-available solutions.

***Box 7.1 Recipe for Homemade Oral Electrolyte Solution***

- $\frac{1}{2}$  to 1 cup infant rice cereal
- 2 cups water, boiled and cooled
- $\frac{1}{4}$  level teaspoon salt (measure salt with a  $\frac{1}{4}$ -teaspoon measuring spoon)
- Optional ingredient: a mashed banana

Slowly add the water and a salt to the cereal. Stir until well mixed. Make the mixture as thick as possible and still drinkable. Give small amounts, about one teaspoon every two to three minutes. Give a total of about  $\frac{1}{4}$  cup to  $\frac{1}{2}$  cup for each loose bowel movement. Do not give the homemade electrolyte mixture for any longer than 12 hours unless your doctor tells you to continue.

**Feeding an infant who has diarrhea** – In order to maintain nutritional status, parents should try to provide an adequate diet to a baby with diarrhea. In general, parents should offer a normal diet, including breastmilk or formula, along with regular foods of suitable texture that the infant is used to eating. Also, parents should check with the baby’s doctor for specific recommendations. Typical foods to offer include:

- bread and cereal products (infant cereal, rice, noodles, crackers, and toast);
- fresh fruit (including bananas) or canned fruit (but *not* fruits packed in syrup);
- plain vegetables (without added butter or fats); and
- lean meat, poultry or fish (remove the skin and fat).

**Foods to avoid** – Parents should not offer:

- grape juice, apple juice, and other juices; sports drinks; and soft drinks including cola, ginger ale, and lemon-lime soda.
- candy, ice cream, pudding, frozen fruit bars, gelatin, sherbet, sweetened cereals, or other sweets.
- salty and fatty foods like salty soup, potato chips, French fries, sausage, and luncheon meats.

For more information and tips for parents, refer to the WIC handout, “Common Infant Problems: What About Diarrhea?” stock number 13-123.



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A baby with diarrhea needs a normal diet of healthy foods; no sweets, juices, sports drinks, or salty, fatty foods.

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## Vomiting

Vomiting is the forceful expulsion of the stomach contents. It’s often the result of something like a stomach virus, intestinal virus, or some other illness. Excessive vomiting can lead to dehydration, so it’s important to monitor the baby and contact the baby’s doctor if the vomiting is extreme or if the infant has other symptoms like a swollen abdomen, convulsions, or if there is blood or green bile in the baby’s vomit.

It's fairly easy to tell the difference between vomiting and spitting up. Vomiting is forceful and usually causes some discomfort and distress in the baby. Spitting up, on the other hand, tends to be fairly passive and causes very little distress.

### **Gastroesophageal Reflux (GER) / Spitting Up**

Gastroesophageal reflux (GER) is a condition in which the stomach contents flow back up into the esophagus. This happens because the ring of muscles between the stomach



and the esophagus are too relaxed.

**Spitting up** – Spitting up is the mildest form of GER. It's quite normal for a baby to spit up breastmilk or formula during or soon after a feeding. Spitting up is messy, but as long as the baby is healthy and

growing well, then it's usually not a concern. Unlike vomiting, most babies hardly even notice when they've spit up and they typically aren't bothered by it. A good supply of burp rags and extra clothes for the baby is helpful. Also, parents can try these tips to help cut down on the frequency of spitting up:

- Keep feedings calm and quiet. Don't bounce or play vigorously with a baby after a feeding.
- Don't feed an infant who is lying down with no head support.
- Burp the baby during and after each feeding, and keep the baby in an upright position after feeding.
- For bottle-fed babies, the hole in the nipple needs to be the right size – not too small and not too big. The right size hole will let just a few drops come out of the bottle.



Many infants with GER improve without treatment around 8 to 10 months of age. At that point, they're sitting up on their own and eating more solid foods. However, some infants continue to experience mild GER until about 18 months of age.

### **Gastroesophageal-Reflux Disease (GERD)**

In some cases, a baby will suffer complications from GER, and then develop a much more serious condition called gastroesophageal-reflux disease. GERD is characterized by problems like poor growth, inflammation of the esophagus, respiratory illness, and difficulty swallowing. It occurs more often in premature infants and infants with neuromuscular disorders like cerebral palsy and muscular dystrophy. For information about GERD, refer to the DSHS Formula Resource Book, stock number 13-174.

### **Fussiness and Colic**

*[While fussiness and colic aren't specifically digestive problems, they are often associated with symptoms like gassiness and abdominal bloating. So we've included a discussion of fussiness and colic in this part of the module.]*

It's very normal for infants to be fussy on a daily basis. In fact, about 50% of babies cry a couple of hours a day, usually in the evening hours. This fussiness usually starts a few weeks after birth, peaks by about 6 weeks of age and then resolves by about 3 to 4 months of age. If the parents can calm the baby and if the baby is fairly content the rest of the day, then it's usually considered "normal fussiness." It helps some parents to know that the daily bouts of crying and fussiness are very common and that the baby will outgrow it someday.

And then there's **colic** - that's when the crying episodes last longer, and the baby is harder to soothe. About 20% of babies meet the common definition of colic: crying for more than three hours a day, for more than three days in one week, and for at least three weeks. Also by definition, a baby with colic is otherwise healthy and gaining weight. So before diagnosing

## Part 7

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Colic typically peaks around 6 weeks of age, and resolves around 3 to 4 months of age.

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colic, a physician should look for any underlying medical problems that could be causing distress.

Colic occurs in both breastfed and formula-fed babies. Babies with colic will sometimes flex their legs, clench their fists, pass gas, and have some abdominal bloating.

Through the years, people have tried to link colic to many factors – intestinal gas, maternal anxiety, overfeeding, cow’s milk, etc. Still, scientists aren’t sure what causes colic. Experts describe babies with colic as being unusually sensitive to stimulation, and it may be related to an immature nervous system or digestive system.

### **What about switching formulas?**

Many parents ask about switching from a cow’s milk formula to some other type of formula as a way to relieve their baby’s colic or fussiness. They often think the baby can’t tolerate the cow’s milk that’s in regular formula, so they hope a soy-based formula or special **hydrolyzed** formula might work better.



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A baby’s constant crying can create a great deal of anxiety, stress, and frustration in parents.

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But the formula is usually not the problem. Only about 10 percent of infants with colicky symptoms are actually sensitive to the protein in cow's milk. What's more, babies who have this type of sensitivity usually have other symptoms like eczema, constipation, diarrhea, or blood or mucous in the stools. So if a baby doesn't have a cow's milk sensitivity, switching formulas won't do any good. According to the AAP, controlled studies show no significant benefits of switching to soy formula for infants with colic. Likewise, the AAP found no evidence to support using hydrolyzed formulas for treating colic, sleeplessness, or irritability. The AAP feels that counseling parents about colic and its duration is more valuable than switching formula.

**Parental stress** – Fussiness and colic can impact the parent-child relationship and cause a huge amount of stress for caregivers. In fact, inconsolable crying and colic are key risk factors for babies at risk of **Shaken Baby Syndrome**. If parents feel especially angry and impatient, it's helpful for them to take a break and leave the house while someone else looks after the baby. No matter how angry parents feel, they should *never* shake a baby. Shaking a baby can cause brain damage, blindness, and even death.

**Soothing fussy babies** – There's no cure for colic or fussiness, though parents do find ways to help soothe their babies, at least to some degree. For example, many babies are calmer when parents hold them or carry them in slings or strap-on carriers. Also, swaddling an infant by wrapping the baby snugly in a blanket can have a calming effect. Some parents gently massage the baby or give the baby a warm bath. Another suggestion is to lay the baby across the knees, tummy-down, while rubbing the baby's back. Some people use rhythmic motions and sounds that imitate the environment inside the womb. For example, running a vacuum cleaner in the next room is a popular technique.

WIC staff can help by listening to parents, offering support, and assuring them that their baby's fussiness won't last forever.

## Summary

- Constipation is a delay or difficulty in passing bowel movements. Infants with constipation need a normal diet, and small amounts of extra fluids.
- Some parents blame the iron in formula for constipation or other gastrointestinal problems. But in research comparing iron-fortified formula with low-iron formula, infants had the same levels of intestinal problems.
- Diarrhea is an increase in the frequency, volume, and water content of stools. It can lead to dehydration. Treatment includes giving an oral electrolyte solution and an adequate diet. Force-feeding large amounts of water or fluids can be harmful.
- Vomiting is usually caused by a virus or other illness. It's forceful, and usually causes some discomfort and distress in the infant.
- Gastroesophageal Reflux (GER) is the condition in which the stomach contents flows back up the esophagus. Spitting up is the mildest form of GER. Unlike vomiting, spitting up is passive and causes very little distress in the infant.
- Gastroesophageal-reflux disease (GERD) is a serious condition that results from complications of GER. GERD is often characterized by poor growth, inflammation of the esophagus, respiratory illness, and difficulty swallowing.
- About 20% of babies meet a common definition of colic: crying for more than three hours a day, for more than three days in one week, for at least three weeks. Colic occurs in both breastfed and formula-fed infants. The AAP does not support using soy formulas or hydrolyzed formulas for treating colic, sleeplessness, or irritability. Many babies are calmer when parents carry them in slings or strap-on carriers. Also, swaddling, massage, warm baths and using sounds or motions that imitate the womb environment can be helpful.

## Self-Test Questions

1. *Check the correct answer.* Constipation in infants is correctly defined as:

\_\_\_\_\_ having a bowel movement only once every four days.  
\_\_\_\_\_ infrequent, hard, and dry stools that are difficult to pass.  
\_\_\_\_\_ a common reaction to iron-fortified formula.  
\_\_\_\_\_ all of the above.

2. *List two possible causes of constipation in infants.*

3. *Check the correct answer.* Recommendations for treating constipation in infants include:

\_\_\_\_\_ feeding a normal, age-appropriate diet.  
\_\_\_\_\_ using over-the-counter medications.  
\_\_\_\_\_ switching to a low-iron formula.  
\_\_\_\_\_ none of the above.

4. *Check the correct answer.* Diarrhea is an increase in the:

\_\_\_\_\_ frequency of stools.  
\_\_\_\_\_ volume of stools.  
\_\_\_\_\_ water content of stools.  
\_\_\_\_\_ all of the above.

5. *List* three signs of dehydration.

6. *Fill in the blanks.*

One of the goals in treating diarrhea is to prevent \_\_\_\_\_ by having the infant take small sips of a special solution called an \_\_\_\_\_  
\_\_\_\_\_.

7. *Describe* the difference between vomiting and spitting up.

8. *Fill in the blanks.*

GER, or \_\_\_\_\_ is a condition in which the contents of the \_\_\_\_\_ flow back up into the \_\_\_\_\_.

9. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ Only a small number of babies have fussy periods on a daily basis.

\_\_\_\_\_ A baby with colic is otherwise healthy and gaining weight.

\_\_\_\_\_ Colic occurs in both breastfed and formula-fed babies.

\_\_\_\_\_ Scientists have discovered a virus that is responsible for colic.

10. *List* two suggestions for parents to help soothe a colicky baby.





## Objectives:

A number of health issues are linked to a baby's dietary intake, including jaundice, oral health, rickets, anemia, lead poisoning, and excess weight gain. After reading this part of the module, you'll be able to:

- describe why jaundice occurs in newborns;
- identify correct statements about jaundice;
- identify correct statements about oral health for infants;
- list three ways parents can help prevent early childhood caries in their infants;
- state the recommendations for providing vitamin D to infants;
- identify the effects of iron-deficiency anemia in infants;
- list four possible sources of dietary iron for infants during the first year of life;
- indicate the main sources of lead exposure;
- state two reasons why infants and young children are at a higher risk of lead poisoning compared to older children and adults;
- list three things parents can do to reduce an infant's risk of lead poisoning; and
- identify correct statements about excessive weight in infants.



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Many experts consider jaundice to be a normal condition among newborns rather than a disease.

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## Jaundice in Newborns

More than half of all newborns experience **jaundice**. Jaundice occurs when a chemical 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's eliminated in the stool. But in many newborns, the liver isn't mature enough to do its job, so blood levels of bilirubin increase, and the skin starts to look yellow.

**Different forms of jaundice** – Jaundice occurs in both formula-fed and breastfed infants, but is more common in breastfed infants. Physicians often categorize jaundice based on how soon after birth it appears in an infant:

- **Jaundice starting between the second and fifth day (also called “breastfeeding jaundice” among breastfed babies or “early-onset jaundice”)** – This is the most common form of jaundice. It's often called “breastfeeding jaundice” because, in addition to the baby having an immature liver, early breastfeeding problems tend to make matters worse. Problems like poor latch-on, delayed onset of a plentiful milk supply, or infrequent nursing sessions all lead to a poor intake of breastmilk, so the baby has fewer stools. And fewer stools means that the baby doesn't eliminate bilirubin from the body; instead, the bilirubin is absorbed back into the bloodstream.

But when breastfeeding gets off to a good start, the frequent feedings of **colostrum** increase the baby's stools. This keeps bilirubin at lower levels and helps prevent high levels from developing later.

- **Jaundice starting after the fifth day of birth (also called “breastmilk jaundice” or “late-onset jaundice”)** – In some breastfed infants, high bilirubin levels occur after the fifth day of life, and sometimes the levels stay high for weeks and even months. Researchers think this type of jaundice may be partly caused by a factor in human milk that increases the absorption of bilirubin from the intestine back into the bloodstream. Sometimes a physician will want the mother

to stop breastfeeding for a day or so to see if the bilirubin levels drop. However, most infants with this type of jaundice can continue to breastfeed while a physician closely monitors the baby's bilirubin levels.

- **Jaundice within the first 24 hours of birth** – This type of jaundice is more serious but also more rare than the other forms of jaundice. It's typically caused by a disease or underlying condition, like a liver disorder, an infection, or a metabolic disorder. A doctor will closely monitor the baby and usually treat both the jaundice and the underlying condition.

**Assessing a baby's skin color** – It can be hard for new parents to judge whether their baby's skin is yellow. Also, it can be more difficult to see jaundice in babies that have darker skin. It's best to check the infant's skin in daylight or under fluorescent lights. The yellow color usually starts in the face and then, as bilirubin levels rise, it spreads to the chest, then to the stomach, and then to the arms and legs. Parents should also check the whites of the eyes for any yellow color. In addition, all newborns should 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.

**Jaundice usually isn't serious** – Most cases of jaundice are harmless. Once a baby's liver is working better and breastfeeding problems are resolved, the jaundice usually goes away on its own. This can take several days to several months. During this time a physician will monitor the baby's bilirubin levels. Be aware that elevated bilirubin levels can make a baby feel sleepy, which can lead to inadequate feedings. Parents may need to follow a feeding schedule for a short time to make sure a sleepy baby takes in enough breastmilk or formula (see section on "Sleepy Infants" in Part 2).

**Treatment for more serious cases** – Sometimes bilirubin can reach high levels that require treatment. One type of treatment involves putting the baby under special blue lights that convert 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.



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Mothers should breastfeed at least eight to 12 times a day to help avoid problems related to jaundice.

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Without treatment, 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's important for parents to follow these guidelines:

- Make sure their baby is checked for jaundice soon after birth.
- Breastfed babies should nurse at least eight to 12 times a day. If a mother has problems with breastfeeding, she should get help.
- Have a doctor or nurse see the baby at three to five days of age.
- Contact the baby's doctor if the baby's skin becomes yellow or more yellow than at a previous doctor's appointment. Even though jaundice is very common and most cases aren't serious, it's important for a physician to be sure the infant's bilirubin levels aren't too high.

### **Oral Health for Infants**

The primary teeth, also called baby teeth, begin to form in the jaw before birth, and keep forming during a baby's first year of life. So right from the start, good nutrition and proper dental care are important for building strong, healthy teeth.

**Fluoride** – The *right* amount of fluoride, not too much and not too little, helps make teeth stronger and more resistant to decay. Tap water is the main source of fluoride. Parents can find out the fluoride content of their water by calling their local health department, contacting the local water supplier, or asking their dentist or pediatrician. Families who use well water should contact their county health department to have it tested for fluoride content.

If the water supply doesn't have enough fluoride, the AAP recommends fluoride supplementation for infants starting at

age 6 months (infants younger than 6 months shouldn't get fluoride supplements).

It's 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 physician prescribes fluoride, parents should be sure to give the correct amount.

**Dental care starts in infancy** – Parents should start caring for their baby's gums in the first month of life. Dental experts recommend cleaning a young baby's gums with a damp washcloth. This removes the film of breastmilk or formula from the mouth and gets the baby used to having someone clean the mouth.

The first teeth usually appear at around 6 months of age, or later for some infants. As soon as the first teeth erupt, tooth decay can occur. Parents should brush the infant's teeth with a very soft toothbrush and plain water. Infants and children under two shouldn't use fluoridated toothpaste (unless specifically advised by a pediatric dentist) since they can swallow the toothpaste and get too much fluoride. Also, 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, a baby's gums can get sore and cause mild irritability, crying, and a decreased appetite. Dentists and pediatricians suggest letting the infant chew on a cold wet washcloth or a clean teething ring made of firm rubber (teething rings that go in the freezer can get too hard and may be harmful). A parent can also rub the infant's gum with a clean finger. The AAP notes that medications and pain relievers designed to rub on the gums aren't very helpful since they quickly wash out of the baby's mouth.

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



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Tooth decay can happen as soon as the first teeth appear.

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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,” occur when a baby’s teeth are frequently exposed to sugary liquids for long periods of time. Sugar is a natural ingredient in formula, fruit juices, cow’s milk and breastmilk. Bacteria in the mouth interact with sugar to make an acid that attacks the teeth and, over time, leads to decay. So 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 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 early signs of decay, but, if treated right away, they 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. Also, a child can develop psychological or emotional problems that stem from speech impediments or unattractive teeth.

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. Still, breastmilk does have natural sugars, and it can lead to tooth decay if it frequently coats the teeth. To reduce the risk of decay, the American Academy of Pediatric Dentistry recommends that women avoid at-will nighttime breastfeeding after the first teeth appear.

**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:

- Don’t put the baby to sleep with a bottle or leave a bottle in a baby’s crib or playpen.
- Hold the baby during feedings instead of propping the bottle with a pillow or blanket.
- Use bottles only for formula, breastmilk or water. Offer juice only in a cup.



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Even though breastfed babies tend to have less tooth decay, breastmilk does contain sugars and can lead to decay.

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## Other Infant Health Issues

- Avoid at-will nighttime breastfeeding after the first teeth appear.
- Clean the baby's teeth with a very soft toothbrush and plain water.
- Check the baby's teeth for white spots along the gum line, paying special attention to the top front teeth. If spots are present, take the child to a dentist right away.
- Introduce the cup at around 6 months of age, and wean the baby from the bottle by 12 to 14 months of age.
- Don't 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. Also, parents should never dip pacifiers in honey, sugar, syrup, or other sweetened liquid.
- Make plans to take the baby to see a dentist when he turns one year old.



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Parents should make plans to take their baby to a dentist at one year of age, or sooner if they see white spots or decay.

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## Vitamin D and Rickets in Infants

The skin produces vitamin D when it's exposed to the sun, and traditionally sunlight has been an important source of vitamin D production for humans. But these days, valid concerns about skin cancer have cut down on sun exposure, especially for infants. In fact, the AAP recommends that babies younger than 6 months be kept out of direct sunlight, and when outdoors, they should wear protective clothing and sunscreen.

Less sun exposure means that the body makes less vitamin D. And without enough vitamin D, **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.



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It's important to protect infants from too much sun exposure. Unfortunately, this can impact vitamin D status.

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In 2003, the AAP recommended that all infants and children get a minimum of 200 IU of vitamin D per day, starting within the first 2 months of life. Since vitamin D is added to formula, infants who drink at least 17 ounces of infant formula per day get the vitamin D they need from formula. Breastfed infants, on the other hand, need to get the extra vitamin D from liquid vitamin drops.



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The AAP suggests a daily form of vitamin D for infants over 2 months. Breastfed infants need liquid vitamin drops to meet their needs.

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To many people, a recommendation to give vitamin D drops to breastfed infants seems strange since experts regard breastmilk as the perfect food for young infants. But remember, nature intended *sunlight* – not food – to be the primary source of vitamin D for humans. In fact, very few foods in our food supply are natural sources of vitamin D (milk has vitamin D *added* to it).

So breastmilk is still the perfect food for babies. But since sunshine is no longer a safe source of vitamin D for babies, infants need a different source of vitamin D. For breastfed infants, this means giving liquid vitamin drops.

If a breastfeeding mother has questions about giving vitamin D drops to her infant, it's important to reassure her that breastmilk is the best source of nutrition for her baby, and encourage her to talk with her health care provider about any questions she has.



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To avoid iron-deficiency anemia, parents need to include sources of iron in the baby's diet.

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### **Iron-deficiency Anemia**

Iron is a part of red blood cells, where it helps carry oxygen to different parts of the body. Most full-term infants are born with enough iron stores that last about the first four to six 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, good sources of iron include meats, iron-fortified infant cereal, dried beans, tofu, and various enriched or fortified bread and cereal products.



If an infant doesn't get enough iron in the diet, iron levels will start to drop. As the infant's iron status worsens, the blood cells can't carry as much oxygen, and the baby can develop **iron-deficiency anemia**. Iron-deficiency anemia can cause serious irreversible problems like learning problems, psychomotor difficulties, and a decrease in immune function. So, as babies start eating solid foods, it's very important for parents to include good sources of iron.

WIC clinics typically 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 doctor. Treatment usually involves iron supplementation.

## Lead Poisoning

Lead poisoning is entirely preventable. Yet, it's a major public health problem among certain groups of infants and children.



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

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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

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crawling on the floor or the ground, and chewing on window sills or other surfaces) increase the risk of lead poisoning.

Once 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 don't always look or act sick, so a blood test is the only way to know if a baby has lead poisoning. In Texas, children on Medicaid are required to have a blood lead test at ages 12 months and 24 months. Also, the Department of State Health Services recommends 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, but many children in Texas live in older homes and apartment buildings with lead-based paint that is peeling, chipping and cracking. In addition to bits of old paint, the surrounding dust gets contaminated with lead from the aging paint. Infants and young children who live and play in and around these old homes and buildings can easily ingest the paint and the dust.

Other sources of lead include:

- contaminated soil outside of older buildings with exterior lead-based paint (as the paint breaks down, lead gets into the soil)
- 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 experience **pica** during pregnancy give birth to infants with elevated lead levels in the blood

**Preventing lead poisoning** – Again, lead poisoning is entirely preventable. Many of the tips listed below are good hygiene and safety practices for everyone, but they're especially

## Other Infant Health Issues

important for families who live in older homes or buildings where lead paint was used.

- Wash the baby's hands and face with soap and water before meals and at bedtime.
- Wash toys and pacifiers often, using soap and water.
- Vacuum carpeted floors, wet mop floors, and wet wipe window parts.
- In older homes, create barriers to protect children from lead sources (for example, put tape over lead-painted window sills or door frames; plant grass in bare soil areas).
- Keep the baby away from peeling, chipping or flaking paint.
- Keep the baby from eating nonfood items.
- Keep the child away from bare soil areas near old buildings.
- Don't use glazed pottery to cook, serve, or store food unless you know that it's lead-free.
- 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. Use this water for drinking, cooking, and formula preparation.
- Don't use home remedies to treat a child's illness.
- Avoid imported canned goods which may be lead-soldered (cans in the United States are not soldered with lead).

**Nutrition is important, too** – A healthy diet can help protect an infant from lead in several ways. First, a full stomach absorbs less lead than an empty stomach, so regular meals are important. Also, foods rich in iron and calcium reduce lead absorption, so parents should offer foods like lean meats, fortified cereals, egg yolks, greens, yogurt, and cheese, if developmentally appropriate. Also, foods rich in vitamin C are important since they help the body absorb iron.

**For more information on lead** – Parents should talk with their doctor, their local health department, or the Texas Childhood Lead Poisoning Prevention Program at 1-800-588-1248.



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It's important to frequently wash the child's hands, face and toys using soap and water.

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Good nutrition helps reduce the risk for lead poisoning in several ways.

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Most infants lose their baby fat and get to a healthy weight once they're preschoolers. But some do become obese children.

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## Excessive Weight in Infants

Babies, simply because they are babies, have a lot of body fat. And some babies weigh more than other infants who are the same age or same length. But big babies aren't destined to become overweight children. In fact, many toddlers lose their baby fat and reach an average weight as they grow into active preschoolers. So, regardless of how high an infant's measurements plot on the weight-for-length growth chart, parents and staff shouldn't automatically assume the baby is going to become an obese child.

However, the weight status of the biological parents does tell you something about the infant's risk of 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 breastfeed. Experts think human milk may have certain physiologic factors that might decrease the risk of obesity. Also, it's likely that positive feeding and parenting patterns related to breastfeeding play a role in helping many breastfed children achieve healthy weights.

**Consider feeding practices** – Since childhood obesity is on the rise, we need to pay attention to babies who gain an excessive amount of weight during infancy. When an infant's weight is a concern, a nutritionist should make sure the parents are offering an appropriate diet. Do they add enough water when making formula? Are they putting cereal in the bottle? Are they giving large amounts of juice? These and other questions might shine some light on feeding practices that are causing extra weight gain. The goal is to help parents make some basic changes so that the baby's *rate* of weight gain will slow down while the infant continues to grow in length.

No matter how much a baby weighs, no one should ever 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, including overweight babies, 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 Box 8.1). 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.

***Box 8.1 Tips for Promoting a Healthy Weight During Infancy***

***Healthy Infant-Feeding Practices***

- Breastfeed – breastfed babies appear to have a lower risk of becoming overweight.
- Dilute formula properly – if the formula is too concentrated, then it's higher in calories than what it should be.
- Wait until a baby is developmentally ready before starting solids (wait until *at least* 4 months of age, though many experts suggest waiting until about 6 months of age).
- Feed solids with a spoon. Don't put infant cereal in a bottle or infant feeder.
- Offer no more than 4 ounces of fruit juice per day. Better yet, offer juice 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. Don't add butter, oils or sauces to foods.
- Check the nutrition labels on baby food jars. Avoid those with added fats, sugars, tapioca, starches, and other fillers.

*(continued)*



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Even during the first year, parents can do a lot to encourage positive eating practices and a healthy lifestyle.

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**Box 8.1 Tips for Promoting a Healthy Weight During Infancy**  
(continued)

***Develop a positive parent-child 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.
- 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. Other people who feed the baby, like 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.

***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 shouldn't watch television. Watching television is a very passive activity, and it replaces time that could be spent doing something active. Also, letting a baby watch television teaches the child a habit that's hard to break.
- After a feeding, try playing and talking with the baby, 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, like **galactosemia**, affect the way babies metabolize certain nutrients. These infants require special formulas that meet their specific needs. Other conditions can affect an infant's chewing ability, swallowing skills or other motor skills. Those infants typically start solid foods later than normal, and some children can only swallow foods that have certain textures. Also, some medical problems can make an infant more prone to problems like constipation or reflux. And then there are infants who get formula through a special feeding tube inserted directly into their stomach. When it's time for these children to learn to eat using their mouths, they often need therapy to help them develop their chewing and swallowing skills.

Since this module covers only basic infant nutrition issues, we won't discuss infants with special health care needs in detail. Suffice it to say that as a WIC staff member, you will encounter all kinds of babies with many different needs. WIC staff can make an important difference by being supportive to parents, making referrals, and helping all parents provide the best nutrition they can to their infants.

## Other Health and Safety Tips

Besides the nutrition topics we've already addressed, there are many other health and safety measures that parents should know about. Although these precautions aren't directly related to infant feeding, they're 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. Also WIC staff should make sure their own clinics are safe for infants and young children. Box 8.2 lists a number of safety tips for parents and caregivers to keep in mind.



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Some infants require extra nutritional support or special feeding techniques.

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**Box 8.2 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 the baby.
- Don't put baby in a crib with toys or soft bedding like blankets.
- When the baby is old enough to pull up on the sides of the crib, take the bumper pad off the crib. Use a crib that meets safety requirements.
- 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's 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 electrical outlets with safety caps.
- Keep curtain cords and other cords out of reach of infants and small children.
- Use a rear-facing infant car seat and install it correctly.
- 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). Also, in those select cases, it's critical that parents remove all fluffy bedding from the crib.*



## Summary

- Newborn jaundice is very common, and usually occurs during the first week when bilirubin builds up in the baby's blood, making the skin look yellow. Jaundice occurs more often in breastfed babies. Most cases are harmless but bilirubin levels can get very high and, if not treated, cause brain damage. Babies should be checked for jaundice before leaving the hospital and again at 3 to 5 days of age. A breastfeeding mother should nurse her baby at least eight to 12 times a day to help promote stooling and reduce bilirubin levels.
- If the water supply is low in fluoride, the AAP recommends fluoride supplementation starting at age 6 months. Experts advise cleaning infant gums and teeth daily with plain water. Bacteria from an adult's mouth can cause tooth decay in an infant, so parents should avoid sharing utensils and pre-chewing food.
- Early childhood caries occur when a baby's teeth are exposed to sugary liquids like milk, formula or juice for long periods. Parents should check the baby's front teeth for white spots (early decay). Breastmilk can also cause decay if it constantly coats the teeth.
- Valid concerns about skin cancer have cut down on sun exposure among infants and doctors are seeing cases of rickets in the U.S. The AAP recommends that all infants and children get a minimum of 200 IU of vitamin D per day, starting within the first 2 months of life. Since vitamin D is added to formula, infants who get 17 ounces of formula a day meet their needs. Breastfed infants need to get the extra vitamin D from liquid vitamin drops.
- Most infants are born with iron stores that last four to six months. Then they need dietary iron to prevent iron-deficiency anemia. Anemia can cause irreversible learning and psychomotor difficulties and decreased immune function. WIC screens babies for anemia around 9 to 12 months of age. Treatment involves iron supplementation.
- Infants and children absorb lead easily and they have a lot of hand-to-mouth activity. Ingested lead can cause learning

## Part 8

and behavioral problems and harm organs. The main sources of lead exposure are lead-based paint and dust in buildings built before 1978. Parents should keep babies away from peeling paint; wash floor, toys, pacifiers, and baby's hands and face; and offer a healthy diet.

- A baby is at a higher risk for obesity if either parent is overweight. Breastfeeding lowers the risk of obesity. Poor feeding practices can cause extra weight gain. No one should put a baby on a weight loss diet. Parents should follow proper feeding practices, form a positive feeding relationship, and encourage physical activity (see Box 8-1).
- Conditions like genetic diseases, physical disabilities, and developmental disorders can impact a baby's nutritional needs and care. WIC staff can make referrals and help parents provide the best nutrition possible.
- There are many other health and safety measures that aren't directly related to infant feeding, but are still important (see Box 8-2).

## Self-test Questions

1 *Fill in the blanks.*

Jaundice occurs when \_\_\_\_\_ builds up in the baby's blood, giving the baby's skin a \_\_\_\_\_ appearance. One reason jaundice happens in newborns is that the baby's \_\_\_\_\_ often isn't mature enough to effectively remove \_\_\_\_\_ from the blood.

2. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ Jaundice is very rare.

\_\_\_\_\_ Bilirubin levels are usually the highest between 3 to 5 days of age.

\_\_\_\_\_ All cases of jaundice require treatment with special lights or a blood transfusion.

\_\_\_\_\_ Early breastfeeding problems can result in the baby having fewer stools, which can lead to elevated bilirubin levels.

3. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ Bottled water is the main source of fluoride for children and adults in the United States.

\_\_\_\_\_ If the water supply doesn't have enough fluoride, the AAP recommends fluoride supplementation for infants starting at age 6 months.

\_\_\_\_\_ Tooth decay can occur as soon as the first teeth erupt.

\_\_\_\_\_ Early childhood caries usually occur on the back teeth, making it hard for parents to check for early signs of tooth decay.

\_\_\_\_\_ Tooth decay cannot occur in breastfed infants.

4. *List* three ways parents can help prevent early childhood caries in their infants.

5. *Fill in the blanks.*

To prevent rickets, The AAP recommends that infants get a minimum of 200 IU of vitamin D per day, starting within the first 2 months of life. Vitamin D is added to infant formula, so infants who drink at least \_\_\_\_\_ ounces of infant formula a day get enough vitamin D. Breastfed infants need to get vitamin D from \_\_\_\_\_.

6. *Check the correct answer.* Iron-deficiency anemia can cause:

- \_\_\_\_\_ learning difficulties
- \_\_\_\_\_ psychomotor problems
- \_\_\_\_\_ a decrease in immune function
- \_\_\_\_\_ all of the above

7 *List four possible sources of dietary iron for infants during the first year of life.*

8. *Fill in the blanks.*

The main sources of lead exposure in the United States are \_\_\_\_\_ and \_\_\_\_\_ in older homes and buildings built before 1978. *List two other sources of lead:* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

9. Briefly *state* two reasons why infants and young children are at a higher risk of lead poisoning compared to older children and adults.

10. *List* three things parents can do to reduce an infant's risk of lead poisoning.

11. Mark each of the following statements **TRUE** or **FALSE**.

\_\_\_\_\_ Almost all big babies become obese children.

\_\_\_\_\_ No matter how much a baby weighs, no one should ever put a baby on a weight loss diet.

\_\_\_\_\_ There's nothing parents can do during the first year of a baby's life to help encourage a healthy weight in their infant. They need to wait until the baby is walking and eating table foods.



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# Appendix

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## Foods to Introduce to Infants

<b>Iron-Fortified Infant Cereal</b>	<ul style="list-style-type: none"><li>• Health-care providers commonly suggest giving iron-fortified infant cereal as an early complementary food, starting sometime between 4 and 6 months of age. Rice, barley, or oatmeal infant cereals are good varieties to start with. Parents should wait until at least 8 months of age to offer wheat and corn cereal.</li><li>• Dry, boxed infant cereal is usually more nutritious and less expensive than jars of prepared baby cereal. Also, by adding more or less breastmilk or formula, it's easy to change the thickness of dry cereal to match the baby's chewing and swallowing skills.</li><li>• Ready-to-eat adult cereals are not appropriate as standard cereals for infants since they often contain mixed grains, as well as sodium and sugar. Also, the iron is not the same form of iron that's used in infant cereals. However, for an older infant who is finger feeding, unsweetened "O-shaped" adult cereals are a good snack food.</li></ul>
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*(continued)*

## Appendix

<b>Fruits</b>	<ul style="list-style-type: none"><li>• Most babies start eating pureed fruits as one of their first foods. For an infant who is just learning to eat solid foods, fruits should be pureed to a smooth and thin texture.</li><li>• Good fruit choices include commercially-prepared or homemade bananas, applesauce, apricots, pears, peaches, plums, cantaloupe, mango, papaya, and avocado. Ripe bananas are soft enough to simply mash and puree with a little liquid, but most other fruits need to be cooked first. If using canned fruits, parents should choose fruits packed in juice instead of heavy syrup.</li><li>• It's best to avoid commercially-prepared fruit cobblers, puddings, or other fruit desserts, as well as baby food fruits with added tapioca and/or other starches. These foods have extra sugar and calories compared to plain fruit baby foods.</li><li>• Citrus fruits (oranges, tangerines, grapefruit, etc.) and their juices can cause negative reactions in some babies. Parents should wait at least until 6 months of age to introduce these fruits and juices and then watch closely for reactions. It's important to be sure to remove the peels, seeds and inner membranes.</li><li>• Parents should not give fruits that might cause choking, like raisins and small pieces of hard fruit. It's</li></ul>
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*(continued)*



<p><b>Fruits</b> <i>(continued)</i></p>	<p>important to remove skin, pits, and seeds from fruit; cook the fruit if needed; and cut it into small pieces.</p> <ul style="list-style-type: none"> <li>• Fruit juice - Small amounts of juice can be part of a healthy diet for infants over 6 months of age, although juice is not a required food for infants (see Part 6). Parents should choose 100% juices that are pasteurized. Also juices should be fortified with vitamin C and/or other added nutrients. Parents should limit juice to 4 ounces a day, and serve juice in a cup, never in a bottle. Pouring canned juices into a glass or plastic container can help maintain the juice's flavor. Also, parents should avoid imported canned goods, which may be soldered with lead.</li> </ul>
<p><b>Vegetables</b></p>	<ul style="list-style-type: none"> <li>• Most babies start eating pureed vegetables as one of their first foods. For an infant who is just learning to eat solid foods, vegetables should be pureed to a smooth and thin texture.</li> <li>• Good first vegetables include commercially-prepared green peas, green beans, sweet potatoes, squash, carrots, beets, spinach and broccoli.</li> <li>• Parents can also prepare the baby's vegetables at home. Good choices include cooked and strained green peas, asparagus, broccoli, green beans, cabbage, cauliflower, kohlrabi, and plantain. <b>Do not offer homemade beets, carrots, collard greens, spinach, and turnips to</b></li> </ul>

*(continued)*

Appendix

<p><b>Vegetables</b> <i>(continued)</i></p>	<p><b>infants younger than 6 months of age.</b> These vegetables may contain high levels of nitrates (see Part 5).</p> <ul style="list-style-type: none"> <li>• Parents should not offer raw spouts (alfalfa, bean or radish).</li> <li>• Babies should get plain vegetables without added seasonings, salt, sauces, oils, margarine, or butter. If parents are using canned vegetables, it's best to choose the "no salt added" or "low sodium" varieties.</li> <li>• Avoid vegetables that might cause choking like hard pieces of raw or partially-cooked vegetables, corn, and round shapes like round slices of carrots.</li> <li>• Small pieces of cooked broccoli, cooked carrots, and cooked green beans are good finger foods for older infants. Foods like mashed potatoes or mashed sweet potatoes are good for learning to self-feed with a spoon.</li> <li>• Parents should buy only pasteurized vegetable juices.</li> <li>• Some infants may have a reaction to tomato or vegetable juice. Symptoms to watch for include skin rash, runny nose, vomiting, and diarrhea.</li> </ul>
<p><b>Meats, Poultry, and Fish</b></p>	<ul style="list-style-type: none"> <li>• Because meats provide zinc, iron and protein, some physicians suggest feeding commercially-prepared pureed meats to infants as an early complementary food around 6 months of age. Other</li> </ul>

*(continued)*

<p><b>Meats, Poultry, and Fish</b> (continued) See next page for information about appropriate <i>meat alternates</i> such as dried beans and peas, tofu, cottage cheese, and plain yogurt.</p>	<p>physicians suggest offering meats a little later, after the baby is eating various fruits, vegetables, and iron-fortified infant cereal.</p> <ul style="list-style-type: none"> <li>• If parents want to prepare meats at home, it's best to use plain, lean meats, poultry, and fish. It's important to remove the skin, bones, and gristle. They should cook the food thoroughly and then strain or puree it so that the texture is developmentally appropriate. Older infants can have small bites of finely chopped meats, poultry and fish.</li> <li>• Parents should not feed any shellfish (shrimp, lobster, crab, crawfish, scallops, oysters, clams) to babies younger than one year of age. Shellfish can cause severe allergic reactions in some babies.</li> <li>• Shark, swordfish, king mackerel, and tilefish may contain high levels of mercury. Parents should not feed these fish to infants or young children.</li> <li>• Parents should avoid giving hot dogs, sausage, bacon, bologna, salami, luncheon meats, or fried meats to infants. These foods are higher in fat and sodium, and lower in protein compared to plain, unprocessed meats. If parents choose to offer processed meats, they should heat them until steaming hot, and allow them to cool before serving them to infants.</li> </ul>
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(continued)

Appendix

<p><b>Legumes (beans, peas, lentils) and Tofu</b></p>	<ul style="list-style-type: none"><li>• <b>Parents should not offer nuts or nut products to infants.</b> Nuts and nut products do offer protein and are referred to as meat alternates, but they are not appropriate for infants. Nuts increase the risk of choking and allergies in infants.</li><li>• Foods in this group provide protein, iron, folic acid, fiber, and other nutrients. Parents typically start offering tofu, beans, and peas a few months after they've introduced other solid foods.</li><li>• Dried beans prepared at home are lower in sodium compared to canned beans. If parents are using canned beans, it's best to drain and then rinse with water to reduce the sodium content. Cooked tofu is an easy protein food for infants since it has a smooth texture. Parents should not serve raw or undercooked tofu to infants.</li><li>• Parents should start by offering just a few teaspoons of mashed or pureed cooked beans or peas or tofu. Don't offer whole beans since they can cause choking.</li></ul>
<p><b>Grain Products (bread, crackers, noodles, etc.)</b></p>	<ul style="list-style-type: none"><li>• Parents can usually start offering grain products around 8 or 9 months of age. At that age, the risk of having a reaction to wheat decreases, and most babies are starting finger foods.</li></ul>

*(continued)*

<p><b>Grain Products (bread, crackers, noodles, etc.)</b> <i>(continued)</i></p>	<p>Grain products like tortillas, rolls, bagels, crackers, teething biscuits, noodles, and macaroni are all good choices. It's best to serve products made from whole-grain or enriched meal or flour.</p> <ul style="list-style-type: none"> <li>• Parents should not give grain products with seeds or nuts.</li> <li>• Also, parents should avoid whole kernels of cooked rice, barley or wheat. It's best to finely grind or mash these types of grains when feeding babies.</li> </ul>
<p><b>Egg Yolks</b></p>	<ul style="list-style-type: none"> <li>• Most health care providers suggest waiting until about 8 or 9 months of age before offering hard-cooked egg yolks. Parents should offer only egg <i>yolks</i>; infants shouldn't have egg whites or whole eggs until at least 12 months of age since egg whites contain proteins that can cause allergic reactions in infants.</li> <li>• Parents can mix cooked egg yolks with cereal or another food that the infant has already tried.</li> </ul>
<p><b>Dairy Products (yogurt, cottage cheese, hard cheeses)</b></p>	<ul style="list-style-type: none"> <li>• Parents can usually offer cheese, yogurt and cottage cheese starting at about 8 months of age. But infants shouldn't get whole milk until after 12 months of age.</li> </ul>

*(continued)*

## Appendix

<p><b>Dairy Products (yogurt, cottage cheese, hard cheeses)</b> <i>(continued)</i></p>	<ul style="list-style-type: none"><li>• Parents should avoid feeding unpasteurized dairy products and soft cheeses to infants. Soft cheeses include feta, Brie, Camembert, blue-veined cheeses, and Mexican-style cheeses (queso blanco, queso fresco, queso de hoja, queso de crema, asadero, etc.).</li><li>• Since cheeses and yogurt are made from cow's milk, parents should observe babies closely for reactions after feeding these foods.</li><li>• Good choices for cheese include cheddar, Colby, and mozzarella, as well as cottage cheese. It's best to avoid processed cheese, cheese food, and cheese spreads since they typically have more salt.</li><li>• To reduce the risk of choking, it's best to offer small thin cheese slices rather than chunks of cheese.</li></ul>
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# Glossary

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**acute diarrhea:** Short-term diarrhea which resolves within two weeks. Causes include viruses, bacteria, parasites, tension, feeding too much juice, and antibiotic therapy.

**allergen:** A substance that triggers the immune system and causes an allergic reaction in certain individuals. This module refers specifically to *food* allergens.

**anaphylactic shock (also called anaphylaxis):** The most severe type of allergic response. Symptoms can be life threatening and include difficulty breathing, hives, rapid pulse, dizziness, swelling of lips, tongue, throat, face and skin; uneven heartbeat; changes in blood pressure; and loss of consciousness.

**bilirubin:** A normal breakdown product of red blood cells. The liver removes bilirubin from the blood and converts it to a form that travels to the intestines, where it's excreted in the stool. Many newborns experience elevated levels of bilirubin at some point, with bilirubin levels usually peaking between three and five days of age (see jaundice).

**chronic diarrhea:** Diarrhea which lasts longer than two weeks. Causes include small intestine disorders, pancreatic insufficiency (as in cystic fibrosis), serious infections, and cow's milk or soy protein allergy.

**colic:** When an infant has long, intense crying episodes that last more than three hours a day, for more than three days in one week, and for at least three weeks. A baby with colic is otherwise healthy and gaining weight.

**colostrum:** Human milk which is produced during pregnancy and in the early postpartum period. This early milk is thick and yellowish and is very rich in nutrients and immunoglobulins (protective proteins that serve as antibodies).

**complementary foods:** For the purposes of this module, complementary foods are defined as any foods or liquids



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other than breastmilk or formula that are fed during the first 12 months of life.

**constipation:** Refers to infrequent bowel movements with hard, dry stools; a delay or difficulty in passing bowel movements.

**corrected age:** For a premature infant, the corrected age takes into account the fact that the baby was born early. For example, a 6-month-old infant born two months early would have a corrected age of 4 months. So the infant's growth and developmental readiness would probably be similar to the average growth and development of a 4-month-old baby born at full term.

**dehydration:** A reduction in body fluids, caused by excessive loss of fluids or poor intake of fluids. Symptoms include a reduced amount of dark yellow urine; dry membranes in the mouth; no tears when crying; sunken eyes; and restlessness, irritability, or lethargy.

**developmental readiness:** A point at which a baby is ready to try new foods, food textures and feeding methods.

**diarrhea:** An increase in the frequency, volume, and water content of stools compared to a person's usual stool patterns.

**early childhood caries** (previously called "baby-bottle tooth decay"): Tooth decay that occurs when a baby's teeth are frequently exposed to sugary liquids for long periods of time. Bacteria in the mouth interact with sugar to make an acid that attacks the teeth and, over time, leads to decay.

**electrolytes:** Sodium, potassium, chloride and other salts found in the blood, tissue, fluids, and cells.

**feeding on cue:** Feeding an infant when the baby shows signs of hunger and stopping when the baby shows signs of being full.

**fluorosis:** A mottling or staining of the teeth caused by ingesting too much fluoride.

**food allergy:** a response by the immune system to a food.

**food intolerance:** An abnormal reaction to an ingested food. Unlike a food allergy, a food intolerance does not involve the

immune system. Examples of food intolerances include caffeine intolerance, salmonella poisoning, and lactose intolerance.

**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 propels the object forward on the tongue. This protects him from swallowing inappropriate foods or objects that might cause choking.

**galactosemia:** A rare genetic disorder in which an enzyme deficiency prevents the body from breaking down the simple sugar, galactose (a breakdown product of lactose which is found in breastmilk and cow's milk). As a result galactose builds up on the blood and can damage the liver, brain, kidneys and eyes.

**gastroesophageal reflux (GER):** A condition in which the stomach contents flow back up the esophagus because the ring of muscles between the stomach and the esophagus are too relaxed. Spitting up is a mild form of GER

**gastroesophageal reflux disease (GERD):** A disease process resulting from complications of excessive reflux. GERD is characterized by poor growth, inflammation of the esophagus, respiratory illness, and difficulty swallowing.

**growth spurt:** A time when the baby's growth accelerates. Babies respond by wanting to nurse or feed more frequently or take in more at each feeding.

**hematocrit:** A measurement that indicates the number of red blood cells and the size of red blood cells present in the blood; used to assess iron status.

**hemoglobin:** A protein in the blood that carries oxygen. A hemoglobin test measures the total amount of hemoglobin in the blood and is used to assess iron status.

**hydrolyzed:** Describes a substance that has been broken down after reacting with water. Some infant formulas have hydrolyzed or partially-hydrolyzed protein, which means the proteins in the formula are broken down (either partially or completely) so that the infant's gut can absorb them more easily.

## Glossary

**infant botulism:** An illness in infants that is caused by ingesting *Clostridium botulinum* spores. Once ingested, the spores produce a toxin in the baby's intestinal tract and produce life-threatening symptoms. Honey is the one food source that has been definitively linked to infant botulism, although an infant may also get the illness by ingesting *C. botulinum* spores that travel on microscopic dust particles.

**infant feeder:** A feeding bottle that's specially designed to feed strained food to a baby. The bottom of the bottle has a syringe, piston, or other device that forces the food up through the nipple. Manufacturers promote infant feeders as a way to start solids, but babies shouldn't get solid foods until they are developmentally ready. Infant feeders can lead to problems like choking, overfeeding and forced feedings.

**iron-deficiency anemia:** A condition that develops when the body doesn't have enough iron to make adequate amounts of hemoglobin. Without enough hemoglobin, the cells don't get enough oxygen. In infants and children, anemia can cause learning and psychomotor difficulties and a decrease in immune function.

**iron-fortified infant formula:** An infant formula with significant amount of added iron. Based on U.S. Food and Drug Administration definitions, an iron-fortified formula must contain *more* than 6.7 mg/L of iron. However, In the United States, the iron concentrations of most iron-fortified formulas range from 10 mg/L to 12 mg/L.

**jaundice:** A condition that occurs when bilirubin builds up in the baby's blood, giving the baby's skin a yellow appearance. Most newborns experience some degree of jaundice.

**kernicterus:** A type of brain damage caused by dangerously high levels of bilirubin. Kernicterus can cause deafness, developmental delays and cerebral palsy. It is completely preventable if a physician monitors bilirubin levels and provides treatment when necessary.

**lactose:** The main carbohydrate (sugar) in human milk and standard cow's milk formulas.

**lactose intolerant:** Unable to digest large amounts of lactose because the small intestine does not produce enough lactase, the enzyme needed to breakdown lactose. When lactose isn't digested, it can cause gas and stomach cramps, usually about 30 minutes to two hours after eating or drinking foods containing lactose.

**low-iron formulas:** Defined by the US FDA as containing *less* than 6.7 mg/L of iron.

**methemoglobinemia:** A possibly fatal condition in which a baby has difficulty breathing and the skin turns blue. This condition is caused by ingesting nitrates (see nitrates).

**nitrates:** Naturally-occurring compounds from soil found in home-prepared beets, carrots, collard greens, spinach, and turnips. Very young babies (less than 6 months of age) convert the nitrates into nitrites, which can cause methemoglobinemia. Commercially-prepared baby foods contain only traces of nitrates and are not considered a risk.

**oral-motor skills:** Skills that involve moving, positioning, and using the lips, tongue, teeth, and palate for tasks like feeding and talking.

**oral rehydration therapy (ORT):** ORT involves giving the infant a special solution to help replace lost fluids and electrolytes (sodium, potassium, chloride and other salts found in the blood, tissue, fluids, and cells).

**parent-child feeding relationship:** All the communication (both verbal and non-verbal) that occurs between a parent and child about food and feeding.

**pica:** The eating of nonfood substances like clay, dirt, baking soda, starch, ashes, chalk, coffee grounds, cigarette ashes, paint chips, or large quantities of ice. Pica is often associated with pregnant women.

**pincer grasp:** A grasp which uses the thumb and first or second finger to pick something up.

**rickets:** A vitamin D deficiency disease that affects a child's skeletal growth, and results in bones that are soft and weak.

## Glossary

**rooting reflex:** When an object touches the mouth, lips, cheek, or chin, the baby turns his head toward the object and opens his mouth to look for a nipple.

**Shaken Baby Syndrome:** A severe form of head injury that occurs when a baby is shaken forcibly enough to cause the baby's brain to bounce against his or her skull. This rebounding may cause bruising, swelling, and bleeding of the brain, which may lead to permanent, severe brain damage or death.

**“spill-proof” cups (also called “sippy cups”):** Infant training cups with a spout and lid, and a plastic valve under the spout. The valve keeps the liquid from spilling out. To drink from the cup, a child sucks the liquid out through the spout.

**spitting up:** A mild form of gastroesophageal reflux (GER) which does not affect growth or health.

**suck/swallow reflex:** As a baby opens his mouth and touches the nipple, he begins sucking movements. Then, as liquid moves into the mouth, the tongue moves it back for swallowing.

**Sudden Infant Death Syndrome (SIDS):** The sudden death of an infant under one year of age that remains unexplained after a thorough case investigation (i.e., autopsy, death scene exam, review of health status prior to dying and other family medical history). SIDS is the leading cause of death in infants between one month and one year of age. Most SIDS deaths occur when a baby is between one and four months of age.

**“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.

**tongue-thrust reflex:** When something touches the infant's lips, the tongue extends out of the mouth.

**vomiting:** The forceful expulsion of the stomach contents; most often related to an illness or infection.

**water intoxication:** An abnormal increase in body fluids, caused by excessive intake of fluids. Symptoms include respiratory failure, seizures and convulsions.



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# Bibliography

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## Part One: Overview of Infant Nutrition During the First Year

- Butte, N., K. Cobb, J. Dwyer, L. Graney, W. Heird, and K. Rickard, 2004. "The start healthy feeding guidelines for infants and toddlers." *J. Am. Dietetic Assn.* 104(3): 442-454.
- Centers for Disease Control and Prevention. 2001. "Recommendations for using fluoride to prevent and control dental caries in the United States." *MMWR Recomm. Rep.* 50 (RR-14):1-42.
- Gartner, L.M. and F.R. Greer. 2003. "Prevention of rickets and vitamin D deficiency: new guidelines for vitamin D intake." *Pediatrics* 111(4):908 -910.
- Klienman RE, ed. 2003. *Pediatric Nutrition Handbook*. 5th ed. Elk Grove Village, IL: American Academy of Pediatrics.
- Satter, E. 1991. *Child of mine, feeding with love and good sense*. Palo Alto, California: Bull Publishing Company.
- United States Department of Agriculture, Food and Nutrition Service. 2001. "Feeding Infants - A guide for use in the child nutrition programs." FNS-258. Available online at: [http://www.fns.usda.gov/tn/Resources/feeding\\_infants.pdf](http://www.fns.usda.gov/tn/Resources/feeding_infants.pdf). Accessed on February 8, 2005.

## Part Two: Feeding the Newborn

- American Dietetic Association (Pediatric Nutrition 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.
- American Academy of Pediatrics, 1998. *Caring for Your Baby and Young Child, Birth to Age 5*. New York: Bantam Books.
- American Academy of Pediatrics, Section on Breastfeeding, 2005. Breastfeeding and the use of human milk. *Pediatrics* 115(2): 496-506. Available online at:

## Bibliography

- <http://aappolicy.aappublications.org/cgi/content/full/pediatrics;115/2/496>. Accessed on June 16, 2005.
- Iwinski, S. and G. Gotsch. 2003. "Feeding on cue." *New Beginnings*, Vol. 20 No. 4, July-August 2003, p. 126.
- Nemours Foundation. "Sleep and your newborn." Available online at: <http://kidshealth.org/parent/growth/sleep/sleepnewborn.html>. Accessed on November 10, 2004.
- Satter, E. 1991. *Child of mine, feeding with love and good sense*. Palo Alto, California: Bull Publishing Company.
- Texas Department of State Health Services. "Individual Counseling Guide - Infants." Available online at: [http://www.nal.usda.gov/wicworks/Sharing\\_Center/TX/appendices.pdf](http://www.nal.usda.gov/wicworks/Sharing_Center/TX/appendices.pdf). Accessed on August 24, 2005.
- United States Department of Agriculture, Food and Nutrition Service. 2001. *Feeding infants - A guide for use in the child nutrition programs*. FNS-258. Available online at: [http://www.fns.usda.gov/tn/Resources/feeding\\_infants.pdf](http://www.fns.usda.gov/tn/Resources/feeding_infants.pdf). Accessed on February 8, 2005.

### **Part 3: Breastmilk and Formula Basics**

- American Academy of Pediatrics, Section on Breastfeeding, 2005. "Breastfeeding and the use of human milk." *Pediatrics* 115(2): 496-506.
- American Academy of Pediatrics, 1998. *Caring for Your Baby and Young Child, Birth to Age 5*. New York: Bantam Books.
- Texas Department of State Health Services, Nutrition Services Section, 2002. *Breastfeeding Promotion and Support Module*. Stock No. 13-27-1.
- Texas Department of State Health Services, 2002. Risk code 417: Lack of sanitation in preparation, handling, and storage of formula or expressed breastmilk. *Texas Nutrition Risk Manual*. Available online at <http://www.dshs.state.tx.us/wichd/nut/risk-nut.shtm>. Accessed on March 31, 2005.



United States Department of Agriculture, Food and Nutrition Service. 2001. *Feeding infants - A guide for use in the child nutrition programs*. FNS-258. Available online at: [http://www.fns.usda.gov/tn/Resources/feeding\\_infants.pdf](http://www.fns.usda.gov/tn/Resources/feeding_infants.pdf). Accessed on February 8, 2005.

#### **Part 4: Starting Solids**

- American Academy of Pediatrics, Section on Breastfeeding, 2005. Breastfeeding and the use of human milk. *Pediatrics*, February 1, 2005; 115(2): 496-506.
- Baydar, N., M. McCann, R. Williams, E. Vesper, 1997. "Final Report: WIC Infant Feeding Practices Study." Available online at: <http://www.fns.usda.gov/oane/menu/Published/WIC/FILES/ifps.pdf>. Accessed on May 17, 2004.
- Butte, N., K. Cobb, J. Dwyer, L. Graney, W. Heird, and K. Rickard, 2004. The start healthy feeding guidelines for infants and toddlers. *J. Am. Dietetic Assn.* 104(3): 442-454.
- Klienman RE, ed. 2003. *Pediatric Nutrition Handbook*. 5th ed. Elk Grove Village, IL: American Academy of Pediatrics.
- LaLeche League International, 2000. "Introducing complementary foods." *LEAVEN*, Vol. 35(6):130. Available on line at <http://www.lalecheleague.org/llleaderweb/LV/LVDec99Jan00p130.html>. Accessed August 31, 2005.
- Naylor A. J. and A.L. Morrow, 2001. "Developmental readiness of normal full term infants to progress from exclusive breastfeeding to the introduction of complementary foods: reviews of the relevant literature concerning infant immunologic, gastrointestinal, oral motor and maternal reproductive and lactational development." Washington, DC: Wellstart International and the LINKAGES Project/Academy of Educational Development. Available online at: <http://www.linkagesproject.org/media/publications/Technical%20Reports/devreadiness.pdf>. Accessed on February 17, 2005.

## Bibliography

Satter, E. 1991. *Child of mine, feeding with love and good sense*. Palo Alto, California: Bull Publishing Company.

United States Department of Agriculture, Food and Nutrition Service. 2001. *Feeding infants - A guide for use in the child nutrition programs*. FNS-258. Available online at: [http://www.fns.usda.gov/tn/Resources/feeding\\_infants.pdf](http://www.fns.usda.gov/tn/Resources/feeding_infants.pdf). Accessed on February 8, 2005.

Zeiger, R.S. 2003. "Food allergen avoidance in the prevention of food allergy in infants and children." *Pediatrics* 111(6): 1662 - 1671.

### **Part 5: Making the Transition to Table Food**

Arnon, S.S. 1998. "Infant botulism treatment and prevention" in *Textbook of Pediatric Infectious Disease*. 4th ed. Philadelphia: W.B. Saunders Co. Available online at: <http://www.infantbotulism.org/>. Accessed July 28, 2005.

Butte, N., K. Cobb, J. Dwyer, L. Graney, W. Heird, and K. Rickard, 2004. "The start healthy feeding guidelines for infants and toddlers." *J. Am. Dietetic Assn.* 104(3): 442-454.

Krebs, N.F., 2000. "Dietary zinc and iron sources, physical growth and cognitive development of breastfed infants." *J. Nutr.* 30(2S Suppl):358S-360S.

National SAFE KIDS Campaign (NSKC). 2004. *Airway Obstruction Injury Fact Sheet*. Washington DC: NSKC. Available online at: [http://www.safekids.org/tier3\\_cd.cfm?folder\\_id=540&content\\_item\\_id=991](http://www.safekids.org/tier3_cd.cfm?folder_id=540&content_item_id=991). Accessed on January 5, 2005.

Satter, E. 1991. *Child of mine, feeding with love and good sense*. Palo Alto, California: Bull Publishing Company.

United States Department of Agriculture, Food and Nutrition Service. 2001. *Feeding Infants - A Guide for use in the child nutrition programs*. FNS-258. Available online at: [http://www.fns.usda.gov/tn/Resources/feeding\\_infants.pdf](http://www.fns.usda.gov/tn/Resources/feeding_infants.pdf). Accessed on February 8, 2005.

## Part 6: Fluids, Cups, and Weaning (6 to 12 months)

- American Academy of Pediatrics, Committee on Nutrition, 2001. "The use and misuse of fruit juices in pediatrics." *Pediatrics*, 107(5): 1210-1213.
- American Dental Association, 2004. "From baby bottle to cup: choose training cups carefully, use them temporarily." *JADA*, Vol. 135, 187. Available online at: [http://www.ada.org/prof/resources/pubs/jada/patient/patient\\_36.pdf](http://www.ada.org/prof/resources/pubs/jada/patient/patient_36.pdf). Accessed on February 8, 2005
- Bengson, D. 1999. *How weaning happens*. Schaumburg, Illinois: Le Leche League International.
- Rychnovsky, J.D. 2000. No-spill sippy cups (editorial). *J. of Pediatric Health Care*(14(5):207-08.
- United States Department of Agriculture, Food and Nutrition Service. 2001. *Feeding infants - A guide for use in the child nutrition programs*. FNS-258. Available online at: [http://www.fns.usda.gov/tn/Resources/feeding\\_infants.pdf](http://www.fns.usda.gov/tn/Resources/feeding_infants.pdf) . Accessed on February 8, 2005.

## Part 7: Conditions Related to the Digestive System

- American Academy of Family Physicians. "Spitting up in babies." Available online at: <http://familydoctor.org/218.xml> . Accessed on November 10, 2004.
- American Academy of Pediatrics, Committee on Nutrition, 1999. Iron fortification of infant formulas. *Pediatrics* 104 (1): 119-123.
- Arguin, A.L. and M. K. Swartz, 2004. "Gastroesophageal reflux in infants: a primary care perspective." *Pediatric Nurse* 30(1):45-51.
- Carbaugh, S.F. 2004. "Understanding shaken baby syndrome." *Adv Neonatal Care* 4(2):105-116, 2004.
- Centers for Disease Control, 2003. "Managing acute gastroenteritis among children, oral rehydration, maintenance, and nutritional therapy in MMWR 52." (RR-16): 1-20.

## Bibliography

- Available online at: <http://www.cdc.gov/mmwr/PDF/RR/RR5216.pdf>. Accessed on July 27, 2005.
- Helseth, S. and S. Begnum. 2002. "A comprehensive definition of infant colic: parents' and nurses' perspectives." *Journal of Clinical Nursing* 11(5):672-80.
- Karp, H., 2004. "The 'fourth trimester': A framework and strategy for understanding and resolving colic." *Contemporary Pediatrics*. February 2004; 21:94. Available online at: <http://www.contemporarypediatrics.com/contpeds/article/articleDetail.jsp?id=108006>. Accessed on August 22, 2005.
- Medline Plus Medical Encyclopedia. Colic and crying. Available online at: <http://www.nlm.nih.gov/medlineplus/ency/article/000978.htm>. Accessed: March 25, 2005.
- National Institute of Neurological Disorders and Stroke. NINDS shaken baby syndrome information page. Available online at: <http://www.ninds.nih.gov/disorders/shakenbaby/shakenbaby.htm> Accessed on August 23, 2005.
- Pray, W. S., 1997. Infant Colic: The Therapeutic Puzzle. *US Pharmacist* 22(3). Available online at: [http://www.uspharmacist.com/oldformat.asp?url=newlook/files/Cons/ACF2EE2.cfm&pub\\_id=8&article\\_id=26](http://www.uspharmacist.com/oldformat.asp?url=newlook/files/Cons/ACF2EE2.cfm&pub_id=8&article_id=26). Accessed on March 29, 2005.
- Texas Department of State Health Services, 2004. *Common infant problems (birth through 1 year), What about constipation?*, Stock no. 13-121.
- Texas Department of State Health Services, 2004. *Common infant problems (birth through 1 year), What about diarrhea?*, Stock no. 13-123.

### **Part 8: Other Infant Health Issues**

- American Academy of Pediatrics, Committee on Nutrition, 2003. "Prevention of pediatric overweight and obesity." *Pediatrics* 112(2): 424 - 430. Available online at:

- <http://aappolicy.aappublications.org/cgi/content/full/pediatrics;112/2/424>. Accessed on March 30, 2005.
- American Academy of Pediatrics, Subcommittee on Hyperbilirubinemia, 2004. "Hyperbilirubinemia in the newborn infant 35 or more weeks of gestation." *Pediatrics* 114(1): 297 - 316. Available online at: <http://aappolicy.aappublications.org/cgi/content/abstract/pediatrics;114/1/297>. Accessed on July 6, 2005.
- American Academy of Pediatrics, 2004. "Frequently Asked Questions and Answers: Jaundice and Your Newborn." Available online at: <http://www.aap.org/family/jaundicefaq.htm>. Accessed on July 6, 2005.
- American Dental Association, 2002. "For the Dental Patient: Baby's First Teeth." Available online at: [http://www.ada.org/prof/resources/pubs/jada/patient/patient\\_11.pdf](http://www.ada.org/prof/resources/pubs/jada/patient/patient_11.pdf). Accessed on February 8, 2005.
- Centers for Disease Control and Prevention. 2005. "Lead fact sheet—second national exposure report." Available online at: [http://www.cdc.gov/exposurereport/2nd/lead\\_factsheet.htm](http://www.cdc.gov/exposurereport/2nd/lead_factsheet.htm). Accessed on February 2, 2005.
- Centers for Disease Control and Prevention. "Sudden Infant Death Syndrome (SIDS)." Available online at: <http://www.cdc.gov/reproductivehealth/SIDS/index.htm>. Accessed on July 28, 2005.
- Gartner, L.M. and F.R. Greer. 2003. "Prevention of rickets and vitamin D deficiency: new guidelines for vitamin D intake." *Pediatrics* 111(4):908 -910.
- Holt, K. and Barsel, R. National Maternal and Child Oral Health Resource Center. "A health professional's guide to pediatric oral health management (online module series)." Available online at: <http://www.mchoralhealth.org/PediatricOH/index.htm>. Accessed on February 8, 2005.
- Koller, K., T. Brown, A. Spurgeon, and L. Levy. 2004. "Recent developments in low-level lead exposure and intellectual impairment in children." *Environmental Health Perspectives* 112(9):987-994.

## Bibliography

- Mohrbacher, N., and J. Stock. 2003. Causes of Newborn Jaundice and Elevated Bilirubin in *The Breastfeeding Answer Book*. 3<sup>rd</sup> ed. Schaumburg, IL: La Leche League International.
- Spence, J.T. and J. R. Serwint. 2004. "Secondary prevention of vitamin D-deficiency rickets." *Pediatrics* 113(1):e70-e72
- Texas Department of State Health Services, 2002. "Risk code 603: Breastfeeding complications or potential complications (in infants)." *Texas Nutrition Risk Manual*. Available online at <http://www.dshs.state.tx.us/wichd/nut/risk-nut.shtm>. Accessed on August 22, 2005.
- Texas Department of State Health Services. "Texas strategic plan to eliminate child lead poisoning by 2010." Available online at: [http://www.tdh.state.tx.us/lead/pdf\\_files/StrategicPlan.pdf](http://www.tdh.state.tx.us/lead/pdf_files/StrategicPlan.pdf). Accessed on Feb 2, 2005.
- United States Environmental Protection Agency, Office of Prevention, "Pesticides and Toxic Substances. 2001. Fight lead poisoning with a healthy diet." EPA - 747- F- 01-004. Available online at: <http://www.epa.gov/lead/nutrition.pdf>. Accessed on February 2, 2005.
- United States Environmental Protection Agency, Region 2. "FAQ - lead poisoning." Available online at: [http://www.epa.gov/region02/faq/lead\\_p.htm](http://www.epa.gov/region02/faq/lead_p.htm). Accessed on February 2, 2005.
- United States Food and Drug Administration. October 2, 2003. "FDA warns consumers about use of 'litargirio' - traditional remedy that contains dangerous levels of lead." Available online at: <http://www.fda.gov/bbs/topics/ANSWERS/2003/ANS01253.html> . Accessed February 2, 2005.
- Weisberg, P., K. S. Scanlong, L. Ruowei, and M. E. Cogswell. 2004. "Nutritional rickets among children in the United States: review of cases reported between 1986 and 2003." *Am. J. Clin. Nutr.* 80 (6):1697S-1705S.

**Appendix: Foods to Introduce to Infants**

Nemours Foundation. "Feeding Your 4- to 7-Month-Old."  
Available online at: [http://kidshealth.org/parent/nutrition\\_fit/nutrition/feed47m\\_p2.html](http://kidshealth.org/parent/nutrition_fit/nutrition/feed47m_p2.html). Accessed on May 17, 2004.

Texas Department of State Health Services. Individual Counseling Guide - Infants. Available online at: [http://www.nal.usda.gov/wicworks/Sharing\\_Center/TX/appendices.pdf](http://www.nal.usda.gov/wicworks/Sharing_Center/TX/appendices.pdf). Accessed on August 24, 2005.

United States Department of Agriculture, Food and Nutrition Service. 2001. *Feeding Infants - A Guide for use in the child nutrition programs*. FNS-258. Available online at: [http://www.fns.usda.gov/tn/Resources/feeding\\_infants.pdf](http://www.fns.usda.gov/tn/Resources/feeding_infants.pdf). Accessed on February 8, 2005.