Florida Nutrition Training Guide

Nutrition Education Series

Infant Nutrition Module

Revised June 2004

Florida Department of Health
Bureau of WIC and Nutrition Services

Introduction to the Infant Nutrition Module

for the Supervising Nutritionist and the Staff Member Studying the Module

The *Infant Nutrition Module* is part of the *Nutrition Education Series* of the *Florida Nutrition Training Guide.* Other modules in the *Nutrition Education Series* are: Basic Nutrition, Prenatal & Postpartum Nutrition, Preschool Child Nutrition, and Breastfeeding.

The *Infant Nutrition Module* consists of the following 3 components:

- the module itself, to be studied by the staff member. The module is the "textbook" which contains information about infant nutrition.
- the workbook, to be completed by the staff member. The workbook contains: the self-checks, the answer key to the self-checks, and the practical activity.
- the evaluation materials for the supervising nutritionist. The evaluation materials contain: the answer key to the practical activity, the posttest, and the answer key to the posttest.

Instructions for using the module, the workbook, and the evaluation materials are contained within each of these documents. Staff members, while progressing through the module and workbook, should read all the instructions—in the order in which they are presented—to ensure proper completion of all requirements. The supervising nutritionist should also read the instructions in both the module and the workbook, as well as in the evaluation materials, in order to understand their basic format, his/her responsibilities as a supervising nutritionist, and the appropriate evaluation procedures to use.

The *Nutrition Education Series* of the *Florida Nutrition Training Guide* has been revised and updated to provide standardized nutrition training to staff members such as dietetic technicians and clerical staff (who provide newsletter nutrition education contacts).[1] In addition, this newly revised *Nutrition Education Series* has been developed so that a more diverse audience might also benefit from its use; e.g., entry-level nutrition professional staff, experienced nutrition staff new to public health, or other professional staff such as nurses. *(over)*

1. Refer to the *WIC Procedure Manual* (DHM 150-24) for complete information and policies regarding which staff members are required to complete the *Florida Nutrition Training Guide* before they are eligible to provide specific nutrition services to WIC clients.

The learning materials in each module of the *Florida Nutrition Training Guide* are developed for individualized, self-paced instruction and are competency-based. In most cases, the staff member will be studying the modules independently, and not in a group setting. The supervising nutritionist should serve as a facilitator, assisting the staff member as needed and evaluating the staff member's performance of specified activities. The study of each module, its workbook activities, and its posttest should take no more than 10 hours to complete. Therefore, the entire *Nutrition Education Series* of the *Florida Nutrition Training Guide* is approximately a 50-hour training program (but, in many cases, can be successfully completed in less time).

If you have any questions about the *Florida Nutrition Training Guide,* please contact the Nutrition Unit, WIC and Nutrition Services, Florida Department of Health at (850) 245-4202.

Instructions on HOW TO DO this Module

1. Read the Knowledge Objectives and the Performance Objectives that follow these instructions. These objectives specify what you are expected to learn (Knowledge Objectives) and what you will be expected to do (Performance Objectives) as a result of studying this *Module.*

2. Begin reading and studying the *Module.* This *Module* is designed for individualized instruction. Read the information at your own pace, or according to the timelines established by your supervising nutritionist.

3. Stop when you come to a *Self-Check* section and complete the assigned *Self-Check* questions right away. The *Self-Check* questions can be found in the *Workbook for the Infant Nutrition Module*. Request this *Workbook* from your supervising nutritionist; it is yours to work in and keep. The *Workbook* contains the: *Self-Check questions, Answer Key to the Self-Check questions,* and *Practical Activity.* **Use your Workbook to record your answers—please do not write in this book.**

4. After you complete a *Self-Check* section, immediately check your answers against the *Answer Key*, which follows the *Self-Check* questions in your *Workbook*. If you have incorrect answers, re-read the appropriate section of text to find, and then record, the correct answer(s). Then, move onto the next new section in the module.

5. Continue to read and study the *Module*—repeating steps 2, 3, and 4 of these instructions—until you reach the end of the *Module.* At the end of the *Module,* you are asked to do the *Practical Activity for the Performance Objective*.

6. Complete the *Practical Activity,* which also can be found in your *Workbook*. When you complete your *Practical Activity,* submit it to your supervising nutritionist, who will, in turn, grade and evaluate it.[1] If you answer at least 85% of the questions and assignments correctly and completely, this is considered acceptable completion.

7. Arrange for a convenient time to take the *Posttest,* and also for the follow-up conference between you and your supervising nutritionist.[1] The supervising nutritionist will give you a copy of the *Posttest* at the arranged time. The posttest is ***not*** an open book test.

Note: The *Posttest* measures your mastery of the Knowledge Objectives. Thus, to prepare for the *Posttest,* **review the Knowledge Objectives.** Each *Posttest* question is directly related to one of the Knowledge Objectives.

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1. **Note to the Supervising Nutritionist:** The *Answer Key to the Practical Activity*, the *Posttest*, and the *Answer Key to the Posttest* can be found in the *Evaluation Materials for the Supervising Nutritionist*.

Objectives of the Infant Nutrition Module

Knowledge Objectives

The staff member will be able to:

1. Explain why breastfeeding is the optimal method of infant feeding and nurturing.
2. Identify how to dilute or mix the following forms of infant formula: concentrated liquid, powdered, and ready-to-feed.
3. Explain why it is extremely important that concentrated liquid and powdered infant formulas be mixed with the proper amounts of water.
4. Explain to a client why sanitation measures used during bottle preparation are very important.
5. Explain to a client how to correctly bottle feed in order to enhance infant development and maternal/infant attachment.
6. Identify the different types of infant formula (artificial baby milk) that can be fed to infants who are not breastfed or who are partially breastfed.
7. Answer a client's basic questions about the appropriate feeding practices for infants from birth to 4 months of age.
8. List the only three liquids which should be fed from a bottle.
9. State the importance of burping a baby during and after feedings.
10. State when solid foods should be introduced in an infant's diet, and recognize the indicators of developmental readiness for introduction of solid foods.
11. Identify appropriate foods to feed an infant 4 to 8 months of age.
12. Recognize appropriate and inappropriate feeding practices for infants.
13. Recognize the appropriate selection, preparation, serving, and storage procedures for commercial and home-prepared baby foods.
14. Identify appropriate foods to feed an infant 8 to 12 months of age.
15. Name the foods which should be avoided because they can cause an infant to choke.
16. Explain to a client the process of weaning an infant from the bottle and/or breast to a cup.
17. Define early childhood caries (also known as baby bottle tooth decay) and name its causes.
18. Identify the foods that supply iron for an infant and explain how absorption of iron by the body can be increased.

19. Recognize the American Academy of Pediatrics' recommendations for the use of supplemental vitamin D in infants.

20. Identify the infants who are at risk of becoming overweight and recognize appropriate counseling tips for the parents/caregivers of these infants.

21. Identify the physical activity guidelines for infants.

Performance Objectives

1. After reading 2 case studies about infants of varying ages, the staff member will be able to analyze the information from the 2 case studies, identify nutrition issues, and offer counseling suggestions and recommendations that are appropriate to the situations presented in each case study.

2. The staff member will be able to demonstrate a clear understanding of the proper procedures for the preparation of infant formula by choosing one of the following activities (a. or b.) to complete:

   a. Prepare an outline that could be used to teach a class about proper formula preparation, including sterilization techniques and mixing powdered and concentrated liquid formulas. The staff member will present the lesson to the supervising nutritionist, using the prepared outline as a guide.

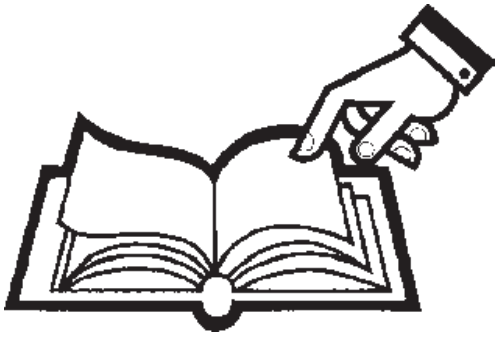
   b. Demonstrate the correct procedures for formula preparation, including sterilization and mixing. This actual demonstration requires the use of appropriate materials and supplies, and will be presented to the supervising nutritionist.

Note: Knowledge Objectives 1–21 directly relate to the *Posttest* that the staff member takes as the final requirement for successful completion of this *Module.*

Performance Objectives 1–2 directly relate to the *Practical Activity* that the staff member completes after his/her study of this *Module;* the *Practical Activity* is located in the *Workbook for the Infant Nutrition Module.*

The *Posttest* and the *Practical Activity* will be graded/evaluated by the supervising nutritionist.

Glossary for the Infant Nutrition Module



Anemia. A condition where the blood does not contain the proper amount of hemoglobin or the proper size or amount of erythrocytes (red blood cells). When this is due to a lack of iron in the body, the condition is called iron-deficiency anemia.

Baby bottle tooth decay. A form of *early childhood caries* (ECC) which results from the long-term exposure of the teeth to sweetened beverages, juice, or even milk. Sugar from the fluid is digested by bacteria in the mouth, acid is produced by the bacteria, and the teeth decay. This often occurs when bottles are used as a pacifier and/or an infant or young child is allowed to go to bed with a bottle in his/her mouth or carries a bottle throughout the day to suck on. Also, extended and repetitive use of a no-spill training cup can be associated with early childhood tooth decay.

Caregiver. For purposes of this module, "caregiver" refers to the person(s) who care(s) for the infant. Most frequently this will be the parent, grandparent, or other relative. Caregiver may also refer to an individual who feeds and cares for the infant, for example, a babysitter or daycare provider.

Colic. Extreme discomfort in the infant's upper and/or lower gastrointestinal tract. Infants with colic will frequently show signs of discomfort by screaming, flexing the limbs, and continuous crying.

Contraindicate. Not advisable.

Dental caries. Tooth decay.

Developmental readiness. The infant's current stage of mouth, hand, and body skill development. The developmental readiness determines the type and texture of foods to feed and which feeding styles to use.

Failure to thrive. When an infant's growth and development do not fall within standard growth or development parameters because of genetic, physical, or psychosocial factors.

Feeding on cue (also referred to as feeding on demand). Feeding at the time an infant displays *feeding cues,* i.e., signs of hunger. Feeding cues include the following: rooting reflex; hand-to-mouth activity, e.g., sucking on hands; small fussing sounds; pre-cry facial grimaces, i.e., the infant looks like he or she is about to cry; and crying. (Caregivers should check if the infant is crying for other reasons before assuming he or she is hungry.)

Feeding relationship. The interactions that take place between the parent/caregiver and infant as they participate in food selection, eating, and other behaviors related to the amount and timing of food intake.

Food additives. Substances added to food to improve, enhance, or preserve the food.

Food allergy. See food hypersensitivity.

Food hypersensitivity. When there is a reaction of the immune system which results from eating a food or food additive. That is, the body produces antibodies specific to a particular substance; when it encounters the substance again, body chemicals are released which cause the allergic symptoms. This is a true "food allergy." The most common food allergens in the United States include cow's milk, wheat, fish, shellfish, eggs, peanuts, and tree nuts.

Food intolerance. An abnormal response (for example, cramps or diarrhea) to a food or food additive. It differs from a true food allergy (food hypersensitivity) because it does not involve an immune reaction. Food intolerance can have a variety of causes; for example, having an insufficient amount of a digestive enzyme to properly digest a food.

Food poisoning. Illness caused by eating foods which contain toxins (poison).

Full-term infant. An infant born at 38 to 42 weeks of pregnancy.

Gag reflex. The automatic gagging of an infant when any object, such as a spoon or a piece of solid food, is placed way back in the mouth; the object is then propelled forward on the tongue. This reflex helps to protect an infant from swallowing inappropriate food or objects which could cause choking. This reflex is one reason for delaying solid foods and the use of a spoon until 4 to 6 months of age. This reflex diminishes by 4 months of age, but is retained to some extent in adults.

Gastroesophageal reflux. A return or backward flow of food and/or liquids from the stomach or esophagus up through the esophagus and/or mouth. One risk of this reflux is aspiration (inhalation) of food particles into the lungs.

Gastrointestinal. Pertaining to the stomach and intestines.

Health care provider. For purposes of this module, "health care provider" refers to the person or facility providing the primary source of medical care for the infant; such as, the family doctor, pediatrician, or health clinic.

Hematocrit (Hct) test. This test measures the percentage of red blood cells in a sample of whole blood. In the WIC program, the hematocrit test is not required to be done with infants less than 6 months of age.

Hemoglobin (Hgb) test. This test measures the concentration of hemoglobin in a sample of whole blood. Hemoglobin is the iron-containing pigment of the red blood cells that carries and releases oxygen to the body cells. In the WIC program, the hemoglobin test is not required to be done with infants less than 6 months of age.

Infancy and infant. For purposes of this module, infancy and infant refer to the time period from birth to less than 1 year of age.

Infant at risk of becoming overweight. An infant born to a woman who was obese (BMI greater than or equal to 30) at the time of conception or at any point in the first trimester of the pregnancy OR having a father or mother who is obese (BMI greater than or equal to 30) at the time of the infant's WIC certification.

Infant formula and formula-fed. For purposes of this module, any reference to these two terms also refers to the terms "artificial baby milk" and "artificially-fed," respectively.

Immune. To be protected against, as in an illness.

Immunological protection of breastmilk. The factors in breastmilk which protect against infection.

Low birth weight. Refers to an infant with a weight at birth of less than or equal to 5pounds 8 ounces or 2,500 grams.

Nutritionist. For purposes of this module, "nutritionist" refers to a licensed nutritionist. In some cases, however, nutrition education and counseling services can be provided by other staff members, e.g., nutrition educators, nurses, and dietetic technicians. Refer to the *WIC Procedure Manual* (DHM 150-24), Chapter 6, Nutrition Education for policies regarding the staff members who are qualified to provide nutrition education and counseling services to medically high risk, high risk, and low risk clients.

Oral Rehydration Therapy (ORT). The consumption of an oral rehydration solution (ORS) which helps to replace the correct amount of essential body fluids and electrolytes (e.g., sodium, chloride, and potassium) lost during diarrhea.

Premature or preterm infant. An infant born at less than or equal to 37 weeks of pregnancy.

Pureed or Strained. These two terms refer to the consistency of baby food. Foods which have been pureed or strained have a smooth, creamy consistency without any lumps.

Rooting reflex. The automatic reaction of an infant to turn his or her head in the direction of an object and open his or her mouth when a corner of the infant's mouth, upper and lower lip, cheek, or chin is touched by an object. This reflex allows the infant to seek out and grasp a nipple. This reflex is seen from birth to about 4 months of age.

Suck/swallow reflex. The automatic reaction of an infant to suck or begin suckling movements when the infant's lips and mouth are touched. As liquid is drawn or sucked into the mouth, the tongue immediately moves it to the back of the mouth for swallowing.

This reflex allows the infant to feed from the breast or bottle, but not from a spoon or cup. This reflex is seen from birth to about 4 months of age.

Sudden Infant Death Syndrome (SIDS). The sudden death of any infant or young child which is unexpected by history and in which there is no known cause of death.

Tongue thrust reflex. The automatic reaction of an infant to extend his or her tongue out of the mouth when his or her lips are touched. This reflex allows for feeding from the breast or bottle but not from a spoon or cup. This reflex is seen from birth to about 4 months of age.

Trace Nutrients. Essential substances [all vitamins and some minerals, such as iron, would be considered trace nutrients] which are needed by the body in very small (trace) amounts. For example, zinc (a mineral) and folic acid (a vitamin) are considered trace nutrients. They are essential for life, the body cannot produce them, and they are needed in very small amounts.

Weaning. The gradual process of introducing solid foods and cup feeding until an infant or child has completely stopped breastfeeding and/or bottle feeding.

Part 1: Feeding the Infant from Birth to 12 Months of Age

Growth during the first year of life is greater than at any other time after birth. An infant's birth weight will usually double by 4 to 6 months of age and triple by the first birthday. Good nutrition during this period of rapid growth is essential for infants to develop both physically and mentally to their fullest potential.

The age recommendations given in this module represent the *earliest* recommended age that a new feeding activity should occur, e.g., when to introduce solid foods or finger foods, when to wean from a bottle to a cup. All infants progress at their own rate. Differences in developmental rates are to be expected. The fact that an infant does not fall within the average age range for readiness to progress to the next feeding method is not necessarily a problem. Check with the infant's health care provider when there is a question or concern about the infant's progress. This module primarily focuses on nutrition for the full-term infant without medical conditions. Any infant who has special needs or medical conditions or who was born prematurely or at a low birth weight may have delayed feeding development and should be referred to the nutritionist or health care provider.

Development of an Infant's Feeding Skills: Stages of Mouth, Hand, and Body Skill Development in Infants

Figure 1. Sequence of Infant Development and Feeding Skills in Normal, Healthy Full-Term Infants summarizes the development of an infant's mouth, hand, and body skills and how these affect the infant's ability to eat foods of different types and textures. This figure provides the background to understand why certain types and textures of food can generally be introduced during certain age periods.

The ability of newborn infants to only suck and swallow liquids is due to their limited level of development. As infants mature, they learn how to eat strained, solid foods from a spoon given to them by a caregiver and eventually how to feed themselves small chunks of soft, cooked foods by hand and later by spoon. As shown in Figure 1, there is an overlap of ages to allow for differences in development.

Several major reflexes related to feeding are evident during early infancy. These reflexes are defined as follows:

Rooting reflex. When a corner of an infant's mouth, upper and lower lip, cheek, or chin is touched by an object, the head and mouth turn in the direction of the object and the infant opens his or her mouth. This reflex allows the infant to seek out and grasp a nipple. This reflex is seen from birth to about 4 months of age.

Suck/swallow reflex. After opening the mouth, when an infant's lips and mouth are touched, suckling or sucking movements begin. As liquid moves into the mouth, the tongue immediately moves it to the back of the mouth for swallowing. This reflex allows the infant to feed from the breast or bottle, but not from a spoon or cup. This reflex is seen from birth to about 4 months of age.

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

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

Note that infants with developmental disabilities may retain these reflexes for longer than normally expected or the reflexes may be stronger or weaker than normal. Refer infants who appear to have feeding problems or abnormal feeding reflexes to the health care provider for assessment, consultation and referral, and if needed, to specialists skilled in feeding assessment and treatment.

Figure 1. **Sequence of Infant Development and Feeding Skills in Normal, Healthy Full-Term Infants[1,2]**

Baby's Approximate Age	*Developmental Skills*		*Feeding Skills or Abilities*
	Mouth Patterns	*Hand and Body Skills*	
Birth through 5 months 	• Suck/swallow reflex • Tongue thrust reflex • Rooting reflex • Gag reflex	• Has poor control of head, neck, trunk • Brings hands to mouth around 3 months	• Swallows liquids but pushes most solid objects from the mouth
4 months through 6 months 	• Draws in upper or lower lip as spoon is removed from mouth • Up-and-down munching movement • Can transfer food from front to back of tongue to swallow • Tongue thrust and rooting reflexes begin to disappear • Gag reflex diminishes • Opens mouth when sees spoon approaching	• Sits with support • Has good head control • Uses whole hand to grasp objects (palmer grasp)	• Takes in spoonful of pureed or strained food and swallows it without choking • Drinks small amounts from cup held by another person, with spilling
5 months through 9 months 	• Begins to control the position of food in the mouth • Up-and-down munching movement • Positions food between jaws for chewing	• Begins to sit alone unsupported • Follows food with eyes • Begins to use thumb and index finger to pick up objects (pincer grasp)	• Begins to eat mashed foods • Eats from a spoon easily • Drinks from a cup with some spilling • Begins to feed self with hands
8 months through 11 months 	• Moves food from side-to-side in mouth • Begins to curve lips around rim of cup • Begins to chew in rotary pattern (diagonal movement of the jaw as food is moved to the side or center of the mouth)	• Sits alone easily • Transfers objects from hand to mouth	• Begins to eat ground or finely chopped food and small pieces of soft food • Begins to experiment with spoon but prefers to feed self with hands • Drinks from a cup with less spilling
10 months through 12 months 	• Rotary chewing (diagonal movement of the jaw as food is moved to the side or center of the mouth)	• Begins to put spoon in mouth • Begins to hold cup • Has good eye-hand-mouth coordination	• Eats chopped food and small pieces of soft, cooked table food • Begins self-spoon feeding with help

1. Developmental stages are approximate and may vary with individual infants.

2. This figure was adapted from: U.S. Department of Agriculture, Food and Nutrition Service. *Feeding Infants: A Guide for Use in the Child Nutrition Programs.* FNS-258; revised December 2001 (page 12).

The Feeding Relationship

The interactions and communication between parent or caregiver and infant during feeding influence the infant's ability to progress in feeding skills and consume a nutritionally adequate diet. These interactions comprise "the feeding relationship," defined as the interactions that take place between the parent and child as they participate in food selection, eating, and other behaviors related to the amount and timing of food intake. When the feeding relationship is positive—i.e., the caregiver is attentive and responsive to an infant's feeding cues and the infant is fed a nutritionally balanced diet—the infant's health and nutritional status are promoted. A negative feeding relationship can result in poor dietary intake and poor growth. A negative relationship may occur when the infant's feeding cues are not receiving the expected response from the caregiver.

To develop positive feeding relationships between the caregiver and the infant, encourage caregivers to:

- Observe and be sensitive to the infant's hunger, fullness, and food preferences, and act promptly and appropriately to meet the infant's feeding needs. Avoid putting the infant on a rigid schedule. An older infant can be offered food at around the same time each day but, in general, let the infant indicate hunger. Feeding at specific intervals of time may be necessary if an infant has certain medical conditions or is a sleepy infant who needs to be awakened to feed.
- Remember the infant's developmental abilities and nutritional needs when deciding the type, amount, and texture of food and the method of feeding. See Figure 1 for guidelines.
- Offer food in a positive and accepting way without forcing the infant to eat, and avoid withholding food from the infant. Healthy infants are capable of regulating their own food intake to meet their needs for growth. The amount and types of foods they eat each day may vary.
- Try to help keep an infant calm before and during a feeding. This will show the infant that eating is a positive, pleasant, relaxed, and calm experience. The caregiver can make the environment relaxed and calm by: finding a comfortable place in the home for feeding and acting calm and relaxed during feeding; not rushing the infant or trying to force the infant to eat a food; not getting upset that the infant is a messy eater; having patience and taking time to communicate with and learn about the infant during feeding; and showing the infant lots of love, attention, and cuddling in addition to feeding. Reassure the caregiver that doing these things will decrease fussiness and will not "spoil" the infant.

Feeding the Infant: Birth to 4 Months of Age

The goal of this section is to provide information about feeding infants during the first months of life. During these early months, nutritional needs can be **entirely** met with breastmilk or iron-fortified infant formula (artificial baby milk). Breastfeeding best fulfills most infant's nutritional and emotional needs, as well as their immunological needs. There are certain components in breastmilk which protect the infant against infections. Breastfeeding is the superior method of infant feeding.[1]

If an infant is not breastfed, an iron-fortified infant formula is the appropriate alternative. When infant formula is used, proper preparation and handling is important. *Bottles should be used to feed **only** expressed breastmilk, infant formula, or water. Infants should always be **held** while being fed from a bottle.*

When infants, birth to 4 months, do not seem to be satisfied with the amount of breastmilk and/or infant formula they are consuming, the intake of breastmilk and/or infant formula usually should be increased. This can happen frequently during the growth spurts which infants often have during the early months of life. Growth spurts usually occur at these ages: 7 to 10 days; 3 weeks; 6 weeks; and 3 months. Refer to *Figure 4. Foodf orBa by'sF irstY ear—General Guidelines for Feeding Healthy Infants* on pages 59 to 62 of this module for the approximate recommended frequency of breastfeeding or intake of formula for the different age ranges of the infant.

Breastfed infants, birth to 2 months of age, take approximately 8 to 12 or more feedings per day (24 hours). From 2 to 4 months of age, breastfed infants take approximately 8to 10 or mor e feedings per day. See the Breastfeeding Module for information on breastfed infants and growth spurts.

The usual formula intake for the infant from birth to 4 months is anywhere from 14 to 43 ounces per day (24 hours). This range of intake is mostly dependent upon the infant's current weight. A general rule is that an infant birth to 4 months of age needs about $2^1/_2$ ounces of formula per pound of body weight (assuming the standard formula is 20 calories per ounce).

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1. In the United States, it is recommended that women with HIV or AIDS not breastfeed as the virus can be passed to their baby through breastmilk. A woman who does not know her HIV status should ask her health care provider for an HIV test.

Breastfeeding Is Best

Breastfeeding is best for infants for **at least** the first year of life. Breastfeeding is perfectly suited to the nutritional, immunological, and developmental needs of the human infant.

Benefits of Breastfeeding

The following are several of the many benefits of breastfeeding for the infant and mother:

- Human milk is particularly suited to the nutritional and immunological needs of human infants. This is called "species-specific."
- Human milk is a dynamic, living substance. Its composition changes during a feeding, over a 24-hour period of time, and over the months of breastfeeding to meet the individual needs of the growing infant.
- Exclusive breastfeeding helps protect the infant from infections such as middle ear infections, gastrointestinal infections, and upper and lower respiratory infections. Formula-fed infants generally get sicker and are sick more often than breastfed infants.
- Exclusive breastfeeding for several months reduces the infant's risk of many chronic diseases such as juvenile diabetes, certain childhood cancers such as lymphomas and leukemias, and adult-onset diseases such as Crohn's disease, and multiple sclerosis.
- Exclusive breastfeeding for the first six months of life reduces the chances of, and delays the onset of allergic disease. Cow's milk proteins are highly allergenic and early exposure could result in allergic symptoms.
- Studies have shown that breastfed infants have a decreased incidence of Sudden Infant Death Syndrome (SIDS).
- The fat (lipid) portion of human milk is almost completely digestible, providing an excellent source of calories for energy. Human milk contains enzymes which aid in the digestion and absorption of nutrients.

- Human milk contains very long chain fatty acids and other substances necessary for optimal brain growth. Infant formulas cannot duplicate these special substances.
- Human milk contains more cholesterol than cow's milk and infant formulas. The infant's body needs cholesterol to make *myelin.* Myelin is a fatty white material that covers nerve and brain cells. It is important for the development of muscular coordination of the infant.
- Human milk has factors that help the body absorb iron and zinc.

- The woman who breastfeeds for several months may have a decreased risk of breast and ovarian cancer later on in life.
- Breastfeeding can help the mother and infant develop a strong bond. The act of breastfeeding is different from that of bottle feeding. Breastfeeding women have high levels of the "mothering" hormone, *prolactin*. Breastfeeding can make it easier for a woman to feel "motherly."
- Once lactation is well established, breastfeeding is easier than bottle feeding—
  - There is no mixing, measuring, or sterilizing involved with breastfeeding.
  - When a baby is breastfed, the breastmilk is always at the right temperature and is always ready when it is needed.
- Overfeeding the infant becomes less likely with breastfeeding because there is no tendency to have the baby "finish the bottle."

Support of Breastfeeding

Health professionals believe breastfeeding is the best choice for almost all infants and their mothers. Many groups have statements that support breastfeeding. These groups include the following:

- The American Dietetic Association
- The American Medical Association
- The American Public Health Association
- American College of the Association of Health, Obstetric & Neonatal Nurses
- American College of Nurse-Midwives
- National Association of Obstetrical and Neonatal Nurses
- National WIC Association
- The American Academy of Pediatrics
- United Nations International Children's Emergency Fund (UNICEF)
- World Health Organization (WHO).

The national *Healthy People 2010* goals are to have at least 75% of mothers breastfeeding in the early postpartum period, at least 50% breastfeeding at 6 months postpartum, and 25% breastfeeding at 1 year postpartum. International efforts to promote, support, and protect breastfeeding include WHO/UNICEF's Ten Steps to a Successful Breastfeeding and the WHO Code of Marketing of Breastmilk Substitutes. All health professionals should be working towards the *Healthy People 2010* goals, and they should be knowledgeable about the WHO statement and code. Refer to the Breastfeeding Module to review these documents.

To improve breastfeeding success, mothers need a strong emotional support system. This support system includes the family, as well as the health care provider and other members of the health care team. Mothers who have successfully breastfed their own infants may offer the best support to other new breastfeeding mothers. Expectant mothers need information on breastfeeding when they are pregnant, and they need continued information and support after giving birth.

If a mother chooses not to breastfeed or stops early, her decision to formula feed needs to be respected. However, her reasons for not choosing to breastfeed or her reasons for stopping early should be explored. Her reasons for doing so **may** be the result of misunderstandings, lack of information, or lack of support. All mothers, regardless of their infant feeding choice, need to receive the continued encouragement and support of the health care team members.

✎ *This begins a series of Self-Check Questions that occur throughout this module. The Self-Checks are contained in the "Workbook for the Infant Nutrition Module."*

Each time you come to a Self-Check assignment in this module (highlighted with the teddy bear logo—see above), go to your Workbook and complete the assigned Infant Self-Check Questions right away. Record your answers directly in your Workbook. ***Please do not write in this book!***

After completing each assigned set of Self-Check Questions in your Workbook, you should immediately correct your responses by using the "Answer Key to the Self-Check Questions" that is also contained in the Workbook for the Infant Nutrition Module.

✎ **GO TO** *the Workbook for the Infant Nutrition Module and complete Self-Check Questions 1–3 right now.*

After completing Questions 1–3, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Follow this procedure for all the Self-Checks.

Infant Formula (Artificial Baby Milk)

When infants are not breastfed, it is normally best to give them an iron-fortified infant formula (artificial baby milk) for the first year of life. It is important that the formula be iron-fortified to prevent iron-deficiency anemia. Contrary to popular belief, the iron in iron-fortified formulas does not cause infants to be constipated or to have other gastrointestinal disturbances such as spitting up, gastroesophageal reflux, colic, or diarrhea.

Infant formulas are modified to be as nutritionally similar to human milk as possible. They are more digestible for the infant than regular cow's milk. Nutrients are added to infant formula to promote good infant growth. However, no infant formula can **duplicate** human milk, because human milk is a dynamic, living substance.

Types of Infant Formulas

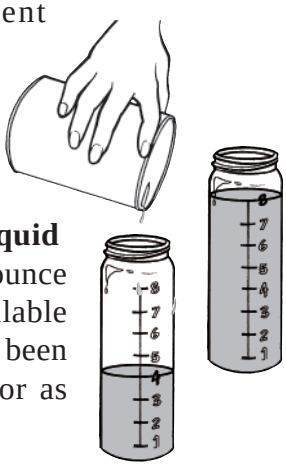
There are several types of infant formulas available on the market.

- **Cow's milk-based formulas**—Most infants can tolerate formulas made from cow's milk.
- **Soy-based formulas**—These formulas are made from soybeans and are for infants who are unable to tolerate cow's milk-based formulas.
- **Special formulas**—There are several kinds of special formulas designed for infants who have medical problems. These formulas are very expensive and have specific uses. Special formulas provided by the WIC program can only be given with a formula request form completed by a physician, Advanced Registered Nurse Practitioner (ARNP), or Physician Assistant (PA). This request must state the specific formula, the disease state or medical condition requiring the formula, and include the length of time for the request (not to exceed six months).

Note: The Florida WIC program has a rebate contract with one of the infant formula manufacturers. This formula manufacturer gives the WIC program a rebate on each can of the contract brands of infant formula purchased with WIC checks. The rebated money is then used to serve additional WIC clients. The contract brands of infant formula are provided to all infants who are not breastfed or who are partially breastfed, unless the infant has a specific medical problem which contraindicates the use of the contract brands. Check with the supervising nutritionist to find out the current *contract* and *non-contract* brands.

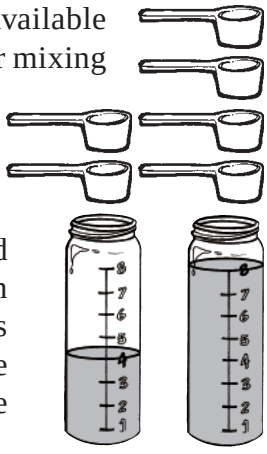
Infant Formula Packaging and Mixing Requirements

Many *cow's milk-based* formulas and *soy-based* formulas are available in: a concentrated liquid form, a powdered form, and/or a ready-to-feed form. Remind caregivers to always check formula can labels for exact mixing instructions. Any variations from the recommended dilution and preparation instructions listed on the formula label should be made only by the infant's health care provider. Improper dilution of infant formula can result in very serious health problems for the infant. Formula mixed with ***too little*** water might be too concentrated for a baby to digest easily and can be difficult for the infant's kidneys to filter out the excess minerals and protein. Formula mixed with ***too much*** water might not supply the calories and nutrients needed for recommended growth and could lead to water intoxication. (Water intoxication is discussed on page 43 of this module.) Also, cleanliness during formula preparation and proper refrigeration of bottles of prepared formula are very important in order to prevent gastrointestinal problems that can be caused by bacteria.



- **Concentrated liquid** formula requires dilution with water in a *one-to-one ratio;* for example, **1 ounce of concentrated liquid formula is mixed with 1 ounce of water** to make a 2-ounce bottle of prepared formula OR **4 ounces of concentrated liquid formula are mixed with 4 ounces of water** to make an 8-ounce bottle of prepared formula. Concentrated liquid formula is available in 13-ounce cans. Once a can of concentrated liquid formula has been opened, it should be refrigerated and used within 24 hours or as specified on the formula label.

- **Powdered** formula is usually mixed with water in a ratio of **1 level scoop of powderf ormula to 2ounces of w ater** (the scoop is included in the can). Thus, if 4 ounces of water is poured into a bottle, 2 level scoops of powdered formula should be added OR if 8 ounces of water is poured into a bottle, 4 level scoops of powdered formula should be added. The powdered formula is available in a variety of can sizes, depending on the brand of formula. After mixing the powdered formula with water, the prepared formula should be refrigerated and used within 24 hours or as specified on the formula label. For a breastfed infant who is also receiving supplemental formula, powdered formula is usually the better choice (when compared to ready-to-feed or concentrated liquid formula) because individual bottles can be prepared, and the can of powdered formula may be kept for up to one month after it is opened. Unnecessary formula supplementation while breastfeeding is to be discouraged. See the Breastfeeding Module for more information.



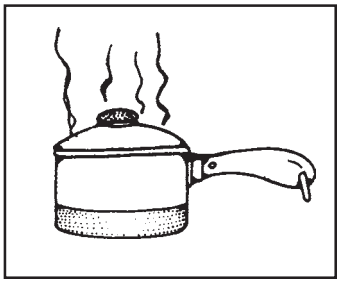
- **Ready-to-feed** formula requires no mixing and no diluting with water and is available in **bottles** and **cans** of various sizes. The ready-to-feed formula is generally the most expensive but may be preferable when there is a questionable water supply or poor refrigeration, or when the parent or caregiver has difficulty in correctly diluting concentrated liquid formula or powdered formula. Once a can of ready-to-feed formula

has been opened, it should be refrigerated and used within 24 hours or as specified on the formula label.

Water Used to Mix Concentrated Liquid or Powdered Formula

If concentrated liquid or powdered infant formula is used, the parent/caregiver mixing the formula must ensure that the water used to mix the formula is from a source approved by the local health department. If there is doubt, the local health department should be asked to test the water to see if it is safe and does not contain anything that might harm the baby, such as lead, bacteria, nitrate, pesticides, or other chemicals. If the water is not safe for a baby to drink, the local health department should recommend a safe source of water to use or a ready-to-feed formula can be used.

Younger babies can be more susceptible to harmful bacteria. Therefore, pediatricians usually recommend to always boil water (including bottled water) for formula preparation. The sterilization of water should continue for as long as the infant's health care provider feels it is necessary.



When boiling the water that is to be mixed with concentrated liquid or powdered formula, the water should be **brought to a bubbly boil for 1 to 2 minutes**, and then should be allowed to cool. Excessive boiling (over 5 minutes) is not recommended because it can concentrate any lead or nitrate that may be in the water. If tap water is used, **use only cold tap water** for boiling by letting the cold tap run for 2 minutes and then collect the water. This procedure tends to reduce the amount of lead in the water, should the pipes contain lead. It is not recommended to boil water in a kettle unless it is known that the kettle is not lead-based.

Purchase of Infant Formula

- Check the formula's expiration date on the label or lid. If the expiration date has passed, the nutrient quality of the formula may have deteriorated and it should not be purchased.
- Make sure the label says "with iron" or "iron-fortified."
- Do not purchase cans of infant formula that have dents, bulges, pinched tops or bottoms, puffed ends, leaks, or rust spots. The formula in such cans may be unsafe.

Storing Cans of Infant Formula

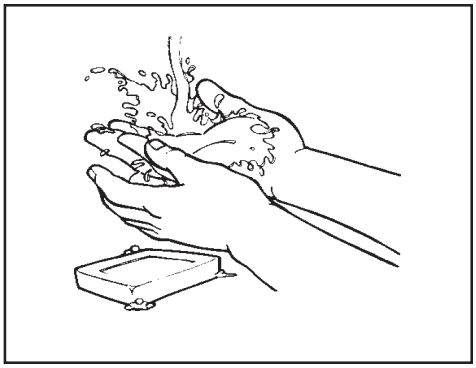
- Before using stored formula, check the expiration date on the lid or label to make sure the product is not too old. If the expiration date has passed, throw out the can.
- Store unopened cans of infant formula in a cool, dry indoor place—not in the refrigerator or in vehicles, garages, or outdoors (in these places, the cans are exposed to water and temperature extremes which can rust the can or affect the quality of the formula).
- Once a can of concentrated liquid or ready-to-feed formula is opened, it should be covered and stored in a refrigerator **no longer than 24 hours or as specified on the formula label**.
- Once a can of **powdered** formula is opened, the can should be covered and stored in a cool, dry place for no longer than **one month**.

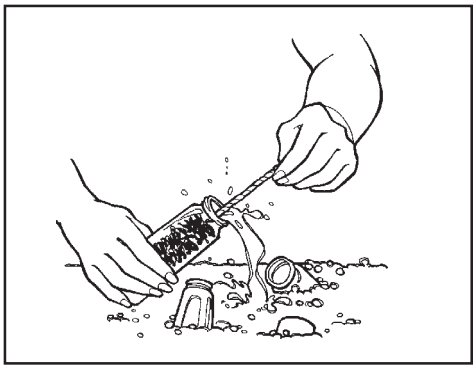
Handling of Prepared Infant Formula

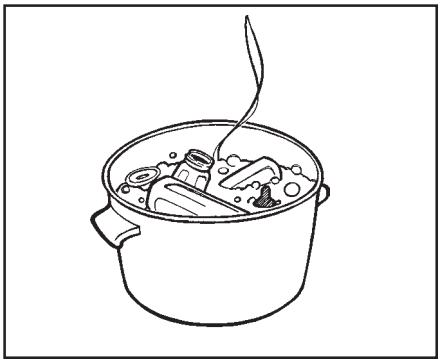
- If the parent/caregiver plans to take the infant with him/her on an "outing," e.g., shopping, health care appointment, day care center, etc., it is important that proper care is taken with the baby's bottles that will be packed in the diaper bag. The formula in the bottles should start out very cold, and then the bottles should be insulated in a small cold pack with an ice pack or ice to keep them cold. If the parent/caregiver will not have access to refrigeration for a very long time, it would be a good idea to keep the bottles in a small ice chest or buy the single, ready-to-feed bottles.
- Instead of taking prepared formula on an "outing," parents/caregivers can take along a can of powdered infant formula and bottles of clean (sterilized) water. Then the water and formula can be mixed when needed.
- Store prepared formula in hard plastic bottles if possible because these are unbreakable.
- When bringing prepared formula to a day care center, the parent/caregiver should label the bottles with the baby's name and the date and time the formula was prepared.

Preparation of Infant Formula

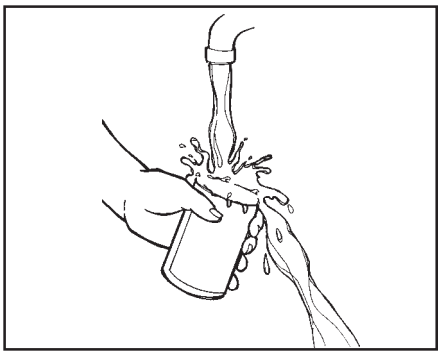
- **Clean and sanitize the workspace.** This includes washing (with hot water and soap) and then rinsing (with hot water) all surfaces used to prepare the formula (including countertops and food preparation equipment and utensils).
- **Wash hands thoroughly by:** wetting hands with warm running water; adding soap; washing all surfaces on hands by rubbing vigorously for 20 seconds (including washing carefully between fingers, around tops and palms of hands, over wrists, and under finger nails using a clean nail brush); rinsing hands well under warm running water (leave the water running while drying hands); drying your hands with a clean, disposable paper towel; and turning off the faucet using the disposable paper towel instead of the clean bare hands.







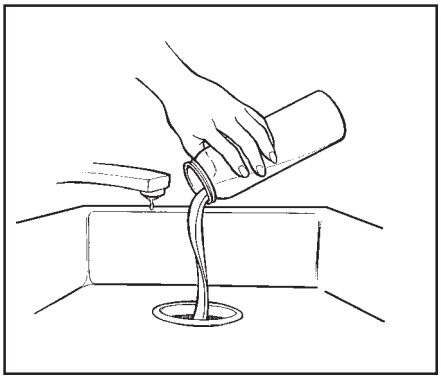
- **Wash all equipment** (nipples, bottles, rings, and caps) in hot, soapy water and scrub, using bottle and nipple brushes.
- **Rinse all equipment** well in hot water.
- **Disinfect nipples, bottles, rings, and caps** by boiling for 5 minutes in a pot with enough water to cover, then remove with sanitized tongs, let cool, and air dry.
- **If disposable plastic liners are used:** throw out the bag after one use; and clean and sterilize the nipples, rings, and caps, as described above. Follow all manufacturer instructions for the use of disposable plastic liners.
- Before opening a formula can, **wash can lid** with soap and clean water and rinse to remove dirt that could contaminate the formula. Before using, wash the can opener with soap and hot water.



- **Prepare the formula according to directions on the formula container.** See Figures 2a, 2b, and 2c for a checklist of instructions for preparing standard concentrated liquid, powdered, and ready-to-feed infant formula using glass or hard plastic baby bottles.
- **Put a clean nipple right side up on each bottle and cover with a nipple cap.**
- A dropped bottle whose nipple has come into contact with the floor or another unsanitary source should not be given to the infant. A clean (sanitized) nipple should be put on the bottle.

Storing Bottles of Prepared Infant Formula

- Make sure the bottles of prepared infant formula are labeled with the baby's name and the date and time the formula was prepared. Use bottles of formula only for the baby for which they are intended.

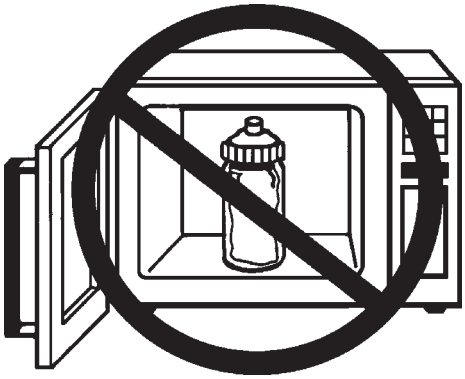


- Refrigerate prepared bottles until ready to use. Store in the back of the refrigerator (colder area). Also, make sure the refrigerator used to store the formula is properly functioning and has a temperature at or below 40°F.
- To prevent spoiling, do not allow prepared bottles of formula to stand at room temperature. Do not feed a baby a bottle left out of the refrigerator for 1 hour or longer. Throw out prepared formula not used within 24 hours or as specified on the formula label.
- Do not freeze infant formula.
- Throw out any unused formula left in a bottle after a feeding and rinse the bottle in cool water to remove formula.

- Clean and sanitize bottles and their parts before reusing them.

Proper Feeding Temperature of Formula

- Infants can be fed formula that is at room temperature, slightly cooler, or slightly warmer. If an infant prefers a warm bottle, special care must be given not to warm the formula beyond body temperature.
- The best way to warm a bottle of infant formula is to set it in a pan or bowl of warm water for a few minutes or to shake it under warm tap water. Shake the bottle before testing the formula's temperature. A few drops of formula on the wrist is a good test of temperature; if it feels slightly warm on the wrist, it is the correct temperature for the baby.

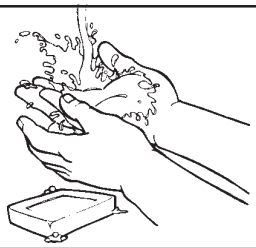


- **Never use a microwave oven to warm infant formula or expressed breastmilk because this practice can cause serious burns.** After microwaving, glass or plastic bottles can remain cool to the touch while the formula inside them can be scalding hot or contain

✎ **GO TO** *the Workbook for the Infant Nutrition Module and complete Self-Check Questions 4 to 7 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.*

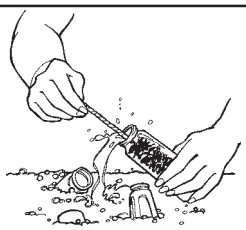
Figure 2a. **Preparation Checklist for Standard Concentrated Liquid Infant Formula**
(using glass or hard plastic bottles)

1



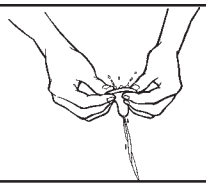
Wash hands, arms, and under finger nails very well with soap and warm water. Rinse thoroughly. Clean and sanitize the workspace.

2



Using bottle and nipple brushes, wash bottles and nipples. Also wash caps, rings, and preparation utensils in hot soapy water before using. Rinse thoroughly.

3

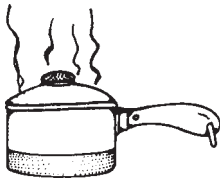


Squeeze clean water through nipple holes to be sure they are open.

4

Put the bottles, nipples, caps, and rings in a pot and cover with water. Put the pot over heat, bring to a boil, and boil for 5 minutes. Remove with sanitized tongs. Allow the items to cool and air dry.

5



For water used to mix with formula, put the water in a pan and cover with a lid. Bring the water to a **bubbly boil for 1 to 2 minutes**, then let it cool with the lid on. Use water from a source approved by the local health department. If tap water is used, use only cold tap water that is allowed to run for 2 minutes first.

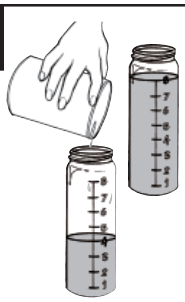
6

Wash the top of the formula can with soap and water and rinse well. Wash the can opener with soap and water.

7

SHAKE CAN WELL and then open the can.

8

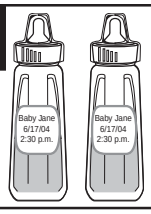


Pour needed amount of formula into a clean bottle using ounce markings to measure formula and add an equal amount of cooled boiled water. Thus, if 4 ounces of concentrated liquid formula is poured into the bottle, 4 ounces of water should also be added.

9

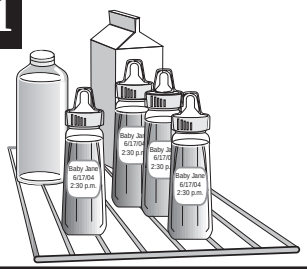
Attach nipple and ring to the bottle and SHAKE WELL. Feed prepared formula immediately or refrigerate until feeding time. To warm bottle, hold under running warm water. **Do not microwave bottles.**

10



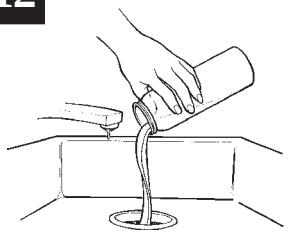
If more than one bottle is prepared, put a clean nipple right side up on each bottle and cover with a nipple cap. Label each bottle with the baby's name and the date and time that it was prepared.

11



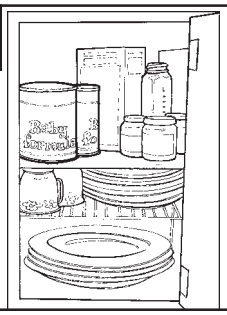
Prepared formula must be refrigerated until feeding time. Do not leave formula at room temperature. Cover and refrigerate formula left in the opened can.

12



Use prepared formula or formula left in an opened can within 24 hours or as specified on the formula label. Throw out unused formula left in the bottle after a feeding or which has been unrefrigerated for 1 hour or more.

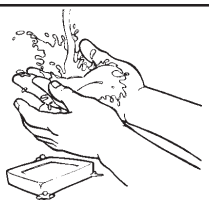
13



Store unopened cans of concentrated liquid formula in a cool, dry indoor pantry shelf. Use before the expiration date.

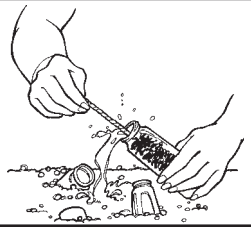
Figure 2b. **Preparation Checklist for Standard Powdered Infant Formula**
(using glass or hard plastic bottles)

1



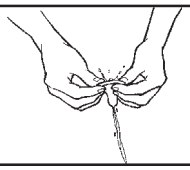
Wash hands, arms, and under finger nails very well with soap and warm water. Rinse thoroughly. Clean and sanitize the workspace.

2



Using bottle and nipple brushes, wash bottles and nipples. Also wash caps, rings, and preparation utensils in hot soapy water before using. Rinse thoroughly.

3

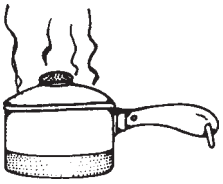


Squeeze clean water through nipple holes to be sure they are open.

4

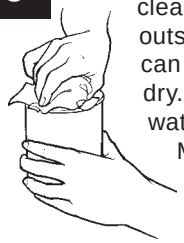
Put the bottles, nipples, caps, and rings in a pot and cover with water. Put the pot over heat, bring to a boil, and boil for 5 minutes. Remove with sanitized tongs. Allow the items to cool and air dry.

5



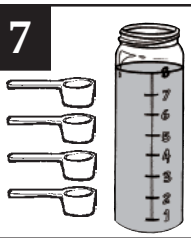
For water used to mix with formula, put the water in a pan and cover with a lid. Bring the water to a **bubbly boil for 1 to 2 minutes**, then let it cool with the lid on. Use water from a source approved by the local health department. If tap water is used, use only cold tap water that is allowed to run for 2 minutes first.

6



Remove plastic lid; wash lid with soap and clean water and dry it. Write date on outside of plastic lid. Wash the top of the can with soap and water, rinse well, and dry. Wash can opener with soap and hot water. Open the can and remove scoop. Make sure that the scoop is totally dry before scooping out powdered formula. Only use the scoop that comes with the formula can.

7



For each 2 ounces of cooled boiled water added to a clean bottle, carefully add 1 level scoop of powdered formula. Thus, if 8 ounces of water is poured into the bottle, 4 level scoops of powdered formula should be added.

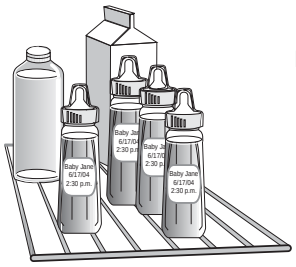
8

Attach nipple and ring to the bottle and SHAKE WELL. Feed prepared formula immediately or refrigerate until feeding time. To warm bottle, hold under running warm water. **Do not microwave bottles.**

9

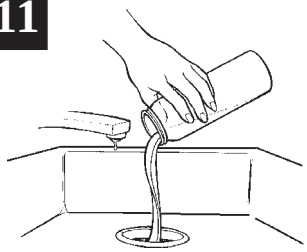
If more than one bottle is prepared, put a clean nipple right side up on each bottle and cover with a nipple cap. Label each bottle with the baby's name and the date and time that it was prepared.

10



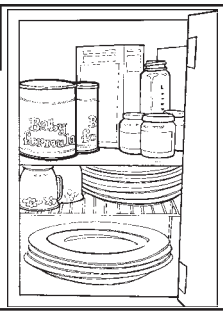
Prepared formula must be refrigerated until feeding time. Do not leave formula at room temperature.

11



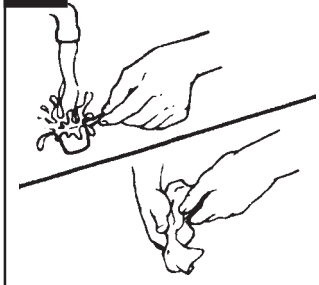
Use prepared formula within 24 hours or as specified on the formula label. Throw out unused formula left in the bottle after a feeding or which has been unrefrigerated for 1 hour or more.

12



Make sure that no water or other liquid gets into the can of powder. Cover opened can tightly and store in a cool, dry indoor pantry shelf (not in the refrigerator). Use within 4 weeks after opening to assure freshness.

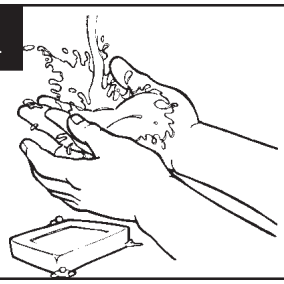
13



To be used again, the scoop should be washed with soap and hot water, rinsed thoroughly, and allowed to air dry. When making formula again, the scoop should be totally dry before using it to scoop powder out of the can. Store unopened cans in a cool, dry place. Use before the expiration date.

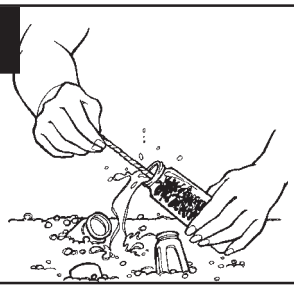
Figure 2c. **Preparation Checklist for Standard Ready-to-feed Infant Formula**
(using glass or hard plastic bottles)

1



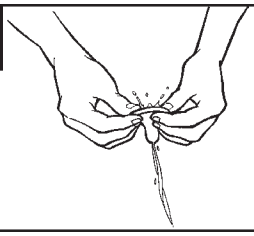
Wash hands, arms, and under finger nails very well with soap and warm water. Rinse thoroughly. Clean and sanitize the workspace.

2



Using bottle and nipple brushes, wash bottles and nipples. Also wash caps, rings, and preparation utensils in hot soapy water before using. Rinse thoroughly.

3

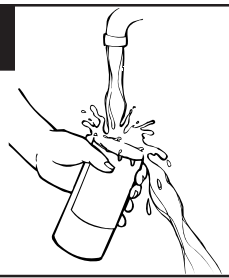


Squeeze clean water through nipple holes to be sure they are open.

4

Put the bottles, nipples, caps, and rings in a pot and cover with water. Put the pot over heat, bring to a boil, and boil for 5 minutes. Remove with sanitized tongs. Allow the items to cool and air dry.

5

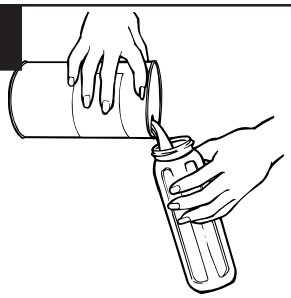


Wash the top of the formula can with soap and water and rinse well. Wash the can opener with soap and water.

6

SHAKE CAN WELL and then open the can.

7



Pour the amount of ready-to-feed formula for one feeding into a clean bottle. Do not add water or any other liquid.

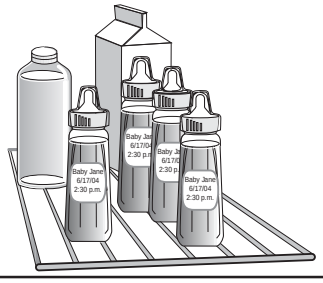
8

Attach nipple and ring to the bottle and SHAKE WELL. Feed prepared formula immediately or refrigerate until feeding time. To warm bottle, hold under running warm water. **Do not microwave bottles.**

9

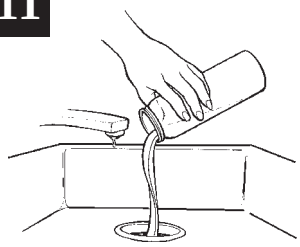
If more than one bottle is prepared, put a clean nipple right side up on each bottle and cover with a nipple cap. Label each bottle with the baby's name and the date and time that it was prepared.

10



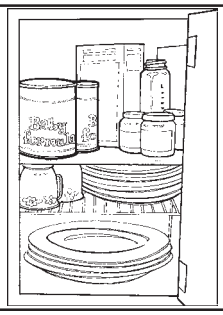
Prepared formula must be refrigerated until feeding time. Do not leave formula at room temperature. Cover and refrigerate formula left in the opened can.

11



Use prepared formula or formula left in an opened can within 24 hours or as specified on the formula label. Throw out unused formula left in the bottle after a feeding or which has been unrefrigerated for 1 hour or more.

12



Store unopened cans of ready-to-feed formula in a cool, dry indoor pantry shelf. Use before the expiration date.

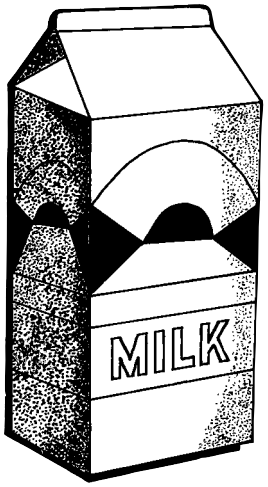
Cow's Milk and Other Types of Milk or Beverages

Fresh, dry, or evaporated cow's milk (whole, reduced fat, lowfat, and/or fat free); sweetened condensed milk; goat's milk; soy milk (usually called soy beverage); imitation milk beverages; beverages made from rice and nuts; and nondairy creamers are *not* acceptable for infants during the first year of life. It is strongly recommended that infants continue to be breastfed throughout the first year of life (or longer). If not breastfed, they should receive an iron-fortified infant formula for the first year of life. Some of the reasons for not giving cow's milk, goat's milk, or the other beverages mentioned above are:

- Cow's milk has a higher level of protein and minerals than human breastmilk or iron-fortified infant formulas. This is not desirable for infants because these high levels of protein and minerals place stress on the kidneys of the young infant.
- The immature digestive system of the young infant is not able to adequately break down cow's milk.
- In the early months, the feeding of cow's milk has been associated with gastrointestinal blood loss, which puts the infant at risk for the development of iron-deficiency anemia. Note: Gastrointestinal blood loss may also occur with the feeding of infant formula; however, iron fortification of the formula reduces the risk of the infant developing iron-deficiency anemia.
- Fresh, dry, or evaporated cow's milk; sweetened condensed milk; goat's milk; and other imitation milk beverages are *poor sources* of iron. Prolonged use in early infancy may result in iron-deficiency anemia. These types of milk or milk beverages do not contain sufficient quantities of many essential nutrients such as vitamin C, some B vitamins, folic acid, and some minerals that are needed for growth and development of the infant.

After the first year, **whole** cow's milk can be given to most healthy children. **Reduced fat, lowfat, and fat free milk** are **not** recommended for children under 2 years of age. The child's health care provider should be consulted when determining the type of milk to be given to the child.

No Cow's Milk until 1 year of age



Feeding Frequency and Amount for the Newborn

Newborn infants, whether breastfed or bottle-fed, need to be fed throughout the day and night. Young infants cannot take much milk at any one feeding and therefore must be fed at regular intervals throughout the day and night.

Infants differ in the age at which they are ready to sleep long stretches of time at night without feedings. Some infants will do so at an early age, but will resume night feedings during periods of rapid growth or teething. Note: Sleeping "through the night" is considered to be one continuous six-hour stretch—for example, from 12:00 midnight until 6:00 a.m.

Newborn Breastfed Infants

Newborn breastfed infants need to be fed when they are hungry. They should breastfeed until they are full. Cues to feed the infant are as follows: pre-cry facial grimaces (i.e., the infant looks like he or she is about to cry); mouthing; rooting reflex; small fussing sounds; and hand-to-mouth activities such as sucking on hands. This is called "feeding on cue." Feeding on cue will not "spoil" the infant. If these early cues of needing to breastfeed are missed, then the infant will probably cry to express his or her need to breastfeed.

If offering the breast does not calm the infant, other reasons for crying should be investigated. All infants cry (whether breastfed or bottle-fed), and they cry for many different reasons; e.g., "I'm lonely" or "I need comforting." *Persistent* crying is neither healthy nor necessary for newborn infants.

Most breastfed infants will need to breastfeed and **should be fed** every 1 to 3 hours during the early weeks of life. This averages out to between 8 and 12 feedings per 24 hours. The amount of time *between feedings* increases as the baby grows older. Feedings can be expected to last about 20 to 45 minutes. This does not mean the infant continually feeds for this amount of time. Often times, infants "take breaks" in the feeding process.

Breastfed infants who receive supplemental formula may have different feeding patterns. Unnecessary formula supplementation while breastfeeding is to be discouraged. See the Breastfeeding Module for more information.

Newborn Bottle-fed Infants

Newborn bottle-fed infants need to be fed when they are hungry. The quantity of formula an infant consumes in 24 hours will vary greatly, depending on the infant's age, size, and level of activity, and if they are also being breastfed. Infants should be fed formula as needed ("on cue"), with special instructions to the parent/caregiver to watch for the first signs of fullness (e.g., decrease in sucking, lack of interest in the feeding, etc.) to prevent overfeeding.

In general, most newborn infants will take approximately 2 to 3 ounces of infant formula every $1^1/_2$ to 3 hours. Smaller newborns may require smaller, more frequent feedings because their stomachs are smaller and cannot handle very much formula at one time. Larger newborns may require larger feedings. Feeding time should last about 15 to 30 minutes.

Adequate infant growth, as assessed by the infant's health care provider or nutritionist, is the best indication that an infant is getting enough breastmilk and/or infant formula. See the Breastfeeding Module for the signs of *adequate milk intake* for a breastfed infant.

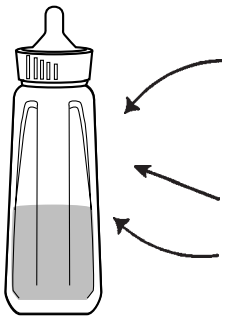
✎ **GO TO** *the Workbook for the Infant Nutrition Module and complete Self-Check Questions 8 and 9 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.*

Use of Bottles

Bottles are appropriate for feeding infants who are being formula-fed, who are fed expressed breastmilk, or who are not developmentally ready to drink from a cup. However, bottles must be used properly.

What—and What Not—to Put into a Bottle

In general, there are only three liquids which should be fed from a bottle:



1. Human milk—that milk which has been "expressed" or removed from the breast by hand techniques or by use of a breast pump;
2. Infant formula (artificial baby milk); and
3. Water.

Cereals and strained or pureed foods should **not** be put into a bottle or an "infant feeder." Solid foods should not be fed until the infant is developmentally ready to take these foods from a spoon. Feeding solids from a bottle **will not help** the infant sleep through the night and may lead to overfeeding. Also, feeding infant cereal in a bottle or "infant feeder" can cause choking.[1]

Juices should not be introduced until the infant is developmentally ready to drink juice from a cup. This usually occurs around 6 months of age. Feeding juice from a bottle may lead to tooth decay and overconsumption of juice.

It is inappropriate to add sweeteners of any kind including honey, syrup, sugar, or "gelatin water" to the bottle. These sweeteners can result in excessive caloric intake, diarrhea, and early childhood caries (baby bottle tooth decay). In addition, feeding honey to an infant under one year of age can cause botulism. (Botulism is discussed on page 46 of this module.)

Early childhood caries (ECC) or baby bottle tooth decay is caused by letting an infant or young child use a bottle—filled with a sweetened drink, juice, infant formula, other milks, or sweetened water—as a pacifier. The child is either put to bed with a bottle, being allowed to suck the bottle until he falls asleep, or the child sucks on a bottle intermittently throughout the day. In some instances, plain water can be given in the bottle to avoid the development of baby bottle tooth decay. (See the Dental Health section in Part 2 of this module for a further discussion of this subject.)

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1. **Special Note about Infants or Children with Certain Types of Medical Conditions** such as gastroesophageal reflux: a health care provider may recommend the addition of cereal to a bottle or similar method of feeding solids through a nipple such as the infant feeder device. *This practice should only be followed if specifically recommended by the infant's health care provider.*

How to Feed with a Bottle

An infant who is fed with a bottle should always be held during a feeding. Parents/caregivers may sometimes become lax about this, especially when an infant becomes capable of holding his or her own bottle. Feeding times are important opportunities for infant stimulation and development. Holding, touching, and establishing good eye contact increases emotional attachments between the parent/caregiver and infant and enhances the infant's development. A parent/caregiver should hold the infant close to his or her body; make a lot of eye contact; and talk to, sing to, and stroke the infant. It is also a very good practice for the parent to switch feeding sides (alternating left hand and right hand) during every feeding. "Switching" feeding sides is best done at a natural break in a feeding—it is usually recommended not to purposely break the feeding just to switch sides or just to burp.

Here are some tips for bottle feeding:

- Feed when the baby indicates hunger. Respond to the early signs of hunger. Do not wait until the baby is upset or crying from hunger.
- Gently and slowly calm and position the baby to get ready for a feeding.
- Feed in a smooth and continuous fashion following the baby's lead regarding when to feed and how long to feed. Parents/caregivers should avoid unnecessary burping, wiping, juggling, and arranging.
- The baby should always be held during a feeding. The bottle should be tipped back so that milk fills the nipple and air does not get in. The bottle should not be propped. Propping the bottle can cause middle ear infections, choking and fluid getting into the baby's lungs. It also deprives the baby of important cuddling and human contact.
- Hold the baby's head a little higher than the rest of the body to prevent the formula from backing up into the baby's ear. Fluid in the baby's ear can cause a middle ear infection.
- Do not offer the bottle at naptime or let the baby carry a bottle around during the day. Allowing a baby to go to sleep with a bottle may lead to tooth decay.
- Wait for the baby to stop eating before burping. Burp by gently patting or rubbing the baby's back while the baby is resting on the caregiver's shoulder or sitting on the caregiver's lap. *Babies should be burped during and after a feeding to release any air that is swallowed.* This holds true for both breastfed and bottle-fed babies.
- Babies should continue to be fed until he or she indicates fullness. Signs of fullness include sealing of lips, decrease in sucking, spitting out the nipple, and turning from the bottle or pushing the bottle away.
- Babies should never be forced to finish a bottle. Babies are the best judge of how much they need.

Sleeping or Resting Position Before or After a Feeding

Health care providers usually recommend placing babies on their backs to rest or sleep, unless there is some medical reason not to do this. It is believed that fewer babies will die of Sudden Infant Death Syndrome (SIDS) if most babies sleep on their backs. If the baby was born with a birth defect; often spits up after eating; or has a breathing, lung, or heart problem, it is very important for the parent to check with the health care provider about the best sleep position for the baby.

The **Back to Sleep** campaign recommends these tips that parents and caregivers can take to help lower the risk of SIDS.

- **Place a baby on his or her back to sleep, at nighttime and naptime.** This is the best way to reduce SIDS.
- **Place a baby on a firm mattress in a safety-approved crib.** Don't put babies to sleep on soft mattresses, sofas, sofa cushions, waterbeds, sheepskins, or other soft surfaces.
- **Remove all fluffy and loose bedding from the sleep area.** All pillows, quilts, stuffed toys, and other soft items should be removed from the crib.
- **Make sure the baby's face and head stay uncovered during sleep.** Keep the baby's mouth and nose clear of blankets and other coverings during sleep. Use sleep clothing with no other covering over the baby. If a blanket or other covering is used, the baby must be put "feet-to-foot" in the crib. Feet-to-foot means that the baby's feet are at the bottom of the crib, the blanket is no higher than the baby's chest, and the blanket is tucked in around the crib mattress.
- **Create a smoke-free zone around the baby, before and after birth.** Make sure no one smokes around the pregnant mother or the baby.
- **Don't let the baby overheat during sleep.** The baby should be kept warm during sleep, but not too warm. The baby's room should be a temperature that is comfortable for an adult. Too many layers of clothing or blankets can overheat a baby.

The Back to Sleep campaign is sponsored by the National Institute of Child Health and Human Development, the Maternal and Child Health Bureau, the American Academy of Pediatrics, the SIDS Alliance, and the Association of SIDS and Infant Mortality Programs. For more information about the Back to Sleep campaign, call toll-free 1-800-505-2742 or go to the web site at http://www.nichd.nih.gov/sids.

Self – Check **Infant Nutrition**

✎ **GO TO** *the Workbook for the Infant Nutrition Module and complete Self-Check Questions 10 to 12 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.*

Feeding the Infant: 4 to 8 Months of Age

When To Introduce Solid Foods

The American Academy of Pediatrics (AAP) recommends that semi-solids (cereals) and solids be introduced into an infant's diet between 4 and 6 months of age if the infant has the developmental readiness. However, the AAP recommends that exclusively breastfed infants be fed only breastmilk for the first six months of life.[1] In addition, premature infants may not be developmentally ready for solid foods until after 6 months of age.

Indicators of developmental readiness include:

- the ability of an infant to keep food in his/her mouth and swallow it rather than push it back out of the mouth onto the chin;
- the ability of the infant to sit with good head and neck support;
- the ability to indicate a desire for food by opening the mouth and leaning toward the spoon, and to indicate disinterest or fullness by leaning back and turning away.

At this time, the infant is able to digest and absorb proteins, fats, and carbohydrates over and above those in breastmilk or formula. Also, the infant's immune system has matured so that the risk of allergic reactions to solid foods is reduced.

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1. Variations to the recommendation—taking into account individual circumstances—may be appropriate. The AAP recognizes that infants are often developmentally ready to accept complementary foods between 4 and 6 months.

There is a critical time in the development of an infant (usually between 4 to 6 months) when he or she is ready to eat solid foods. Delaying the introduction of solid foods much past 6 months of age may result in some problems. Lack of solid foods in the diet after 6 months of age can lead to deficiencies of calories, iron, protein, and other nutrients.

The infant may even reject solid foods and/or spoon feeding if they are introduced much past 6 months of age.

Problems with Introducing Solid Foods Too Early

There is no advantage to the introduction of solid foods before 4 months of age. The infant's nutritional needs can be entirely met by breastmilk from birth to 6 months, or by iron-fortified infant formula from birth to between 4 and 6 months of age.

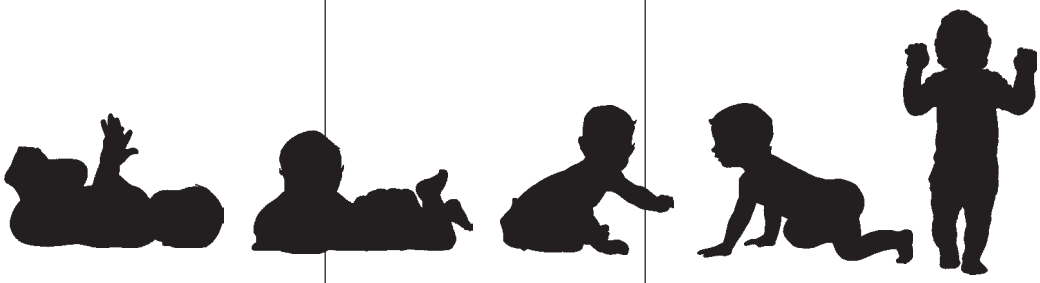
In fact, some negative effects may be associated with the early introduction of solid foods. For example, very young infants lack the enzymes needed to break down the types of carbohydrates found in cereals and vegetables. Early introduction of solid foods may result in gastrointestinal problems such as gastroesophageal reflux, constipation, and/or diarrhea for these infants. Giving solid foods too early has been associated with the development of allergies in young infants. Young infants who are not developmentally ready for solid foods may choke on solids, which can force these food particles into their lungs. This aspiration (or inhalation) of food particles into the lungs can result in pneumonia, or even death, in young infants. In addition, infants who are fed solid foods too early may consume less than the appropriate amount of breastmilk or infant formula, which provides a better balance of the nutrients needed by a young infant.

It is a common myth in the United States that feeding an infant cereal at a very early age will help the infant sleep through the night. Studies which have investigated this have failed to find truth in this belief. It seems that "sleeping through the night" is a developmental stage that varies with each infant and is reached at any time from the newborn period to 15 months of age.

See the following page, *Figure 3. How the Recommended Sequence of Introducing Foods Corresponds with Food Textures and Feeding Styles.*

Figure 3. **How the Recommended Sequence of Introducing Foods Corresponds with Food Textures and Feeding Styles**[1]

Age of Baby by Month	Birth 1 2 3	4 5 6 7	8 9 10 11 12
Age grouping	Birth through 4 months	4 months through 8 months	8 months through 12 months
Sequence of Introducing Foods	Breastmilk or Infant Formula (artificial baby milk)	At 4 to 6 months, add: Infant Cereal At 6 months, add: Vegetables, Fruit, Protein Foods, Fruit Juice in a cup	At 8 months, add: Grains such as crackers, toast, noodles, rice, grits, and soft tortilla pieces, Yogurt, Soft Cheese
Texture of Solid Food		Strained/Pureed (thin consistency for cereal) Mashed Ground/Finely Chopped Chopped	
Feeding Style	Breastfeeding/Bottle Feeding	Spoon Feeding Cup Feeding Self Feeding/Finger Foods	



1. This figure was adapted from: U.S. Department of Agriculture, Food and Nutrition Service. *Feeding Infants: A Guide for Use in the Child Nutrition Programs.* FNS-258; revised December 2001 (page 59).

Sequence of Solid Food Introduction

Iron-fortified Infant Cereals

Iron-fortified infant cereal is the best choice for an infant's first solid food since it provides a good "solid food" source of iron. It should be introduced between 4 and 6 months.[1] Inad dition, infant cereals provide a smooth texture and they can be varied in thickness to help the infant adjust to the new eating experience. Cereals designed for adults or older children are not recommended because they often contain mixed grains, tend to contain more sodium and sugar than infant cereals, and may also cause choking.

Rice cereal is recommended as the *first* cereal choice because it is a single grain, easily digested, and is least likely to cause an allergic reaction. Rice cereal should be fed to the infant for one week before introducing a new cereal.

In fact, once solids are introduced into an infant's diet, only one new food at a time should be given, and the new food should be fed for one week prior to the introduction of another new food. If a sensitivity to the food such as a skin rash, diarrhea, hives, or vomiting is exhibited, the food can be readily identified and eliminated from the diet until a later date when the food can be reintroduced.

Barley and oatmeal are good choices after rice has been started. Wheat and mixed grain cereals should not be offered until the infant is 8 months old because these cereals are more likely to cause an allergic reaction when introduced at an earlier age.

Dry infant cereals are preferred over jars of prepared infant cereals. Jars of prepared infant cereals are more expensive, usually contain more ingredients such as sugar and fruit, and tend to be higher in calories.

Dry infant cereals must be mixed with breastmilk, infant formula, water, or fruit juice (but only after the infant has tried the fruit juice and has had no reactions to it). Start with a teaspoon of cereal mixed with the liquid in a small dish to form a very thin cereal. As the infant gets used to eating cereal, larger portions should be offered, and the cereal can be made thicker. Infant cereal should be served without added sugar or sweeteners.

During the first feedings, it may appear that the infant is trying to push the cereal out of his or her mouth. This does not necessarily mean that the infant does not like it. It takes time for the infant to learn to use the tongue to move food to the back of the mouth to swallow. If the infant becomes very upset and refuses to eat the cereal at the first feeding, do not force it, but offer it again at another time.

---

1. Babies who are exclusively breastfed should be given cereal at about **6 months of age.**

Vegetables and Fruits

After cereals have been started, vegetables and fruits should be introduced to provide a variety of flavors and textures. This is usually between 6 and 8 months of age.

Vegetables should be strained or pureed and should be served plain without added fat (e.g., butter, margarine, lard, etc.), salt, spices, or sauces. Carrots, peas, green beans, sweet potatoes, and squash are good first vegetables for infants. If using canned vegetables to make baby food, they should be labeled as "no salt added" or "low sodium." An adult's taste preferences are not the same as the infant's—an infant will not necessarily want salted vegetables just because that is the way the parent likes his or her vegetables prepared.

Remember that each new vegetable should be served one at a time for about a week before introducing the next vegetable. Also, when each new vegetable is given, it should be a single vegetable, e.g., strained or pureed carrots instead of a mixture of peas and carrots. Once the infant has had carrots for a week and then peas for another week *without a reaction,* then a mixture of peas and carrots can be given.

Suggested fruits to serve to infants include strained or pureed pears, apples, and peaches. A mashed, ripe banana or unsweetened applesauce would also be good fruits for an infant. Commercially prepared baby foods such as bananas, plums, and apricots that contain tapioca or modified food starch should be avoided because they are lower in nutrient density. Fruits packed in heavy syrup should be avoided because of their high sugar content.

Commercially prepared infant desserts such as chocolate pudding, peach cobbler, and banana/apple dessert, as well as other desserts should **not** be given because of their high sugar content.

Infants who cannot consume milk products because of cow's milk allergy, lactose intolerance, or galactosemia should not be fed commercial baby food dinners, vegetables, or other products containing milk products such as milk, cheese, whole milk solids, yogurt, or nonfat dry milk (e.g., some creamed corn products, creamed spinach). Caregivers should read food labels to check ingredients.

A Caution About Vegetables High in Nitrates

The following **home-prepared** vegetables should only be fed to babies 6 months of age and older: beets, carrots, collard greens, spinach, and turnips. These vegetables, when prepared at home, are high in nitrates. The naturally occurring nitrates in these vegetables can be converted to nitrites in very young babies. Then nitrites bind the iron in the blood and make it difficult to carry oxygen. If the nitrites are high enough in a very young baby, this can result in a condition called **methemoglobinemia** in which a baby has blue skin and difficulty breathing. Commercially prepared baby food spinach, beets, and carrots contain only traces of nitrate and are not considered a risk to the infant less than 6 months of age.

Protein Foods

Plain meats, poultry, and fish are next in the progression. They should be well-cooked and strained or pureed, and started at approximately 6 to 8 months of age. Chicken, turkey, lamb, beef, pork, veal, and finfish are suggested protein foods to serve. (See boxed note on the following page regarding fish.)

Remember that each new protein food should be served one at a time for about one week before introducing the next new protein food. It is easier this way to identify the source of a possible allergic reaction. Also, when each new protein food is given, it should be a *single-ingredient food,* i.e., strained or pureed lamb instead of a combination dinner that contains lamb. The use of commercially prepared strained or pureed combination dinners (such as chicken noodle dinner or turkey rice dinner) should be discouraged because of their high cost and relatively low nutrient content.

Egg yolks may be offered to the infant at 8 to 10 months of age. The yolk of the egg (the yellow part of the egg) must be hard cooked and then could be mixed with cereal or another food. Commercially prepared cooked egg yolks are also available for infants. Egg whites contain a variety of proteins which infants may be allergic to; therefore, *egg whites should not be fed to an infant younger than one year of age.*

Cottage cheese, plain yogurt, mashed cooked dry beans and peas, tofu, and small slices of mild cheese are other protein foods that can be introduced between 8 to 10 months of age.

Due to their high salt and/or fat content, the following foods are not generally recommended for infants: hot dogs, sausage, bacon, bologna, salami, luncheon meats, other cured meats, fried animal foods, and the fat and skin trimmed from meat and poultry.

A Caution About Fish

Fish can be an important part of a balanced diet. It is a good source of protein and is low in fat. However, there are two cautions related to fish.

1. Infants should be observed closely if finfish (fish other than shellfish) are introduced because these fish can cause allergic reactions. **Do not feed any shellfish** (includes shrimp, lobster, crab, crawfish, scallops, oysters, clams) **to babies less than 1 year of age**—these types of seafood can cause severe allergic reactions in some babies.

2. Some fish contain high levels of mercury. Too much mercury can harm unborn babies, infants, and young children. Therefore, infants should be fed fish according to these guidelines:

   - **Infants should not eat shark, swordfish, king mackerel, or tilefish** (also known as golden snapper or white snapper) because they contain high levels of mercury.

   - **Infants should eat no more than 2 meals per week of a variety of fish that are lower in mercury.** Some of the most commonly eaten fish that are lower in mercury are canned light tuna, salmon, pollock, and catfish. White albacore tuna is higher in mercury, therefore light tuna should be selected instead of white albacore tuna.

   - **Check local advisories** about the safety of fish caught by family and friends in local lakes, rivers, and coastal areas. Information about Florida Fish Consumption Advisories are available at the following web site: http://www.doh.state.fl.us/Environment/hsee/fishconsumptionadvisories/index.html

Fruit Juice

Fruit juices (100% fruit juices without added sugar) should only be offered when an infant can drink from a cup, which is usually around 6 months of age. Juice should not be put in a baby bottle. When juice is put in a bottle, it is often used as a pacifier and can lead to tooth decay. Drinking juice from a bottle also can result in overconsumption of juice.

When introducing juice into the infant's diet, the *single* juice varieties should be offered first for a week at a time to check sensitivity. A good first choice of juice to be given is vitamin C-fortified apple juice or white grape juice. After trying all the *single* juice varieties, each for a week at a time *with no reaction noted*, then the mixed juices can be offered one at a time. The infant should *not* be given fruit drinks, artificially colored and flavored drinks, sweetened drinks, tea, "gelatin water," or sodas.

Some additional points about feeding fruit juices to infants include:

- Infant fruit juices are expensive and not necessary. They are the same strength as "adult" fruit juices.

- The infant 6 to 8 months of age needs **only** 2 to 4 ounces of juice daily. For the 8 to 12 month old infant, 4 ounces per day are recommended. Excessive intake of fruit juice can quickly fill an infant's stomach, may result in a decrease in the consumption of other important foods, and may lead to diarrhea. The possibility of excess consumption of fruit juice should be considered when an infant has chronic diarrhea or failure to thrive. Any infant with these health problems should be referred to the nutritionist and his or her health care provider.
- It is usually best to dilute juice to half strength—one part juice to one part water—when first offered to an infant. The strength can gradually be increased as the infant becomes older; however, continuing to give diluted fruit juice to older infants and young children is an acceptable practice.
- Some infants have allergic reactions or have an intolerance to citrus (e.g., orange, grapefruit), pineapple, or vegetable juices (e.g., tomato juice or vegetable juice).[1] This reaction or intolerance may manifest in a skin rash, runny nose, vomiting, and/or diarrhea. Check with the infant's health care provider regarding when to try to introduce these foods again. Usually it is best to wait until the infant is over 1 year old before trying these foods again.
- If canned juices are used, the juice should be poured into a glass or plastic container after the can is opened. Once a can of juice is opened, some corrosion of the can's lining may take place which can affect the juice's flavor.
- While the seams of cans manufactured in the United States are no longer made using lead solder, those manufactured outside the United States may have lead seams. Therefore, parents/caregivers should be advised to avoid feeding imported canned juices to their infants. Also, juices should not be stored in lead crystal containers or pottery containers which may leach lead into the juice. *Note:* For additional information on lead and how to avoid lead poisoning, see the Preschool Child Nutrition Module.

Water

Under normal circumstances, the water requirements of healthy infants less than 6 months old are met by the breastmilk or formula alone as long as they are fed adequate amounts of breastmilk or properly diluted infant formula. Infants who begin eating a variety of solid foods, and especially any foods containing protein, should be fed about 4 to 8 ounces of water each day. Under certain circumstances, additional water or special fluids are needed in the diet. If in doubt about how much water an infant should drink, consult the infant's health care provider.

Insufficient Water Intake

On the following page is a list of situations that can result in an infant not receiving enough water. Next to each "situation" is a corresponding recommendation for ensuring sufficient water intake.

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1. Note: Tomato juice and vegetable juice are not WIC-allowed juices for infants.

Situation	Recommendation
Infant is fed formula which is too concentrated.	Instruct the caregiver on proper formula preparation and dilution to avoid this problem.
Infant consumes much less formula or breastmilk than usual, such as when ill.	Infants who are ill and are not feeding normally should be referred to the health care provider.
Infant consumes protein-rich or salty foods. These foods include protein-rich foods such as cooked meats, cooked egg yolks, and foods with added salt.	It is recommended that infants who eat these foods should have about 4 to 8 ounces of water per day as previously stated. Reminder: infants do not need salt added to foods.
Infant is fed fat free, lowfat, or reduced fat cow's milk.	These milks are not recommended for infants and may be dangerous because the infant's kidneys need to work very hard to excrete the minerals and protein by-products of metabolism.
Infant has a medical condition such as vomiting, diarrhea, fever, diabetes, etc.	In these circumstances, water needs may increase. Refer infants with these medical conditions to the health care provider for evaluation and recommendation of fluid intake. The health care provider may recommend an oral rehydration solution for infants with vomiting and/or diarrhea. See pages 73 and 74 of this module for further information on this subject.

Note: Lack of fluids in the diet can also lead to **constipation.** For further information on constipation, see page 73 of this module.

Dehydration

Since dehydration (excessive loss of water from the body) can lead to death in infants, caregivers need to be aware of the signs of dehydration which include the following:

- A reduced amount of urine which is also dark yellow in color;
- Dry membranes in the mouth;
- No tears when crying;
- Sunken eyes; and
- Restlessness, irritability, or lethargy.

Refer an infant to the health care provider for immediate medical attention if the caregiver notes that the infant has any of the symptoms listed above.

Excessive Water in the Diet and Water Intoxication

Water intoxication can occur if infants are fed excessive amounts of water. This condition can develop in infants who consume infant formula overdiluted with water and those who are force-fed water. This condition, while preventable, can be life-threatening to an infant. Symptoms of the condition include respiratory failure, seizures, and convulsions. Also, infants fed excessive water will not receive adequate calories to meet needs for growth and development.

In summary, it is important to review the following with caregivers of infants:

- Correct formula preparation, including dilution procedures. See Figures 2a, 2b, and 2c on pages 25 to 27 for formula preparation procedures.
- Do not *substitute* a bottle of water or beverages such as fruit juice, sweetened drinks, tea, etc. as a feeding *in place of* infant formula or breastmilk. Plain water and fruit juice are meant to be fed in relatively small amounts primarily as a source of fluid *supplementing* a nutritionally balanced diet.
- Do not allow the infant to drink *at will* from a bottle of water or dilute liquid all day or for extended periods. Young infants need to be fed a sufficient amount of breastmilk, infant formula, and/or appropriate solid foods to meet their calorie and other nutrient needs.
- Formula-fed infants or infants who are eating solid foods need about 4 to 8 ounces of water per day, unless otherwise recommended by the health care provider.
- Refer the caregiver to a health care provider if an infant has diarrhea, vomiting, fever, or other illness.

Self – Check Infant Nutrition

GO TO the Workbook for the Infant Nutrition Module and complete Self-Check Questions 13 to 16 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.

Infant Feeding Practices

Feeding practices influence infant health and lifelong eating habits. The following pages offer valuable information regarding some "Appropriate Infant Feeding Practices" and "Inappropriate Infant Feeding Practices" that should be shared with your clients, as needed.

Appropriate Infant Feeding Practices

- Infants should be fed in a high chair or in an upright position on the parent's lap. This helps to make the infant feel secure about this new feeding experience. The parent and infant should have good eye contact so that they can easily see each other. The infant should always be checked to make sure that the food is being swallowed without any problem.
- Solids should be fed from a spoon. Spoon feeding plays an important part in the development of the ability to self-feed. It also promotes the proper development of tongue muscles that are important for speech and allows the infant to experience the taste and texture of foods. There are several inexpensive feeding utensils that are specially designed for feeding infants. For example, long-handled spoons with small, shallow bowls make feeding easier for the infant and parent. When a cup is given, it should have handles, a lid with a spout, and a weighted bottom.

- Each new food should be introduced one at a time with approximately one week in between each new item. This will allow the infant to become accustomed to new foods. It will also provide an opportunity for parents to readily identify if any one food causes an adverse reaction such as rash, hives, vomiting, diarrhea, respiratory problems, or other more serious reactions which require immediate medical attention. If an adverse reaction is noted, eliminate this food from the diet until a later date, if this is recommended by the infant's health care provider. New foods should be started in small quantities such as a teaspoon and slowly increased to a tablespoon or more.

✓ New foods that are rejected by an infant should not be forced on him or her, but should be offered at another time. Infants and young children may need to be exposed to a new food numerous times before they decide they like it. Encourage parents to continue offering new foods, even though the food has been rejected by the infant one or more times.

✓ New foods should be introduced at a feeding when the infant is typically in a good mood and is hungry.

✓ Parents can encourage acceptance of new foods by demonstrating a positive attitude about the foods. Parents should not assume that their infant will refuse foods that other family members do not like.

✓ It is not necessary for an infant to finish everything offered at a feeding. The infant is usually the best judge of how much to eat. Most infants will indicate when they are full by turning their heads, clamping their mouths shut, or spitting the food out. Encourage parents or caregivers to pay attention to these signals.

✓ It is important for the parent or caregiver to allow the infant to set the pace for a feeding by waiting until the infant indicates he or she is ready for another spoonful.

Inappropriate Infant Feeding Practices

⦸ Solid foods should not be fed from a bottle. Solids from a bottle can lead to overfeeding and may delay the infant's ability to feed himself or herself.[1]

⦸ Syringe-action nipple feeders are **inappropriate** for the normal infant because they can cause overfeeding; they encourage early introduction of solids; they do not allow for the development of self-feeding abilities; and they can cause choking.[1]

⦸ Infants should not be given foods which contain large amounts of sugar and/or fat. These items include added sugar, corn syrup and other sweetened syrups, candies, chocolate, cake, pie, commercially prepared baby food desserts, potato chips, sodas, and sweetened drinks. Infants do not need salt, sweeteners, seasonings, and fat added to their food. Also, some babies have allergic reactions to chocolate. Plain foods are recommended to allow the infant to experience the individual tastes of foods and to avoid feeding excessive calories.

⦸ Low-calorie sweeteners, such as saccharin or aspartame (Nutrasweet®), are not appropriate for infants and young children. Infants and young children who are growing rapidly have no need for low calorie foods and drinks. Also, artificial sweeteners have not been proven safe for consumption by babies.

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1. For some infants with certain types of medical conditions (such as gastroesophageal reflux), a health care provider may recommend addition of cereal to a bottle (or similar method of feeding solids through a nipple such as the syringe-action nipple feeder). This practice should only be followed when specifically recommended by the infant's health care provider.

⦸ The use of **honey** is <u>not</u> appropriate for infants because it may contain *Clostridium botulinum* spores which are responsible for the very serious foodborne illness called botulism. The gastrointestinal tract of infants cannot destroy these spores (older children and adults can destroy the small amount of spores in honey). Botulism can cause severe illness and death in infants. **Honey should never be given to an infant under one year of age.**[1] Do not feed honey alone or in cooking or baking or as found in prepared foods (e.g., yogurt with honey, peanut butter with honey, or honey graham crackers). Even the honey in prepared foods could cause botulism in babies.

⦸ Tea and coffee (with or without caffeine) are <u>not</u> recommended for infants and young children. Tea and coffee contain tannic acid which decreases the absorption of iron by the body.

⦸ It is a common practice in some cultures for the parent to chew the food before giving it to the infant. This should be discouraged because bacteria in the parent's mouth will go to the infant and can cause disease (including tooth decay).

⦸ Near the age of 6 months, infants begin to hold their own bottles. However, they should <u>not</u> be put to bed with a bottle because this will start a habit which may be difficult to break and which can lead to early childhood caries (baby bottle tooth decay). In addition, infants still need close interpersonal contact with their parents when taking a bottle. **All** feeding times should be an opportunity for interaction between the infant and the parent.

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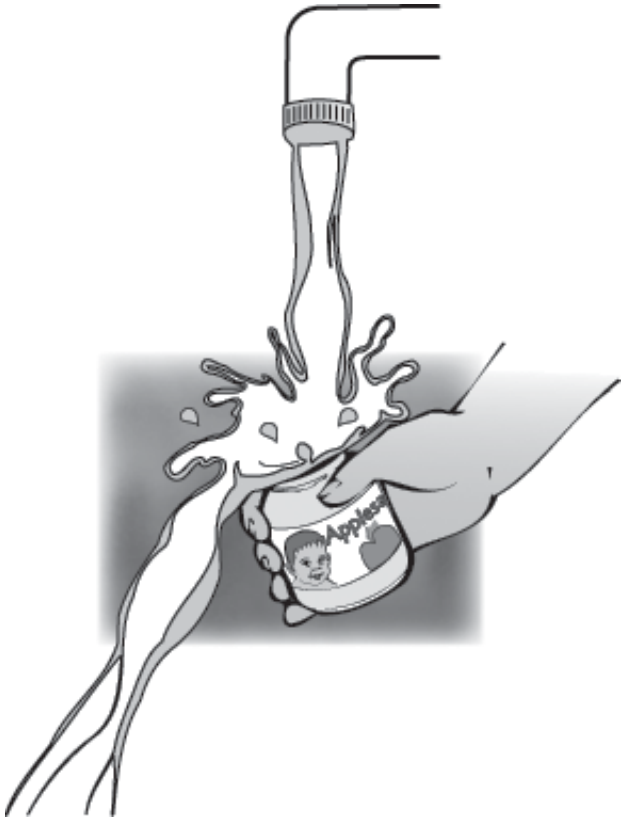
1. In fact, the American Academy of Pediatrics, *Pediatric Nutrition Handbook*, 5th edition, copyright 2004 (page 833) states that "infants less than 2 years of age should avoid all sources of honey."

Selection, Preparation, Serving, and Storage of Commercial and Home-Prepared Baby Foods[1]

Commercial Baby Foods

- *Single-ingredient* fruit, vegetable, or meat products of commercially prepared baby foods contain only one ingredient and water. These single-ingredient foods are generally preferred *instead of* baby food mixtures, fruit desserts, or baby foods with added ingredients or fillers. Added ingredients or fillers include: sugars; modified food starches; tapioca; nonfat dry milk; corn syrup; and wheat, rice, and other flours.
- Jars of baby food should be washed before opening. Jar lids should make a popping sound when opened. This sound indicates that the product was safely processed and stored. Check if the "bubble" on the top of the jar has already popped up. *If so, do not feed the food in that jar to the infant.*



1. USDA's *Feeding Infants: A Guide for Use in the Child Nutrition Programs* (FNS-258, revised December 2001) contains camera-ready client handouts on "Using Commercially Prepared Baby Food" (Figure 11, page 81) and "Using Home-Prepared Baby Foods" (Figure 12, page 91).

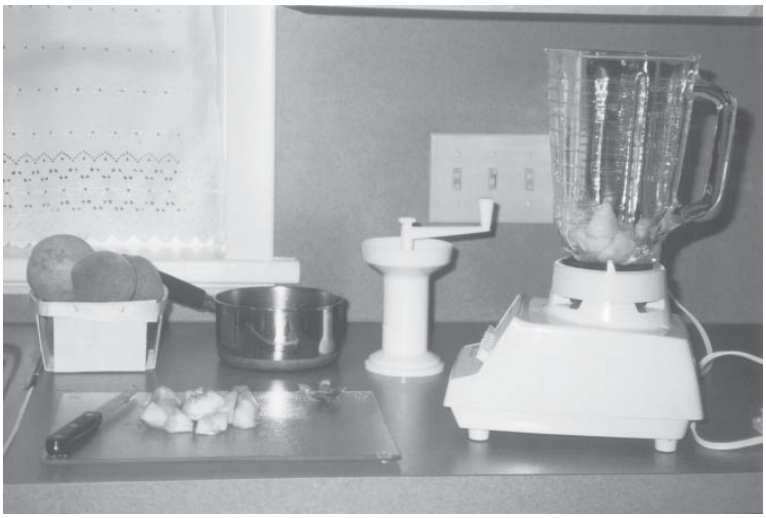
- Do <u>not</u> feed the infant directly from the baby food jar. Instead, food should be placed into a clean feeding dish before it is served to the infant. Food that is not eaten and left in the feeding dish should be discarded. If leftover food is returned to the jar, the infant's saliva will enter the food. The saliva will also enter the food if the infant is fed directly from the jar and there is food left in the jar. The saliva contains bacteria which can cause the food to spoil. If the infant was *not* fed directly from the jar, any *uncontaminated* food left over in the jar can be tightly resealed and stored in the refrigerator for up to 48 hours, except for meats and egg yolks which should be used within 24 hours.

- Baby food can be served at *room temperature* or *warm*—but never hot. Baby food can be warmed by setting the jar or other container in a pan or dish of warm water for a few minutes, or it can be warmed in an electric feeding dish. Microwave ovens can also be used to warm baby food, but caution should be used with this method. Microwave heating is uneven and can result in very hot pockets of food that can burn the infant's mouth. The unevenness in the consistency of the baby foods causes the more liquid or watery parts to heat up faster in the microwave than the thicker or more solid parts. To avoid any problems, parents/caregivers should be instructed to follow the microwave heating instructions on the baby food jar label, stir the food gently but thoroughly after heating to even out the temperature, and check the temperature of the food before feeding to the infant.

Home-Prepared Baby Foods

Home-prepared baby foods are generally lower in cost than commercial baby foods. Care must be taken during the preparation and storage of the food to prevent contamination. Guidelines for preparing baby foods are listed below:

- The preparer's hands should be washed in hot, soapy water and rinsed thoroughly. All equipment and surfaces used in the preparation should be thoroughly washed and sanitized.



- Fruits and vegetables should be washed. Skins, pits, and seeds should be removed. The vegetables or fruits should then be boiled or steamed in a small amount of water to preserve the nutrients. (Some fruits don't need to be boiled because they are very soft already, e.g., a ripe banana.) The fruits or vegetables can then be mashed with a fork or put in a blender, food grinder, or food processor. If liquid is needed in the preparation, use water, breastmilk, or infant formula only.
- Meats should be trimmed of fat and then baked, broiled, or boiled in a small amount of water. The meat can then be put in a blender, food grinder, or food processor. Foods prepared for the infant should contain no added salt, sugar, fat, or seasonings. If canned vegetables are used, they should be low in sodium or have no salt added. Preferably, fruits packed in their own juices should be chosen. If canned fruits in heavy syrup are used, the fruit can be rinsed with clean water.
- Spoons used to "taste test" foods should not be put back into the food.
- If the food is not to be eaten immediately after it is prepared, it must be properly stored. Home-prepared foods can be stored in a refrigerator for up to 48 hours, except for meats and egg yolks which should be used within 24 hours.
- The foods can be stored in a freezer for 1 month. To store single servings for the freezer, the food can be frozen in clean ice cube trays or muffin liners and covered with aluminum foil. Once frozen, the food can be removed from the tray and stored in plastic bags or plastic containers. To thaw, the frozen foods can be placed in a pan or dish and thawed in the refrigerator, or warmed in a conventional or microwave oven or pan of water on the stove. Any thawed, heated food that is not eaten should be thrown away.

Choking Prevention

Choking is a major cause of death in infants and young children. Normally when eating, the airway to the lungs is blocked off. This prevents food from passing into the airway. However, in infants and young children, choking can occur more easily because the airway is not always blocked off properly when swallowing, allowing food to enter the airway and prevent breathing. Choking may also occur when food is inhaled directly into the airway. Since choking can occur anywhere and anytime an infant is eating, strongly encourage parents and caregivers to:

✓ Use correct feeding and food preparation techniques as described in this module;

✓ Feed small portions and encourage their infants to eat slowly;

✓ Avoid teething pain medicine before meals;

✓ Maintain a calm atmosphere during eating time (i.e., avoid too much excitement or disruption during eating); and

✓ Closely supervise infants and young children when they are eating.

Certain eating behaviors increase an infant's risk of choking on food and should be avoided. These include:

⦸ Propping a bottle in an infant's mouth;

⦸ Using a bottle with a nipple having too large a hole;

⦸ Feeding solid foods to an infant who is not developmentally ready for them;

⦸ Feeding an infant too quickly;

⦸ Feeding while an infant is lying down, walking, talking, crying, laughing, or playing; and

⦸ Feeding difficult-to-chew foods to an infant with poor chewing and swallowing abilities.

Parents and caregivers should modify foods to make them safer, or substitute foods that may cause choking with a safe alternative food. Examples of modifying and substituting foods include the following:

✓ Cut round foods, like soft-cooked carrots, into short strips rather than round pieces.

✓ Whole grapes, cherries, or berries should be cut into quarters, with skin, pits, and seeds removed, before feeding.

✓ Substitute chopped, tender-cooked meat or mashed hamburger instead of hot dogs, sausages, or pieces of tough meat.

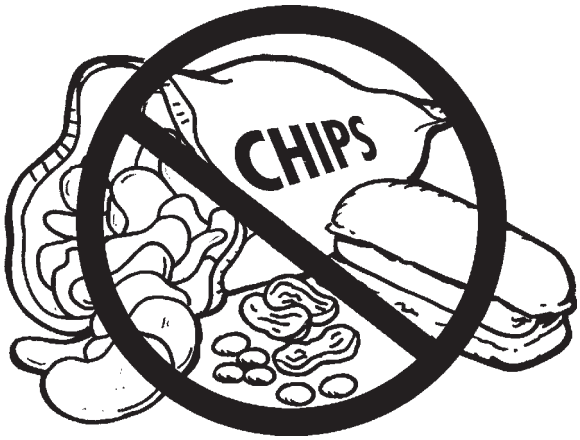
✓ Mash or grind cooked dry beans and peas.

✓ Cut cheese chunks into very small, thin pieces.

✓ Whole grain kernels such as wheat, barley, rice, and corn must be cooked and finely ground or mashed before being fed to an infant.

The following foods are **not** recommended for infants and young children because they are associated with choking:

- ⦸ fish, chicken, or turkey with bones
- ⦸ tough meat
- ⦸ hot dogs, sausages, toddler meat sticks, and breaded fish sticks (Hot dogs and sausages are also not recommended for infants due to their high salt and fat content.)
- ⦸ popcorn, nuts, seeds
- ⦸ potato chips, corn chips, cheese curls, cheese puffs, and pretzels
- ⦸ peanut butter, other nut/seed butters
- ⦸ raisins, other uncooked, dried fruits
- ⦸ large chunks of cheese
- ⦸ cooked or raw whole kernel corn, other whole grain kernels
- ⦸ raw vegetables such as carrots, celery, string beans, or hard pieces of partially cooked vegetables
- ⦸ round-shaped candies, gum drops, chewing gum
- ⦸ granola and plain wheat germ
- ⦸ whole beans
- ⦸ whole grapes, cherries, berries
- ⦸ fruit pieces with pits
- ⦸ whole pieces of canned fruit (cutthem up instead)
- ⦸ hot, sticky breads
- ⦸ marshmallows
- ⦸ hard cookies



The local chapter of the American Heart Association, American Lung Association, and the American Red Cross can be contacted for pamphlets and posters on choking prevention.

See the Preschool Child Nutrition Module for information on choking prevention in young children.

Self – Check Infant Nutrition

✎ **GO TO** *the Workbook for the Infant Nutrition Module and complete Self-Check Questions 17 to 21 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.*

Feeding the Infant: 8 to 12 Months of Age

The progression from strained or pureed foods to foods with more texture is an important step in the development of the feeding skills necessary to eat independently.

Finger Foods

When the infant shows signs of being able to chew with up and down movement of the jaw, and can move the tongue from side to side and swallow, finger foods should be offered. This is usually at 8 months of age.

Appropriate finger foods for infants are small pieces of soft food which can be easily dissolved in the throat or dislodged if they become stuck. These foods are called finger foods because they allow infants to practice using their hands and fingers to feed themselves. These foods should be small enough for the infant to pick up and soft enough for the infant to chew on. Good examples of finger foods include: cooked macaroni or noodles; small pieces of toasted bread; small, thin pieces of mild cheese; crackers; and teething biscuits. At 10 months of age, finger foods can include small pieces of soft, peeled fruit; small pieces of soft-cooked vegetables; and small pieces of tender-cooked meats.

To reduce the risk of choking on crumbs, it is best for infants to eat biscuits, small pieces of toast, or crackers only while in an upright position. Small, round, hard, or sticky foods that can become lodged in the infant's throat or that can "ball up" in the infant's throat should **not** be given. Examples of such foods are nuts, popcorn, raisins, raw vegetables, whole grapes, whole cherries, whole hot dogs or meat sticks, and peanut butter. See the previous section on Choking Prevention for more information.

Self-feeding Skills

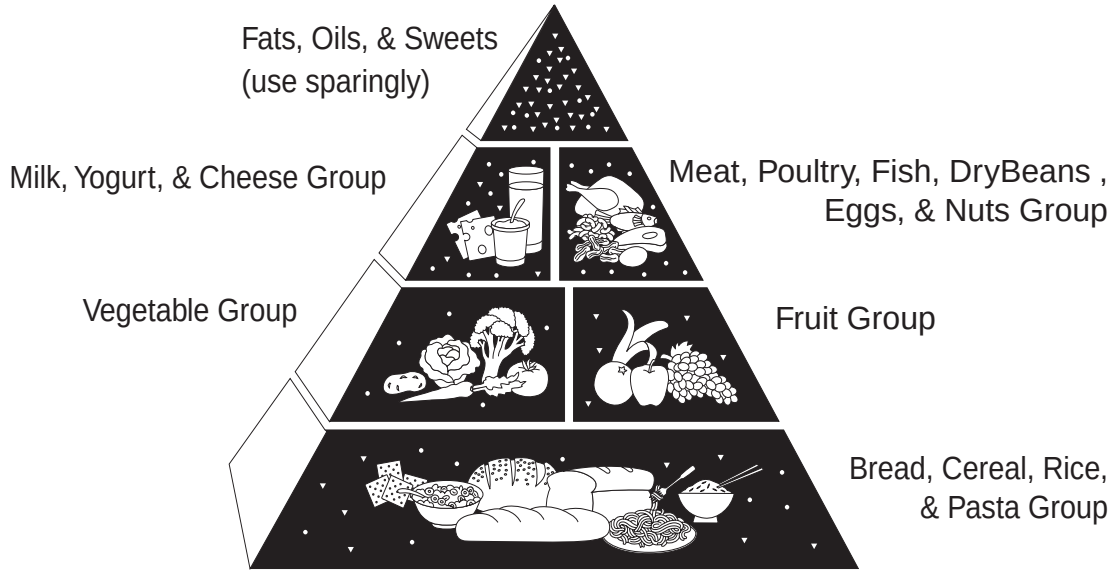
Near the age of 1 year, infants become interested in holding utensils and feeding themselves. They enjoy playing with spoons during mealtime or play time. This is a good way for them to begin to learn to use a spoon. Infants gradually learn to get food on the spoon and the spoon to their mouth, although food is often spilled before it gets into their mouth. Many infants prefer to feed themselves with their hands and fingers rather than with utensils. This is their way of experimenting with food. It is important that infants be allowed to take part in this activity, even though it is messy, because it helps them learn to feed themselves.

Some suggestions for parents of infants who are learning to feed themselves include:

- Make sure the infant's hands are washed before he or she eats.
- Be patient with the infant during this learning period.
- Pick a time or times of the day to allow the infant to "play" with his or her food.
- Cover the floor under the infant's chair with paper or an old shower curtain and put the infant in clothing that will not be harmed by spilled food. **Caution:** Make sure the shower curtain is cut to size so the infant cannot crawl underneath and risk suffocation.
- Include items which are fed to the infant as well as items that the infant can feed to himself or herself at meals.
- Give the infant small portions of food.
- Each infant develops at his or her own rate. There is no specific age at which an infant should be able to feed himself or herself. The process of learning to eat independently continues into the second year of life.

Meal Planning

An infant who is 8 to 12 months of age should be eating many types of solid foods with a variety of textures and colors. Finger foods should be included at meals and snacks. The daily diet should include foods from all of the food groups of the Food Guide Pyramid shown below. These solid foods should be offered on a feeding schedule that considers the infant's appetite and the family's schedule and food preferences. The amount needed depends on the infant's age and weight. Smaller infants and infants at the lower end of the age range will usually eat less than older, larger infants.



Source: U.S. Department of Agriculture/U.S. Department of Health and Human Services

Counseling Tips About Feeding Habits

The following are some counseling tips to pass on to your clients about feeding habits and how all this information relates to their infants' attitudes towards eating:

- Lifelong eating habits are formed in childhood and early positive experiences with foods can encourage acceptance of them later in life.
- Parents should not assume that a food that is rejected once will be disliked permanently. It takes time to learn to enjoy some foods.
- Parents should not assume that their infants will not like a food that another family member will not eat. Children should be allowed to develop their own food likes and dislikes.
- Parents should serve as good examples for their children by being open to trying new foods themselves.
- The habits of eating sugar, salt, and fat begin early in life for many people. These habits can be harmful if learned while young and continued throughout life. The infant should not be given foods with low nutrient density such as potato chips and soft drinks.
- The family's mealtime is an important time for children to learn good eating habits. The infant should take part in the family's mealtime. Perhaps the infant could be fed earlier and then eat finger foods while the rest of the family eats.

GO TO *the Workbook for the Infant Nutrition Module and complete Self-Check Questions 22 to 24 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.*

Weaning

Weaning from the breast or bottle is a gradual process. Weaning to a cup begins when the infant is able to sit up without support and is eating solid foods. It is a gradual process which usually begins around 6 or 7 months of age. Bottle-fed infants should be completely weaned from the bottle near the time of their first birthday. Bottles should not be used after 12 to 14 months of age by normal, healthy infants. Prolonged bottle feeding could lead to increased risk of early childhood caries (baby bottle tooth decay) as well as insufficient intake of nutritious foods.

Weaning from the Breast

Breastfeeding is recommended for the first year of life and beyond; however, the decision to wean the infant from the breast to a bottle or cup is an individual one. The reasons why a mother decides to wean from the breast before one year of age should be thoroughly explored. Sometimes a mother does not have the social and emotional support from family or friends to continue breastfeeding, or she may need help working through any breastfeeding problems that she may be having. Ideally, infants are exclusively breastfed for about six months and continue breastfeeding with appropriate complementary foods for *at least* one year. Many children continue breastfeeding after their first birthday and well into their second year of life.

Weaning is usually accomplished by stopping one breastfeeding at a time. It is suggested that the first feeding to stop should be the one in which the infant is least interested, such as the late afternoon feeding. The mother can then substitute a bottle or cup of breastmilk or infant formula for this feeding (or substitute whole cow's milk for children over 1 year of age). The mother should continue to use a bottle or cup at this feeding for 3 to 5 days before another breastfeeding is stopped. The procedure should continue gradually until the infant is entirely weaned from the breast. This weaning process will result in a gradual decrease in the mother's milk supply with little or no discomfort to the mother. If the mother should experience some engorgement, she should be instructed to hand express enough milk to relieve the discomfort or allow the infant to breastfeed for a minute or two. (Note: See the Breastfeeding Module for more about weaning from the breast.)

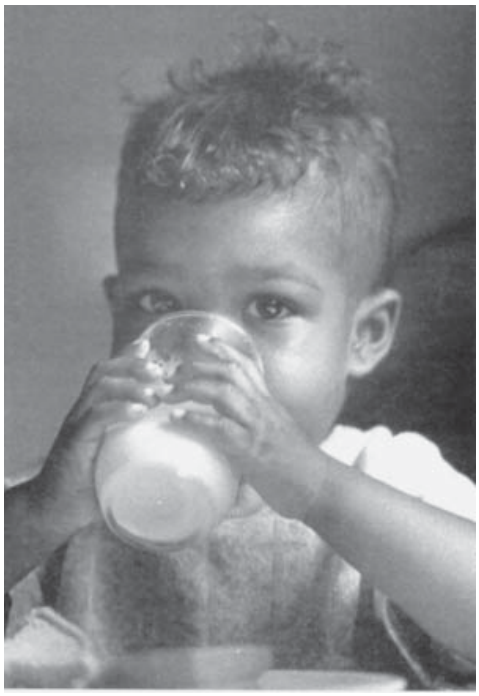
Weaning from the Bottle

Weaning an infant from the bottle to a cup is a gradual process. It usually starts when an infant can adequately drink from a cup with assistance, and ends when the infant is receiving all of his or her liquids in a cup (around 12 to 14 months of age).

When beginning the process, the parent should be instructed to choose a feeding in which the infant is least interested—such as, at the late afternoon feeding or at mealtime when other family members are drinking from a cup—and introduce a cup in place of the bottle.

The infant will probably consume less formula from a cup than he or she consumed from a bottle, since the quantities *required* by the infant at this time are not as large. The parent should continue with the cup at this feeding for 1 to 2 weeks before another bottle feeding is stopped. The procedure should continue gradually until the infant is entirely weaned from the bottle.

Counseling Tips About Weaning



- Children who use the bottle after 12 to 14 months of age may drink too much milk and not eat enough of other important foods. This can lead to inadequate intake of nutrients and the development of iron-deficiency anemia.
- Between 4 and 12 months, infants are developmentally ready and usually interested in learning to drink from a cup. Delaying the change to a cup during this period can lead to a refusal to change at an older age.
- At first, the infant should be allowed to play with a cup to become familiar with it.
- When liquids are first introduced from a cup, the infant's lips may not close around the edge of the cup and liquids will leak. Cups with lids and spouts (sippy cups) are acceptable.
- Infants need help holding the cup for the early weeks of cup feeding.
- When cup feeding is started, only a small amount of liquid should be put in it.
- As the infant gets used to drinking from a cup, liquids such as breastmilk, formula, or juice may be offered from the cup. *Sweetened beverages (e.g., fruit drinks and soda) should not be given to infants.*
- Some infants do not want to give up breastfeeding or bottle feeding, or are unwilling to drink from a cup. The weaning process often requires much patience from the parents.
- For infants who are bottle-fed, the bottle given before a nap or bedtime is often the most difficult one to discontinue. This bottle can also be the most harmful to the teeth if it is filled with milk, fruit juice, or a sweetened liquid and the infant takes it to bed.

Some suggestions for helping an infant give up the bedtime bottle include:

- Interest the infant in something other than the bottle at bedtime, e.g., a stuffed toy, a favorite blanket, etc.;
- Provide lots of affection and attention—instead of a bottle—at bedtime;
- Offer a small snack or beverage from a cup near bedtime; and
- Put a small amount of water in the bottle instead of milk.

✎ **GO TO** *the Workbook for the Infant Nutrition Module and complete Self-Check Question 25 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook) before proceeding to the next section of the module.*

Before leaving "Part 1: Feeding the Infant from Birth to 12 Months of Age," refer to *Figure4. F ood for Baby's First Year—General Guidelines for Feeding Healthy Infants,* on the following four pages. This contains the information on the inside of the "Food for Baby's First Year" pamphlet (DH 150-90) that is routinely given, as appropriate, to parents/caregivers of infants participating in the WIC program.

Figure 4. **Food for Baby's First Year**—***General Guidelines for Feeding Healthy Infants***

Birth to 6 Months

- Pediatricians recommend babies be breastfed until at least 1 year of age or older.
- If you are thinking about giving infant formula (artificial baby milk) to your breastfed baby, talk with the nutritionist or health care provider.
- Babies who are not breastfed need iron-fortified infant formula until they are 1 year old.

Breastfed Babies

Birth to 2 months:

- 8 to 12 or more breastfeedings per day

2 to 4 months:

- 8 to 10 or more breastfeedings per day

4 to 6 months:

- 6 to 8 or more breastfeedings per day

Formula Fed Babies

Birth to 1 month:

- 2 to 3 oz formula per feeding
- 8 to 12 feedings per day

1 to 4 months:

- 4 to 6 oz formula per feeding
- 6 to 8 feedings per day

4 to 6 months:

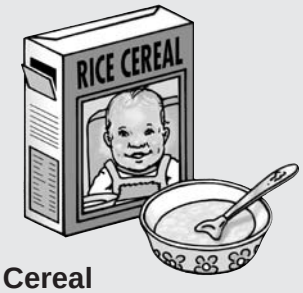
- 5 to 8 oz formula per feeding
- 5 to 6 feedings per day

Water

Healthy babies under 6 months old do not usually need to be given water bottles.

Most babies are ready to eat baby cereal when they can hold their heads steady, sit with some support, and take cereal off a spoon.

In the United States, it is recommended that women with HIV or AIDS not breastfeed as the virus can be passed to their baby through breastmilk. If you do not know your HIV status, please ask your health care provider for an HIV test.



Baby Cereal

- Begin iron-fortified baby cereal between 4 and 6 months. For babies who are only breastfed, wait until about 6 months.
- Start with rice baby cereal. Mix dry cereal with breastmilk, infant formula, or water.
- Feed rice cereal for 1 week, then start oatmeal or barley cereal. Feed your baby only one new cereal each week.
- Feed 1 to 8 tablespoons prepared cereal per day with a spoon, not in a bottle or infant feeder.
- Wait until 8 months to start mixed grain baby cereal.

Figure 4, continued

6 to 8 Months

Breastfed Babies

- 4 to 6 or more breastfeedings per day

Formula Fed Babies

- 6 to 8 oz formula per feeding
- 4 to 5 feedings per day
- total of 27 to 32 oz of formula per day

If your baby is both breastfed and formula fed, talk with the nutritionist or health care provider about your baby's feeding pattern.

Feed your baby only one new food per week. Then you can find out if your baby has a problem with the new food.

Baby Cereal

- 4 to 8 tablespoons or more per day of prepared cereal

Pureed Vegetables

- 4 to 8 tablespoons or more per day

Pureed Fruits

- 4 to 8 tablespoons or more per day

Pureed Meats

- cooked lean meat, chicken or turkey
- 1 to 6 tablespoons per day

100% Fruit Juice

- 2 to 4 oz per day in a cup only; not a bottle
- Begin with apple juice or white grape juice mixed with some water.
- You don't need to buy baby juices; diluted adult juices are just fine.

Water

- Babies over 6 months old who are eating a variety of foods should be given about 4 to 8 oz of plain water per day. There may be times when your baby needs to be given more water. Check with your baby's health care provider for more information.

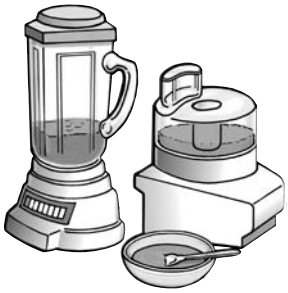
Making Your Own Baby Food

Make your own baby food or buy it in jars at the grocery store. See the "Baby Food Tips" on the back of this brochure for information about buying baby food. **To make pureed baby food:**

1. Prepare meats by removing the bones, skin, and visible fat.

2. Prepare fresh fruits and vegetables by scrubbing and peeling off the skin. Remove stems, pits, and seeds. Some fresh fruits, like bananas, and most canned fruits and vegetables don't need to be cooked before pureeing. Buy canned foods that have no added sugar, syrup, or salt.

3. Boil foods until soft, in just enough water to cover foods. Allow to cool. **Puree food in a food processor or blender**, adding small amounts of cooking water until mixture is smooth and creamy.



How many tablespoons are in a jar of baby food?

5 tablespoons = 

8 tablespoons = 

12 tablespoons = 

Figure 4, continued

8 to 12 Months

Breastfed Babies

- 4 to 6 or more breastfeedings per day

Formula Fed Babies

- 6 to 8 oz formula per feeding
- 4 to 5 feedings per day for ages 8-10 months
- 3 to 4 feedings per day for ages 10-12 months
- total of 24 to 32 oz of formula per day

At 8 to 10 months, let your baby begin to eat some foods with his/her fingers.
At 10 to 12 months, let your baby begin to feed himself/herself with a spoon.

Baby Cereal

- 4 to 8 tablespoons or more per day of prepared cereal
- Begin mixed grain baby cereal at about 8 months.

Vegetables: peeled; soft-cooked or canned; and then ground, mashed, or chopped

- 4 to 8 tablespoons or more per day

Fruits: peeled; soft or soft-cooked or canned; and then ground, mashed, or chopped

- 4 to 8 tablespoons or more per day

Meat or Meat Substitutes: cooked and then ground, mashed, or chopped

- lean meat, chicken, turkey, fish* (no shellfish), dry beans, or egg yolk (yellow part of the egg only)
- 1 to 6 tablespoons per day

*See **Health Advisory for Mercury in Fish** on the other side of this brochure.

Grains

- crackers, toast, noodles, rice, grits, and soft tortilla pieces
- 2 to 3 times per day

Yogurt and Soft Cheese

- small amounts

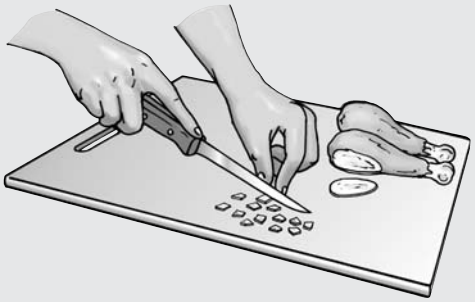
100% Fruit Juice

- 4 oz per day in a cup only; not a bottle

Water

- 4 to 8 oz per day or as needed. See information in the 6 to 8 months section.

At 8 to 10 months, most babies are ready to begin to eat mashed or ground foods.



At 10 to 12 months, most babies are ready to begin to eat chopped foods.

Figure 4, continued

Sample Daily Meal Plans

Ages 6 to 8 months

Early Morning
- breastfeed **or** give 6 to 8 oz formula

Mid Morning
- 4 tablespoons prepared baby cereal
- 4 tablespoons pureed fruit **or** 2 to 4 oz fruit juice

Noon Meal
- breastfeed **or** give 6 to 8 oz formula
- 4 tablespoons pureed vegetables
- 1 to 3 tablespoons pureed meat

Mid Afternoon
- breastfeed **or** give 6 to 8 oz formula

Evening Meal
- 4 tablespoons pureed vegetables
- 1 to 3 tablespoons pureed meat
- 4 tablespoons pureed fruit

Before Bedtime
- breastfeed **or** give 6 to 8 oz formula
- 4 tablespoons prepared baby cereal

Note: More breastfeedings per day may be needed, especially for younger babies.

Ages 8 to 12 months

Early Morning
- breastfeed **or** give 6 to 8 oz formula

Mid Morning
- 4 to 8 tablespoons prepared cereal **or** grits
- 4 tablespoons fruit **or** 4 oz fruit juice

Noon Meal
- breastfeed **or** give 6 to 8 oz formula
- 4 tablespoons vegetables
- 1 to 4 tablespoons meat

Mid Afternoon
- breastfeed **or** give 6 to 8 oz formula
- crackers
- soft cheese **or** yogurt

Evening Meal
- 4 tablespoons vegetables
- 1 to 4 tablespoons meat
- 4 tablespoons fruit
- grains such as noodles, rice, or soft tortilla pieces

Before Bedtime
- breastfeed **or** give 6 to 8 oz formula

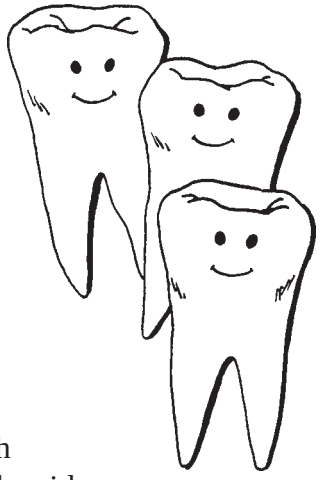
Note: More breastfeedings per day may be needed, especially for younger babies.

Part 2: Nutrition-Related Health Issues from Birth to 12 Months of Age

Dental Health

The primary teeth (i.e., baby teeth) begin to form in the jaw before birth and they continue to develop throughout the first year of life. This is why good nutrition during pregnancy and infancy helps to form teeth that are strong and healthy.

Tooth Development



There are several nutrients that are necessary for the development of healthy teeth, but the most important are **protein, calcium, phosphorus,** and **fluoride.** Protein provides the foundation for the teeth and the minerals (calcium, phosphorus, and fluoride) are deposited in this foundation to form a hard tooth structure.

Fluoride

Fluoride is a mineral which, if consumed at appropriate levels, may decrease the susceptibility of teeth to dental caries (tooth decay). On the other hand, the consumption of too much fluoride can, over a period of time, cause staining of the teeth (fluorosis). Many communities adjust the level of fluoride in the water supply to an optimal level to help prevent dental caries. Parents can find out the fluoride content of their water by contacting the manager of the water supply system in their area. Parents who have well water can contact their county health department to have their well water tested for fluoride content.

Recommendations for fluoride supplements for infants are as follows:[1]

- Infants *under 6 months* of age should not receive fluoride supplements. (However, mixing infant formula with fluoridated tap water is okay.)
- A fluoride supplement of 0.25 milligrams of fluoride is recommended for infants and children *6months to 36 months of a ge* when their household water supply has less than or equal to 0.3 parts per million of fluoride. Parents should follow the instructions of the infant's health care provider on the use of fluoride supplements.

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1. These are recommendations are based on the Fluoride Supplementation Schedule, American Academy of Pediatrics, *Pediatric Nutrition Handbook,* 4th edition, 1998, page 525.

Care of the Gums and Teeth

The primary teeth usually begin to appear near the age of 6 months, and they are subject to decay from the time that they first appear. Therefore, care of the gums and teeth should begin in the first months of life.

Before the teeth appear, parents can clean the infant's gums with a clean cloth or gauze. This removes the *milk film* from the mouth and gets an infant used to having his or her mouth cleaned.

When the infant is near the age of 1 year, parents can begin to use a small, soft tooth brush to gently brush the infant's teeth. Toothpaste is not recommended for this age, because infants are likely to swallow it and can consume too much fluoride. Toothpaste can begin to be used at 18 to 24 months of age.

Early Childhood Caries (also referred to as Baby Bottle Tooth Decay)

Infants and children who are put to bed with a bottle of infant formula (artificial baby milk), milk, juice, or a sweetened drink can develop serious tooth decay referred to as **early childhood caries (ECC) or baby bottle tooth decay**. ECC may occur in children who are given pacifying bottles of juice, milk, or formula to drink during the day or overnight. The sugar in the liquid pools around the upper front teeth mixes with cavity-causing bacteria which causes rapidly progressing destruction. ECC is not only painful and unattractive because of the tooth decay, but may also cause problems such as crooked permanent teeth and speech problems, such as lisping. Children with these problems may be teased by other children.

ECC is rare in breastfed infants since the mechanics of suckling and the positioning of the breast in the mouth during breastfeeding are different from bottle feeding. Another "dental health" benefit of breastfeeding is that breastfeeding for several months may reduce the risk of improperly aligned teeth.

This is an example of tooth decay in a young child (early childhood caries). It was caused by letting the infant or child use a bottle or cup as a pacifier. The bottle or cup was filled with formula, milk, juice, or a sweet drink.

Infants should never be put to bed with a bottle of milk, juice, or sweet drink. Weaning from bottle to cup should begin around 6 to 7 months of age and be completed near the time of the first birthday. Bottles should not be used after 14 months of age for developmentally normal, healthy children. Also, parents/caregivers should not allow children to continuously drink from a sippy cup (containing milk, juice, or sweet drink) throughout the day.

Prevention of Tooth Decay

To prevent tooth decay in infants:

- Breastfeed the infant for one year or more.
- Feed only breastmilk, formula, or water from a bottle.
- Do not feed juice in a bottle. Provide juice only in a cup. Do not feed more than 4 ounces of fruit juice per day.
- Do not let a baby carry around and continuously drink from a bottle or sippy cup.
- Offer the bottle only at feeding time, not at naptime or bedtime. If a baby falls asleep during a feeding, move the baby around a bit to stimulate swallowing before putting the baby down to sleep
- Do not leave a bottle in a baby's crib or playpen.
- Do not prop a bottle.
- Do not put water sweetened with honey, sugar, or corn syrup; soda pop; sweetened iced tea; sports drinks; sweetened gelatin water; juice drinks; or other sweetened drinks in the baby's bottle or cup.
- Do not use a bottle of cold juice to soothe a teething baby's gums. Instead, offer a clean favorite rattle or teething ring that has been cooled in the refrigerator (not the freezer).
- Do not feed a baby sweetened foods, such as lollipops, sweet candies, candy bars, cookies, cakes, or sweetened cereals, or sticky sweet foods such as dried fruit.
- Gradually begin shifting bottle feedings to cup feedings any time between 6 and 12 months of age as the baby consumes more solid foods and drinks liquids from a cup. It is best to wean from a bottle to a cup by about 12 to 14 months of age.
- Daily cleaning of the gums and teeth, should be started early in life.
- Only give a baby a plain clean pacifier. Never give a baby a pacifier dipped in honey, syrup, sugar, or other sweet substance.

The Department of Health pamphlet, "Protecting Tiny Teeth" (DH 150-113 English, DH 150-303 Spanish), can be used as a nutrition education tool for parents/caregivers. This pamphlet discusses the causes and prevention of tooth decay in young children.

Iron Needs During Infancy

Iron is necessary throughout life, but it is especially important during infancy and childhood when growth is rapid. Iron is a part of red blood cells, and it carries oxygen to all parts of the body. Adequate oxygen is necessary for normal growth.

A healthy, full-term infant is born with a supply of iron that will be used up by the time the infant is 4 to 6 months of age. Therefore, in order to maintain an adequate amount of iron in the infant's body, iron must be obtained from the infant's diet during the early months of life. Breastmilk contains a form of iron that is well absorbed and utilized by infants. Infants who are not breastfed should be given an iron-fortified infant formula.

Iron-fortified infant cereal is a good food source of iron for both formula-fed infants (at 4 to 6 months) and breastfed infants (at about 6 months). Since iron-fortified cereal is easy for a young infant to eat and digest, it makes an excellent choice for the first solid feedings. Even after other solids have been introduced, iron-fortified infant cereal remains a good source of iron for infants and can be offered until 18 months of age or longer.

Some other solid foods that supply iron are:

- **for an infant at 6 months of age or older:** Meats—especially liver and red meat—that are commercially strained or pureed, or meats that have been well-cooked until tender and then pureed in a blender, food grinder, or food processor.
- **for infants 8 months of age or older:** Mashed, cooked dry beans and peas may be added. Also, lean meat, chicken, and turkey can be well-cooked until tender and then ground, mashed, or finely chopped.

Absorption of iron by the body can be increased by feeding a vitamin C-enriched juice or another food which is high in vitamin C at the same time as the food which contains iron. For example, serving vitamin C-enriched apple juice along with iron-fortified infant cereal causes the iron in the cereal to become more available to the body.

The use of tea and coffee (with or without caffeine) should be discouraged because they lack nutritional value, contain tannic acid which interferes with the body's ability to absorb iron, and can stain a child's teeth.

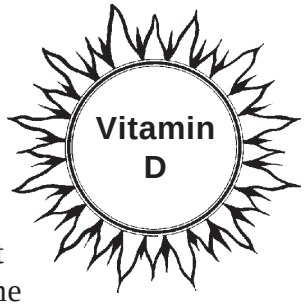
Remember that cow's milk is a *poor* source of iron and should *not* be fed to infants *under* 1 year of age. Also, while fruits and vegetables are nutritious foods for infants, most of them provide very small amounts of iron in an infant's diet. Jars of mixed baby food dinners are not recommended for infants because these foods contain very small amounts of iron and protein. Instead, parents should be encouraged to mix together a jar of plain meat and a jar of plain vegetables to feed to their babies.

Treatment of Iron-deficiency Anemia

One of the nutrition risk criteria for certification in the WIC program is a low hematocrit or hemoglobin level. Hematocrit and hemoglobin tests are good screening tools to indicate when an infant may have iron-deficiency anemia. If an infant's hematocrit value and/or hemoglobin value are low, they should be referred to the nutritionist who will provide counseling and referral to a health care provider, when appropriate.

Vitamin D Needs During Infancy[1]

Rickets is a disease caused by an extreme vitamin D deficiency in infants and children. The deficiency results in inadequate deposition of lime salts in developing cartilage and newly formed bone, causing abnormalities in the shape and structure of bones. Cases of rickets in infants which are attributed to inadequate vitamin D and decreased exposure to sunlight continue to be reported in the United States. The recommended adequate intake of vitamin D by the National Academy of Sciences to prevent vitamin D deficiency in normal infants, children, and adolescents is 200 International Units (IU) per day.



Sunlight Exposure

A potential source of vitamin D is synthesis in the skin from the ultraviolet B light fraction of sunlight. Decreased sunlight exposure occurs during the winter and other seasons and when sunlight is affected by clouds, air pollution, or the environment (e.g., shade). Lifestyles or cultural practices that decrease time spent outdoors or increase the amount of body surface area covered by clothing when outdoors further limit sunlight exposure. The effects of sunlight exposure on vitamin D synthesis are also decreased for individuals with darker skin pigmentation and by the use of sunscreens. All of these factors make it very difficult to determine what is adequate sunshine exposure for any given infant or child. In addition, parents are instructed to limit exposure of infants and children to direct sunlight by using protective clothing and sunscreens.

Breastfeeding and Vitamin D

Infants who are breastfed but do not receive supplemental vitamin D or adequate sunlight exposure are at increased risk of developing vitamin D deficiency or rickets. Human milk typically contains a vitamin D concentration of 25 IU per liter or less. Therefore, the recommended adequate intake of vitamin D (200 IU per day) cannot be met with human milk as the only source of vitamin D. While there is evidence that limited sunlight exposure prevents rickets in breastfed infants, it is very difficult to determine what is adequate sunlight exposure for an individual breastfed infant. In addition, there are growing concerns and recommendations about limiting an infant's sunlight exposure to prevent future development of skin cancer. Based on this information, the American Academy of Pediatrics recommends that all breastfed infants be given supplemental vitamin D beginning within the first two months of life.

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1. Source of information: Gartner LM, Greer FR. Section on Breastfeeding and Committee on Nutrition. Prevention of rickets and vitamin D deficiency: new guidelines for vitamin D intake. *Pediatrics.* 111(4):908-910;2003.

Formulas and Vitamin D

All infant formulas currently sold in the United States have a vitamin D content of at least 400 IU per liter of a 20-calorie per ounce formula. If an infant consumes at least 16 fluid ounces per day ($^1/_2$ liter) of formula with a content of 400 IU per liter, he or she will receive the recommended vitamin D intake of 200 IU per day.

Vitamin D Supplements

The American Academy of Pediatrics recommends a supplement of 200 IU of vitamin D per day for the following:

- All breastfed infants unless they are weaned to at least 16 fluid ounces of vitamin D-fortified formula or milk.
- All non-breastfed infants who are ingesting less than 16 fluid ounces of vitamin D-fortified formula or milk.
- All children and adolescents who do not get regular sunlight exposure, do not ingest at least 16 fluid ounces per day of vitamin-D fortified milk, or do not take a daily multivitamin supplement containing at least 200 IU of vitamin D.

A vitamin D supplement can be provided by currently available multivitamin preparations containing 400 IU of vitamin D per mL or tablet. Currently available solitary vitamin D preparations (containing up to 8,000 IU/mL) are too concentrated to be safe for routine home use.

Infants At Risk of Becoming Overweight[1]

The rise in the number of overweight children and adolescents in the United States is one of the most important public health issues we currently face. National surveys from the mid-1960s to the early 1990s show a significant increase in overweight among children from preschool age through adolescence. These trends follow a similar increase in obesity among adults. This suggests that shifts are occurring in dietary and/or physical activity behaviors that are having a negative effect on overall energy balance.

Specific reasons for the rapid rise in obesity in the United States are not well understood. Important contributors include a large and growing abundance of calorically dense foods and an increase in sedentary lifestyle for all ages. Evidence from recent scientific studies has shown that obesity tends to run in families, suggesting a genetic predisposition. However, a genetic predisposition does not inevitably result in the development of obesity. Environmental, social, and other factors also influence the development of obesity.

In any individual, and in the same individual at different times of life, the influence of genetics and environment on the development of obesity may vary. In other words, individuals with a genetic predisposition to obesity may be lean in an environment of food scarcity or high demand for physical activity; while individuals not genetically predisposed may become obese in an environment that encourages over-consumption of foods (especially calorically dense foods) and has few incentives for physical activity.

Increasingly, attention is being focused on the need for comprehensive strategies that focus on preventing overweight/obesity and a sedentary lifestyle for all ages. Scientific evidence suggests that the presence of obesity in a parent greatly increases the risk of overweight in preschoolers, even when no other obvious signs of increasing body mass are present.

The WIC nutrition risk factor of "At Risk of Becoming Overweight" is defined as one of the following:

- **Being 2 years of age or older and being greater than the 85th percentile and less than the 95th percentile Body Mass Index (BMI)-for-age.** (Standing height must be taken.)
- **Being less than 12 months of age and born to a woman who was obese (BMI greater than or equal to 30) at the time of conception or at any point in the first trimester of pregnancy.** The BMI must be based on self-reported, *by the mother*, prepregnancy weight and height or on a measured weight and height documented by staff or other health care provider.

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1. Source of information in this section: *Florida WIC Nutrition Risk Criteria Reference Guide.* Florida Department of Health, Bureau of WIC and Nutrition Services; October 2001.

- **Being greater than or equal to 12 months of age and having a biological mother who is obese (BMI greater than or equal to 30) at the time of certification.** BMI must be based on self-reported, *by the mother*, weight and height or on weight and height measurements taken by staff at the time of certification. If the mother is pregnant or has had a baby within the past 6 months, use her prepregnancy weight to assess for obesity since her current weight will be influenced by pregnancy-related weight gain.
- **Being an infant or child and having a biological father who is obese (BMI greater than or equal to 30) at the time of certification.** BMI must be based on self-reported, by the father, weight and height or on weight and height measurements taken by staff at the time of certification.

See Figure 5 below which can be used to determine if an infant has one obese parent or if both parents are obese.

Figure 5. **BMI Table for Determining Parental (male or female) Obesity**

Height (inches)	Obese (BMI greater than or equal to 30)
58”	143 pounds or more
59”	148 pounds or more
60”	153 pounds or more
61”	158 pounds or more
62”	164 pounds or more
63”	169 pounds or more
64”	174 pounds or more
65”	180 pounds or more
66”	186 pounds or more
67”	191 pounds or more
68”	197 pounds or more
69”	203 pounds or more
70”	209 pounds or more
71”	215 pounds or more
72”	221 pounds or more
73”	227 pounds or more
74”	233 pounds or more
75”	240 pounds or more
76”	246 pounds or more

The WIC Program has the opportunity to become an important player in public health efforts to curb the increasing spread of obesity by actively identifying and enrolling infants and children who may be at risk of becoming overweight in childhood or adolescence, and assisting them and their families in making dietary and lifestyle changes necessary to reduce their risk factors. The issue of a child being at risk of becoming overweight may cause some families to feel embarrassed; therefore, it is extremely important for the staff member to treat these families with sensitivity and compassion. Appropriate nutrition education emphasizing the importance of prevention (addressing both feeding/eating behaviors and physical activity), food choices within the food

prescriptions, and appropriate referrals provided through WIC would benefit not only the at-risk infants and children, but also their families.

Counseling Parents of Infants At Risk of Becoming Overweight

Parents of infants at risk of becoming overweight should be encouraged to change any inappropriate feeding or caregiving practices. Some suggestions for counseling include:

- Feed solids from a spoon, not from a bottle.
- Offer nutritious finger foods such as soft fruits and cooked vegetables.
- Do not feed sweetened water or other sweetened liquids. Plain water is the best choice for thirst.
- Do not encourage an infant to eat more than he or she wants, and do not force the infant to finish a bottle or food.
- Encourage the infant to be active by playing with him or her and allowing him or her to roll over, crawl, and/or walk throughout the day. Do not keep the infant confined to a playpen or an infant carrier for a large part of the day. **Caution:** Parents need to take care in closely supervising infants who are allowed to walk and crawl freely and make sure they take all necessary child-proofing measures.
- Do not use food to quiet the infant every time he or she cries. Try to learn to distinguish between cries of hunger and those of discomfort.
- Provide positive attention at other times besides feeding time.
- Provide attention and conversation, rather than sleep, immediately after a feeding.
- Respect the infant's food likes, dislikes, and needs. Most infants like plain food. Butter and sugar may make the flavor palatable to parents, but adds unnecessary calories for the infant. Parents should get into the habit of reading the nutrition information on baby food jars and avoid those that have added sugar, tapioca, starch, and other fillers.
- The parent of the infant should be in charge and take responsibility for the infant's diet and overall health. Caregivers who feed the infant, such as older children, grandparents, and babysitters, may not be as particular as the parent about what the infant is being fed.

Physical Activity Guidelines for Infants

The National Association for Sport and Physical Education (NASPE) released Early Childhood Physical Activity Guidelines in February 2002. The document was developed to provide teachers, parents, caregivers, and health care professionals with guidelines that address the kinds of physical activity, the environment, and the individuals responsible for facilitating the physical activity for infants, toddlers, and preschoolers.

Dr. Jane Clark, professor at the University of Maryland, who chaired the task force that developed the guidelines stated, "Adopting a physically active lifestyle early in life increases the likelihood that infants and young children will learn to move skillfully. Promoting and fostering enjoyment of movement and motor skill confidence and competence at an early age will help to ensure healthy development and later participation in physical activity."

Here are the five physical activity guidelines for infants:

Guideline 1. Infants should interact with parents and/or caregivers in daily physical activities that are dedicated to promoting the exploration of their environment.

Guideline 2. Infants should be placed in safe settings that facilitate physical activity and do not restrict movement for prolonged periods of time.

Guideline 3. Infants' physical activity should promote the development of movement skills.

Guideline 4. Infants should have an environment that meets or exceeds recommended safety standards for performing large muscle activities.

Guideline 5. Individuals responsible for the well-being of infants should be aware of the importance of physical activity and facilitate the child's movement skills.

Information about the NASPE can be found on the Internet at www.aahperd.org, the web site of the American Alliance for Health, Physical Education, Recreation & Dance (AAHPERD).

Special Problems

Gastrointestinal Disturbances

Certain gastrointestinal disturbances are commonly reported by mothers of infants, especially those who are bottle-fed. These include constipation, diarrhea, spitting up, and colic. When infants with these special problems come to the WIC office, immediately refer these clients to the nutritionist. The nutritionist can then provide appropriate counseling and referral to a health care provider, when necessary. The following presents a short discussion about each of these problems.

Constipation

Many parents become concerned if their infants do not have daily bowel movements. Although many bottle-fed infants have a daily stool (or more than one stool per day), others may have only one stool every 2 to 3 days. **Frequency is not a good indicator of constipation.** Constipation in infants is better characterized by hard, dry stools which are difficult for an infant to pass. Constipation in infants may result from:

- physical problems;
- incorrect formula dilution, i.e., the formula is not being mixed with enough water so the infant is not getting adequate water; or
- inappropriate diet.

The amount of iron supplied by iron-fortified infant formula does not cause constipation. When an infant has a problem with constipation, immediately refer his or her parent to the nutritionist who then can refer to a health care provider for counseling and treatment, when appropriate.

Diarrhea

Diarrhea is defined as the passage of loose, unformed, or watery stools that have an unpleasant odor. Also, diarrhea is when the number of stools passed in a day is more frequent than normal. Diarrhea is difficult to define, however, because each infant has his or her own pattern of bowel movements, and what is normal for one infant may not be normal for another. For example, breastfed infants normally have loose, frequent stools. This is usually not a matter of concern. However, if the stools of a breastfed infant become explosive and foul smelling, then there may be cause for concern. In all cases, infants with diarrhea should *immediately* be referred to the nutritionist for counseling and further referral to an appropriate health care provider in order to prevent dehydration and other serious complications. Frequently, oral rehydration therapy is recommended.

Oral Rehydration Therapy

Oral rehydration therapy is the consumption of an oral rehydration solution (ORS) which helps to replace the correct amount of essential body fluids and electrolytes (e.g., sodium, chloride, and potassium) lost during diarrhea. The ORS is usually consumed after each bowel movement or every few minutes. The ORS is usually taken in small amounts, either sips from a cup, by spoon, or by dropper, so that it is easily absorbed.

General Recommendations for Feeding During Diarrhea

The basic principles for the feeding of an infant who has diarrhea are listed below. These are general recommendations that should be used in consultation with the infant's health care provider.

- The infant should be given the ORS in the amount and frequency recommended by the health care provider.
- The infant should be breastfed or bottle-fed as usual.
- If the infant is at the stage when he/she is eating the solid foods listed below, here are some **foods to encourage:**

  Starchy foods: cooked baby cereals, oatmeal, rice, potatoes, noodles, crackers, and toast.

  Protein foods: plain, lean, cooked poultry, fish, or meat (chopped or mashed). Fat and skin should be removed.

  Vegetables: plain, cooked without added butter or other fats.

  Fruits: fresh such as bananas or canned fruit (not in sweet syrup).

  Soups: Soups which contain rice or noodles, tender meat, and tender vegetables. These soups should be low in salt and low in fat.

- The infant should **avoid the following foods and beverages:**

  Beverages such as grape or apple juice; soft drinks including cola, ginger ale, and lemon-lime; and sports drinks.

  Candy, ice cream, pudding, frozen fruit bar, gelatin, sherbet, sweetened cereals, or other sweets.

  Salty and fatty foods such as salty soup, potato chips, french fries, sausage, and luncheon meats.

For more detailed information about feeding during diarrhea, see page 66 of the Preschool Child Nutrition Module.

Spitting Up

Spitting up is not the same as vomiting. Spitting up involves small amounts of milk that come up. This may occur several times a day during or shortly after feeding. If the baby is growing well and is not irritable, then there is little reason for concern. Normally, breastfed infants spit up much less than bottle-fed infants. Occasionally, a change in feeding techniques will alleviate the problem.

Some feeding techniques which may be the cause of excess spitting up include:

- feeding too much food at one time;
- feeding with bottle nipples that have holes that are too large—these large holes allow liquid to flow too rapidly causing excessive intake and the swallowing of air; and
- feeding the baby without burping him or her during and after the feeding.

In all cases, infants who are spitting up frequently should be referred to the nutritionist.

Vomiting large amounts of liquid or food may be a symptom of a serious illness and medical attention should be sought immediately.

Colic

Colic is described as extreme discomfort in the infant's upper and/or lower gastrointestinal tract. Infants with colic will frequently show signs of discomfort by screaming, flexing the limbs, and continuous crying. The abdomen may be bloated. This may occur at similar times every day. Colic can occur in both formula-fed and exclusively breastfed infants, although it is much rarer in exclusively breastfed infants. (See the Breastfeeding Module for information on colic and breastfed infants.)

Through the years, many factors have been blamed for causing colic—e.g., gas, an anxious mother, overfeeding—but these theories have not been proven. Recent studies have linked cow's milk and soy milk with colic. However, the bottom line is—the cause or causes of colic are not really known. The psychological stress and harm to the parent-child relationship is of concern when an infant has colic. Parents need support and assurance throughout this difficult time. Parents of infants with colic should be referred to the nutritionist for counseling who will then refer to a health care provider, if appropriate.

Infants with Delayed Development

Approximately three percent of all infants and children are developmentally delayed. These infants and children may be developmentally delayed in their feeding skills for one or more of the following reasons:

- prematurity;
- multiple hospitalizations;
- low birth weight;
- failure to thrive;
- genetic or congenital disorder such as cleft lip or cleft palate, congenital heart disease, Down's syndrome;
- medical condition, such as cerebral palsy, Acquired Immune Deficiency Syndrome (AIDS);
- neuromuscular delay;
- abuse or neglect; or
- not having eaten by mouth (i.e., fed only from a tube in the stomach or inserted in a vein) for a long time.

Nutritional problems in this population can range from severe undernutrition to gross obesity. Many of the problems of nutrient intake in infants and children with developmental delays can be prevented. Parents and caregivers of developmentally delayed infants and children need guidance and support in the following areas:

- selecting nutritionally adequate foods;
- creating an environment in which the infant or child can learn to consume foods in a manner appropriate for his/her level of development;
- understanding the appropriate time at which to change the textures of food;
- determining when an infant or child can self-feed;
- understanding the factors that contribute to problems of food intake and planning for feeding in light of these factors; and
- incorporating physical activity into daily activities.

An interdisciplinary team approach which includes the infant's health care provider, the nutritionist, other health and social service professionals such as occupational therapists, speech therapists, physical therapists, and social workers is essential to meeting the needs of these infants and children.

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1. Source of information: Chapter 15, Nutrition and Special Health Care Needs by PL Pipes and RP Glass from Trahms CM, Pipes PL. *Nutrition in Infancy and Childhood*. 6th ed. St. Louis, MO: Mosby-Year Book, Inc.; 1997.

Special Formula

An infant who has one or more medical conditions, e.g., prematurity, a disease state, or a physical disability, may require a special formula. Some special formulas contain more calories and different types of proteins, fats, and vitamin/mineral levels than standard infant formulas (artificial baby milk). Special formulas are prescribed for the infant for the necessary period of time as determined by the health care provider. In all cases, an infant who requires a special formula must be seen by the nutritionist.

✎ **GO TO** *the Workbook for the Infant Nutrition Module and complete Self-Check Questions 26 to 31 right now. Then, immediately check your answers against the Answer Key to the Self-Check Questions (contained in your workbook).*

After completing Self-Check Questions 26 to 31, GO TO the "Practical Activity for the Performance Objectives," which is in your Workbook for the Infant Nutrition Module—it follows the Answer Key to the Self-Check Questions. Do this Practical Activity according to the instructions provided.

Congratulations! You have just finished the Infant Nutrition Module.

Infant Nutrition References

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Pamphlets that can be used for nutrition education:

Florida Department of Health. *Food for Baby's First Year.* DH 150-90 (English); DH150-35 (Spanish); and DH 150-757 (Haitian Creole).

Florida Department of Health. *Let's Be Lead Free—A Guide to Nutrition and Lead Poisoning Prevention*. DH 150-309 (English); DH 150-321 (Spanish); and DH 150-693 (Haitian Creole version in PDF format only).

Florida Department of Health. *Protecting Tiny Teeth*. DH 150-113 (English) and DH 150-303 (Spanish).

Additional Resources

The American Academy of Pediatrics http://www.aap.org

American Red Cross http://www.redcross.org

Centers for Disease Control and Prevention http://www.cdc.org

Food and Drug Administration, Center for Food Safety and Applied Nutrition http://www.cfsan.fda.gov

Food and Nutrition Information Center, National Agricultural Library/USDA Phone: (301) 504-5414

Infant Nutrition and Feeding Resource List
http://www.nal.usda.gov/fnic/pubs/bibs/topics/pregnancy/infnut.html

Infant Nutrition Web Site
http://www.nal.usda.gov/fnic/etext/000106.html

WIC Works Resource System
http://www.nal.usda.gov/wicworks/

National Institute of Child Health and Human Development (NICHD) http://www.nichd.nih.gov or 1-800-370-2943

National Network for Child Care http://www.nncc.org

National Women's Health Information Center, U.S. Department of Health and Human Services http://www.4woman.gov or 1-800-994-9662 or TDD 1-888-220-5446. This web site contains information about breastfeeding.

NUTRITION.GOV Web Site http://www.nutrition.gov

Partnership for Food Safety Education sponsors the Fight BAC! campaign http://www.fightbac.org

U.S. Department of Health and Human Services "HHS Blueprint to Boost Breastfeeding" http://www.fda.gov/fdac/features/2003/303_baby.html

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Nutrition Education Series

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For further information contact:

Florida Department of Health
Bureau of WIC and Nutrition Services
Bin # A16
4052 Bald Cypress Way
Tallahassee, FL 32399-1726
(850) 245-4202

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