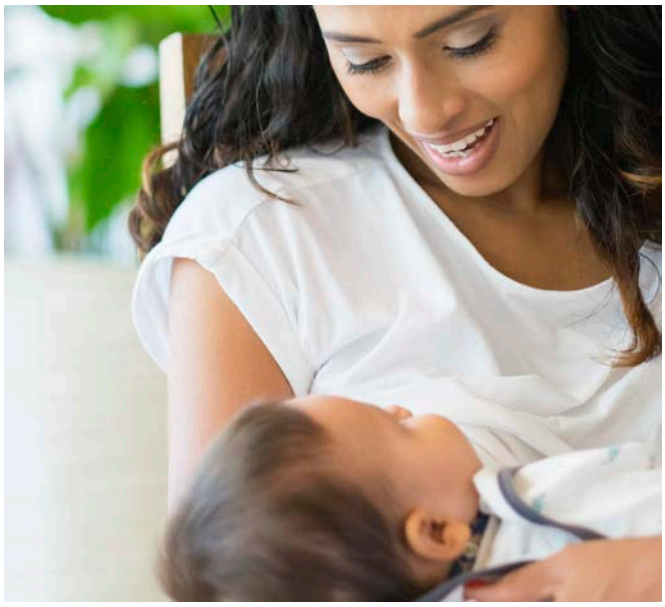
California Infant Feeding Guide

Infant Feeding for Children Birth to Age 1

CDPH California Department of PublicHealth



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Note: This guide is an update to Chapter 9: Lifecycle: Normal Infant Feeding (0-12 months), found in the California Food Guide: Sacramento, California. California Department of Health Care Services and California Department of Public Health, 2008. Available at http://www.dhcs.ca.gov/formsandpubs/publications/Pages/CaliforniaFoodGuide.aspx.

INTRODUCTION

Infant feeding is the feeding of a child from birth to one year of age. This guide promotes the "normal" infant feeding method, which is defined as exclusive breastfeeding for the first six months of life followed by breastfeeding and the introduction of iron-rich complementary foods around age six months.[1] For this reason, breastfeeding recommendations are a focus of this Infant Feeding Guide. This guide is intended for health care and public health professionals and does not address high risk infants.

Appropriate infant nutrition including breastfeeding reduces the risk in children under the age of five of infections, iron deficiency anemia, excessive weight, and short stature. This risk reduction may continue beyond childhood. For example, early and persistent iron deficiency anemia is associated with an adverse effect on early psychomotor development and may cause irreversible negative developmental impacts in cognitive and motor areas.[2]

BREASTFEEDING

Scientific Evidence Supports Breastfeeding

There is overwhelming scientific evidence that human breastmilk is the optimal food for human infants. Professional health organizations and government entities actively promote breastfeeding including, but not limited to the American Academy of Pediatrics (AAP),[1] the American College of Obstetrics and Gynecologists,[3] the American Academy of Family Physicians,[4] the Association of Women's Health, Obstetric and Neonatal Nurses,[5] the Academy of Nutrition and Dietetics (formerly the American Dietetic Association),[6] the U.S. Department of Health and Human Services,[7] the American Public Health Association,[8] the World Health Organization[9] and the United States Breastfeeding Committee.[10]

The American Academy of Pediatrics Recommendation on Breastfeeding

The American Academy of Pediatrics recommends, "…exclusive breastfeeding for about six months, followed by continued breastfeeding as complementary foods are introduced, with continuation of breastfeeding for one year or longer as mutually desired by mother and infant."[1] Exclusive breastfeeding refers to offering no other foods or fluids for infant feeding.

Quality of Human Breastmilk

Human breastmilk is nutritionally complete and is the healthiest source of nutrients for infants during their first six months of life.[1] Human milk contains a variety of enzymes, proteins, hormones, hormone-like substances, and living cells that are not found in commercial infant formula.[11] These bioactive factors optimize the immune system, decrease the risk of infections, promote growth of optimal gut flora, and change over time to meet the specific biological needs of the growing infant.[1] Our understanding of the benefits of breastfeeding is expanding as research on new topics such as epigenetics[12] and the gut microbiome[13] illustrate how human milk can lead to lower risks of infections, autoimmune disorders and non-communicable diseases.[12]

Table 1: Risks of Not Breastfeeding

This table highlights the medical risks associated with not breastfeeding that are supported by scientific evidence. It is not an exhaustive list of all the available research.

Infant has a higher risk of	Mother has a higher risk of
Obesity in childhood[1,14,15] **Diarrhea[16]** **Respiratory tract infection[17]** **Ear infections[18]** **Sudden Infant Death Syndrome (SIDS)[19]** **Type 1 and 2 diabetes[20,21]** **Gastroenteritis[22]** **Asthma[23]** **Lower IQ[24]** **Necrotizing enterocolitis[25,26]** **Urinary tract infections[27]** **Atopic dermatitis[28]**	**Post-partum weight retention[29]** **Depression[22]** **Ovarian cancer[30]** **Breast cancer[31]**

Economic and Environmental Benefits of Breastfeeding

In addition to being the most nutritious choice, breastfeeding also provides economic and environmental benefits.[32] Families do not have to purchase commercial infant formula or bottles when infants breastfeed, and there are no external costs to the environment generated by the production, transportation, and discarding of commercial infant formula containers. The reduction in health risks from breastfeeding reduces health care costs and subsequently the insurance and tax burden for everyone.[33]

Contraindications for Breastfeeding

There are limited contraindications for breastfeeding.[1] Contraindications include women who are infected with the human immunodeficiency virus (HIV) or human T-cell lymphotropic virus type I or type II; women who are using and dependent upon illicit drugs; and the infant born with galactosemia, an in-born error of metabolism, where the infant lacks the enzyme to breakdown galactose. While other in-born errors of metabolism such as phenylketonuria (PKU) or maple syrup urine disease (MSUD) preclude exclusive breastfeeding, health care professionals should encourage mothers to work with their child's health care team to ensure both infant and mother achieve the health and psychological benefits associated with breastfeeding.

Women with HIV infection in the United States are advised not to breastfeed because of the risk of HIV transmission to their infants via breastmilk. However, many women face social, familial and personal pressures to breastfeed. It is recommended that health care professionals have an open discussion with pregnant women living with HIV about the risks and benefits of breastfeeding and what personal meaning breastfeeding or formula feeding may have. Health care professionals can get more information and consultation from the Perinatal HIV Hotline (Perinatal HIV Hotline) and patients can find more resources at HIV Resources. For women living with HIV who choose to breastfeed after discussing risk of transmission, counseling is complex and health care professionals are encouraged to obtain consultation from the Perinatal HIV Hotline.[34]

Other maternal conditions or treatments can lead to a temporary cessation of breastfeeding including untreated, active tuberculous (expressed breastmilk can be used), active herpes-simplex lesion on the breast, therapeutic or diagnostic radioactive isotopes, antiretroviral medications, and chemotherapy agents that interfere with DNA replication and cell division.[1]

Alcohol consumption is not a contraindication for breastfeeding; however the ingestion of alcoholic beverages should be limited to 0.5 grams alcohol per kilograms of body weight per day.[1] This equates to two ounces of liquor, eight ounces of wine, or two beers for a 60 kilogram or 133 pound woman. The quantity of alcohol in breastmilk correlates with the amount of alcohol in the mother's blood stream. A breastfeeding woman who chooses to drink alcohol should breastfeed or pump breastmilk immediately *before* drinking alcohol and wait at least two hours after ingesting alcohol to minimize alcohol concentration in the breastmilk. By waiting for alcohol to clear the bloodstream and breastmilk, there is no need to "pump and dump," which was once recommended after ingesting alcohol.[1,35]

Cigarette smoking is not a contraindication to breastfeeding, however it is encouraged that women stop smoking cigarettes. Women who continue to smoke while breastfeeding should smoke as little as possible and avoid second- and third-hand smoke exposure to the

infant.[36,37] Third-hand smoke can be avoided by changing shirts and washing hands after smoking and before holding a baby.

Few studies examine the effects of marijuana (cannabis) use during breastfeeding. Small amounts of marijuana's active components are found in the breastmilk of mothers who use marijuana during lactation.[38,39] Therefore marijuana use is not recommended during lactation. Second-hand marijuana smoke should be avoided.

Galactosemia is an additional contraindication, as the disorder that does not allow infants to break down a sugar found in breastmilk. Commercial infant formula is recommended in such cases when an infant cannot consume human milk.

Most prescription and over-the-counter medications are safe to use while breastfeeding; however, a woman who needs medications should consult her health care professionals during pregnancy to see which drugs are most appropriate to use. The National Institutes of Health maintains an extensive registry of drugs that are safe to take or should not be used when breastfeeding. See, LactMed at Lactation Meds. Drugs that are contraindicated during lactation include antimetabolites, chemotherapeutic and illicit drugs.

If a woman or her infant has a health condition, she should consult with a health care professional to obtain breastfeeding information pertaining to her specific situation.[1]

HEALTHY PEOPLE 2020 OBJECTIVES

The US Department of Health and Human Services creates the Healthy People 2020 Objectives, which are objectives designed to promote health for all. There are specific Maternal and Child Health Objectives that are associated with infant feeding and in recent decades there have been an increased number of objectives targeting breastfeeding, given its growing recognition as a valuable health intervention. These objectives are listed in Table 2.

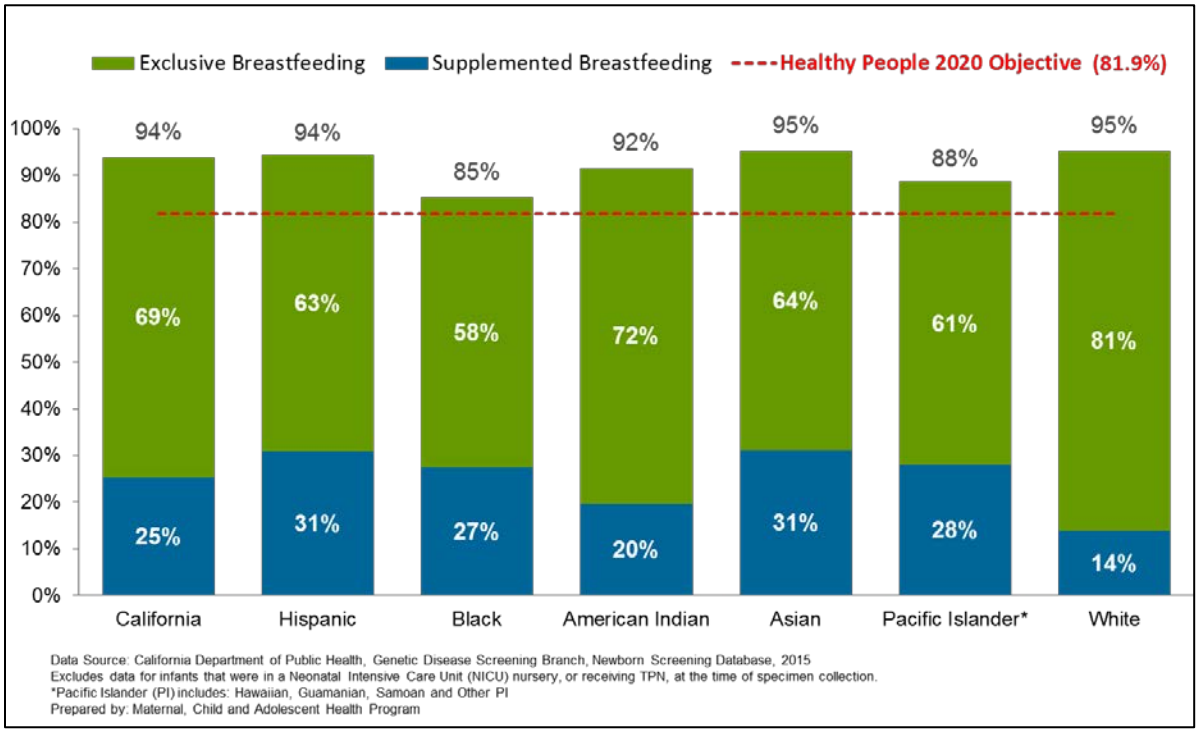
Table 2: Healthy People 2020 Objectives Pertaining to Infant Feeding[40]

Healthy People 2020 Objectives	Description
MICH-21.1	Increase the proportion of infants who are ever breastfed to 81.9 percent.
MICH-21.2	Increase the proportion of infants who are breastfed at 6 months to 60.6 percent.
MICH-21.3	Increase the proportion of infants who are breastfed at 1 year to 34.1 percent.
MICH-21.4	Increase the proportion of infants who are breastfed exclusively through 3 months to 46.2 percent.
MICH-21.5	Increase the proportion of infants who are breastfed exclusively through 6 months to 25.5 percent.
MICH-22	Increase the proportion of employers that have worksite lactation support programs to 38 percent.
MICH-23	Reduce the proportion of breastfed newborns who receive formula supplementation within the first two days of life to 14.2 percent.
MICH-24	Increase the proportion of live births that occur in facilities that provide recommended care for lactating mothers and their babies to 8.1 percent.

DISPARITIES IN BREASTFEEDING RATES

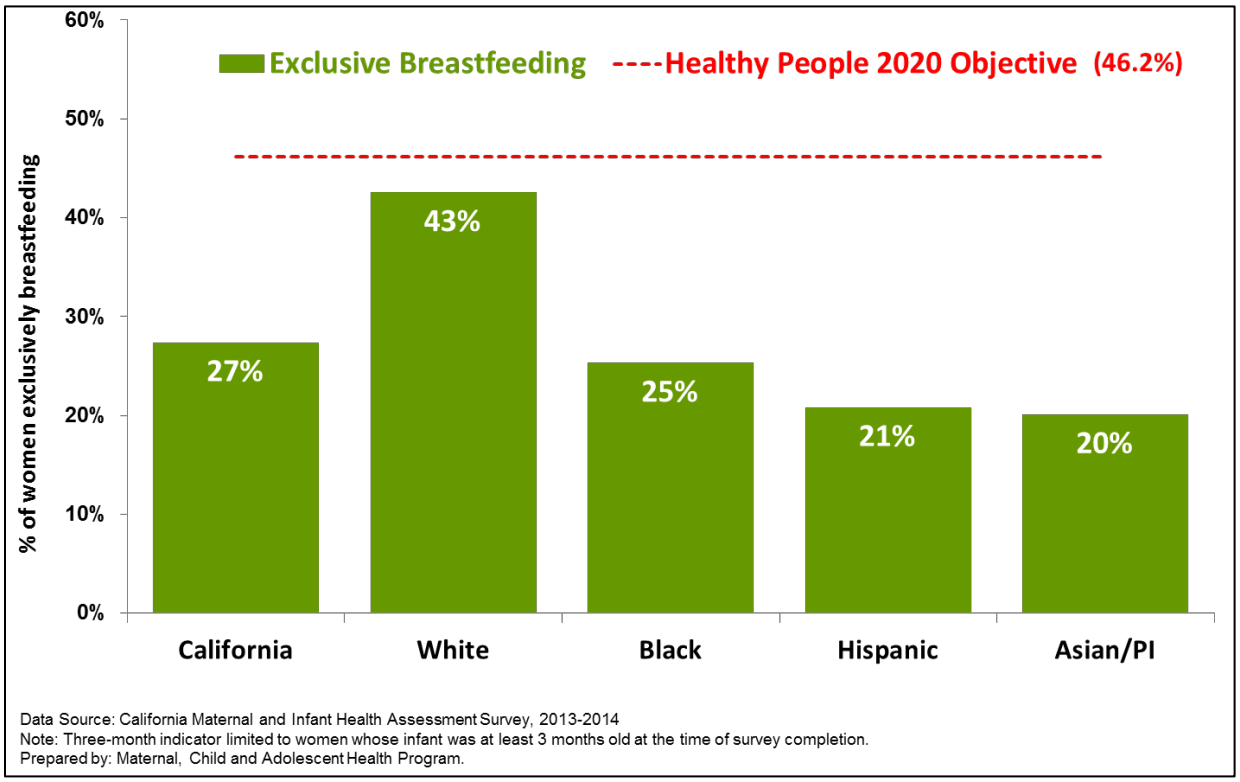
The 2015 data from the California Department of Public Health's Genetic Disease Screening Program show that 94 percent of California women breastfed their babies at least once while in the hospital after delivery (Figure 1). This prevalence is well above the Healthy People 2020 Objective of 81.9 percent. While the incidence of breastfeeding initiation in California has increased from 91 percent to 94 percent and exclusive breastfeeding has increased from 57 percent to 69 percent between 2010 and 2015, racial and ethnic disparities persist. Only three out of five Hispanic, Black, Asian and Pacific Islander (PI) women exclusively breastfed their infants while in the hospital compared to four out of five White women.

Figure 1: California In-Hospital Breastfeeding Initiation by Race/Ethnicity, 2015



Hospital breastfeeding data is very encouraging; however, data from the Maternal and Infant Health Assessment Survey (MIHA) demonstrate how quickly breastfeeding rates decline during the early postpartum period. Figure 2 highlights the proportion of women that report that they are still exclusively breastfeeding at three months postpartum by race and ethnicity compared to the Healthy People 2020 Objective of 46.2 percent. These data show that many race and ethnic groups among California women have yet to meet the Healthy People 2020 Objective for exclusive breastfeeding at three months postpartum. Less than one in four Black, Hispanic and Asian and PI women are exclusively breastfeeding at three months postpartum, compared to 43 percent of White women. Clearly more efforts, such as routine lactation consultation, free breast pumps and workplace lactation accommodation, are needed to support exclusive breastfeeding for all California women and reduce disparities in breastfeeding outcomes.

Figure 2: Prevalence of Exclusive Breastfeeding at Three Months among California Women by Race/Ethnicity, 2013-2014



SUBSTITUTES FOR BREASTMILK: BANKED HUMAN MILK OR COMMERCIAL INFANT FORMULA

Banked human milk refers to professionally tested, stored and processed expressed breastmilk from other mothers. When medically indicated, banked human milk is preferred over commercial infant formula as a substitute for a mother's own breastmilk. If it becomes medically necessary to feed a healthy term infant commercial infant formula, the American Academy of Pediatrics recommends that infants consume iron-fortified cow's milk-based infant formula.[9]

Indications for the Use of Banked Human Milk or Commercial Infant Formula

The need for long-term supplementation of the breastfed baby is rare as most infants who are allowed to self-regulate their feedings will thrive on human milk and their mothers will be able to maintain an adequate milk supply. Before recommending supplementation, both mother and infant should be evaluated by a healthcare professional. Banked human milk is the preferred supplement when:

1) A mother cannot breastfeed her child.

2) The mother seeks consultation with a lactation specialist to address low milk supply, inadequate or inappropriate suck and milk transfer, or other medical or non-medical concerns.
3) The caregiver is not the biological mother, such as in adoption and foster care. Commercial infant formula is the recommendation if banked human milk is not a viable option.
4) Mothers choose not to breastfeed. Commercial infant formula is the recommendation if banked human milk is not a viable option.

Commercial Infant Formula Options, Genetically Modified Organisms, Prebiotics and Fatty Acid Supplementation

People who purchase breastmilk substitutes, referred to as commercial infant formula, may be confused about which type of formula to purchase and what the labels mean. Some of the new commercial infant formula ingredients and preparation recommendations are discussed below.[41]

- **Commercial infant formulas:** There are three forms of commercial infant formulas available for healthy, full-term infants: ready-to-feed, concentrated liquid and powder. Since powdered commercial infant formulas are not sterile, they should not be fed to premature infants or infants with reduced immunity. See the next section entitled "Preparing Commercial Infant Formula" for more information.
- **Soy-based commercial infant formulas:** These are not generally recommended. They may be used for infants with galactosemia or hereditary lactase deficiency. Soy protein-based commercial infant formulas have not been shown to help relieve colic. Infants with a cow milk protein allergy should not have soy due to a high risk of also having a soy protein allergy. Soy-based commercial infant formulas are not recommended for preterm infants.[42]
- **Specialized infant formulas:** There are many commercial infant formulas that are for babies who are born premature or who have specific health concerns.[43] These specialized commercial infant formulas are not for healthy, full-term infants. A health professional should identify and prescribe specialized formulas for the minority of infants who need them. When appropriate, refer to public health programs such as Medi-Cal and California Children's Services and when not covered under these health programs, the Special Supplemental Program for Women, Infants, and Children (WIC) may provide specialized infant formulas.
- **Commercial infant formula made without genetically modified organisms:** No studies were identified on the health benefits of non-genetically modified organism commercial infant formula.
- **Commercial infant formula with prebiotics**: Not enough evidence is available to determine if there are positive health effects associated with the use of probiotic and/or prebiotic-supplemented commercial infant formula.[44,45,46]
- **Commercial infant formula with fatty acid supplementation:** Studies in non-human species suggest supplementing the diets of newborns with docosahexaenoic

acid (DHA) and arachidonic acid (ARA) may lead to positive neurodevelopment.[47] However these results have not been replicated in humans.[48] There is insufficient evidence for a statement for or against fatty acid supplementation of commercial infant formula at this time.[49]

PREPARING COMMERCIAL INFANT FORMULA

Commercial infant formulas are available in three forms: ready-to-feed, concentrated liquid, and powder. Directions for correct preparation are included on the label of commercial infant formulas and should be followed. Water safety should be taken into consideration when choosing to use powdered or concentrated commercial infant formulas, which require water in their preparation. Contaminants such as harmful microorganisms, lead, nitrates, and copper are potential health hazards. If water is boiled to kill microorganisms, it should be boiled for only one minute and cooled to room temperature before being used in preparing commercial infant formula. Do not use hot water from the tap to prepare the commercial infant formula; hot water may leach unwanted minerals from pipes into the water. If the safety of the water supply is questionable, caregivers should contact their local health department or the U.S. Environmental Protection Agency (EPA) Safe Drinking Water Hotline at 1-800-426-4791.

The type of commercial infant formula used will affect stool frequency, color and consistency. If commercial infant formula is indicated, parents should be educated on the wide range of typical infant stooling patterns, as well as the increased incidence of feeding intolerance such as crying, spitting up and gas.

When using powdered commercial infant formula for very low birth weight neonates who are less than three months of age, special attention needs to be paid to how the commercial infant formula is prepared to avoid cronobacter infection. Cronobacter is a rare yet serious infection that has been associated with the use of powdered commercial infant formula as it is not a sterile product.[50] The Centers for Disease Control and Prevention has recommendations to avoid cronobacter infection when using powdered commercial infant formula, located at Avoiding Cronobacter Infection. This web page reviews in detail how to reduce the risk of cronobacter: 1) breastfeed, 2) if using commercial infant formula, choose a liquid form, 3) if using powdered commercial infant formula, use good hygiene when preparing and storing, 4) use proper hygiene for yourself and all objects that may go in the infants' mouth.

WATCHFULNESS WHEN CUP OR BOTTLE FEEDING: LET YOUR INFANT SET THE PACE

When cup or bottle feeding expressed breastmilk or commercial formula, it is important to replicate the act of breastfeeding by providing skin-to-skin contact and attending to infant hunger and fullness cues. Newborn formula-fed infants are generally fed infant formula as often as exclusively breastfed infants are fed. Pacing the feeding and attending to infant cues means less chance of overfeeding, gas, stomach discomfort and spitting up. Below are some do's and don'ts that promote caregiver-infant bonding and prevent problems related to poor feeding techniques when an infant is bottle or cup-fed.[51,52]

Dos and Don'ts

- **DO** hold and cuddle the infant comfortably and securely during feeding.
- **DO** make sure the head and neck are supported. Hold the infant almost upright.
- **DO** alternate sides so the baby looks towards the caregiver in both directions.
- **DO** provide skin-to-skin contact between caregiver and baby.
- **DO** allow the infant to hear the caregiver's heartbeat by holding infant close to chest.
- **DO** pause and let your baby take breaks every few sucks.
- **DO** feed according to an infant's hunger cues such as lip smacking, keeping hands near mouth, puckering lips, searching for nipple, and satiety cues such as slowed sucking, turning away and increased distractibility.
- **DO** feed appropriate volume for age, pausing during the feeding (tilting the bottle so that there is no milk in the nipple) to observe infant's cues in order to avoid overfeeding.
- **DO** hold the bottle in an almost flat position. The nipple will be only partly full. This keeps the milk from pouring into the infant's mouth.
- **DO NOT** prop the bottle in the infant's mouth.
- **DO NOT** let the baby fall asleep with a bottle as this can lead to overfeeding and tooth decay.

The amount of infant formula needed by an infant over a twenty-four hour period will vary. Infants need to be fed small amounts of infant formula often throughout the day and night because their stomachs cannot hold a large quantity. From birth to six months of age, infants grow rapidly and will gradually increase the amounts of infant formula they can consume at each feeding, the time between each feeding, and the total amount of infant formula consumed in twenty-four hours. Parents and caregivers are encouraged to prepare two ounces of infant formula every two to three hours at first. More should be prepared if the infant seems hungry, especially as the infant grows.[52]

MICRONUTRIENT RECOMMENDATIONS

Table 3 provides micronutrient recommendations for selected nutrients for infants in two age categories: 0-6 months and 7-12 months of age. Nutrient needs generally increase as

the infant gets older because of their accelerated growth. The specific values below are obtained from the most current scientific publication from the Food and Nutrition Board, Institute of Medicine, National Academy of Sciences (NAS). The Dietary Reference Intake (DRI) is the general term for a set of reference values used to plan and assess nutrient intakes of healthy people. DRI values include Recommended Dietary Allowance (RDA) and Adequate Intake (AI). The RDA is the average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%-98%) healthy people. The AI is the recommended average daily nutrient intake.

When sufficient evidence is not available to determine an RDA, an Adequate Intake (AI) is provided as a recommended intake for individuals. For infants, AIs are based on adequate intakes of healthy breastfed infants. The AI may not meet requirements for clinical conditions or medical diseases. Healthy infants do not normally require supplements, with the exceptions listed in Table 4. Infants with special health care needs, which include chronic medical conditions, may require additional supplements.

Table 3: Selected Vitamin and Mineral Adequate Intakes (AI) for Infants

Age (mo.)	*Calcium* (mg/d)	Iron (mg/d)	Phosphorous (mg/d)	Magnesium (mg/d)	Vitamin D (µg/d)	Fluoride (mg/d)	Biotin (µg/d)
0-6	200	0.27	100	30	10	0.01	5
7-12	260	11*	275	75	10	0.5	6

Age (mo.)	Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d)	Vitamin B_6 (mg/d)	Folate (µg/d)	Vitamin K (µg/d)	Vitamin B_{12} (mcg/d)	Pantothenic Acid (mg/d)
0-6	0.2	0.3	2	0.1	65	2	0.4	1.7
7-12	0.3	0.4	4	0.3	80	2.5	0.5	1.8

Data for this table was taken from DRI reports, see www.nap.edu.[53-58] Values reflect Adequate Intakes (AIs) except when labeled with an * which indicate the value is a Recommended Dietary Allowance.

VITAMIN AND MINERAL SUPPLEMENTATION FOR INFANTS

Table 4: Vitamin and Mineral Supplement Recommendations for Healthy Full-Term Infants from Birth Through One Year of Age[1]

Nutrient	Age	Dosage	Special Instructions
Vitamin K	Birth	0.5 to 1.0 mg	Vitamin K is usually given as a single intramuscular dose after the first feeding is completed and within the first six hours of life for prophylaxis against hemorrhagic disease of the newborn.
Vitamin D	Soon after birth	400 ug per day	Breastfed infants should be supplemented with 400 ug of vitamin D every day beginning in the first few days of life. Infants consuming 1 liter (34 Oz.) per day of vitamin D-fortified commercial infant formula should not take vitamin D supplements. Vitamin D supplementation has been shown to reduce the risk of rickets, a manifestation of vitamin D deficiency. However, over supplementation can lead to toxicity.[59,60]
Iron	At four months	1 mg/kg per day	Exclusively breastfed term infants should receive iron supplementation of 1 mg/kg/per day, starting at four months of age and continued until complementary foods have been introduced.[42] First complementary foods should contain iron to prevent iron deficiency anemia.
Fluoride	+ six months	Varies	Fluoride supplementation is recommended for infants older than six months who reside in communities without adequate fluoride concentration in the water (ppm <0.3 ppm). The frequency and dose of supplementation varies by the amount of fluoride infants ingest in their diets. Information on the fluoride in your water may be found here: Fluoride Recommendations
Vitamin B_{12}	Pregnancy and lactation	Varies	The Academy of Nutrition and Dietetics recommends supplemental vitamin B12 for vegans and lacto-ovo vegetarian mothers during both pregnancy and lactation to ensure that enough vitamin B12 is transferred to the fetus and infant.[61] Consultation with a pediatrician regarding the appropriate vitamin B12 dose is recommended.

INTRODUCING COMPLEMENTARY FOODS

AAP recommends exclusive breastfeeding for about six months followed by continued breastfeeding as complementary foods are introduced.[1] At about six months of age, AAP recommends the introduction of complementary foods, especially those high in iron and zinc.[1] Infant foods high in iron and zinc include but are not limited to strained or pureed meats, poultry, eggs, fish, legumes, lentils, dried peas, tofu, dark green vegetables and iron fortified cereals.

The recommendation that complementary foods should be introduced to infants around six months is largely consistent across different health organizations.[1,9,62] Though some studies suggest that introducing complementary foods at four months may decrease an infant's risk of having allergic reactions to food,[63,64] a recent Cochrane Review reported there is insufficient evidence to recommend complementary foods before six months. [65] The Review was undertaken because many infants are not exclusively breastfeeding for six months, so it is important to consider the possible benefits or risks associated with giving breastfeeding infants complementary food or liquids other than breastmilk before six months of age. It is still recommended that healthy infants exclusively breastfeed for the first six months. It is important to note that every child is different, and infants should exhibit the developmental stage indicating that they are ready to begin consuming complementary foods before starting solid foods (See Table 5).

Feeding guidance should be family-based and adhere to the AAP infant feeding recommendations.[1] It is important to consider cultural norms, and to support the use of appropriate cultural foods using culturally affirming language. However, practitioners should be aware of possible inappropriate cultural practices such as, but not limited to, the use of sugar sweetened drinks, introducing solids early, offering honey, putting food in the bottle, and offering medicinal teas. The first year of life is the time when habits and preferences are beginning to form, so it is important to foster healthy eating habits early. Parental and caregiver feeding beliefs and practices directly affect the quality and quantity of their infant's nutrition intake.

Some effective parental and caregiver feeding practices for 6-12 month old infants include:[66]

- Having nutritious foods readily available at home and child care.
- Eating family meals, including the baby, at established and regular meal times.
- Feeding according to developmental readiness, such as adding appropriate food size and texture when ready.
- Feeding when infant displays hunger cues; ending the feeding when the infant displays age appropriate satiety cues.

- Creating a supportive and predictable atmosphere for enjoyable eating which is free from significant pressure to eat certain foods or amounts of food.

FEEDING RECOMMENDATIONS FOR HEALTHY FULL-TERM INFANTS ACCORDING TO DEVELOPMENTAL STAGE AND NUTRITION NEEDS

In the first week of life mothers are often concerned that their child is not getting enough breastmilk.[67] Introducing a bottle or pacifier in the first 30 days of life may interrupt the breastfeeding learning process.[1,68,69] Bottle use can affect the way an infant tries to draw milk from the breast, making breastfeeding more challenging. This is often referred to as nipple confusion and flow preference. The mouth, tongue and jaw muscles used to breastfeed are different compared to sucking on a bottle nipple. Babies who bottle feed, especially within the first 30 days of life, may feed inefficiently, i.e., on the mother's nipple, rather than her breast. Infants can develop a preference for the bottle, the easiest feeding method due to the bottle's easy milk flow. It is important to note that the use of a bottle instead of feeding from the breast may cause poorer self-regulation and lead to excess weight gain.[1]

The Special Supplemental Program for Women Infants and Children (WIC) provides client-focused information on how to know when a baby is getting enough milk in the first week of life.[70] Key points include:

- Tracking weight gain using WHO Growth Charts https://www.cdc.gov/nccdphp/dnpao/growthcharts/who/using/index.htm and the number of diapers used
- Understanding that the baby's stool will change in color and consistency
- Paying attention to baby hunger cues

A delay in the introduction of complementary foods or modifications in food texture and nutritional density may be needed due to medical conditions, prematurity, multiple hospitalizations, low birth weight, failure to thrive, neuromuscular delay, physical or emotional abuse, or restrictions on oral feeding for extended periods of time. In these situations, medical management and referral for medical nutrition therapy is indicated. The introduction of complementary foods and liquids other than human breastmilk or commercial infant formula should be determined by the infant's development and nutrient needs. Infants who are introduced to complementary foods too early, or before they are developmentally ready, may choke on the food, damage their intestinal track, consume inadequate amounts of human breastmilk or commercial infant formula, and possibly gain excess weight.[63,71,72]

Infants who are fed complementary foods too late or after they are developmentally ready, may not consume an adequate variety and/or amount of complementary food to meet their nutritional needs and thereby compromise growth and nutrient status,

particularly iron status.[62] Furthermore, infants may develop negative feeding behaviors, such as rejecting age appropriate foods and textures, delaying independent eating skills, and resisting a mealtime routine.

By looking for developmental cues of readiness, parents can be confident in offering food textures and consistencies that are age appropriate. At around six months, an infant will be ready to be introduced to complimentary foods when they repeatedly show the ability to:

- Sit up with little or no support
- Reach out and grab objects, bringing them to the mouth
- Chew or gnaw on objects
- Close lips around a spoon
- Transfer food from the front of the mouth to the back

Table 5 identifies appropriate feeding recommendations according to developmental stages of healthy infants. By matching an infant's development with an appropriate feeding approach, infants and caregivers experience feeding as a positive family activity and equally enjoy the feeding experience.

Table 5: Feeding Recommendations for Caregivers of Healthy Full-Term Infants According to Developmental Stage and Nutrient Needs[1,52,66,72-75]

Developmental Stage	Approximate Age	Feeding Recommendations to Meet Nutrient Needs
Rooting reflex will gradually diminish Sucks and swallows liquids May push food out with tongue	Birth to six months	**What to feed?** • Exclusive breastfeeding until six months of age. Prior to six months, infant digestive tract may not be mature. • If not breastfeeding or offering banked human milk, use iron-fortified commercial infant formula. • No complementary foods at this time. • No other fluids such as tea, juice, vitamin waters or other adult beverages. Water may be recommended by a physician in some medically necessary circumstances. **How to feed?** • Feed when the infant shows **early signs of hunger**. Signs of hunger can vary by child but often include the baby holding their hands near the mouth, sucking noises and puckering of the lips. Note that crying is a late sign of hunger. • Watch for infant's **cues of satiety**. Provide pauses during the feeding so that the baby can communicate with cues the desire to continue feeding or to

Developmental Stage	Approximate Age	Feeding Recommendations to Meet Nutrient Needs
		stop. Cues of satiety often include a slowing or stoppage of a baby's sucking, relaxation of the hands and arms, or turning or pushing away from the nipple. • Breastfeed on-demand at least 10 times or more in 24 hours. There is no maximum limit.
Sits with support Holds head steady Keeps food in mouth and swallows it	Six months	**What to feed?** • Continue to breastfeed or provide banked human milk or iron-fortified commercial infant formula on demand. Breastmilk or commercial infant formula is still the primary source of nutrients. • Introduce complementary foods. Watch for signs of allergic reactions that could include hives, rash, coughing or wheezing. • Plain iron-fortified infant cereal can be mixed with breastmilk or commercial infant formula. • Meat, chicken, eggs or cooked beans can be strained or pureed; tofu can be mashed. • Cooked vegetables and soft fruits may be offered strained or pureed. • Sugar, soy sauce or salt does not need to be added. • While fish is ok, DO NOT feed large predatory fish, such as shark and swordfish because these large fish can accumulate heavy metals in their flesh. **How to feed?** • A new complementary food can be introduced 3 days after the last new food. Start with single-ingredient foods. The order of foods is not critical, although high-iron foods are recommended first such as pureed meat and iron-fortified cereals. • Feed with a spoon. The infant should be sitting upright and supervised. • Feed 2-3 small meals per day, with snacks optional. • Start using a cup for expressed breastmilk or formula. • A strainer, blender or baby food grinder can be used to make baby food. • **DO NOT** put cereal or other foods in the bottle. • **DO NOT** force feed or extend feeding time beyond a half hour. • **DO NOT** feed too much complementary foods, for instance no more than one half cup of complementary food at a sitting.

Developmental Stage	Approximate Age	Feeding Recommendations to Meet Nutrient Needs
Grasps and holds onto things Sits with ease and without support Begins to chew Uses a cup with help May self-feed finger foods.	7 to 8 months	**What to feed?** • Continue to breastfeed or provide banked human milk or iron-fortified commercial infant formula by cup. • Offer a variety of foods pureed with lumps; gradually progress to mashed foods. • Sugar, soy sauce or salt does not need to be added. **How to feed?** • Provide 3-4 meals per day with 1-2 snacks. • Begin meals with the family. • Encourage and explore self-feeding by providing soft, easy to swallow finger foods cut in small pieces. Finger foods may include soft fruit and vegetables, soft cheese, unsalted crackers or small pieces of tortilla, tofu or toasted breads. • Self-feeding is also an important opportunity for mastery of fine motor skills. • Avoid foods in a form that may cause choking (i.e., items that have a shape and/or consistency that may cause them to become lodged in the trachea, such as whole nuts, whole grapes, and pieces of hot dog, popcorn, and raw vegetables, whole or in pieces). • **DO NOT** force feed or extend feeding time beyond a half hour. Note: **Satiety cues at this age** include changes in posture, closing mouth tightly, distractibility, playing with or throwing utensils, and more active hands. • **DO NOT** leave child alone during feeding.
Takes a bite of food Self feeds finger foods Uses a cup without help or with minimal help	8 to 10 months	**What to feed?** • Continue to breastfeed or provide banked human milk or iron-fortified commercial infant formula by cup. • Offer chopped soft cooked foods. • Continue to offer a variety of new foods and finger foods. • Sugar, soy sauce or salt does not need to be added. **How to feed?** • Provide soft, baby bite-size pieces of complementary foods for self-feeding, such as soft cheese, unsalted crackers or small pieces of tortilla, tofu or toasted breads. • Continue to be cautious of foods that may cause choking.

Developmental Stage	Approximate Age	Feeding Recommendations to Meet Nutrient Needs
Starts to use a spoon to self-feed	10 to 12 months	**What to feed?** • Continue to breastfeed or provide banked human milk or iron-fortified commercial infant formula by cup. • Provide chopped and ground meats, and small, bite-size pieces of cooked or soft foods that the family is eating. • Restrict sweets and fatty foods as infants require nutrient-dense foods to meet their nutrition needs. • Sugar, soy sauce or salt does not need to be added. **How to feed?** • Begin to structure feeding times with family members to create mealtime socialization.
Uses a spoon without help Begins to use a fork	1 year old	**What to feed?** • Continue to breastfeed. • Continue with breastmilk or provide whole milk starting no earlier than 1 year of age. If the child is at risk for overweight or has a family history of obesity, dyslipidemia, or cardiovascular disease, in which case reduced fat milk is recommended rather than whole milk. • Continue to expand complementary foods offered. • Sugar, soy sauce or salt does not need to be added. **How to feed?** • Provide 3-4 meals per day, with snacks. • If breastfeeding, offer all other liquids in a cup. • If bottle feeding, complete transition from bottle to cup. • Continue to include in family meals.

FOOD SENSITIVITY

Major types of adverse reactions to food include food hypersensitivity (allergy) and food intolerance. Hypersensitivity to a food is an immunologic reaction to an ingested food or food additive. Food intolerance is an abnormal physiologic response to an ingested food or food additive and generally is less serious.

Food hypersensitivity and food intolerance may cause similar symptoms. Food intolerance more frequently involves symptoms such as intestinal gas, abdominal pain or diarrhea. Food hypersensitivity may cause diarrhea, vomiting, coughing and wheezing, respiratory symptoms, ear infections, abdominal pain, gas, hives, skin rashes, and less commonly systemic reactions (anaphylactic shock, failure to thrive). Food

allergies are commonly associated with consumption of cow's milk, whole eggs (or egg white), wheat, tree nuts, finfish and shellfish, and legumes such as soy beans and peanuts.[73] Reactions to environmental allergens may confuse the diagnosis of food hypersensitivities or intolerances.

The American Academy of Allergy, Asthma & Immunology (AAAAI) suggests highly allergenic complementary foods may be introduced after a few non-allergenic complementary foods have been fed and tolerated.[74] The AAAAI suggests parents be advised that some allergic reactions are immediate and happen at ingestion and some are not. Consultation with an immunologist is recommended if the infant has persistent moderate-to-severe atopic dermatitis despite quality care, a sibling who has a peanut allergy or if the infant has had a previous allergic reaction.[74] Caregivers should stop feeding any food that causes an adverse reaction and should consult their health care professionals immediately.

Honey should be avoided in the first year of life due to the potential for botulism because of botulism spores that germinate in the infant bowel.[76] Anise tea should be avoided in the first year of life due to possible increased risk of seizures.[77]

POTENTIAL CONTAMINANTS TO INFANT FOOD

Bisphenol A (BPA)

In 2012, the use of BPA in baby bottles and cups was banned by the US Food & Drug Administration.[78] Although the scientific evidence varies, it is recommended to avoid using BPA containing plastic wear, or BPA containing infant feeding products when feeding infants.[79,80] This includes not heating up human breastmilk in BPA containing plastics.

Arsenic

Introducing varied iron-fortified grains including rice cereal and other iron rich foods as first foods is important for the prevention of anemia. Inorganic arsenic in infant rice cereal has been shown to be a source of arsenic exposure in infants. Inorganic arsenic may lead to neurological effects in early life, so the Food and Drug Administration (FDA) recommends limiting inorganic arsenic in infant rice cereal. FDA testing found that the majority of infant rice cereals currently on the market have acceptable levels of inorganic arsenic.[81] The American Academy of Pediatrics recommends infants consume a diet that consists of a variety of grains for a well-balanced diet, including rice cereal.[82]

OTHER FLUIDS IN INFANT FEEDING

Supplementary fluids are not needed by healthy breastfed infants before 6 months of age[1] (see Table 6). Young breastfed infants who receive supplementary fluids have a lower intake of breastmilk than if they are exclusively breastfed and are also more likely to be breastfed for shorter periods.[83,84]

Cup use, which can be started around 6 months of age, is the preferred feeding method when supplementary fluids are provided.

The consumption of sweetened beverages such as soda, energy drinks, sports drinks, juices, and flavored waters during infancy has been linked with dental caries and overweight and obesity in childhood.[85-87] These beverages should not be consumed during infancy.

Table 6: Fluids During Infant Feeding[1,88]

Fluids	Cautions During Infant Feeding
Water	• Healthy infants do not require plain water added to their diet in the first six months of life. Exclusively breastfed infants can meet their water requirements from breastmilk alone even in hot, dry or humid climates. Infants fed infant formula do not need additional water if the formula is prepared correctly.[2] • Water and electrolyte needs may be increased during some medical circumstances such as vomiting and/or diarrhea. In this case, a health care professional should medically manage the infant. Breastmilk helps prevent dehydration through periods of vomiting and diarrhea and should not be considered "milk" when an infant is to stop taking "milk products" (i.e. commercial infant formula, cow's milk, cheese, etc.) • Hyponatremia and malnutrition may occur if infants are fed excessive amounts of water or if commercial infant formula is prepared improperly by over diluting. [2]
Herbal Supplements & Teas	• Teas and herbal supplements are not recommended for infants because there is limited research on the effectiveness and safety of herbs and supplements, and in some cases they have been shown to be harmful to infants.[89] [90] • Herbal and other tea use may point to parental concerns about underlying conditions that need to be addressed by the health care practitioner. • Teas are often administered to improve colic, however teas have not been shown to help with colic.[91]
Fruit Juice	• Infants **do not** need to consume fruit juice to meet their nutritional needs. Whole fruits provide nutritional benefits that juices do not. Excessive fruit juice consumption may lead to overweight,[92] failure to thrive,[93] and early childhood caries.[94] • Use of a bottle or sippy cup with juice or sweetened beverages is not recommended by the American Dental Association or the American Academy of Pediatrics because of the risk of early childhood caries.[95]
Cow or goat milk, chocolate milk, cocoa, coffee, sugar sweetened drinks- including fruit drinks, sugar sweetened drink mixes, or soft drinks	• These are NOT appropriate beverages to offer to infants.

BARRIERS TO BREASTFEEDING

While the health and psychological benefits of breastfeeding are well accepted, California mothers and their families face many barriers that make it difficult to initiate or continue breastfeeding. The Surgeon General's Call to Action to Support Breastfeeding discusses the actions needed to overcome the main barriers to breastfeeding. Common barriers that women and families face include the following:[67-69,96-99]

Lack of Knowledge

- Although the majority of women are aware breastfeeding is a healthy source of nutrition for infants, many do not fully understand the risks of not breastfeeding.
- When breastfeeding, women may be uncertain about how to hold and position the infant, how to achieve an effective latch, and other techniques necessary for comfortable and effective breastfeeding.
- Many women are fearful they are not producing enough milk, which can lead to lowered confidence and breastfeeding cessation. Knowing how much breastmilk a baby needs in the first few days of life can ease this fear.
- Some families lack knowledge about how to address infant behavior, including but not limited to the need for frequent breastfeeding, varied sleep patterns and how to calm babies.
- Without enough information, especially in the first 30 days, woman may feel they are not producing enough breast milk or that they should introduce a pacifier. Introducing a bottle or pacifier in the first 30 days of life may interrupt the breastfeeding learning process.

Social Norms

The widespread exposure to commercial infant formula marketing and other substitutes for breastmilk have enforced a social norm that bottle feeding is the norm in the United States. Unreliable on-line resources may also lead to breastfeeding being discontinued.

Lack of or Inadequate Family and Social Support

Women who have friends and family around them who have breastfed successfully are more likely to choose to breastfeed. Supportive male partners can also make a positive difference. Not having role models or access to mother-to-mother support groups may lead to discontinuation of breastfeeding.

Embarrassment

Despite the protections provided by California law for public breastfeeding, breastfeeding in public is not fully accepted. Mothers who breastfeed in public places still face embarrassment. In California, women have the right to breastfeed anywhere in public an infant is allowed to be and mothers do not have to leave the area or stop breastfeeding even if asked.

Lactation Issues

- Breast infections, improper latch, pain and other breastfeeding problems lead women to stop breastfeeding unless they get timely professional information and assistance.
- Lactation problems are more significant barriers when a woman does not receive adequate information and support from her healthcare professional, pediatrician or community.
- Lack of timely interventions, especially early after discharge to avoid more serious complications caused by ineffective breastfeeding (nipple damage, low milk production, etc.).

Employment and Child Care Challenges

- Lack of workplace and community friendly breastfeeding environments still exist, despite California Lactation Accommodation Law (Cal. Labor Code § 1030, 1031, 1032, 1033).
- Employers provide limited paid maternity leave and may offer only inflexible work schedules.
- For many reasons, such as the ability to thoroughly monitor businesses or employer and employee awareness of laws and the grievance process, there is a lack of enforcement of laws that give mothers the right to take breaks to breastfeed or express breastmilk.
- Lack of adequate training and education for child care workers regarding how to feed breastfeeding babies and encourage and support their mothers.

Health Services Policies and Capacity

- Hospital policies may not support successful breastfeeding initiation, such as separation of mother and baby following delivery, gifts of free commercial infant formula, early discharge and inadequate follow-up in the early days of breastfeeding.
- Lack of training amongst healthcare workers is a significant barrier to breastfeeding women, as many healthcare workers lack basic knowledge and clinical skills of how to support breastfeeding women and their babies.
- There are not enough lactation experts representing the various languages, ethnicities and cultural groups in California.
- More financial support to develop a statewide coordinated, non-profit and cost-effective human milk bank program is needed. These programs are competing with formula companies that provide hospitals their product for free or at a reduced price. Mothers requesting banked human milk to supplement their limited supply are denied, as hospitals and insurance companies try to keep their costs down.

ACTIONS TO ADDRESS BREASTFEEDING BARRIERS

Breastfeeding is the normal infant feeding method. California continues to lead the way in promoting strong practices to support breastfeeding initiation and duration, but gaps remain and more can be done. Table 7 contains the Surgeon General's 20 recommended actions to promote optimum infant feeding through public health action.

Table 7: Twenty Surgeon General Actions to Improve Breastfeeding

1	Give mothers the support they need to breastfeed their babies
2	Develop programs to educate fathers and grandmothers about breastfeeding
3	Strengthen programs that provide mother-to-mother support and peer counseling
4	Use community-based organizations to promote and support breastfeeding
5	Create a national campaign to promote breastfeeding
6	Ensure that the marketing of infant formula is conducted in a way that minimizes its negative impacts on exclusive breastfeeding
7	Ensure that maternity care practices throughout the United States are fully supportive of breastfeeding
8	Develop systems to guarantee continuity of skilled support for lactation between hospitals and health care settings in the community
9	Provide education and training in breastfeeding for all health professionals who care for women and children
10	Include basic support for breastfeeding as a standard of care for midwives, obstetricians, family physicians, nurse practitioners and pediatricians
11	Ensure access to services provided by International Board Certified Lactation Consultants
12	Identify and address obstacles to greater availability of safe banked donor milk for fragile infants
13	Work toward establishing paid maternity leave for all employed mothers
14	Ensure that employers establish and maintain comprehensive, high-quality lactation support programs for their employees
15	Expand the use of programs in the workplace that allow lactating mothers to have direct access to their babies
16	Ensure that all child care providers accommodate the needs of breastfeeding mothers and infants
17	Increase funding of high-quality research on breastfeeding
18	Strengthen existing capacity and develop future capacity for conducting research on breastfeeding
19	Develop a national monitoring system to improve the tracking of breastfeeding rates as well as the policies and environmental factors that affect breastfeeding
20	Improve national leadership on the promotion and support of breastfeeding

In addition to the actions to address breastfeeding barriers recommended by the Surgeon General, there is a need to develop lactation experts from the various ethnicities and cultural groups in California to provide both breastfeeding expertise and emotional and psychological support. Also, a statewide coordinated and cost-effective banked human milk program is needed to address the increased demand for banked human milk.

Breastfeeding is the normal infant feeding method. Health care professionals and staff from medical facilities, workplaces, childcare and schools are encouraged to promote and support breastfeeding, the normal infant feeding method.

RESOURCE WEBSITES

Academy of Breastfeeding Medicine (ABM)
Academy of Breastfeeding Medicine

American Academy of Pediatrics (AAP)
American Academy of Pediatrics

California Department of Public Health
Breastfeeding and Healthy Living Webpage
C D P H Breastfeeding and Healthy Living

California Department of Public Health
Women, Infants and Children Program
C D P H Women Infants and Children Program

Centers for Disease Control and Prevention (CDC)
Center for Disease Control Breastfeeding Page

Department of Health Care Services
Systems of Care Division
California Department of Health Care Services website

Health Resources and Services Administration Information Center
Department of Health and Human Services
Maternal and Child Health Bureau
Health Resources and Services Administration Information Center

Human Milk Banking Association of North America, Inc.
Human Milk Banking Association of North America

International Lactation Consultant Association
International Lactation Consultant Association

La Leche League USA
La Leche League

Office of the Surgeon General
Office of the Surgeon General

Office on Women's Health
Office on Womens Health

United States Breastfeeding Committee (USBC)
United States Breastfeeding Committee

United States Department of Agriculture
Women, Infants and Children
U S D A Women Infant and Childrens Program

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