

Chapter 2

Tides in Breastfeeding Practice

Mary Margaret Coates

THE NEWS IS ENCOURAGING: Throughout the world today, an infant is apt to receive more breastmilk than during the nadir of breastfeeding in the 1960s and early 1970s. Until the 1940s, the prevalence of breastfeeding was high in nearly all societies. Although the feeding of manufactured milk products (for general use or specifically for infants) had begun before the turn of the century in parts of Europe and North America, the practice spread slowly during the next several decades. It was still generally limited to segments of population elites, and it involved only a small percentage of the world's people. During the post-World War II era, however, the way in which most mothers in industrialized regions fed their infants began to change, and the export of these new practices to developing regions gained speed (for one of many examples, see Schaefer, 1956).

Evidence About Breastfeeding Practices

How do we know what we “know” about the prevalence of breastfeeding? (The word *prevalence* is used here to mean the combined effect of breastfeeding initiation rates and breastfeeding continuance rates.) Before attempting to trace long-term trends in

infant feeding practices, let us consider the nature of the evidence available to us in 2007.

Large-Scale Surveys

National surveys that produce the kind of representative data that allow statistical evaluation have become available only recently anywhere in the world; in the United States, they have been available only since 1955. These surveys consist primarily of national fertility or natality surveys and of marketing surveys conducted by manufacturers of artificial baby milk. Some surveys are now (2007) asking not only about any breastfeeding but also about the age of the infant when foods other than breastmilk were introduced and the nature of those foods. A brief description of national surveys conducted in the United States follows (<http://www.cdc.gov/nchs/nhis.htm>).

During the latter part of the 1900s and earliest years of this century, reliable information about breastfeeding rates in the United States and elsewhere was difficult to obtain. It is a marker of the late interest of public health officials and the medical profession in general in promoting breastfeeding that the earliest and longest continued survey of breastfeeding initiation rates in the United States

began in 1956 to provide marketing information for the maker of manufactured substitutes for human milk. Health surveys in the United States or other nations or those sponsored by international organizations only recently began incorporating questions about breastfeeding.

This situation has finally begun to change (Box 2–1). In the United States, various arms of the Centers for Disease Control and Prevention sponsor national surveys that now collect information about breastfeeding: the National Health Interview Survey, National Health and Nutrition Survey, National

Immunization Survey, and National Survey of Family Growth, Pediatric Nutrition Surveillance System. With the notable exception of questions in the National Health and Nutrition Examination Survey and the National Immunization Survey, questions in most surveys pertain to “any breastfeeding” and do not distinguish degrees of mixed feeding from exclusive breastfeeding or the age of the infant when other liquids or foods were first regularly added to the infant’s diet. Thus, the ability to calculate continuance rates lags well behind our ability to calculate initiation rates.

BOX 2–1

Large Surveys of Breastfeeding Prevalence and Practices in the United States and Around the World and Selected Reports Using Survey Information

United States

The federal government sponsors several health surveys that include questions about infant feeding.

Surveys Sponsored by the Centers for Disease Control and Prevention (CDC)

This Web address contains links to all CDC surveys listed below:

www.cdc.gov/breastfeeding/data/index.htm:

- Infant Feeding Practices Survey II: Two Infant Feeding Practices Surveys have been undertaken, the first in 1993–1994 (*Infant Feeding Practices Survey I*) and the second in 2005–2007. Both were longitudinal studies that followed women for about 15 months—from the third trimester of pregnancy through their infant’s first year. In the second study, about 4000 women began and about 2200 women were expected to finish the study, which required com-

pleting 1 telephone interview and 11 extensive written questionnaires. The survey’s goal is to elicit information about what mothers feed their infants and the influences on those feeding choices.

- www.cdc.gov/breastfeeding/data/infant_feeding.htm
- Preliminary results were presented in November 2007 at an American Public Health Association conference (apha.confex.com/apha/135am/techprogram/session_22066.htm)
- Maternity Care Practices Survey: The CDC is surveying breastfeeding-related care in labor and delivery units throughout the United States; the first survey occurred 2007 and subsequent surveys are proposed at 2-year intervals.
- www.cdc.gov/breastfeeding/data/maternity_care.htm
- National Health and Nutrition Examination Survey: The National Health

(Continues)

BOX 2-1 (Continued)

and Nutrition Examination Survey (NHANES) has as one purpose the gathering of information that will allow researchers to study the relationship between diet, nutrition, and health. It was conducted periodically seven times since its inception in 1959, but beginning in 1999 it was converted to a continuous field survey. About 5000 people drawn from throughout the United States are interviewed in any given 12-month period. The 2005–2006 questionnaire asked seven questions about infant feeding and introduction of non-breastmilk foods.

- Visit www.cdc.gov/nchs/nhanes.htm; then search on NHANES 2005–2006 and then on Survey questionnaires)
- Gibson et al. Prevalence of breastfeeding and acculturation in Hispanics: results from NHANES 1999–2000 study. *Birth*. 2005;32(2):93–98.
- National Immunization Survey: The National Immunization Survey, first used in 1994, completes approximately 36,000 telephone interviews with people in all 50 states and the District of Columbia. All households contacted (by random-digit dialing) contain children aged 19–35 months. Since January 2003, questions about breastfeeding have been asked of all survey respondents. Results of the survey not only provide overall population estimates for the initiation, duration, and exclusivity of breastfeeding, but also provide breastfeeding rates for certain metropolitan areas. As of 2006, data obtained from National Immunization Survey are used to track progress towards the breastfeeding goals outlined in the Surgeon General's report *Healthy People 2010*.
 - www.cdc.gov/breastfeeding/data/NIS_data/data_2005.htm
 - Li et al. Breastfeeding rates in the United States by characteristics of the child, mother, or family: the 2002 National Immunization Survey. *Pediatrics*. 2005;115(1):e31–e37.
 - Ryan. More about the Ross Mothers Survey [letter to the editor]. *Pediatrics*. 2005;115(5):1450.
- National Survey of Family Growth: Face-to-face interviews are conducted at irregular intervals. The 2002 women's questionnaire (a part of cycle 6 of the survey), which obtained information from about 7500 interviewees, contained five questions pertaining to breastfeeding and the introduction of nonbreastmilk foods (www.cdc.gov/nchs/data/nsfg). Cycle 7 of the survey, which is now a continuous survey, began in mid-2006. The first public release of information is projected for late 2009; it will be based on about 11,000 interviews made during 2006–2008.
 - A description of the National Survey of Family Growth can be found at www.cdc.gov/nchs/nsfg.htm.
 - Taylor et al. Duration of breastfeeding among first-time mothers in the United States: results of a national survey. *Acta Paediatr*. 2006;95:980–984.
- National Birth Certificate Data: In 2007, the US Standard Certificate of Live Birth is undergoing revision. For the first time in its history, the proposed birth certificate will include a question on whether the newborn is being breastfed. Two forms will be completed: one reported by the mother, another reported by the birthing health facility.

(Continues)

BOX 2-1 (Continued)**Surveys Sponsored by Supplemental Nutrition for Women, Infants, and Children (WIC)**

- Pediatric Nutrition Surveillance System (PedNSS): Information about breastfeeding incidence and duration in low-income populations are collected in public health clinics and WIC programs and reported annually. National, state, county, and clinic data are analyzed.
 - www.cdc.gov/pednss/htm
 - The report for 2004, released in 2006, is available at www.cdc.gov/nccdphp/dnpa/pednss.htm.
- Pregnancy Risk Assessment and Monitoring System:
 - www.cdc.gov/prams
 - Ahluwalia et al. Why do women stop breastfeeding? Findings from the Pregnancy Risk Assessment and Monitoring System. *Pediatrics*. 2005;116(6):1408–1412.
- WIC Participant and Program Characteristics: Data on breastfeeding are collected each even-numbered year by the Department of Agriculture about participants in the WIC program. In 2004, approximately 8,500,000 women and children were enrolled in WIC; about a quarter each were mothers and infants under 1 year of age, and about a half were children aged 1 through 4 years. For infants 7–11 months old, data is collected by state about any breastfeeding.
 - www.fns.usda.gov/oane/MENU/Published/WIC/FILES/PC2004ExeSum.pdf

Surveys Sponsored Privately

- Ross Mothers Survey: For marketing purposes, the maker of a manufactured infant milk mails questionnaires to a probability sample of mothers whose names are obtained from a large national database of pregnant or newly delivered women. The survey generates some controversy (Li et al., 2003) in part because the response rate has been as low as 28% (Ryan et al., 2002). Data about the type of milk or milk product fed, but not about exclusive breastfeeding, are collected monthly for up to 12 months for a given cohort and are published on an ad hoc basis. Until 2006, the survey was the source of data used to monitor breastfeeding goals in the U.S. Surgeon General's *Healthy People* programs, the current version of which is *Healthy People 2010*.
 - www.childtrends.databank.org/indicators/90Breastfeeding.cfm
 - www.ross.com/images/library/BF_Trends_2003.pdf
- Ryan et al. Regional and sociodemographic variation of breastfeeding in the United States, 2002. *Clin Pediatr*. 2004;43:815–824.
- Ryan et al. Breastfeeding continues to increase into the new millennium. *Pediatrics*. 2002;110:1103–1109.
- Ryan AS. More about the Ross Mothers Survey [letter to the editor]. *Pediatrics*. 2005;115(5):1450.
- Ryan AS, Zhou W. Lower breastfeeding rates persist among the Special Supplemental Nutrition for Women, Infants, and Children participants, 1978–2003. *Pediatrics*. 2006;117(4):1136–1146.

(Continues)

BOX 2-1 (Continued)

- **HealthStyles Survey:** The HealthStyles Survey is a proprietary (Porter Novelli Consumer Styles) national marketing survey in the United States that asks about health behavior; the survey was first distributed in 1995. It may be the only nationwide survey in the United States that gathers opinion about breastfeeding. The CDC licenses survey results for use in health promotion; it has contributed questions on breastfeeding since 1999. The CDC Web site contains links to those questions and survey results for each year beginning in 1999. This survey is mailed annually to about 5000 persons; the sample is structured so that respondents mirror demographic categories and proportions of United States census data.
 - www.cdc.gov/print; then search on HealthStyles Survey
 - Hannan A, Li R, Benton-Davis S, Grummer-Strawn L. Regional variation in public opinion about breastfeeding in the United States. *J Hum Lact.* 2005;21(3):284–288.
- **Baby-Friendly Hospital Initiative:** Breastfeeding initiation rates in 2001 in United States' hospitals certified as baby-friendly by the Baby-Friendly Hospital Initiative, an international effort sponsored by the World Health Organization and the United Nations Children's Fund.
 - www.unicef.org/programme/breastfeeding/baby.htm
 - Merewood et al. Breastfeeding rates in US Baby-Friendly hospitals: results of a national survey. *Pediatrics.* 2005;116(3):628–634.
- **World Health Organization (WHO) Global Databank on Breastfeeding and Complementary Feeding:** The World Health Organization places information about breastfeeding and weaning practices obtained from methodologically rigorous local studies into a database that can be searched by country, year, and any of about 30 specific types of information—such as “ever breastfed” or “exclusively breastfed at 3 months.” The data bank pools information mainly from national and regional surveys and from studies dealing specifically with the prevalence and duration of breastfeeding and complementary feeding. Data for inclusion are based on two types of indicators: those derived from households and those used to assess health facility practices, which are also part of the Baby-Friendly Hospital Initiative. It is continually updated as new studies and surveys become available.
 - www.who.int/research/iyfc/bfcb/bfcb.asp (Links to WHO Global Data Bank on Breastfeeding and Complementary Feeding)

Around the World

Outside the United States, representative data for countries in North America, Latin America, Asia, Africa, and the Middle East can be obtained from the following surveys:

- United Nations International Children's Fund (UNICEF)
 - www.childinfo.org (Worldwide statistics on rate of exclusive breastfeeding, introduction of complementary foods, and continued breastfeeding; data derived from a variety of studies and presented graphically)

(Continues)

BOX 2-1 (Continued)

- www.who.int/nutrition/databases/infantfeeding/en/index.html (General information page; links to searchable database on rates of breastfeeding)
- www.who.int/topics/breastfeeding/en/ (Links to WHO publications on breastfeeding)
- **Demographic and Health Surveys:** The Demographic and Health Surveys are nationally representative household surveys with large sample sizes (usually between 5000 and 30,000 households); they typically are conducted every 5 years. They continue the work of earlier World Fertility Surveys. Now called “Measure DHS,” the surveys are part of a US Agency for International Development’s program that collects and analyzes information on infant and young child nutrition in some 40 countries. Breastfeeding practices in the newborn period and later and the addition of complementary foods to the diets of breastfed and non-breastfed infants are reported in each country’s final report. The most recent update, which was published in 2006, analyzes data collected between 1998 and 2004.
 - www.measuredhs.com
 - Mukuria et al. Infant and young child feeding update (USAID). Calverton, MD: ORC Macro; 2006. Available at: <http://www.measuredhs.com/pubs/pdf/NUT1/NUT1%2Epdf>.
 - Marriott et al. Preliminary data from Demographic and Health Surveys on infant feeding in 20 developing countries. *J Nutr.* 2007;137:518S–523S.
 - Ruel, Menon. Child feeding practices are associated with child nutritional status in Latin America: innovative uses of the Demographic and Health Surveys. *J Nutr.* 2002;132:1180–1187.

Other Evidence

Until the last several decades, breastfeeding was the unremarkable norm. Thus what we “know” about breastfeeding from much earlier times often must be inferred from evidence of other methods of feeding infants. Most historical material available in English-language literature derives from a limited geographic area: Western Europe, Asia Minor, the Middle East, and North Africa. More recently, English-language reviews of ancient breastfeeding practices in other regions and varied religious traditions are beginning to fill this gap (Gartner & Stone, 1994; Laroia & Sharma, 2006; Shaikh & Ahmed, 2006). Written materials, although sparse, extend back to before 2000 BC and include verses, legal statutes, religious tracts, personal correspondence, inscriptions, and medical literature.

Some of the earliest existing medical literature deals at least in passing with infant feeding. An

Egyptian medical encyclopedia, the *Papyrus Ebers* (c. 1500 BC), contains recommendations for increasing a mother’s milk supply (Fildes, 1986). The first writings to discuss infant feeding in detail are those of the physician Soranus, who practiced in Rome around AD 100; his views were widely repeated by other writers until the mid-1700s. It is not immediately apparent to what degree these early exhortations either reflected or influenced actual practices. Many writings before AD 1800 deal primarily with wet nurses or how to hand-feed infants.

Archeological evidence provides some information about infant feeding prior to 2000 BC. Some of the earliest artifacts are Middle Eastern pottery figurines that depict lactating goddesses, such as Ishtar of Babylon and Isis of Egypt. The abundance of this evidence suggests that lactation was held in high regard (Fildes, 1986). Such artifacts first appear in sites about 3000 BC, when pottery making first

became widespread in that region. Information about infant feeding may also be derived from paintings, inscriptions, and infant feeding implements.

Modern ethnography has a place of special importance. By documenting the infant feeding practices of present-day nontechnological hunter-gatherer, herding, and farming societies, ethnographers expand our knowledge of the range of normal breastfeeding practices. At the same time, they provide a richer appreciation of cultural practices that enhance the prevalence of breastfeeding. Such studies are also our best window into breastfeeding practices that may be the biological norm for *Homo sapiens sapiens*.

In summary, the historical aspect of this chapter deals with limited data from a limited social stratum in a limited geographic region. However, the common threads of these data provide a useful context within which we may better understand modern breastfeeding practices, especially in Western cultures.

The Biological Norm in Infant Feeding

Early Human Evolution

The class Mammalia is characterized principally by the presence of breasts (mammary), which secrete and release a fluid that for a time is the sole nourishment of the young. This manner of sustaining newborns is extremely ancient; it dates back to the late Mesozoic era, some 100 million years ago, when the first mammals appeared (see Figure 2-1). Hominid precursors first appeared about 4 million years ago; the genus *Homo* has existed for about 2 million years. Fossil evidence shows that our species, *Homo sapiens*, has existed for approximately 200,000 years and that our species of anatomically modern humans, *Homo sapiens sapiens*, first differentiated about 130,000 years ago in Africa, were in the Near East by 90,000 years ago, and first appeared in what is now southern Europe about 40,000 years ago. Direct information about breastfeeding practices among our earliest ancestors is lacking, although other information about Paleolithic societies that existed 10,000 or more years ago sheds some light on this subject.

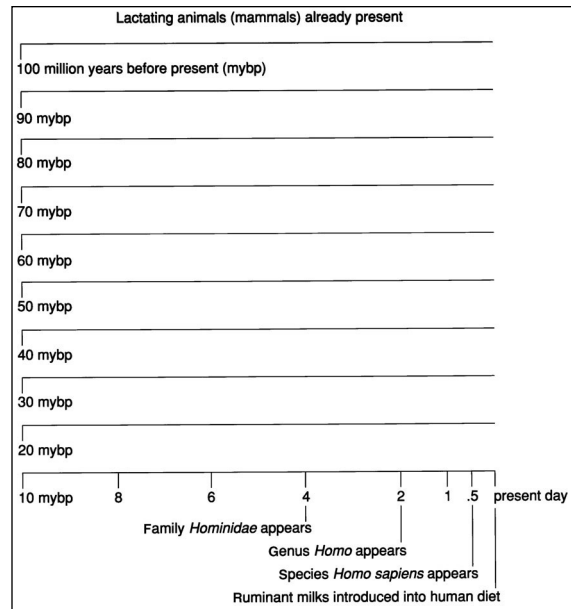


FIGURE 2-1 The antiquity of lactation. The bottom line shows the approximate times of first appearance of lactating precursors of modern humans and of regular use of nonhuman animal milk by humans.

Early Breastfeeding Practices

Diets reconstructed by archeological methods reveal that the Late Paleolithic era, roughly 40,000 to 10,000 years ago, was populated by hunter-gatherer peoples who ate a wide variety of fruits, nuts, vegetables, meat (both large and small game depending on its availability), and in geographically favorable regions, fish and shellfish (Eaton, 1992). This diet closely resembles that of 20th-century hunter-gatherer societies. Therefore, the infant-feeding practices of such societies today may reflect breastfeeding practices of much earlier (prehistoric) times. Consider the breastfeeding practices of the !Kung of the Kalahari Desert in southern Africa (Konner & Worthman, 1980) as well as hunter-gatherer societies of Papua New Guinea and elsewhere. Among these people, breastfeeding of young infants is frequent (averaging four feeds per hour) and short (about 2 minutes per feed). It is equally distributed over a 24-hour period and continues, tapering off gradually, for 2 to 6 years (Short, 1984).

Age of weaning (complete cessation of breastfeeding) in this ancient era is more difficult to pin

down, but at least two lines of evidence suggest that 2 to 4 years was common in many cultures. First, weaning would be difficult before eruption of a full set of deciduous teeth, about 24 months, that allowed an infant to consume the family diet (Dettwyler, 1995). Second, as is true of other mammals, a human infant must produce lactase, the enzyme that cuts lactose (an otherwise indigestible disaccharide that is the principal sugar in milk) into an easily digestible monosaccharide. In other mammals, the ability to produce lactase attenuates during the nursing interval and is lost after weaning. In most modern human infants, this ability declines steadily after age two years and is rare by age four years (Dettwyler, 1995), suggesting that infants generally were weaned—or consuming only small amounts of breastmilk—by that time. (In those cultures where animal milk is fed throughout childhood and beyond, lactase production may continue longer.) These breastfeeding patterns are considered a direct inheritance of practices that prevailed at the end of a long, and dietetically stable, evolutionary period that began to end about 15,000 BC. This assumption is supported by observations of the human's closest primate relative, the chimpanzee, which secretes a milk quite similar to that of humans, suckles several times per hour, and sleeps with and nurses its young at night (Short, 1984).

Infant Feeding: Alternatives to Maternal Breastfeeding

Infant-feeding practices in most societies commonly have mixed breastfeeding, wet-nursing, and hand-feeding (also called dry-nursing) to one degree or another and at one time or another in the infant's life.

Wet-Nursing

Wet-nursing may not have been the only alternative to maternal breastfeeding, but it was the only one likely to enable the infant to survive. Wet-nursing is common, although not universal, in traditional societies of today and (by inference) among ancient human societies. An already-lactating woman may have been the most obvious choice for a wet nurse, but women who stimulate lactation

without a recent pregnancy have been described in many traditional societies (Wieschhoff, 1940; Slome, 1976).

Wet-nursing for hire is mentioned in some of the oldest surviving texts, which implies that the practice was well established even in ancient times. The Babylonian Code of Hammurabi (c. 1700 BC) forbade a wet nurse to substitute a new infant for one who had died. The Old Testament Book of Exodus (Exodus 2:7–9; c. 1250 BC) records the hiring of a wet nurse for the foundling Moses; the fact that the wet nurse was Moses's own mother is incidental. The epic poems of Homer, written down around 900 BC, contain references to wet nurses. A treatise on pediatric care in India, written during the second century AD, contains instructions on how to qualify a wet nurse when the mother could not provide milk. The Koran, set in written form about AD 500, also permits parents to “give your children out to nurse.”

Although the history of wet-nursing has continued virtually unbroken from the earliest times to the present, the popularity of the practice among the elite classes who used it most has waxed and waned. In England during the 1600s and 1700s and elsewhere in Europe, the middle classes began to employ wet nurses. The use of less attentive nurses and the sending of infants greater distances from home diminished maternal supervision of either nurse or infant. Often infants were not seen by their parents from the time they were given to the nurse until they were returned home after weaning (providing they lived). However, by the latter part of the 1700s wet-nursing was on the decline in North America and England, except in foundling hospitals, owing to increased public concern regarding the moral character of wet nurses (and in the belief that character was transmitted through the milk) and the quality of the care they provided. In France, government officials and physicians led a campaign against wet-nursing. Throughout this long period, wet nurses were used sometimes because of maternal debility but more often because of the social expectations of the class of women who could afford to hire a wet nurse. Thus the use of wet nurses by social elites foreshadows the demographic pattern later seen in the use of manufactured human-milk substitutes.

Hand-Fed Foods

The Agricultural Revolution

The idea that animal milks are suitable foods for human infants is reflected in such myths as that of Romulus and Remus, the mythical founders of Rome, who are usually depicted as being suckled by a wolf. Surprisingly, the currently most popular hand-fed infant foods—animal milks and cereals—did not become part of the human diet until well along in human history. Cereal grains first appeared in the human diet, in the Near East, only about 15,000 years ago (Eaton, 1992), and animal milks considerably later, perhaps 7000–5000 years ago (McCracken, 1971). The development of agriculture and (later) animal husbandry permitted the widespread adoption of these foods.

Gruels

In much of the world, the soft foods added most commonly to the infant diet have been paps or gruels containing a liquid, a cereal or another starchy food, and other substances common in the family diet that added variety or nutritional value. The liquid might be water, animal milk, or meat broth. The starch might be rice, wheat, or corn; or taro, cassava, or plantain. It might be boiled and mashed, ground and boiled, or—as in the case of bread crumbs—ground, baked, crushed, moistened, and reheated. In some cultures, eggs or butter might also be added.

Animal Milks

Despite the widespread use of animal milks (directly or in manufactured milk products) as a food for infants, animal milks are a relatively recent addition to the human diet. This “new-comer” status is implied genetically, because children beyond weaning age commonly do not produce lactase, an enzyme needed to digest the milk sugar lactose. In cultures that traditionally do not use animal milks, such as those in Mexico or Bangladesh or Thailand, some children may be lactose intolerant before one year of age; in those cultures that use animal milks abundantly, the onset of lactose intolerance occurs considerably later—after age 10, for instance, in Finland (Simoons, 1980). Animal milk thus is a food unknown in the human diet for most of its history

and to which our physiology is incompletely adapted. Such a food should be offered to a young infant as its sole nutriment for several months only with greatest caution.

Feeding Vessels

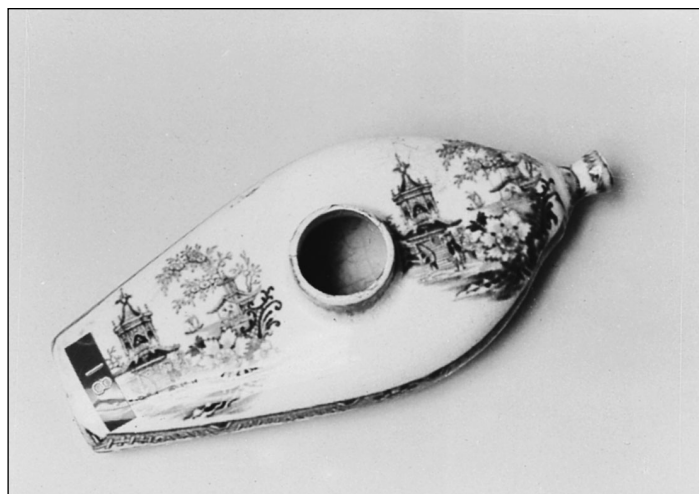
The earliest “vessel” used to hand-feed an infant was undoubtedly the human hand, and the foods so fed were probably soft or mashed, rather than liquid. The earliest crafted vessels for feeding liquids were probably animal horns pierced by holes in the tips; such horns continued to be used into the 1900s in parts of Europe. The oldest pottery vessel thought to have been used for infant feeding, a small spouted bowl found in an infant’s grave in France, is dated c. 2000–1500 BC (Lacaille, 1950). Small spouted or football-shaped bowls have been found in infant burial sites in Germany (c. 900 BC) and in the Sudan in North Africa (c. 400 BC) (Lacaille, 1950). These utensils suggest that hand-feeding of infants has been attempted for more than three millennia (see Figure 2–2).

Age of Infant at Introduction of Hand-Feeding

What archeological evidence cannot tell us is why or how much these infants were hand-fed. Neonates may temporarily be offered certain foods as pre-lacteal feeds; young infants may be offered occasional tastes of other foods, and they will be offered increasing amounts of soft foods as they make the transition to the adult diet (mixed feeds). Finally, infants may be reared from birth on other foods (artificial feeding).

Prelacteal Feeds

Many of the world’s infants, even those who later will be fully breastfed, receive other foods as newborns. Of 120 traditional societies (and, by inference, in many ancient preliterate societies) whose neonatal feeding practices have been described, 50 delay the initial breastfeeding more than 2 days, and some 50 more delay it 1 to 2 days. The stated reason is to avoid the feeding of colostrum, which is described as being dirty, contaminated, bad, bitter, constipating, insufficient, or stale (Morse, Jehle, & Gamble, 1990). For instance, it is reported that up to three quarters of women in

**FIGURE 2–2**

An English Staffordshire Spode nursing bottle, c. 1825.

Source: Courtesy V. H. Brackett.

India discard colostrum for similar reasons (Jethi & Shriwastava, 1987; Saha, 1991). However, the amount of milk discarded may range from none at all—rather, breastfeeding is delayed a day or two—to small—only a few drops before the baby is put to breast—to expression of larger quantities (Bhale & Jain, 1999).

Early medical writers in the eastern Mediterranean region (Greece, Rome, Asia Minor, and Arabia) and later in Europe—from Soranus through those of the 1600s—also discouraged the use of colostrum for feeding. These writers recommended avoiding breastfeeding for periods as short as 1 day (Avicenna, c. AD 1000) to as long as 3 weeks (Soranus, c. AD 100). Commonly, to promote the passage of meconium, the newborn was first given a “cleansing” food such as honey, sweet oils (such as almond), or sweetened water or wine.

In Europe, the fear of feeding an infant colostrum may have contributed to the undermining of maternal breastfeeding, at least among the upper classes, and helped spread wet-nursing (Deruisseau, 1940). A similar charge has been leveled at the prelacteal bottle feeds commonly given in Western (or Western-style) hospital nurseries; many studies show that early bottle-feeds undermine breastfeeding and increase the mother's use of manufactured human-milk substitutes. One

can only wonder if customary Western hospital practices, which have included delayed first breastfeeding and substituted prelacteal feeds of water or artificial baby milk, are technological vestiges of this widespread traditional taboo.

Not all published work supports the idea that prelacteal feeds and a delay in initiating breastfeeding reduce the likelihood of continued lactation (see Chapter 3). Some authors propose that ensuing breastfeeding is associated with the maternal belief that prelacteal feeds are appropriate and, once breastfeeding is begun, that certain culturally approved maternal behaviors will result in an uneventful breastfeeding course: nearly constant contact with or proximity to the infant, breastfeeding *ad lib* day and night, and no further use of feeding bottles (Woolridge, Greasley, & Silpisornkosol, 1985; Nga & Weissner, 1986).

Mixed Feeds

On the basis of current practices of many traditional societies, early mixed feedings may be the most common infant-feeding regimen (Kusin, Kardjati, & van Steenberg, 1985; Latham et al., 1986; Dimond & Ashworth, 1987).

Mixed feeding is widely practiced, even during the time when breastmilk forms the foundation of the infant diet. In regions such as Africa and Latin

America breastfeeding continues into the second or third year of life. In non-Western cultures, hand-fed foods include tea infusions, mashed fruits, and a variety of starchy gruels or pastes. Where the use of a particular food dominates a culture (such as rice in many parts of Asia), that food is usually the principal family food fed to an infant (Jelliffe, 1962). In some (mostly non-Western) cultures, such foods are offered to weaning infants in such a way that they supplement, rather than replace, breastmilk (Whitehead, 1985; Greiner, 1996) and, thus, do not appreciably hasten complete cessation of breastfeeding. The use of feeding bottles, however, can shorten the weaning interval, the period between full sustenance by breastmilk and full sustenance by family foods (Winikoff & Laukaran, 1989). In the United States, even as the prevalence of *any* breastfeeding increased during the years 2000–2004, the prevalence of *exclusive* breastfeeding lagged. Less than 24% of breastfed infants were exclusively breastfed for 3 months by mothers who were still teenagers, who completed formal education at or before grade 12, who were unmarried, who lived in rural areas, or who were black (CDC, 2007a).

Hand-Feeding from Birth

In a few regions of northern Europe a tradition of dairy farming in a cool, dry climate allowed (long before the introduction of refrigeration) dairy milk to remain unspoiled for some useful interval. This tradition permitted the survival of at least some infants who were fed cow milk nearly from birth. However, even in climatically optimal areas, hand-feeding was hazardous. In Iceland infants were hand-fed during the 1600s and 1700s despite disastrous results; married women bore as many as 30 infants because so few survived (Hastrup, 1992). In France, some foundlings and infants with syphilis were fed directly from goats; this practice was first described in writings in the 1500s, and it persisted until the early 1800s (Wickes, 1953a). Of necessity, foundling hospitals of the 1700s and 1800s in Europe and the United States hand-fed infants but with appalling mortality rates: up to 100 percent died. However, by the mid-1900s in industrialized countries, hand-feeding from birth had become the norm and hand-fed infants survived and grew. Why did that happen?

Technological Innovations in Infant Feeding

The Social Context

During the late 1800s and the early 1900s, high infant mortality, even among infants cared for at home, was a major public concern. Physicians and parents recognized that poorly nourished children were more susceptible to illness. Between 1910 and 1915 the newly created United States Children's Bureau sponsored several studies of infant mortality in major cities. Each study showed that babies fed any fluid other than mother's milk were three to five times as likely to die as those who were breastfed. The studies also documented that both the rate of breastfeeding and the rate of infant mortality were linked: each increased steadily as family income decreased. In summarizing these results Williamson (1915) commented, "The disadvantages of a low income were sufficient to offset the greater prevalence of breastfeeding among the babies of the poorer families." During this same period, a similar observation was made in England, where high infant mortality prevailed among poor, working-class mothers, 80% of whom breastfed their infants (Levenstein, 1983).

As women's aspirations for community service and commercial employment were rising, the logistics of integrating breastfeeding with regular absence from home increased the difficulty of long-term breastfeeding. Advertising that promoted bodily cleanliness may have led to associating breastmilk with body fluids that were unclean or noxious, a notion that persists to this day, at least in North America (Morse, 1989). Advances in the prevention of disease, largely through public health measures related to sanitation, extended an expanding faith in "modern science" in general to "modern medicine" in particular. Women's magazines developed a wide audience of readers interested in women's accomplishments outside the home, in modern attitudes, and in technological innovations. At the same time, these same magazines reinforced concerns about infant health and maternal adequacy. An 1880 issue of the *Ladies' Home Journal* contained this statement (Apple, 1986):

If fed from your breast, be sure that the quantity and quality supply his demands. If you are weak or worn out, your milk cannot contain the nourishment a babe needs.

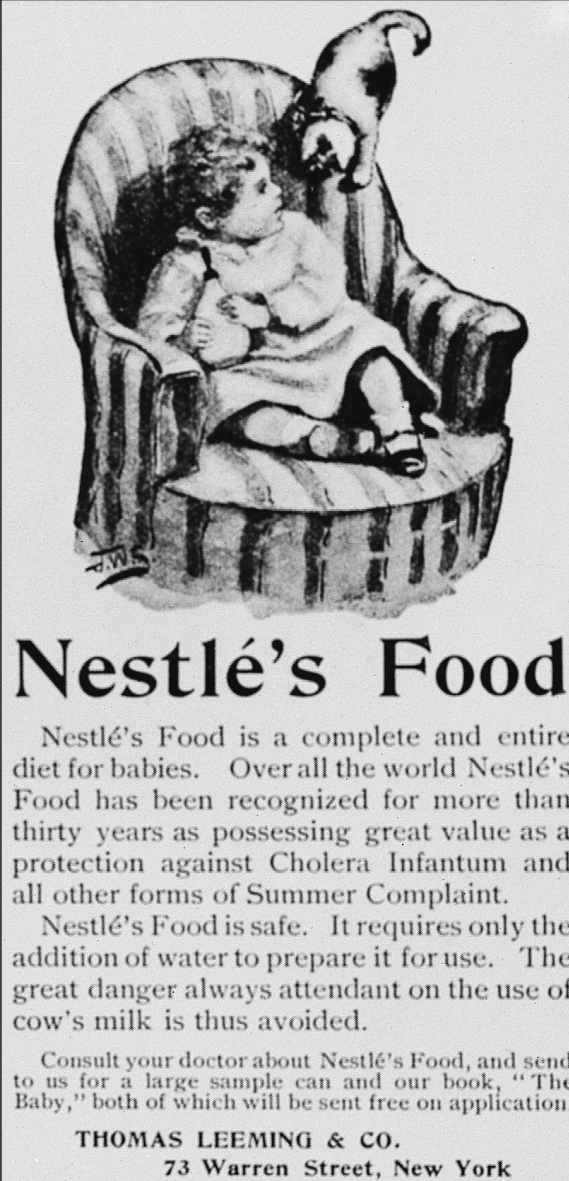
The Technological Context

Between about 1860 and 1910, scientific advances and technological innovations created many new options in infant feeding that appeared to increase infant survival. The upright feeding bottle and rubber nipple, each of which could be cleaned thoroughly, made artificial feeding easier and safer. New foods to be used with this equipment appeared. Large-scale dairy farming produced abundant supplies of cow milk, which was marketed first as canned evaporated milk and later in condensed (highly sweetened to retard spoilage) or dried forms.

This technological ferment, fueled both by the need for improved infant health care and by a popular belief in the ability of science and technology to provide answers, attracted analytical chemists. Around 1850 chemists had begun to turn their attention to food products. Early investigations (now viewed as rudimentary) into the composition of human and cow milk convinced them that “the combined efforts of the cow and the ingenuity of man” could construct a food the equal of human milk (Gerrard, 1974). Patented foods, such as Liebig’s Food and Nestle’s Milk Food, were first marketed in Europe and the United States in the 1860s. The Nestle’s product was a mixture of flour, cow milk, and sugar that was to be dissolved in milk or water before feeding. Milk modifiers, such as Mellin’s Food, and milk foods, such as Horlick’s Malted Milk, were popular in the United States by the 1880s.

Extravagant claims for these foods (Liebig’s Food was called “the most perfect substitute for mother’s milk”) were combined with artful advertising that played on fears for the health of the infant and faith in modern science (Apple, 1986) (Figure 2–3). A hundred years later we see these advertising themes played again and again.

In the 1890s, physician Thomas Rotch developed a complex system of modifying cow milk so that it more closely resembled human milk. Rotch



Nestlé's Food

Nestlé's Food is a complete and entire diet for babies. Over all the world Nestlé's Food has been recognized for more than thirty years as possessing great value as a protection against Cholera Infantum and all other forms of Summer Complaint.

Nestlé's Food is safe. It requires only the addition of water to prepare it for use. The great danger always attendant on the use of cow's milk is thus avoided.

Consult your doctor about Nestlé's Food, and send to us for a large sample can and our book, "The Baby," both of which will be sent free on application.

THOMAS LEEMING & CO.
73 Warren Street, New York

FIGURE 2–3

An advertisement for artificial infant milk that appeared in the *Ladies' Home Journal* in 1895.

observed that the composition of human milk varies, as do digestive capacities in infants. He devised mathematical formulas to denote the proportions of fat, sugar, and protein in cow milk that some infants required at a particular age (Rotch, 1907). The result was an exceedingly complex system of feeding that required constant intervention by the physician, who often changed

the “formula” weekly. Supervising infant feeding then became a principal focus of the newly emerging specialty of pediatrics.

Commercial advertising promoted the use of manufactured infant milks to both mothers and physicians. Again, the basic themes—a mother’s concern for her infant’s health and the supposed perfection of the manufactured product and difficulty of breastfeeding—have persisted over the years (Apple, 1986).

The Role of the Medical Community

Breastfeeding may have in fact become more onerous during this interval, as women were impelled to give birth and breastfeed according to externally generated ideas about how those activities should be accomplished.

Regulation of Childbirth

During the early part of the 1900s, childbirth moved largely from home or midwife-attended births to hospitals, where a birthing woman was separated from her family and attended by hospital staff. During the middle part of this century, hospital routines and the widespread use of general anesthesia during labor and delivery separated mother and infant much of the time in the early postpartum period. Bottle-feeding of manufactured human-milk substitutes by nursery staff became increasingly common. Normal postpartum hospital stays in the United States lengthened; during the 1930s and 1940s, they were sometimes as long as 2 weeks. This period, intended to permit the mother to recuperate from a commonly highly medicated childbirth, resulted as well in a return home with an impaired breastmilk supply and a baby who was accustomed to feeding from bottle nipples. Bain (1948) notes that babies who were older than 8 days at discharge were less apt to be breastfed than were younger ones.

Regulation of Breastfeeding

Underlying many changes in the feeding of infants was a “regulatory” frame of mind, the seeds of which had been sown in Europe as early as the 1500s. The advent of book printing about this time permitted a much wider dissemination of works on infant care. Their authors, male physicians, shared a concern for the high incidence of gastrointestinal illness in infants and for high infant-mortality rates.

For reasons not at all clear today, overfeeding was deemed a central factor in both. Writers concerned with child care responded by advocating the regulation of feeding in order to prevent presumed overfeeding. Writing in the mid-1600s, Ettmuller (1703; cited in Wickes, 1953a) was not the first to recommend infrequent feedings:

Nothing is more apt to disorder the child than suckling it too often, since large quantities of milk stagnating in the stomach, must needs corrupt . . . especially if fresh milk be pour’d in before the preceding be digested.

Some 250 years later in 1900, Pierre Budin (1907; cited in Wickes, 1953b), a French obstetrician famous for his early interest in premature infants and for his advocacy of breastfeeding, was nonetheless typical of many others in recommending small feedings: “It is better at first to give too little than too much (for an underfed infant failed to gain weight but it was free from digestive troubles).”

Even early medical writers who strongly recommended breastfeeding also recommended highly regulated times for feedings—a fixed number of feedings at fixed times. William Cadogan (1749; cited in Kessen, 1965), whose firm endorsement of breastfeeding and largely sound advice prompted many privileged English women to breastfeed, advocated only four feeds per day at equal intervals, and no night feeds! A prototype mothercraft manual by Hugh Smith (1774; cited in Fildes, 1986) contains excellent advice: to feed colostrum and to allow the newborn to suckle frequently to stimulate lactation. However, it then instructs mothers to limit feeds (beginning at 1 month), to five per day between 7 A.M. and 11 P.M. (although how those feedings were timed in households that generally lacked clocks is difficult to understand). About 50 years later, after recommending ad lib feeds for the first 10 days, Thomas Bull (1849; cited in Wickes, 1953a) instructed mothers to feed for the rest of the first month at regular 4-hour intervals day and night, because he also believed that irregular feeding harmed the infant. After 1 month the night feed was to be eliminated.

These influential publications began to remove the management of infant feeding from the mother

(or from the realm of women in general) and placing it in the hands of (usually male) “authorities.” Cado-gan (1749; cited in Kessen, 1965) commended this change that put “men of sense rather than foolish unlearned women” in charge, and Rotch a century and a half later (1907) deplored that “mothers and nurses . . . dominated the physicians.” The most common explanation among all classes of women in the United States, at least since popular women’s magazines became widely distributed in the late 1800s, for feeding artificial products to an infant is that the mother did not have enough milk. It has been observed that “not enough milk” corresponds closely with the widespread implementation of infant feeding schedules (Wolf, 2006). For far too long, women able to consult physicians were thus placed in a double bind, and—as they tried to satisfy both the baby and the authorities directing how she cared for her baby—breastfeeding oftentimes got left behind.

With respect to a newborn’s first breastfeed, as late as the 1950s US physicians ordered that newborns be given nothing by mouth for the first 24 hours after birth. In Australia, midwifery texts of the 1940s recommended that the baby not go to the breast until 12 hours after birth (Thorley, 2001). Now (2007) we encourage the newborn to feed at the breast immediately after birth or at least within the first hour after birth (World Health Organization, 1991). One can only wonder which of today’s standard recommendations to breastfeeding mothers will be shown, at some time in the future, to be counterproductive.

Many—and perhaps most—of our everyday decisions are influenced by the social norms of our culture, our civic community, and our immediate circle of family and friends (Baranowski et al., 1983; Matich & Sims, 1992). The long-standing need in the United States for breastfeeding “promotion” is rooted in the common perception that the breast functions primarily for sexual gratification and, thus, should not be exposed in public. Legislation in most states in the United States that permits breastfeeding in public notwithstanding, many mothers avoid doing so because of social censure. For instance, a telephone survey in Australia found that almost 83% of respondents favored bottle-feeding rather than breastfeeding in public (McIntyre, Hiller, & Turnbull, 2001). A 2004 HealthStyles survey in the United

States reported that about 37% of people questioned agreed that mothers should breastfeed only in private (a nearly equal percentage favored allowing breastfeeding in public; the remainder, about 27%, was undecided) (CDC, 2004). Considerable regional and demographic variation in such attitudes exists in the United States (Ryan, Zhou, & Gaston, 2004; Hannan, Li, Benton-Davis, & Grummer-Strawn, 2005). In general, New England, the mountain West, and Pacific regions were most accepting of breastfeeding in public.

Mass media may also influence perceptions of breastfeeding. One study finds that when the number of commercial advertisements for formula feeding increased in one widely circulated magazine for parents published in the United States, breastfeeding prevalence generally dropped during the following year (Foss & Southwell, 2006). Magazine illustrations depicting breastfeeding may have a decidedly mixed reaction. In 2006, one popular magazine’s cover photo depicted a portion of breast with a baby latched on (no nipple visible). In a poll of about 4000 readers, only about a quarter objected to the photo, but those people objected strongly (CBS News, 2006).

Regulation and Industrialization

This “regulatory” frame of mind fit nicely with the needs of the growing industrial sector of the economy, which relied on efficiency and schedules governed by the clock. Societal perceptions of infants’ innate characteristics and needs were interpreted in this light (Millard, 1990). Early in the 1900s, infants were seen as needing order imposed onto their characters from the outside (Rossiter, 1908):

An infant two days old may be forming either a good or a bad habit. A child that is taken up whenever it cries is trained into a bad habit; the same principle is true in reference to nursing a baby to stop its crying. Both these habits cultivate self-indulgence and a lack of self-control.

“Good” mothering thus drifted toward meeting the letter of schedules commonly imposed by the medical profession rather than meeting the mutual needs of mother and infant as expressed by and interpreted within the dyad.

Although the use of rigid, externally imposed infant care schedules began diminishing in the 1970s, much “how to” breastfeeding literature assumes that lactation functions better when mother and baby develop feeding routines. The lack of some routine is usually perceived as abnormal by both mother and physician (Millard, 1990). Unfortunately, certain attitudes required of most employees, such as an awareness of time within a hierarchical authority structure, are least apt to enable a mother or a pediatrician to accommodate the normal irregularities of early breastfeeding.

Regulation of Contraception

During the late 1950s and early 1960s, the widespread acceptance of oral contraceptives may have also reinforced the decline in breastfeeding (Meyer, 1968). Contraceptives containing estrogen reduce breastmilk volume and thus contribute to lactation insufficiency, early supplementation, and early weaning from the breast. Moreover, women who planned to use combined estrogen and progestin oral contraceptives were discouraged from breastfeeding in order to avoid passing those hormones to the infant. During this period, several million women per year in the United States alone were thereby removed from the pool of potential breastfeeders. Concurrently, the widespread adoption of manufactured substitutes for human milk led to loss of appreciation for the contraceptive benefit of lactation amenorrhea.

Although low-progestin contraceptives once were thought to pose fewer hazards to the maternal milk supply and the baby (Kelsey, 1996), a more recent review of literature finds the evidence contradictory (Truitt et al., 2003). The Academy of Breastfeeding Medicine currently (2007a) recommends that mothers be advised that all contraceptives that contain any exogenous hormone may reduce breastmilk supply.

Accommodation Between Physicians, Other Health Professionals, and Infant Milk Manufacturers

The relationship between physicians, other health professionals, and infant food manufacturers has in general promoted mothers’ dependency on either

the manufacturer or the physician for information on infant feeding. In the late 1800s as proprietary infant foods were being developed, manufacturers advertised to both groups. By the 1920s, some preparations were advertised to mothers but could be purchased only by prescription or used only after consulting a physician: the package contained no instructions for use. By 1932 the American Medical Association essentially required baby milk manufacturers to advertise only to the medical profession (Greer & Apple, 1991). The mutual economic benefits of this policy were clearly spelled out in many advertisements placed by formula manufacturers such as Mead Johnson (1930) in medical journals:

When mothers in America feed their babies by lay advice, the control of your pediatric cases passes out of your hands, Doctor. Our interest in this important phase of medical economics springs, not from any motives of altruism, philanthropy, or paternalism, but rather from a spirit of enlightened self-interest and cooperation because (our) infant diet materials are advertised only to you, never to the public.

For several decades this unwritten agreement has extended also to medical education. Formula companies spend about \$10,000 per medical student during a student’s medical education (Walker, 2001). Many nursing and dietetic professional organizations also accept money from formula companies to fund continuing education, grants, and other projects.

Despite several early studies that showed breastfed infants to be healthier than bottle-fed ones (Howarth, 1905; Woodbury, 1922; Grulee, Sanford, & Herron, 1934), for years many physicians advised mothers that there was little advantage to breastfeeding. This view was expressed persistently up through the 1960s. For instance, Aitken and Hytten (1960) reported that “with modern standards of hygiene artificial feeding on simple mixtures of cow’s milk, water, and sugar is a satisfactory substitute for breast feeding.” Despite an overwhelming amount of research that shows that infants fed manufactured milk products have higher rates of morbidity, hospitalization, and mortality (Raisler, Alexander, & O’Campo, 1999; International

Lactation Consultant Association, 2000), or the inverse, that breastfed infants enjoy better health (Ip et al., 2007), even in 2007 statements similarly dismissive of the crucial role of breastmilk in infant health can still be heard.

The Prevalence of Breastfeeding

United States

1940–2000

The net result of shifts in technology, commercial advertising, and attitudes (discussed above) was a rapid decline in the prevalence of breastfeeding in Western nations that began in the 1940s. In the United States, the proportion of newborns receiving any breastmilk at 1 week postpartum declined steadily to a low of 25% in 1970 (Martinez & Krieger, 1985). The proportion of newborns exclusively breastfed at hospital discharge was even lower: in 20 years, it declined from 38% (in 1946; Bain, 1948) to 21% (in 1956; Meyer, 1968) and only 18% (in 1966; Meyer, 1968).

In addition, the period of most dramatic decline of breastfeeding coincided with economic factors in the United States that encouraged major migrations from rural to urban areas. For example, between 1945 and 1970 approximately 5 million African-Americans moved from the rural South to the urban North (Coombs, 1972; Gregory, 1995). The associa-

tion between internal migration from rural to urban areas and a decline in breastfeeding also has been noted in other countries (Millman, 1986; Pasternak & Ching, 1985). In the United States, breastfeeding rates reversed in the 1970s and rose gradually until the mid-1980s. Breastfeeding prevalence then dipped for a few years but has slowly risen since the early 1990s (Figures 2–4 and 2–5).

Current Breastfeeding Practices

As of 2006, the most recent year for which National Immunization Survey data has been analyzed, breastfeeding rates slowly rose in the United States to 77%—just above the *Healthy People 2010* goal of 75%—of hospital-born infants receiving some breastmilk. Breastfeeding at 6 months of age remained unchanged and is still lower than goals set by government agencies (McDowell, Wang, & Kennedy-Stephenson, 2008).

In 2004, rates of exclusive breastfeeding were only about half of target rates proposed in *Healthy People 2010*: 30% at 3 months (goal, 40%) and 11% at 6 months (goal, 17%) (Table 2–1). Various populations of women differ considerably in their breastfeeding practices; lower rates of initiation and continuance of exclusive breastfeeding persisted among women who were younger, non-white, and unmarried; who had less formal education and low incomes; and who lived in

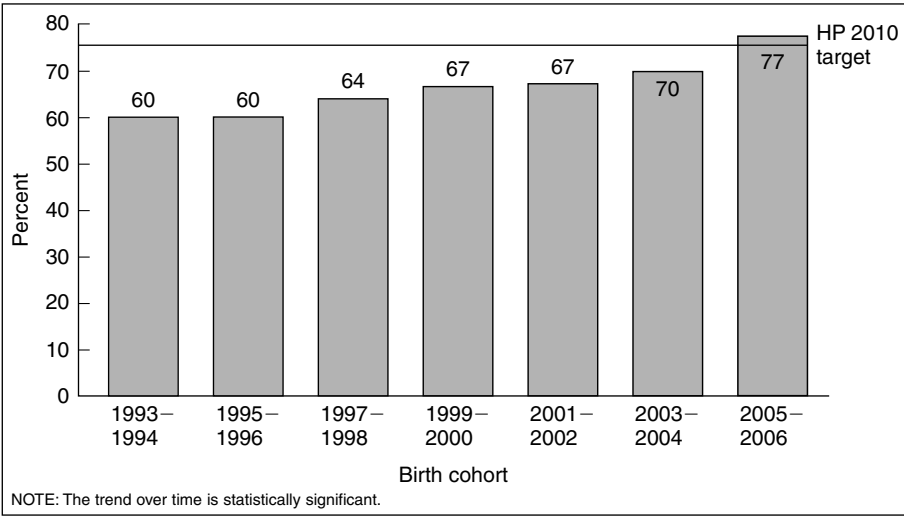
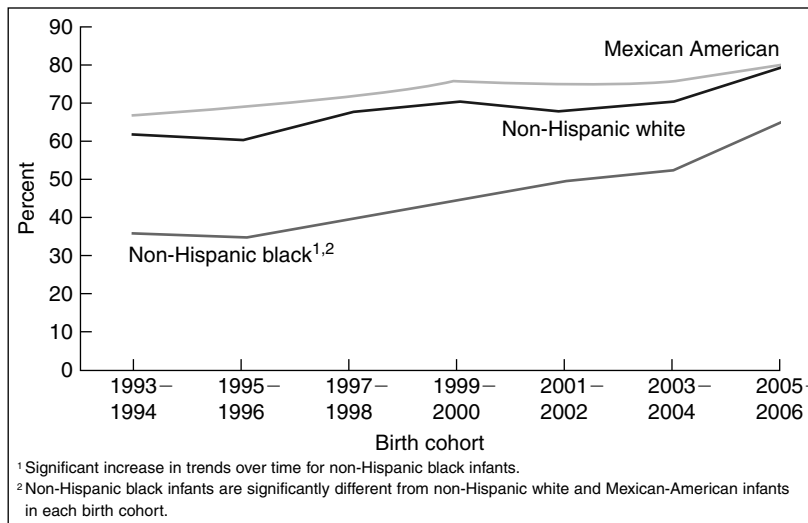


FIGURE 2–4 Percentage of infants who were ever breastfed by birth cohort: United States, 1993–2006.
Source: CDC/NCHS, National Health and Nutrition Examination Survey.

**FIGURE 2-5**

Percentage of infants who were ever breastfed by birth cohort and race ethnicity: United States, 1993–2006.

Source: CDC/NCHS, National Health and Nutrition Examination Survey.

rural areas. Geographic variations also persist. In general, higher initiation rates and continuance rates at 6 months were found west of the Mississippi River and along the Eastern seaboard (CDC, 2007a). Individual US states differ in how breastfeeding data is collected. About half collect breastfeeding based on the birth certificate. Only

8% collect information on exclusivity. In 2003, a breastfeeding question, “Is the infant being breastfed at discharge?” was added to the US Standard Certificate of Live Birth. As states adopt this new standard, they should capture exclusivity data (Ackatia-Armah & Merewood, 2007).

TABLE**2-1**

Breastfeeding Goals and 2004 Prevalence in the United States

| Point in Time | Breastfeeding Prevalence (percent) | |
|-------------------------|------------------------------------|------------------------|
| | Goal ¹ | 2004 rate ² |
| Early postpartum | 75 | 73.8 |
| Any breastfeeding | | |
| 6 months | 50 | 41.5 |
| 12 months | 25 | 20.9 |
| Exclusive breastfeeding | | |
| 3 months | 40 | 30.5 |
| 6 months | 17 | 11.3 |

¹ *Healthy People 2010* (US Department of Health and Human Services, 2000a)

² National Immunization Survey (CDC, 2007)

Non-Western Regions

The Role of Colonial Empires

Declines in the prevalence of breastfeeding were noted in non-Western regions somewhat later than in the West. Between World Wars I and II, British, French, and German colonial empires controlled fully a quarter of the inhabited globe and a quarter of the world's population. These empires served as vehicles for the expansion of markets for manufactured baby milks.

Colonial ruling elites who followed the practices of their social class in their country of origin (a class that placed social distance between the ruling elites and the nationals ruled) were much more likely to feed their infants artificial milks than to breastfeed. That most of these infants survived is due in large part to the higher levels of sanitation and medical care that their position in life afforded them. To some degree, these colonial elites served as unwitting role models for indigenous peoples.

Concern for the health of indigenous peoples led many healthcare workers to transmit Western attitudes toward infant feeding to the populations they served by example, by direct recommendations, and by the training provided to indigenous healthcare providers. Westerners have traditionally assumed that foods good for them must be good for all people and have passed these notions to foreign nationals trained in Western schools (McCracken, 1971). Perhaps because Western medical personnel were successful at treating many other health problems, local populations were prepared to accept attitudes that encouraged the use of artificial baby milks. Healthcare personnel in hospitals helped to introduce the use of manufactured baby milks and contributed to undermining breastfeeding (Winikoff & Laukaran, 1989).

Colonial transportation and communication networks and health clinics and hospitals aided the advertisement and sale of artificial baby milks to this huge population. The decline in breastfeeding accelerated after World War II: contact increased between Western healthcare personnel and populations in developing countries, relief projects originating in the United States shipped to war-torn countries a surplus of skim milk, produced by the large dairy industry in the United States, and makers of manufactured baby milks created large new markets. For instance, between 1976 and 1977, 42 transnational companies manufactured, distributed, and marketed infant milk products in four countries surveyed: Ethiopia, Nigeria, India, and the Philippines (World Health Organization, 1981a).

Infant Feeding and Infant Mortality

The relation between infant feeding and infant mortality is complex. Infant mortality has tended to be highest among populations in which breastfeeding was most common: the poor. Rural mothers in Ethiopia and Zaire reported that at least 30% of their infants died, although 97% of mothers were breastfeeding at 18 months postpartum, as were 80% of a similar group of mothers in rural Zaire (World Health Organization, 1981a). The same relationship held in the United States during the early 1900s (Williamson, 1915).

Although artificial feeding has been associated with more illness, especially gastrointestinal illness (Quigley, Cumberland, Cowden, & Rodrigues, 2006), and with poorer infant survival in all countries

studied—developing nations (Habicht, DaVanzo, & Butz, 1988) and Western nations (Chen & Rogan, 2004) alike, the reverse is not always the case. The advent of primary health care for a large portion of a population may explain decreases in infant mortality in the face of declines in breastfeeding. In Nicaragua, the proportion of infants breastfed at 6 months declined 25 percentage points (from 58% to 33%) between 1977 and 1988. During this same period, infant mortality declined from about 10% to about 6.5% (Sandiford et al., 1991). It seems clear that the pervasive problems of poverty, in both Western and non-Western locales, were at the root of the appalling infant mortality in impoverished populations.

Current Breastfeeding Practices

During the 1970s, when breastfeeding initiation rates were generally rising in Western nations, such rates fluctuated around traditional rates among developing countries in response to societal adjustments such as advertising of substitutes for human milk, internal migration from rural to urban locales, and entry of greater numbers of women into the paid labor force (Millman, 1986). In 2003, however, breastfeeding continued to be widely practiced in 20 countries studied in Africa, Asia, Europe, and Latin America. During the interval 1999–2004, pooled data from demographic and health surveys show that more than 95% of infants less than 6 months old were breastfed, as were 88% of infants 6 to 12 months old. Although mixed feeds were the norm, manufactured infant milks formed only a small portion of infant diets (Marriott et al., 2007). More detailed information about individual countries in these regions can be obtained from a 2006 Infant and Young Child Feeding Update (Mukuria et al., 2006).

The Cost of Not Breastfeeding

*To see a world in a grain of sand
And a heaven in a wild flower,
Hold infinity in the palm of your hand
And eternity in an hour.*

—William Blake,
“Auguries of Innocence,” c. 1803

Breastfeeding—or not—can be that grain of sand through which one can see influences on the health

of infant and mother, the costs of healthcare infrastructure, and the economics of infant feeding at many scales. Although isolated voices championed breastfeeding throughout its years of steady decline, not until the 1970s did the trend toward artificial feeding reverse. What prompted this change? The reasons are not clear but seem to reflect a widespread desire by many to include simpler, more natural practices in their lives. Lay organizations that promoted breastfeeding began to spread more widely. Basic, clinical, and demographic research increasingly demonstrated the benefits of breastmilk and breastfeeding to the infant and of lactation and breastfeeding to the mother. Later still, it has come to be recognized that there are physiological and financial costs to not breastfeeding.

Health Risks of Using Manufactured Substitutes for Human Milk

Risks to the Infant

It has been recognized since the advent of manufactured infant milks that infants fed these products suffered more acute illness than did breastfed infants (Howarth, 1905; Woodbury, 1922; Grulee et al., 1934; Cunningham et al., 1991; United States Breastfeeding Committee, 2002; Quigley et al., 2006). Moreover, even in the United States, both black and white infants fed on manufactured infant milks suffer 20% more deaths in their first year than do breastfed infants (Chen & Rogan, 2004). Artificially fed infants are denied the benefits of autoimmunization, whereby the breast produces antibodies to organisms to which the infant has been exposed. This observation is confirmed by more recent studies that are discussed in later chapters. At the time of the earlier studies, the immunological role of breastmilk was unclear; most deleterious effects of manufactured milks were attributed to contamination. In more recent decades, it has become established that artificial baby milks increase the risk of ill health by many pathways (Walker, 1993). Not only can manufactured infant milks be (or easily become) contaminated, but also they lack the immunological and other health-promoting factors present in human milk. In addition, they contain compounds that are foreign to humans or are present in nonphysiologic proportions. Furthermore, the act of bottle-feeding

differs from that of breastfeeding in ways that may contribute to cardiopulmonary problems in some infants. The effects of artificial feeding may extend well beyond infancy.

Risks to the Mother

Artificial feeding is also detrimental to maternal health. In the absence of lactation amenorrhea, additional pregnancies may ensue that adversely affect the mother's health. As discussed in Chapter 16, mothers who artificially feed their infants are more likely than breastfeeding mothers to later develop health problems such as osteoporosis, premenopausal breast cancer, and ovarian cancer (Labbok, 2001). Bottle-feeding mothers who have diabetes will not enjoy the same amelioration of symptoms that may be experienced by breastfeeding mothers who have diabetes (Butte et al., 1987). Moreover, healthy mothers who use manufactured infant milks to feed their infants (as well as those infants) are more likely to develop diabetes 2 later in life (Stuebe et al., 2005).

Economic Costs of Using Manufactured Substitutes for Human Milk

The presence or absence of breastfeeding affects the economics of the family, the community, and the country at large. Some of these effects are more pronounced in less developed regions, but to a degree they also affect all segments of populations in technologically advanced regions.

Costs to the Family

Although lactation imposes some metabolic demands on the mother—about 500 kcal/day extra is needed to synthesize human milk (Butte et al., 2001)—these demands are moderated by gastric changes that allow lactating women to metabolize foods more efficiently (Illingworth, 1986; Uvnas-Moberg et al., 1987) and by the water-conserving effect of prolactin (Dearlove & Dearlove, 1981). Moreover, the contraceptive effect of full, unrestricted breastfeeding reduces a woman's physical and economic costs of childbearing (Jackson, 1988; Kennedy et al., 1989).

The direct monetary costs of rearing an infant who is breastfed are markedly lower than those of one who is artificially fed (Ball & Wright, 1999;

Ball & Bennett, 2001). Approximately 150 cans of ready-to-feed manufactured baby milk are used during the first 6 months of full artificial feeding. Even mothers who receive free manufactured infant milk from the WIC program (see below) must pay for it after their WIC eligibility expires. In industrial nations, the cost of manufactured baby milk may exceed the cost of additional food for the lactating mother by two or three times (Jarosz, 1993)—and more if a special mixture is required to minimize allergies or other health problems. In developing nations, the ratio is many times higher. In regions where one third to one half of those in large urban areas live in poverty, the cost of manufactured milks required to provide adequate nutrition (and implements with which to feed them) is a significant portion of the family income (Serva et al., 1986). Other members of the family may eat more poorly because the baby is artificially fed.

An equally important consideration is the reduced need for medical care by breastfed infants (particularly those who are exclusively breastfed). The frequency and severity of illnesses in a young infant is often inversely related to the proportion of the diet that comes from breastmilk (Chen et al., 1988; Cattaneo et al., 2006). More breastfeeding increases infant intake of high-quality protein and a variety of other needed nutrients, and it decreases infant exposure to potential pathogens in other foodstuffs (Habicht et al., 1988). In the early 1990s, a large health-maintenance organization in the United States estimated that in one state alone (North Carolina) the cost during the first year of life of treating infants who were breastfed at least 6 months was \$1400 less than the cost of treating never-breastfed infants (Kaiser Permanente, 1997). A minimum of \$3.6 billion would be saved in the United States alone if breastfeeding were increased from current levels to those recommended by the US Surgeon General (75% initiation and 50% continuation at 6 months) (Ball & Wright, 1999). It is estimated that insurers pay out \$1.3 billion more for infants fed manufactured infant milks, as compared with breastfed infants, to treat respiratory infections, ear infections, and diarrhea in the first year of life (Riordan, 1997; Weimer, 2001). These mind-boggling figures likely underestimate the total excess cost of caring for artificially fed infants

because they account for the treatment of only a few types of childhood illnesses.

Consider also some of the ancillary costs of not breastfeeding (US Breastfeeding Committee, 2002).

- If a parent misses 2 hours per year of work for excess illness attributable to formula feeding, greater than 2000 hours—the equivalent of 1 year of employment—are lost per 1000 never-breastfed infants.
- The United States uses 110 billion BTUs of energy (costing about \$2 million) each year for processing, packaging, and transporting manufactured infant milks—and even more to either dispose of empty milk containers or to recycle them.

Because full breastfeeding, which includes frequent feeds throughout a 24-hour period, tends to delay resumption of ovulation (Lewis et al., 1991), spacing between births tends to increase. Births spaced less than 2 years apart may increase the mortality risk of both the older and the younger infant (Retherford et al., 1989). Especially in families living at subsistence level, the older a child is when he or she is displaced from the breast and the fewer the number of children in a family, the more likely each child is to be healthy. In malnourished communities, breastfeeding may substantially increase child survival up to 3 years of age (Briend et al., 1988; World Health Organization, 2003).

Thus the breastfed infant stands a significantly greater likelihood of surviving. The mother's physical and emotional investment in pregnancy and lactation and the familial investment in time and money are repaid by the survival of a child; they are lost to the family when that child dies.

Cost to the Community and State

Community or national units that provide health care must respond to the local epidemiology of infant illness, in which feeding may play a major role. Morbidity is more prevalent in artificially fed infants regardless of location. The increase of the infant population, resulting from the loss of the contraceptive effect of breastfeeding, also serves to increase the need for pediatric health care.

The debate on the economic value of breastfeeding has focused on health costs, but the value of the time and energy women expend on breastfeeding is rarely

estimated. The value of time spent breastfeeding is neglected (along with all the other unwaged caring work women do, including caring for children who fall ill as a result of not breastfeeding).

Another little-discussed aspect of the replacement of breastfeeding by use of manufactured products is that certain sectors of an economy can become economically dependent on the payrolls met and taxes paid by infant milk manufacturers, especially if capital funds are obtained from outside the country. Once they become a financial presence in a country, those manufacturers may be politically and economically difficult to dislodge, despite increases in health costs elsewhere in the economy. In the United States, infant formula is a \$2.5 billion per year industry (United States Breastfeeding Committee, 2002) that generates a large payroll in the community and tax revenues to governmental entities.

Nonetheless, manufactured milk products widely used for infant feeding are subsidized by the diversion of resources (land, dairy cattle, and people to manage both)—and by manufacturing capacity pulled from other possible uses.

When one considers that more than 20 million babies are born annually in Africa alone, it becomes apparent that providing adequate volumes of manufactured milks represents a staggering burden and a largely unnecessary diversion of human and monetary resources from other more beneficial programs. At a time when environmental issues have become paramount, these unnecessary uses of power and raw material, not to mention the disposal of discarded packaging, is an increasing concern.

The Promotion of Breastfeeding

The many ways of encouraging mothers to breastfeed their own infants—breastfeeding promotion—may be considered to lie on a continuum. At one end, in societies where breastfeeding is the cultural norm, “promotion” consists of assuming that mother and infant will breastfeed. This assumption is combined with social arrangements, such as special foods for the mother or lightened duties, especially within the first few weeks after birth, to ensure that breastfeeding becomes well established. At the other end, in societies in which artificial feeding is the norm, promotion often consists of encouragement to breastfeed, sometimes offered by government officials and often

by healthcare professionals or members of elite population groups. These “promoters,” unfortunately, are commonly unable to cultivate more accepting attitudes towards breastfeeding or to remove cultural barriers to breastfeeding. Two understandings have become clear: promotion of breastfeeding without support and protection of the breastfeeding mother produces little long-term gain, and the ways in which manufactured infant milks are inferior to human milk—rather than the reverse—must be emphasized.

Breastfeeding Promotion in the United States

Healthy People Statements

National health objectives were first formally defined in 1978 and published the following year as *Healthy People* (US Department of Health and Human Services, 1979). The initial goal for breastfeeding stated that 75% of women should breastfeed at hospital discharge and 35% at 6 months, as opposed to the actual 1978 figures of 45% and 21%. The current report, *Healthy People 2010* (US Department of Health and Human Services, 2000a), calls for the identical rate of newborn breastfeeding, and goal increases at age 6 months to 50% and at age 1 year to 25% (US Department of Health and Human Services, 2000a) (Table 2–2). The same department also published a *Blueprint for Action on Breastfeeding*, a document that affirms breastfeeding and sets goals for federal policies (US Department of Health and Human Services, 2000b). However, it does not recommend specific legislation that would support breastfeeding.

The WIC Program

Although other government agencies in the United States also work to improve infant nutrition, the Special Supplemental Nutrition Program for Women, Infants, and Children—the WIC program—probably directly affects the greatest number of people. Established in 1972, this program provides free nutrition counseling and food supplements, including manufactured baby milk, to low-income mothers and their infants. Clients typically come from the population segment in the United States least likely to breastfeed (MacGowan et al., 1991). Of those infants born in the

TABLE 2–2 **Breastfeeding Rates (Percentages) and US Healthy People 2010 Breastfeeding Objectives for the Nation**

| | 1998 Actual | 2005 Actual | 2010 Goal |
|---|-------------|-------------|-----------|
| Initiate breastfeeding within the early postpartum period | 64 | 73 | 75 |
| Breastfeeding at 6 months after birth | 29 | 39 | 50 |
| Breastfeeding at 12 months of age | 16 | 20 | 25 |

Source: Adapted from <http://www.ross.com/aboutross/Survey.pdf> (accessed March 17, 2002) and National Immunization Survey, http://www.cdc.gov/breastfeeding/data/NIS_data/index.htm (accessed February 25, 2009).

United States in 2005, almost half (48%) were enrolled in WIC (Ryan & Zhou, 2006).

The WIC program follows in the footsteps of United States infant welfare programs of the 1890s and at the turn of the century in France, England, and elsewhere that operated centers where infants could be weighed and examined weekly. These centers also provided cow milk (“fresh and clean” in some cases, sterilized in others) to nonbreastfeeding mothers in an effort to reduce infant illness and death caused by the use of contaminated milk. By 1903, such milk dispensaries were already being accused of discouraging breastfeeding because they seemed to endorse artificial feeding of infants (Wickes, 1953b). Even today, government-sponsored distribution of free milk (as has occurred in Nicaragua since 1970) has been considered one reason for the decline of breastfeeding (Sandiford et al., 1991; Ryan & Zhou, 2006). The WIC program is still the largest purchaser (and distributor, at little cost to the manufacturers (Tuttle, 2000; Kent, 2006) of formula in the United States: \$600 million per year. As a result, the direct cost to WIC of supporting mothers who never breastfeed is nearly twice the cost of supporting breastfeeding mothers (United States Breastfeeding Committee, 2002).

The promotion of breastfeeding finally became a goal within WIC in the late 1980s. The Child Nutrition and WIC Reauthorization Act of 1989 required that a certain proportion of WIC’s budget be spent on the promotion and support of breastfeeding and that each state health department establish a breastfeeding promotion coordinator. That budget proportion remains small, however: in 2005, only 0.6%—\$34 million—of a \$5235 million WIC budget was earmarked for promotion and support of breastfeeding (Ryan & Zhou, 2006). Thus, the dollar

amount spent to promote breastfeeding is only about 5% of the amount spent for artificial infant milk. Even so, in 2007 breastfeeding women have a higher priority for enrollment in WIC programs than do nonbreastfeeding mothers: they are provided more, and more varied, foods, and their benefits persist longer—1 year, as opposed to 6 months for nonbreastfeeders (USDA, 2007).

Despite these efforts, the increases in breastfeeding rates of WIC enrollees have been minimal. Mothers enrolled in WIC not only initiate breastfeeding at a much lower rate (at least 20% lower at all time points; 2003 data) than mothers at large (Ryan & Zhou, 2006), but initiate at a lower rate than mothers who qualify for WIC aid but are not enrolled (Li et al., 2005). Even women of Hispanic or Asian ethnicity, who traditionally breastfeed, do so at lower rates if they are enrolled in WIC. The conclusion, then, is that WIC participation lowers breastfeeding initiation and duration (Ryan & Zhou, 2006).

US Breastfeeding Committee

In 1998, supported by the Maternal and Child Health Bureau, a national breastfeeding conference was convened to form a breastfeeding committee as had been recommended by the Innocenti Declaration in 1990. The United States Breastfeeding Committee was established, composed of representatives from government and nongovernmental organizations and health professional associations. The committee’s goals have been to expand awareness of the value of breastfeeding and to recommend policies to government and corporate organization that increase breastfeeding prevalence (United States Breastfeeding Committee, 2001).

Legislation

Legislation intended to increase the prevalence of breastfeeding may mandate actions that encourage breastfeeding or discourage feeding of artificial baby milk (or use of wet nurses) or both. One of the earliest examples was set in 350 BC by Lycurgus, the king of Sparta: he required not only that mothers nurse their own infants, but that nursing mothers be shown kindness and respect (Hymanson, 1934).

Pressures external to the mother and infant have dictated not only *when* an infant should be breastfed but also *where*. Social censure and in some places the interpretation of statutory laws regarding indecent exposure have limited the public places in which a woman might breastfeed. Although the best situation would be a pervasive social acceptance of breastfeeding such that legislation permitting breastfeeding in public is not needed, legislation protecting the right to breastfeed is for the moment the next best thing. Beginning in 1984 in New York State, American women began to gain the legal right to breastfeed in public places. Ten years later, laws in five states addressed breastfeeding. In the United States, a 1999 federal law makes breastfeeding legal on all federal property where a woman has the right to be (Tiedje et al., 2002). As of August 2007, 42 states (of 50 states plus the District of Columbia) have laws that address breastfeeding in public—either by permitting a woman to breastfeed any place where she is entitled to be or by exempting a woman who is breastfeeding in public from charges of indecent exposure (La Leche League International, 2007a). Wilson-Clay et al. (2005) describe in detail how you can effectively lobby the state legislature to reduce barriers to breastfeeding.

Statements by Health Organizations

In 1997 the American Academy of Pediatrics Work Group on Breastfeeding issued a policy statement endorsing breastfeeding (American Academy of Pediatrics, 1997). The statement received considerable attention from the press, accelerating nationwide interest in breastfeeding. Other professional organizations have published similar public endorsements of breastfeeding: the American College of Obstetricians and Gynecologists (2000; rev. 2002), the American Dietetic Association (1997), the American College of Nurse-Midwives (1992), the American Academy of Family Physicians (2001), the

Association of Women's Health, Obstetric, and Neonatal Nurses (1999), National Association of Pediatric Nurse Practitioners (2003), Academy of Breastfeeding Medicine (2007b), and the American Public Health Association, 2008.

International Breastfeeding Promotion

The International Code of Marketing of Breast-Milk Substitutes

In the 1970s, the deleterious effects of manufactured baby milks on infant health and survival became better appreciated, and the role of advertising in spreading the use of these milks became increasingly suspect. In 1981 the World Health Organization, by a vote of 118 to 1 (the United States cast the sole dissenting vote), approved the International Code of Marketing of Breast-Milk Substitutes. The code provides a model of marketing practices that permits the availability of manufactured baby milk but forbids its advertisement or free distribution directly to consumers (Box 2–2).

The code also seeks to balance the information provided by infant milk manufacturers, in both written “educational” material and in the text or pictures on containers of the product (International Baby Food Action Network, 1985; Armstrong, 1988). In 1996, the World Health Assembly passed six resolutions that further clarify the intent of the international code. Of these six, one reaffirms the use of local family foods to complement the diet of breastfeeding infants beyond about 6 months of age. Another reaffirms the need to end the free or low-cost (subsidized) distribution of artificial baby milk to newly parturient women in the hospital. Two other resolutions proscribe receipt of funds from manufacturers or distributors of artificial baby milk or feeding supplies to be used for professional training in infant and child health, or for financial support of any organization that monitors compliance with the international code (United Nations Children's Emergency Fund, 1996).

An individual country may adopt the international code in the manner that best fits the needs of that country. In some, no action has been taken, and formula manufacturers are bound only by voluntary adherence to an industry-written “codes of ethics” that lacks sanctions for noncompliance.

BOX 2-2**WHO/UNICEF Code for Marketing Breastmilk Substitutes**

- No advertising of these products to the public.
- No free samples to mothers.
- No promotion of products in health-care facilities.
- No company mothercraft nurses to advise mothers.
- No gifts or personal samples to health workers.
- No words or pictures idealizing artificial feeding, including pictures of infants, on the products.
- Information to health workers should be scientific and factual.
- All information on artificial feeding, including the labels, should explain

the benefits of breastfeeding, and the costs and hazards associated with artificial feeding.

- Unsuitable products, such as condensed milk, should not be promoted for babies.
- All products should be of a high quality and take into account the climatic and storage conditions of the country where they are used.

Source: World Health Organization, 1981b.

A few other countries have adopted and do enforce various aspects of the code.

The international code focuses attention on ways in which the infant formula industry influences both consumers and professionals to increase the use of their products. Direct advertising to consumers may be the most obvious ploy, but what Jelliffe and Jelliffe (1978) called “manipulation by assistance” is also effective. For example, formula manufacturers not only provide free formula to hospital nurseries but also assist in the design of those nurseries, donate equipment and supplies to hospitals and individual physicians (bottles of formula and sterile water, for example), support conferences (including some dealing with breastfeeding), and even entertain hospital staff at company-sponsored events. These gifts are treated by the companies as marketing expenses. Lactation consultants should be watchful in order to avoid succumbing to such “manipulation by assistance” provided by manufacturers of artificial baby milk and of other feeding products banned by the international code.

As individuals and institutions become financially dependent on such gifts and enmeshed in social relationships with company salespeople, they are more likely to tacitly endorse, or even recommend, artificial baby milks. By highlighting such practices as marketing ploys, the code may make healthcare professionals more aware of the intent behind them and thus perhaps more resistant to their allure.

Innocenti Declaration

In 1990, the World Health Organization and the United Nations International Children’s Emergency Fund (UNICEF) were instrumental in the development of the Innocenti Declaration, which restated the importance of breastfeeding for maternal and child health. It set forth four goals to be met by 1995: (1) the establishment of national breastfeeding coordinators and a national breastfeeding committee, (2) the practice of Ten Steps to Successful Breastfeeding by maternity services (Box 2-3), (3) the implementation of the WHO International

BOX 2-3**Ten Steps to Successful Breastfeeding**

Every facility providing maternity services and care for newborn infants should

1. Have a written breastfeeding policy that is routinely communicated to all healthcare staff.
2. Train all healthcare staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within 30 minutes after birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming-in—allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Source: World Health Organization, 1989.

Note: These steps and the complete elimination of free and low-cost supplies of breast-milk substitution, bottles, and teats from healthcare facilities form the basis for the Baby-Friendly Hospital Initiative.

Code, and (4) enactment of enforceable laws for protecting the breastfeeding rights of employed women (United Nations Children's Fund, 1990).

An offshoot organization, the World Alliance for Breastfeeding Action (WABA) is a multinational coalition of individuals and private organizations involved in research and promotion of breastfeeding (World Alliance for Breastfeeding Action, 2007). It works to ensure that the goals of the Innocenti Declaration are met, and it annually supports activities presented during World Breastfeeding Week, the first week in August—an opportunity for people worldwide to celebrate and support breastfeeding. The Texas Breastfeeding Coalition is a helpful resource for building and strengthening a coalition (www.txbfcoalition.org) and for ideas for celebrating World Breastfeeding Week.

Baby-Friendly Hospital Initiative

The World Health Organization and UNICEF launched the Baby-Friendly Hospital Initiative (BFHI) in 1991 to encourage specific birth-center practices in all countries that promote exclusive breastfeeding. To be designated “baby-friendly,” a hospital must demonstrate to an external review board that it practices each of the 10 steps to successful breastfeeding outlined in the Innocenti Declaration. With the principal exception of the Scandinavian countries, industrialized nations have moved more slowly than developing nations. Of some 19,000 maternity facilities worldwide that have been designated baby-friendly, 63 are in the United States (Baby-Friendly USA, 2008). The principal stumbling block has been the political and financial difficulty of the requirement that hospitals not accept free artificial infant milk from

manufacturers. Breastfeeding advocates in the industrialized world labor against three impediments: an artificial milk industry that is powerful enough, both financially and politically, to avoid most regulation; a pervasive bottle-feeding culture that does not consider breastfeeding important to child or maternal health; and the lack of much precedence for government-mandated health programs. As a result, all industrialized nations together can claim only a small percentage of all baby-friendly hospitals.

Several studies have examined the degree to which the “Ten Steps” are being implemented and their effect on hospital practices and breastfeeding outcomes (DiGirolamo, Grummer-Strawn, & Fein, 2001; Broadfoot et al., 2005; Merewood et al., 2005; Merten et al., 2005). Without exception, these studies show greater initiation and longer duration of breastfeeding, even among populations less likely to breastfeed. A high proportion of mothers delivering in a hospital or birthing center certified as baby-friendly choose to breastfeed because of the consistent support they receive from the staff and from their birth experience in a breastfeeding-friendly environment.

Private Support Movements

During the 1970s, the unthinking acceptance of artificial feeding began to unravel. The reasons are not clear but seem to have been part of a widespread

desire of many to include simpler, more natural practices in their lives. In the 1950s and 1960s, voluntary groups that offer information and support to women interested in breastfeeding, such as La Leche League International (LLLl) in the United States, Nursing Mothers’ Association of Australia, and Ammenhjelpen of Sweden, had been formed. Such groups assist individual women and have focused national attention on the benefits of breastfeeding. La Leche League is officially recognized as a nongovernmental organization qualified to consult on breastfeeding to organizations such as the United Nations and the United States Agency for International Development. As of 2006, it has a presence—accredited leaders or other ongoing source of LLLl information—in 75 countries (La Leche League International, 2007b). Members of groups such as these, by their demonstration that even “modern” mothers can breastfeed, and by their requests to medical personnel for information about medical practices that support breastfeeding, have been a major force behind the dissemination of technical information concerning lactation, human milk, and breastfeeding.

To better reach low-income women, who are not commonly La Leche League members, LLLl has trained more than 3000 peer counselors—low-income women who have breastfed and have completed a training program. Offering breastfeeding advice and support in clinics that serve low-income populations, such counselors can be very effective (see Chapter 25).

Summary

Humans evolved within the mammalian lineage, which has provided a species-specific milk for the nourishment and protection of the young of each species. For millennia, the staple of the human infant’s diet has been human milk obtained directly from the human breast, commonly in situations where no other food was suitable. Within the last century or so, as breastfeeding became associated with more restrictive aspects of women’s lives, as breastmilk was thought by some to be inferior to increasingly available manufactured infant milks, and as use of manufactured milks became a hallmark of privileged segments of society, large portions of both lay and healthcare populations came to believe that there was little reason to persist in traditional breastfeeding practices.

Since the early 1990s, however, it has become increasingly clear that breastfeeding confers health, cognitive, and psychological advantages on the breastfeeding infant and also onto the child and adult into which that infant will grow. Breastfeeding enhances aspects of maternal health as well. Breastfeeding is economically frugal and ecologically sound. Breastfeeding is important at both the family and the community level. The promotion efforts outlined in this chapter are needed because, to some degree in most countries (and particularly those in the United States), the most important requirements are missing: acceptance by society at large of the need for a mother and child to be together, and the right of the breastfeeding dyad to participate in social, civic, and commercial

activities outside the home. For many women, the ultimate barrier to breastfeeding is not sore nipples, night-time nursing, or employment outside the home. It is the disapproval they encounter for “wasting” their education and career skills by staying home with their breastfeeding infants, or for being considered disruptive or even obscene for taking their breastfeeding infant with them to work or to worship, or perhaps to a city council or parent-teacher meeting, or simply to a restaurant or to a park. A goal for all women should be to empower mothers so that they are able to attend to all of their duties, maternal as well as civic, religious, and professional.

Those who breastfeed or who promote the reestablishment of breastfeeding as the norm in

infant feeding do so not because there are no alternatives but because the alternatives are inferior. Unfortunately, the belief that breastfeeding is the optimal way to nourish an infant may not be enough to empower a woman to breastfeed. Knowledge of beneficial breastfeeding practices and society’s acceptance of those practices are also required. Currently, the prevalence of breastfeeding reflects the importance that society places on it, as measured by the degree to which breastfeeding mothers and infants are accepted in the life of the community at large. Returning breastfeeding wisdom to the public domain and reintegrating breastfeeding into the social fabric so that women who wish to breastfeed may do so without hindrance is the challenge that awaits.

Key Concepts

- The class Mammalia is characterized by breasts (mammary glands) that secrete and release a fluid that for a time is the sole nourishment of the young; breastfeeding dates back some 100 million years.
- Among modern hunter-gatherers, whose breastfeeding practices may be very ancient, breastfeeds tend to be frequent (average 4/hour), short (about 2 minutes), equally distributed throughout a 24-hour day, and persist for 2 to 6 years.
- Beginning in the 1700s, mothercraft manuals began to shift the management of infant feeding from the mother (or women in general) to usually male “authorities,” and by the early part of the 1900s, “good mothering” drifted toward meeting feeding and infant-care schedules imposed by authorities.
- Before about 1900, information about breastfeeding incidence, prevalence, and practices came from indirect sources; since the mid-1900s, national surveys and World Health Organization data have been available.
- Before about 1900, wet-nursing was the only alternative to breastfeeding that was likely to allow the infant to survive.
- The currently typical hand-fed infant foods did not become part of the human diet until late in human history; cereal grains were domesticated only about 10,000 years ago and animal milks only about 5000 years ago.
- In the 1890s, physician Thomas Rotch developed a complex system of progressive modifications of cow milk to make it more digestible by infants of various ages; this system required constant intervention by the physician, who might change an infant’s “formula” weekly.
- In the decades around 1900, high infant mortality was a major public concern, standards of modesty strictly limited breastfeeding outside the home, and advances in science and technology led to the creation of dry or tinned artificial infant foods.
- In the United States, the proportion of newborns receiving any breastfeeding declined steadily after 1940 to a low of 25% in 1970; the trend then reversed and despite a dip in the late 1980s, has risen steadily since then.
- Infants fed manufactured infant milks suffer more illness because such milks lack the nutritive qualities and immunologic factors of breastmilk. Mothers who use manufactured infant milks are more susceptible to osteoporosis, premenopausal breast cancer, and ovarian cancer.
- Infants who are fed manufactured infant milks are more costly to raise, in part because of the considerable cost of the formula and in part because they suffer more, and more severe, illness as compared with breastfed infants.
- The diversion of land, power, and raw material to the manufacture of artificial infant milks,

and the disposal of discarded packaging, is an increasing ecological concern.

- Especially after World War II, the United States and Western Europe exported hand-feeding practices to countries that they colonized or otherwise influenced.
- Voluntary groups dedicated to promoting breastfeeding, such as La Leche League International in the United States, Nursing Mothers' Association of Australia, and Ammenhjelpen in Sweden, began in the 1960s and 1970s and paved the way for governmental efforts.
- In the United States, national breastfeeding goals were first stated in 1979 in *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*.
- During the 1980s, the promotion of breastfeeding in the United States became an important goal within the Women, Infants, and Children (WIC) program; however, increases in breastfeeding rates of WIC

enrollees, who typically come from population segments least likely to breastfeed, have come slowly.

- The International Code of Marketing of Breast-Milk Substitutes was approved in 1981 by the World Health Organization; it permits manufactured infant milks to be available but forbids their advertisement or free distribution directly to consumers.
- The Innocenti Declaration was approved in 1990 by the World Health Organization and the United Nations International Children's Emergency Fund; it encourages specific hospital perinatal practices that promote exclusive breastfeeding.
- Breastfeeding promotion efforts in 2007 are rediscovering that promotion must also include support and protection of the breastfeeding mother and that the harmful outcomes of feeding manufactured infant milks must be addressed as well as the benefits of breastfeeding.

References

- Academy of Breastfeeding Medicine. Contraception during breastfeeding: clinical protocol 13. 2005. Available at: <http://www.bfmed.org/ace-files/protocol/finalcontraceptionprotocolsent2.pdf>. Accessed August 4, 2007a.
- Academy of Breastfeeding Medicine. Protocols. Available at: <http://www.bfmed.org/index.asp?menuID=139&firstlevelmenuID=139>. Accessed October 14, 2007b.
- Ackatia-Armah R, Merewood A. State collection of breastfeeding data: who counts what and how? Boston University Medical Center. ILCA Conference and Annual Meeting, "Controversies in Lactation," San Diego, August 15–19, 2007.
- Aitken FC, Hytten FE. Infant feeding: comparison of breast and artificial feeding. *Nutr Abstr Rev*. 1960;30:341–371.
- American Academy of Family Physicians. AAFP policy and position statement on breastfeeding. Available at: <http://www.aafp.org/x633.xml>; 2001. Accessed May 2003.
- American Academy of Pediatrics, Work Group on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 1997;100:1035–1039. *Guidelines and Recommendations for Breastfeeding*. Available at: <http://www.aap.org/policy/re9729.html>.
- American College of Nurse-Midwives. *Position Statement on Breastfeeding*. Washington, DC: ACNM; 1992.
- American College of Obstetricians and Gynecologists. Breastfeeding: maternal and infant aspects. *ACOG Educ Bull*. 2000;258. Available at: http://www.acog.org/from_homepublications/press_releases/nr07-0100.htm. Accessed July 1, 2002.
- American Dietetic Association. Position of the American Dietetic Association: promotion of breastfeeding. *ADA Reports*. 1997;97(6):662–666. Available at: http://www.eatright.org/adar1_101801.html.
- American Public Health Association. Policy on breastfeeding and public health. Available at: <http://www.apha.org/advocacy/policy>. Accessed December 4, 2008.
- Apple RD. "Advertised by our loving friends": the infant formula industry and the creation of new pharmaceutical markets, 1870–1910. *J Hist Med Allied Sci*. 1986;41:3–23.
- Armstrong H. The International Code of Marketing of Breast-Milk Substitutes (Part 2). *J Hum Lact*. 1988;4:194–199.
- Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN). AWHONN position statement. *NAACOG Newsletter*. 1992;19.
- Baby-Friendly USA. Baby-friendly hospitals and birth centers. Available at: <http://www.babyfriendlyusa.org/index.html>. Accessed October 4, 2007.
- Bhale P, Jain S. Is colostrum really discarded by Indian mothers? *Indian Pediatrics*. 1999;36:1069–1070.
- Bain K. The incidence of breast feeding in hospitals in the United States. *Pediatrics*. 1948;2:313–320.
- Ball TM, Bennett DM. The economic impact of breastfeeding. *Pediatr Clin North Am*. 2001;48:253–262.

- Ball TM, Wright AL. Health care costs of formula-feeding in the first year of life. *Pediatrics*. 1999;103:870–876.
- Baranowski T, Bee DE, Rassin DK et al. Social support, social influence, ethnicity and the breastfeeding decision. *Soc Sci Med*. 1983;17:1599–1611.
- Briend A, Wojtyniak B, Rowland MGM. Breast feeding, nutritional state, and child survival in rural Bangladesh. *Br Med J*. 1988;296:879–882.
- Broadfoot M, Britten J, Tappin DM, MacKenzie JM. The Baby Friendly Hospital Initiative and breast feeding rates in Scotland. *Arch Dis Child Fetal Neonat Ed*. 2005;90:F114–F116.
- Butte NF et al. Milk composition of insulin-dependent diabetic women. *J Pediatr Gastroenterol Nutr*. 1987;6:936–941.
- Butte NF, Wong WW, Hopkinson JM. Energy requirements of lactating women derived from doubly labeled water and milk energy output. *J Nutr*. 2001;131:53–58.
- Cattaneo A, Ronfani L, Burmaz T, Quintero-Romero S, Macaluso A, Di Maria S. Infant feeding and cost of health care: a cohort study. *Acta Paediatrica*. 2006;95:540–546.
- CBS News. Eyeful of breast-feeding mom sparks outrage. Available at: http://www.cbsnews.com/stories/2006/07/28/national/main1844454_page2.shtml. Accessed September 21, 2007.
- Centers for Disease Control and Prevention (CDC). HealthStyles Survey—Breastfeeding practices, 2004. Available at: http://www.cdc.gov/breastfeeding/data/healthstyles_survey/survey_2004.htm#2004. Accessed September 21, 2007.
- Centers for Disease Control and Prevention (CDC). Breastfeeding trends and updated national health objectives for exclusive breastfeeding—United States, birth years 2000–2004. *MMWR*. 2007a;56(30):760–763. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5630a2.htm>. Accessed August 15, 2007a.
- Centers for Disease Control and Prevention (CDC). Breastfeeding practices—results from the National Immunization Survey. 2007b. Available at: http://www.cdc.gov/greastfeeding/data/NISdata/data_2004.htm. Accessed October 7, 2007b.
- Chen A, Rogan WJ. Breastfeeding and the risk of post-neonatal death in the United States. *Pediatrics*. 113(5):e435–e439, 2004.
- Chen Y, Yu S, Li W. Artificial feeding and hospitalization in the first 18 months of life. *Pediatrics*. 1988;81:58–62.
- Coombs N. 1972. The new Negro, immigration and migration. In: *The Black Experience in America*. Available at: <http://www.gale.cengage.com>. Accessed September 15, 2007.
- Cunningham AS, Jelliffe DB, Jelliffe EFP. Breast-feeding and health in the 1980s: a global epidemiologic review. *J Pediatr*. 1991;118:659–666.
- Dearlove JC, Dearlove BM. Prolactin fluid balance and lactation. *Br J Obstet Gynaecol*. 1981;88:652–654.
- Deruisseau LG. Infant hygiene in the older medical literature. *Ciba Symposia*. 1940;2:530–560.
- Dettwyler KA. A time to wean: the hominid blueprint for the natural age of weaning in modern human populations. In: Stuart-Macadam P, Dettwyler KA, eds. *Breastfeeding—Biocultural Perspectives*. New York, NY: Aldine de Gruyter; 1995:39–73.
- DiGirolamo AM, Grummer-Strawn LM, Fein S. Maternity care practices: Implications for breastfeeding. *Birth*. 2001;28(2):94–100.
- Dimond HJ, Ashworth A. Infant feeding practices in Kenya, Mexico and Malaysia: the rarity of the exclusively breastfed infant. *Hum Nutr Appl Nutr*. 1987;41A:51–64.
- Eaton SB. Humans, lipids and evolution. *Lipids*. 1992;27(10):814–820.
- Fildes VA. *Breasts, bottles, and babies: a history of infant feeding*. Edinburgh, Scotland, UK: Edinburgh University Press; 1986.
- Foss KA, Southwell BG. Infant feeding and the media: the relationship between *Parents' Magazine* content and breastfeeding, 1972–2000. *Intl Breastfeeding J*. 2006;1:10. Available at: <http://www.internationalbreastfeedingjournal.com/content/1/1/10>. Accessed August 15, 2007.
- Gartner LM, Stone C. Two thousand years of medical advice on breastfeeding: comparison of Chinese and western texts. *Sem Perinatol*. 1994;18(6):532–536.
- Gerrard JW. Breast-feeding: second thoughts. *Pediatrics*. 1974;54:757–764.
- Greer FR, Apple RD. Physicians, formula companies, and advertising: a historical perspective. *Am J Dis Child*. 1991;145:282–286.
- Gregory JN. 1995. The Southern diaspora and the urban dispossessed: demonstrating the census public use microdata samples. *J American History*. 1995;82:111–134. Available at: <http://faculty.washington.edu/gregoryj/dispossessed.pdf>. Accessed September 15, 2007.
- Greiner T. The concept of weaning: definitions and their implications. *J Hum Lact*. 1996;12:123–128.
- Grulee CG, Sanford HN, Herron PH. Breast and artificial feeding: influence on morbidity and mortality of twenty thousand infants. *J Am Med Assn*. 1934;103:735–739.
- Habicht J-P, DaVanzo J, Butz WP. Mother's milk and sewage: their interactive effect on infant mortality. *Pediatrics*. 1988;88:456–461.
- Hannan A, Li R, Benton-Davis S, Grummer-Strawn L. Regional variation in public opinion about breastfeeding in the United States. *J Hum Lact*. 2005;21(3):284–288.
- Hastrup K. A question of reason: breastfeeding patterns in seventeenth and eighteenth-century Iceland. In: Maher V, ed. *The Anthropology of Breast-Feeding—Natural Law or Social Construct*. Oxford, UK: Berg Publishers; 1992:91–108.
- Howarth WJ. The influence of feeding on the mortality of infants. *Lancet*. 1905;2 (July 22):210–213.

- Hymanson A. A short review of the history of infant feeding. *Arch Pediatr*. 1934;51:1–10.
- Illingworth PJ. Diminution in energy expenditure during lactation. *Br Med J*. 1986;292:437–441.
- International Baby Food Action Network/International Organization of Consumers Unions (IBFAN/IOCU). *Protecting Infant Health: A Health Worker's Guide to the International Code of Marketing of Breast-Milk Substitutes*. Penang, Malaysia: IBFAN/IOCU; 1985.
- International Lactation Consultant Association. Position Paper on Infant Feeding (and references therein). Available at: <http://www.ilca.org/pubs/pospapers/infantFeeding.pdf>. Accessed August 4, 2007.
- Ip S, Chung M, Raman G et al. Breastfeeding and maternal and infant health outcomes in developed countries: Evidence Report/Technology Assessment 153. Available at: <http://www.ahrq.gov/downloads/pub/evidence/pdf/brfout/brfout.pdf>. Accessed August 12, 2007.
- Jackson RI. Ecological breastfeeding and child spacing. *Clin Pediatr*. 1988;27:373–377.
- Jaros L. Breast-feeding versus formula: cost comparison. *Hawaii Med J*. 1993;52:14–16.
- Jelliffe DB. Culture, social change and infant feeding: current trends in tropical regions. *Am J Clin Nutr*. 1962;10:19–45, 1962.
- Jelliffe DB, Jelliffe EFP. *Human Milk in the Modern World*. Oxford, UK: Oxford University; 1978.
- Jethi SC, Shrivastava DK. Knowledge, attitudes and practices regarding infant feeding among mothers. *Indian Pediatr*. 1987;24:921–924.
- Kaiser Permanente. Costs of NOT breastfeeding: Kaiser Permanente study. Available at: <http://www.visi.com/~artmama/kaiser.htm>. Accessed October 8, 2007.
- Kelsey JJ. Hormonal contraception and lactation. *J Hum Lact*. 1996;12:315–318.
- Kennedy K et al. Consensus statement on the use of breastfeeding as a family planning method. *Contraception*. 1989;39:447–496.
- Kent G. WIC's promotion of infant formula in the United States. *International Breastfeeding Journal*. 2006;1(8). Available at: <http://www.internationalbreastfeedingjournal.com/content/1/1/8>. Accessed October 14, 2007.
- Kessen W. *The Child*. New York, NY: Wiley; 1965.
- Konner M, Worthman C. Nursing frequency, gonadal function, and birth spacing among Kung hunter-gatherers. *Science*. 1980;207:788–791.
- Kusin JA, Kardjati S, van Steenberg W. Traditional infant feeding practices: right or wrong? *Soc Sci Med*. 1985;21:283–286.
- Labbok MH. Effects of breastfeeding on the mother. *Pediatr Clin North America*. 2001;48:143–158.
- Lacaille AD. Infant feeding-bottles in prehistoric times. *Proc R Soc Med*. 1950;43:565–568.
- La Leche League International. A current summary of breastfeeding legislation in the U.S. Available at: <http://www.lalecheleague.org/Law/LawBills.html>. Accessed July 14, 2007a.
- La Leche League International. Annual report 2005–2006. Available at: [http://www.llli.org/docs/2006 Report.pdf](http://www.llli.org/docs/2006%20Report.pdf). Accessed August 17, 2007b.
- Laroia N, Sharma D. The religious and cultural bases for breastfeeding practices among the Hindus. *Breastfeeding Med*. 2006;1(2):94–98.
- Latham MC et al. Infant feeding in urban Kenya: a pattern of early triple nipple feeding. *J Trop Pediatr*. 1986;32:276–280.
- Levenstein H. “Best for babies” or “Preventable infanticide”? The controversy over artificial feeding of infants in America, 1880–1920. *J Am Hist*. 1983;70:75–94.
- Lewis PR et al. The resumption of ovulation and menstruation in a well-nourished population of women breastfeeding for an extended period of time. *Fertil Steril*. 1991;55:529–536.
- Li R, Darling N, Maurice E, Barker L, Grummer-Strawn LM. Breastfeeding rates in the United States by characteristics of the child, mother, or family: The 2002 National Immunization Survey. *Pediatrics*. 2005;115(1):e31–e37.
- MacGowan RJ et al. Breast-feeding among women attending Women, Infants, and Children clinics in Georgia, 1987. *Pediatrics*. 1991;87:361–366.
- Marriott BM, Campbell L, Hirsch E, Wilson D. Preliminary data from Demographic and Health Surveys on infant feeding in 20 developing countries. *J Nutr*. 2007;137:518S–523S.
- Martinez GA, Krieger FW. 1984 Milk-feeding patterns in the United States. *Pediatrics*. 1985;76:1004–1008.
- Matich JR, Sims LS. A comparison of social support variables between women who intended to breast or bottle-feed. *Soc Sci Med*. 1992;34:919–927.
- McCracken RD. Lactase deficiency: an example of dietary evolution. *Curr Anthropol*. 1971;12:479–517.
- McDowell MM, Wang CY, Kennedy-Stephenson J. Breastfeeding in the United States: findings from the National Health and Nutrition Examination Surveys 1999–2006. NCHS Data Brief, No. 5, April 2008.
- McIntyre E, Hiller JE, Turnbull D. Community attitudes to infant feeding. *Breastfeeding Rev*. 2001;9(3):27–33.
- Mead Johnson [advertisement]. *J Am Med Assn*. 1930;95:22.
- Merewood A, Mehta SD, Chamberlain LB, Phillipp BL, Bauchner H. Breastfeeding rates in US Baby-Friendly hospitals: results of a national survey. *Pediatrics*. 2005;116(3):628–634.
- Merten S, Dratva J, Ackermann-Liebrich U. Do Baby-Friendly Hospitals influence breastfeeding duration on a national level? *Pediatrics*. 2005;116:702–708.
- Meyer HF. Breastfeeding in the United States: report of a 1966 national survey with comparable 1946 and 1956 data. *Clin Pediatr*. 1968;7:708–715.
- Millard AV. The place of the clock in pediatric advice: rationales, cultural themes, and impediments to breastfeeding. *Soc Sci Med*. 1990;31:211–221.
- Millman S. Trends in breastfeeding in a dozen developing countries. *International Family Planning Perspectives*. 1986;12(3):91–95.

- Morse JM. "Euch, those are for your husband!" Examination of cultural values and assumptions associated with breast-feeding. *Health Care Women Intl*. 1989;11:223-232.
- Morse JM, Jehle C, Gamble D. Initiating breastfeeding: a world survey of the timing of postpartum breast-feeding. *Intl J Nurs Stud*. 1990;27:303-313.
- Mukuria AG, Kothari MT, Abderrahim N. Infant and young child feeding update (USAID). Calverton, MD: ORC Macro; 2006.
- National Association of Pediatric Nurse Practitioners (NAPNAP). *Position Paper on Breastfeeding*. Available at: <http://www.napnap.org/practice/position/breastfeeding>. Accessed May 2003.
- Nestlé's Food [advertisement]. *Ladies' Home Journal*. 1892;9:26.
- Nga NT, Weissner P. Breast-feeding and young child nutrition in Uong Bi, Quang Ninh Province, Vietnam. *J Trop Pediatr*. 1986;32:137-139.
- Pasternak B, Ching W. Breastfeeding decline in urban China: an exploratory study. *Human Ecol*. 1985;13(4):433-466.
- Quigley MA, Cumberland P, Cowden JM, Rodrigues LC. How protective is breast feeding against diarrhoeal disease in infants in 1990s England? A case-control study. *Arch Dis Child*. 2006;91:245-250.
- Raisler J, Alexander C, O'Campo P. Breast-feeding and infant illness: a dose-response relationship? *Am J Public Health*. 1999;89(1):25-30.
- Retherford RD et al. To what extent does breastfeeding explain birth-interval effects on early childhood mortality? *Demography*. 1989;26:439-450.
- Riordan J. Cost of not breastfeeding: A commentary. *J Hum Lact*. 1997;13:93-97.
- Rossiter FM. *The practical guide to health, a popular treatise on anatomy, physiology, and hygiene, with a scientific description of diseases, their causes and treatment, designed for nurses and home use*. Pacific Press Publishing; 1908. (Reprinted in part in *J Hum Lact*. 1991;7:89-91.)
- Rotch TM. An historical sketch of the development of percentage feeding. *NY Med J*. 1907;85:532-537.
- Ryan AS, Zhou W. Lower breastfeeding rates persist among the Special Supplemental Nutrition for Women, Infants, and Children participants, 1978-2003. *Pediatrics*. 2006;117(4):1136-1146.
- Ryan AS, Zhou W, Gaston MH. Regional and socio-demographic variation of breastfeeding in the United States. *Clin Pediatr*. 2004;43:815-824.
- Saha K. Studies on colostrum: Nutrients and immunologic factors. *Nutr Foundation India Arch*. Available at: <http://www.nutritionfoundationofindia.res.in/archives>. Accessed August 2, 2007.
- Sandiford P et al. Why do child mortality rates fall? An analysis of the Nicaraguan experience. *Am J Public Health*. 1991;81:30-37.
- Serva V, Karim H, Ebrahim GJ. Breast-feeding and the urban poor in developing countries. *J Trop Pediatr*. 1986;32:127-129.
- Schaefer O. The impact of culture on breastfeeding patterns. *J Perinatology*. 1956;6(1):62-65.
- Shaikh U, Ahmed O. Islam and infant feeding. *Breastfeeding Med*. 2006;1(3):164-167.
- Short RV. Breast feeding. *Sci Am*. 1984;250:35-41.
- Simoons FJ. Age of onset of lactose malabsorption. *Pediatrics*. 1980;66:646-648.
- Slome C. Nonpuerperal lactation in grandmothers. *J Pediatr*. 1976;49:550-552.
- Stuebe AM, Rich-Edwards JW, Willett WC, Manson JE, Michels KB. Duration of lactation and incidence of type 2 diabetes. *JAMA*. 2005;294(20):2601-2610.
- Thorley V. Initiating breastfeeding in postwar Queensland. *Breastfeeding Rev*. 2001;9(3):21-26.
- Tiedje LB et al. An ecological approach to breastfeeding. *MCN: Am J Matern Child Nurs*. 2002;27:154-161.
- Truitt ST, Fraser AB, Grimes DA, Gallo MF, Schulz KF. Cochrane database systematic review 2003(2) CD003988. Combined hormonal versus nonhormonal versus progestin-only contraception in lactation.
- Tuttle CR. An open letter to the WIC program: the time has come to commit to breastfeeding. *J Hum Lact*. 2000;16:99-103.
- United Nations Children's Emergency Fund (UNICEF). *Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding, Florence, Italy, August 1990*. New York, NY: UNICEF, Nutrition Cluster (H-8F); 1990.
- United States Breastfeeding Committee (USBC). *Breast-feeding in the United States: A national agenda*. Rockville, MD: Health Resources and Services Administration, Maternal and Child Bureau; 2001.
- United States Breastfeeding Committee (USBC). *Economic Benefits of Breastfeeding* (issue paper). Raleigh, NC: United States Breastfeeding Committee; 2002. Available at: <http://www.usbreastfeeding.org/Issues-Papers/Benefits.pdf>. Accessed October 7, 2007.
- US Department of Agriculture (USDA), Food and Nutrition Service. Breastfeeding promotion and support in WIC. 2007. Available at: <http://www.fns.usda.gov/wic/Breastfeeding/breastfeedingmainpage.htm>. Accessed October 8, 2007.
- US Department of Health and Human Services (USDHHS). *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*. Washington, DC: Government Printing Office; 1979. Available at: <http://www.surgeongeneral.gov/library/reports.htm>. Accessed June 2002.
- US Department of Health and Human Services (USDHHS). *Healthy People 2010*. Vol. II. Washington: Government Printing Office. 2000a. Rev. ed. Available at: http://www.healthypeople.gov/Document/HTML/Volume2/16MICH.htm#_Toc494699668. Accessed October 10, 2007.
- US Department of Health and Human Services, Office on Women's Health. Blueprint for action on breastfeeding. 2000b. Available at: <http://www.womenshealth.gov/breastfeeding/bluprntbk2.pdf>. Accessed October 14, 2007.
- Uvnas-Moberg K et al. Release of GI hormones in mother and infant by sensory stimulation. *Acta Paediatr Scand*. 1987;76:851-860.

- Walker M. A fresh look at the risks of artificial infant feeding. *J Hum Lact.* 1993;9:97–107.
- Walker M. *Selling Out Mothers and Babies: Marketing of Breast Milk Substitutes.* Weston, MA: National Alliance for Breastfeeding Action; 2001.
- Weimer JP. *The economic benefits of breastfeeding: a review and analysis.* Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture, Food Assistance and Nutrition Research Report No. 13; March 2001.
- Whitehead RG. The human weaning process. *Pediatrics.* 1985;75(suppl 1):189–193.
- Wickes IG. A history of infant feeding: III. Eighteenth and nineteenth century writers. *Arch Dis Child.* 1953a;28:332–340.
- Wickes IG. A history of infant feeding: V. Nineteenth century concluded and twentieth century. *Arch Dis Child.* 1953b;28:495–502.
- Wieschhoff HA. Artificial stimulation of lactation in primitive cultures. *Bull Hist Med.* 1940;8:1403–1415.
- Williamson MA. *Infant mortality: Montclair, NJ. A study of infant mortality in a suburban community.* Washington, DC: US Department of Labor, Children's Bureau; 1915.
- Wilson-Clay B et al. Learning to lobby for probreastfeeding legislation: the story of a Texas bill to create a breastfeeding-friendly physician designation. *J Hum Lact.* 2005;21:191–198.
- Winikoff B, Laukaran VH. Breast feeding and bottle feeding controversies in the developing world: evidence from a study in four countries. *Soc Sci Med.* 1989;29:859–868.
- Wolf JH. The first generation of American pediatricians and their inadvertent legacy to breastfeeding. *Breastfeeding Med.* 2006;1(3):172–177.
- Woodbury RM. The relation between breast and artificial feeding and infant mortality. *Am J Hyg.* 1922;2:668–687.
- Woolridge MW, Greasley V, Silpisornkosol S. The initiation of lactation: the effect of early versus delayed contact for suckling on milk intake in the first week postpartum. A study in Chiang Mai, northern Thailand. *Early Hum Dev.* 1985;12:269–278.
- World Alliance for Breastfeeding Action (WABA). Home page. Available at: <http://www.waba.org.my>. Accessed October 14, 2007.
- World Health Organization (WHO). *Contemporary Patterns of Breast-Feeding.* Geneva, Switzerland: WHO; 1981a.
- World Health Organization (WHO). *International Code of Marketing Breastmilk Substitutes.* Geneva, Switzerland: WHO; 1981b.
- World Health Organization (WHO). *Protecting, Promoting, and Supporting Breastfeeding: The Special Role of Maternity Services.* [A joint WHO/UNICEF statement]. Geneva, Switzerland: WHO; 1989.
- World Health Organization (WHO). *Baby-Friendly Hospital Initiative* (A joint WHO/UNICEF statement). International Paediatric Association Meeting, Ankara, Turkey, 1991.
- World Health Organization, UNICEF. *Global Strategy for Infant and Young Child Feeding.* Geneva, Switzerland: WHO, UNICEF; 2003.