

Tides in Breastfeeding Practice

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The news is mixed. Worldwide, about 38% of the world's infants younger than the age of 6 months were exclusively breastfed during 2010 (World Health Organization [WHO], 2012)—the same overall rate as in 1985 (WHO, 2011) but an increase from more-depressed rates around 1990 (Labbok et al., 2006), and certainly, in the United States, a higher rate 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 (or for medical indications), and it involved only a small percentage of the world's people. During World War II and thereafter, however, the way in which most mothers in industrialized regions fed their infants began to change. Increasingly, breastfeeding was replaced by cow milk formulations, and the export of these new practices and associated products 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 occurrence of any breastfeeding.) Before attempting to trace long-term trends in infant feeding practices, let us consider the nature of available evidence.

Large-Scale Surveys

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. National surveys that allow statistical evaluation of their results have become available only relatively recently anywhere in the world. It is a marker of the late interest in breastfeeding among public health officials, and the medical profession in general, that the earliest and longest continued survey of breastfeeding initiation rates in the United States began in 1955 to provide marketing information for the maker of manufactured substitutes for human milk. These surveys

now consist primarily of national fertility, health, nutrition, or natality surveys, as well as marketing surveys conducted by manufacturers of baby milk products. By the new millennium, government-sponsored health surveys in the United States and other nations and surveys sponsored by international organizations had begun 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. More recently, surveys have begun to ask about the timing of the first breastfeeding. A brief description of national surveys conducted in the United States follows (Box 2-1).

BOX 2-1 BREASTFEEDING SURVEYS

United States

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

Centers for Disease Control and Prevention

www.cdc.gov/breastfeeding/data/

This web address contains links to all CDC surveys listed below.

Breastfeeding Report Card

<http://www.cdc.gov/breastfeeding/pdf/2013BreastfeedingReportCard.pdf>

Breastfeeding Report Cards, which have been issued annually since 2007, provide state-by-state data on breastfeeding initiation, continuation, and exclusivity rates at 3, 6, and 12 months. Additional data show how each state encourages breastfeeding: number of births at Baby-Friendly hospitals, number of International Board Certified Lactation Consultants (IBCLCs) and number of La Leche League leaders per 1000 live births, and support of breastfeeding at childcare centers.

Infant Feeding Practices Survey II

http://www.cdc.gov/breastfeeding/data/infant_feeding.htm

This study has not been repeated since 2007, but information collected then may still be useful. By using a series of questionnaires administered from the mother's seventh month of pregnancy through the baby's first year of life, the study gathered information about the following:

- Maternal and infant diets
- Correlates of infant feeding, sleep practices, and long-term breastfeeding
- Mothers' labor and delivery experiences and postpartum depression
- How mothers manage employment and child care
- Related topics such as food allergies, use of breast pumps, and WIC participation

Maternity Care Practices Survey

<http://www.cdc.gov/breastfeeding/data/mpinc/index.htm>

Every two years, beginning in 2007, the Maternity Care Practices Survey collects nationwide data about maternity care that is associated with establishing breastfeeding. A questionnaire is completed in all birth centers and hospitals that routinely provide maternity services. These data reinforce the importance of certain maternity-care practices that support establishment of breastfeeding: immediate postpartum skin-to-skin contact; rooming-in and in-hospital teaching about breastfeeding; early,

frequent, and exclusive breastfeeding; and in-person follow-up visits after discharge to monitor the progress of breastfeeding.

National Health and Nutrition Examination Survey

<http://www.cdc.gov/nchs/nhanes.htm>

The National Health and Nutrition Examination Survey assesses the health and nutrition status of respondents to the survey. It is the only U.S. survey that includes a home interview and a physical examination. The population sampled includes blacks, whites, and Hispanics in several age categories from younger than 6 years to more than 60 years. Questions related to breastfeeding concern whether—and if not, why not—newborns were breastfed.

U.S. National Immunization Survey

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

Although the primary purpose of this survey is to collect data on prevalence of vaccination in young children, since July 2001 questions pertaining to breastfeeding have also been asked. Data since 2000 are available on any breastfeeding postpartum and at 6 and 12 months; in addition, data since 2003 are available on exclusive breastfeeding through 3 and 6 months. Supplementation with manufactured milks for infants has also been tracked since 2003. Tables and maps present these data by social and demographic factors and by geographic location, although for fewer years; as of fall 2013, 2007 was the most recent year for which these presentations appear on the website.

National Survey of Family Growth

<http://www.cdc.gov/nchs/nsfg.htm>

The National Survey of Family Growth, which collects data on an irregular basis, samples women age 15–45 years about family life, fertility, and maternal and infant health. For breastfed infants, questions ask about addition of supplemental nutriment as well as infant age at complete weaning. The resulting information is used by federal agencies to plan health services and health education programs as well as to develop statistical studies of families, fertility, and health.

National Birth Certificate Data

<http://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf>

In 2003, a revised U.S. Standard Certificate of Live Birth was released; several revised questions ask about labor, delivery, and the general health of parents and newborn. One new question asks if the newborn is being breastfed at the time of discharge. The new certificate has been adopted on a state-by-state basis, but all states are expected to be in compliance in 2014. For a discussion of data quality and validity, refer to http://www.cdc.gov/nchs/data/nvsr/nvsr62/nvsr62_02.pdf Martin JA, Wilson EC, Osterman MJK, et al. Assessing the quality of medical and health data from the 2003 birth certificate revision: results from two states. *National Vital Statistics Reports*. 2013;62(2):1–20.

Pediatric Nutrition Surveillance System

Pregnancy Nutrition Surveillance System

<http://www.cdc.gov/pednss/>

The Pediatric Nutrition Surveillance System and Pregnancy Nutrition Surveillance System collect information about the nutritional status of low-income pregnant and postpartum women and their children enrolled in federally funded programs such as Special Supplemental Nutrition Program

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for Women, Infants, and Children (WIC) and Head Start. Data have been collected from more than 8 million children aged birth to 5 years. These data are used to plan, manage, and evaluate the programs serving these children, to develop nutrition education programs, and to monitor progress in achieving *Healthy People* objectives for the United States. The most recent summary of data from this survey, the Pediatric Nutrition Surveillance 2010 report, can be found at http://www.cdc.gov/pednss/pdfs/PedNSS_2010_Summary.pdf.

Pregnancy Risk Assessment Monitoring System

<http://www.cdc.gov/PRAMS/index.htm>

The CDC and state health departments collaborate to collect data on maternal and child health indicators from women who recently gave birth; topics addressed include unintended pregnancy, prenatal care, incidence and duration of breastfeeding, alcohol and tobacco use, and infant health. These data are published in a state-by-state format. As of 2013, 40 states and New York City participated in the systems, accounting for nearly 80% of live births in the United States. The data are used to implement and review state programs and policies that affect maternal and infant health.

Food and Nutrition Service of the U.S. Department of Agriculture

WIC Participant and Program Characteristics—Special Supplemental Nutrition Program for Women, Infants, and Children

<http://www.fns.usda.gov/wic-program-and-participant-characteristics-2010>

Data on breastfeeding are collected each even-numbered year by the U.S. Department of Agriculture about participants in the WIC program; data are submitted by state WIC agencies. In 2010, the year covered by the most recent report available in 2013, approximately 10 million women and children were enrolled in WIC; approximately one-fourth each were mothers and infants younger than 1 year of age, and about a half were children aged 1 through 4 years. In 2010, 63% of WIC mothers began breastfeeding. Overall median duration of any breastfeeding was 13 weeks, but in some states the median was considerably higher or lower. The estimated proportion of children receiving any breastmilk for at least 6 months is 21% to 29%.

Breastfeeding Data Local Agency Report—Special Supplemental Nutrition for Women, Infants, and Children

<http://www.fns.usda.gov/sites/default/files/FY2011-BFdata-localagencyreport.pdf>

In 2010, for the first time, WIC compiled and published breastfeeding performance data, a requirement of Public Law 111-296. Data are tabulated by state and local agencies. The 2011 report, the most recent year of coverage available in 2013, presents breastfeeding percentages by region and by degree of breastfeeding, partial or full; these data are compared with the previous year's data.

Surveys Sponsored Privately

Ross Laboratories Mothers Survey

The Ross Mothers Survey, used for marketing purposes, has been conducted since 1955 and was the chief source of statistical data about breastfeeding for many decades. 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 2020*. It is still the largest survey; as long ago as 2002, about 1.4 million questionnaires were mailed, and about 300,000 were returned. Questionnaire recipients are part of a probability sample of mothers whose names are obtained from

a large national database of pregnant or newly delivered women. 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. Neither Ross nor Abbot Laboratories (which owns Ross) has a website that discusses the Mothers Survey.

HealthStyles Survey

http://www.cdc.gov/breastfeeding/data/healthstyles_survey/survey_2012.htm

The HealthStyles survey, a proprietary national marketing survey, has collected data annually since 1995 in several categories. One of these categories is health beliefs and practices, to which the CDC has contributed questions about breastfeeding since 1999. The population sampled is structured so that it mirrors demographic categories and proportions of U.S. census data; thus the data acquired are considered to reflect current cultural norms. The CDC then licenses the data to use in its own health promotion activities.

Child Trends Data Bank

<http://www.childtrends.org/?indicators=breastfeeding>

Child Trends is a nonprofit, nonpartisan research center in the United States that collects and analyzes data about topics in family life, health, and child development in many countries; this information is used to improve policies and programs serving children. Some breastfeeding information is collected.

Around the World

World Health Organization

Global Data Bank on Infant and Young Child Feeding

<http://www.who.int/nutrition/databases/infantfeeding/en/>

The WHO Global Data Bank on Infant and Young Child Feeding, which came online about 2003, continues the work begun in 1991 by WHO's Global Data Bank on Breastfeeding. It pools data from national Ministries of Health, national research and academic institutions, nongovernmental organizations, organizations within the United Nations, and reports published online. About 145 countries are represented in its 2013 online database, approximately three-fourths of the nations of the world. Studies included in the database must have a population-based sample and use standard infant and young child feeding indicators. Information is updated continually as new data become available. The data bank can be searched by country or year, and with respect to breastfeeding, it contains information about initiation of breastfeeding, exclusive breastfeeding, and any breastfeeding.

Baby-Friendly Hospital Initiative

<http://www.who.int/nutrition/topics/bfhi/en/>

Although the purpose of the Baby-Friendly Hospital Initiative is to promote and support breastfeeding, the website listed above presents no statistical data about changes in rates of breastfeeding after adoption of the *Ten Steps to Successful Breastfeeding*, which help qualify a birthing location as “baby friendly.” For that information, turn to the many articles that focus on a given region or hospital. A 2012 review of Baby-Friendly birth facilities in the United States finds some correlation between the increasing number of birth facilities qualifying for Baby-Friendly status and increasing rates of breastfeeding initiation (Labbok MH. Global Baby-Friendly hospital initiative monitoring

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data: update and discussion. *Breastfeed Med.* 2012;7:210–222. doi: 10.1089/bfm.2012.0066; <http://www.ncbi.nlm.nih.gov/pubmed/22861482>).

UNICEF (United Nations International Children's Fund)

ChildInfo—Monitoring the Situation of Children and Women

<http://www.childinfo.org/>

UNICEF monitors the well-being of women and children worldwide and, to that end, collects and analyzes demographic information on many health topics. Statistical information about breastfeeding is placed under two headings in its 2013 webpage: Statistical tables—http://www.childinfo.org/breastfeeding_tables.php and Statistics by country—http://www.childinfo.org/country_list.php.

State of the World's Children 2009—Maternal and Newborn Health

http://www.unicef.org/cotedivoire/SOWC_2009_.pdf

The 2009 issue of *State of the World's Children*, an annual publication of the World Health Organization and UNICEF, reviews maternal and newborn health throughout the world (topics differ each year). Benefits of breastfeeding are discussed in the 2009 issue, and one figure and one appendix table provide statistical information relating to breastfeeding.

Demographic and Health Surveys

<http://www.measuredhs.com/What-We-Do/Survey-Types/DHS.cfm>

The Demographic and Health Surveys (“Measure DHS” surveys) are nationally representative household surveys with large sample sizes (usually between 5000 and 30,000 households); they typically are conducted in a given country every 5 years. The surveys are funded by a U.S. Agency for International Development program that collects and analyzes information on infant and young child nutrition in some 90 countries. Questionnaires used in 2012 contained questions on initiation and duration of breastfeeding and on attitudes toward transmission of HIV through breastfeeding. The data sets are available to the public for analysis.

Organization for Economic Cooperation and Development Family Database

Child Outcomes

<http://www.oecd.org/els/family/43136964.pdf>

The Organization for Economic Cooperation and Development works with governments to improve the economic and social well-being of people around the world. Four broad categories of interest focus on the structure of families, families and the job market, public policy related to families, and child outcomes. Child Outcome 1.5 (CO1.5) reviews breastfeeding. The webpage that was currently in place in 2013 was last updated in 2009, and some data presented look back as far as 2005.

World Breastfeeding Trends Initiative (WBTi) (IBFAN Asia)

<http://worldbreastfeedingtrends.org/>

The World Breastfeeding Trends Initiative, in 2008 and 2012, compiled assessments of breastfeeding from 82 countries total in Africa, the Arab world, Asia, Latin America, and Oceania. These assessments are provided to governments to inform policies on infant and young child feeding and to International Baby Food Action Network (IBFAN) as a way to monitor its activities, all with the goal of reducing young child mortality.

In the United States, various arms of the Centers for Disease Control and Prevention (CDC) have now added questions about breastfeeding to their data collection instruments. The National Immunization Survey now regularly collects information about breastfeeding. Other surveys have collected such data from time to time, such as the National Health Interview Survey, National Health and Nutrition Examination Survey, and National Survey of Family Growth. In addition, the Supplemental Nutrition for Women, Infants, and Children (WIC) program sponsors the Pediatric Nutrition Surveillance System.

With the notable exception of the National Health and Nutrition Examination Survey and the National Immunization Survey, questions in many surveys pertain to “any breastfeeding”; that is, they do not distinguish between initiation, mixed feeding, or exclusive breastfeeding, and they do not report the age of the infant when other liquids or foods were first regularly added to the child’s diet. Thus our ability to calculate rates of exclusive breastfeeding and continuation rates for other breastfed infants lags well behind our ability to calculate initiation rates. Government- and United Nations–sponsored surveys in developing countries collected minimal data on breastfeeding prior to the 1970s but have added more questions since then. These data have been made available to the public on the ChildInfo website (United Nations International Children’s Emergency Fund [UNICEF], 2013).

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 have begun 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 addresses infant feeding, at least in passing. 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 practice. 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.

Today, modern ethnography documents the infant feeding practices of low-technology hunter-gatherer, herding, and farming societies. Ethnographers expand our knowledge of the range of normal breastfeeding practices, and they provide a richer appreciation of cultural practices that enhance the prevalence of breastfeeding. Such studies may serve as a window into those earlier 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 glands), which secrete and release a fluid, milk, that for a time provides 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). Hominids—the precursors of *Homo sapiens*—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. Our species of

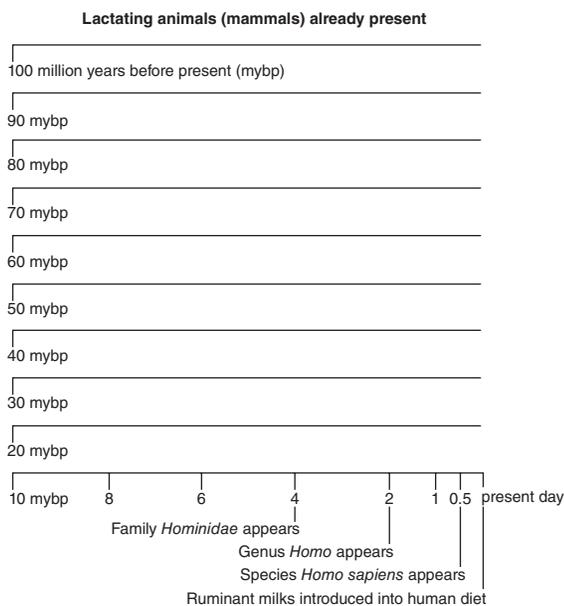
anatomically modern humans, *Homo sapiens sapiens*, first became differentiated about 130,000 years ago in Africa, were present in the Near East by 90,000 years ago, and first appeared in what is now southern Europe about 40,000 years ago. Although other information about Paleolithic societies that existed 10,000 or more years ago sheds some light on this subject, direct information about breastfeeding practices among our earliest ancestors is lacking.

Early Breastfeeding Practices

Diets reconstructed by archeological methods reveal that the world of 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), and, where available, 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) and of hunter-gatherer societies of Papua New Guinea and elsewhere. Among these peoples, breastfeeding of young infants is frequent (averaging four feeds per hour) and short (about 2 minutes per feed). Young infants are carried much of the time, are commonly in skin-to-skin contact with their mother, and attach to the breast at will (Konner, 2004). Breastfeeding is equally distributed throughout 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

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.



easily digestible monosaccharides. In most mammals, the ability to produce lactase persists during the nursing interval but attenuates after weaning. In most modern human children who do not continue breastfeeding, this ability declines steadily after age 2 years and is rare by age 4 years (Dettwyler, 1995). These breastfeeding patterns are considered a direct inheritance of widely used practices that prevailed at the end of a long, and dietetically stable, evolutionary period before about 15,000 BC, after which the diffusion of agriculture brought new foods into both the adult and the infant diet. A similar pattern is seen in humans' 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

To sustain their infants, most societies commonly mix 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 are also reported in descriptions of many traditional societies (Slome, 1976; Wieschhoff, 1940) and in today's literature on re-lactation (Newman & Goldfarb, 2002).

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 (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 2nd 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, permits parents to "give your children out to nurse" (and also forbade children nursed by the same woman to marry).

Although the history of wet-nursing has continued virtually unbroken from the earliest times to the present, the popularity of the practice among the classes who used it most has waxed and waned (Stevens et al., 2009). In England during the 1600s and 1700s, as well as 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. Infants might not be 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 both North America and England, except in foundling hospitals, owing to increased public concern regarding the moral character of wet nurses—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 cow milk formulations to substitute for human milk.

Hand-Fed Foods

The Agricultural Revolution

The idea that animal milks are suitable foods for human infants is reflected in myths such 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 10,000 years ago (Eaton, 1992), and animal milks considerably later, perhaps 7000–5000 years ago (McCracken, 1971). The diffusion 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 or cooking 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 products, or honey or oils, might also be added.

Animal Milks

The use of animal milk (directly or in household or commercial formulations) to nourish infants was unknown in the human diet for most of our history as a species, and animal milk is a food to which human physiology is incompletely adapted. This “newcomer” status is implied genetically, because children beyond weaning age commonly do not produce the enzyme lactase needed to digest the milk sugar lactose. In cultures that traditionally do not use animal milks, such as those in Mexico, Bangladesh, and Thailand, children may become lactose intolerant shortly after breastfeeding ceases. In other cultures that use animal milks abundantly, especially northern European societies, the onset of lactose intolerance occurs considerably later—in Finland,

for instance, after age 10 (Simoons, 1980). A young infant should be nourished by such a food only with greatest caution, as is attested by recent research into the relationship between celiac disease and a high-gluten diet early in life (Ivarsson et al., 2013).

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 a hole in the tip; 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).

Figure 2-2 AN ENGLISH STAFFORSHIRE SPODE NURSING BOTTLE, C. 1825.



Courtesy of V. H. Brackett

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 be offered certain foods as prelacteal feeds; young infants may be offered occasional tastes of other foods, and they will be offered increasing amounts of soft foods as they slowly transition to the family diet in later infancy. Finally, infants may be reared from birth on non-human milks and other foods, whether homemade or manufactured.

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, many ancient preliterate societies) whose neonatal feeding practices have been described, 50 delay the initial breastfeeding more than 2 days, and some 50 others 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 et al., 1990). For instance, it is reported that as many as three-fourths of women in India discard colostrum for these reasons (Jethi & Shriwastava, 1987; McKenna & Shankar, 2009; Saha, 1991). The actual amount of milk discarded may range from none at all—rather, breastfeeding is delayed a day or two—to a small volume—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 the authors 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 (e.g., almond), or sweetened water or wine. It is not clear why these traditions developed, because each day's delay in initiation of breastfeeding steadily increases the likelihood of neonatal death from infection (Edmond et al., 2007). Perhaps the health cost to the infant was outweighed by the social benefit that led more people to care for the newborn.

In Europe, the fear of feeding colostrum may have contributed to the undermining of maternal breastfeeding, at least among the upper classes, and helped to spread wet-nursing (Deruisseau, 1940)—wet nurses typically offered a newborn mature milk rather than colostrum. A modern version of this charge has been leveled at the prelacteal bottle feeds commonly given in Western (or Western-style) hospital nurseries; many studies show that day 1 or 2 bottle-feeds of manufactured milk products are associated with increased maternal use of manufactured substitutes for the mother's milk. (Ostensibly these practices allowed staff to check for esophageal patency and to protect against hypoglycemia; neither practice is considered an appropriate standard of care today.) One can only wonder if customary Western hospital practices, which have included delaying first breastfeeding and instead offering the neonate 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 in and of themselves reduce the likelihood of continued lactation (see the *Anatomy and Physiology of Lactation* chapter). Some authors propose that the 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 lead to an uneventful breastfeeding course: nearly constant contact with or proximity to the infant, breastfeeding on an ad lib basis day and night, and no further use of feeding bottles (Nga & Weissner, 1986; Woolridge et al., 1985).

Mixed Feeds

Historically, early mixed feedings may have been the most common infant-feeding regimen (Dimond & Ashworth, 1987; Kusin et al., 1985; Latham et al., 1986). Mixed feeding is widely practiced today, even during the time when breastmilk forms the foundation of the infant diet. In regions such as Africa and Latin America, breastfeeding commonly continues into the second or third year of life, well after the infant has been introduced to family foods. 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 complement, rather than replace, breastmilk (Greiner, 1996; Whitehead, 1985); thus they do not appreciably hasten complete cessation of breastfeeding. The use of feeding bottles, however, can shorten the weaning interval, that 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. Fewer 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 African American (Centers for Disease Control and Prevention [CDC], 2013b).

Hand-Feeding from Birth

In a few regions of northern Europe, a long history 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 happenstance permitted the survival of at least some infants who were fed cow milk nearly from birth. However, even in climatically optimal areas, lack of breastfeeding, combined with hand-feeding, was

hazardous. In Iceland, infants were generally hand-fed from birth 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 death rates: as many as 100% died.

However, by the mid-1900s in many industrialized countries, hand-feeding from birth had become the norm and hand-fed infants survived and grew. How 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). (However, we do not know the patterns of breastfeeding in this population, nor have we ascertained the prevalence of supplementary feeding.)

As women's aspirations for community service and commercial employment began 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 the survival of infants who were not breastfed. The upright feeding bottle and the rubber nipple, each of which could be cleaned thoroughly, made artificial feeding easier and somewhat safer. This equipment and the new commercial foods to be used with them were widely marketed as modern and better for mother and child. Large-scale dairy farming produced abundant supplies of cow milk which, when sold as canned evaporated milk and later in condensed (highly sweetened to retard spoilage) or dried forms, came with recipes for infant-food formulas.

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 Nestlé's Milk Food, were first marketed in Europe and the United States in the 1860s. The Nestlé'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 replayed again and again.

In the 1890s, physician Thomas Rotch developed a complex system for modifying cow milk so that it "more closely resembled human milk." Rotch 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 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—a situation that may continue to influence the field today.

Commercial advertising promoted the use of manufactured milk products for infant feeding to mothers and to health workers. Again, the basic themes—a mother's concern for her infant's welfare, the supposed difficulty of breastfeeding, and the "perfection" of the manufactured product—have persisted into the 21st century (Apple, 1986).

The Role of the Medical Community

Breastfeeding, in fact, may have become more onerous during the last 200 years, as women were

increasingly impelled to give birth and then to feed according to externally generated ideas about how those activities should be accomplished.

Figure 2-3 AN ADVERTISEMENT FOR ARTIFICIAL INFANT MILK THAT APPEARED IN THE *LADIES' HOME JOURNAL* IN 1895.



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

Regulation of Childbirth

During the early part of the 1900s, childbirth moved (for all but the most impoverished families) largely from home or midwife-attended births to hospitals. In these facilities, a birthing woman was separated from her family and friends (in part because of the fear of infection) and was attended by hospital staff. During the middle part of the 20th century, the widespread use of general anesthesia during labor and delivery and other hospital routines were instituted that separated mother and infant for much of the early postpartum period. Bottle-feeding by nursery staff, initially with hospital-produced formulas but later with manufactured milk products, became 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, which was intended to permit the mother to recuperate from a commonly highly medicated childbirth, usually resulted in a return home with an impaired milk supply and a baby who was accustomed to feeding from bottle nipples. As long ago as the mid-1940s, Bain noted that babies who were older than 8 days at discharge were less apt to be breastfed than were younger ones (Bain, 1948).

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 that 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. For reasons not at all clear today, "overfeeding" was deemed a central factor in both conditions. Writers concerned with child care responded by advocating the regulation of feeding 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 need 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 caring for 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 imagine). 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 (and from the realm of women in general) and place it in the hands of (usually male) “authorities.” Cadogan (1749; cited in Kessen, 1965) commended this change that put “men of sense rather than foolish unlearned women” in charge; Rotch, a century and a half later (1907), deplored the fact that “mothers and nurses ... dominated the physicians.”

Despite earlier concern on the part of “authorities” about too much milk, the most common concern among all classes of women in the United States, at least since popular women’s magazines

became widely distributed in the late 1800s, was 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 physician who directed how the mother cared for her baby—breastfeeding oftentimes got left behind.

With respect to a newborn’s first breastfeed, as late as the 1950s physicians in the United States 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). Today, immediate postpartum skin-to-skin contact between mother and neonate and encouragement to breastfeed are thought best. At a minimum, bringing baby to breast within the first hour after birth is recommended (WHO, 2009). 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; Saadeh et al., 1993; Tiedje et al., 2002). The long-standing need in the United States for breastfeeding “promotion” is rooted in the common perception (in the United States) that the breast is primarily for sexual gratification and, therefore, should not be exposed in public. Notwithstanding the fact that legislation in all states in the United States permits breastfeeding in public (CDC, 2013a), many mothers avoid doing so because of social censure. However, considerable regional and demographic variation in such attitudes exists in the United States (Hannan et al., 2005; Ryan et al., 2004). In general, New England, the mountain West, and Pacific regions appear to be most accepting of breastfeeding in public. In a survey conducted in the United States in 2004, 37% of people questioned agreed that mothers should

breastfeed only in private; a nearly equal percentage favored allowing breastfeeding in public, and the remainder, about 27%, were undecided (CDC, 2004). Almost 10 years later, little had changed. A news story in 2013 reported that 40% of surveyed mothers were “concerned” (the term was not further defined) about breastfeeding in public (*Business Wire*, 2013). The same prejudice is present in some other countries. An Australian telephone survey found that almost 83% of respondents favored bottle-feeding rather than breastfeeding in public (McIntyre et al., 2001); discussion of that topic was still taking place in social media in 2013 (Parenting Central Australia, 2013).

Mass media may also influence perceptions of breastfeeding. One study in the United States found that after the number of commercial advertisements for manufactured infant food products increased in one widely circulated magazine geared toward parents, breastfeeding prevalence dropped during the following year (Foss & Southwell, 2006). Magazine illustrations depicting breastfeeding may produce 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 one-fourth 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 best obtained through 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 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, even now, assumes that lactation functions better when mother and baby develop feeding routines—and the sooner those routines are settled, the better. 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 hurried the decline in breastfeeding (Meyer, 1968). Contraceptives containing estrogen reduce milk volume and, therefore, 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 so as 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 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 later review of the literature found the evidence on this point to be contradictory (Truitt et al., 2003). The Academy of Breastfeeding Medicine (2005) recommended that mothers be advised that all contraceptives that contain any exogenous hormone may reduce breastmilk supply. [A revision of the contraception protocol under way in 2013 continued to caution against estrogenic methods

during lactation and against early progestogenic methods, because onset of lactation results from the decline in progesterin levels following the delivery of the placenta. However, it will also include new CDC (2013c) recommendations that allow all methods during lactation by 4 weeks postpartum, with cautionary notes.}]

As a result of the wide use of exogenous contraceptives for many decades, the understanding of how early full breastfeeding can serve as a reliable contraceptive has been lost by most laywomen and medical professionals alike.

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 manufacturers of milk products for infants 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 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" (Mead Johnson, 1930). For many decades, this unwritten agreement extended to medical education as well. Formula companies may spend as much as \$10,000 per medical student during a student's education

(National Alliance for Breastfeeding Advocacy, 2007). 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 (Grulee et al., 1934; Howarth, 1905; Woodbury, 1922), for years many physicians advised mothers that there was little advantage to breastfeeding. This view was expressed consistently 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 greater morbidity, hospitalization, and mortality (Raisler et al., 1999; Steube, 2009 [see also extensive references therein]), or the inverse, that breastfed infants enjoy better health (Ip et al., 2007), even in 2013 statements similarly dismissive of the crucial role of breastmilk in infant health could still be heard. On a more positive note, since 1997 many professional health organizations have endorsed breastfeeding as the superior way to feed infants (see a subsequent section, "Statements by Health Organizations").

The Prevalence of Breastfeeding

United States

1940–2000

Beginning in the 1940s, the net result of shifts in technology, commercial advertising, and social attitudes (discussed previously) was a rapid decline in the prevalence of breastfeeding in Western nations. 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 to only 18% in 1966 (Meyer, 1968).

This period of sharpest decline of breastfeeding coincided with economic factors in the United States that encouraged major migrations from rural to urban areas, and those migrations may have contributed to the decline. For example, between 1945 and 1970, approximately 5 million African Americans, seeking greater opportunity and financial security, moved from the rural South to the urban North or far West (Coombs, 1972; Gregory, 2005). The association between internal migration from rural to urban areas and a decline in breastfeeding has been noted in other countries as well (Brockerhoff, 1994; Millman, 1986; Pasternak & Ching, 1985).

Current Breastfeeding Practices

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. As of spring 2013, the provisional rate of any breastfeeding of children born in 2009 (the most recent year for which National Immunization Survey data had been analyzed) was 77%—five percentage points below the *Healthy People 2020* goal of 81.5%—of hospital-born infants initiating breastfeeding. The rate of any breastfeeding at 6 months of age rose to 47%—an encouraging trend but still lower than the 61% goal set by *Healthy People 2020* (CDC, 2013b; U.S. Department of Health and Human Services [DHHS], 2010a).

Various populations of women differ considerably in their breastfeeding practices. Notably, lower rates of initiation and continuation (especially for exclusive breastfeeding—nothing fed by mouth except human milk)—persisted among women who were younger, nonwhite, and unmarried; who had less formal education and low incomes; and who lived in rural areas (Grummer-Strawn & Shealy, 2009; Kogan et al., 2008). Geographic variations in the United States are also evident. In general, higher initiation rates and continuation rates at 6 months were found in the West and Northwest (Kogan et al., 2008). In 2013, about half of U.S. states collected “ever breastfed” data on the basis of information provided

on a birth certificate. The birth certificate approach, however, does not include continued breastfeeding or exclusive breastfeeding, information that would add much to our understanding at the state level. All states are now collecting breastfeeding data on women within the WIC program.

Outside North America

The Role of Colonial Empires

Declines in the prevalence of breastfeeding were noted in non-Western regions somewhat later than in Europe and North America. Between World Wars I and II, British, French, and German colonial empires controlled fully one-fourth of the inhabited globe and one-fourth of the world’s population. These empires served as vehicles for the expansion of markets for, among other things, manufactured milk products for infants.

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 population ruled) were much more likely to feed their infants artificial milks than to breastfeed. The fact that most of these infants survived is due in large part to the larger roles played by the sanitation and medical care that their position in life afforded them. To some degree, these colonial elites served as unwitting 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 in treating many other health problems, local populations were prepared to accept attitudes that encouraged the use of artificial baby-milk products. Healthcare personnel in hospitals who helped to introduce the use of those products reinforced the undermining of breastfeeding (Winikoff & Laukaran, 1989).

Colonial transportation and communication networks and health clinics and hospitals aided the advertisement and sale of manufactured milk products 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 manufacturers of milk products for infants created large new markets. Later, their sales practices were damningly documented in the report *The Baby Killer* (War on Want & Muller, 1974; see also National Alliance for Breastfeeding Advocacy, 2007). Subsequently, the market for such milk products diminished somewhat in Europe and North America; in turn, manufacturers' intensive sales efforts were redirected toward Africa and Asia. Those efforts continue to reward manufacturers: in 2011, formula manufacturers spent \$190 million on advertising in Indonesia alone; in return, they grossed \$1.1 billion in sales (Prakasa, 2013).

Infant Feeding and Infant Mortality

The relationship 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. The same relationship held in the United States as early as the early 1900s (Williamson, 1915).

Although artificial feeding has been associated with more illness (Steube, 2009)—especially gastrointestinal illness (Quigley et al., 2006)—and with poorer infant survival in all countries studied—developing nations (Habicht et al., 1988) and Western developed 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. The pervasive problems of poverty, in both Western and non-Western (Lartey, 2008) locales, continue to be at the root of the high infant mortality seen in many impoverished populations.

Current Breastfeeding Practices

During the 1970s, when breastfeeding initiation rates were generally rising in Western nations, the corresponding rates among developing countries fluctuated around post-World War II developing-country rates 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). However, breastfeeding continued to be widely practiced in many countries studied in Africa, Asia, Europe, and Latin America. During the period 1999–2004, pooled data from demographic and health surveys showed that more than 95% of infants younger than 6 months old were breastfed, as were 88% of infants 6–12 months old. Although mixed feeds were the norm, manufactured infant milk products formed only a small portion of infant diets (Marriott et al., 2007). Detailed information for individual countries about rates of exclusive breastfeeding and of continuation after introduction of complementary feedings can be found in child nutrition statistics published by UNICEF (2009).

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 various influences on the health of infant and mother, the costs of health-care 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—and, in the case of breastfeeding, a reliance on new scientific evidence. Existing lay organizations that promoted breastfeeding began to spread more widely. Basic, clinical, and demographic research increasingly demonstrated the benefits of human milk and breastfeeding to the infant and of lactation and breastfeeding to the mother. Later still, it was recognized that not only does breastfeeding promote better long-term health for infant and mother, but that *not* breastfeeding entails long-term physiological and financial costs.

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 suffer more acute illness than do breastfed infants (Cunningham et al., 1991; Grulee et al., 1934; Howarth, 1905; INFACT Canada, 2006; Quigley et al., 2006; Raisler et al., 1999; United States Breastfeeding Committee, 2002; Woodbury, 1922). Moreover, even in the United States, both black and white infants fed on manufactured infant milk products 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 subsequent chapters of this text. At the time of the earlier studies, the immunological role of breastmilk was unclear; hence most of the deleterious effects of manufactured milk products for infants 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 they also lack the immunological and other health-promoting factors present in

human milk. In addition, they contain compounds that are either 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 a later chapter, 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 (INFACT Canada, 2006; 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 milk products to feed their infants (and those infants as well) are more likely to develop type 2 diabetes 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 some degree they affect all segments of populations in technologically advanced regions.

Costs to the Family

Although lactation imposes some metabolic demands on the mother—an extra 500 kcal/day 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 the costs of rearing one who is artificially fed (Ball & Bennett, 2001; Ball & Wright, 1999). Approximately 150 cans of ready-to-feed manufactured milk products for infants are used during the first 6 months of full artificial feeding (approximate 6-month cost, 2013, ready-to-feed: \$1050–\$2250). Even mothers who receive free manufactured infant milk from the WIC program (see the later discussion) 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 by even more if a special mixture is required to minimize the baby's allergies or other health problems. In developing nations, this ratio is many times higher. In regions where one-third to one-half of those persons in large urban areas live in poverty, the cost of manufactured milk products required to provide adequate nutrition (and implements with which to feed them) represents a substantial 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 increased need for medical care by infants fed with manufactured milk products (Weimer, 2001). The frequency and severity of illnesses in a young infant is directly related to the proportion of the diet that comes from human milk substitutes (Cattaneo et al., 2006; Chen et al., 1988). As intake of manufactured milk products increases, infant intake of high-quality protein and a variety of other needed nutrients decreases, as compared with the intake of breastfed infants, and artificial feeding increases infant exposure to potential pathogens in other foodstuffs (Habicht et al., 1988). One study

calculated that if 90% of U.S. families breastfed exclusively for 6 months, as medical organizations now recommend (in 2013), \$13 billion would be saved in excess medical costs of treating infants fed manufactured human milk substitutes (Bartick & Reinhold, 2010). A decade or more ago, it was estimated that insurers paid out \$1.3 billion more for infants fed manufactured infant milks, as compared with breastfed infants, to treat only three conditions in the first year of life: respiratory infections, ear infections, and diarrhea (Riordan, 1997; Weimer, 2001). That sum is even larger now. 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 illness.

Because full breastfeeding that incorporates frequent feeds throughout a 24-hour period tends to delay resumption of ovulation (Chao, 1987; Lewis et al., 1991), spacing between births tends to increase. Births spaced less than 3 years apart tend to increase the mortality risk of both the older child and the younger infant (Retherford et al., 1989; Rutstein & Macro International, 2008). 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; WHO & UNICEF, 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 in 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 tended to focus on health costs or on the cost of food for the mother rather than manufactured milks for the infant, 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 other unwaged caring work women do, such as 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 manufacturers of milk products for infants, 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. Worldwide, revenues from the manufacture of infant milks, baby food, and ancillary products such as bottles and bottle nipples are projected to reach \$23.8 billion by the year 2015 (Global Industry Analysts, 2010). In the process of developing this market, the industry creates a large payroll and tax revenues in communities where factories are located. Moreover, such manufactured milk products are subsidized by the diversion of resources (land and dairy cattle, and people to manage both) as well as by manufacturing capacity pulled from other possible uses. When one considers that more than 30 million babies are born annually in Africa alone (United Nations, 2011), 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 benefits of breastfeeding, then, extend through a small environmental footprint to the society at large (DHHS, 2010b).

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 during 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, may be unable to cultivate in the general population more accepting attitudes toward breastfeeding or to remove social or workplace barriers to breastfeeding. It is now clear that promotion of breastfeeding without support and protection of the breastfeeding mother produces little long-term gain, and that the ways in which manufactured infant milks are inferior to human milk—rather than the reverse—need to become more generally understood.

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* (DHHS, 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%, respectively. The current report, *Healthy People 2020*, proposed increasing the percentage of ever-breastfed infants to 82% and those breastfed at 6 months to 60%, among other goals (DHHS, 2010a) (Table 2-1). Another document issued by

Table 2-1 BREASTFEEDING GOALS AND PREVALENCE IN THE UNITED STATES, 1990–2020 (PERCENT)^a

Degree of Breastfeeding	<i>Healthy People 2000</i> ^b		<i>Healthy People 2010</i> ^c		<i>Healthy People 2020</i> ^e	
	Actual, 1990	Goal, 2000	Actual, 2001 ^c	Goal, 2010	Actual, 2006 ^f	Goal
Any breastfeeding						
Early postpartum	52	75	72	75	74	82
6 months	18	50	37	50	44	61
12 months		25	18	25	23	34
Exclusive breastfeeding						
3 months			31 ^d	40	34	46
6 months			12 ^d	17	14	26

^a Percentages are rounded to the nearest whole number.

^b Source: <http://www.cdc.gov/nchs/data/hp2000/hp2k01.pdf> (National Center for Health Statistics. *Healthy People 2000 final review*. Hyattsville, MD: Public Health Service; 2001).

^c Source: <http://wonder.cdc.gov/data2010/obj.htm> (U.S. Department of Health and Human Services. DATA2010: the *Healthy People 2010* database. 2011 edition. Updated August 2013).

^d For year 2004, first year reported in DATA2010 website (as in note c).

^e Source: <http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=26#102124> (U.S. Department of Health and Human Services. *Healthy People 2020*. Maternal, infant, and child health objectives (MICH) 21: increase the proportion of infants who are breastfed. 2010a).

^f Data for children born in 2006 as reported in 2007–2009; see *Healthy People 2020* website (as in note e).

the Department of Health and Human Services (2011) affirms the benefits of breastfeeding, recognizes barriers to breastfeeding, and recommends actions that will make it more likely that babies will be breastfed. However, it does not recommend specific legislation to 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, which may include manufactured infant milk products, to low-income mothers and their infants (U.S. Department of Agriculture, 2012a). Clients typically come from those population segments in the

United States least likely to breastfeed (those of low income, less formal education, and black race) (CDC, 2006, 2013b).

The WIC program follows in the footsteps of U.S. infant welfare programs established in the 1890s and at the turn of the century, as well as 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 has been considered one reason for the decline of breastfeeding (Ryan & Zhou, 2006; Sandiford et al.,

1991). The WIC program remains the largest purchaser (and distributor, at little cost to the manufacturers) of manufactured milk products for infants in the United States (Kent, 2006; Oliveira, 2011; Tuttle, 2000): in 2010 it served more than half of all infants born in the United States (Oliveira, 2011), of whom the majority were fed formula. 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 \$5.2 billion WIC budget was earmarked for promotion and support of breastfeeding (Ryan & Zhou, 2006); in 2011, a budget of \$7.6 billion earmarked 1.1%—\$83 million—for breastfeeding promotion (U.S. Department of Agriculture, 2011). Thus the dollar amount spent to promote breastfeeding is only a small fraction of the amount spent for manufactured infant milk. In 2013, breastfeeding women had a higher priority for enrollment in WIC programs than did nonbreastfeeding mothers: they were provided with more, and more varied, foods, and their benefits persist longer—1 year, as opposed to 6 months for nonbreastfeeders (U.S. Department of Agriculture, Food and Nutrition Service, 2012b).

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 they also initiate breastfeeding at a lower rate than mothers who qualify for WIC aid but are not enrolled in this program (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).

Breastfeeding advocates such as the American Academy of Nursing Expert Panel on Breastfeeding are speaking out on the disconnect between WIC's breastfeeding supportive policy and its practices that indicate “funding is overwhelmingly spent on formula with only a small fractional portion allocated toward peer counseling programs” (Baumgartel et al., 2013). The group is calling for the Food and Nutrition Service to adjust funding to more fully support peer counseling programs, which are known to increase breastfeeding rates and duration.

United States Breastfeeding Committee

In 1998, supported by the Maternal and Child Health Bureau of the Department of Health and Human Services, a national breastfeeding conference was convened to form a breastfeeding committee. 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 organizations 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 known examples was set in 350 BC by Lycurgus, the king of Sparta: he required not only that mothers nurse their own infants, but also 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 often 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, at least 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 (United States Breastfeeding Committee, 2013). As of 2012, no state laws forbade breastfeeding in public. Laws of 48 states and the District of Columbia—but not Idaho or West Virginia—address breastfeeding in public, either by permitting a woman to breastfeed anywhere where she is entitled to be or by exempting a woman who is breastfeeding in public from charges of indecent exposure (National Conference of State Legislatures, 2012).

Statements by Health Organizations

In 1997, the American Academy of Pediatrics Work Group on Breastfeeding issued a policy statement endorsing breastfeeding; the current statement was published in 2012. The initial statement received considerable attention from the press, accelerating nationwide interest in breastfeeding. Other professional organizations have published similar endorsements of breastfeeding; the American College of Obstetricians and Gynecologists (2007),

the Association of Women's Health, Obstetric, and Neonatal Nurses (2007), the National Association of Pediatric Nurse Practitioners (2007), the American Dietetic Association (2009), the American College of Nurse–Midwives (2011), the Academy of Breastfeeding Medicine (2008), the American Public Health Association (2011), and the American Academy of Family Physicians (2013).

International Breastfeeding Promotion

The International Code of Marketing of Breast-Milk Substitutes

In the 1970s, as the deleterious effects of manufactured baby milk products on infant health and survival became better appreciated, the role of advertising in spreading the use of these products 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. This code provides a model of marketing practices that permits the availability of manufactured baby milk products but forbids advertisement or free distribution directly to consumers (Box 2-2).

BOX 2-2 WHO CODE OF MARKETING OF BREAST-MILK SUBSTITUTES

- No advertising of these products to the public.
- No free samples to mothers.
- No promotion of products in healthcare 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, 1981.

The code also seeks to balance the information provided by manufacturers of milk products for infants, in both written “educational” material and in the text or pictures on containers of the product (Armstrong, 1988; International Baby Food Action Network, 1985). In 1996, the World Health Assembly of the World Health Organization 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 manufactured baby-milk products 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 (World Health Organization 1996). As of 2011, of 168 countries surveyed, exactly half had enacted into law many or all of the provisions of the international code: 37 had adopted all or substantially all of the provisions, and 47 had enacted many of the provisions. Most others had enacted some of the provisions. Only 6 countries—including the United States—have not adopted any of the provisions of the code (UNICEF, Nutrition Section, 2011).

The international code focuses attention on ways in which the infant formula industry influences both consumers and professionals to increase the use of its products. Direct advertising to consumers may be the most obvious method, 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 (usually leading to greater separation of mothers and infants), 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. Gift bags containing formula or coupons for formula for many years have been presented

to new mothers at hospital discharge. These gift bags are given to the hospitals by manufacturers of baby-milk products; mothers who receive such bags are less likely to breastfeed exclusively during the first 10 weeks postpartum (Merewood, 2008). Such “gifts” have received greater publicity from watchdog organizations since 2006, and such publicity has led some hospitals to eliminate this practice. These “gifts” are treated by the baby-milk manufacturers as marketing expenses. 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 international code may make healthcare professionals more aware of the intent behind them and, in turn, perhaps more resistant to their allure. Lactation consultants should be watchful to avoid succumbing to such “manipulation by assistance” banned by the international code.

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 Code of Marketing of Breast-Milk Substitutes, and (4) enactment of enforceable laws for protecting the breastfeeding rights of employed women (UNICEF, 1990).

An offshoot organization, the World Alliance for Breastfeeding Action (WABA), was founded in 1991; it is a multinational coalition of individuals and private organizations active in research and promotion of breastfeeding (WABA, 2013). 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

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 breastmilk, unless medically indicated.
7. Practice rooming-in—that is, 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 breastmilk substitutes, bottles, and teats from healthcare facilities form the basis for the Baby-Friendly Hospital Initiative.

See also: World Health Organization, Evidence for the Ten Steps to Promote Successful Breastfeeding, 1998.

week in August—an opportunity for people worldwide to celebrate and support breastfeeding.

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 major exception of the Scandinavian countries, industrialized nations have moved more slowly than developing nations. Of some 20,000 maternity facilities worldwide that have been designated as Baby-Friendly, 170 are in the United States (Baby-Friendly USA, 2013). The principal stumbling block has been the political and financial difficulty of the requirement that hospitals not accept free infant milk products from manufacturers. Breastfeeding advocates in the industrialized world continue to struggle against

three impediments: a manufactured-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 (Broadfoot et al., 2005; DiGirolamo et al., 2008; Merewood et al., 2005; Merten et al., 2005). Without exception, these studies have shown that implementation of the “Ten Steps” leads to higher rates of initiation and longer duration of breastfeeding, even in hospitals that have implemented only half of the steps, and even among populations less likely to breastfeed. A high proportion of mothers delivering in a hospital or birthing center designated as Baby-Friendly are able 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

In the 1950s and 1960s, during the nadir of breastfeeding in the United States, the first voluntary groups to offer information and support to women interested in breastfeeding were formed: La Leche League International (LLLl) in the United States, Nursing Mothers' Association of Australia, and Ammehjelpen of Sweden. 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 2012, it had a presence—accredited leaders or other ongoing source of LLLl information—in 70 countries (La Leche League International, 2013). 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.

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 restrictive aspects of women's lives, as

breastmilk was thought by some to be inferior to increasingly available manufactured infant milk products, 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 both on the breastfeeding infant and on 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 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, but rather 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 within 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 (on average 4 of per hour), short (about 2 minutes), and equally distributed throughout a 24-hour day, and they 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 “authorities,” usually male. By the early part of the 1900s, “good mothering” had drifted toward following the feeding and infant-care schedules advocated by those 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” on a weekly basis.
- 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, rose steadily until it generally plateaued in the first decade of the 21st century.
- Infants fed manufactured milk products experience more illness because such milks lack the nutritive and immunologic qualities of breastmilk. Mothers who use manufactured infant milks are more susceptible to osteoporosis, premenopausal breast cancer, and ovarian cancer.
- Infants who are fed manufactured milk products are more costly to raise, in part because of the considerable cost of the formula and in part because they commonly suffer more, and more severe, illness as compared with breast-fed infants.
- The diversion of land, power, and raw material to the manufacture of milk products for infants and the disposal of discarded packaging are sources of 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 Ammehjelpen in Sweden, began in the 1960s and 1970s and paved the way for governmental efforts to promote and support breastfeeding.

- 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 a goal within the Women, Infants, and Children (WIC) program. However, only a small percentage of that program's budget goes for breastfeeding promotion and support, and breastfeeding rates of WIC enrollees, who typically come from population segments less likely to breastfeed, are low.
- 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 2013 recognize 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 many health benefits of breastfeeding to infant and mother.

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