Position of the American Dietetic Association: Promoting and Supporting Breastfeeding

ABSTRACT

It is the position of the American Dietetic Association that exclusive breastfeeding provides optimal nutrition and health protection for the first 6 months of life and breastfeeding with complementary foods from 6 months until at least 12 months of age is the ideal feeding pattern for infants. Breastfeeding is an important public health strategy for improving infant and child morbidity and mortality, improving maternal morbidity, and helping to control health care costs. Breastfeeding is associated with a reduced risk of otitis media, gastroenteritis, respiratory illness, sudden infant death syndrome, necrotizing enterocolitis, obesity, and hypertension. Breastfeeding is also associated with improved maternal outcomes, including a reduced risk of breast and ovarian cancer, type 2 diabetes, and postpartum depression. These reductions in acute and chronic illness help to decrease health care-related expenses and productive time lost from work. Overall breastfeeding rates are increasing, yet disparities persist based on socioeconomic status, maternal age, country of origin, and geographic location. Factors such as hospital practices, knowledge, beliefs, and attitudes of mothers and their families, and access to breastfeeding support can influence initiation, duration, and exclusivity of breastfeeding. As experts in food and nutrition throughout the life cycle, it is the responsibility of registered dietitians and dietetic technicians, registered, to promote and support breastfeeding for its short-term and long-term health benefits for both mothers and infants.

J Am Diet Assoc. 2009;109: 1926-1942.

0002-8223/09/10911-0013$36.00/0
doi: 10.1016/j.jada.2009.09.018

This American Dietetic Association (ADA) position paper includes the authors' independent review of the literature in addition to systematic review conducted using ADA's Evidence Analysis Process and information from ADA's Evidence Analysis Library. Topics from the Evidence Analysis Library are clearly delineated. The use of an evidence-based approach provides important added benefits to earlier review methods. The major advantage of the approach is the more rigorous standardization of review criteria, which minimizes the likelihood of reviewer bias and increases the ease with which disparate articles may be compared. For a detailed description of the methods used in the Evidence Analysis Process, go to http://adaeal.com/eaprocess/.

Conclusion Statements are assigned a grade by an expert work group based on the systematic analysis and evaluation of the supporting research evidence. Grade I=Good; Grade II=Fair; Grade III=Limited; Grade IV=Expert Opinion Only; and Grade V=Not Assignable (because there is no evidence to support or refute the conclusion). Evidence-based information for this and other topics can be found at www.adaevidencelibrary.com and subscriptions for nonmembers are purchasable at www.adaevidencelibrary.com/store.cfm.

POSITION STATEMENT

It is the position of the American Dietetic Association that exclusive breastfeeding provides optimal nutrition and health protection for the first 6 months of life and breastfeeding with complementary foods from 6 months until at least 12 months of age is the ideal feeding pattern for infants. Breastfeeding is an important public health strategy for improving infant and child morbidity and mortality, and improving maternal morbidity, and helping to control health care costs.

With rare exceptions, breastfeeding, or lactation, is the optimal method for feeding and nurturing infants. Extensive research documents the significant advantages of breastfeeding for infants, mothers, families, and the environment. Breastfeeding involves primary and, to a lesser extent, secondary prevention of acute and chronic diseases. The benefits of breastfeeding include decreased infant and child morbidity and mortality, protection against common childhood infections, and decreased risk for certain acute and chronic diseases. Federal agencies and national professional associations in the United States recommend infants be exclusively breastfed for the first 6 months of life, and continue to breastfeed at least through the first year of life (1-6). In addition, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) recommend that every infant should be exclusively breastfed for the first 6 months of life, with breastfeeding continuing for up to 2 years of age or longer (7-9). Exclusive breastfeeding is defined as feeding the infant only breast milk, with no supplemental liquids or solids except for liquid medicine and vitamin/mineral supplements (9). The Bellagio Child Survival Study Group identified breastfeeding during the first year as one of the most important strategies for improving child survival (10-12). There also are extensive health benefits for breastfeeding mothers (7,8). The growth and development of breastfeeding infants is the standard by which all infants and children should be measured. New growth charts available from WHO

are based on breastfed infants as the normative growth model constituting good nutrition, health, and development (13). This is in contrast to the Centers for Disease Control and Prevention (CDC) growth charts that represent the growth patterns of breast- and formula-fed infants (14).

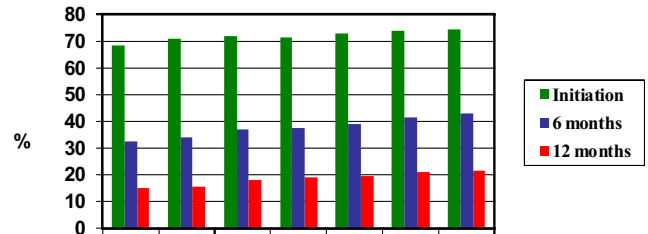
Portions of this position paper used the American Dietetic Association's (ADA's) Evidence Analysis Library (EAL) to address three questions:

- Which dietary factors would affect breast milk production, breast milk supply, or established lactation?
- What are the effects of an artificial nipple on the duration of breastfeeding?
- What are the effects of maternal diet or dietary supplements of n-3 fatty acids on breast milk composition and infant health outcomes?

For a detailed description of the methods used in the evidence analysis process, access ADA's Evidence Analysis Process information page at http://adaeal.com/eaprocess/.

BREASTFEEDING TRENDS IN THE UNITED STATES

Breastfeeding initiation and duration rates in the United States are lower than in most nations. Globally, about 79% of infants are breastfed for 12 months, compared to 21.4% in the United States (7,15,16). Currently, one out of three infants in the developing world is exclusively breastfed for the first 6 months of life, compared to 11.9% in the United States (16,17). Almost all newborns in the United States were breastfed before 1880. In the 1880s, women began to supplement breastfeeding with cow's milk soon after giving birth and to wean their infants before they were 3 months old. Infants fed cow's milk died at much higher rates than breastfed infants until the 1920s when pasteurization made cow's milk safe and readily available for infant feeding. Breastfeeding rates declined sharply because of the widespread belief that pasteurized cow's milk eliminated the differences between human and cow's milk feeding (18). The decline continued when other milk substitutes such as evaporated cow's milk and infant formula became widely available. These were promoted as being more convenient for the mothers and being more nutritious than human milk. Breastfeeding rates reached an all-time low in the United States in 1971 with only 24% of mothers initiating breastfeeding (19).



	1999	2000	2001	2002	2003	2004	2005
Initiation	68.3	70.9	71.6	71.4	72.7	73.8	74.2
6 months	32.62	34.2	36.9	37.6	39.1	41.5	43.1
12 months	15	15.7	18.2	19	19.6	20.9	21.4

Figure 1. Percentage of US children who were breastfed by birth year, 1999-2005. Data adapted from: National Immunization Survey, 2005 Births, Centers for Disease Control and Prevention, Department of Health and Human Services. http://www.cdc.gov/breastfeeding/data/NIS_data/. Accessed April 24, 2009.

The US Department of Health and Human Services (HHS) set goals for breastfeeding initiation and duration rates in the late 1970s, and the United States has since seen a steady increase in breastfeeding rates (1). Data from the 2007 National Immunization Survey (NIS) indicate that the rate of initiation and duration of breastfeeding are improving, but are still below the Healthy People 2010 goals (16). Breastfeeding initiation rates increased from a low of about 20% in the early 1970s to a high of 61.9% in 1982 (19,20). After a decline in breastfeeding rates through 1990, breastfeeding initiation rates in hospitals have increased yearly, exceeding 70% from 2000. The 2007 NIS data indicate a high of 74.2% in 2005 (16) (see Figure 1). Breastfeeding rates are expected to continue increasing as a result of several national efforts, including Healthy People 2010 (1) and Blueprint for Action on Breastfeeding (2), the US Department of Agriculture's Loving Support Makes Breastfeeding Work campaign (21), the US Breastfeeding Committee's Breastfeeding in the United States: A National Agenda (22), and the HHS's The Business Case for Breastfeeding: Steps for Creating a Breastfeeding Friendly Worksite (23). The US Breastfeeding Committee's strategic plan is supported by the HHS and more than 20 professional and public health organizations.

According to provisional 2007 NIS data for infants born in 2005, 23 states achieved the national Healthy People 2010 objectives of 75% of mothers initiating breastfeeding. In addition, 10 states achieved the objective of 50% of mothers breastfeeding at 6 months, 12 states achieved the objective of 25% of mothers breastfeeding at 12 months, and eight states achieved all three initiation and duration objectives (16). It should be noted that many of the mothers counted as "breastfeeding" were supplementing their infants with formula or other products and the degree of breastfeeding was not actually measured.

Breastfeeding initiation rates paint a much more positive picture of breastfeeding practices in the United States than do breastfeeding exclusivity rates. Although data about breastfeeding exclusivity are limited, the available data provide important insight. In 2007, Healthy People 2010 objectives were updated to include two new objectives that address exclusive breastfeeding (ie, feeding an infant only breast milk, with no additional liquids or solids) (9,24). These two new objectives are to increase the proportion of women who exclusively breastfeed their infants for 3 months to 40%, and to increase the proportion of mothers who exclusively breastfeed their infants for 6 months to 17% (24). The national rates for exclusive breastfeeding at 3 and 6 months for infants born in 2005 were 31.5% and 11.9%, respectively. These rates are significantly lower than the targets set by Healthy People 2010. More detailed information can be found on the CDC Web site (16). Furthermore, 10 states met the objective of 40% exclu-

Table. Provisional breastfeeding (BF) rates by sociodemographic factors among children born in 2005 (percent±half 95% confidence interval), n=15,014 (exclusive), n=15,269 (any)[a]

Demographic factor	Ever BF	BF at 6 months	BF at 12 months	Exclusive BF[b] at 3 months	Exclusive BF[b] at 6 months
US national	74.2±1.2	43.1±1.3	21.4±1.1	31.5±1.3	11.9±0.9
Marital status					
Married	79.6±1.2	49.8±1.5	25.1±1.4	36.9±1.5	14.0±1.1
Not married	62.4±2.6	28.0±2.5	13.3±2.0	19.5±2.2	7.1±1.5
Age					
<20	51.2±8.3	18.6±6.9	9.2±5.1	14.9±5.8	7.4±5.2
20-29 y	70.6±2.0	36.0±2.2	15.5±1.6	26.7±2.0	10.8±1.5
>30 y	78.5±1.4	49.9±1.7	26.6±1.6	36.1±1.7	12.9±1.2
Education					
< High school	65.7±3.4	37.1±3.7	20.4±3.2	23.9±3.5	8.6±2.4
High school	67.8±2.5	33.6±2.8	15.5±2.1	25.2±2.6	10.2±1.9
Some college	75.2±2.1	39.7±2.5	18.7±2.1	31.5±2.4	11.3±1.7
College grad	85.9±1.3	58.8±1.9	29.9±1.8	43±1.9	16.2±1.3
Race/ethnicity					
American Indian or Alaskan Native	65.5±8.5	42.3±6.9	24.3±5.8	25.7±5.7	7.9±2.8
Asian or Pacific Islander	83.6±4.9	51.8±4.4	29.1±3.9	34.5±5.9	13.4±3.7
Native Hawaiian and other	87.5±7.4	43.7±12.7	26.5±10.8	35.6±11.4	12.1±7.0
Black/African American	61.4±3.2	29.3±2.5	13.4±1.8	19.2±2.4	6.5±1.5
White	76.8±1.3	43.2±1.3	21.9±1.1	33.9±1.5	12.9±1.1
Hispanic/Latino	80.6±2.3	45.1±2.5	24.1±2.2	32.6±3.1	12.6±2.3
Receiving WIC[c]					
Yes	67.8±1.9	34.2±1.6	16.9±1.6	23.8±1.8	8.2±1.3
No, but eligible	76.2±5.2	56.4±6.5	32.9±6.8	40.6±7.2	16.1±4.5
No, ineligible	82.3±1.5	52.7±1.9	25.7±1.7	40.4±1.8	15.9±1.4
Poverty Income Ratio[d]					
<100%	67.0±2.9	36.2±3.1	19.3±2.7	25.8±3.0	8.9±2.0
100% to <185%	71.4±3.1	38.8±3.7	20.0±3.0	27.2±3.4	10.2±2.4
185% to <350%	74.9±2.4	43.3±2.6	21.5±2.0	32.6±2.4	12.7±1.8
350% or higher	82.8±1.7	52.1±2.2	24.5±2.0	40.1±2.2	15.1±1.6
Residence					
MSA[e], Central City	76.2±1.8	45.4±2.1	23.8±1.8	31.7±2.0	12.3±1.4
MSA, Non-Central City	75.8±1.8	44.4±2.2	21.4±1.8	32.7±2.0	12.3±1.5
Non-MSA	64.6±2.9	33.1±2.7	15.3±1.9	27.5±2.6	9.4±1.7

[a]Source: National Immunization Survey, Centers for Disease Control and Prevention, Department of Health and Human Services. http://www.cdc.gov/breastfeeding/data/NIS_data/2005/socio-demographic_any.htm. Accessed April 26, 2009.
[b]Exclusive breastfeeding is defined as only breast milk—no solids, no water, and no other liquids.
[c]WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.
[d]Ratio of self-reported family income to the federal poverty threshold value.
[e]MSA=Metropolitan Statistical Area; defined by the US Census Bureau.

sively breastfeeding through 3 months of age and eight states met the objective of 17% of mothers who exclusively breastfeeding through 6 months (16). Achieving all of the Healthy People 2010 objectives for breastfeeding could lead to a significant decrease in pediatric health care costs in the United States (25).

Breastfeeding initiation rates and exclusive breastfeeding at 3 and 6 months are highest among women who are white or non-Hispanic, college educated, married, living in urban areas, older than 30 years, employed part-time, have higher incomes, or living in the Mountain or Pacific regions of the country (15,16) (see the Table). Among women eligible for the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), those not receiving WIC benefits have higher initiation and duration rates, and twice as many are exclusively breastfeeding at 6 months (15). Whereas all demographic groups reported increases in breastfeeding initiation since 1990, the largest increases occurred among mothers who have historically been less likely to breastfeed—women who are African American, Hispanic, less educated, employed full-time, younger than 24 years old, living in the South Atlantic region, participating in WIC, and mothers with low-birth-weight infants (15,16).

BENEFITS OF BREASTFEEDING FOR INFANTS

According to the American Academy of Pediatrics, breastfed infants are the reference against which all alternative feeding methods must be measured with regard to growth, health, development, and other outcomes (4). Human milk has many beneficial effects on the health of infants, especially premature and low birth weight

1. Which dietary factors would affect breast milk production (or breast milk supply, established lactation)?

EAL Conclusion Statement: Current available evidence shows no significant effects or relationships between any of the following dietary factors and breast milk production in healthy, adult, lactating women (mean±standard deviation body mass index ranged from 21.4±0.9 to 25.2±4.2): short periods (<10 weeks) of reduced energy intake (25% to 35% energy deficit), increased or decreased fluid intake (±25% to 50%), increased protein intake (1.5 g/kg/d), three types of nutrition supplement (ie, *Coleus amboinicus* soup, Fenugreek seed capsules; sugar-coated Moloco+B-12 tablets), and calcium intake (*Evidence Grade II=Fair*).

2. What are the effects of artificial nipple on the duration of breastfeeding?

EAL Conclusion Statement: Overall, evidence suggests a negative influence of artificial nipple on the duration of all types of breastfeeding (from partial to exclusive). Observational evidence consistently showed an association between use of pacifier before 3 months of age and shorter breastfeeding duration in healthy term or full-term infants, after controlling for potential confounding. Data are insufficient to determine whether increasing frequencies of pacifier use or introduction of pacifier use beyond 3 months of age has differential influences on breastfeeding duration. Well-designed randomized control tests with blinded assessments of breastfeeding outcomes are needed to further support the validity of the findings from the observational studies concerning negative influence of pacifier use on the duration of breastfeeding. Data are insufficient to make a conclusion regarding the effects of artificial nipple on the duration of breastfeeding among preterm infants (*Evidence Grade II=Fair*).

Supplemental feeding in term or full-term Infants
Data from both randomized control trials and observational studies also consistently suggested that supplemental feedings to term infants, regardless of method (bottle or cup), had a detrimental effect on breastfeeding duration, compared to no supplemental feeding.

Preterm Infants
Data are insufficient to make a conclusion regarding the effects of artificial nipple on the duration of breastfeeding among preterm infants.

3. What are the effects of maternal diet or dietary supplements of n-3 fatty acids on the breast milk composition and infant health outcomes?

EAL Conclusion Statement: Consistent results from randomized control trials have shown that n-3 fatty acid supplementation (fish oil, cod liver oil, or docosahexaenoic acid [DHA]-rich oil) to pregnant women or breastfeeding mothers can increase n-3 FA levels in both breast milk and infants' plasma phospholipids. There is a dose-response relationship between doses of DHA supplementation and breast milk DHA levels, but the saturation dose remains unclear. Currently there is no study directly examining the dose-response relationship for other types of n-3 fatty acid supplementation.

These positive changes in breast milk n-3 fatty acid compositions, however, do not always show a positive affect on children's visual acuity and cognitive development at long-term follow-up. (*Evidence Grade=Good*).

Figure 2. American Dietetic Association Evidence Analysis Library (EAL) conclusion statements for dietary effects on lactation and the effects of artificial nipples on duration of breastfeeding.

infants and young children. These benefits are magnified with exclusive breastfeeding and breastfeeding beyond 6 months of age (9,10).

Optimal Nutrient Composition

Human milk is uniquely tailored to meet the nutrition needs of human infants. It has the appropriate balance of nutrients provided in easily digestible and bioavailable forms (7,26,27). The milk changes its composition—from colostrum for newborns to mature milk for older infants—to meet the nutrient needs of growing infants. It provides adequate amounts of carbohydrates, essential fatty acids, saturated fatty acids, medium-chain triglycerides, long-chain polyunsaturated fatty acids, and cholesterol. An EAL report indicates that there is consistent evidence to show that n-3 fatty acids supplementation to pregnant and breastfeeding women can increase n-3 fatty acid levels in breast milk and infant plasma phospholipids. However, there do not appear to be any long-term clinical benefits in children (**Evidence Grade I=Good**). See Figure 2 for the EAL conclusion statement.

The relatively low protein content of human milk presents a relatively modest nitrogen load to immature kidneys. The protein is largely alpha-lactalbumin—a whey protein that forms a soft, easily digestible curd. There are more than 100 major milk oligosaccharides in human milk that are thought to have protective properties against respiratory and enteric diseases. These oligosaccharides pass through the infant undigested, concentrate in feces, and are thought to interfere with pathogens binding to host cell receptors (28). Human milk has a relatively low sodium content, allowing the fluid requirements of exclusively breastfed infants to be met while keeping the renal solute load low. Minerals in breast milk are largely protein bound and balanced to enhance bioavailability. The 2:1 ratio of calcium to phosphorus is ideal for the absorption of calcium and both of these minerals, and, along with magnesium, are present in appropriate amounts for growth and development. The limited amount of iron and zinc is highly absorbable (26). Given the nutrient content of human milk, supplements are not necessary, with the exception of vitamin D and possibly fluoride (1,4,8). Due to insufficient levels of vitamin D in human milk and decreased exposure to sunlight, a

Benefits for infants	Benefits for mothers
• Optimal nutrition for infant • Strong bonding with mother • Safe, fresh milk • Enhanced immune system • Reduced risk for acute otitis media, nonspecific gastroenteritis, severe lower respiratory tract infections, and asthma • Protection against allergies and intolerances • Promotion of correct development of jaw and teeth • Association with higher intelligence quotient and school performance through adolescence • Reduced risk for chronic disease such as obesity, type 1 and 2 diabetes, heart disease, hypertension, hypercholesterolemia, and childhood leukemia • Reduced risk for sudden infant death syndrome • Reduced risk for infant morbidity and mortality	• Strong bonding with infant • Increased energy expenditure, which may lead to faster return to prepregnancy weight • Faster shrinking of the uterus • Reduced postpartum bleeding and delays the menstrual cycle • Decreased risk for chronic diseases such as type 2 diabetes, breast, and ovarian cancer • Improved bone density and decreased risk for hip fracture • Decreased risk for postpartum depression • Enhances self-esteem in the maternal role • Time saved from preparing and mixing formula • Money saved from not buying formula and increased medical expenses associated with formula feeding

Figure 3. Potential benefits of breastfeeding for infants and mothers. Data adapted from references 1-3, 6, 7, 9, 26, 27, 33, and 42.

vitamin D supplement is recommended. The American Academy of Pediatrics recommends that all healthy infants and children have at least 400 IU of vitamin D daily. Supplementation should be given to breastfeeding infants within the first few days of life and continued throughout childhood regardless of whether or not the child is receiving supplemental formula as it is unlikely that a breastfed infant would consume 1 L formula, the amount needed to supply 400 IU vitamin D (29). Breastfed infants who are aged 6 months and older may need a fluoride supplement if the total amount of fluoride from the local water supply or other sources available to the infant is inadequate (30).

Reduction in Infant Morbidity and Mortality

Breastfeeding, especially exclusive breastfeeding, during the first 6 months of life is an important factor for reducing infant and childhood morbidity and mortality (12). Breastfeeding is associated with a reduction in postneonatal deaths from all causes other than congenital anomalies and malignancies (31) and exclusive breastfeeding is associated with lower rates of hospitalization from infections in the first year of life (32). Evidence suggests that breastfeeding may reduce the risk for a large number of acute and chronic diseases (see Figure 3). A report by the Agency for Healthcare Research and Quality (AHRQ) provides an extensive summary of meta-analyses, randomized and nonrandomized comparative trials, prospective cohort, and case-control studies to examine the effects of breastfeeding on certain infant and maternal health outcomes (33). Evidence suggests a significant reduction in the risk of acute otitis media, nonspecific gastroenteritis, childhood leukemia, and in hospitalizations from lower respiratory tract disease for breastfed infants compared to their formula-fed counterparts (33). Compared to infants who are exclusively formula-fed, there is a 23% reduction in the risk of otitis media in infants ever breastfed and a 50% reduction in infants exclusively breastfed for at least 3 months (33). Breastfeeding may decrease morbidity from respiratory tract infections and infants exclusively breastfed 4 months or longer have a 72% reduction in hospitalization for a lower respiratory tract infection during the first year of life than infants who are formula-fed (32). In addition, breastfeeding may reduce the risk of nonspecific gastroenteritis by 64% when compared to infants who are not breastfed (33).

Breastfeeding for at least 6 months is associated with a 15% to 19% reduction in the risk of developing childhood leukemia (33,34). Exclusive breastfeeding has a positive effect on the development of the oral cavity by improving shaping of the hard palate resulting in proper alignment of the teeth and fewer problems with malocclusions (35). For families with a history of atopic dermatitis, breastfeeding for at least 3 months is associated with a 42% reduction in the condition (33). Studies on the effects of breastfeeding on the development of asthma are less clear. Some studies have shown a moderate protective effect whereas other studies demonstrate conflicting results including an increased risk associated with breastfeeding. Children without a family history of asthma who breastfeed at least 3 months have been shown to have a 27% reduction in the risk for asthma compared to children who do not breastfeed (33). For those with a family history of asthma, there is a 40% reduction in the risk of asthma in children younger than 10 years old if they are breastfed for at least 3 months (33). However, it is not clear if there is a reduction in older children and adolescents (33).

Breastfeeding is associated with a reduced risk of sudden infant death syndrome (SIDS). According to the AHRQ report, a meta-analysis of case-control studies found that receiving breast milk is associated with a 36% reduction in the risk of SIDS compared to infants who never breastfed (33). A German case-control study compared 333 infants who died as a result of SIDS to 998 age-matched controls and found that exclusively breastfeed infants at 1 month of age had half the risk, and that both partial and exclusive breastfeeding were associated with a reduced risk of SIDS (36).

Breast milk feedings for premature infants may reduce the incidence of necrotizing enterocolitis (NEC). Studies show an absolute risk difference of

Disease	AHRQ	WHO
Obesity	Three meta-analyses of good and moderate methodological quality report an association of breastfeeding and a reduction in the risk of obesity in adolescence and adult life compared with those not breastfed.	Updated meta-analyses concluded that the evidence suggests that breastfeeding may have a small protective effect on the prevalence of obesity.
Blood pressure	Two moderate quality meta-analyses concluded there was a small reduction in systolic and diastolic pressure in adults who were breastfed compared to those formula-fed.	Updated meta-analyses showed a small but significant protective effect of breastfeeding on systolic and diastolic blood pressure.

Figure 4. Findings of the *Agency for Healthcare Research and Quality (AHRQ)* and the World Health Organization (WHO) analyses of breastfeeding and obesity and blood pressure. Data adapted from references 13 and 33.

5% in the risk of NEC between preterm infants receiving human milk and formula. This is considered a meaningful clinical difference due to the high case-fatality rate of NEC (33,37,38). The value of human milk in reducing the incidence of NEC has influenced the growing use of pasteurized donor human milk for infants at high risk for NEC (37-41). When mother's milk is not available, providing pasteurized donor milk from appropriately screened donors from an approved milk bank offers immunoprotection and bioactive factors not found in infant formula and is the next best option particularly for ill or preterm infants (4,39,41). Only human milk from facilities that screen and approve donors and pasteurize the milk should be used because there is risk of disease transmission to the recipient from donors who are not screened and from the use of unpasteurized milk.

Long-Term Outcomes

In addition to a significant reduction in acute illnesses, breastfeeding can affect the development of chronic diseases later in life. WHO conducted systematic reviews of 33 observational and randomized studies to assess the long-term consequences of breastfeeding on blood pressure, obesity/overweight, total cholesterol, type 2 diabetes, and intellectual performance (42). Nearly all the studies were conducted in countries with high income and in predominantly white populations. The systematic review found a small but significant protective effect of breastfeeding on systolic and diastolic blood pressure and a reduction in cholesterol levels among adults who were breastfed in infancy (42). Breastfeeding has been found to have long-term effects on the reduction of blood pressure possibly due to the lower sodium content of breast milk compared to infant formula, the long-chain polyunsaturated fatty acid content of breast milk, and the reduced incidence of obesity, which is a risk factor for hypertension (42).

Studies have suggested that adults who were breastfed are more likely to have lower serum cholesterol than their formula-fed counterparts. However, the AHRQ reports that a meta-analysis of cohort and case-control studies included studies with serious methodological flaws and that the relationship between breastfeeding and cholesterol levels cannot be determined at this time (33). Nonetheless, a meta-analysis published by WHO reports that the evidence suggests that the association between breastfeeding and total cholesterol varies by age, with significant effects in adults who were breastfed, but not among children or adolescents who were breastfed. The study also concluded that the association was not due to publication bias or residual confounding (42) (see Figure 4).

Breastfed infants are less likely to become overweight or obese as adults (42-44). Some studies have found an association of breastfeeding and a reduction in the risk of obesity in adolescence and adulthood compared with those who were not breastfed. Breastfeeding may reduce the risk of overweight or obesity in adolescence and adulthood by 7% to 24% (43,44). Another study found a 4% reduction in the risk of being overweight in adulthood for each additional month of breastfeeding in infancy (44). Overall, there is an association between a history of breastfeeding and a reduction in the risk of being overweight or obese in adolescence and adulthood (44). Bottle-fed full-term infants who are appropriate for gestational age have a 3.2 times greater risk of rapid weight gain between ages 2 and 6 years when compared to breastfed infants (45). This effect may be related to factors such as the higher protein intake of formula-fed infants, greater insulin response to formula resulting in fat deposition, or an easier transition among breastfed infants to some new foods such as vegetables, which may lead to a more healthful diet in later life (42).

Breastfeeding is also associated with a decreased risk of type 2 diabetes later in life after adjusting for birth weight, parental diabetes, socioeconomic status, and body size (42). Studies report that formula-fed infants have higher glucose concentrations and higher basal and post-prandial concentrations of insulin and neurotensin when compared to breastfed infants (42,46). Children and adults who were not breastfed have higher serum insulin levels. WHO and AHRQ identified studies that found breastfed infants were less likely to present with type 2 diabetes later in life compared to formula-fed infants, but also report other studies that failed to show an association (33,42). WHO and AHRQ concluded that it is not currently possible to draw conclusions about the long-term effects of breastfeeding on the risk of type 2 diabetes. (33,42).

Although evaluating the effect of breastfeeding on cognitive development is problematic, as it is difficult to control for factors such as maternal intelligence, maternal education, the home environment, and socioeconomic status, a WHO meta-analysis report indicated that infants who were breastfed for at least 1 month

performed higher on intelligence tests than their formula-fed counterparts. Furthermore, infants who are exclusively formula-fed have an average intelligence quotient that is 4.9 points lower than infants who breastfeed at least 1 month, even when studies control for the home environment. Breastfeeding for less than 6 months is associated with decreased test scores and impaired school performance when compared to infants who breastfeed for a longer duration. The report also suggests that breastfeeding is associated with increased cognitive development in childhood. However, the practical significance is unknown. The report also reviewed a few studies that examined school performance and found higher educational achievement in late adolescence and young adulthood among those who were breastfed compared to their formula-fed counterparts (42). In addition, AHRQ reviewed one well-performed sibling analysis and three prospective cohort studies conducted in developed countries with term infants that were adjusted for maternal intelligence and found little or no evidence of a relationship between breastfeeding and cognitive performance (33).

A high concentration of long-chain polyunsaturated fatty acids in breast milk and enhanced maternal-child bonding may be responsible for improved cognitive development (27,30) and researchers are still trying to understand which of them is the deciding factor. However, the results from one large randomized trial suggest that the nutritional properties of breast milk have a positive independent effect (47). The EAL reports that although maternal supplementation with n-3 fatty acids increases plasma phospholipids in infants there is an apparent dose-response relationship. Furthermore, the increases in breast milk n-3 fatty acid compositions do not always show a positive influence on children's visual acuity and cognitive development at long-term follow-up, indicating that other factors are involved. (**Evidence Grade I=Good**). See Figure 2 for the EAL conclusion statement.

Although there is limited research, breastfeeding may also help to protect against maternal neglect and maltreatment. An Australian longitudinal cohort study spanning 15 years found that in children with substantiated maternal neglect, the odds were nearly four times greater for nonbreastfed infants compared to infants breastfed more than 4 months, after adjustment for confounding variables (48).

BENEFITS OF BREASTFEEDING FOR WOMEN

In addition to the numerous benefits of breastfeeding for the infant, there are many benefits for the mother (see Figure 3). The degree to which some of these health benefits may be realized depends on breastfeeding duration, breastfeeding frequency, breastfeeding exclusivity, and other personal factors (49). Women choosing to breastfeed can feel confident that their choice of infant feeding improves not only the health of their child but also their own long-term health and well-being.

Family Planning

Women who exclusively breastfeed their infants are more likely to be amenorrheic, which conserves iron stores and decreases the risk for iron deficiency, at 6 months postpartum (50). Extended breastfeeding also suppresses ovulation, which delays the menstrual cycle and in turn may increase spacing between pregnancies. The lactational amenorrhea method (LAM) has been promoted for more than two decades by family planning advocates, especially in developing countries that have difficulty obtaining contraceptive (50-53). LAM advocates purport that the method provides more than 98% protection from pregnancy in the first 6 months postpartum. A Cochrane Database of Systematic Review of LAM also concluded that exclusively breastfeeding women who stay amenorrheic (regardless of whether they used LAM) have a very small risk of getting pregnant (54). LAM can be implemented with minimal counseling or follow-up and is an effective family planning method with a high level of user satisfaction that can be used in a variety of cultures and health care settings (55). However, this method is not promoted by US federal agencies and national professional assocations (54).

Reduction in Disease

Several studies have found that breastfeeding is associated with a decreased risk for breast cancer that is magnified with a lifetime breastfeeding of more than 12 months (56-58). Women with breast cancer are less likely to have ever breastfed and their average lifetime duration of breastfeeding is shorter (9.8 vs 15.6 months) compared to women without breast cancer. For each year a woman breastfeeds in her lifetime there is a 4.3% reduction in the risk of breast cancer (56). Women who have breastfed three or more children have a decreased risk for breast cancer (57), and for each 6-month increase in breastfeeding there is further reduction in breast cancer risk (58). Breastfeeding has been also found to be effective in reducing ovarian cancer risk. This protection is attributed to the partial inhibition of ovulation in lactating women (59). One systematic review of 31 studies found that there was no emerging consensus regarding breastfeeding and protection against breast cancer for either ever vs never breastfeeding or for the duration of breastfeeding as only about half of the studies reviewed found a significant protective effect (60).

A longer duration of lifetime breastfeeding is also associated with a decreased risk for developing type 2 diabetes among women with no history of gestational diabetes, although for women with a history of gestational diabetes the increased risk of developing type 2 diabetes is not ameliorated by lactation (33,46). Breastfeeding may be associated with a reduced risk of hip fractures in postmenopausal women (61) and improve bone mineral density during young adulthood in adolescent mothers (62). However, others report there is little evidence to show an association between lifetime breastfeeding and a reduced risk of fractures due to osteoporosis (33). There also is a decreased risk for developing rheumatoid arthritis, especially if a mother breastfeeds for more than 12 months (63).

Weight Loss

The studies on breastfeeding and weight loss have produced mixed findings. Studies estimating postpartum weight changes are less likely to detect weight or fat loss than studies directly measuring postpartum weight changes (64). In the short term, breastfeeding women experience greater weight and fat loss than non-breastfeeding women. Furthermore, women who breastfeed for longer than 6 months and those who

do so exclusively are more likely to achieve greater weight loss (65-68). Some studies report that lactation may be associated with increased weight gain, or that any observed weight difference may not be sustained past 18 months (69). It should be noted that weight loss and body composition changes are highly variable among postpartum women (69). In addition, prepregnancy weight, total pregnancy weight change, and parity all greatly impact postpartum weight loss (69,70).

Maternal Well-Being

An unexpected benefit of exclusive breastfeeding is improved sleeping at night. Mothers who supplement with formula at night even when the father takes over the nighttime feedings to allow the mother to get more sleep have been found to sleep 40 to 45 minutes less and to have more sleep disturbances than mothers who exclusively breastfeed their infants, including overnight feedings (71). Breastfeeding also lowers blood pressure in breastfeeding mothers before, during, and after breastfeeding sessions. Oxytocin release during breastfeeding is thought to be responsible for this effect (72).

Consistently studies have shown that breastfeeding is associated with a decrease in depressive symptoms in the postpartum period and some studies have reported lower mean depression scores in breastfeeding mothers compared to those who bottle-feed (73). A shorter duration or no breastfeeding is associated with increased rates of postpartum depression although it is difficult to determine whether depression leads to a reduced duration of breastfeeding as opposed to breastfeeding reducing the risk for the development of depression. These outcomes might occur concurrently (33).

ECONOMIC BENEFITS OF BREASTFEEDING

Breastfeeding provides significant economic benefits to the family and society, such as reduced health care-related expenses and reduced time off from work and loss of income to take care of a sick infant or child (74-76). The US Department of Agriculture estimates that at least $3.6 billion could be saved in health care costs if breastfeeding rates were increased from current levels to those recommended by the US Surgeon General (74). These savings could be much higher since this figure only represents cost savings from the treatment of three childhood illnesses: otitis media, gastroenteritis, and necrotizing enterocolitis (74). It also is estimated that $30 million would be saved if all women participating in WIC breastfed for one month. An additional $48 million could be saved if 75% of the mothers in the WIC program breastfed for 3 months (74-76). Changes to the WIC food packages have recently been tailored to better promote and support the establishment of successful long-term breastfeeding (77). In addition to the savings in direct medical costs, data are emerging that document the economic benefits of breastfeeding support to employers, including lower maternal absenteeism due to infant illness, increased employee loyalty, improved productivity, lower insurance premiums and enhanced public image (74,78,79). Health care payers or insurers would reap benefits from savings in physician fees, emergency room visits, prescriptions, and laboratory procedures with increased breastfeeding rates (78). Costs that are equally important but more difficult to measure are long-term health concerns such as chronic diseases, a reduction in adult productivity due to decreased cognitive development and increases in chronic illnesses leading to higher health insurance rates related to not breastfeeding (78).

FACTORS THAT AFFECT INITIATION, DURATION, AND EXCLUSIVITY OF BREASTFEEDING

Despite an abundance of reasons to breastfeed, a large number of women still choose not to initiate breastfeeding, to only partially breastfeed, or to breastfeed for a short duration. Although the factors that determine whether a mother will choose breastfeeding or formula feeding for her newborn are numerous, unsupportive hospital practices, lack of knowledge, personal beliefs, and family attitudes are likely to influence the mother's decision (80,81). Popular mother-related reasons for breastfeeding include: the low cost, convenience, enjoyment, and not wanting to prepare formula and sterilize bottles (80). Women who do not initiate breastfeeding or who do so for less than 3 months report barriers such as: unsure if the infant is getting enough milk, perception of not producing enough milk, nipple or breast problems, mother or infant not liking breastfeeding, maternal fatigue, embarrassed to breastfeed in public, going back to work, concern about weight loss or dietary restrictions, and being the only one who can feed the infant (81-85). In a study of WIC participants who did not initiate breastfeeding, African American and white mothers were more likely to report perceptions of pain and Hispanic mothers were more likely to report perceptions of infant breast rejection (82).

Support, Education, and Cultural Influences

The support that a mother receives can influence her success with breastfeeding. Mothers rate social support as more important than health service support due to a lack of availability of health professionals, promotion of unhelpful practices, and conflicting advice (84). They also report dissatisfaction with their breastfeeding experience when they do not receive adequate help from their health professionals (84). Adolescent mothers report that they are not informed by physicians or nurses about the health benefits of breastfeeding and that it is ideally suited for infants (86). Many mothers who intend to exclusively breastfeed often give formula earlier than anticipated either because of difficulty with breastfeeding or because formula was given at the hospital (87,88). Often mothers believe that breastfeeding is beneficial for their infants, but also believe that early introduction of formula and solid food is necessary and often unavoidable, especially if the infant is fussy, does not sleep well, or if formula supplementation was started in the hospital (87,89). Although WIC is seen as supportive of breastfeeding, it is also seen as supportive of formula supplementation for breastfeeding mothers, which discourages mothers from exclusive breastfeeding (87). Whereas many mothers exclusively breastfeed initially, this number drops dramatically over time. Early introduction of formula (1 week after hospital discharge) by breastfeeding women is influenced by the hospital of delivery,

previous breastfeeding experience, and residing with a smoker (90).

The decision to breastfeed an infant is usually made before a woman discovers she is pregnant. Women with a positive intention to breastfeed usually initiate breastfeeding, but they do not necessarily have plans to breastfeed for a longer duration (91). Attending a prenatal breastfeeding class offered at the birth hospital has been shown to increase breastfeeding rates and improve exclusive breastfeeding for longer periods of time (92). Classroom education on infant feeding has been shown to increase knowledge and improve attitudes of adolescents towards breastfeeding and result in greater intention to breastfeed their children in the future (93).

The intention to breastfeed can also be influenced by country of origin. Foreign-born women living in the United States are more likely to intend to breastfeed when compared to women born in the United States (94). On the other hand, the influence of family members not born to the United States can have a negative influence on exclusive breastfeeding. It may be accepted within some cultures or groups of people to supplement breastfeeding with formula feeding. A study of Puerto Rican women in Hartford, CT, suggests that mothers are less likely to exclusively breastfeed when the maternal grandmother resides in the United States (95). The grandmothers may be discouraging exclusive breastfeeding in favor of mixed feedings of breast milk and formula (96). Researchers in Denver, CO, found that it is not uncommon for Latina mothers to initiate breastfeeding with combination feedings of breast and formula known as "Los Dos," or "best of both," a practice that inevitably leads to a low milk supply and eventual refusal of the infant to latch on to the breast (96). Mothers may believe that giving both breast milk and formula will assure that the infant is getting the health benefits of breast milk along with the vitamins in the formula (96). Other studies have shown that Hispanic mothers have high rates of partial breastfeeding at both discharge from the hospital and at 1 month postpartum (16,88,95). Some breastfeeding mothers may seek to enhance the quality and quantity of their milk production by using dietary supplements or eating certain foods. However, the EAL found limited evidence to suggest that there are specific dietary components that can boost a woman's breast milk production (**Evidence Grade II=Fair**). See Figure 2 for the EAL conclusion statement.

Hospital Practices

Hospitals provide a unique and critical link between the breastfeeding support provided before and after delivery. Hospital practices can influence not only the success of breastfeeding during the hospital stay but also the exclusivity and duration of breastfeeding. The CDC conducted the Maternity Practices in Infant Nutrition and Care Survey to determine if hospital and birth practices were supportive of breastfeeding during a critical time when lactation is being established (97). The study found that most hospitals offer breastfeeding assistance and instruct mothers on breastfeeding technique. Women who deliver in a hospital that employs board-certified lactation consultants have increased breastfeeding success at hospital discharge, especially women at high risk for not breastfeeding such as Medicaid recipients, adolescent mothers, and mothers of preterm or low birth weight babies (98). Support after hospital discharge is also important. Adolescent mothers believe that more support and phone contact with nurses would have helped them overcome breastfeeding difficulties after they are discharged from the hospital (86). Several hospital practices were found not to be supportive of breastfeeding. Some hospitals advise women to limit the duration of suckling at each breast and pacifiers are routinely given to more than half of all healthy, full-term breastfed infants (97).

Most observational studies report an association between pacifier use and shortened duration of breastfeeding (99). The EAL concludes that there is a negative impact of artificial nipple on breastfeeding duration (**Evidence Grade II=Fair**). See Figure 2 for the EAL conclusion statement. Observational studies show an association between pacifier use before 3 months of age and a shorter duration of breastfeeding in healthy term infants. However, the EAL reports that there are insufficient data to determine if increasing the frequency of pacifier use or introducing a pacifier after 3 months of age has differential effects on breastfeeding duration. The EAL did conclude that there are insufficient data regarding the influence of pacifier and breastfeeding duration among preterm infants (**Evidence Grade II=Fair**). See Figure 2 for the EAL conclusion statement and grade. However, in a systematic review of the literature from 1950-2006, results from four randomized controlled trials do not support an adverse relationship between pacifier use and breastfeeding duration or exclusivity. The researchers assert that the association between shortened duration of breastfeeding and pacifier use in observational studies likely reflects several factors such as breastfeeding difficulties or intent to wean (99).

Formula supplemental feedings to breastfed infants occur frequently in hospitals. As a general practice, 24% of facilities give supplements to more than half of all healthy, full-term breastfeeding infants, 30% offer glucose water, and 15% offer water (97). In 17% of the facilities, healthy full-term breastfeeding infants born in uncomplicated cesarean births are fed something other than breast milk for their first feeding. Discharge packs containing infant formula are distributed to breastfeeding mothers in 70% of facilities, giving the mother mixed messages about the value of exclusive breastfeeding (97). The CDC recommends that these practices be discontinued to provide more positive support for breastfeeding initiation and duration (97). The EAL concludes that there is consistent evidence to suggest that supplemental feedings to term infants, regardless of method (bottle or cup), had a detrimental effect on breastfeeding duration, compared to no supplemental feeding (**Evidence Grade II=Fair**). See Figure 2 for the EAL conclusion statement.

The Baby-Friendly Hospital Initiative (BFHI) is a global program sponsored by WHO and UNICEF to encourage hospitals and birthing centers that offer an optimal level of care for lactation. There are 10 steps to becoming a "baby-friendly" facility and those that accomplish them are officially designated as such. The BFHI assists hospi-

tals in giving breastfeeding mothers information, confidence, and skills needed to successfully initiate and continue breastfeeding infants and gives special recognition to hospitals that follow "baby-friendly" pratices (100). A mother's perception of the hospital's compliance with the Ten Steps of the BFHI influences the rate of exclusive breastfeeding during the hospital stay. Mothers are more likely to exclusively breastfeed when they feel that the hospital is compliant with the BFHI (101). Having a written breastfeeding policy (Step 1) that is communicated to all staff improves breastfeeding rates 2 weeks after delivery (101). Training of perinatal and neonatal nurses and medical staff in breastfeeding guidance (Step 2) can have a significant influence on breastfeeding initiation, duration, and exclusivity as well as improving satisfaction with lactation support (102). Mothers who experience "baby-friendly" hospital practices are also more likely to continue breastfeeding beyond 6 weeks (103).

Hospital practices found to have a positive effect on breastfeeding duration include breastfeeding in the first hour after birth, feeding only breast milk in the hospital, infant rooming-in, providing a phone number for breastfeeding help after discharge, and not using a pacifier (103,104). Mothers who experience these hospital practices are less likely to wean due to difficulties establishing breastfeeding such as insufficient milk supply, an unsatisfied infant, and difficulties with latching (104). Mothers who breastfeed within 120 minutes of birth are 2.5 times more likely to be exclusively breastfeeding at 4 months than mothers who breastfeed for the first time at more than 120 minutes (105). Mothers who hold their infants skin to skin are more likely to initiate breastfeeding sooner after birth (105). In-hospital feeding of newborns can influence the modality of infant feeding at one month of age. Of the mothers who are exclusively breastfeeding in the hospital, 50.9% continue to exclusively breastfeed during the first month compared to 20.3% of women who partially breastfeed and 4.2% of mothers who do not breastfeed before hospital discharge (82). Mothers are more likely to fulfill their intention to exclusively breastfeed when the hospital staff does not supplement with formula and the mother is assisted with breastfeeding (103).

Formula Marketing

Formula company marketing is a common institutional practice in public health clinics, physician offices, and hospitals that reduces the rates of breastfeeding initiation, duration, and exclusivity. Marketing of formula is evident in the provision of formula company-produced infant feeding literature and free formula offers at prenatal care visits, free formula provided at hospital discharge, and when hospitals feed breastfed infants formula when it is not medically indicated (106). Concerned about the effects of formula marketing on breastfeeding rates, the New York City Department of Health and Mental Hygiene and its partners collaborated to change hospital and health professionals' practices and to educate professionals and the public that breastfeeding is the normative and accepted method of infant feeding (107).

Peer Counselors

Ongoing support is essential to assure breastfeeding success. Peer counselor programs are an effective strategy to improve breastfeeding rates among WIC participants and empower both the peer counselor and the client (108-113). Counselors are capable of identifying and discussing barriers to breastfeeding, recognizing situations that require referrals to a health professional, and are able to increase a woman's self-confidence in her ability to breastfeed. Proactive interactions are important as it is known that few mothers will call for help even when provided with a referral contact number upon discharge from the birth hospital (109). Counselors manage client's questions through telephone counseling and individual clinic visits, and many also visit clients in their homes. Fathers are also an important source of support for breastfeeding women. A "peer dad" program can offer fathers an opportunity to serve as role models and to share information and support with other new fathers. WIC sites where peer dads are available have increased breastfeeding initiation rates (114).

Maternal Employment

Even with sufficient family and community support, many women discontinue or reduce breastfeeding when they return to employment outside the home. Evidence suggests that return to employment does not necessarily reduce initiation of breastfeeding except for those mothers returning to work within the first 6 weeks after delivery (115,116). However, there is evidence to suggest that breastfeeding duration is significantly reduced when the mother returns to work in less than 12 weeks (117). It has been suggested that offering paid maternity leave may encourage more women to extend the duration of breastfeeding (115). Studies suggest that paid leave may result in more positive health outcomes for both mother and infant (118).

Paid maternity leave is not required by federal law in the United States, and industrialized nations with exemplary paid maternity coverage include: Norway, with 42 weeks at 100% of salary or 52 weeks at 80% of salary; France, with 16 weeks at 100% of salary; Germany, with 14 weeks at 100% of salary; Italy, with 5 months at 80% of salary; and Ireland, with 18 weeks at 70% of salary (119). The only law related to maternity leave in the United States is the Family and Medical Leave Act of 1993, and it provides 12 weeks of unpaid leave annually, allows for continued health insurance, and guarantees a return to the same, or an equivalent job (120). Five states (California, Hawaii, New Jersey, New York, and Rhode Island) and Puerto Rico have gone beyond the Family and Medical Leave Act and offer postpartum women temporary disability insurance. The insurance is funded by the employee, employer, or both and the weeks covered vary by state (121). The HHS offers guidelines for employers to create a supportive work environment for breastfeeding employees (23).

Four components have been shown to provide the greatest financial return for employer investments: privacy for milk expression, flexible breaks and work options, breastfeeding education, and support (121). The International Lactation Consultant Association recommends three strategies for protection of breastfeeding in the workplace. First, arrange-

ments should be considered to keep mother and infant together such as working from home, bringing the infant to the workplace and extended maternity leave. If that is not feasible then intermittent contact to allow for breastfeeding breaks by having the mother visit her child or having the child brought to the workplace will allow breastfeeding to continue while the mother is at work. If mother and infant must be separated, protection of breastfeeding can be provided by offering the mother adequate breaks and appropriate facilities to express and store her breast milk for later use while the child is at the child care provider (122). Legislation protecting the rights of breastfeeding mothers to breastfeed in public and in the workplace has been enacted in many states and is an important strategy to extend the duration of breastfeeding.

SPECIAL CONSIDERATIONS

The advantages of breastfeeding and the use of human milk are particularly salient for premature infants and low birth weight infants. If these infants are unable to feed directly at the breast, the mother's milk can be administered through various feeding routes (27). Human milk has also been successfully used with infants with cleft palate; cystic fibrosis (with pancreatic enzyme replacement); Down syndrome; congenital heart disease; and inborn errors of metabolism, especially phenylketonuria (with supplementation of low-phenylalanine formula) (27). In each of these situations, the major challenge remains the achievement and maintenance of an adequate milk supply. Health professionals should provide anticipatory support and be alert to early signs or symptoms of feeding difficulties so effective early intervention can be initiated. Mothers who desire to breastfeed and are unable to produce a sufficient milk supply can augment the milk the infant receives from the breast with the assistance of a supplemental feeding device, allowing them to experience the closeness of breastfeeding while providing adequate supplemental nutrition (123). Mothers may have concerns about the long-term effects of offering their preterm infants feedings by bottle on breastfeeding success. The EAL found insufficient evidence to make a conclusion about the effects of artificial nipple on the duration of breastfeeding among preterm infants. (**Evidence Grade II=Fair**). See Figure 2 for the EAL conclusion statement and grade.

Despite the many benefits of breastfeeding, there are some situations in which the infant should not be breastfed. These include an infant with galactosemia (4), and an infant whose mother uses illegal drugs (4), has active tuberculosis (4,124), is infected with the human immunodeficiency virus (HIV), has acquired immunodeficiency syndrome (AIDS), or other diseases where the immune system is compromised (4,124). In countries with high prevalence of HIV/AIDS, the infant mortality risks associated with not breastfeeding may outweigh the possible risks of acquiring HIV (125). Breastfeeding is not contraindicated when the mother has hepatitis, is febrile, has been exposed to low-level environmental agents, or is positive for cytomegalovirus (4). Women who smoke cigarettes or are exposed to cigarette smoke should attempt to quit and avoid smoke exposure, but for breastfeeding women with tobacco smoke exposure, breastfeeding is still the best and preferred feeding method (4).

A mother's physical and mental health status can affect her ability to successfully breastfeed her infant. Maternal obesity is linked to lower rates of breastfeeding initiation (126). Women with obesity who initiate lactation are less likely to maintain a full supply and are more likely to have infants with slower weight gain who require supplementation. Mothers with obesity face more breastfeeding challenges, yet are less likely to seek support (127). Depression in the early postpartum period has been shown to be linked to lower breastfeeding rates. The observation that depressed women who stop breastfeeding by 6 weeks have greater improvement in their symptoms than women who continue to breastfeed leads to speculation that unresolved nipple pain or soreness may be a factor in depression (127). Medical advances have improved the health outcomes of many pregnant women with chronic diseases. The key to successful breastfeeding for these women is appropriate choice of medications, treatments, and lactation support from the early prenatal to postpartum period (27).

Most prescribed and over-the-counter medications are safe for the breastfed infant and resources are available to assist in evaluating the safety of drug use in lactation (27,128). However, there are a few medications that are not compatible with breastfeeding. They include radioactive isotopes, antimetabolites, cancer chemotherapy agents, lithium, ergotamine, and a small number of other medications (4). Breastfeeding mothers should be encouraged to discuss any use of prescription drugs, over-the-counter drugs, and herbal medications with their primary care health professional. Although herbal products are widely used in the United States, data are lacking about the safety of their use during lactation.

With the exception of maternal chemical poisoning, human milk remains a safe feeding method for infants and young children. Contamination of breast milk with environmental pollutants is a concern when mothers have had specific exposure to heavy metals or insecticides (129,130). In situations where maternal exposure and probability of transfer in breast milk lipids are determined to be significant, analysis of milk is recommended with decisions regarding safety made from estimated average intake. Environmental contaminants get into human milk when mothers have had geographical, occupational, or accidental exposure. Dioxins produced during industrial processes, organochlorine pesticides, polybrominated diphenyl ethers and polychlorinated biphenyls are of greatest concern due to their long half-lives and bioaccumulative nature in human tissues of mothers and infants (129,131). Studies have shown that even when levels of environmental chemicals are high, beneficial effects of breastfeeding have been observed (131). Research shows that the greatest risk period for adverse effects from exposure is prenatally (132).

Breastfeeding mothers should be encouraged to reduce their exposure to known chemical contaminants. For example, women who may become pregnant, who are pregnant, or who are breastfeeding should reduce their exposure to methylmercury (133). Large bottom-dwelling fish are the

most common food source of methylmercury so the US Food and Drug Administration and the US Environmental Protection Agency recommend the following guidelines for eating fish: avoid shark, swordfish, mackerel, and tilefish; eat up to 12 oz of other kinds of fish every week with a maximum of 6 oz albacore tuna per week; and check local advisories about eating locally caught fish. If no advice is posted, limit intake of locally caught fish to 6 oz per week and consume no other fish in that same week (133).

ROLES AND RESPONSIBILITIES OF FOOD AND NUTRITION PROFESSIONALS REGARDING PROMOTING AND SUPPORTING BREASTFEEDING

As experts in food and nutrition throughout the life cycle, it is the responsibility of registered dietitians (RDs) and dietetic technicians, registered (DTRs) to promote and support breastfeeding for its short- and long-term health benefits for both mother and infants. ADA emphasizes the essential role of RDs and DTRs in promoting and supporting breastfeeding by providing up-to-date, practical information to pregnant and postpartum women, involving family and friends in breastfeeding education and counseling, advocating for the removal of institutional barriers to breastfeeding, collaborating with community organizations and others who promote and support breastfeeding, and advocating for policies that position breastfeeding as the norm for infant feeding. ADA recommends the following strategies to promote and support breastfeeding:

Counsel and Educate Pregnant and Postpartum Women

- Counsel clients enthusiastically about the benefits of breastfeeding, with emphasis that breastfeeding is more than a lifestyle choice.
- Recognize and respect that breastfeeding is an individual and personal decision. Effective educational strategies that strike a balance of support, respect, and education result in informed decisions about infant feeding.
- Discuss the challenges of breastfeeding and suggest ways to minimize or eliminate.
- Provide pregnant women and their families with practical information about breastfeeding that addresses their specific questions and concerns. A family-centered approach may help identify potential breastfeeding problems early and prevent unnecessary or premature weaning.
- Limit or discontinue the use of educational materials provided by formula companies, because they often contain subtle messages that may discourage breastfeeding.
- Target women who are less likely to breastfeed (eg, ethnic minority groups, low education, and adolescents) and counsel in a culturally relevant and sensitive manner.
- Identify women who are at risk for early cessation. The first 6 weeks are especially crucial. Predictors of early cessation include education level, working intentions, workplace support, social support, and previous breastfeeding experience (134).
- Encourage breastfeeding mothers with overweight and obesity to achieve a healthful weight. These women may have a lower prolactin response, which may result in decreased milk production and early cessation of breastfeeding (135).
- Refer new mothers to a woman-to-woman breastfeeding support group. Women who are members of these peer networks act as volunteer counselors and receive specific training on supporting and encouraging new mothers. Peer support may represent a cost-effective method to promote and support breastfeeding, especially where lactation consultants or professional breastfeeding support is not widely available.
- Encourage women who are returning to work or school to explore their options for continuing to breastfeed. Discuss on-site arrangements to pump and store milk safely for later use. For women who cannot pump on-site, discuss how to supplement breastfeeding with formula while apart and continuing to breastfeed when with their infant.
- Discuss appropriate weaning foods, and clean and safe feeding of breast milk substitutes when indicated.
- Provide appropriate and timely information on weaning. The decision to wean should be based on the desires and needs of each breastfeeding dyad. Ideally, weaning should be gradual and solid foods should be offered based on the age and developmental stage of the child. Evaluate client education materials and service delivery sites for product bias. Changes should be made to the counseling environment to clearly communicate that breastfeeding is the norm for infant feeding.

Involve Family and Friends

- Identify support networks as early in pregnancy as possible and develop programs and materials aimed at specific groups such as adolescent mothers, partners, and grandmothers.
- Include fathers in breastfeeding education and counseling sessions. Support from a woman's partner and her mother significantly increase her chances of breastfeeding and continuing to breastfeed. Fathers need to learn how to be part of a successful breastfeeding family and adolescents need to hear that breastfeeding strengthens the bond with their infants. Mothers and grandmothers of pregnant adolescent mothers should also be included if possible.
- Encourage women to identify and enlist help and support of women in their family or community who have previously breastfed successfully.
- Compile a list of resources to give to clients such as breast pump rentals, breastfeeding-friendly places in the community, and contact information for lactation consultants and breastfeeding support groups and agencies.

Enhance Professional Development

- Be familiar with and comply with all aspects of the International Code of Marketing of Breast-milk Substitutes in particular as it applies to health professionals (136).
- Participate in continuing education activities to keep up-to-date with the art and science of lactation. Intensive courses in lactation training and education are available through various organizations.
- Consider obtaining the professional

credential, International Board Certified Lactation Consultant, through the International Board of Lactation Consultant Examiners (137,138).
- Participate in continuing education programs that sharpen skills in counseling and brief motivational interviewing.
- Participate in continuing education programs on cultural competence. Cultural, ethnic, linguistic, and economic differences impact how individuals access and use health, education, and social services. These differences also present barriers to effective education and health care interventions (139,140). The low prevalence of breastfeeding among racial/ethnic minority groups demands ongoing training in cultural competence. Ask questions and invite dialogue to identify and understand the specific barriers for a group, then design or refine services and messages to address those barriers. Focusing on hands-on interventions, skill building and problem-solving can begin the process of social change.
- Conduct critical internal review of undergraduate and graduate dietetic training programs to ensure that lactation physiology, breastfeeding management, and cultural competence are incorporated into curriculums.

Initiate Institutional Change

- Encourage hospitals and birthing centers to adopt the "Ten Steps to Successful Breastfeeding" as outlined by UNICEF/WHO (100).
- Initiate and create institutional and organizational policies to reduce or eliminate institutional bias in hospitals and clinics for infant formula and incorporate appropriate lactation promotion and support policies in their place. Food and nutrition professionals must present the breastfed infant as the standard against which infants fed human milk substitutes are compared.
- Encourage public health agencies and health professionals to use the WHO reference standards for growth assessment of all infants and children.
- Promote the use of pasteurized donor milk from a milk bank for sick or preterm infants when mother's own milk is not available.
- Encourage lactating mothers to consider donating surplus milk to a milk bank.
- Advocate for hospitals and clinics to provide training for all health care staff, including physicians.
- Encourage hospitals to have lactation consultants available.
- Ensure that commercial infant formula and feeding products are not inadvertently being promoted through the display of formula company logos on lanyards, badge holders, pens, and note pads.
- Support the removal of discharge packs in hospitals provided by formula companies to breastfeeding mothers.
- Advocate for the use of nurse home-visitation programs that promote and support breastfeeding among low-income pregnant and postpartum women.

Collaborate with Others Who Promote Breastfeeding

- Participate in professional and volunteer activities with other health professionals and community-based agencies. Collaborative opportunities exist for ADA members to work with the International Lactation Consultant Association; La Leche League International; Nursing Mothers' Counsel; Healthy Mothers Healthy Babies coalitions; WIC; home visitation programs such as the Nurse-Family Partnership Program, the Community Health Workers Program, and the Healthy Families Program; the African American Breastfeeding Alliance; and breastfeeding task forces at all levels to promote and support breastfeeding.
- Work with other health professionals to recruit and train successful breastfeeding women to be members of woman-to-woman breastfeeding peer support groups.

Initiate and Support Breastfeeding Campaigns

- Work with pro-breastfeeding organizations to promote breastfeeding as the social norm.
- Support extending the reach of breastfeeding promotion campaigns to adolescent mothers, men, and grandmothers.
- Initiate and support campaigns that promote breastfeeding exclusivity for the first 6 months of life and continued breastfeeding beyond 6 months. Emphasize that breastfeeding is more than meeting the nutrition needs of young infants. It offers health, physical, and psychological benefits to infants that influence health outcomes later in life.
- Initiate campaigns that promote breastfeeding as part of a broader strategy to eliminate health disparities among vulnerable groups.
- Organize and participate in World Breastfeeding Week activities annually in the first week of August.

Advocate for Policy Change

- Support legislation to eliminate barriers to breastfeeding. More than half of the states have enacted legislation to address breastfeeding in public, on the job, and on jury duty (141).
- Advocate for other policy changes affecting a woman's ability to continue breastfeeding including longer family leave, paid family leave, facilities for child care and breastfeeding at the worksite or nearby in the community, paid nursing breaks, lactation rooms for milk expression, flexible work arrangements, breastfeeding support personnel/lactation consultation, and third party reimbursement for lactation consultation and management services.
- Encourage school boards to review their curriculums to ensure that breastfeeding is presented as the norm in texts, other resources, and classroom discussion at elementary and secondary schools. Volunteer to work with curriculum committees; science fair committees; and guest lecture in classes such as social studies, life management, and science.

Conduct Empirical Research

- Initiate or partner with researchers in the conduct of empirical research. Research is needed on topics such as breastfeeding older children, cultural

influences on infant feeding, milk banking, social marketing of breastfeeding, breastfeeding in the workplace, media portrayal of infant feeding, effectiveness of breastfeeding promotion programs, cost-effectiveness of breastfeeding, hospital/clinic use rates, oral health and breastfeeding, eliminating barriers to extended breastfeeding, and nutrient needs for women and children with special needs. In addition, research should be theory-based and have policy implications.

- Encourage all public and private funding sources to target breastfeeding as an important topic in grant funding.
- Develop and/or advocate for a consistent definition of breastfeeding in research studies to include frequency and duration of breastfeeding as well as timing of introduction of solid foods to improve the understanding of the benefits of exclusive breastfeeding.
- Submit applications for training grants to promote and support breastfeeding at the local level. These grants could focus on activities such as developing woman-to-woman breastfeeding network, providing stipends for women in the woman-to-woman network, developing culturally relevant breastfeeding materials, providing workshop training for health professionals, and establishing telephone hotlines.
- Support a national policy to track breastfeeding trends using nonproprietary data. Policies are also needed to centralize national infant and child morbidity and mortality data.

CONCLUSIONS

Human milk has many beneficial effects on the health of infants, especially premature and low birth weight infants and young children. These benefits are magnified with exclusive breastfeeding and breastfeeding beyond 6 months of age (7,12). Breastfeeding also provides several health benefits for the breastfeeding woman. ADA recognizes the various factors that influence women and their families to choose a particular infant feeding method, but ADA supports and advocates the position that breastfeeding is the optimal feeding method for the infant. RDs and DTRs have an important role in promoting and supporting breastfeeding for its short- and long-term health benefits for both mother and infants. RDs and DTRs also have an important role in conducting empirical research on breastfeeding-related topics. Research is especially needed on the effectiveness of breastfeeding promotion campaigns.

References

1. *Healthy People 2010* [conference edition]. Washington, DC: US Department of Health and Human Services; 2000.
2. *HHS Blueprint for Action on Breastfeeding*. Washington, DC: US Department of Health and Human Services, Office on Women's Health; 2000.
3. National Center for Education in Maternal and Child Health, eds. *Followup Report: The Surgeon General's Workshop on Breastfeeding and Human Lactation*. Rockville, MD: US Department of Health and Human Services, Division of Maternal and Child Health; 1985.
4. American Academy of Pediatrics. Breastfeeding and the use of human milk. *Pediatrics*. 2005;115:496-506.
5. National WIC Association. Breastfeeding promotion and support in the WIC program [position paper]. Washington, DC: National WIC Association; 2004.
6. A call to action on breastfeeding: A fundamental public health issue. American Public Health Association Web site. http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1360. Published November 6, 2007. Accessed July 29, 2008.
7. *Global Strategy for Infant and Young Child Feeding*. Geneva, Switzerland: World Health Organization; 2003.
8. *Community-Based Strategies for Breastfeeding Promotion and Support in Developing Countries*. Geneva, Switzerland: World Health Organization; 2003.
9. The optimal duration of exclusive breastfeeding: A systematic review World Health Organization Web site. http://www.who.int/nutrition/publications/optimal_duration_of_exc_bfeeding_review_eng.pdf. Published 2002. Accessed April 9, 2009.
10. Black RE, Morris SS, Bryce J. Child survival I: Where and why 10 million children die every year? *Lancet*. 2003;361:226-2234.
11. Jones G, Steketee R, Black R, Bhutta Z, Morris S, and the Bellagio Child Survival Study Group. Child survival II: How many child deaths can we prevent this year? *Lancet*. 2003;362:65-71.
12. Bellagio Child Survival Study Group. Child survival V: Knowledge into action for child survival. *Lancet*. 2003;362:323-327.
13. *WHO Child Growth Standards: Length/Height-For-Age, Weight-For-Age, Weight-For-Length, Weight-For-Height, and Body Mass Index-For-Age: Methods and Development*. Geneva, Switzerland: World Health Organization; 2006.
14. National Center for Health Statistics, Centers for Disease Control and Prevention. 2000 CDC growth charts: United States Centers for Disease Control and Prevention Web site. http://www.cdc.gov/growthcharts/clinical_charts.htm. Accessed August 28, 2009.
15. Abbot Nutrition Mother's Survey: Breastfeeding Trends 2003. Abbot Nutrition Web site. Web site. http://abbottnutrition.com/resources/en-US/news_and_media/media_center/BF_Trends_2003.pdf. Published 2003. Accessed January 10, 2009.
16. Breastfeeding practices: Results from the National Immunization Survey. Centers for Disease Control and Prevention Web site. http://www.cdc.gov/breastfeeding/data/NIS_data/index.htm. Accessed August 28, 2009.
17. Progress for children: A report card on nutrition. 2006; No 4. United Nations Children's Fund Web site. http://www.unicef.org/progressforchildren/2006n4/index_introduction.html. Published May 2006. Accessed January 10, 2009.
18. Wolf JH. Low breastfeeding rates and public health in the United States. *Am J Public Health*. 2003;93:2000-2010.
19. Ryan AS, Rush D, Krieger FW. Recent declines in breastfeeding in the United States, 1984 through 1989. *Pediatrics*. 1991;88:719-727.
20. Ryan, AS. The resurgence of breastfeeding in the United States. *Pediatrics*. 1997;99:E12. http://pediatrics.aappublications.org/cgi/content/full/99/4/e12%20. Accessed August 28, 2009.
21. US Department of Agriculture; Food and Nutrition Service. Loving Support Makes Breastfeeding Work Campaign. Food and Nutrition Service Web site. http://www.fns.usda.gov/wic/Breastfeeding/lovingsupport.htm. Accessed January 10, 2009.
22. US Breastfeeding Committee. *Breastfeeding in the United States: A National Agenda*. Rockville, MD: US Breastfeeding Committee; 2001.
23. US Department of Health and Human Services. The business case for breastfeeding: Steps to creating a breastfeeding-friendly worksite. Womenshealth.gov Web site. http://www.womenshealth.gov/breastfeeding/programs/business-case/. Accessed April 10, 2009.
24. US Department of Health and Human Services, Office of Public Health and Science. *Hp 2010* midcourse review. Healthypeople.gov Web site. http://www.healthypeople.gov/data/midcourse. Accessed April 20, 2009.
25. Weimer J. *The Economical Cost of Breastfeeding: A Review and An Analysis*. Washington, DC: Economic Research Service, US Department of Agriculture. ERS Food Assistance and Nutrition Research Report No. 13; 2001.
26. Riordan J. *Breastfeeding and Human Lactation*. Boston, MA: Jones and Bartlett; 2004:108-109.
27. Lawrence RA, Lawrence RM. *Breastfeeding: A Guide for the Medical Profession*. St Louis, MO: Mosby-Year Book; 2005:105-170.
28. Flanders Stepans MB, Wilhelm SL, Hertzog M, Callahan Rodehorst TK, Blaney S, Clemens B, Polak JJ III, Newburg DS. Early consumption of human milk oligosaccharides is inversely related to subsequent risk of respiratory and enteric disease in infants. *Breastfeed Med*. 2006;1:207-215.
29. Wagner CL, Greer FR, Section on Breastfeeding and Committee on Nutrition. Prevention of rickets and vitamin D deficiency

in infants, children, and adolescents. *Pediatrics*. 2008;122:1142-1152.
30. Kleinman RE, ed. *Pediatric Nutrition Handbook*. 6th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2008: 1046-1052.
31. Chen A, Rogan W. Breastfeeding and the risk of postneonatal death in the United States. *Pediatrics*. 2004;113:e435-e439.
32. Talayero JMP, Lizán-Garacia M, Puime AO, Muncharaz MJB, Soto BB, Sánchez-Palomares M, Serrano LS, Rivera LL. Full breastfeeding and hospitalization as a result of infections in the first year of life. *Pediatrics*. 2006;118:e92-e99.
33. Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J. *Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries. Evidence Report/Technology Assessment*. AHRQ Publication No. 07-E007. Rockville, MD: Agency for Healthcare Research and Quality; 2007.
34. Bener A, Hoffmann GF, Afify Z, Rasul K, Tewfik I. Does prolonged breastfeeding reduce the risk for childhood leukemia and lymphomas? *Minerva Pediatr*. 2008;60:155-161.
35. Palmer B. The influence of breastfeeding on the development of the oral cavity: A commentary. *J Hum Lact*. 1998;14:93-98.
36. Vennemann MM, Bajanowski T, Brinkmann B, Jorch G, Yücesan, Sauerlan C, Mitchell EA, the GeSID Study Group. Does breastfeeding reduce the risk of sudden infant death syndrome? *Pediatrics*. 2009;123: e406-e410.
37. Schanler R, Shulman R, and Lau C. Feeding strategies for premature infants: Beneficial outcomes of feeding fortified human milk vs preterm formula. *Pediatrics*. 1999; 103:1150-1157.
38. Sisk PM, Lovelady CA, Dillard RG, Gruber KJ, O'Shea TM. Early human milk feeding is associated with a lower risk of necrotizing enterocolitis in very low birth weight infants. *J Perinatal*. 2007;27:428-433.
39. Tully MR, Lockhart-Borman L, Updegrove K. Stories of success: The use of donor milk is increasing in North America. *J Hum Lact*. 2004;20:75-77.
40. Updegrove K. Necrotizing enterocolitis: The evidence for use of human milk in prevention and treatment. *J Hum Lact*. 2004; 20:335-339.
41. Tully D, Jones F, and Tully MR. Donor milk: What's in it and what's not. *J Hum Lact*. 2001;17:152-155.
42. Horta BL, Bahl R, Martines JC, Victora CG. Evidence on the long-term effects of breastfeeding. Systematic reviews and meta-analyses. http://whqlibdoc.who.int/publications/2007/9789241595230_eng.pdf. Accessed August 28, 2009.
43. Owen CG, Martin RM, Whincup PH, Smith GD, Cook DG. Effect of infant feeding on the risk of obesity across the life course: A quantitative review of published evidence. *Pediatrics*. 2005;115:1367-1377.
44. Arenz S, Ruckerl R, Koletzko B, von Kries R. Breastfeeding and childhood obesity: A systematic review. *Int J Obes Relat Metab Disord*. 2004;28:1247-1256.
45. Karaolis-Danckert N, Buyken AE, Kulig M, Kroke A, Forster J, Kamin W, Schuster A, Hornberg C, Keil T, Bergmann RL, Wahn U, Lau S. How pre- and postnatal factors modify the effect of rapid weight gain in infancy and early childhood on subsequent fat mass development: Results from the Multicenter Allergy Study 90. *Am J Clin Nutr*. 2008;87:1356-1364.
46. Owen CG, Martin RM, Whincup PH, Smith GD, Cook DG. Does breastfeeding influence risk of type 2 diabetes in later life? A quantitative analysis of published evidence. *Am J Clin Nutr*. 2006;84:1043-1054.
47. Lucas A, Morley R, Cole TJ, Lister G, Leeson-Payne C. Breast milk and subsequent intelligence quotient in children born preterm. *Lancet*. 1992;339:261-264.
48. Strathearn L, Mamun A, Najman JM, O'Callahan MJ. Does breastfeeding protect against substantiated child abuse and neglect? A 15-year cohort study. *Pediatrics*. 2009;123:483-493.
49. Steyn NP, Mann J, Bennet PH, Temple N, Zimmet P, Tuomilehto J, Lindstrom J, Louheranta A. Diet, nutrition and the prevention of type 2 diabetes. *Public Health Nutr*. 2004;7:147-167.
50. Dewey KG, Cohen RJ, Brown KH, and Rivera LL. Effects of exclusive breastfeeding for 4 vs 6 months on maternal nutritional status and infant motor development: Results of two randomized trials in Honduras. *J Nutr*. 2001;131:262-267.
51. Family Health International. Consensus statement. Breastfeeding as a family planning method. *Lancet*. 1998;ii:1204-1205.
52. Kennedy KI, Vissness CM. Contraceptive efficacy of lactational amenorrhoea. *Lancet* 1992;339:227-230.
53. Labbok MH, Perez A, Valdes V, Sevilla F, Wade K, Laukaran VH, Cooney KA, Coly S, Sanders C, Queenan JT. The lactational amenorrhea method (LAM): A postpartum introductory family planning method with policy and program implications. *Adv Contracept*. 1994;10:93-109.
54. Van der Wijden C, Brown J, Kleijnen J. Lactational amenorrhea for family planning. *Cochrane Database System Rev*. 2008; 3:CD001329.
55. Peterson AE, Perez-Escamilla R, Labbok M, Hight V, von Hertzen H, Van Look P. Multicenter study of lactational amenorrhea method (LAM) III: Effectiveness, duration and satisfaction with reduced client-provider contact. *Contraception*. 2000;62: 221-230.
56. Collaborative Group on Hormonal Factors in Breast Cancer. Breast cancer and breastfeeding: Collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries, including 50,302 women with breast cancer and 96,973 women without the disease. *Lancet*. 2002; 360:187-195.
57. Zheng T, Holford TR, Mayne ST, Owens PH, Zhang Y, Zhang B, Boyle P, Zahm SH. Lactation and breast cancer risk: A case-control study in Connecticut. *Br J Cancer*. 2001;84:1472-1476.
58. Trggvadóttir L, Tulinius J, Jórunn EE, Sigurvinsson T. Breastfeeding and reduced risk of breast cancer in an Icelandic cohort study. *Am J Epidemiol*. 2001;154:37-42.
59. Tung KH, Wilkens LR, Wu AH, McDuffie K, Nomura AMY, Kolonel LN, Terada KY, Goodman MT. Effect of anovulation factors on pre-and postmenopausal ovarian cancer risk: Revisiting the incessant ovulation hypothesis. *Am J Epidemiol*. 2005;161:321-329.
60. Yang L, Jacobsen K. A systematic review of the association between breastfeeding and breast cancer. *J Women's Health*. 2008;17: 1635-1645.
61. Huo D, Lauderdale DS, Liming L. Influence of reproductive factors in hip fracture risk in Chinese women. *Osteoporos Int*. 2003;14: 694-700.
62. Chantry CJ, Auinger P, Byrd RS. Lactation among adolescent mothers and subsequent bone mineral density. *Arch Pediatr Adolesc Med*. 2004;158:650-656.
63. Pikwer M, Bergström U, MNilsson J-Å, Jacobsson L, Berglund G, Turesson C. Breastfeeding, but not oral contraceptives, is associated with a reduced risk of rheumatoid arthritis. *Ann Rheum Dis*. 2009;68:526-530.
64. Dewey KG. Impact of breastfeeding on maternal nutritional status. *Adv Exp Med Biol*. 2004;554:91-100.
65. Kac G, Benicio M, Velasquez-Melendez G, Valente J, Struchiner CJ. Breastfeeding and postpartum weight retention in a cohort of Brazilian women. *Am J Clin Nutr*. 2004;79:487-493.
66. Rooney BL, Schauberger CW. Excess weight gain and long-term obesity: One decade later. *Obstet Gynecol*. 2002;100:245-252.
67. Olson CM, Strawderman MS, Hinton PS, Pearson TA. Gestational weight gain and postpartum behaviors associated with weight change from early pregnancy to 1 y postpartum. *Int J Obes*. 2003;27:117-127.
68. Hatsu IE, McDougald DM, Anderson AK. Effect of infant feeding on maternal body composition. *Int Breastfeed J*. 2008;3:18.
69. Sichieri R, Field AE, Rich-Edwards J, Willett WC. Prospective assessment of exclusive breastfeeding in relation to weight change in women. *Int J Obes Relat Metab Disord*. 2003;27:815-820.
70. Coitinho DC, Sichieri R, D'Aquino BMH. Obesity and weight change related to parity and breast-feeding among parous women in Brazil. *Public Health Nutr*. 2001; 4:865-870.
71. Doan T, Gardiner A, Gay C, Lee K. Breastfeeding increases sleep duration of new parents. *J Perinat Neonatal Nurs*. 2007;21: 200-206.
72. Jonas W, Nissen E, Ransjö-Arvidon, Wiklund I, Henriksson P, Uvnas-Moberg K. Short- and long-term decrease of blood pressure in women during breastfeeding. *Breastfeed Med*. 2008;3:103-109.
73. Dennis CL, McQueen K. The relationship between infant-feeding outcome and postpartum depression: A qualitative systematic review. *Pediatrics*. 2009;123:e736-e751.
74. Weimer J. The economic benefits of breastfeeding: A review and analysis. US Department of Agriculutre Economic Research Service Web site. http://www.ers.usda.gov/publications/fanrr13/fanrr13.pdf. Accessed April 20, 2009.
75. Montgomery DL, Splett PL. The economic benefit of breast-feeding infants in the WIC program. *J Am Diet Assoc*. 1997;97:379-385.
76. Splett PL, Montgomery DL. *The Economic Benefits of Breastfeeding an Infant in the WIC Program: Twelve Month Follow-up Study*. Final Report submitted to USDA Food and Consumer Service. 1998.
77. US Department of Agriculture, Food and Nutrition Service. Special Supplemental Nutri-

tion Program for Women, Infants and Children (WIC): Revisions in the WIC food packages; interim rule. Food and Nutrition Service Web site. http://www.fns.usda.gov/WIC/regspublished/wicfoodpkginterimrulepdf.pdf. Published December 6, 2007. Accessed May 22, 2009.
78. Ball T, Bennett D. The economic impact of breastfeeding. *Ped Clin North Am*. 2001;48:253-262.
79. Cohen R, Mrtek MB, Mrtek RG. Comparison of maternal absenteeism and infant illness rates among breastfeeding and formula-feeding women in two corporations. *Am J Health Promot*. 1995;10:148-153.
80. Brodribb W, Fallon AB, Hegney D, O'Brien M. Identifying predictors of the reasons women give for choosing to breastfeed. *J Hum Lact*. 2007;23:338-344.
81. McCann MF, Baydar N, Williams RL. Breastfeeding attitudes and reported problems in a national sample of WIC participants. *J Hum Lact*. 2007;23:314-324.
82. Hurley KM, Black MM, Papas MA, Quigg AM. Variation in breastfeeding behaviors, perceptions, and experiences by race/ethnicity among a low-income statewide sample of Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participants in the United States. *Maternal Child Nutr*. 2008;4:95-105.
83. Li R, Fein SB, Chen J, Grummer-Strawn LM. Why mothers stop breastfeeding: Mother's self-reported reasons for stopping during the first year. *Pediatrics*. 2008;122(suppl):S69-S76.
84. McInnes RJ, Chambers JA. Supporting breastfeeding mothers: Qualitative synthesis. *Adv Nurs*. 2008;62:407-427.
85. Amir LH, Cwikel J. Why do women stop breastfeeding? *Breastfeed Rev*. 2005;13:7-13.
86. Spear H. Breastfeeding behaviors and experiences of adolescent mothers. *MCN Am J Matern Child Nurs*. 2006;31:106-113.
87. Holmes AV, Chin NP, Kaczorowski J, Howard C. A barrier to exclusive breastfeeding for WIC enrollees: Limited use of exclusive breastfeeding food package for mothers. *Breastfeeding Med*. 2009;4:25-30.
88. Petrova A, Hegyi T, Mehta R. Maternal race/ethnicity and one-month exclusive breastfeeding in association with the in-hospital feeding modality. *Breastfeed Med*. 2007;2:92-98.
89. Heinig MJ, Follett JR, Ishii KD, Kavanagh-Prochaska K, Cohen R, Panchula J. Barriers to compliance with infant-feeding recommendations among low-income women. *J Hum Lact*. 2006;22:27-33.
90. Clifford TJ, Campbell MK, Speechley KN, Gorodzinsky F. Factors influencing full breastfeeding in a southwestern Ontario community: Assessments at 1 week and at 6 months postpartum. *J Hum Lact*. 2006;22:292-304.
91. Gijsbers B, Mesters I, Knottnerus JA, Van Schayck CP. Factors associated with the initiation of breastfeeding in asthmatic families: The Attitude-Social Influence-Self-Efficacy Model. *Breastfeed Med*. 2006;1:236-246.
92. Rivero-Lugo M, Parrilla-Rodriguez AM, Davila-Torres RR, Albizu-Garcia C, Rios-Motta R. Full breastfeeding during the postpartum hospitalization and mothers' report regarding Baby-Friendly practices. *Breastfeed Med*. 2007;2:19-26.
93. Walsh A, Moseley J, Jackson W. The effects of an infant-feeding classroom activity on the breast-feeding knowledge and intentions of adolescents. *J Sch Nurs*. 2008;24:164-169.
94. Bonuck K, Freeman K, Trombley M. Country of origin and race/ethnicity: Impact on breastfeeding intentions. *J Hum Lact*. 2005;21:320-326.
95. Anderson A, Damio G, Chapman D, Perézz-Escamilla R. Differential response to an exclusive breastfeeding peer counseling intervention: the role of ethnicity. *J Hum Lact*. 2007;23:16-23.
96. Bunik M, Clark L, Marquiz Zimmer L, Jiminez LM, O'Connor ME, Crane LA, Kempe A. Early infant feeding decisions in low-income Latinas. *Breastfeed Med*. 2006;1:225-235.
97. Centers for Disease Control and Prevention. Breastfeeding-related maternity practices at hospitals and birth centers—United States, 2007. *MMWR Morbid Mortal Wkly Rep*. 2008;57:621-625.
98. Castrucci BC, Hoover KL, Lim S, Maus KC. A comparison of breastfeeding rates in an urban birth cohort among women delivering infants at hospital that employ and do not employ lactation consultants. *J Public Health Manag Pract*. 2006;12:578-585.
99. Connor NR, Tanabe KO, Siadaty MS, Hauch FR. Pacifiers and breastfeeding. *Arch Pediatr Adolesc Med*. 2009;163:378-382.
100. Protecting, promoting, and supporting breastfeeding: The special role of maternity services—A joint WHO/UNICEF statement. World Health Organization Web site. http://www.who.int/nutrition/publications/infantfeeding/9241561300/en/print.html. Accessed August 28, 2009.
101. Rosenberg KD, Stull JD, Adler MR, Kasehagen LJ, Crivelli-Kovach A. Impact of hospital policies on breastfeeding outcomes. *Breastfeed Med*. 2008;3:110-116.
102. Shinwell ES, Churgin Y, Shlomo M, Shani M, Flidel-Rimon O. The effect of training nursery staff in breastfeeding guidance on the duration of breastfeeding in healthy term infants. *Breastfeed Med*. 2006;1:247-252.
103. DiGirolamo AM, Grummer-Strawn LM, Fein SB. Effect of maternity-care practices on breastfeeding. *Pediatrics*. 2008;122(suppl):S43-S49.
104. Murray EK, Ricketts S, Dellaport J. Hospital practices that increase breastfeeding duration: Results from a population-based study. *Birth*. 2007;34:202-211.
105. Nakao Y, Moji K, Honda S, Oishi K. Initiation of breastfeeding within 120 minutes after birth is associated with breastfeeding at 4 months among Japanese women: A self-administered questionnaire survey. *Int Breastfeed J*. 2008;3:1.
106. Breastfeeding: Some strategies used to market infant formula may discourage breastfeeding; state contracts should better protect against misuse of WIC name. US Government Accountability Office Web site. http://www.gao.gov/new.items/d06282.pdf. Accessed April 20, 2009.
107. Kaplan DL, Graff KM. Marketing breastfeeding—Reversing corporate influence on infant feeding practices. *J Urban Health*. 2008;85:486-504.
108. Bronner Y, Barber T, Miele L. Breastfeeding peer counseling: Rationale for the National WIC survey. *J Hum Lact*. 2001;17:135-141.
109. Martens P. Increasing breastfeeding initiation and duration at a community level: An evaluation of Sagkeeng First Nation's Community Health Nurse and peer counselor programs. *J Hum Lact*. 2002;18:236-246.
110. Meier E, Olson BH, Benton P, Eghtedary K, Song WO. A qualitative evaluation of a breastfeeding peer counselor program. *J Hum Lact*. 2007;23:262-268.
111. Bronner Y, Barber T, Davis S. Breastfeeding peer counseling: policy implications. *J Hum Lact*. 2001;17:105-109.
112. Bronner Y, Barber T, Vogelhut J, Kovar Resnick A. Breastfeeding peer counseling: Results from the National WIC Survey. *J Hum Lact*. 2001;17:119-125.
113. Merewood A, Philipp B. Peer counselors for breastfeeding mothers in the hospital setting: Trials, training, tributes, and tribulations. *J Hum Lact*. 2003;19:72-76.
114. Stremler J, Lovera D. Insights from a breastfeeding peer support pilot program for husbands and fathers of Texas WIC participants. *J Hum Lact*. 2004;20:417-422.
115. Calnen G. Paid maternity leave and its impact on breastfeeding in the United States: An historic, economic, political, and social perspective. *Breastfeed Med*. 2007;2:34-44.
116. Berger L, Hill J, Waldfogel J. Maternity leave, early maternal employment and child health and development in the US. *Econ J*. 2005;2:F29-F47.
117. Guendelman S, Kosa JL, Pearl M, Graham S, Goodman J, Kharrazi M. Juggling work and breastfeeding: Effects of maternity leave and occupational characteristics. *Pediatrics*. 2009;123:e38-e46.
118. McGovern P, Dowd B, Gjerdingen D, Moscovice I, Kochevar L, Murphy, S. The determinants of time off work after childbirth. *J Health Politics Policy Law*. 2000;25: 528-564.
119. United Nations Statistics Division: Demographic and Social Statistics, Table 5c—Maternity leave benefits. United Nations Web site. http://unstats.un.org/unsd/demographic/products/indwm/ww2005/tab5c.htm. Accessed April 20, 2009.
120. Family and medical leave act. Department of Labor Web site. http://www.dol.gov/esa/whd/fmla/. Accessed April 8, 2009.
121. Lovell V, Rahmanou H. Paid family and medical leave: Essential support for working women and men. Washington, DC: Institute for Women's Policy Research; 2000.
122. International Lactation Consultant Association position paper on breastfeeding and work [monograph]. International Lactation Consultant Association Web site. http://www.ilca.org/files/resources/ilca_publications/BreasfeedingandWorkPP.pdf. Accessed July 15, 2009.
123. Borucki L. Breastfeeding mothers' experiences using a supplemental feeding tube device: Finding an alternative. *J Hum Lact*. 2005;21:429-438.
124. Shealy KR, Li R, Benton-Davis S, Grummer-Strawn LM. The CDC guide to breastfeeding interventions. Centers for Disease Control and Prevention Web site. http://www.cdc.gov/breastfeeding/pdf/breastfeeding_interventions.pdf. Accessed April 19, 2009.
125. American Academy of Pediatrics, Committee on Pediatric AIDS. Human milk,

breastfeeding, and transmission of human immunodeficiency virus in the United States. *Pediatrics*. 1995;96:977-979.
126. Mok E, Multon C, Piguel L, Barroso E, Goua V, Christin P, Perez MJ, Hankard R. Decreased full breastfeeding, altered practices, perceptions, and infant weight change of prepregnant obese women: A need for extra support. *Pediatrics*. 2008; 121:e1319-e1324.
127. Hatton DC, Harrison-Hohner J, Coste S, Dorato V, Curet LB, McCarron DA. Symptoms of postpartum depression and breastfeeding. *J Hum Lact*. 2005;21:444-449.
128. Hale T. *Medications and Mothers' Milk*. Amarillo, TX: Pharmasoft Medical Publishing; 2004.
129. Schecter A, Pavuk M, Päpke O, Ryan JJ, Birnbaum L, Rosen R. Polybrominated diphenyl ethers (PBDEs) in US mother's milk. *Environ Health Perspect*. 2003;111: 1723-1729.
130. Etzel RA, Balk S, eds. *Pediatric Environmental Health*. Elk Grove Village, IL: American Academy of Pediatrics; 2003.
131. LaKind JS, Berlin C, Mattison D. The heart of the matter on breast milk and environmental chemicals: Essential points for healthcare providers and new parents. *Breastfeeding Med*. 2008;3:251-259.
132. Przyrembel H, Heinrich-Hirsch B, Vieth B. Exposition to the health effects of residues in human milk. In: Koletzko B, Michaelsen KF, Nernell O, eds. *Short and Long Term Effects of Breastfeeding on Child Health*. New York, NY: Kluwer Academic/Plenum Publishers; 2000; 478:307-325.
133. Backgrounder for the 2004 FDA/EPA consumer advisory: What you need to know about mercury in fish and shellfish. US Food and Drug Administration Web site. http://www.fda.gov/oc/opacom/hottopics/mercury/backgrounder.html. Accessed April 20, 2009.
134. Kronborg H, Vaeth M. The influence of psychosocial factors on the duration of breastfeeding. *Scan J Pub Health*. 2004;32:210-216.
135. Rasmussen K, Kjolhede CL. Prepregnant overweight and obesity diminish the prolactin response to suckling in the first week postpartum. *Pediatrics*. 2004;113;465-471.
136. International code of marketing breast milk substitutes. International Baby Food Action Network Web site. http://www.ibfan.org/site2005/Pages/article.php?art_id=52&iui=1. Accessed April 26, 2009.
137. Certification information. International Board of Lactation Consultant Examiners Web site. http://www.iblce.org. Accessed August 19, 2008.
138. Diamond L. Lactation consulting: Is it for you? *J Am Diet Assoc*. 1997;97:591-592.
139. US Department of Health and Human Services, Office of Minority Health. Assuring cultural competence in health care: Recommendations for national standards and an outcomes-focused research agenda. Office of Minority Health Web site. http://www.omhrc.gov/clas/cultural1a.htm. Accessed April 22, 2009.
140. Getting started . . . and moving on . . . planning, implementing, and evaluating cultural and linguistic competence for comprehensive mental health services for children and families: Implications for systems of care. National Center for Cultural Competence Web site. http://gucchd.georgetown.edu/nccc/documents/Getting_Started_SAMHSA.pdf. Accessed May 20, 2009.
141. 50 state summary of breastfeeding laws. National Conference of State Legislatures Web site. http://www.ncsl.org/programs/health/breast50.htm. Updated April 2009. Accessed April 27, 2009.

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We thank the reviewers for their many constructive comments and suggestions. The reviewers were not asked to endorse this position or the supporting paper.